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WESTERN AUSTRALIA

**NorthLinkWA**

Perth-Darwin National Highway

# Final Public Environment Report

Perth–Darwin National Highway (Swan Valley Section)

FEBRUARY 2016 | PART B: RESPONSE TO SUBMISSIONS







Australian Government

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# Response to Submissions

Perth-Darwin National Highway (Swan Valley Section)

FEBRUARY 2016





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- C Assessment & Refinement of Potential Critical Habitat for *Caladenia Huegelii* (T-DRF) within the Development Envelope
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- K EPBC Act Offset Assessment Guide – Forest Red-tailed Black Cockatoo
- L EPBC Act Offset Assessment Guide – SCP20a
- M Technical Advice on Fauna Issues

## Document Control

Revision	Date	Description	Prepared	Reviewed	Approved
A	4/12/2015	Draft for Main Roads review (Coffey v1)	Coffey	B. Napier	B. Napier
B	6/12/2015	Final for Main Roads review (Coffey v2)	Coffey	B. Napier	B. Napier
0	7/12/2015	Final for submission to Office of Environmental Protection Authority (Coffey v3)	Coffey	B. Napier	B. Napier
1	23/02/2016	Revised for Main Roads review following OEPA and DOTE comment (Coffey v4)	Coffey	B. Napier	B. Napier
2	25/02/2016	Final for Main Roads review (Coffey v5)	Coffey	B. Napier	B. Napier
3	29/02/2016	Final for submission to OEPA (Coffey v6)	Coffey	B. Napier	B. Napier

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# 1 INTRODUCTION

## 1.1 Background

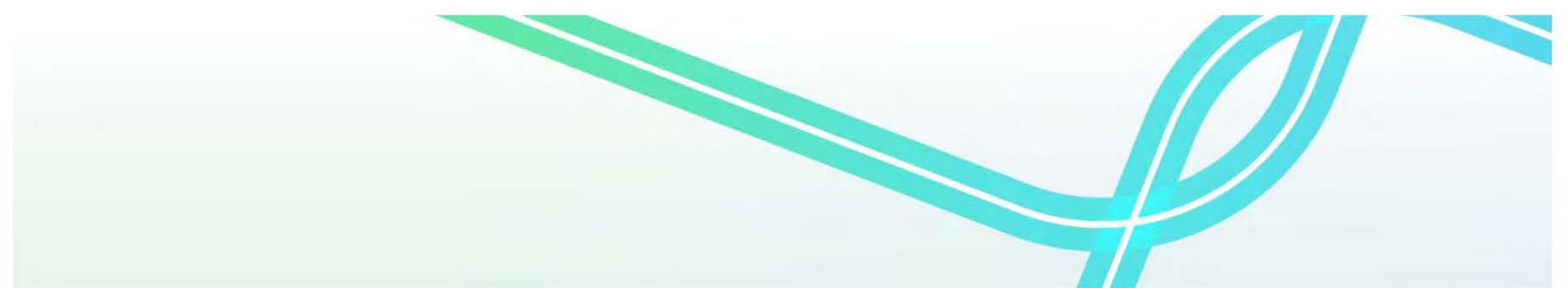
Main Roads Western Australia (MRWA) proposes to construct a new section of the Perth–Darwin National Highway (Swan Valley Section) between Malaga and Muchea, in the Swan Valley in Western Australia (the proposal).

A Public Environmental Review (PER) under the *Environmental Protection Act 1986* (EP Act) was prepared for the proposal (Coffey, 2015a). The PER also satisfies the requirement for a draft Public Environment Report under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for potential impacts on Matters of National Environmental Significance (MNES). The draft Public Environment Report and this Response to Submissions document together form the final Public Environment Report for the proposal under the EPBC Act.

The PER was exhibited for public review for four weeks from 7 September 2015 to 6 October 2015. Eighteen submissions were received on the PER. Table 1.1 lists the submissions received.

**Table 1.1 List of submissions on the PER received by Office of the Environment Protection Authority**

Submission number	Submitter	OEPA reference
1	Private individual	ANON-FD3J-U7K7-N
2	Bullsbrook Residents and Ratepayers Association	ANON-FD3J-U7K8-P
3	Private individual	ANON-FD3J-U7KB-Z
4	Maralla Land Syndicate Pty Ltd	ANON-FD3J-U7KD-2
5	Department of Lands	ANON-FD3J-U7KE-3
6	Wildflower Society of Western Australia Inc.	ANON-FD3J-U7KG-5
7	Department of Water	ANON-FD3J-U7KH-6
8	Private individual	ANON-FD3J-U7KM-B
9	Private individual	ANON-FD3J-U7KS-H
10	Private individual	ANON-FD3J-U7KT-J
11	Department of Aboriginal Affairs	DAA
12	Private individual	ANON-FD3J-U7KV-M
13	Private individual	ANON-FD3J-U7KW-N
14	Department of Planning	DOP
15	Department of Parks and Wildlife	DPAW
16	Private individual	ANON-FD3J-U7KZ-R
17	Department of Environment Regulation	DER
18	Office of the Environmental Protection Authority	OEPA



The Office of the Environmental Protection Authority (OEPA) provided copies of all submissions to MRWA. Issues raised in submissions made by non-government organisations, private individuals and the development group were summarised by the OEPA in its submission on the 23 October 2015 (Appendix A, OEPA Summary). The OEPA redacted personal details prior to making submissions available to MRWA.

The OEPA subsequently provided additional comments and advice on this Response to Submissions document on the 2 February 2016 (Appendix A, OEPA Summary).

## **1.2 Purpose of This Document**

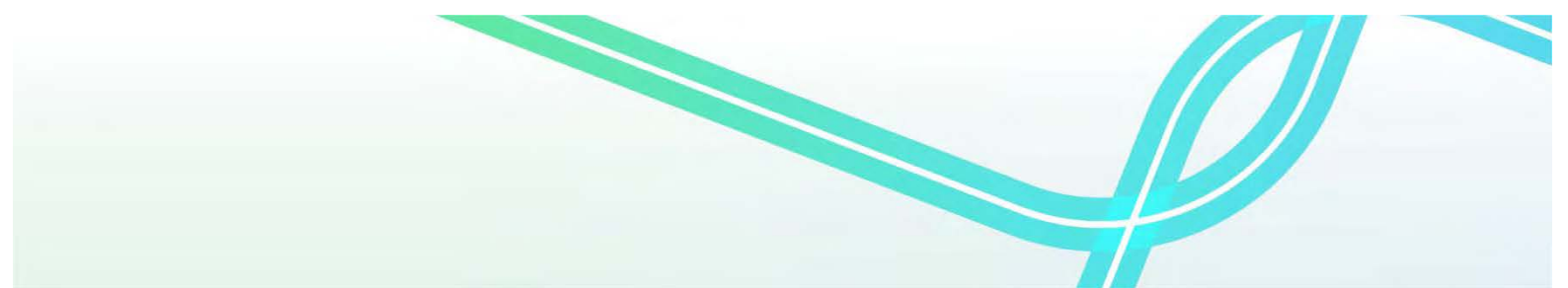
This document sets out MRWA's responses to issues raised in submissions. This document also provides MRWA with an opportunity to:

- Address any errors and/or omissions identified in the PER by submissions.
- Present additional information and/or technical reports collected since the PER and used in the preparation of MRWA's responses to submissions.
- Modify aspects of the proposal in response to submissions received.
- Amend environmental commitments and/or include additional environmental commitments in response to submissions received.

## **1.3 Response Method and Framework**

All submissions were entered into a database and analysed to identify the underlying issues. Similar issues were grouped together to form a single consolidated issue. A single response has been developed for each consolidated issue. Consolidated issues and responses are categorised into one of the following categories, which follow the chapter structure of the PER:

- Proposal background and justification.
- Route selection development.
- Detailed description of proposal.
- Regulatory context.
- Stakeholder consultation.
- Environmental Impact Assessment (EIA) framework.
- Terrestrial flora and vegetation.
- Terrestrial fauna.
- Hydrological processes and inland waters environmental quality.
- Amenity (noise and vibration).
- Rehabilitation and decommissioning.
- Aboriginal and European heritage.
- Amenity (reserves).
- Matters Protected Under the EPBC Act.
- Offsets.
- Other (i.e. any issues raised that did not fit directly under a chapter of the PER).



Responses are provided for each consolidated issue, taking into consideration each of the contributing issues raised in the submissions. Where a consolidated issue comprises only one contributing issue, the consolidated issue and contributing issue are conflated and presented as one.

The OEPA requested MRWA respond to issues raised in its submission, issues raised in submissions by Western Australian Government agencies and its summary of non-government issues. This document addresses submissions in a structure consistent with OEPA's request. Responses are provided in the following order:

- OEPA submission.
- Department of Parks and Wildlife (DPAW) submission.
- Department of Water (DOW) submission.
- Department of Environment Regulation (DER) submission.
- Other Government agency submissions:
  - Department of Aboriginal Affairs (DAA).
  - Department of Lands (DOL).
  - Department of Planning (DOP).
- Public submissions.

If two or more submitters have raised the same issue, the consolidated issue may appear in two or more sections of this document.

Individual submitters may use Appendix B, Index to Submission Issues to locate where issues raised by their submissions have been responded to in this document.

The Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP Lakes Policy) was revoked on 20 November 2015, which was after the public review period ended. References to lakes formerly protected by the EPP Lakes Policy have been retained for consistency.



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## 2 PROPOSAL UPDATE

### 2.1 Changes to the Development Envelope

The PER was submitted for public review on 4 September 2015. Following submission of the PER a number of changes were made to the development envelope boundary described in the PER. The majority of additional areas were required to facilitate connections between the proposal and other roads (both the highway and the Principal Shared Path (PSP)). Other areas were required to enable removal of redundant road infrastructure and associated rehabilitation (i.e., sections of Old Beechboro Road North). In the majority of these cases, these additional amendments are minor in scale, situated within previously disturbed environments and/or the proposed works do not require clearing and so do not result in a significant change to the environmental values impacted. The additional areas required are described in Table 2.1.

### 2.2 Changes to the Proposal Footprint

As discussed in Table 2.1, only one of the changes to the development envelope (addition of 0.1 ha along Reid Highway, west of the proposed interchange) will require clearing. The proposal footprint has been amended to include this additional 0.1 ha of disturbance, but has not increased the total proposal footprint considered in the PER (746 ha), due to this number having been rounded up to the nearest hectare.

The other amendments to the development envelope have not been included in the proposal footprint as no clearing is required in these areas.

**Table 2.1 Changes to proposal development envelope**

Location	Change in development envelope	Relative impact as a result of change
Belstead Avenue (Addition 1, Figure 2.1A)	An additional area of 0.1 ha within existing road reserve is required to facilitate a connection between the PSP along the highway and the local road network, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Lightning Park (Addition 2, Figure 2.1A)	An area of 0.1 ha is required to facilitate a connection between the PSP along the highway and the existing shared path that borders the southern boundary of Lightning Park, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment and (Lightning Park). No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Lightning Park (Addition 3, Figure 2.1A)	An additional area of 0.1 ha is required to facilitate a connection between the PSP along the highway and the Lightning Park sporting facilities in the north of the Park, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment (Lightning Park). No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Reid Highway, west of the proposed interchange (Addition 4, Figure 2.1B)	An additional area of 0.1 ha within the existing road reserve is necessary to bridge the gap between this proposal and the area covered by existing approvals for the Malaga Drive Interchange Upgrade project. This land is required to facilitate the construction of the Reid Highway additional traffic lanes and the provision of a continuous PSP along Reid Highway. Other infrastructure to be constructed in this area includes lighting, fencing and road safety barriers.	<p>This amendment will result in the additional removal of less than 0.1 ha of:</p> <ul style="list-style-type: none"> <li>• Vegetation association Et<sup>1</sup>, Eucalyptus sparse mid woodland (see PER Figure 8.2A), which is mapped as in very good condition (see PER Figure 8.6A)</li> <li>• Moderate value Black Cockatoo foraging or roosting habitat (see PER Figure 9.2A).</li> <li>• Bush Forever Site 307.</li> </ul> <p>There will be no impact to priority or threatened ecological communities or conservation significant flora (see PER Figure 8.1A and 8.4A); potential Black Cockatoo breeding trees (see PER Figure 9.2A) or geomorphic wetlands (PER Figure 10.2A).</p>

Location	Change in development envelope	Relative impact as a result of change
Victoria Road (Addition 5, Figure 2.1C)	An additional area of 0.3 ha within existing road reserve is required to facilitate a connection between the PSP along the highway and the local road network, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Northwest of Conifer Place (Addition 6, Figure 2.1D)	An additional area of 0.1 ha is required to facilitate a connection between the PSP along the highway and the local road network and the existing pedestrian facilities within the reserve, this land will facilitate improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Yerilla Glen (Addition 7, Figure 2.1E)	An additional area of 0.1 ha within the existing road reserve is required to facilitate a connection between the PSP along the highway and the local road network, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Hamelin Drive and Premier Place intersection (Addition 8, Figure 2.1E)	An additional area of 0.1 ha within the existing road reserve is required to facilitate a connection between the PSP along the highway and the local road network, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Beechboro Road North (Southeast of the Hepburn Avenue Interchange) (Addition 9, Figure 2.1F)	An additional area of 2.7 ha within the existing road reserve is required to facilitate the removal of redundant road infrastructure and associated rehabilitation.	No clearing of native vegetation is proposed. Rehabilitation of the old road alignment will provide positive environmental outcomes.  This area will be rehabilitated in accordance with the revegetation strategy discussed in PER Chapter 12, Rehabilitation and Decommissioning and will be supported by a detailed revegetation plan.
Northeast quadrant of the Hepburn Avenue interchange (Addition 10, Figure 2.1F)	An additional area of 0.2 ha is required to facilitate improved connectivity between the regional road network and Beechboro Road North. This land will facilitate a more direct connection and reduce the risk of traffic congestion at the proposed interchange.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.

Location	Change in development envelope	Relative impact as a result of change
Baal Street and Beechboro Road North intersection (Addition 11, Figure 2.1G)	An additional area of 0.2 ha is required to ensure the development envelope includes the existing Baal Street. This land is directly over the existing road servicing the Cullacabardee community.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Beechboro Road North (south of intersection with Gngangara Road) (Addition 12, Figure 2.1H)	An additional area of 4.1 ha within the existing road reserve is required to facilitate the removal of redundant road infrastructure and associated rehabilitation.	No clearing of native vegetation is proposed. Rehabilitation of the old road alignment will provide positive environmental outcomes.  This area will be rehabilitated in accordance with the revegetation strategy discussed in PER Chapter 12, Rehabilitation and Decommissioning and will be supported by a detailed revegetation plan.
Beechboro Road North (between the proposal and Jules Steiner Memorial Drive) (Addition 13, Figure 2.1H)	An additional area of 2.6 ha within the existing road reserve is required to facilitate the removal of redundant road infrastructure and associated rehabilitation.	No clearing of native vegetation is proposed. Rehabilitation of the old road alignment will provide positive environmental outcomes.  This area will be rehabilitated in accordance with the revegetation strategy discussed in PER Chapter 12, Rehabilitation and Decommissioning and will be supported by a detailed revegetation plan.
To the south of the interchange west of Ellenbrook (Addition 14, Figure 2.1I)	An additional area of 0.1 ha within the existing road reserve is required to accommodate the tie in with Drumpellier Drive.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Interchange west of Ellenbrook (Addition 15, Figure 2.1I)	An area of 0.2 ha within the existing road reserve is required to facilitate the removal of redundant road infrastructure and associated rehabilitation.	No clearing of native vegetation is proposed. Rehabilitation of the old road alignment will provide positive environmental outcomes.  This area will be rehabilitated in accordance with the revegetation strategy discussed in PER Chapter 12, Rehabilitation and Decommissioning and will be supported by a detailed revegetation plan.

Location	Change in development envelope	Relative impact as a result of change
Gaskell Avenue, Rocla access (Addition 16, Figure 2.1J)	An additional area of 0.1 ha within the existing road reserve is required to accommodate the tie in to Gaskell Avenue.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Mitre Bend, Ellenbrook (Addition 17, Figure 2.1K)	An area of 0.1 ha within the existing road reserve is required to facilitate a connection between the PSP along the highway and the local road network, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.
Warrego Outlook, Ellenbrook (Addition 18, Figure 2.1K)	An area of 0.1 ha within the existing road reserve is required to facilitate a connection between the PSP along the highway and the local road network, to provide improved connectivity for pedestrians and cyclists.	This additional area is within a previously disturbed environment. No clearing of native vegetation is proposed and so increasing the size of the development envelope at this location will not result in an increase in the impact the proposal may have on the environment.

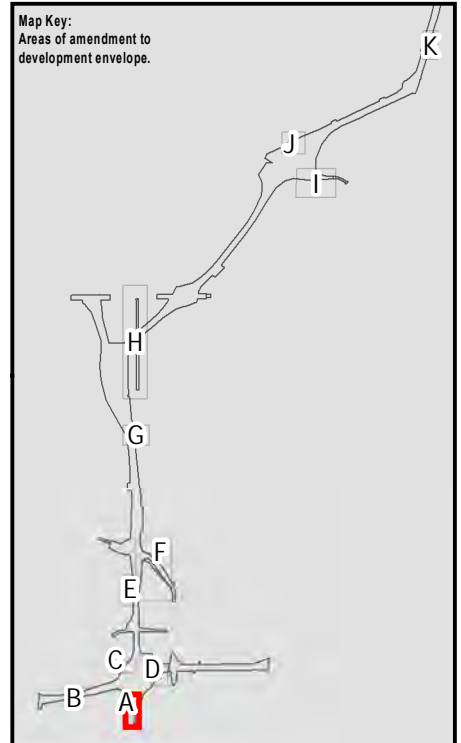
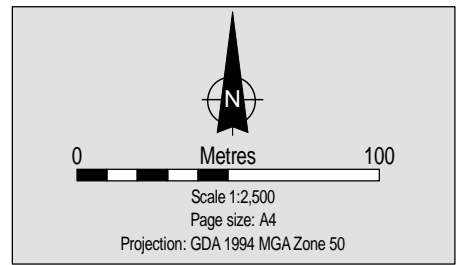
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Source & Notes  
Aerial imagery from Landgate (August 2014)

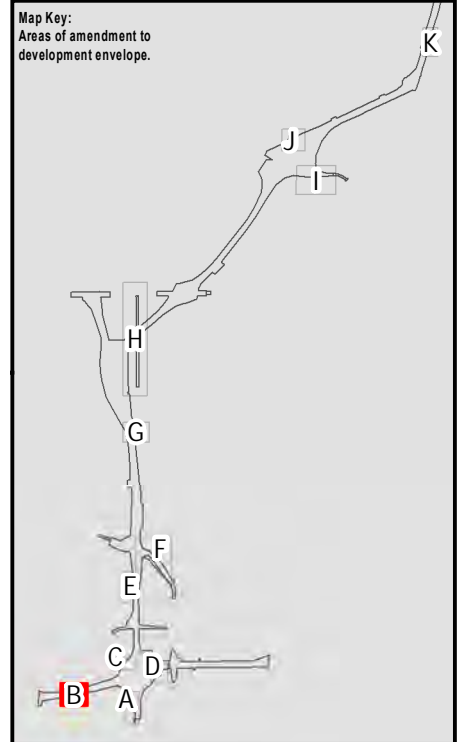
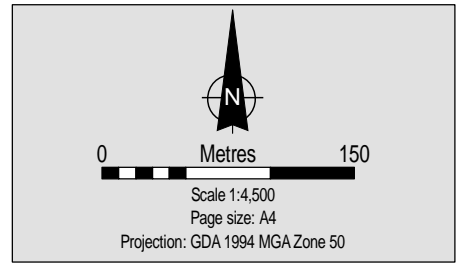
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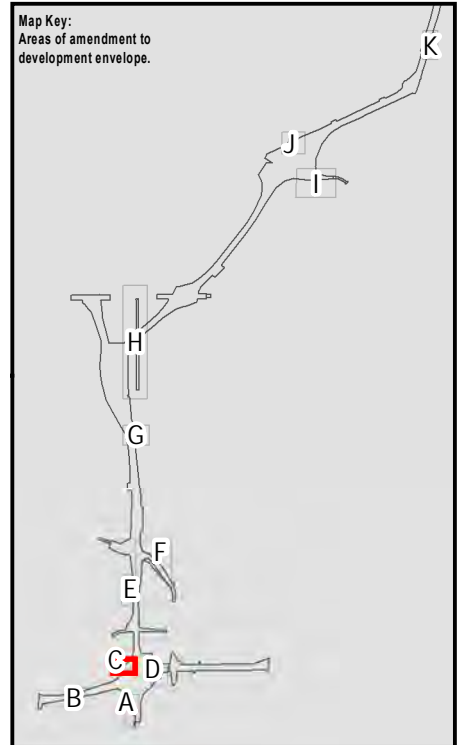
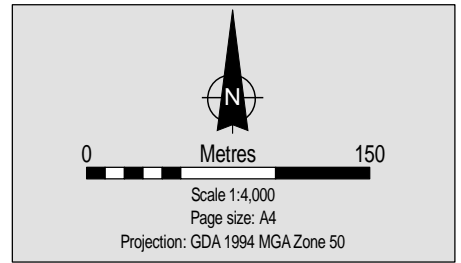
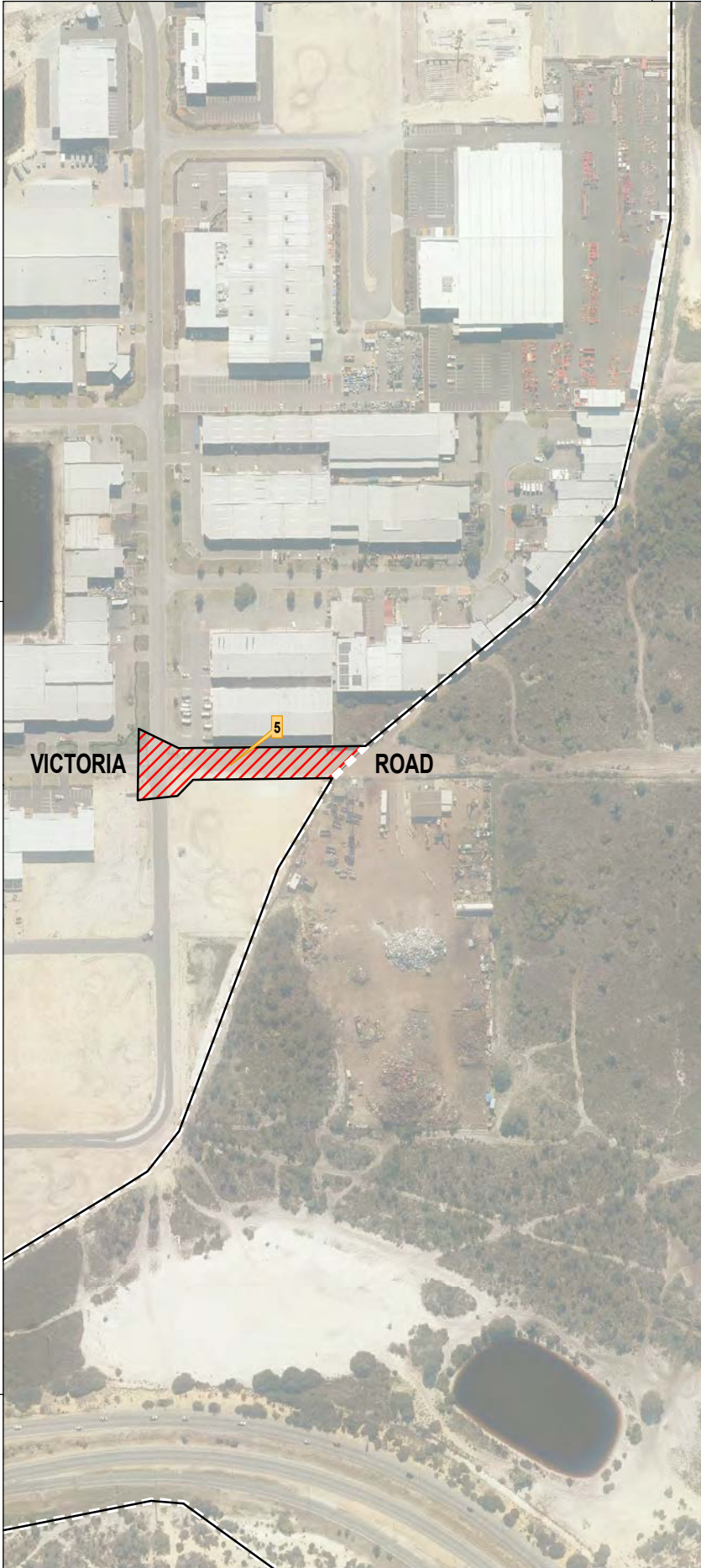
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Source & Notes  
Aerial imagery from Landgate (August 2014)

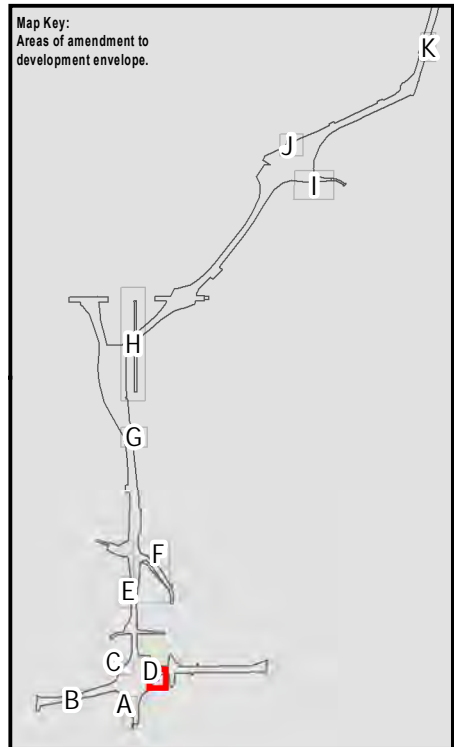
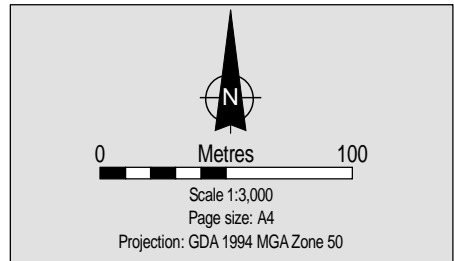
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Source & Notes  
Aerial imagery from Landgate (August 2014)

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Source & Notes  
Aerial imagery from Landgate (August 2014)

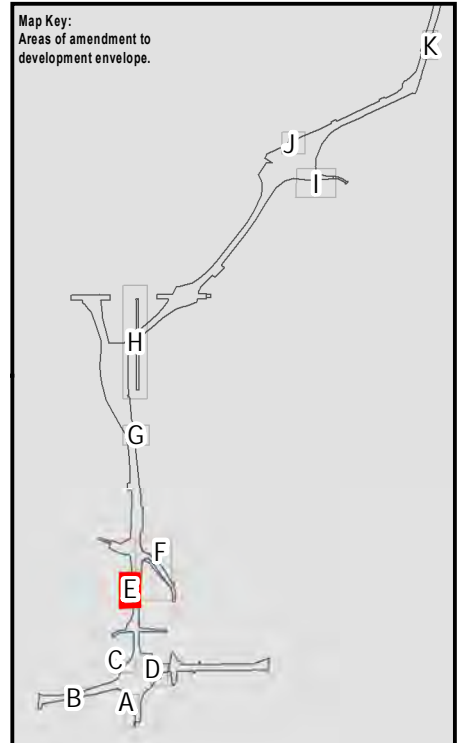
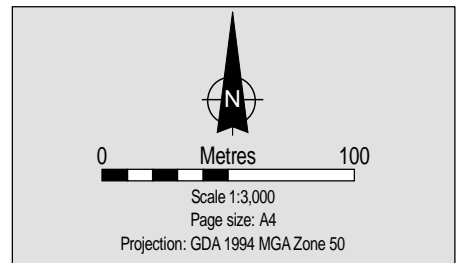
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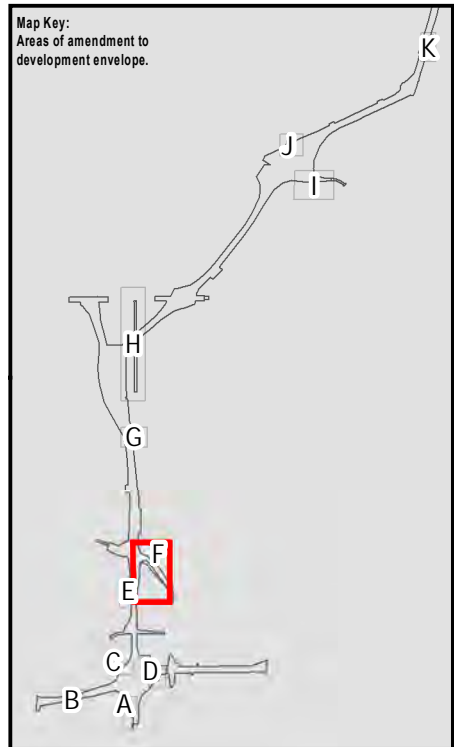
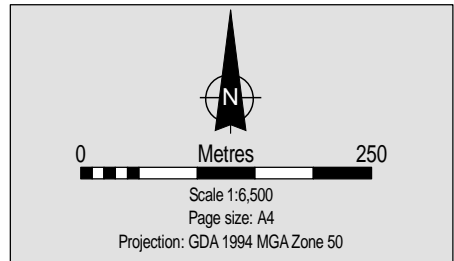
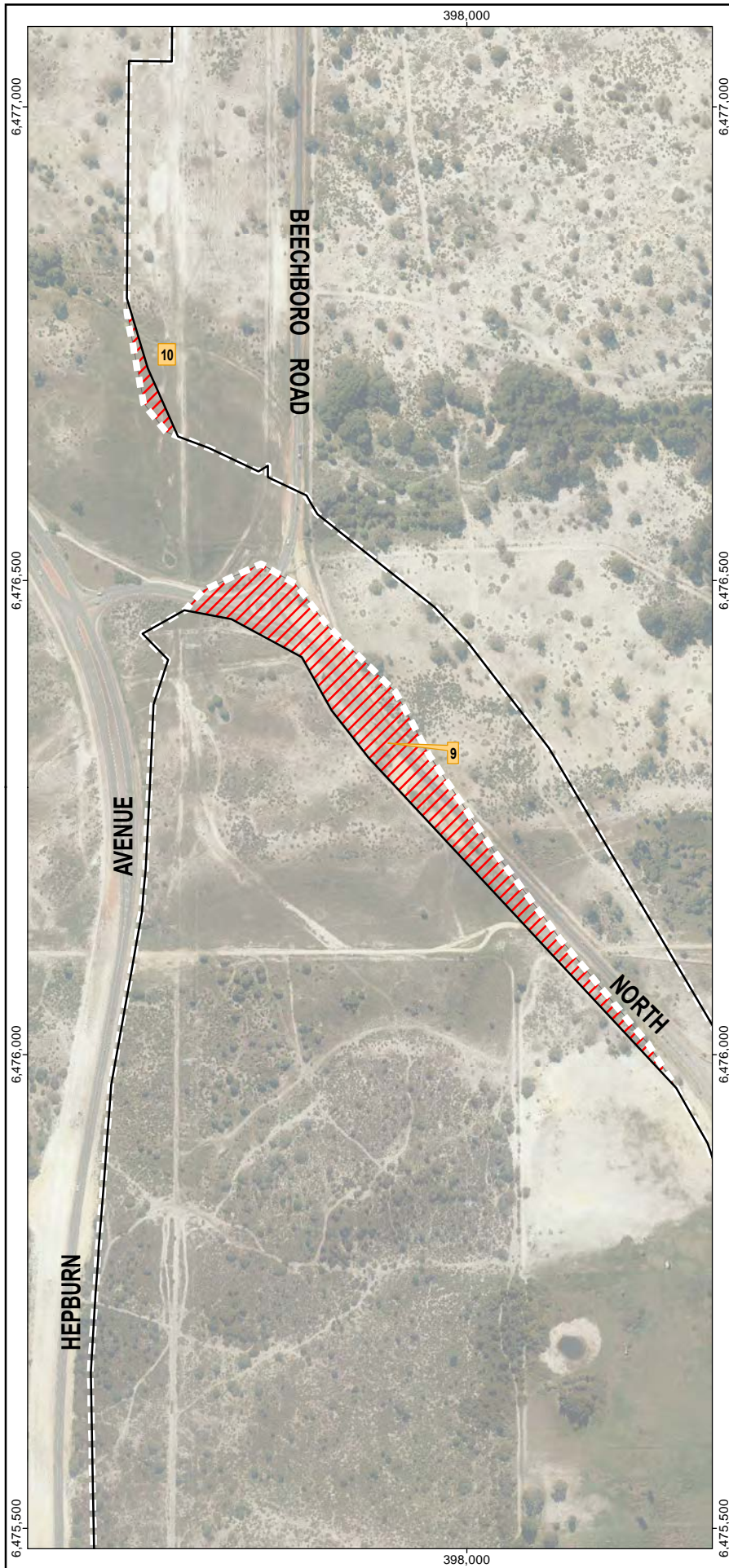
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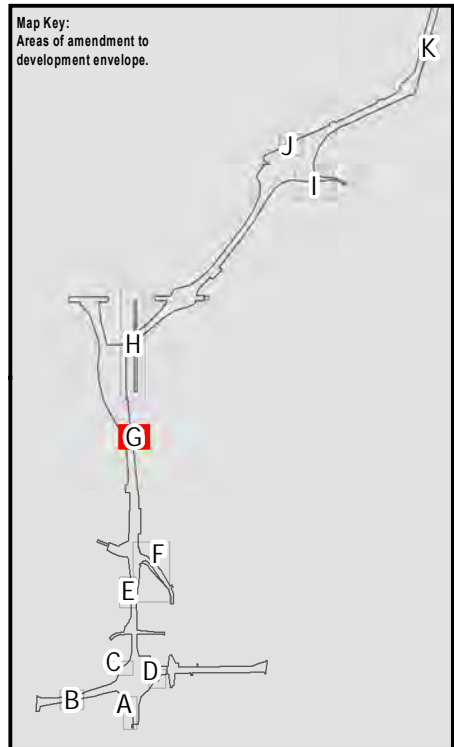
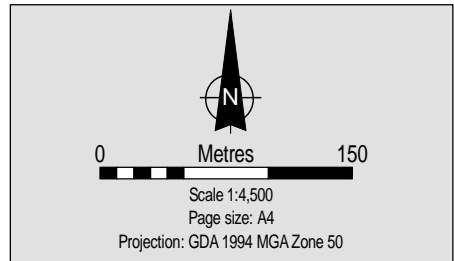
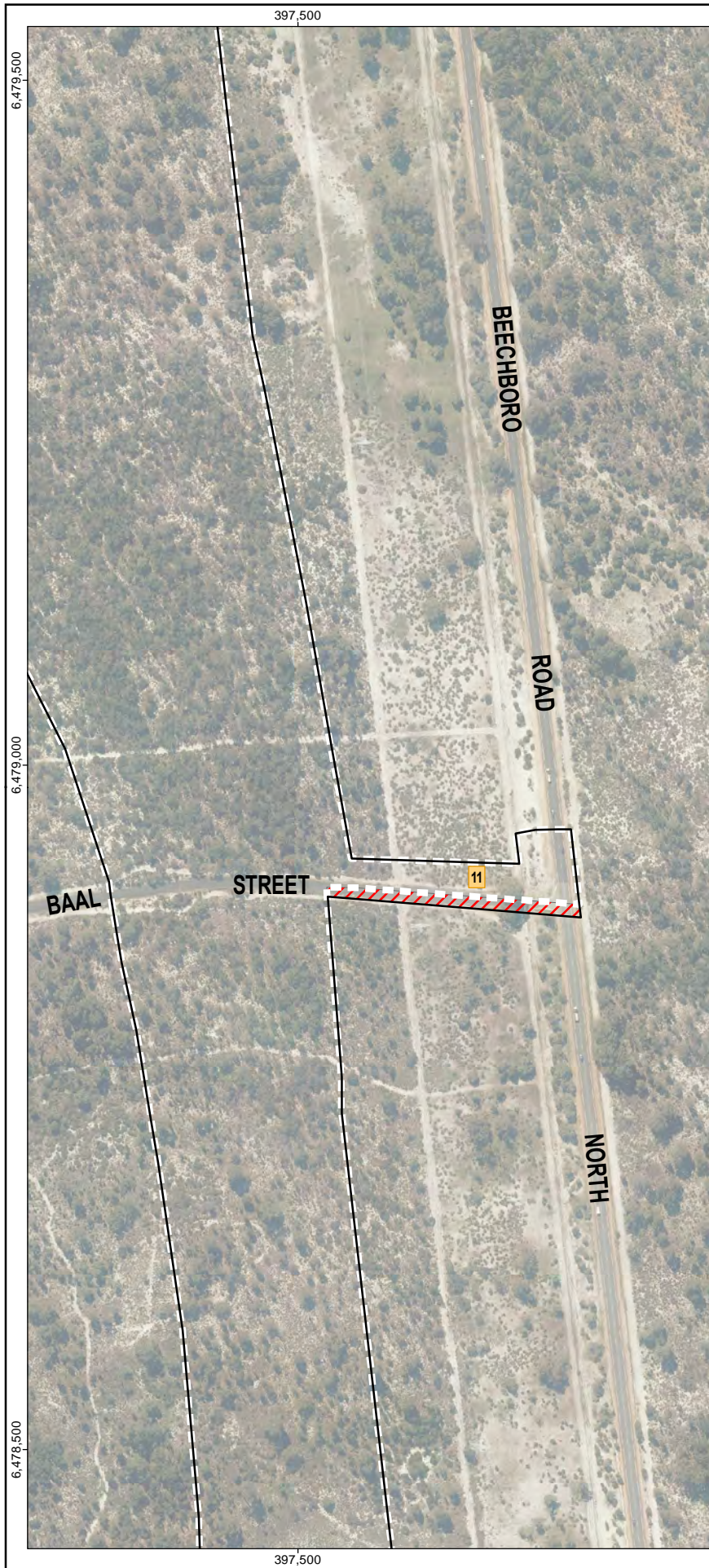
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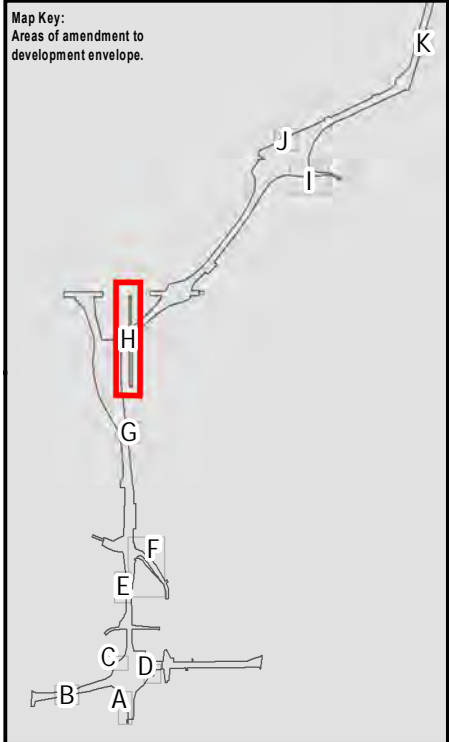
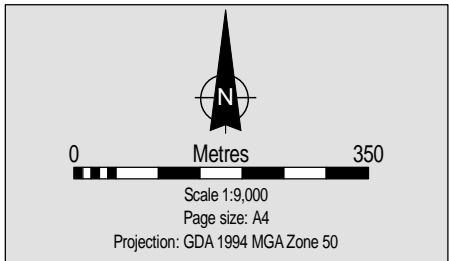
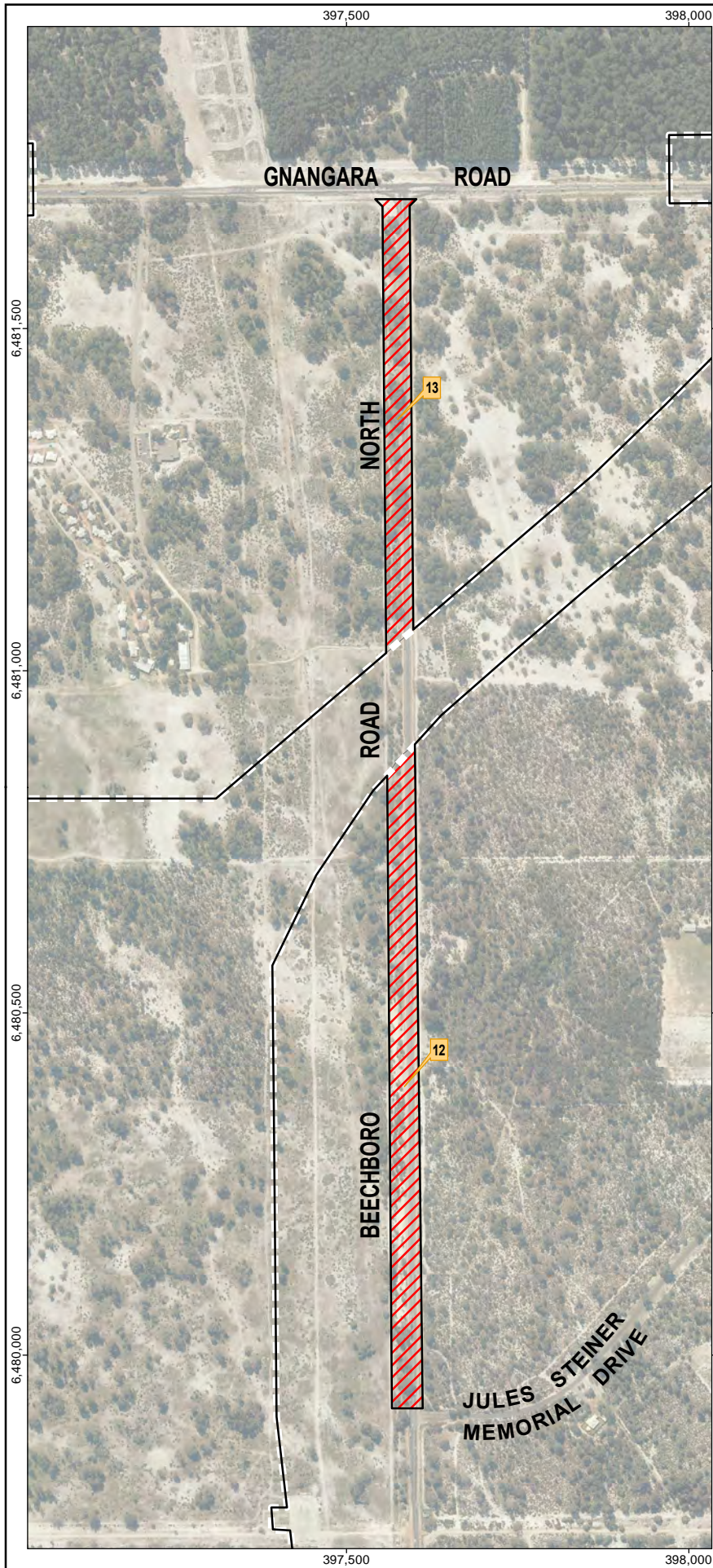
Source & Notes  
Aerial imagery from Landgate (August 2014)



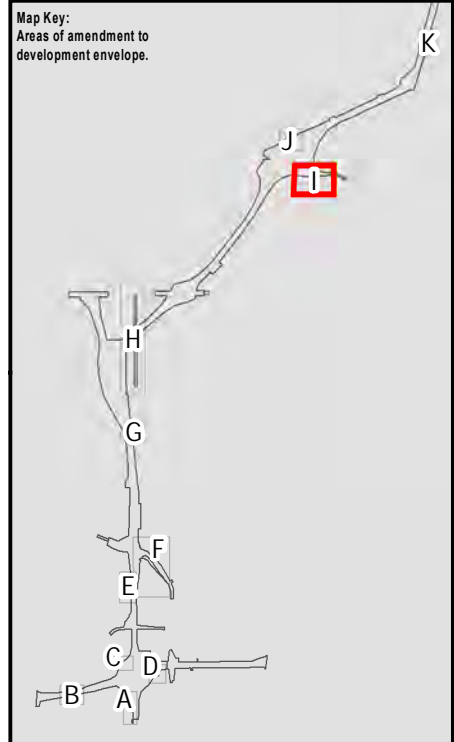
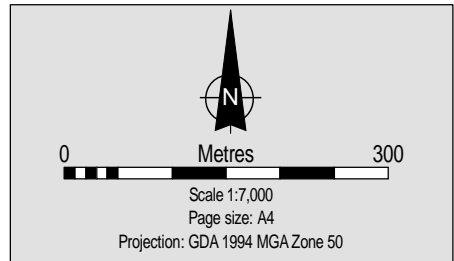
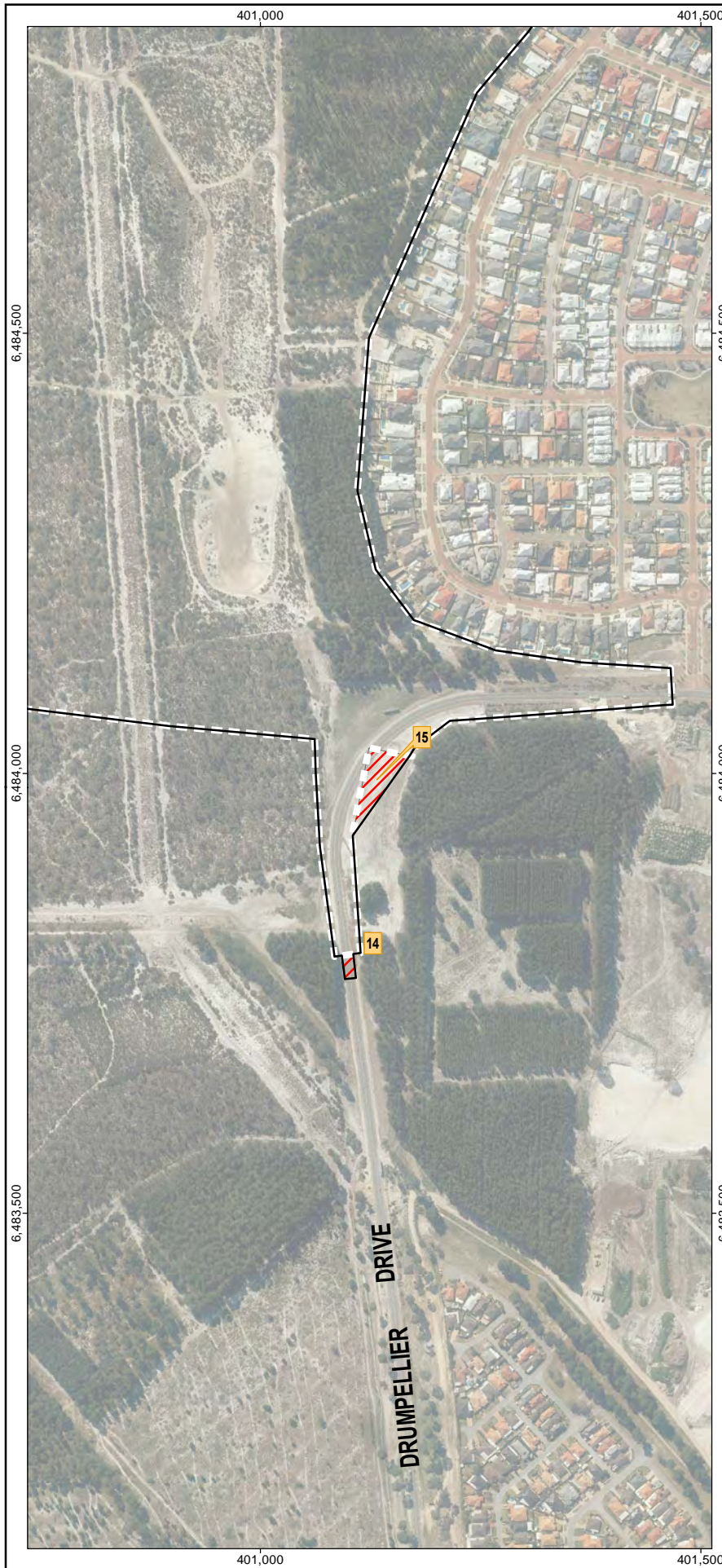
Source & Notes  
Aerial imagery from Landgate (August 2014)



Source & Notes  
Aerial imagery from Landgate (August 2014)



Source & Notes  
Aerial imagery from Landgate (August 2014)



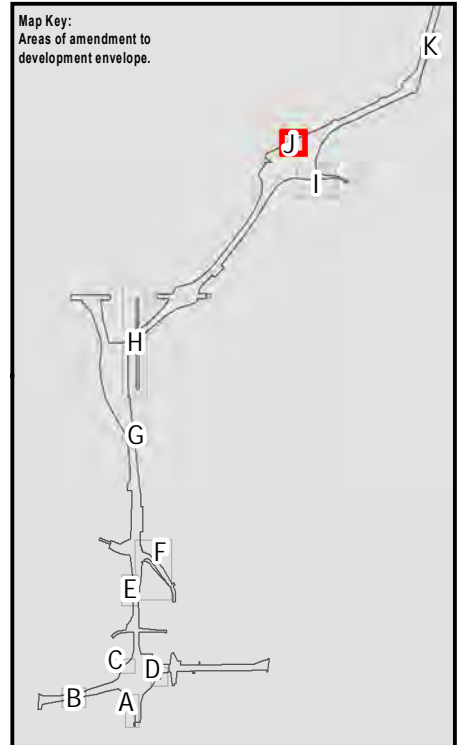
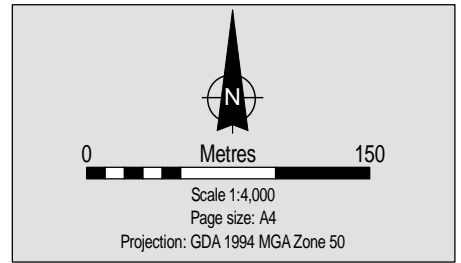
Source & Notes  
Aerial imagery from Landgate (August 2014)

400,500

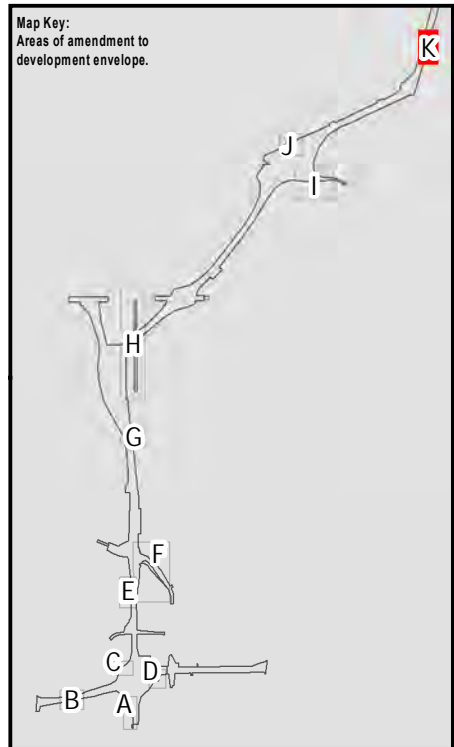
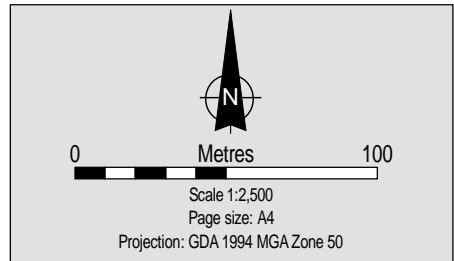
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Source & Notes  
Aerial imagery from Landgate (August 2014)



Source & Notes  
Aerial imagery from Landgate (August 2014)



## 2.3 Updated Key Proposal Characteristics

In light of the changes discussed in Section 2.1 and 2.2, the key characteristics of the proposal presented in PER Chapter 1, Introduction, Table 1.2 have been revised and are included in Table 2.2.

**Table 2.2 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 (GNH) and Brand Highway in the north.
Development envelope	985 ha
Proposal footprint	Disturbance for construction purposes to be no more than 746 ha.
Noise walls	<ul style="list-style-type: none"> <li>Noise walls will be constructed only as required in the development envelope south of Maralla Road, either adjacent to property boundaries or adjacent to the road carriageways.</li> <li>The height of noise walls will be capped at 5 m and confirmed in the detailed infrastructure plan.</li> </ul>
Area of native vegetation cleared	No more than 206 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 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.



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## 3 SPRING ECOLOGICAL SURVEYS

This chapter summarises the results of additional work that has been completed since the publication of the PER in September 2015.

### 3.1 Additional Targeted Surveys for *Caladenia huegelii* Critical Habitat

A targeted field survey to confirm the extent of critical habitat for *Caladenia huegelii* was undertaken on 18 September 2015 by suitably qualified and experienced botanists (Woodman Environmental, 2015a) (Appendix C, Assessment & Refinement of Potential Critical Habitat for *Caladenia huegelii* (T-DRF) within the Development Envelope).

The field survey targeted potential areas of critical habitat within the study area west of Ellenbrook. The survey was conducted during the peak flowering period for *Caladenia huegelii*. The area of potential critical habitat originally mapped in the study area west of Ellenbrook (PER Appendix C, Level 2 Spring Flora and Vegetation Assessment) was revised and reduced by 42.8 ha from 184.6 ha to 141.4 ha. The extent of critical habitat in the study area, including critical habitat in Whiteman Park (not re-surveyed), is now 185.1 ha. As a result of the revised mapping, the proposal's direct impact to *Caladenia huegelii* critical habitat has been reduced by 9.2 ha from 39.2 ha to 30.0 ha (Figure 3.1).

The survey did not record any new locations of *Caladenia huegelii*.

### 3.2 Additional Targeted Surveys for *Meeboldina decipiens* subsp. *decipiens* and *Millotia tenuifolia* var. *laevis*

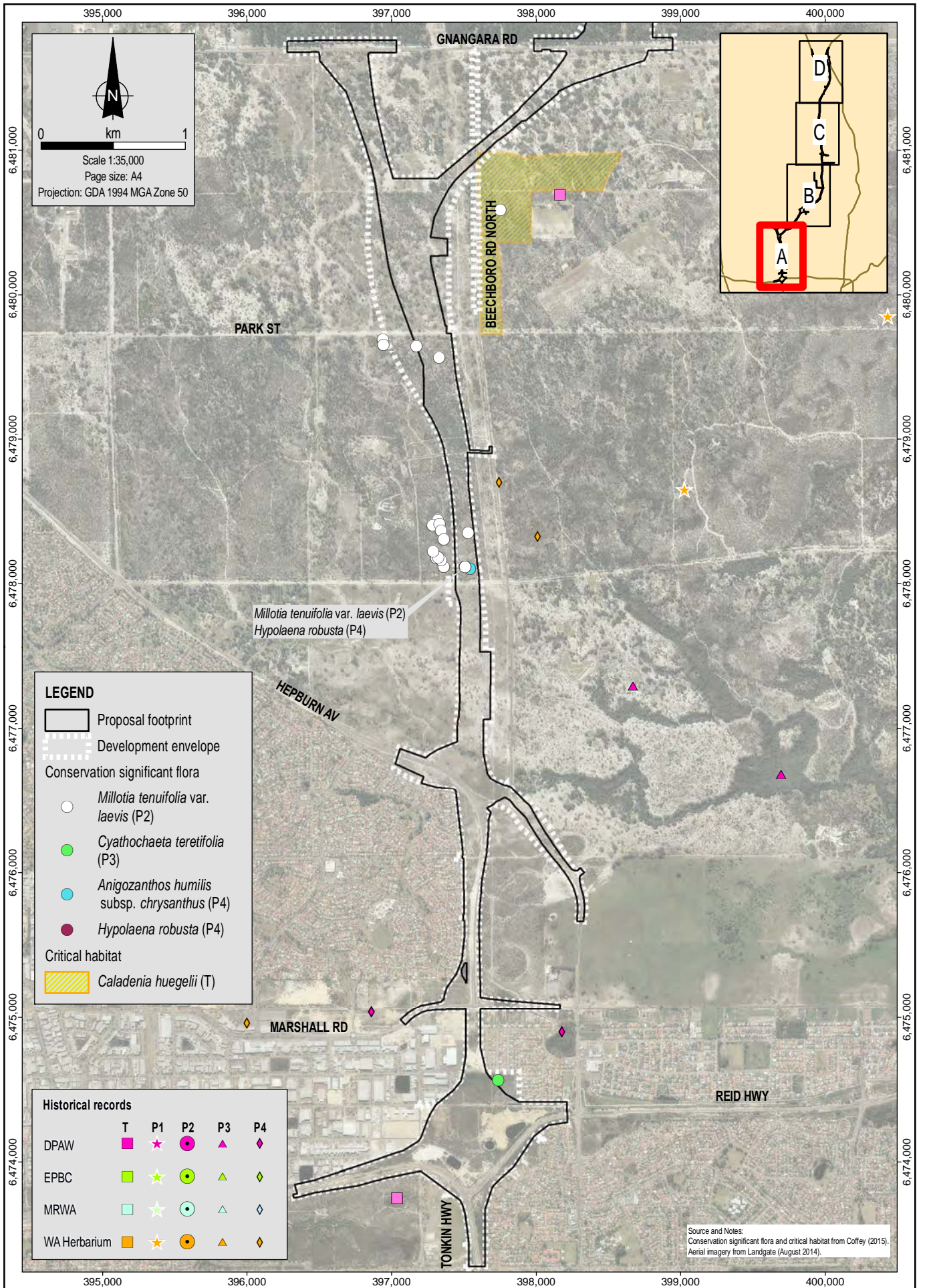
A targeted spring survey for *Meeboldina decipiens* subsp. *decipiens* (P3) and *Millotia tenuifolia* var. *laevis* (P2) was undertaken over five days between 6 and 15 October 2015 (Woodman Environmental, 2015b) (Appendix D, Spring Surveys for *Meeboldina decipiens* subsp. *decipiens* (P3) and *Millotia tenuifolia* var. *laevis* (P2)).

The survey for *Millotia tenuifolia* var. *laevis* recorded a total of 5,222 individuals within eight populations outside the development envelope. This included two populations (1,652 individuals) adjacent to the proposal footprint west of Beechboro Road North in Cullacabardee. Of the 5,222 individuals recorded, 3,345 are in conservation estate (State Forest, Regional Park or MRWA's proposed offset property at Ioppolo Road).

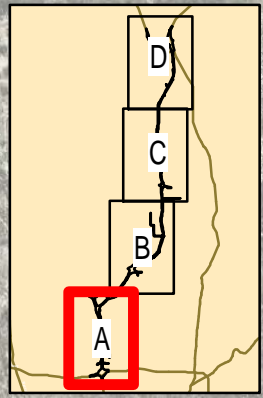
The proposal will impact two populations of *Millotia tenuifolia* var. *laevis* comprising three individuals (PER Appendix C, Level 2 Spring Flora and Vegetation Assessment, Figure 3.1). The impact is not significant at a local or regional scale due to the number of individuals identified outside the proposal footprint in Woodman's 2015 survey.

Woodman collected plant material for individuals identified as *Meeboldina decipiens* subsp. *decipiens* (P3) in surveys for the PER. The material was re-identified by Western Australian Herbarium (WAH) staff to be *Lepyrodia muiirii* (not a threatened species). *Meeboldina decipiens* subsp. *decipiens* (P3) is not in the proposal footprint and will not be impacted.

Local and regional numbers of and updated impacts to *Millotia tenuifolia* var. *laevis* and *Meeboldina decipiens* subsp. *decipiens* are tabulated in Section 3.5, New Records of *Darwinia foetida* as a revised version of PER Table 8.15.



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Page size: A4  
Projection: GDA 1994 MGA Zone 50



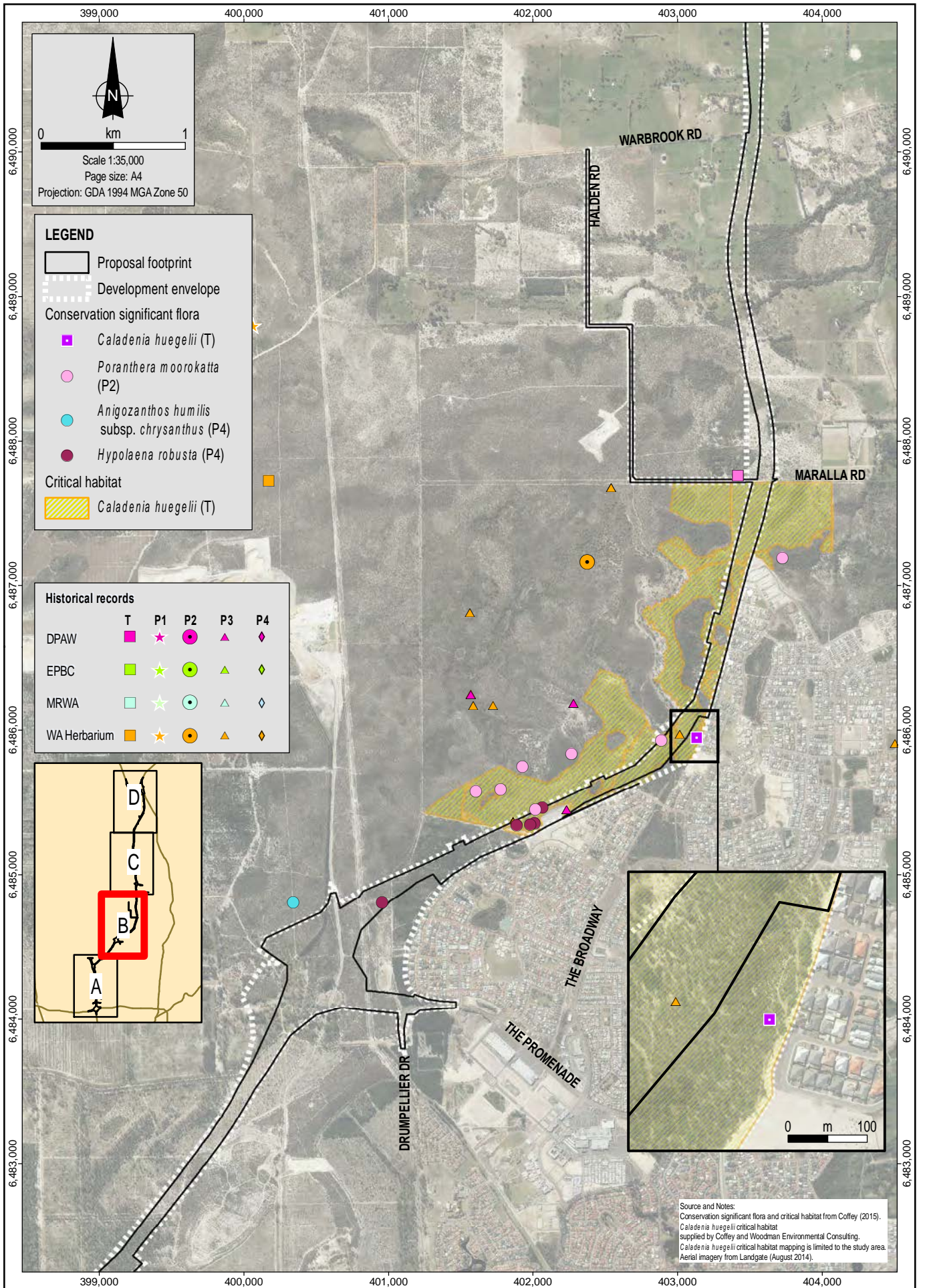
**LEGEND**

- Proposal footprint
- Development envelope
- Conservation significant flora
  - Millotia tenuifolia* var. *laevis* (P2)
  - Cyathochaeta teretifolia* (P3)
  - Anigozanthos humilis* subsp. *chrysanthus* (P4)
  - Hypolaena robusta* (P4)
- Critical habitat
  - Caladenia huegelii* (T)

**Historical records**

	T	P1	P2	P3	P4
DPAW	■	★	●	▲	◆
EPBC	■	★	●	▲	◆
MRWA	■	★	●	▲	◆
WA Herbarium	■	★	●	▲	◆

Source and Notes:  
Conservation significant flora and critical habitat from Coffey (2015).  
Aerial imagery from Landgate (August 2014).



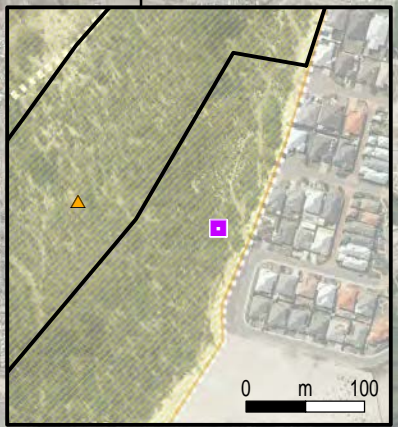
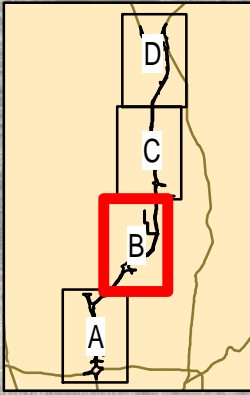
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Projection: GDA 1994 MGA Zone 50

**LEGEND**

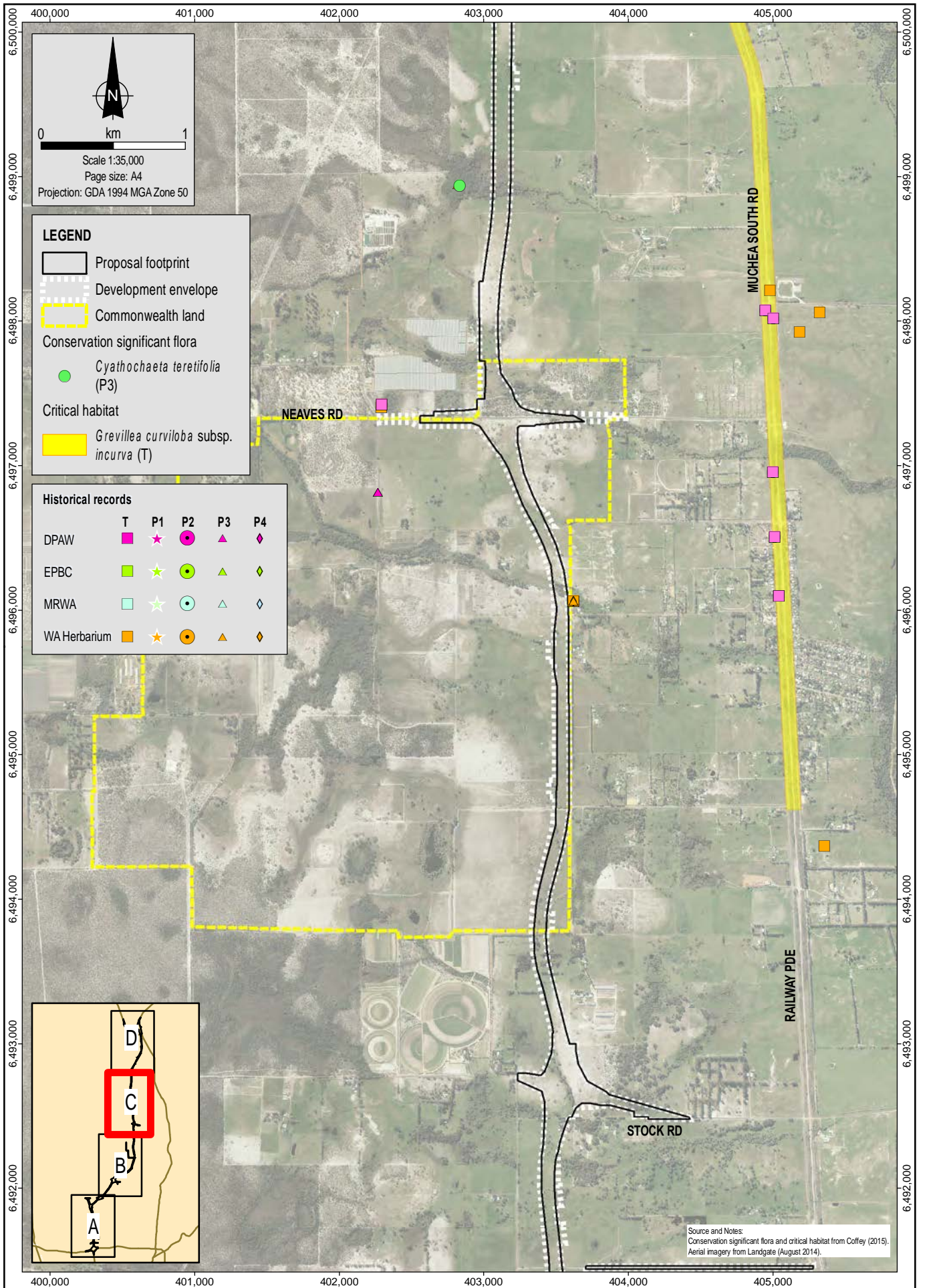
- Proposal footprint
- Development envelope
- Conservation significant flora
  - Caladenia huegelii* (T)
  - Poranthera moorokatta* (P2)
  - Anigozanthos humilis* subsp. *chrysanthus* (P4)
  - Hypolaena robusta* (P4)
- Critical habitat
  - Caladenia huegelii* (T)

**Historical records**

	T	P1	P2	P3	P4
DPAW	■	★	●	▲	◆
EPBC	■	★	●	▲	◆
MRWA	□	☆	○	△	◇
WA Herbarium	■	★	●	▲	◆



Source and Notes:  
 Conservation significant flora and critical habitat from Coffey (2015).  
*Caladenia huegelii* critical habitat supplied by Coffey and Woodman Environmental Consulting.  
*Caladenia huegelii* critical habitat mapping is limited to the study area.  
 Aerial imagery from Landgate (August 2014).



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Projection: GDA 1994 MGA Zone 50

**LEGEND**

- Proposal footprint
- Development envelope
- Commonwealth land
- Conservation significant flora
  - Cyathochaeta teretifolia* (P3)
- Critical habitat
  - Grevillea curviloba* subsp. *incurva* (T)

**Historical records**

	T	P1	P2	P3	P4
DPAW	■	★	●	▲	◆
EPBC	■	★	●	▲	◆
MRWA	■	★	●	▲	◆
WA Herbarium	■	★	●	▲	◆

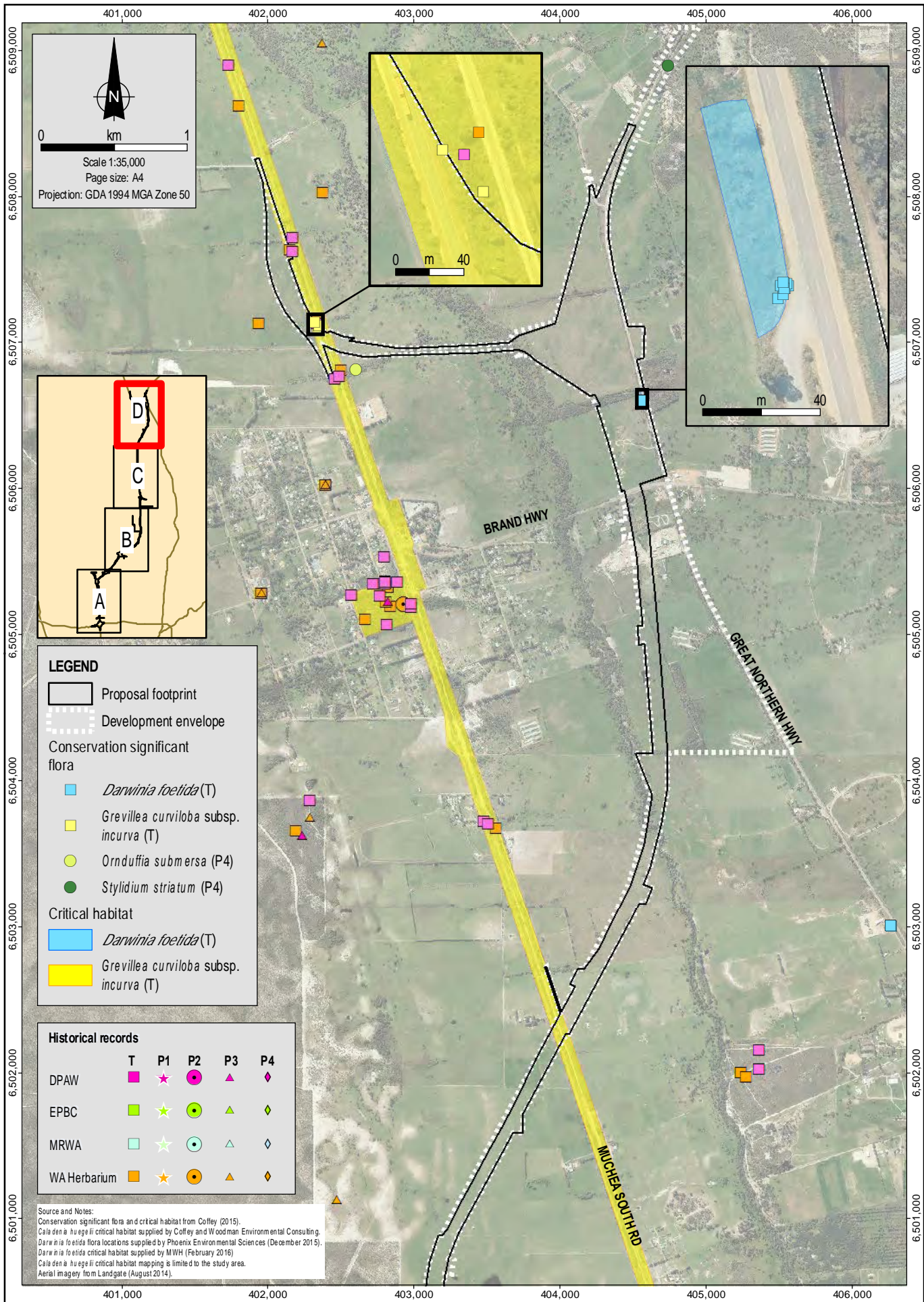
NEAVES RD

MUCHEA SOUTH RD

STOCK RD

RAILWAY PDE

Source and Notes:  
Conservation significant flora and critical habitat from Coffey (2015).  
Aerial imagery from Landgate (August 2014).

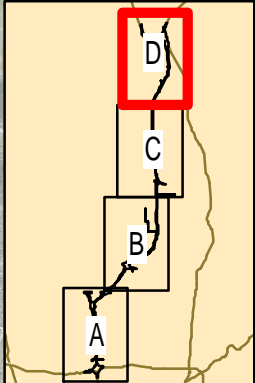


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Page size: A4  
Projection: GDA 1994 MGA Zone 50

0 40 m

0 40 m



**LEGEND**

Proposal footprint

Development envelope

Conservation significant flora

- *Darwinia foetida* (T)
- *Grevillea curviloba* subsp. *incurva* (T)
- *Ornduffia submersa* (P4)
- *Stylidium striatum* (P4)

Critical habitat

- *Darwinia foetida* (T)
- *Grevillea curviloba* subsp. *incurva* (T)

**Historical records**

	T	P1	P2	P3	P4
DPAW	■	★	●	▲	◆
EPBC	■	★	●	▲	◆
MRWA	■	★	●	▲	◆
WA Herbarium	■	★	●	▲	◆

Source and Notes:  
 Conservation significant flora and critical habitat from Coffey (2015).  
*Callitriche hughesii* critical habitat supplied by Coffey and Woodman Environmental Consulting.  
*Darwinia foetida* flora locations supplied by Phoenix Environmental Sciences (December 2015).  
*Darwinia foetida* critical habitat supplied by MWH (February 2016).  
*Callitriche hughesii* critical habitat mapping is limited to the study area.  
 Aerial imagery from Landgate (August 2014).

### **3.3 Additional Surveys to Investigate the Presence of SCP02 in the Proposal Footprint**

An additional field survey was conducted on 17 September 2015 near Hepburn Avenue in Ballajura to further investigate the potential occurrence of the Threatened Ecological Community (TEC) SCP02 (Woodman Environmental, 2015c) (Appendix E, Spring Surveys and Analysis to Investigate SCP02 Presence).

Two new quadrats were placed in the vegetation community to the west of Hepburn Avenue, north of its intersection with Marshall Road (Figure 3.2). One new quadrat was placed in the vegetation community to the east of Hepburn Avenue.

The quadrat data was analysed using PATN and interpreted to determine the floristic community type (FCT) most closely resembling the vegetation communities. The quadrats were placed in the same supergroup as SCP02 due to similar dominant taxa, but occur within different subgroups. There was no direct match with FCTs for the three quadrats in this survey. The vegetation was grouped with SCP04 and S02, and most closely resembles SCP04. SCP04 is a common vegetation community of the Swan Coastal Plain (SCP) and is not listed as a TEC or Priority Ecological Community (PEC).

SCP02 is no longer considered to exist in the proposal footprint (Figure 3.2). The proposal will no longer impact SCP02.

### **3.4 Assessment of the Presence of SCP20a at the Ippolo Road Offset Site**

A supplementary field survey and investigation of the presence and extent of SCP20a within the proposed offset site at Ippolo Road, Chittering was undertaken on 15 and 16 September 2015 (Woodman Environmental, 2015d) (Appendix F, Assessment of the Presence of the TEC SCP20a).

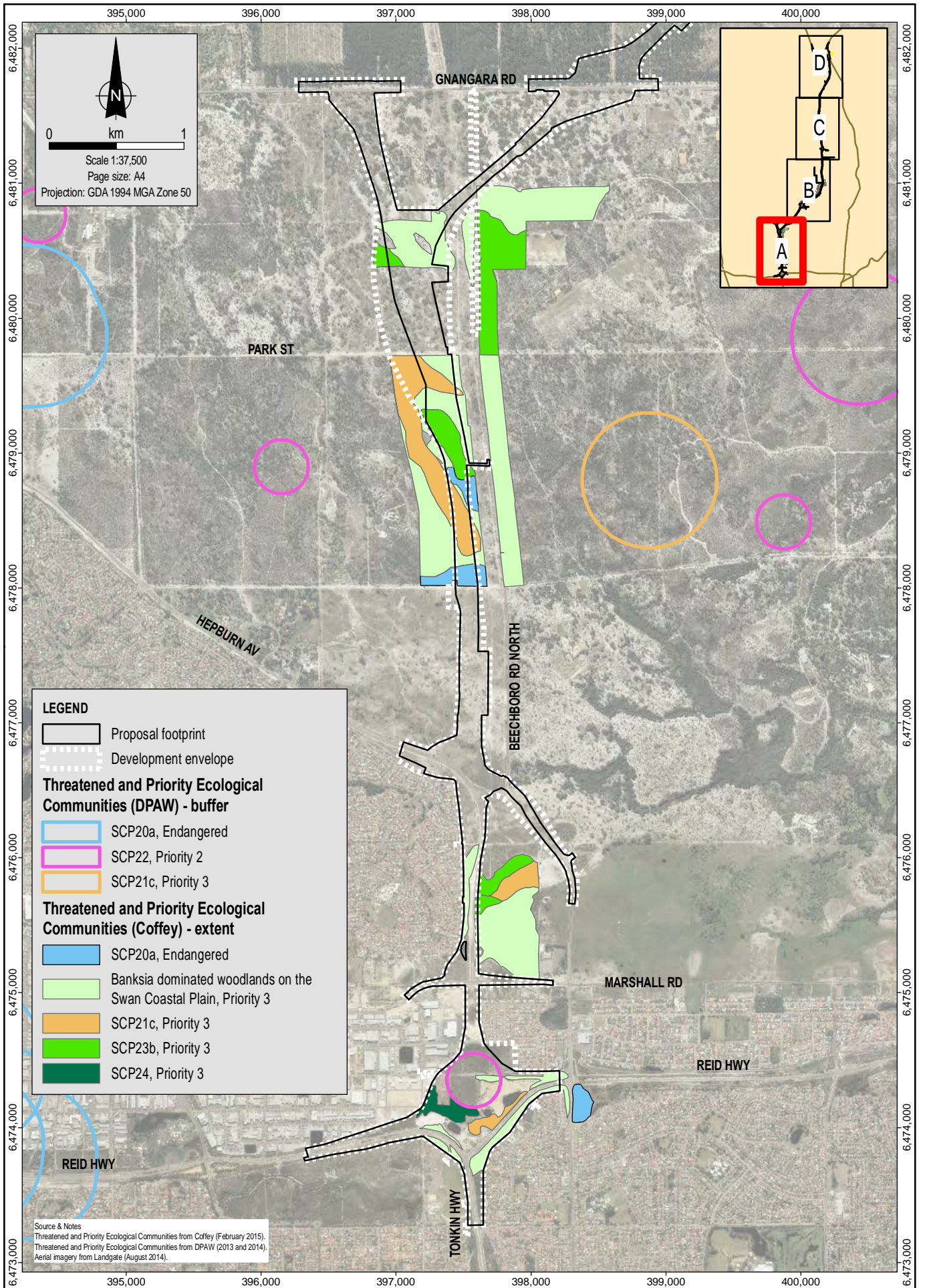
The quadrats surveyed in the offset proposal had a close association with SCP28. Two quadrats IR-01 and IR-05 had species in common with SCP20a, but analysis shows they are most closely related to SCP28. Other quadrats had the most species in common with SCP23c and SCP28 in the updated SCP dataset (Keighery et al., 2012).

The vegetation within the proposed offset site occurs in the same supergroup as SCP20a, but is more closely related to the subgroup SCP28, which is a common vegetation community.

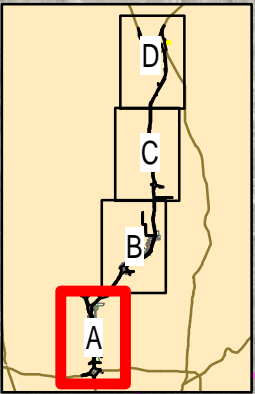
This analysis (Woodman Environmental, 2015d) used the System Six dataset updated by Keighery et al. (2012) with all available records used in the analysis (i.e., 1,815 quadrats). To confirm the veracity of the results, the quadrats surveyed by Woodman were independently analysed by Griffin and Trudgen (2015) using the Gibson et al. (1994) and the System Six update, a total of 1,098 quadrats including 100 quadrats from the Dandaragan Plateau. Gibson et al. (1994) formed the basis for the original assessment presented in PER Appendix C, Level 2 Spring Flora and Vegetation Assessment (Appendix G, Analysis of floristic data from Ippolo Road and Hepburn Avenue to assign sites to floristic community types). The Dandaragan Plateau quadrats provide useful context, as the Ippolo Road offset site is located on the plateau. The Griffin and Trudgen analysis concluded that vegetation at the proposed offset site more closely resembled SCP23 (including subgroups SCP23a and SCP23b) and SCP28, noting that an analogue of SCP20a might exist at the site. The analogue appears to reflect a Dandaragan Plateau variation of SCP20a.

While DPAW has previously recorded the presence of SCP20a at Ippolo Road, these studies found that SCP20a is unlikely to be represented in vegetation at Ippolo Road and that vegetation communities at that site more closely resemble SCP23 (including subgroups) and SCP28.





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**LEGEND**

- Proposal footprint
- Development envelope

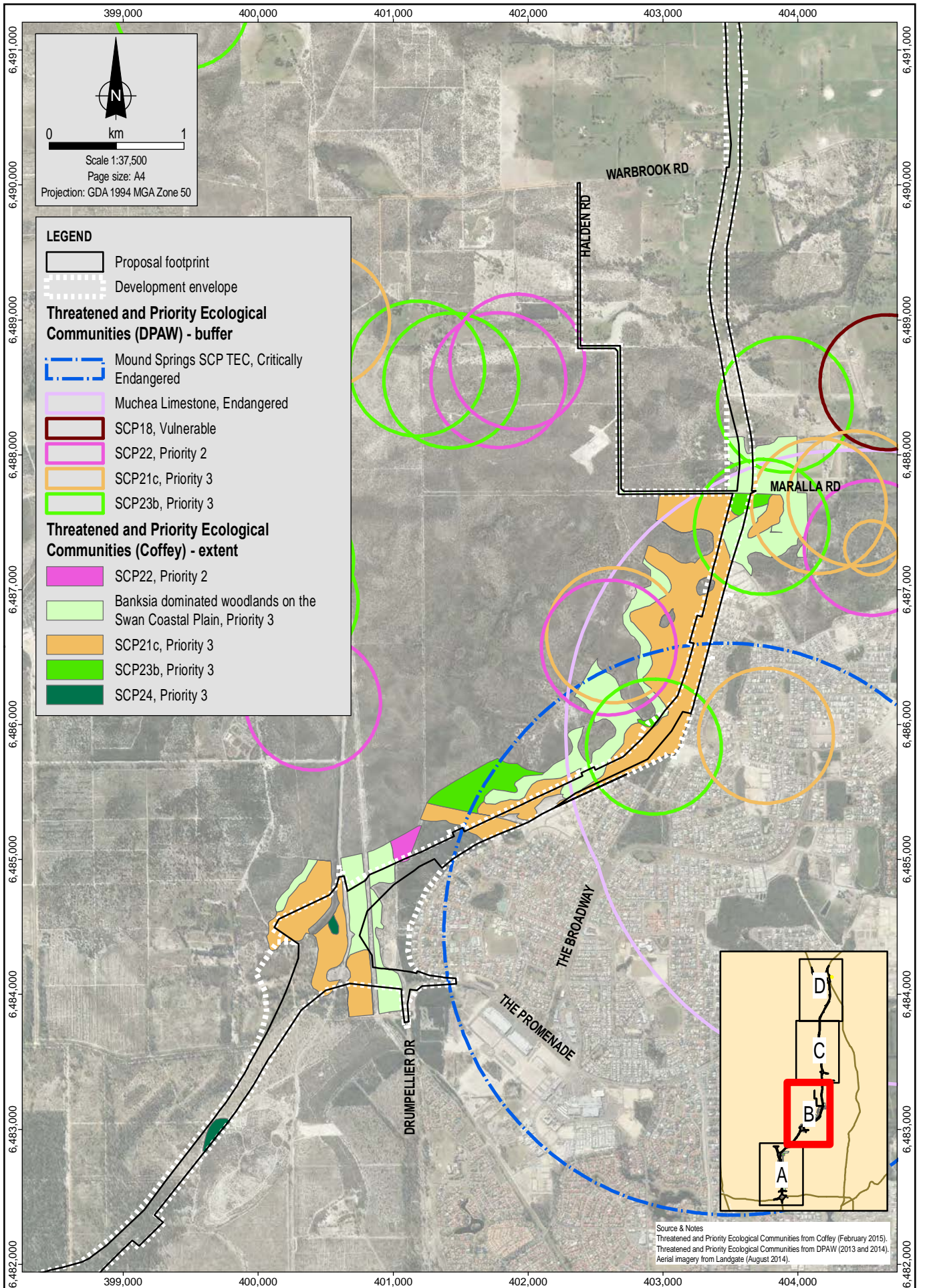
**Threatened and Priority Ecological Communities (DPAW) - buffer**

- SCP20a, Endangered
- SCP22, Priority 2
- SCP21c, Priority 3

**Threatened and Priority Ecological Communities (Coffey) - extent**

- SCP20a, Endangered
- Banksia dominated woodlands on the Swan Coastal Plain, Priority 3
- SCP21c, Priority 3
- SCP23b, Priority 3
- SCP24, Priority 3

Source & Notes  
 Threatened and Priority Ecological Communities from Coffey (February 2015).  
 Threatened and Priority Ecological Communities from DPAW (2013 and 2014).  
 Aerial imagery from Landgate (August 2014).



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Page size: A4  
Projection: GDA 1994 MGA Zone 50

**LEGEND**

- Proposal footprint
- Development envelope

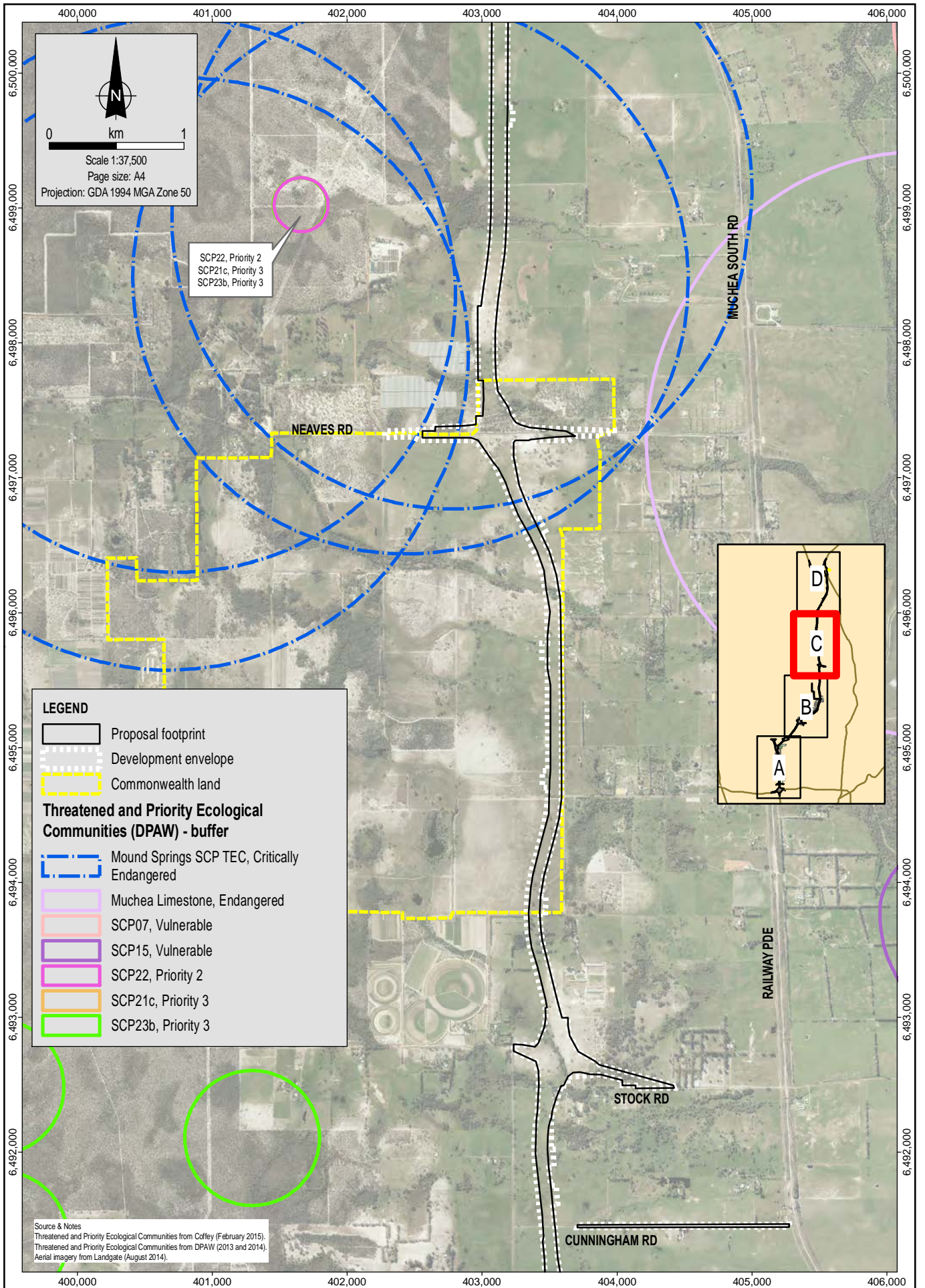
**Threatened and Priority Ecological Communities (DPAW) - buffer**

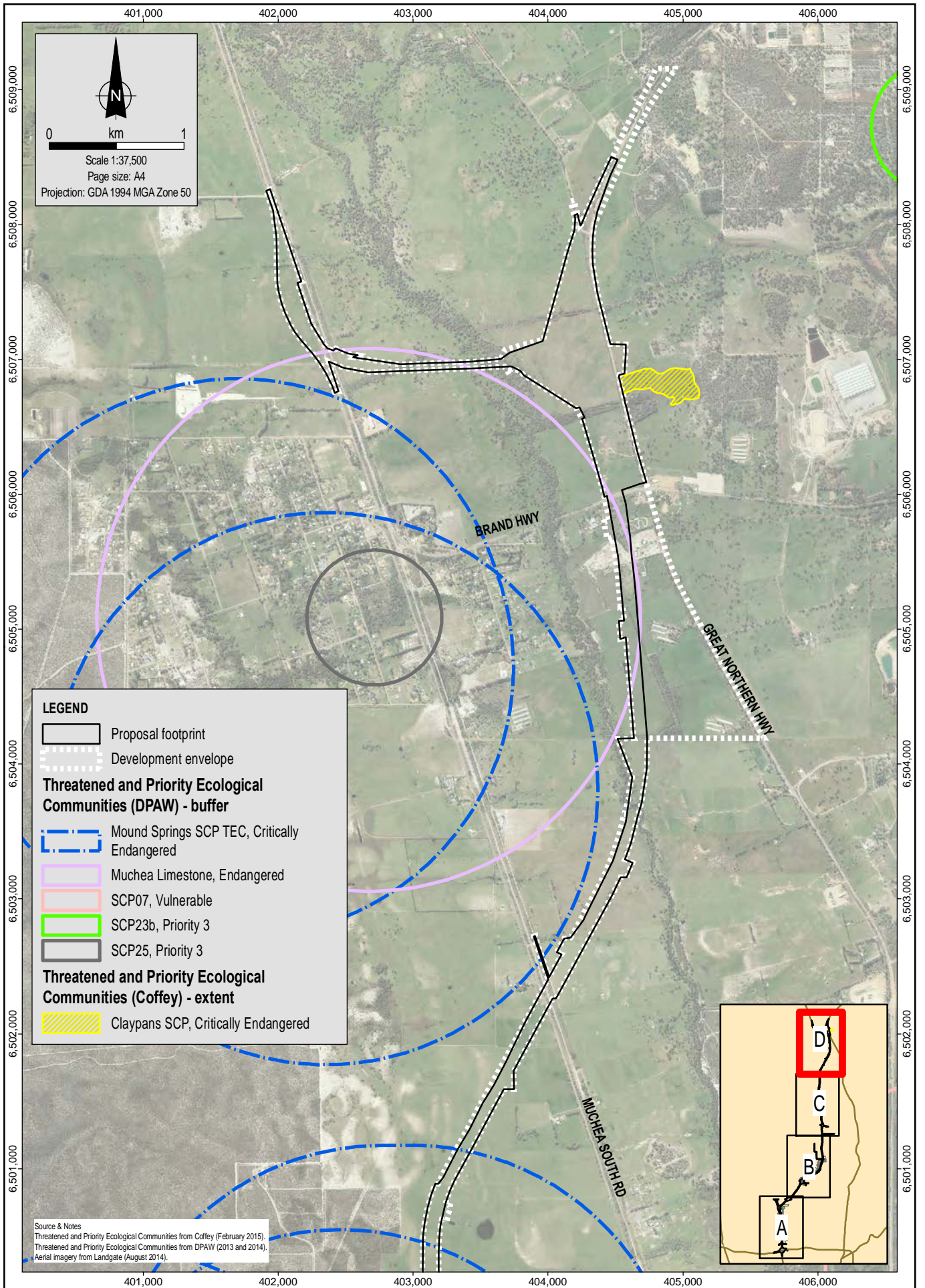
- Mound Springs SCP TEC, Critically Endangered
- Muchea Limestone, Endangered
- SCP18, Vulnerable
- SCP22, Priority 2
- SCP21c, Priority 3
- SCP23b, Priority 3


**Threatened and Priority Ecological Communities (Coffey) - extent**

- SCP22, Priority 2
- Banksia dominated woodlands on the Swan Coastal Plain, Priority 3
- SCP21c, Priority 3
- SCP23b, Priority 3
- SCP24, Priority 3



Source & Notes  
Threatened and Priority Ecological Communities from Coffey (February 2015).  
Threatened and Priority Ecological Communities from DPAW (2013 and 2014).  
Aerial imagery from Landgate (August 2014).










  
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**LEGEND**

 Proposal footprint  
 Development envelope

**Threatened and Priority Ecological Communities (DPAW) - buffer**

 Mound Springs SCP TEC, Critically Endangered  
 Muchea Limestone, Endangered  
 SCP07, Vulnerable  
 SCP23b, Priority 3  
 SCP25, Priority 3

**Threatened and Priority Ecological Communities (Coffey) - extent**

 Claypans SCP, Critically Endangered

Source & Notes  
 Threatened and Priority Ecological Communities from Coffey (February 2015).  
 Threatened and Priority Ecological Communities from DPAW (2013 and 2014).  
 Aerial imagery from Landgate (August 2014).

## 3.5 New Records of *Darwinia foetida*

The following sections provide existing environment, impact assessment, mitigations and residual impact assessment for *Darwinia foetida* in revision of (or in addition to) the information contained in PER Chapter 8, Flora and Vegetation.

### 3.5.1 Existing Environment

*Darwinia foetida* is listed as Endangered (EN) under the *Wildlife Conservation Act 1950* (WC Act) and Critically Endangered (CR) under the EPBC Act. *Darwinia foetida* was identified in a desktop assessment as occurring within the flora study area (see PER Chapter 8, Flora and Vegetation, Section 8.2, Existing Environment). Subsequent field surveys undertaken for the proposal did not locate *Darwinia foetida* within the proposal footprint. The assessment of *Darwinia foetida*'s presence in the proposal footprint was given in PER Table 8.1 as 'Likely'.

Phoenix Environmental Sciences carried out a flora and fauna assessment along parts of the Great Northern Highway (GNH) road reserve in Muchea and Chittering (Phoenix Environmental, 2015). The assessment was undertaken as part of a separate MRWA project to upgrade GNH between Muchea and Wubin. The assessment included the results of several field surveys during 2014 and 2015, some of which overlapped parts of the GNH road reserve within the development envelope of the proposal.

Two new populations of the Threatened (T) flora Muchea Bell (*Darwinia foetida*) were recorded during the Phoenix Environmental surveys. One new population of seven individuals was located on the western side of Great Northern Highway road reserve, adjacent to the northern end of the roadside rest area north of the Brand Highway intersection in Muchea (see Figure 3.1D). This population is nominally within the proposal footprint. A second new population of ten individuals was recorded from the GNH road reserve, about 4 km southeast of Muchea and outside the development envelope.

MWH was commissioned to undertake a further targeted search of the *Darwinia foetida* population nominally within the proposal footprint (MWH, 2016) (Appendix H, *Darwinia foetida* further information). MWH located the individuals recorded by Phoenix Environmental and revised the plant count to 16 mature individuals and 1 seedling. The population is located approximately 2 m from the edge of the sealed area of the roadside rest area. The extent of the population was identical to that mapped by Phoenix Environmental.

No critical habitat has been formally defined or described for *Darwinia foetida* (DOTE, 2016). MWH defined approximately 0.12 ha of roadside vegetation surrounding this population as critical habitat based on its area of occupancy, the hydrology of the area, coexisting species and the local habitat of this population. The critical habitat is bounded on the south by the roadside rest area, on the west by a fence, on the east by GNH and on the north by a drain under GNH (see Figure 3.1). The critical habitat is not considered to extend outside this area due to changes in vegetation and soils (MWH, 2016).

Table 3.1 provides an updated entry for *Darwinia foetida* in PER Table 8.1.



**Table 3.1 Updated *Darwinia foetida* entry for PER Table 8.1 Threatened and priority listed flora occurring in proximity to the proposal footprint**

Taxon	Conservation code			Generalised description of known locations	Flowering period	Closest record (km)	Likelihood of occurrence in the proposal footprint <sup>2</sup>
	EPBC Act	WC Act <sup>1</sup>	DPAW				
<i>Darwinia foetida</i>	CR	EN	–	Grey-white sand on swampy, seasonally wet sites.	Oct to Nov	0	Present

Note: this table shows the updated entry for *Darwinia foetida* only. The remainder of PER Table 8.1 is unchanged and is not repeated here.

Numbered notes:

1. *Wildlife Conservation Act 1950*.
2. 'Present' = occurring within the proposal footprint based on surveys.

PER Table 8.6 lists locally significant vegetation associations supporting threatened and priority taxa. The new population of *Darwinia foetida* in Muchea was recorded in a road reserve mapped as Cleared (Highway) (see PER Chapter 8, Flora and Vegetation, Figure 8.2F). There are no vegetation associations from the flora and vegetation assessment in the PER that can be attributed as locally significant to *Darwinia foetida*. There are consequently no updates or additions to PER Table 8.6 for *Darwinia foetida*.

Changes to PER Chapter 16, Matters Protected Under the EPBC Act, Table 16.2 'Significant impact criteria for flora' resulting from the new *Darwinia foetida* records are addressed in Chapter 5, Matters Protected Under the EPBC Act.

### 3.5.2 Assessment of Potential Impacts

This section updates PER Chapter 8, Flora and Vegetation, Section 8.1.5, Assessment of Potential Impacts with respect to *Darwinia foetida* only.

The new population adjacent to the roadside rest area in Muchea is nominally within the proposal footprint. Activities proposed for this area are works relating to the upgrading or removal of existing infrastructure only. The proposal will result in the removal of the roadside rest area and the upgrading of GNH. Upgrade works include resealing and/or reshoulder the road in connection with a realignment of GNH that will commence about 200 m north of the *Darwinia foetida* locations. While the proposal will not result in direct impacts to *Darwinia foetida* at this location, its immediate proximity to the rest area and Great Northern Highway potentially expose it and its critical habitat to indirect impacts. These indirect impacts potentially include habitat degradation from dust, altered hydrology, weeds and dieback. Due to the proximity of GNH, this location is already exposed to many of these threats as well as illegal rubbish dumping and an altered fire regime resulting from introduced grasses and weeds (MWH, 2016).

The other new population of *Darwinia foetida* recorded by Phoenix Environmental 4 km to the south is outside the development envelope and will not be impacted by the proposal.

Local and regional impacts to *Darwinia foetida* are shown in Table 3.2, which is an updated version of PER Table 8.15. Table 3.2 also contains the updates to *Meeboldina decipiens* subsp. *decipiens* and *Millotia tenuifolia* var. *laevis* described in Section 3.2.

The proposal will not impact the four populations of *Darwinia foetida* already considered in the PER.

**Table 3.2 Updated PER Table 8.15 Local and regional impacts on threatened and priority flora**

Species	Conservation status	Total number of known populations	Number of populations known within the study area	Number of populations to be impacted within the proposal footprint	Proportion of populations to be impacted (%)	Total minimum number of known Individuals	Number of individuals within study area	Number of known individuals to be impacted within the proposal footprint	Proportion of known individuals to be impacted (%)
<i>Caladenia huegelii</i>	T	19	1	–	–	355	1	–	–
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	T	24	3	–	–	682	137	–	–
<i>Darwinia foetida</i>	T	6	2	–	–	1,911	41	–	–
<i>Millotia tenuifolia</i> var. <i>laevis</i>	P2	8	2	2	25.0	5,222	1,652	3	0.06
<i>Poranthera moorokatta</i>	P2	4	2	1	25.0	2,508	7	1	0.04
<i>Meeboldina decipiens</i> subsp. <i>decipiens</i> ms <sup>1</sup>	P3	11	–	–	–	7,137	–	–	–
<i>Cyathochaeta teretifolia</i>	P3	30	2	–	–	1,375	30	–	–
<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	P4	18	2	1	5.6	1,334	4	2	0.15
<i>Hypolaena robusta</i>	P4	30	3	3	10.0	17,742	25	17	0.1
<i>Ornduffia submersa</i>	P4	43	1	–	–	10,297	1	–	–
<i>Stylidium striatum</i>	P4	24	1	–	–	2,965	1	–	–

Sources: Coffey (2015b), MWH (2016), Phoenix Environmental (2015) and Woodman Environmental (2015b).

Notes:

1. Total number of known populations and minimum number of individuals includes populations of *Meeboldina decipiens* not resolved to infra-species level.

### 3.5.3 Management Measures

This section updates PER Chapter 8, Flora and Vegetation, Section 8.5, Management Measures with respect to *Darwinia foetida* only.

A 10 m buffer will be established, demarcated and maintained in existing vegetation around *Darwinia foetida* (See MPM02 in Table 13.1). The buffer will protect potential critical habitat and maintain hydrological regimes as far as practicable. Given existing infrastructure at the site, the buffer will be constrained to the road reserve not already used for Great Northern Highway and the roadside rest area. The buffer is also constrained by private property to the west. However, the buffer includes the roadside drainage structure that provides sumpland habitat for the species.

Existing mitigation measures proposed for flora and vegetation will apply to the new population of *Darwinia foetida* at Muchea. The following existing management as documented in Table 13.1, is particularly relevant to *Darwinia foetida*:

- Delineation of the clearing boundary prior to clearing (see FVM02 in Table 13.1).
- Preparation and implementation of an EMP to limit risk of fire, the introduction and/or spread of weeds (i.e. WONS and declared pests) and/or dieback, littering and unauthorised access (see FVM03 in Table 13.1).
- Preparation and implementation of a Flora and Vegetation Management and Monitoring Plan to manage impacts on environmentally significant flora and vegetation (see FVM04 in Table 13.1).
- Preparation and implementation of a weed and dieback hygiene management plan (see FVM07 in Table 13.1).
- Educational and induction material will include information on significant flora and ecological communities to reduce the risk of accidental clearing. (see FVM08 in Table 13.1).

### 3.5.4 Residual Environmental Outcome

This section updates PER Chapter 8, Flora and Vegetation, Section 8.6, Residual Environmental Outcome with respect to *Darwinia foetida* only.

The proposal will not directly impact any individuals or populations of *Darwinia foetida*. The proposal will result in the removal of the roadside rest area and upgrades to GNH, both of which may have indirect impacts on *Darwinia foetida* such as increased dust and altered hydrology. Given the proposed management and the species' current persistence next to GNH in a highly modified and weedy environment, the proposal is not expected to have a significant impact.



## 4 AMENITY (NOISE AND VIBRATION)

The DER raised concerns about calibration of the noise model in its submission on the PER. DER expressed concern that traffic noise impact from the proposed highway may have been underestimated due to the method adopted for calibrating the noise model.

This chapter summarises the revised transportation noise assessment (Appendix I, Revised Transportation Noise Assessment) undertaken in response to DER's concerns. This assessment supersedes the noise level predictions in PER Appendix O, Transportation Noise Assessment, as presented in PER Chapter 11, Amenity (Noise and Vibration).

### 4.1 Method Update

This section describes the review and update of the calibration factor and traffic volumes used in the revised assessment.

#### 4.1.1 Calibration Factor

A calibration factor is used to adjust noise model outputs for differences between measured and modelled noise levels at monitoring locations. Differences may arise from spatial variations in parameters such as ground adsorption and noise propagation.

The modelled noise levels presented in the PER are 5 to 11 dB higher than the measured levels at sites A to L (PER Appendix O, Transportation Noise Assessment, Table 4.2). Typically, differences between measured and modelled noise levels range from 1 to 3 dB. The large variation between measured and modelled noise levels could be a result of the difference between the traffic conditions (and noise) modelled and those measured. For example, congestion on Tonkin Highway and local road traffic are not reflective of free-flowing traffic on a highway.

Additional monitoring was undertaken at a more analogous site on GNH at Muchea (Appendix I, Revised Transportation Noise Assessment, Figure 3-3 (Location T)) to enable review of the calibration factor. GNH is more reflective of the traffic conditions (and noise) expected for the proposal. The results of the monitoring and comparison with the modelled noise levels at this location are presented in Table 4.1.

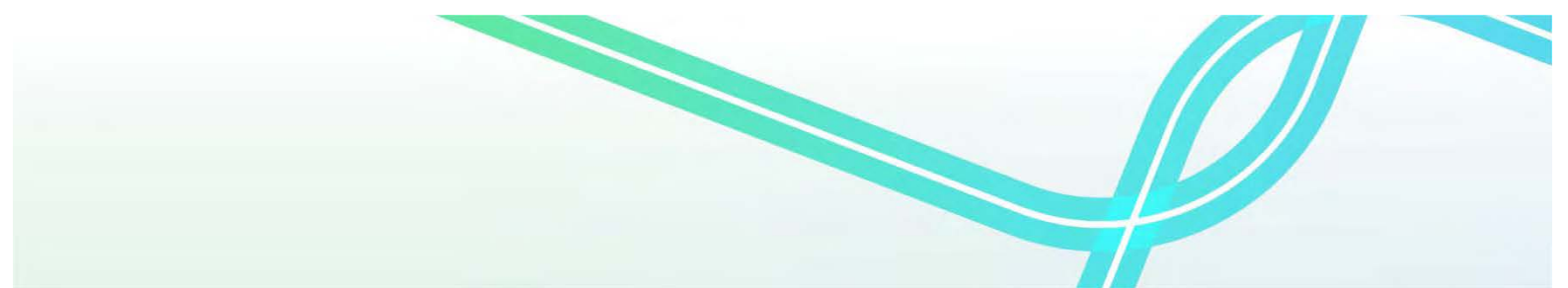
**Table 4.1 Comparison of measured and modelled noise levels at Location T**

Rec ID	Address	Noise level (dB)		
		Measured $L_{Aeq(Day)}$	Modelled $L_{Aeq(Day)}$	Difference
T	3362 Great Northern Highway, Muchea	61.5	62.1	-0.6

The measured noise levels adjacent to the GNH show good correlation with the noise model. A calibration factor of -0.6 dB was adopted for the noise model.

#### 4.1.2 Traffic Volumes

MRWA and the DOP periodically develop regional traffic models for the Perth Metropolitan area to account for predicted changes in land use and population. The 2050 regional traffic model was developed as part of this proposal and used in the transportation noise assessment (PER Appendix O, Transportation Noise Assessment). The previous regional traffic model was for predicted traffic in 2031.



State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP 5.4) (Government of WA, 2009) requires a 15 to 20 year transport planning horizon (from the opening date) for new roads. Neither 2031 (not far enough into the future) or 2050 (too far into the future) are suitable forecasts for modelling traffic noise for this proposal.

Traffic volumes for 2040 were used in the revised assessment. They were calculated from Perth–Darwin National Highway (PDNH) traffic models for 2031 and 2050 assuming linear growth, which is consistent with the land use and population growth trends used in those regional traffic models for Perth Metropolitan area.

## 4.2 Assessment of Potential Impacts

This section presents the revised noise impacts for operation based on a calibration factor of -0.6 dB and modelling with 2040 traffic volumes. The noise criteria for this assessment are unchanged from the PER (PER Appendix O, Transportation Noise Assessment).

### 4.2.1 Noranda, Ballajura and Ellenbrook

The noise level (55 dB  $L_{Aeq(Day)}$  target and 60 dB  $L_{Aeq(Day)}$  limit) contour plots (including location of noise walls) for Noranda, Ballajura and Ellenbrook are provided in Appendix I, Revised Transportation Noise Assessment, figures 5-1 to 5-4. In consultation with DER, a maximum height of 5 m has been adopted for noise walls, with the height of noise walls designed, where practicable, to achieve the following noise levels:

- SPP 5.4 noise target (55 dB  $L_{Aeq(Day)}$ ) at residential properties in the vicinity of Ellenbrook.
- SPP 5.4 noise limit (60 dB  $L_{Aeq(Day)}$ ) at noise sensitive premises at the Tonkin Highway/Reid Highway Interchange and along the highway section between Reid Highway and Hepburn Avenue.

### 4.2.2 Properties North of Ellenbrook

The predicted noise levels at rural residential properties north of Ellenbrook (with consideration of noise attenuation provided by 2.4-m-high visual screen walls constructed where residences are within 100 m of the road) are provided in Appendix I, Revised Transportation Noise Assessment, Table 5-1. The locations are identified in Figures 5-5 and 5-6. Sixteen rural residential properties north of Ellenbrook will experience noise levels exceeding the SPP 5.4 noise limit of 60 dB  $L_{Aeq(Day)}$ . Environmental Assessment Guidelines (EAG) EAG13 states that (EPA, 2014):

*If, for a road or rail proposal, it has been identified that SPP 5.4 noise criteria cannot be met, the proponent is expected to follow the procedures provided for in SPP 5.4 to implement 'reasonable and practicable measures' to reduce noise impacts. This includes consulting with the community to identify the best overall solutions for noise management.*

To ensure the Environment Protection Authority's (EPA) objective will be met at these locations, indoor noise levels at these properties will be reduced to as low as reasonably practicable through the application of noise mitigation, set out in the Implementation Guidelines for SPP 5.4 (WAPC, 2014), as discussed and agreed with the affected property owners.

## 4.3 Management Measures

This section presents changes to the management measures proposed to manage noise impacts during operation, as a result of the revised transportation noise assessment (Table 4.2).

**Table 4.2 Noise management measures**

PER management measure	Revised/Deleted/New	Final management measure/Reason for deleting measure
Should the construction of noise walls not result in achieving the noise target of 55 dB $L_{Aeq}$ at noise sensitive receptors between Hepburn Avenue and Ellenbrook, efforts will be made to achieve the noise limit of 60 dB $L_{Aeq}$ .	Deleted	Not applicable.  Reason for deletion: The revised transportation noise assessment has shown that the noise limit of 60 dB $L_{Aeq(Day)}$ can be met at noise sensitive receivers south of Maralla Road. While modelling shows that the noise target of 55 dB $L_{Aeq(Day)}$ will be achieved at most residences in Ellenbrook, it is not practicable to achieve this noise level at some locations due to the 5 m cap on noise wall height.
Façade protection packages will be implemented at identified properties north of Ellenbrook where noise levels are likely to exceed the day limit criteria of 60 dB $L_{Aeq}$ . The level of treatment provided will be determined on a case-by-case basis in consultation with affected property owners and is likely to consist of 6 mm thick glazing to windows (see Figure 11.4).	Revised	Where the SPP 5.4 noise limit (60 dB $L_{Aeq(Day)}$ ) is unable to be achieved at rural residential properties north of Ellenbrook, indoor noise levels at these properties will be reduced to as low as reasonably practicable through the application of noise mitigation, set out in the Implementation Guidelines for SPP 5.4 (WAPC, 2014), as discussed and agreed with the affected property owners (See NVM06 Table 13.1).
Not applicable.	New	Noise monitoring will be undertaken to confirm the as built and operating highway achieves the SPP 5.4 noise limit (60 dB $L_{Aeq(Day)}$ ) at residences south of Maralla Road. Based on the results of the monitoring, MRWA may implement additional noise mitigation (See NVM07 Table 13.1).

The revised management proposed in this document supersedes the statement in PER Table 11.3 on page 11-12 that “Façade treatment will be provided to achieve indoor noise targets”. This statement is incorrect and inconsistent with other statements made in PER Chapter 11 regarding the intended outcome of façade treatment packages. Indoor noise targets within SPP 5.4 do not apply to major road infrastructure proposals such as this proposal.

The full list of management measures relating to noise is provided in Section 13, Summary of Management Measures.

#### 4.4 Residual Impact

This section presents the revised residual impact assessment for traffic noise during operation. No updates to the assessment of construction impacts presented in PER Chapter 11, Amenity (Noise and Vibration), Table 11.3 are required, as a result of the revised impact assessment. Table 4.3 presents a summary of the residual operational noise impacts.

**Table 4.3 Summary of residual operational noise impacts following implementation of management measures**

Aspect	Predicted impact	Management	Residual impact
Road traffic using PDNH	Changes in noise levels for local communities	<ul style="list-style-type: none"> <li>• Locate road infrastructure as far as practicable to the west within the road reserve in the vicinity of Ellenbrook (See NVM02 Table 13.1).</li> <li>• Use the quietest practical road surface (See NVM03 Table 13.1).</li> <li>• Construct 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<sup>2</sup> to achieve the noise limit of 60 dB L<sub>Aeq (Day)</sub> (See NVM04 Table 13.1).</li> <li>• Construct screening walls of a maximum height of 2.4 m at noise sensitive premises north of Ellenbrook where they are within 100 m of the road (See NVM05 Table 13.1).</li> <li>• Where the SPP 5.4 noise limit (60 dB L<sub>Aeq (Day)</sub>) is unable to be achieved at rural residential properties north of Ellenbrook, indoor noise levels at these properties will be reduced to as low as reasonably practicable through the application of noise mitigation, set out in the Implementation Guidelines for SPP 5.4 (WAPC, 2014), as discussed and agreed with the affected property owners (See NVM06 Table 13.1).</li> <li>• Noise monitoring will be undertaken to confirm the as built and operating highway achieves the SPP 5.4 noise limit (60 dB L<sub>Aeq (Day)</sub>) at residences south of Maralla Road. Based on the results of the monitoring, MRWA may implement additional noise mitigation (See NVM07 Table 13.1).</li> </ul>	<p>The SPP 5.4 noise limit (60 dB L<sub>Aeq (Day)</sub>) will be met at noise sensitive premises south of Maralla Road.</p> <p>The SPP 5.4 noise target (55 dB L<sub>Aeq (Day)</sub>) will be met at most noise sensitive premises in the vicinity of Ellenbrook. It is not practicable to achieve the noise target at all residences due to the 5 m cap on noise wall height.</p> <p>Where noise levels exceed the noise limit (60 dB L<sub>Aeq (Day)</sub>) at residences north of Maralla Road, noise mitigation set out in the implementation guidelines for SPP 5.4 will be applied, in consultation and by agreement with the property owner, to reduce indoor noise levels to acceptable levels. Outdoor noise levels will not be reduced by application of building mitigation.</p>