



Main Roads Western Australia
York - Merredin Road Widening
Impact Assessment of Clearing and MNES

September 2015

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the Report.

Project Information

Project Title: York to Merredin Widening between Straight Line Kilometres (SLK) 1.95 and SLK 51

Project location: The Project is located on the York – Merredin Road at SLK 1.95 to SLK 15, SLK 19 to SLK 29 and SLK 29 to SLK 51. The proposed works are within the Shires of York and Quairading. The Project will start east of York at SLK 1.95 and finishes approximately 9 km east of Mawson at SLK 51.

Project purpose: Gradual and steady increases in traffic levels along the York-Merredin Road have occurred as a result of increased grain freight movements in the area. This has increased the volume of vehicles using the York-Merredin Road to access the Co-operative Bulk Handling (CBH) bins in the area. The width of the existing road is unsuitable for the increased traffic and these works are required to improve the road geometry and general road safety attributes along this section of road.

Area proposed to be cleared: The Project area (the disturbance footprint) is approximately 55.70 ha (excluding the road) and includes up to 38.85 ha of native vegetation and fauna habitat and 16.85 ha of previously cleared area and highly modified area.

Temporary clearing required: No

The project is to be assessed by the State Department of Environmental Regulation (DER) under the Commonwealth-State *Bilateral Agreement for Environmental Assessment of Matters of National Environmental Significance* (Bilateral Agreement).

An impact assessment of the project was undertaken and an *Impact Assessment of Clearing and matters of NES report* (this document) produced. The report outlines the key activities associated with the road project, the existing environment and an assessment of native vegetation clearing and matters of NES. This assessment provided an evaluation of the impacts and strategies used to manage them. Key impact assessment points are listed below.

Key Clearing Impact Assessment Aspects

The key impacts of native vegetation clearing associated with the project include:

- A biological desktop assessment and field survey for the Project was completed by GHD (2015a).
- The Clearing requirements for the Project were assessed against the Ten Clearing Principles. Clearing of 38.85 ha of native vegetation within the Project area is at variance with Principle (a), (b), (e) and (h). The Project is not likely to be at variance to the other Principles.
- Terrestrial fauna – the loss of potential fauna habitats for two species of conservation significant fauna (Red-tailed Phascogale and Carnaby's Black Cockatoo). This will result in the overall reduction of habitat for both species and potentially impact local populations of both species.
- Flora and vegetation – loss of potentially *Endangered* vegetation (vegetation with less than 10% remaining in the State as defined in English and Blyth, 1999). The local and

regional impacts on the loss of vegetation associations have been assessed using the mapped extent of the pre-European (Beard 1979) vegetation associations within the Project area. The Project will result in the clearing of a portion of two potentially *Endangered* vegetation associations (352 and 1049) which are below the 10 % threshold level for the state, IBRA bioregion and subregion. The Project has been re-designed to avoid any impact on the Priority 1 flora taxon *Eremophila glabra* subsp. York (P.G. Wilson 21172 B) located during the biological assessment.

Matters of National Environmental Significance Aspects

Based on the biological survey (GHD 2015a) and this assessment it is considered the Project may have a negative impact on populations of the Red-tailed Phascogale and Carnaby's Black Cockatoo.

Key Environmental Management Actions

Project specific environmental management actions have been developed to manage potential clearing and MNES impacts.

Environmental Factors	Management Action
Reserves and conservation areas (vegetation clearing)	<ul style="list-style-type: none"> No clearing is permitted at the Class A reserve, located at 42.34 SLK. Minor clearing within Class C reserve to be strictly controlled through design, signage and site marking.
Pollution and Litter (fauna)	<ul style="list-style-type: none"> All waste materials from the Project area will be removed from the site upon completion of the project and to the satisfaction of the Project Manager or Site Supervisor. Construction waste and other rubbish will be contained in bins with lids (where practicable) and removed regularly.
Surface Drainage (vegetation)	<ul style="list-style-type: none"> Road design should maintain existing surface water flows and incorporate soil erosion control measures. Vegetation removal and soil disturbance will be minimised, where practicable. Disturbed areas will be stabilised soon after construction activities are completed. Existing natural drainage paths and channels along the road or the vicinity of the Project area will not be unnecessarily blocked or restricted during project construction. Vehicle and equipment wash down areas will be located away from environmentally sensitive areas No on-site storage of fuel, oils and other contaminant materials will be permitted within 50 m of a watercourse.
Fire (vegetation and fauna)	<ul style="list-style-type: none"> No fires shall be lit within the Project area. Machinery will be fitted with approved spark arresting exhaust systems. All vehicles, plant and equipment to be fitted with fire extinguishers and restricted and to designated cleared areas. A water tanker/fire fighter unit will be on site at all times during project construction and personnel trained in their use. All hot works will be undertaken in accordance with standard safety procedures Construction personnel will extinguish and report fires occurring within the Project area.
Topsoil (vegetation)	<ul style="list-style-type: none"> Topsoil will be managed according to Main Roads Topsoil Management Guideline (TRIM Doc D12#256186). The movement of topsoil will be restricted to the limits of the Project area. Where possible construction activities will be undertaken in summer to reduce the potential for soil erosion and drainage line siltation due to vegetation removal and heavy rains.

Environmental Factors	Management Action
Species specific management actions – Red-tailed Phascogale and Carnaby's Black Cockatoo (MNES - Scenario 1 - Construction to be undertaken during the breeding season)	<ul style="list-style-type: none"> • Development and implementation of a DPaW approved handling and relocation protocol. • Undertake pre-clearance surveys of trees identified as having hollows suitable for Carnaby's Black Cockatoo and Red-tailed Phascogale
Species specific management actions – Red-tailed Phascogale and Carnaby's Black Cockatoo (MNES - Scenario 2 - Construction to be undertaken outside the breeding season)	<ul style="list-style-type: none"> • Check all trees identified as having suitable hollows for both species to remove any fauna in the hollows prior to clearing. • Clearly delineate the extent of the disturbance footprint (clearing footprint) with coloured pegs. • Prior to clearing/ construction operations the surveyor will mark out the clearing line and this will be checked by Main Roads Environment Officer to determine that it is clearly defined and compliant with permits. • The extent of this clearing will be clearly communicated in documentation and accurately demarcated on-ground. • All project construction personnel will be inducted prior to the commencement of works. The induction program will include communication about the 'No Go Areas', importance and consequences of entering/disturbing these areas. • Regular review of the disturbance footprint boundary to ensure 'No Go Areas' are clearly delineated • Restrict construction personnel to the disturbance footprint including designated access routes and parking areas. Fauna encountered during the construction process shall be given the chance to move on if there is no threat to the person's safety in doing so. The Ecologist will be suitably experienced and licensed and will be available at all times during the clearing phase to interact with fauna that cannot move away freely.

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1. Introduction

1.1 Assessment scope

GHD Pty Ltd (GHD) has been commissioned by Main Roads Western Australia (Main Roads) to prepare an Impact Assessment of Clearing (IAC) and Matters of National Environmental Significance (MNES) for the proposed upgrade of three sections of York - Merredin Road between Straight Line Kilometre (SLK) 1.95 and SLK 51 (the Project) in the Avon Wheatbelt region of Western Australia.

The preparation of this IAC and MNES report has included the results from a biological desktop and field assessment (GHD 2015a) and an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) (GHD 2015b). This assessment was undertaken to support an application for a purpose clearing permit for the York to Merredin Widening between Straight Line Kilometres (SLK) 1.95 and SLK 51.

1.2 Project description

Main Roads is proposing to upgrade three sections of the York - Merredin Road, in the Avon Wheatbelt region of Western Australia between SLK 1.95 and SLK 51.

Gradual and steady increases in traffic levels along the York-Merredin Road have occurred as a result of increased grain freight movements in the area. This has increased the volume of vehicles using the York-Merredin Road to access the Co-operative Bulk Handling (CBH) bins in the area. The width of the existing road is unsuitable for the increased traffic and these works are required to improve the road geometry and general road safety attributes along this section of road.

The three sections to be upgraded are at SLK 1.95 to SLK 15, SLK 19 to SLK 29 and SLK 29 to SLK 51 (Figure 1 Appendix A). The proposed Project will consist of the following:

- Road widening for three sections of road
- The extension of 24 culverts, one new culvert and the upgrade of 13 existing culverts with wider culverts in the first section (SLK 1.95 to SLK 15)
- The replacement of six culverts and extension of 10 culverts in the second section (SLK 19 to SLK 29)
- The replacement of 21 culverts extension of 26 and one new culvert in the third section (SLK 29 to SLK 51)

The Project will not involve any changes to the four main watercourses which occur along the York – Merredin Road. Main Roads will maintain the current watercourse crossing structures as part of the proposed road upgrade.

1.3 Project location

The Project is located on the York – Merredin Road at SLK 1.95 to SLK 15, SLK 19 to SLK 29 and SLK 29 to SLK 51. The proposed works are within the Shires of York and Quairading. The Project will start east of York at SLK 1.95 and finish approximately 9 kilometres (km) east of Mawson at SLK 51. The Project area is shown in Figure 1, Appendix A. The Project area is the maximum disturbance footprint and includes the clearing area for native vegetation and fauna habitat. The final design has not been developed for this Project. The disturbance footprint calculations have been based on the 'Project area', which is based on the concept design for

this Project. The Project area includes a 10 % buffer to allow for design changes between concept design and final design.

The Project area is approximately 55.70 ha (excluding the road) and includes 38.85 ha native vegetation and fauna habitat and 16.85 ha of previously cleared area and highly modified area (Figure 1, Appendix A).

1.4 Project costs and benefits

The project will cost approximately \$32,000,000 and will employ 35-55 people, many from the local area, depending on whether it is constructed over several years or all at once. The construction of the widened road will create a safer environment for local road users as well as reducing wear and tear on grain trucks and saving time for grain freight movements. There will be temporary disruption for local road users but ultimately a safer and quicker road access with no dis-benefits for the few farm houses in the vicinity of the road.

1.5 Scope and limitations

This report has been prepared by GHD for Main Roads and may only be used and relied on by Main Roads for the purpose agreed between GHD and the Main Roads as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Main Roads arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Main Roads and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Methodology

2.1 Biological assessment

A biological assessment including desktop assessments and field survey for the Project was conducted during the early design phase for the Project (GHD 2015a).

The desktop components utilised a range of information sources (detailed in GHD 2015a at Appendix B) including the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool with a 5 km buffer (DotE 2015 Appendix C) and *NatureMap* search with a 5 km buffer (DPaW 2007-).

The assessment of the vegetation and flora components was consistent with a Level 1 assessment in accordance with the Environmental Protection Authority (EPA) Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004a). Elements of the survey were consistent with a detailed Level 2 survey (EPA 2004a); however, the survey was conducted in one season only. GHD completed the vegetation and flora assessment of the Study area from 9th to 11th September 2014. The fauna assessment was consistent with a Level 1 survey (reconnaissance survey) with regard to the requirements of the EPA Guidance Statement No. 56 *Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004b).

As the Project progressed, design alterations were made by Main Roads which changed the Project area. Consequently some sections of the Study area were no longer included as part of the impact assessment and some additional areas were added. GHD completed a site investigation on 30 June 2015 to capture additional biological data that may not have been included as part of the survey in September.

This biological assessment aimed to identify the key biological values in the Study area (which was larger than the Project area), as described in Appendix B. The proposed Project area was specified with consideration to the biological assessment results.

2.2 Environmental Impact Assessment and Environmental Management Plan

An Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) (GHD 2015b) was undertaken to assess the potential impacts to the environmental values associated with the Project area. The assessment considered the results from the biological assessment (GHD 2015a), GIS shapefiles, and relevant government agency managed databases with respect to the Project area and broader Study area.

2.3 Clearing Impact and Matters of National Environmental Significance Assessment

This IAC and MNES report includes an assessment of the Project impacts to native vegetation clearing and MNES protected under the EPBC Act that were identified in the:

- Biological assessment (GHD 2015a)
- EIA & EMP (GHD 2015b)

3. Clearing of native vegetation

Native vegetation describes all indigenous aquatic and terrestrial vegetation (living or dead). The term does not include vegetation that was intentionally sown, planted or propagated unless it was required under a statutory condition.

3.1 Measures to avoid and minimise clearing

Justification of Project

There has been an increase in the grain freight movements along the York - Merredin Road (approximately SLK 1.95 to 51) to access the Co-operative Bulk Handling (CBH) bins in the area. The existing width of the current road does not support the increased traffic and these proposed works are required to improve the road geometry and general road safety attributes along this section of road.

Avoidance of impacts

The proposed Project area (ie clearing area) has been designed with consideration to:

- The biological assessment (GHD 2015a) which identified the key biological values in the area.
- The Project area has been refined, where possible, to minimise direct and indirect impacts to the two DPaW managed Nature Reserves and a Shire conservation reserve.
- The Project will not involve the clearing or removal of any part of the Class A Reserve (No. 46074). A maximum of 0.35 ha of the Class C Reserve (Hardy Nature Reserve No. 40642) will be unavoidable cleared.
- An Aboriginal Heritage Risk Assessment (AHRA) was completed for the three sections of the road. Main Roads will not be impacting site 5671.
- No disturbance is permitted to the heritage site located at SLK 20.8. A 5 metre (m) disturbance zone will be applied to this heritage site to prevent interference.
- The existing road intersects Mackie River at three locations in Section 1 and Section 2, and one other large unnamed watercourse. The Project area does not include these four watercourses. The Project will not involve any changes to these four watercourses which occur along the York – Merredin Road. Main Roads will maintain the current watercourse crossing structures as part of the proposed road upgrade. Limited clearing will occur within riparian vegetation but will be exempt from the Clearing Permit assessment as it is covered under a Bed and Banks Permit which has been applied for by Main Roads for Project activities.

During the detailed design process for the Project Main Roads will aim to refine the design to reduce the Project area to a smaller area by positioning the disturbance footprint directly adjacent to the road within the more degraded areas where possible.

One of the key strategies to avoid impacts to native vegetation, fauna and habitat during the construction phase of the Project is to strictly adhere to clearing and disturbance boundaries. The clearing area will be established by a surveyor and pegged and then checked by a member of the Main Roads environment team before clearing is approved and then it will be checked again after clearing.

Prior to clearing, pre-clearance surveys of trees identified as having hollows suitable for Carnaby's Black Cockatoo and Red-tailed Phascogales will be undertaken. Also, all trees identified as having suitable hollows for both species of Black Cockatoo will be checked to remove any fauna in the hollows prior to clearing.

3.2 Existing vegetation

The vegetation in the broader Study area is presented in biological assessment (GHD 2015a), with the Project area described in the EIA&EMP (GHD 2015b). Both of these reports are reproduced in Appendix B. The following information relates to the Project area.

3.2.1 Project area vegetation association description

Broad scale (1:250,000) pre-European vegetation mapping of the region was completed by Beard (1979) at an association level, which indicates that there are three vegetation associations present within the Project area (Table 1).

Table 1 Pre-European (Beard 1979) vegetation associations

Vegetation Association	Description
352	Medium woodland; York gum
694	Shrublands; scrub-heath on yellow sandplain <i>Banksia-Xylomelum</i> alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet

The extent of the vegetation associations has been determined by the state-wide vegetation remaining extent calculations maintained by DPaW (Government of Western Australia 2013). As shown in Table 2, the remaining extent of the vegetation associations occurring within the Project area are all below 30 % threshold level for the state, IBRA bioregion and subregion and Local Government Area (LGA) levels and are therefore considered potentially *Endangered* (as defined by English and Blythe, 1999). Vegetation type 1049 has less than 10 % remaining at the State, bioregion, and local levels, indicating that that it is *Critically Endangered* (EPA 2000).

Table 2 Vegetation association extent and status (Government of Western Australia 2013)

Vegetation association	Scale	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	% Current Extent in All DPaW managed lands
IBRA bioregion (Avon Wheatbelt)		9,517,109.9	1,778,407.08	18.69	9.7
IBRA subregion (Katanning)		2,992,929.35	409,618.23	13.69	11.34
352	State	724,272.97	143,677.92	19.84	8.67
	Bioregion	630,581.76	110,128.6	17.46	9.25
	Sub-region	337,875.88	37,246.78	11.02	1.95
	LGA (Shire of York)	89,947.59	8,617.77	9.58	0.63
694	State	346,493.81	67,339.93	19.43	47.26
	Bioregion	173,921.55	12,192.19	7.01	12.91
	Sub-region	94,465.31	6,947.63	7.35	11.62
	LGA (Shire of York)	3,861.69	392.86	10.17	4.91
1049	State	833,384.77	56,843.2	6.82	5.76
	Bioregion	833,384.77	56,843.2	6.82	5.76
	Sub-region	255,402.63	20,575.63	8.06	1.34
	LGA (Shire of York)	22,472.17	2,433.1	10.83	0.14
	LGA (Shire of Beverley)	39,715.35	3,002.84	7.56	1.42
	LGA (Shire of Quairading)	88,403.35	5,728.39	6.48	2.83

3.2.1 Project area vegetation type and condition description

Vegetation types

The field survey of the Project area identified the Project area as likely to have supported a variety of Eucalypt woodlands including York Gum (*Eucalyptus loxophleba*) and Jam (*Acacia acuminata*) woodlands, Wandoo (*E. wandoo*) woodlands, York Gum and Salmon Gum (*E. salmonophloia*) woodlands and Wandoo and Salmon Gum woodlands prior to European settlement. However, the Project area occurs within a road reserve and much of the road reserve has been either historically cleared or is otherwise highly modified.

A total of eight vegetation types and one highly modified vegetation type were identified within the Project area utilising a combination of results from quadrat and transect assessments and comparisons with aerial photography. The majority of the road reserve supported an overstorey of scattered native Eucalypt species over a highly cleared understorey dominated by weeds. The extent of each vegetation type in the Project area is detailed in Table 3.

Table 3 Extent of vegetation types in Project area

Vegetation types (GHD 2015b)	Project Area (ha)
Cleared	16.85 ha
EIAaW: York Gum and Jam woodland	5.93 ha
EIEsW: York and Salmon Gum woodland	3.32 ha
EwAhAaW: York, Wandoo and Jam woodland	2.10 ha
EwW: Wandoo woodland	3.59 ha
CoW: Salt Sheoak woodland	2.56 ha
TsS: Samphire shrubland	0.64 ha
Scattered Eucalypt trees	19.82 ha
EwEsW: Wandoo and Salmon Gum woodland	0.82 ha
TaS: Mixed Heath	0.05 ha
TOTAL	55.70 ha
Total native vegetation within Project area (excluding cleared areas)	38.85 ha

Vegetation condition

The condition of the vegetation in the Project area was rated according to the Keighery scale (Keighery 1994) and is presented in Table 4.

Much of the Project area (68 %) was very highly modified, with only scattered native species remaining and was rated Condition 6 (*Completely Degraded*). Sections of the road reserve that contained native vegetation but which did not have all vegetation layers intact and which were dominated by weeds, were rated Condition 5 or 5- 6 (*Degraded – Completely Degraded*) (13 % of the Project area). The remaining majority of the vegetation adjacent to the road had been impacted by previous clearing and works associated with the road and while some layers of the vegetation structure remained intact, the understorey was generally highly impacted by weeds, this vegetation was rated as Condition 4 or 4-5.

Table 4 Vegetation condition in the Project area components

Vegetation Condition	Project Area (ha)
2-3	2.35
3	0.79
3-4	1.32
4	0.46
4-5	5.29
5	1.23
5-6	6.14
6*	38.12
TOTAL	55.70

* This includes the cleared areas.

3.3 Assessment against the 10 clearing principles

In assessing whether the Project is likely to have a significant impact on the environment, the Project was assessed against the Ten Clearing Principles (*Environmental Protection Act 1986* Schedule 5).

For the purpose of this impact assessment, it has been assumed that the construction will require clearing and potential permanent loss of up to 38.85 ha of native vegetation and fauna habitat and 16.85 ha of previously cleared area and highly modified areas, totalling 55.70 ha.

This assessment has identified that clearing for the Project is at variance to Principle (a), (b), (e) and (h). The Project is not likely to be at variance to the other Principles.

3.3.1 Ten clearing principles assessment

a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Project is at variance to this Principle

Assessment - Flora and Vegetation

The Project area is located within the road reserve and has been either historically cleared or is otherwise highly modified. The majority of the road reserve supported an overstorey of scattered native Eucalypt species over a highly cleared understorey dominated by weeds.

Broadscale vegetation mapping of the area undertaken by Beard (1979) identified three vegetation associations within the Project area.

- Vegetation association 352: Medium woodland; York gum
- Vegetation association 694: Shrublands; scrub-heath on yellow sandplain *Banksia-Xylomelum* alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions
- Vegetation association 1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet

The biological assessment (GHD 2015a) determined that the Project area contains eight vegetation types and one highly modified vegetation type.

- 16.85 ha Cleared
- 5.93 ha York Gum and Jam woodland
- 3.32 ha York and Salmon Gum woodland
- 2.10 ha York, Wandoo and Jam woodland
- 3.59 ha Wandoo woodland
- 2.56 ha Salt Sheoak woodland
- 0.64 ha Samphire shrubland
- 19.82 ha Scattered Eucalypt trees
- 0.82 ha Wandoo and Salmon Gum woodland
- 0.05 ha Mixed Heath

The biological assessment found the vegetation of the Project area ranged between Condition 2 - 3 (*Excellent – Very Good*) to Condition 6 (*Completely Degraded*) using the Keighery (1994) vegetation condition rating. Much of the Project area (38.12 ha) was very highly modified, with only scattered native species remaining and was rated Condition 6 (*Completely Degraded*). Sections of the road reserve that contained native vegetation but which did not have all vegetation layers intact and which were dominated by weeds, were rated Condition 5- 6 (*Degraded – Completely Degraded*) (6.14 ha).

No vegetation types that were considered likely to be TECs were recorded within the Project area during the biological assessment. The vegetation types mapped within the Project area as 'York Gum and Jam woodland' (EIAaW), 'York and Salmon Gum woodland' (EIEsW), 'Wandoo woodland' (EwW), 'York Gum and Wandoo woodland over Jam low woodland' (EIEwAaW) and 'Wandoo and Salmon Gum woodland' (EwEsW) are all considered to be representative of the Eucalypt Woodlands within the Western Australian Wheatbelt Priority 3 PEC. However, some degraded sections of these vegetation types can no longer be considered as a woodland, and it is likely that only the areas mapped as Condition 5 (*Degraded*) or higher can be considered as this community. A search of the *NatureMap* database (DPaW 2007-) indicated a total of 585 flora taxa have been previously recorded within 5 km of the Project area.

The biological assessment recorded a total of 208 flora taxa (including subspecies and varieties). This total comprised 145 (69.7 %) native taxa and 63 (30.3 %) introduced taxa. This survey was done in one season (Spring 2014) and may not have recorded all of the flora species that occur within the Project area.

The desktop and field surveys determined that no Threatened flora species are known to occur within the Project area and none are likely to occur.

A desktop likelihood of occurrence assessment (based on the range, habitat requirements, previous records of the species and efficacy of survey) identified 48 conservation significant flora species that may possibly occur within the Project area. Based on the field survey, few of these species were considered likely to occur in the vegetation that would be cleared in the Project area, due to their habitat requirements.

Two Priority flora species were recorded during the biological field assessment within the Project area: *Hemigenia platyphylla* (Priority 4); and *Eremophila glabra* subsp. York (P.G. Wilson 21172 B) (Priority 1). No individuals of *Eremophila glabra* subsp. York (P.G. Wilson 21172 B) will be cleared as the Project design has been modified to avoid this important population. Two plants of *Hemigenia platyphylla* will be cleared as part of the proposed Project.

Fauna

The biological assessment (GHD 2015a) determined the vegetation within the Project area supports six fauna habitat types:

- 15.77 ha Eucalypt woodlands
- 0.64 ha Saline areas along drainage lines
- 2.56 ha Salt Sheoak (*Casuarina obesa*) in lower lying areas
- 0.05 ha Mixed heathland
- 19.82 ha Scattered roadside trees
- 16.85 ha Highly modified areas (dominated by weeds)

A search of the *NatureMap* database (DPaW 2007-) identified 233 fauna taxa previously recorded within 5 km of the Project area. This comprised of 118 birds, 49 reptiles, 20 mammals, ten amphibians and 36 invertebrates. The biological assessment field survey recorded a total of 61 fauna species, consisting of 57 birds, two reptiles and two mammals, of which 57 are native species and four are introduced species.

A likelihood of occurrence assessment identified 24 conservation significant fauna within 5 km of the Project area. Three of these species were considered likely to occur (based on the range, habitat requirements and previous records of the species) within the Project area:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Red-tailed Phascogale (*Phascogale calura*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.

- Rainbow Bee-eater (*Merops ornatus*) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act.

No other fauna species of conservation significance are considered likely to occur in the Project area.

Surrounding environment

The Project area is located within the road reserve. The road reserve is a designated State road reserve and is therefore managed by Main Roads and under the control of the Commissioner for Main Roads. The Project area is not located within a conservation reserve or area and Main Roads are aiming to avoid any clearing or removal of any part of the reserves adjacent to the Project area. The proposed clearing is not expected to impact on any of the conservation areas in close proximity to the Project area. There are no Environmentally Sensitive Areas within or adjacent to the Project area and no impacts to ESAs from the project are likely to occur.

Outcome

The clearing of up to 38.85 ha of native vegetation and fauna habitat is likely to result in the clearing of native vegetation that has similar biodiversity attributes to that of the surrounding native vegetation, within a highly cleared landscape. Approximately 6 - 7 ha of the Priority 3 PEC, Eucalypt Woodlands within the Western Australian Wheatbelt, in varying vegetation condition, occurs within the Project area. The project will also involve the clearing of two plants of *Hemigenia platyphylla* (Priority 4). The Project area also contains habitat for conservation significant fauna species: Carnaby's Black Cockatoo (35.59 ha); Red-tailed Phascogale (38.15 ha); and Rainbow Bee-eater (may potentially occur throughout the entire Project area on an opportunistic basis), which are considered as likely to occur within the Project area. Therefore clearing of 38.85 ha of native vegetation within the Project area may be at variance to this Principle.

Methodology

Beard (1979)

DotE (2015) (Appendix C)

GHD (2015a)

GHD (2015b)

NatureMap - (DPaW 2007–)

Keighery (1994)

DPaW shapefiles

b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Project is at variance to this Principle

The biological assessment (GHD 2015a) determined the vegetation within the Project area supports six fauna habitat types:

- 15.77 ha Eucalypt woodlands
- 0.64 ha Saline areas along drainage lines
- 2.56 ha Salt Sheoak (*Casuarina obesa*) in lower lying areas
- 0.05 ha Mixed heathland
- 19.82 ha Scattered roadside trees
- 16.85 ha Highly modified areas (dominated by weeds)

A search of the *NatureMap* database (DPaW 2007–) identified 233 fauna taxa previously recorded within 5 km of the Project area. This comprised of 118 birds, 49 reptiles, 20 mammals, ten amphibians and 36 invertebrates.

Desktop searches of the EPBC Act PMST (DotE 2015 in Appendix C) and Western Australian Museum/DPaW *NatureMap* records (DPaW 2007–) within a 5 km buffer of the Project area identified the presence or potential presence of 24 conservation significant fauna species within the Project area, including:

- Ten fauna species listed under the EPBC Act and WC Act.
- One fauna species listed under the WC Act.
- Five fauna species listed under DPaW.
- Three specially protected terrestrial fauna listed under the WC Act.

- Five Migratory and/or Marine species.

The biological assessment field survey recorded a total of 61 fauna species, consisting of 57 birds, two reptiles and two mammals, of which 57 are native species and four are introduced species. The introduced species recorded included the European Rabbit (*Oryctolagus cuniculus*), the Sheep (*Ovis aries*), the Rainbow Lorikeet (*Trichoglossus haematodus*) and the Laughing Kookaburra (*Dacelo novaeguineae*).

A likelihood of occurrence assessment determined that three species were considered likely to occur within the Project area:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Red-tailed Phascogale (*Phascogale calura*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Rainbow Bee-eater (*Merops ornatus*) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act.

The Project is likely to impact on fauna species through the loss of habitat - clearing and would result in the permanent loss of up to 38.85 ha of fauna habitat, including potential habitat for fauna species of conservation significance. Furthermore, this clearing would also serve to reduce the functionality of the remaining habitat alongside the road. The impacts are likely to lead to incremental losses (i.e. fragmentation, barrier effects, edge effects).

Impacts to Carnaby's Black Cockatoo habitat are predicted as a result of the Project. The Project area provides foraging, potential breeding and roosting habitat for Carnaby's Black Cockatoo. The key potential impacts to Carnaby's Black Cockatoo resulting from clearing of the Project area is the loss of habitat including:

- Loss of an estimated 35.59 ha of foraging habitat including:
 - 15.77 ha of Eucalypt woodland.
 - 19.82 ha of scattered roadside Eucalypt trees.
- Loss of potential breeding habitat which includes 592 potential habitat trees, of which 20 trees currently have hollows that provide nesting opportunities for the Carnaby's Black Cockatoo.
- The remaining 572 potential breeding these trees do not contain suitable breeding hollows at present but have a DBH (Diameter Breast Height) greater than 300 millimetres (mm) or 500 mm and have the potential to develop a suitable nest hollow in the future.
- Suitable roosting habitat occurs throughout the Project area and consists of Eucalypt woodland and tall mature trees located in proximity to permanent water sources (e.g. farm dams).

The Red-tailed Phascogale has been identified as likely to occur within the Project area. Given that the Project is located within the known breeding range of the species and that there is preferred habitat within the Project area (e.g. in the form of hollow-bearing Eucalypts and *Allocasuarina*), it has been assumed that the species could utilise the habitat within the Project area for breeding and therefore likely to be impacted as a result of the Project. The key potential impacts to Red-tailed Phascogale resulting from clearing of the Project area is:

- Loss of an estimated 38.15 ha of suitable habitat including foraging, nesting and breeding habitat (i.e. hollow bearing trees). It is difficult to estimate the number of hollow-bearing trees within the Project area as counts for hollows suitable for Red-tailed Phascogale were not undertaken, however the presence of hollows (e.g. 20 hollows of suitable size for breeding for Carnaby's Black Cockatoo) and additional smaller hollows provides an indication that potentially suitable hollows for breeding may be present within the Project area.

Outcome

The clearing of native vegetation for the Project includes habitat for specially protected or Threatened fauna species: Carnaby's Black Cockatoo; Red-tailed Phascogale; and Rainbow Bee-eater, which are all likely to occur within the Project area. As such, the Project is at variance to this Principle.

GHD (2015a)

GHD (2015b)

NatureMap - (DPaW 2007–)

DotE (2015) (Appendix C)

c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Project is not likely to be at variance to this Principle

No Threatened flora species were recorded within the Project area during the field survey in September 2014 (GHD 2015a).

Desktop searches (GHD 2015b and DotE 2015 in Appendix C) indicated that 23 Threatened flora may occur within 5 km of the Project area. The likelihood of occurrence assessment (based on the range, habitat requirements, previous records of the species and efficacy of survey) determined that no Threatened species are likely or to possibly occur within the Project area.

Outcome

The Project is not likely to be at variance to this Principle.

GHD (2015b)

DotE (2015) (Appendix C)

NatureMap - (DPaW 2007-)

DPaW shapefiles

d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a Threatened Ecological Community.

Project is not likely to be at variance to this Principle

A search of the EPBC Act Protected Matters Search Tool (DotE 2015 in Appendix C) and DPaW TEC database (GHD 2015a) identified no Threatened Ecological Communities (TEC) within 20 km of the Project area.

No TECs were identified during the field study and none are likely to occur within the Project area.

Outcome

The Project is not likely to be at variance with this Principle.

GHD (2015a)

DotE (2015) (Appendix C)

DPaW shapefiles

e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Project is at variance to this Principle

The Project area is located within the Avon Wheatbelt IBRA bioregion. This IBRA bioregion has less than 18.69 % of its pre-European extent remaining (Government of Western Australia 2013). Pre-European (Beard 1979) mapping indicates that the Project area contains three vegetation associations (Vegetation associations 352, 694 and 1049) (GHD 2015b).

Beard mapping has been adapted and digitised by the Department of Agriculture (Shepherd et al. 2002). The extent of the vegetation associations has been determined by the state-wide vegetation remaining extent calculations maintained by DPaW (Government of Western Australia 2013) (see table below).

Vegetation association extent

Vegetation association	Scale	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	% Current Extent in All DPaW managed lands
IBRA bioregion (Avon Wheatbelt)		9,517,109.9	1,778,407.08	18.69	9.7
IBRA subregion (Katanning)		2,992,929.35	409,618.23	13.69	11.34
352: Medium woodland; York gum	State	724,272.97	143,677.92	19.84	8.67
	Bioregion	630,581.76	110,128.6	17.46	9.25
	Sub-region	337,875.88	37,246.78	11.02	1.95
	LGA (Shire of York)	89,947.59	8,617.77	9.58	0.63
694: Shrublands; scrub-heath on yellow sandplain <i>Banksia-Xylomelum</i> alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	State	346,493.81	67,339.93	19.43	47.26
	Bioregion	173,921.55	12,192.19	7.01	12.91
	Sub-region	94,465.31	6,947.63	7.35	11.62
	LGA (Shire of York)	3,861.69	392.86	10.17	4.91
1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	State	833,384.77	56,843.2	6.82	5.76
	Bioregion	833,384.77	56,843.2	6.82	5.76
	Sub-region	255,402.63	20,575.63	8.06	1.34
	LGA (Shire of York)	22,472.17	2,433.1	10.83	0.14
	LGA (Shire of Beverley)	39,715.35	3,002.84	7.56	1.42
	LGA (Shire of Quairading)	88,403.35	5,728.39	6.48	2.83

The remaining extents of the vegetation associations mapped within the Project area (352, 694 and 1049) are all below 30 % threshold level for the state, IBRA bioregion and subregion and Local Government Area (LGA) levels and are therefore considered potentially *Endangered*.

The clearing of up to 38.85 ha of native vegetation within the Project area would result in clearing of less than 9.88 per cent of the remaining extent of Beard's (1979) vegetation association 694 at the LGA level and less than 1.59 percent for all other levels.

There is approximately 65,551.87 ha of native vegetation remaining within 10 km of the Project area (Western Australian Agriculture Authority (WAAA), 2015 GIS databases). The vegetation in the Project area (approximately 38.85 ha) represents less than 0.06 % of the vegetation remaining within 10 km of the Project area.

The Project area is surrounded by farming lands in an area which is largely cleared. The Project area is located in a region that is used for agriculture and is largely cleared.

Outcome

The project involves the clearing of up to 38.85 ha of native vegetation in varying condition, as follows:

Vegetation Condition	Project Area (ha)
2-3	2.35
3	0.79
3-4	1.32
4	0.46
4-5	5.29
5	1.23
5-6	6.14
6*	21.27
TOTAL	38.85

* This includes the cleared areas

This vegetation is habitat suitable for protected and/or Threatened fauna species considered likely to occur within the Project area (Carnaby's Black Cockatoo; Red-tailed Phascogale; and Rainbow Bee-eater). Vegetation associations mapped by Beard (1979) and digitised by Shepherd et al. (2002) within the Project area are all below the 30 % threshold level at all levels and are considered *Vulnerable*. Vegetation types 352 and 1049 (York Gum and wandoo woodlands) have less than 10% remaining at most scales, as does the IBRA Avon region, and are therefore considered to be *Endangered* (English and Blythe, 1999). Clearing for the project will also increase the fragmentation and reduce habitat corridors and connectivity for remnant vegetation within the local area and region. As such, the Project is at variance to this Principle.

Beard (1979)

GHD (2015b)

Government of Western Australia (2013)

Shepherd et al. (2002)

WAAA (2015) remnant vegetation mapping

Aerial photography

f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Project not likely to be at variance to this Principle

A search of the EPBC Act Protected Matters Search Tool (DotE 2015 Appendix C) indicated that no Wetlands of International Importance (i.e. listed under the Ramsar Convention) or Nationally Important Wetlands occur within the Project area or within 5 km of the Project area. In addition the field assessment did not identify any wetlands within the Project area.

The existing York to Merredin Road intersects Mackie River at three locations in Section 1 and Section 2, and one other large unnamed watercourse, however the Project area does not include these four watercourses. The Project will not involve any changes to these four watercourses which occur along the York – Merredin Road.

Native vegetation associated with drainage lines occurs throughout the Project area, in the form of samphire shrublands with *Juncus* sedgeland with Salt Sheoak (*Casurina obesa*) and York Gum fringing the drainage areas. A total of 0.64 ha of this vegetation was located within the Project area, with 0.09 ha located at the large unnamed watercourse. The vegetation type Salt Sheoak woodland was recorded at the Mackie River. A total of 2.56 ha of this vegetation occurs throughout the Project area, however 0.13 ha of this vegetation was located at the Mackie River and would be considered riparian vegetation.

Outcome

The clearing will be undertaken under a Bed and Banks permit (under the Rights in Water and Irrigation Act, 1915) and is therefore exempt for consideration under the vegetation clearing permit process.

GHD (2015a)

GHD (2015b)
DoW (2015)
DotE (2015) (Appendix C)

g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Project is not likely to be at variance to this Principle

The Project area is located within the road reserve, is linear in nature and has been either historically cleared or is otherwise highly modified.

The soils of the Project area consist of grey sandy duplexes, yellow and brown sandy earths, brown and red loamy earths, red loamy duplexes, deep sands and shallow sands (GoWA 2015). The soils recorded during the field assessment ranged from grey clayey-sandy-loam with good drainage to brown loamy-sands and brown sandy-loams also with good drainage (GHD 2015a).

The Natural Resource Management Shared Land Information Platform (SLIP) has mapped the salinity risk of the Project area as ranging between '<3% to 30 - 50 % of map unit has a moderate to high salinity risk or is presently saline' (GoWA 2015). This indicates that there is a low to very high risk of salinity occurring throughout the Project area. Due to the nature of the project (long and linear), clearing of native vegetation in the Project area is unlikely to increase the risk of salinity in the Project area and surrounding areas.

The Natural Resource Management SLIP has mapped the waterlogging risk as '10-30% to >70% of map unit has a moderate to very high waterlogging risk' and flooding risk as areas with a no risk rating up to areas with '>70% of the map unit has a moderate to high flood risk' (GoWA 2015a). This indicates that there is a very low to high risk of waterlogging and flooding throughout the Project area.

The risk of water erosion was mapped as predominantly '3-10% of map unit has a high to extreme water erosion risk' throughout the Project area. A small section in the north west of the Project area had a water erosion risk ranging between '10-30% to 50-70% of map unit has a high to extreme water erosion risk'. This indicates that there is a moderate to high risk of water erosion risk within the north west of the Project area, but the remaining Project area has a low risk of water erosion occurring as result of clearing for the project.

The Natural Resource Management SLIP has mapped wind erosion risk between '10-30 % to >70% high to extreme wind erosion risk' for the Project area (GoWA 2015). The sand content of the soils and ease with which these materials can be transported by the wind means there is a risk of wind erosion in this area, where vegetation is completely cleared to bare soil.

The Natural Resource Management SLIP mapped the Phosphorus export risk as between '3-10% to >70% high to extreme phosphorus export risk' for the Project area (GoWA 2015a). This indicates that there is a low to very high risk of nutrient export throughout the Project area.

A review of the Natural Resource Management SLIP indicates that the majority of the Project area is located within an area that has a no ASS layer detected. The ASRIS database (2015) indicates that the Project area is classified as Extremely Low Probability or Low Probability of Occurrence.

Outcome

The narrow, linear nature of the Project area in an already highly modified and cleared landscape is not considered likely to increase wind erosion, salinity, ground water recharge, surface water runoff or nutrient export. As such, the Project is not likely to be at variance to this Principle.

ASRIS (2015)
GoWA (2015)
Natural Resource Management SLIP (GoWA2015)

h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Project is at variance to this Principle

The Project area is located within the road reserve. The road reserve is a designated State road reserve and is therefore managed by Main Roads and under the control of the Commissioner for Main Roads. The majority of the area surrounding the Project area consists of private land primarily used for cropping and grazing. A small portion of the surrounding land use consists of state and local government reserves.

Two Department of Parks and Wildlife (DPaW) managed properties are adjacent to the Project area:

- Hardey Nature Reserve (Class C, No. 40642) – is located on the north and south side of the road reserve at approximately SLK 10 in Section 1
- A Nature Reserve at Mawson (Class A, No. 46074) – is located on both sides of road reserve, between approximately SLK 42.2 and SLK 43, within Section 3

In addition there are two Shire reserves adjacent to the Project area:

- At approximately SLK 23 to SLK 23.5 there is a Shire reserve and crown land associated with Saint Andrew's church and cemetery, which contains remnant vegetation
- At approximately SLK 25 there is a Shire reserve named Cowering Well Conservation Reserve on the north side of the road

Outcome

The Project will unavoidably impact 0.35 ha of the Hardey Nature Reserve, due to the requirements for road design on a curve. There is also potential for indirect impact through changes in road drainage and the reduction in vegetation buffer adjacent to the reserves.

The Project area currently provides a buffer from the road to the conservation areas and is likely to act as an ecological linkage for fauna in an otherwise cleared and fragmented landscape.

Additionally this habitat contains habitat for specially protected and/or Threatened fauna species considered likely to occur within the Project area (Carnaby's Black Cockatoo; Red-tailed Phascogale; and Rainbow Bee-eater) and would act as a corridor linkage for these species. As such, clearing 38.85 ha of native vegetation within the Project area may impact on vegetated linkages within the region and as such, the Project is likely to be at variance with this Principle

DPaW reserve shapefiles

GHD (2015b)

- i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.**

Proposal is not likely to be at variance to this Principle

An assessment of the Department of Water (DoW) Geographic Data Atlas indicates the Project is within the Avon River water catchment area. This is a large catchment area (approximately 12.5 million ha) and the Project area comprises a very small section of this catchment. The Project area is not located within a Public Drinking Water Source Area (DoW 2015).

Clearing of native vegetation is not considered to be significant, as the native vegetation to be cleared comprises a very minor proportion (0.06 %) of the vegetation remaining within 10 km of the Project area (65,551.87 ha) (WAAA 2015). Therefore, the quality of surface and underground water in areas within and surrounding the Project area are unlikely to be impacted as a result of native vegetation clearing.

The narrow, linear nature of the Project area in an already highly modified and cleared landscape is not considered likely to increase wind erosion, salinity, ground water recharge, surface water runoff or nutrient export.

Also, clearing is not likely to significantly increase surface water runoff due to the porosity of the soils in the area.

The ASRIS database (2015) indicates that the Project area ASS risk has been classified as Extremely Low Probability or Low Probability of Occurrence. It is considered unlikely that the integrity of the surrounding environment will be significantly adversely impacted by ASS from the clearing of native vegetation.

Outcome

The clearing of 38.85 ha of vegetation is unlikely to cause deterioration in the quality of surface or underground water. As the Project is unlikely to impact on surface water flows or groundwater

quality or quantity the Project is not likely to be at variance to this Principle.

DoW (2015)

GHD (2015b)

GHD (2015a)

ASRIS database (2015)

WAAA (2015) remnant vegetation mapping

j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Proposal is not likely to be at variance to this Principle

The Project area is within the Avon River catchment area and comprises a very small extent of this catchment. As such, the clearing for the project is not likely to influence the potential flooding or waterlogging of the catchment area.

The Natural Resource Management SLIP has mapped the waterlogging risk as '10-30% to >70% of map unit has a moderate to very high waterlogging risk' and flooding risk as areas with a no risk rating up to areas with '>70% of the map unit has a moderate to high flood risk' (GoWA 2015). This indicates that there is a very low to high risk of waterlogging and flooding throughout the Project area.

Outcome

Given the narrow, linear nature of much of the Project area, clearing for the project is unlikely to increase the risk of flooding or waterlogging within the area. The soils consist primarily of sands and loam which are free draining. The clearing required for this Project is a very small amount of the overall catchment and as such the Project is not likely to be at variance to this Principle.

GHD (2015b)

GoWA (2015)

4. Matters of National Environmental Significance

An assessment of Project's impacts on the relevant MNES was undertaken. The biological assessment (GHD 2015a) and EIA & EMP (GHD 2015b) were used to determine the Project impacts on MNES. The MNES reported in the EPBC Act Protected Matters Search Tool (DotE 2015) are detailed in Table 5 and the PMST report is provided in Appendix C.

Table 5 Assessment of MNES and likely impact

MNES	Existing Environment and Likely Impact
Nationally listed threatened species or ecological communities	<p>Fauna</p> <p>The results of the field survey were combined with the results of the desktop assessment to provide a likelihood of occurrence assessment. Two species were considered likely to occur within the Project area based on the habitat types present within the Project area and species habitat requirements. These are:</p> <ul style="list-style-type: none"> • Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act. • Red-tailed Phascogale (<i>Phascogale calura</i>) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC

MNES	Existing Environment and Likely Impact
	<p>Act.</p> <p>Flora No Federally listed plant species are likely to be present, based on the likelihood of occurrence assessment for the Project area and field survey.</p> <p>Ecological communities No Federally listed communities are likely to be present, based on the likelihood of occurrence assessment for the Project area and field survey.</p>
<i>Justification of likely impact</i>	<p>Project activities will directly or indirectly impact the following species:</p> <p>Carnaby's Black Cockatoo The key potential impacts to Carnaby's Black Cockatoo resulting from clearing of the Project area is the loss of habitat including:</p> <ul style="list-style-type: none"> • Loss of an estimated 35.59 ha of habitat including foraging and potential breeding and roosting habitat. • Loss of potential breeding habitat includes 592 potential habitat trees. • 20 of these trees contains suitable hollows for breeding. • The remaining 572 of these trees do not contain suitable breeding hollows at present but have a DBH greater than 300 mm or 500 mm and have the potential to develop a suitable nest hollow in the future. <p>Red Tailed Phascogale The key potential impacts to Red-tailed Phascogale resulting from clearing of the Project area is:</p> <ul style="list-style-type: none"> • Loss of an estimated 38.15 ha of suitable habitat including foraging, nesting and breeding habitat (i.e. hollow bearing trees). It is difficult to estimate the number of hollow-bearing trees within the Project area as counts for hollows suitable for Red-tailed Phascogale were not undertaken, however the presence of hollows (e.g. 20 hollows of suitable size for breeding for Carnaby's Black Cockatoo) and additional smaller hollows provides an indication that potentially suitable hollows for breeding may be present within the Project area.
<i>Methodology</i>	<p>Reference to a number of sources was made to provide the relevant information for assessment of impact. These are:</p> <ul style="list-style-type: none"> • DotE Protected Matters Search Tool Report July 2015 • GHD, 2015a, York to Merredin Road Widening SLK 1.95 -15, SLK 19-29 and SLK 29-51 Biological Assessment (unpublished report for Main Roads Western Australia, 2015) • Department of the Environment (DotE) 2015, SPRAT Profile for the Red-tailed Phascogale and Carnaby's Black Cockatoo (retrieved June 2015) • Department of the Environment (DotE) 2013, Matters of National Environmental Significance: Significant impact guidelines 1.1. Commonwealth of Australia 2013 • Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2012, Environment Protection and Biodiversity Act 1999 referral guidelines for three threatened black cockatoo species: Carnaby's Black Cockatoo (endangered) <i>Calyptrorhynchus latirostris</i>, Baudin's Black Cockatoo (vulnerable) <i>C. baudinii</i> and Forest red-tailed Black Cockatoo (vulnerable) <i>C. banksiana</i>, Australian Government Canberra.
<i>Migratory species</i>	<p>One listed migratory species was considered likely to occur within the Project area, based on the desktop and field assessment.</p> <ul style="list-style-type: none"> • Rainbow Bee-eater (<i>Merops ornatus</i>) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act
<i>Justification of likely impact</i>	<p>Rainbow Bee-Eater No observations or evidence of the Rainbow Bee-eater was recorded during the September 2014 field survey (GHD 2015a). This species will utilise a large variety of habitat types and may potentially occur throughout the entire Project area on an opportunistic basis. There are numerous records of the species scattered throughout the Wheatbelt, and</p>

MNES	Existing Environment and Likely Impact
	it is mostly likely that the species would utilise the Project area for foraging and during dispersal. While Rainbow Bee-eaters will utilise a wide-range of habitats to nest, there was no habitat recorded during the current assessment (GHD 2015a) within the Project area suitable for the species to breed. However, the species is unlikely to rely solely on the habitats available in the proposed Project area.
<i>Methodology</i>	Reference to a number of sources was made to provide the relevant information for assessment of impact. These are: <ul style="list-style-type: none"> • DotE Protected Matters Search Tool Report July 2015 • GHD, 2015, York to Merredin Road Widening SLK 1.95 -15, SLK 19-29 and SLK 29-51 Biological Assessment (unpublished report for Main Roads Western Australia, 2015) • Department of the Environment (DotE) 2013, Matters of National Environmental Significance: Significant impact guidelines 1.1. Commonwealth of Australia 2013
Wetlands of International Importance	No Wetlands of International Importance within 5 km of Project area.
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, July 2015.
World Heritage Properties	No world heritage properties within 5 km of the Project area
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, July 2015.
National Heritage Places	No world heritage properties within 5 km of the Project area.
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, July 2015.
Commonwealth Land or Marine Areas	Project activities are not located on or near Commonwealth land or marine areas. Commonwealth land or marine areas will not be impacted by the activities associated with the project.
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, July 2015.
Nuclear Actions	Not relevant to the proposed activity.
<i>Justification of likely impact</i>	No Project actions involve nuclear actions. Therefore no project impact on this matter.
<i>Methodology</i>	N/A
Water Resource	Not relevant to the proposed activity.
<i>Justification of likely impact</i>	No project actions involve a significant water resource. Therefore no project impact on this matter.
<i>Methodology</i>	N/A.

5. Summary of biological survey

This section provides a summary of the York to Merredin Road upgrades (SLK 1.95 to SLK 51) biological assessment (GHD 2015a) as shown in Appendix B. This assessment included a 51.04 ha Study area which was later refined by Main Roads to the Project area as described in this report. Desktop and field investigations of the Study area were conducted in September 2014 and June 2015 and the key results from this assessment are summarised below.

Reserves and Vegetation

Two Department of Parks and Wildlife (DPaW) managed properties are adjacent to the Project area: Hardey Nature Reserve (Class C, No. 40642), and an un-named Nature Reserve at Mawson (Class A, No. 46074). In addition there are two Shire reserves adjacent to the Project area: Shire reserve and crown land associated with Saint Andrew's church and cemetery, which contains remnant vegetation; and Shire reserve named Cowering Well Conservation Reserve on the north side of the road.

No wetlands of international or national importance occur within the Study area. There are no Threatened Ecological Communities known to occur within 5 km of the Study area, however vegetation types mapped within the Study area as 'York Gum and Jam woodland' (EIAaW), 'York and Salmon Gum woodland' (EIEsW), 'Wandoo woodland' (EwW), 'York Gum and Wandoo woodland over Jam low woodland' (EIEwAaW) and 'Wandoo and Salmon Gum woodland' (EwEsW) are all considered to be representative of the Eucalypt Woodlands within the Western Australian Wheatbelt Priority 3 PEC. Considering the condition of the vegetation within the Study area approximately 17.28 ha of this community occurs within the Study area.

The field survey recorded seven native vegetation types and two highly modified vegetation types which were identified within the Study Area. The seven vegetation types that occur in the Study area ranged from *Excellent* to *Completely Degraded* condition and due to historical clearing.

Flora

A total of 208 flora taxa were recorded within the Study area during the field survey, this included 145 native flora taxa and 63 introduced taxa.

No flora species listed under the EPBC Act or under the WC Act were recorded within the Study area during the field surveys or considered likely to occur within the Study area based on the likelihood of occurrence assessment. Two DPaW listed Priority Flora taxa were recorded from the Study area: *Hemigenia platyphylla* (Priority 4); and *Eremophila glabra* subsp. York (P.G. Wilson 21172 B) (Priority 1). One plant of *Eremophila glabra* subsp. York (P.G. Wilson 21172 B) was recorded within the proposed clearing envelope but road design has been amended to avoid it. Two plants of *Hemigenia platyphylla* will be cleared as part of the proposed Project. This species conservation status will not be significantly adversely affected by the removal of two plants.

Weeds

Two weed species **Tamarix aphylla* (Athel Tree) and **Lycium ferocissimum* (African Boxthorn) both are listed as Weeds of National Significance (WoNS). Athel Pine is also a Declared Pest under the Biosecurity and Agriculture Management Act 2007 (BAM Act), and two other Declared Pests: **Moraea* spp. (Cape Tulip) and **Echium plantagineum* (Paterson's Curse) were also recorded within the Study area. None of the Declared Pests have been allocated a management/control category in the York/Beverley/Quairading shires.

Fauna

The six fauna habitat types in the Study area are well represented in the areas adjacent to the Study area and the broader region. The habitat within the Study area are part of the remaining regional linkages in the area.

Sixty-one fauna species were recorded during the field survey within the Study area including 57 birds, two reptiles and two mammals, of which 57 are native species and four are introduced species.

A likelihood of occurrence assessment identified three fauna species as considered likely to occur within the Project area:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Red-tailed Phascogale (*Phascogale calura*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Rainbow Bee-eater (*Merops ornatus*) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act.

6. Management actions

The management actions included in Table 6 should be implemented to avoid, mitigate and / or manage the identified impacts to clearing and MNES.

Table 6 Management actions with respect to identified impacts to clearing and MNES

Environmental Factors	Management Action
Reserves and conservation areas (vegetation clearing)	<ul style="list-style-type: none"> No clearing is permitted at the Class A reserve, located 42.34 SLK. Clearing with the Class C reserve will be strictly minimised and controlled through design, signage and site marking.
Pollution and Litter (fauna)	<ul style="list-style-type: none"> All waste materials from the Project area will be removed from the site upon completion of the project and to the satisfaction of the Project Manager or Site Supervisor. Construction waste and other rubbish will be contained in bins with lids (where practicable) and removed regularly.
Surface Drainage (vegetation)	<ul style="list-style-type: none"> Road design should maintain existing surface water flows and incorporate soil erosion control measures. Vegetation removal and soil disturbance will be minimised, where practicable. Disturbed areas will be stabilised soon after construction activities are completed. Existing natural drainage paths and channels along the road or the vicinity of the Project area will not be unnecessarily blocked or restricted during project construction. Vehicle and equipment wash down areas will be located away from environmentally sensitive areas No on-site storage of fuel, oils and other contaminant materials will be permitted within 50 m of a watercourse.
Fire (vegetation and fauna)	<ul style="list-style-type: none"> No fires shall be lit within the Project area. Machinery will be fitted with approved spark arresting exhaust systems. All vehicles, plant and equipment to be fitted with fire extinguishers and restricted and to designated cleared areas. A water tanker/fire fighter unit will be on site at all times during project construction and personnel trained in their use. All hot works will be undertaken in accordance with standard safety procedures Construction personnel will extinguish and report fires occurring within the Project area.
Topsoil (vegetation)	<ul style="list-style-type: none"> Topsoil will be managed according to Main Roads Topsoil Management Guideline (TRIM Doc D12#256186). The movement of topsoil will be restricted to the limits of the Project area. Where possible construction activities will be undertaken in summer to reduce the potential for soil erosion and drainage line siltation due to vegetation removal and heavy rains.
Species specific management actions – Red-tailed Phascogale and Carnaby's Black Cockatoo (MNES - Scenario 1 - Construction to be undertaken during the breeding season)	<ul style="list-style-type: none"> Development and implementation of a DPaW approved handling and relocation protocol. Undertake pre-clearance surveys of trees identified as having hollows suitable for Carnaby's Black Cockatoo and Red-tailed Phascogale

Environmental Factors	Management Action
<p>Species specific management actions – Red-tailed Phascogale and Carnaby’s Black Cockatoo (MNES - Scenario 2 - Construction to be undertaken outside the breeding season)</p>	<ul style="list-style-type: none"> • Check all trees identified as having suitable hollows for both species to remove any fauna in the hollows prior to clearing. • Clearly delineate the extent of the disturbance footprint (clearing footprint) with coloured pegs. • Prior to clearing/ construction operations the surveyor will mark out the clearing line and this will be checked by Main Roads Environment Officer to determine that it is clearly defined and compliant with permits. • The extent of this clearing will be clearly communicated in documentation and accurately demarcated on-ground. • All project construction personnel will be inducted prior to the commencement of works. The induction program will include communication about the ‘No Go Areas’, importance and consequences of entering/disturbing these areas. • Regular review of the disturbance footprint boundary to ensure ‘No Go Areas’ are clearly delineated • Restrict construction personnel to the disturbance footprint including designated access routes and parking areas. • Fauna encountered during the construction process shall be given the chance to move on if there is no threat to the person’s safety in doing so. The Ecologist will be suitably experienced and licensed and will be available at all times during the clearing phase to interact with fauna that cannot move away freely.

7. Stakeholder consultation

Consultation with key stakeholders has been undertaken for this Project in accordance with Main Roads internal processes. Letters were sent to the following stakeholders in November 2014:

- Department of the Environment
- Conservation Council
- Department of Water
- Shire of York
- Shire of Quairading

Copies of the stakeholder response are provided in Appendix E.

A A Class Nature Reserve, which will be marginally impact by the Project, is vested in the Conservation Commission. Correspondence has been sent (August 2015) to the Commission in regards to the proposed resumption of 0.35 ha of this reserve.

Impacts to sensitive receptors from the construction of the road safety improvements are expected to be low. It is expected that the community would support this project, as it involves improvements to road safety to the York to Merredin Road.

An Aboriginal Heritage Risk Assessment was completed for the Project and found the project has a low risk of impacting known or unknown heritage sites due to the high level of existing disturbance. Further consultation is not considered necessary (Appendix C in GHD 2015b).

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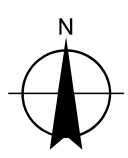
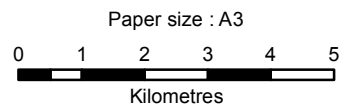
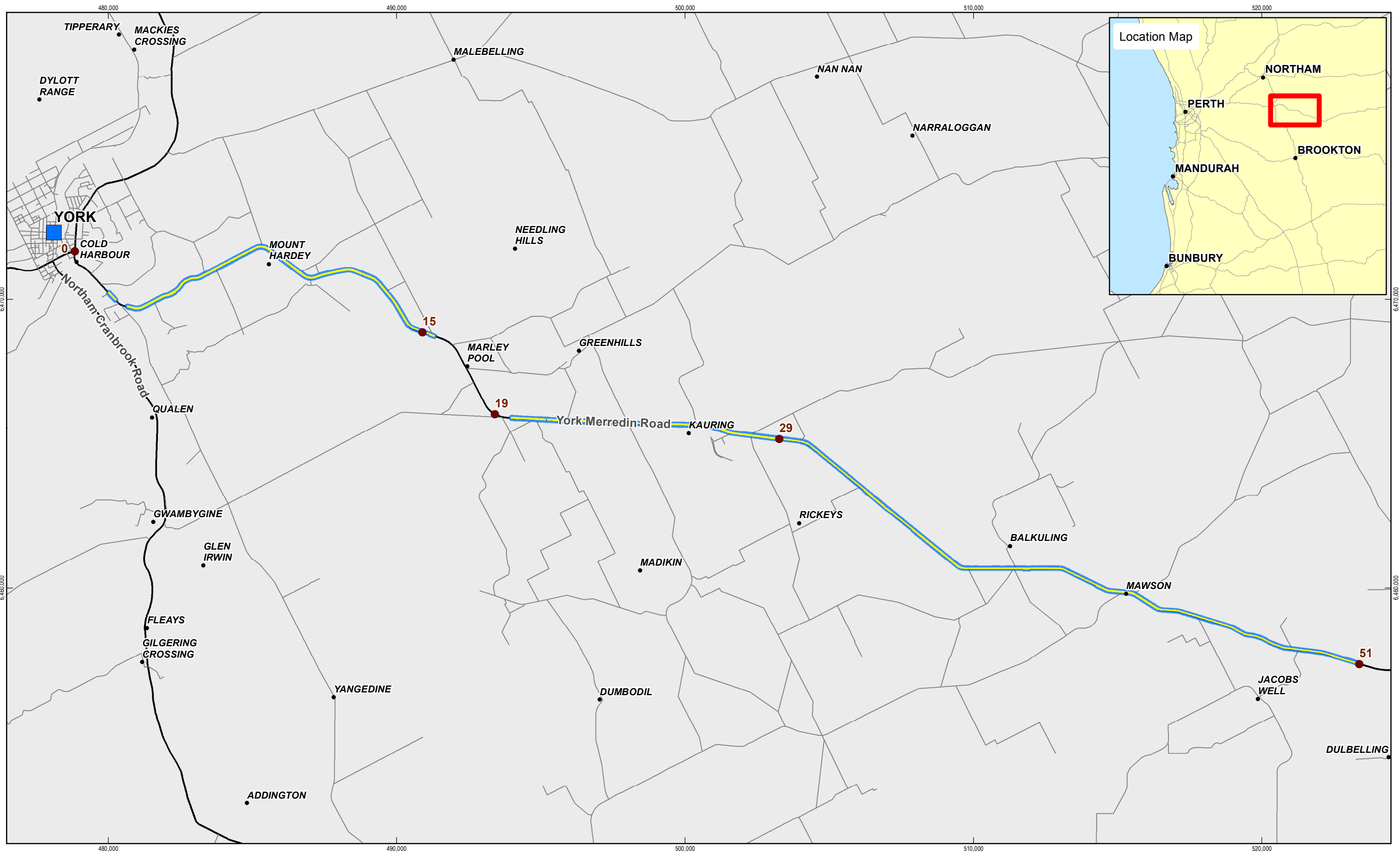
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Appendices

Appendix A - Figure

Figure 1 Locality



LEGEND

- SLK Points
- ▬ Project Envelope
- ▭ Project Area
- ▭ Study Area

Map Projection: Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia
 Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
 York-Merredin Road Widening
 Clearing Impact Assessment

Job Number 61-32010
 Revision 0
 Date 18 Aug 2015

Locality

Figure 1

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 © 2015. Whilst every care has been taken to prepare this map, GHD and MRWA make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
 Data source: MRWA: Road Network - 201411; GHD: SLK Points - 20140926, Project Area, Project Envelope - 20150619. Created by: jbmteignies

Appendix B – Reports

GHD, 2015, *York to Merredin Road Widening SLK 0 – 51 EIA and EMP*, unpublished report for Main Roads Western Australia.



Main Roads Western Australia
York to Merredin Road Widening SLK 0 - 51
EIA and EMP

July 2015

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.6 and the assumptions and qualifications contained throughout the Report.

Project Title: York to Merredin Widening between Straight Line Kilometres (SLK) 1.95 and SLK 51

Project location: The Project is located on the York – Merredin Road at SLK 1.95 to SLK 15, SLK 19 to SLK 29 and SLK 29 to SLK 51. The proposed works are within the Shires of York and Quairading. The Project will start east of York at SLK 1.95 and finishes approximately 9 km east of Mawson at SLK 51.

Project purpose: Gradual and steady increases in traffic levels along the York-Merredin Road have occurred as a result of increased grain freight movements in the area. This has increased the volume of vehicles using the York-Merredin Road to access the Co-operative Bulk Handling (CBH) bins in the area. The width of the existing road is unsuitable for the increased traffic and these works are required to improve the road geometry and general road safety attributes along this section of road.

Area proposed to be cleared: The Project area (the disturbance footprint) is approximately 55.70 ha (excluding the road) and includes up to 38.85 ha of native vegetation and fauna habitat and 16.85 ha of previously cleared area and highly modified area.

Temporary clearing required: No

Impacts to Key Environmental Aspects

The key environmental aspects and impacts for the proposed Project were identified through the EIA process. The key relevant environmental aspects identified during this process and addressed in this EIA include:

- Terrestrial fauna – the loss of potential fauna habitats for two species of conservation significant fauna (Red-tailed Phascogale and Carnaby's Black Cockatoo). This will result in the overall reduction of habitat for both species and potentially impact local populations of both species.
- Flora and vegetation – loss of Vulnerable vegetation. The local and regional impacts on the loss of vegetation associations have been assessed using the mapped extent of the Beard (1979) vegetation associations within the Project area. The Project will result in the clearing of a portion of three Vulnerable vegetation associations (352, 694 and 1049) which are all below 30 % threshold level for the state, IBRA bioregion and subregion.

Other environmental factors have been identified as requiring less detailed assessment as they pose a lower risk and can be readily managed through Main Roads' procedures and adherence to regulations. These factors include:

- Dust, noise and vibration
- Waste and hydrocarbon management
- Dieback and weeds
- Watercourses and drainage
- ASS and contaminated sites
- Amenity

- Aboriginal heritage – it should be noted that although discussed in this EIA heritage will be assessed and managed separately under the AH Act.

Residual environmental impacts are those impacts that remain after mitigation measures have been applied. The avoidance and mitigation measures outlined in the Project Environmental Management Plan (EMP) aim to minimise the potential impacts to the Carnaby's Black Cockatoo and Red-tailed Phascogale as a result of the Project, however, it is unlikely that the level of impact will be reduced so as to avoid a significant impact. Therefore it is still considered likely that the loss of the potential breeding trees for the Project with respect to similar potentially suitable breeding habitat in the local area is substantial.

The potential residual environmental impacts for this Project are:

- The loss of up to 38.85 ha of native vegetation ranging from Very good to Degraded condition. Of the vegetation to be cleared within the Project area, 4.92 ha is Excellent-Very Good to Very Good – Good condition.
- Approximately 15.81 ha of this vegetation represents three Vulnerable vegetation associations (352, 694 and 1049) which are all below 30% threshold level for the state, IBRA bioregion and subregion.
- The loss of 35.59 ha of Carnaby's Black Cockatoo habitat including 592 potential habitat trees (tree with a DBH of greater than 300 mm or 500 mm) of which 20 of these trees contains suitable hollows for breeding. It is considered that clearance of this habitat, is likely to result in a shortage of hollows in the local area, thus reducing the availability of potential breeding habitat in the future for Carnaby's Black Cockatoo.
- The loss of an estimated 38.15 ha of suitable habitat for the Red-tailed Phascogale, including potential breeding habitat (i.e. hollow bearing trees). It is considered that clearance of this habitat, in particular the potential breeding habitat is likely to result in a shortage of nesting resources and breeding hollows in the local area, thus reducing the availability of breeding habitat in the future for the Red-tailed Phascogale.
- Furthermore the road reserve (including the Project area) is likely to support dispersal of the Red-tailed Phascogale in a highly cleared and fragmented landscape. The clearing associated with the Project is likely to reduce the functionality of this habitat for dispersal for this species.

Key environmental management measures

Project specific environmental management actions have been developed to manage all impacts and these are outlined in the EMP introduced in Section 4 and provided in Appendix D.

The key environmental management actions provided in the EMP to address potential impacts to terrestrial fauna and native vegetation include the implementation of species specific management measures for the Red-tailed Phascogale and Carnaby's Black Cockatoo.

Standard project management actions (e.g. record keeping and monitoring project implementation) will be implemented for the Project for those aspects considered to be of low risk.

Decision to refer

Department of the Environment

GHD has prepared an EPBC referral on behalf of Main Roads to address the potential impacts of the Project to relevant MNES, in particular potential impacts to the endangered Red-tailed Phascogale and Carnaby's Black Cockatoo.

It was determined after reviewing the DotE Significant Impact Policy Statement 1.1 (DotE 2013) that the clearing of up to 38.85 ha of fauna habitat for the Project is likely to have a significant impact on the Red-tailed Phascogale and Carnaby's Black Cockatoo.

Environmental Protection Authority

This EIA report has determined the Project is unlikely to require referral to the WA Environmental Protection Authority. This is due to the low significance of its impacts to the surrounding environment except for impacts to native vegetation and fauna habitats. The potential impacts from the loss of native vegetation clearing and loss of fauna habitat for the Project may be effectively assessed through the Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

Department of Environment Regulation

Assessment bilateral agreement between Western Australia and the Commonwealth

Under the assessment bilateral agreement, if a native vegetation clearing permit is required and the clearing will have or is likely to have an impact on a MNES (e.g. Red-tailed Phascogale or Carnaby's Black Cockatoo), the assessment of the clearing application including the potential impacts to the MNES can be conducted by the Department of Environment and Regulation (DER) or Department of Mines and Petroleum (DMP) under delegation. If the project is deemed a Controlled Action, it is likely to be assessed under this agreement and a project specific clearing permit will be applied for.

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Appendices

- Appendix A Figures
- Appendix B Biological Assessment Report (GHD 2015)
- Appendix C Aboriginal Heritage Risk Assessment (AHRA)
- Appendix D Environmental Management Plan
- Appendix E Stakeholder Consultation

1. Introduction

1.1 Project description

Main Roads Western Australia (Main Roads) is proposing to upgrade three sections of York - Merredin Road, in the Avon Wheatbelt region of Western Australia between Straight Line Kilometres (SLK) 1.95 and SLK 51.

Gradual and steady increases in traffic levels along the York-Merredin Road have occurred as a result of increased grain freight movements in the area. This has increased the volume of vehicles using the York-Merredin Road to access the Co-operative Bulk Handling (CBH) bins in the area. The width of the existing road is unsuitable for the increased traffic and these works are required to improve the road geometry and general road safety attributes along this section of road.

The three sections to be upgraded are at SLK 1.95 to SLK 15, SLK 19 to SLK 29 and SLK 29 to SLK 51 (Figure 1 Appendix A). The proposed Project will consist of the following:

- Road widening for three sections of road
- The extension of 24 culverts, one new culvert and the upgrade of 13 existing culverts with wider culverts in the first section (SLK 1.95 to SLK 15)
- The replacement of six culverts and extension of 10 culverts in the second section (SLK 19 to SLK 29)
- The replacement of 21 culverts extension of 26 and one new culvert in the third section (SLK 29 to SLK 51)

The Project will not involve any changes to the four main watercourses which occur along the York – Merredin Road. Main Roads will maintain the current watercourse crossing structures as part of the proposed road upgrade.

1.2 Project area and location

The Project is located on the York – Merredin Road at SLK 1.95 to SLK 15, SLK 19 to SLK 29 and SLK 29 to SLK 51. The proposed works are within the Shires of York and Quairading. The Project will start east of York at SLK 1.95 and finish approximately 9 km east of Mawson at SLK 51. The Project area is shown in Figures 1 and 2 Appendix A.

The Project area is the maximum disturbance footprint and includes the clearing area for native vegetation and fauna habitat. The final design has not been developed for this Project. The disturbance footprint calculations have been based on the 'Project area', which is based on the concept design for this Project. The Project area includes a 10 % buffer to allow for design changes between concept design and final design.

The Project area is approximately 55.70 ha (excluding the road) and includes 38.85 ha native vegetation and fauna habitat and 16.85 ha of previously cleared area and highly modified area (Figures 1 and 2 Appendix A).

1.3 Purpose of this report

This Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report has been developed to provide an assessment of the potential environmental impacts of the proposed upgrade of York - Merredin Road, as described above; and provide recommendations regarding the need to refer the Project for environmental approval. The report

can be used as a supporting document for the required State or Commonwealth environmental approvals.

1.4 Scope of works

Main Roads commissioned GHD Pty Ltd (GHD) to prepare an EIA and EMP for the Project. The EIA will include desktop assessment and biological survey results for the Project including impact area calculations. The scope of works included:

- Complete a desktop assessment of the Project area and identification of significant environmental constraints (Acid Sulphate Soils, contamination, noise, dust, vibration, European heritage, surface and groundwater etc.) written in the form of an EIA
- Utilise biological survey results to discuss Project impacts
- Utilise GIS calculations on the impact and clearing areas for the EIA. Calculations were for the impact area only and exclude existing clearing and infrastructure
- The Project design was provided by Main Roads in the form of an impact area shapefile and this impact area will be utilised for the EIA calculations
- Undertake relevant environmental constraints mapping using GIS mapping software (e.g. ArcMap)
- Development of an EMP capturing key risks from the EIA, utilising the Main Roads template
- Recommendations in the EIA are not required

GHD liaised with government regulatory authorities or specialists as required to obtain the necessary information needed to undertake the environmental assessment. GHD also liaised with the Main Roads Environment Officer on a regular basis to ensure that the needs of the brief were met.

Public consultation was not part of the scope of works, and therefore not undertaken by GHD. Main Roads provided the outcome of stakeholder consultation for inclusion in the EIA.

1.5 Previous assessments

In accordance with Main Roads' corporate Environmental Assessment and Approval process, an Environmental Low Impact Screening Checklist (LISC) was completed for the proposed Project. The checklist determined the Project required further environmental assessment as the Project requires clearing outside of the maintenance zone.

Main Roads completed a preliminary environmental assessment for the sections of York-Merredin Road proposed for upgrade. The assessment found that a number of conservation significant species may be present in the Project area, including the Red-tailed Phascogale (*Phascogale calura*), Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Threatened (Declared Rare) Flora.

In order to clarify and define the potential impacts on conservation significant flora and fauna species, Main Roads commissioned GHD to undertake a biological assessment for the areas of the York-Merredin Road proposed for upgrading.

The biological assessment included a Level 1 flora and fauna survey and targeted Black Cockatoo habitat assessment was completed in September 2014. Key terrestrial flora and fauna and ecological issues were identified (GHD 2015, Appendix B).

The biological survey was undertaken for an area (referred to as the Study Area – GHD 2015) encompassing the three road sections based on the preliminary Project design at the time of the

survey. The Study Area included the road reserve north and south of the road, or on one side of the road only. Between approximately SLK 44.6 and 48.5 the road reserve was very wide; however the Study Area only included a width of 30 m from the road centreline (north side of the road). See Appendix B (Figure 1, GHD 2015) for a map of the Study Area.

As the Project progressed, design alterations were made by Main Roads which changed the Project area. Consequently some sections of the Study Area were no longer included as part of the impact assessment and some additional areas were added. GHD completed a site investigation on 30 June 2015 to capture additional biological data that may not have been included as part of the previous survey.

Subsequent to the field survey Main Roads provided a refined Project area, which is the area that will potentially be required to be cleared for the Project. The data from the June 2015 survey of the additional areas is presented in this report. The complete data sets of biological values for the current Project area have been displayed in the Figures 3 – 5, Appendix A. Calculations on the extent of vegetation type, condition, habitat, potential Black Cockatoo breeding trees and counts of conservation significant species within the Project area using data collected from the GHD 2014 and 2015 surveys were undertaken as part of this assessment and are presented in Sections 3.5 – 3.9.

The calculations using the data from the 2014 and 2015 biological surveys have been used to inform the impact assessment for this Project and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral to the Department of the Environment (DotE).

1.6 Limitations and assumptions

This report: has been prepared by GHD for Main Roads and may only be used and relied on by Main Roads for the purpose agreed between GHD and the Main Roads as set out in Section 1.4 of this report.

GHD otherwise disclaims responsibility to any person other than Main Roads arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Main Roads and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The results of the environmental assessment in this report are based on the proposed upgrade works design and construction information as provided to GHD by Main Roads. Any changes to the location or scope of the works may change the outcomes of this report.

For the purposes of this report GHD assumes the construction and operation of the road upgrade does not include the construction of any on-site buildings or other infrastructure such

as dams or access roads which may change the outcome of this assessment. This report does not include the assessment of impacts from materials extraction.

This EIA is based upon the Project area as described in Section 1.2 displayed in Figures 1 and 2, Appendix A. Additional assessment may be required should the Project area significantly change.

2. Methodology

2.1 Desktop assessment

A desktop assessment of the existing environment and heritage aspects and potential constraints for the proposed Project was undertaken by reviewing government agency managed databases and relevant reports (Table 1). The majority of the desktop investigations employed a buffer around the Project area (e.g. 5 km), with the buffer distance determined by the type of investigation. The purpose of using a buffer is to capture the majority of the known and/or predicted environmental and heritage aspects (e.g. threatened flora and fauna for the locality) to inform the EIA.

Other than the database searches, no other environmental agencies were consulted by GHD during the preparation of this EIA and EMP.

Table 1 Information sources

Aspect	Information Source
Physical environment - geology, topography, soils and land systems and regional biogeography	Geology, topography, soils and land systems in the Project area as described in Department of Agriculture and Food WA (DAFWA) Soil-landscape mapping (2007) Regional biogeographical information for the Project area as described in Australia's bioregions (IBRA) (DotE 2014) and Beecham (2001)
Climate	Bureau of Meteorology (BoM 2015)
Acid Sulfate Soils	Acid Sulfate Soils (ASS) Risk Mapping DER - Government of Western Australia (GoWA) Natural Resource Management Shared Land Information Portal (SLIP) (GoWA 2015a) and Australia Soil Resources Information System (CSIRO 2015)
Contaminated sites	DER Contaminated Sites Database (DER 2015)
Land use and Reserves	Reserves for conservation as shown in DPaW Managed Lands and Waters spatial dataset SLIP (GoWA 2015)
Environmentally Sensitive Areas	Identification of Environmentally Sensitive Areas utilising Clearing Regulations – Environmentally Sensitive Areas (ESA) spatial dataset (GoWA 2015)
Air quality and noise	Desktop review of aerial photograph available at SLIP (GoWA 2015) to determine nearby sensitive receptors
Hydrology and hydrogeology	Surface and groundwater features in the Project area based on: <ul style="list-style-type: none"> Department of Water (DoW) Geographic Data Atlas (DoW 2015) Natural Resource Management Shared Land Information Portal (SLIP) (GoWA 2015) DPaW <i>WetlandBase</i> (DPaW 2015) EPBC Act PMST (DotE 2015)
Vegetation	Vegetation in the Project area as show in: <ul style="list-style-type: none"> Beard Vegetation Mapping (1979) <i>Naturemap</i> Wheatbelt vegetation mapping (DPAW 2007 -) Flora and vegetation assessment undertaken by GHD 2015 (methodology detailed in Appendix B)
Threatened and Priority Ecological Communities	Ecological communities listed in the following databases as being within the Project area: <ul style="list-style-type: none"> DPaW Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) spatial datasets DPaW PEC List (DEC 2013a)

Aspect	Information Source
	<ul style="list-style-type: none"> TECs endorsed by the Minister for Environment (DEC 2013b) Vegetation and flora field survey undertaken by undertaken by GHD 2015 (methodology detailed in Appendix B)
Conservation Significant flora and fauna	Conservation significant flora and fauna listed in the following databases as being within the Study Area: <ul style="list-style-type: none"> DPaW <i>NatureMap</i> (DPaW 2007–) DPaW Threatened (Rare) and Priority Flora database (TPFL) and Western Australian Herbarium database (WAHERB) DPaW Threatened and Priority Fauna datasets Vegetation, flora and fauna field assessment undertaken by GHD 2015 (methodology detailed in Appendix B)
Dieback	Review of rainfall data from BOM 2015 and Dieback Public Map from Project Dieback, NRM WA (PD 2015).
Aboriginal heritage	Identification of Aboriginal sites utilising the Department of Aboriginal Affairs Registered Sites database (DAA 2015)
European heritage	Identification of European heritage sites utilising: <ul style="list-style-type: none"> DotE Australian Heritage Database (DotE 2015) EPBC Act PMST (DotE 2015) Government of Western Australia Inherit Database (GoWA 2015)
Matters of National Environmental Significance	Search of the EPBC Act PMST for Matters of National Environmental Significance in the Project area (DotE 2015) GHD 2015, Level 1 flora, vegetation and fauna assessment

2.2 Field Survey

A Level 1 flora and fauna assessment was undertaken for the majority of the current Project area, and immediately adjacent areas, in September 2014 by qualified and experienced ecologists (GHD 2015). The assessment included the following:

- A desktop assessment of the Study Area prior to the field survey work to identify all biological constraints, which may be in, or nearby the Study Area which included:
 - Identification of broad vegetation types using Beard (1979) mapping
 - Identification of conservation significant species likely to be present in the Study Area and a likelihood of occurrence assessment
- A field survey to verify the desktop assessment findings which included:
 - Identification of wetland or watercourse vegetation and a calculation of the hectares of such vegetation in the Study Area
 - Mapping of vegetation condition within the project area using the Keighery (1994) condition rating scale
 - Mapping of vegetation types within the Study Area
 - Assessment of the plant species diversity, density, composition, structure and weed cover of the project area through the use of quadrats
 - Targeted survey for Carnaby's Black Cockatoo including mapping of suitable roosting habitat, feeding habitat, breeding trees and hollows
 - Recording of any conservation significant flora identified within the project area
 - Identification and mapping of any Threatened or Priority Ecological Communities

- Identification and mapping of any Weeds of National Significance or Declared Pests.

Further details regarding the outcome of the field assessment are provided in Appendix B.

On 30 June 2015 a GHD ecologist visited the Project area with Main Roads in order to assess the additional areas that were outside of the Study Area surveyed during September 2014. This involved mapping the vegetation type and condition of the additional areas and recording any potential black cockatoo trees. It must be noted that where the additional areas were located in private land these areas were not accessed for the survey.

The complete data sets of biological values for the current Project area have been combined to form the data displayed on Figures 3 – 5, Appendix A. Calculations on the extent of vegetation type, condition, habitat, potential Black Cockatoo breeding trees and counts of conservation significant species within the Project area using data collected from the GHD 2014 and 2015 surveys were undertaken as part of this assessment and are presented in Sections 3.5 – 3.9.

3. Assessment of Aspects and Impacts

This section describes the proposed Projects physical, biological, heritage and social aspects based on the desktop investigation, heritage assessment and biological surveys. The environmental aspects of the Project area are shown on the maps attached in Appendix A. The potential impacts to each aspect are discussed (Sections 3.1 – 3.10) and where relevant, management and mitigation measures for the potential Project impacts are outlined in the EMP (Section 4). When considering the identified impacts it is assumed Main Roads will implement the management and mitigation measures as outlined in Section 4.

3.1 Physical environment

3.1.1 Regional biogeography

The Project area is situated in the Southwest Botanical Province of Western Australia (Beard 1990) within the Avon Wheatbelt (AVW) bioregion described by the Interim Biogeographic Region of Western Australia (IBRA; DotE 2014b).

The Avon Wheatbelt is an area of active drainage dissecting a Tertiary plateau in the Yilgarn Craton. The Avon Wheatbelt is a gently undulating landscape of low relief with Proteaceous scrub-heaths, rich in endemics on residual lateritic uplands and derived sandplains, mixed Eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on Quaternary alluvials and eluvials (Beecham 2001).

The Project area is located within the Katanning (AVW02) IBRA subregion. The Katanning subregion is an erosional surface of gently undulating rises to low hills with abrupt breakaways. In this area continuous stream channels flow in most years and colluvial processes are active. The soil of the Katanning subregion has been formed in colluvium or in-situ weathered rock. The vegetation of this area includes woodland of Wandoo, York Gum and Salmon Gum with Jam and Casuarina (Beecham 2001). Dominant land uses for the subregion include: cultivation (dry land agriculture) and grazing with small areas retained for conservation, as crown reserves and rural residential (Beecham 2001). The majority of ecosystems in the Katanning subregion have been extensively cleared and are under threat from competing land use, weeds, rising water tables and altered fire regimes.

3.1.2 Climate

The Project area is located in the Central Wheatbelt region of Western Australia and experiences a temperate climate with distinctly dry, hot summers and cool, wet winters.

The Bureau of Meteorology (BoM) Beverley station (site number: 010515) is the nearest weather station to the Study Area (approximately 20 to 45 km from the western/eastern ends of the Project area), with continuous long-term data. Climatic data from this site indicates the mean maximum temperature of the area ranges from 16.8 °C in July to 34.3 °C in January, and the mean minimum temperature of the area ranges from 5 °C in August to 16.7 °C in February. The mean annual rainfall is 418.3 mm, with an average of 51.8 rain days per year (BoM 2015).

Climatic data for the region is summarised in Plate 1 (Source: data from BoM 2015).

No impacts were identified for this environmental aspect for the proposed Project.

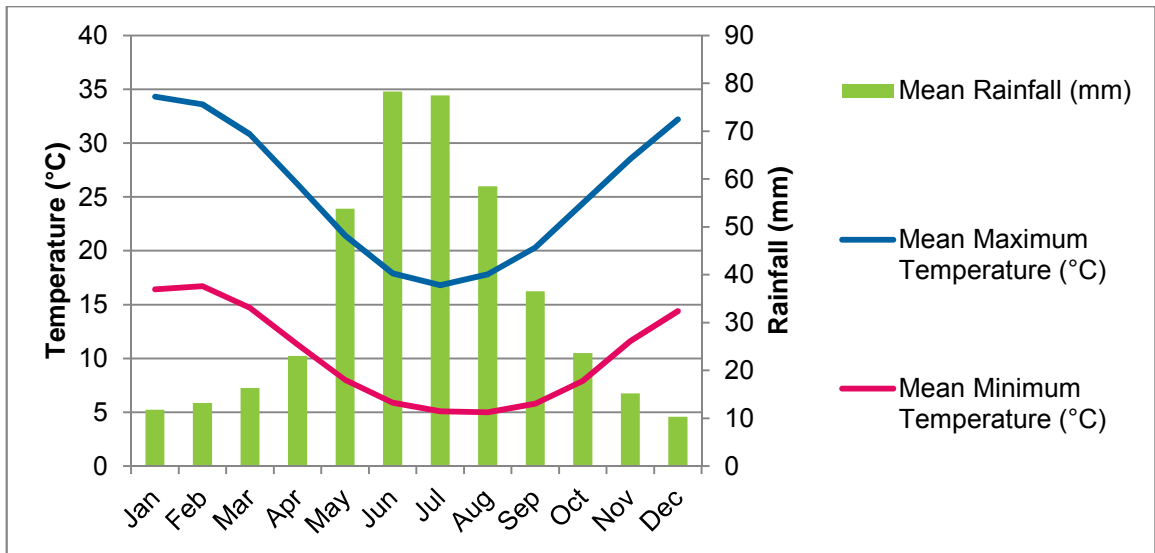


Plate 1 Mean Annual Temperatures and Rainfall for Beverley weather station (010515) (BoM 2015)

3.1.3 Acid sulphate soils

The DER (was Department of Environment and Conservation (DEC) 2013) describes Acid Sulfate Soils (ASS) as naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). In an undisturbed state below the water table these soils are benign. However, if the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid. Disturbance of these soils can flush acidic leachate to groundwater and surface waters, and cause off site environmental impacts.

A review of the Natural Resource Management SLIP indicates that the majority of the Project area is located within an area that has a no ASS layer detected. The ASRIS database indicates that the Project area is classified as Extremely Low Probability or Low Probability of Occurrence.

3.1.4 Contaminated sites and hazardous substances

The Project activities are located within the road reserve and no known previous land use activities on or adjacent to the Project area have had the potential to create contamination. A search of DER's contaminated sites database indicates there are no identified contaminated sites within the Project area. The nearest known contaminated site is at a service station approximately 700 - 800 m south west of the Project area, near the York town site.

There is some potential for contamination of surface soil areas through the historical use of pesticides and herbicides on the agricultural land.

3.1.5 Land use and reserves

The Project area is located within the road reserve. The road reserve is a designated State road reserve and is therefore managed by Main Roads and under the control of the Commissioner for Main Roads. The majority of the area surrounding the Project area consists of private land primarily used for cropping and grazing. A small portion of the surrounding land use consists of state and local government reserves.

Two Department of Parks and Wildlife (DPaW) managed properties are adjacent to the Project area (see Figure , Appendix A):

- Hardey Nature Reserve (Class C, No. 40642) – is located on the north and south side of the road reserve at approximately SLK 10 in Section 1
- A Nature Reserve at Mawson (Class A, No. 46074) – is located on both sides of road reserve, between approximately SLK 42.2 and SLK 43, within Section 3

In addition there are two Shire reserves adjacent to the Project area (see Figure , Appendix A):

- At approximately SLK 23 to SLK 23.5 there is a Shire reserve and crown land associated with Saint Andrew’s church and cemetery, which contains remnant vegetation
- At approximately SLK 25 there is a Shire reserve named Cowering Well Conservation Reserve on the north side of the road

There are no Environmentally Sensitive Areas within or adjacent to the Project area.

The Project will not involve the clearing or removal of any part of the Class A Reserve (No. 46074). Main Roads are in the final design phase for the Project and are aiming to avoid any clearing or removal of any part of the other reserves discussed above.

3.1.6 Potential impacts

The Project is likely to result in minor, short-term impacts to the physical environment. These impacts are expected to occur during the construction phase and are considered to be minor and temporary given appropriate management measures. Potential impacts include:

- Risk of water and wind erosion as a consequence of the proposed works. Areas with lighter-texture soils (e.g. sandy soils) are likely to be susceptible to water and wind erosion.
- Undisturbed ASS do not pose a risk, and only become an issue where excavation occurs, works are required below the water table, or lowering of the water table is required. As no dewatering or excavation below the water table is planned for this Project, no further investigations are required
- The Project area has been refined to avoid any direct impacts to the two DPaW managed Nature Reserves, but indirect impacts such as sedimentation, dust and new weed invasions are possible.
- On site contamination and pollution generation activities during the construction process. Any contamination identified during works should be managed in accordance with the Project EMP. Any pollution generating activities such as refuelling or storage of chemicals during works should also be managed in accordance with the EMP.

It is understood the Project involves standard road construction, so the use and storage of hazardous substances will be limited. All materials used on site should be handled, used and disposed of in accordance with their Materials Safety Data Sheet (MSDS) and Main Roads standard procedures.

The impacts on the physical environment are expected to be minor and once the site is stabilised they are unlikely to pose long-term changes to the existing environment.

3.2 Air quality, noise and vibration

No sensitive receptors are located within close proximity to the Project area. The closest sensitive receptors are all residential or rural residential properties within 100 - 200 m of the existing road at the following locations:

- Four residential properties south of the existing road within Section 1 between the railway line and Osborne Road

- Three residential-rural properties north of the existing road within Section 1 between the Osborne Road and Leeming Road
- One residential-rural property north of the existing road within Section 1 at Mt Hardey at approximately SLK 11
- One residential-rural property north of the existing road within Section 2 at Kauring at approximately SLK 28 west of the railway line
- Four residential-rural properties south of the existing road within Section 2 at Mt Hardey at approximately SLK 29 east of the railway line

3.2.1 Potential impacts

Thirteen residential-rural properties were identified within 100 – 200 m of the Project area. The potential impacts are expected to be minor and restricted to the construction phase, with the exception of ongoing noise/vehicle emissions from the road that currently exist.

Construction work is not expected to significantly contribute to noise levels at these residences, provided works are limited to normal working hours. The requirements of the Shires of York and Quairading must be met in respect of noise management and construction working hours. Where works occur outside normal hours, noise management plans are required to be approved by the LGA under delegated authority from the DER.

The proposed upgrading is not expected to significantly increase the traffic volume along the existing road, therefore air quality is not expected to change substantially as a result of the Project. The predicted traffic flow is less than 15,000 vehicles per day (pers comm Rochelle Lupton Main Roads 2015).

The proposed Project is on an existing road, therefore the impact of operational noise is not considered to change significantly as a result of the upgrade.

Dust is likely to be a moderate issue during earthworks, but no sensitive receptors are located immediately adjacent to the proposed works.

Activities that may result in air and noise emissions during the construction phase of the Project include:

- Physical disturbance of the land – such as removal of vegetation and topsoil, excavation, earthworks and road rehabilitation works
- Transportation – haulage of materials and machinery, vehicle movements
- Dust from dry, cleared areas and soil stockpiles

Whilst, air and noise emission impacts are expected to be restricted to the immediate proximity of the Project, these aspects can be managed through the implementation of the Project EMP.

3.3 Hydrology and hydrogeology

3.3.1 Groundwater

No Public Drinking Water Source Areas are present.

3.3.2 Surface water and drainage

An assessment of the Department of Water (DoW) Geographic Data Atlas indicates the Project is within the Avon River surface water catchment area. Numerous drainage lines occur in the local area, most of which are tributaries of named watercourses including Pitt Brook, Coolalinga Brook, Mackie River, Salt River and the Avon River.

The existing road intersects Mackie River at three locations in Section 1 and Section 2, and one other large unnamed watercourse (Figure 2, Appendix A), however the Project area does not include these four watercourses. The Project will not involve any changes to these four watercourses which occur along the York – Merredin Road. Main Roads will maintain the current watercourse crossing structures as part of the proposed road upgrade.

3.3.3 Wetlands

A search of relevant online mapping (DotE 2015; DPaW 2015b) indicates that there are no listed wetlands within 5 km of the Project area.

3.3.4 Potential impacts

The proposed Project will include:

- The extension of 24 culverts, one new culvert and the upgrade of 13 existing culverts with wider culverts in the first section (SLK 1.95 to SLK 15)
- The replacement of six culverts and extension of 10 culverts in the second section (SLK 19 to SLK 29)
- The replacement of 21 culverts extension of 26 and one new culvert in the third section (SLK 29 to SLK 51)

A permit to disturb the watercourses is required to be submitted to the DoW if works impact the bed or banks of rivers or significant tributaries across the Project area. Main Roads has applied for and received Bed and Banks permit for the following locations:

- | | | |
|-------------|-------------|-------------|
| • SLK 2.3 | • SLK 23.5 | • SLK 46.82 |
| • SLK 7.8 | • SLK 26.7 | • SLK 47.73 |
| • SLK 20.0 | • SLK 40.69 | • SLK 49.68 |
| • SLK 20.85 | • SLK 46.01 | |

The proposed Project area does not impact the three locations of the Mackie River or one other unnamed water course intersected by the existing road. The Project will not involve any changes to these four watercourses.

The proposed works may cause disturbance or interruption to the natural drainage and surface run-off patterns however, the proposed works are not expected to significantly alter the hydrological regime, given appropriate drainage design. Potential impacts include:

- Groundwater – the Project will not require dewatering, or requirement to construct bores for construction water. Furthermore, the hydrological regime (drainage patterns) will be maintained. Hence, there is no expectation that groundwater levels will be impacted. Should dewatering or bores be required permits/licenses will be obtained from the DoW for installation of bores and groundwater abstraction.
- Surface water – there are numerous drainage lines that occur in the local area. It is expected that the proposed works will utilise similar drainage features as for the existing road. It is expected that the surface water hydrology can be maintained in its current regime with appropriate drainage design.
- The Project will result in clearing of up to 3.2 ha of vegetation associated with watercourses.
- Erosion/sedimentation – during the construction phase there is the potential for erosion and sedimentation. This is likely to be more pronounced in current drainage areas.

- Pollution impacts associated with construction phase – the storage and handling of chemicals and hydrocarbons will require management to prevent pollution of watercourses.

It is anticipated the potential impacts to hydrology can be adequately managed through the standard techniques to maintain existing environmental conditions in the EMP.

3.4 Visual amenity

Clearing for the roadworks will involve the removal of 38.50 ha of vegetation including 592 large trees. This impact will be seen by road users both on the immediate roadside and in viewsheds towards sections of the road in the distance. There are no residences or tourist sites (rest points, camp grounds etc.) that overlook the Project area.

3.4.1 Potential impacts

The loss of this vegetation, particularly the larger trees will have an impact on the visual amenity for road users, and potentially, some local residents through loss of screening vegetation.

Construction of the Project has the potential to impact on the amenity of the local area as a consequence of vegetation clearing.

There will also be impacts to visual amenity during the construction phase of the Project however this will only be for the period of construction.

3.5 Vegetation and flora

3.5.1 Broad vegetation mapping and vegetation associations

At a desktop level broad scale (1:250,000) vegetation mapping of the region was completed by Beard (1979) and digitised by Shepherd et al (2002) at an association level. Beard (1979) mapping indicates that three vegetation associations are present across the Project area.

The extent of Beard's (1979) vegetation associations have been determined by the state-wide vegetation remaining extent calculations maintained by DPaW (latest update 2012 – Government of Western Australia 2013). As shown in Table 2, the extent of vegetation associations 352, 694 and 1049 are all below 30 % threshold level for the state, IBRA bioregion and subregion and are considered *Vulnerable*.

Table 2 Vegetation association extent

Vegetation association	Scale	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	% Current Extent in All DPaW managed lands
IBRA bioregion (Avon Wheatbelt)		9,517,109.9	1,778,407.08	18.69	9.7
IBRA subregion (Katanning)		2,992,929.35	409,618.23	13.69	11.34
352: Medium woodland; York gum	State	724,272.97	143,677.92	19.84	8.67
	Bioregion	630,581.76	110,128.6	17.46	9.25
	Sub-region	337,875.88	37,246.78	11.02	1.95
	LGA (Shire of York)	89,947.59	8,617.77	9.58	0.63
694: Shrublands; scrub-heath	State	346,493.81	67,339.93	19.43	47.26
	Bioregion	173,921.55	12,192.19	7.01	12.91
	Sub-region	94,465.31	6,947.63	7.35	11.62

Vegetation association	Scale	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	% Current Extent in All DPaW managed lands
on yellow sandplain <i>Banksia-Xylomelum</i> alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	LGA (Shire of York)	3,861.69	392.86	10.17	4.91
1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	State	833,384.77	56,843.2	6.82	5.76
	Bioregion	833,384.77	56,843.2	6.82	5.76
	Sub-region	255,402.63	20,575.63	8.06	1.34
	LGA (Shire of York)	22,472.17	2,433.1	10.83	0.14
	LGA (Shire of Beverley)	39,715.35	3,002.84	7.56	1.42
	LGA (Shire of Quairading)	88,403.35	5,728.39	6.48	2.83

(Beard 1979; Government of Western Australia 2013).
LGA Local government area

3.5.2 Vegetation types

Prior to European settlement the Project area is likely to have supported a variety of Eucalypt woodlands including York Gum (*Eucalyptus loxophleba*) and Jam (*Acacia acuminata*) woodlands, Wandoo (*E. wandoo*) woodlands, York Gum and Salmon Gum (*E. salmonophloia*) woodlands and Wandoo and Salmon Gum woodlands. However, the Project area occurs within a road reserve and much of the road reserve has been either historically cleared or is otherwise highly modified.

The majority of the road reserve supported an overstorey of scattered native Eucalypt species over a highly cleared understorey dominated by weeds (approximately 19.82 ha). The dominant tree species within the road reserve were species that naturally occur within the area, including York Gum, Wandoo and Salmon Gum. Towards the eastern end of the Project area scattered Powderbark Wandoo (*Eucalyptus accedens*) also occurs. While the majority of the Project area was modified there were some areas (19.03 ha) that retained patches of native vegetation (excluding the scattered Eucalyptus trees). These areas predominantly occurred within sections of the road reserve that were adjacent to remnant native vegetation, both within private property and in reserves, within sections of road reserve in which the cadastre was very wide and on rocky rises where the rocks would have inhibited past clearing. Approximately 16.85 ha of the Project area was completely cleared with no native vegetation remaining, or only occasional scattered native understorey species.

During the GHD field assessment (2015) eight native vegetation types and one highly modified vegetation types were identified within the Study Area of which all occur within the Project area. These vegetation types have been mapped in Figure 3, Appendix A and are summarised below in Table 3.

Table 3 Vegetation types (GHD 2015) and Beard vegetation associations

Vegetation types (GHD 2015)	Project Area (ha)	Beard vegetation association
Cleared	16.85 ha	N/A
EIAaW: York Gum and Jam woodland	5.93 ha	352: Medium woodland; York gum
EIEsW: York and Salmon Gum woodland	3.32 ha	1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet
EwAhAaW: York, Wandoo and Jam woodland	2.10 ha	1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet
EwW: Wandoo woodland	3.59 ha	1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet
CoW: Salt Sheoak woodland	2.56 ha	N/A
TsS: Samphire shrubland	0.64 ha	N/A
Scattered Eucalypt trees	19.82 ha	N/A
EwEsW: Wandoo and Salmon Gum woodland	0.82 ha	1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet
TaS: Mixed Heath	0.05 ha	694 Shrublands; scrub-heath on yellow sandplain banksia-xylomelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions
TOTAL	55.70 ha	1049 = 9.83 ha 352 = 5.93 ha 694 = 0.05 ha
Total native vegetation within Project area (excluding cleared areas)	38.85 ha	15.81 ha

3.5.3 Vegetation condition

The vegetation condition of the Study Area was assessed and mapped in accordance with the vegetation condition rating scale developed by Keighery (1994) (GHD 2015, Appendix B). Much of the Project area (38.12 ha) was very highly modified, with only scattered native species remaining and was rated Condition 6 (*Completely Degraded*).

Sections of the road reserve that contained native vegetation but which did not have all vegetation layers intact and which were dominated by weeds, were rated Condition 5 or 5- 6 (*Degraded – Completely Degraded*) (7.37 ha in the Project area).

The remaining majority of the vegetation adjacent to the road had been impacted by previous clearing and works associated with the road and while some layers of the vegetation structure remained intact, the understorey was generally highly impacted by weeds, this vegetation was rated as Condition 4 or 4-5. However, there were some areas where the vegetation structure remained intact, with a diverse understorey, but with some low-level weed invasion. These areas were rated between Condition 2-3 (*Excellent-Very Good*), Condition 3 (*Very Good*) and Condition 3-4 (*Very Good – Good*). These areas generally occurred adjacent to the nature reserves and within the wide road reserve at approximately SLK 44.6 to 48.5 where the vegetation has been buffered from degrading processes by the presence of intact vegetation directly adjacent to it. In the Wandoo woodland at approximately SLK 48.5, in the eastern end of the area of wide road reserve, the vegetation health appeared to be in decline, with a number of dead and dying species.

Vegetation condition has been mapped in Figure 4, Appendix A and are summarised below in Table 4.

Table 4 Vegetation condition of the Project area

Vegetation Condition	Project Area (ha)
2-3	2.35
3	0.79
3-4	1.32
4	0.46
4-5	5.29
5	1.23
5-6	6.14
6	38.12
TOTAL	55.70

3.6 Flora

3.6.1 Conservation significant ecological communities

The remnant vegetation within the Project area was predominantly composed of Eucalypt woodlands. Eucalypt woodlands within the Western Australian Wheatbelt are considered a Priority 3 PEC as defined by DPaW:

- Eucalypt woodlands of the Western Australian Wheatbelt (Priority 3)
Eucalypt-dominated woodlands in the Western Australian Wheatbelt region as defined by the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions with the specific exceptions of: woodlands and forests dominated by Jarrah (*E. marginata*) or Marri (*Corymbia calophylla*) where they occur without York Gum present; and non-woodland communities dominated by eucalypts, specifically those dominated by eucalypts with a mallee growth form. Community is defined primarily by its structure as a woodland. The presence in the canopy layer of eucalypt trees - most commonly salmon gum (*Eucalyptus salmonophloia*), York gum (*Eucalyptus loxophleba*), red morrel (*Eucalyptus longicornis*) or gimlet (*Eucalyptus salubris*) defines the Wheatbelt woodlands.

The vegetation types mapped within the Project area as 'York Gum and Jam woodland' (EIAaW), 'York and Salmon Gum woodland' (EIEsW), 'Wandoo woodland' (EwW), 'York Gum and Wandoo woodland over Jam low woodland' (EIEwAaW) and 'Wandoo and Salmon Gum woodland' (EwEsW) are all considered to be representative of the Eucalypt Woodlands within the Western Australian Wheatbelt PEC. However, some degraded sections of these vegetation types can no longer be considered as a woodland, and it is likely that only the areas mapped as Condition 5 (Degraded) or higher can be considered as an intact community. Considering the condition of the vegetation within the Project area approximately 6 - 7 ha of this community occurs within the Project area.

3.6.2 Other significant ecological communities

The 'Mixed Heath' vegetation that occurred on the top of a small rocky rise at about SLK 6 was unusual in that it was not recorded anywhere else within the Study Area or Project area and it supported an unusual combination of species. The extent of this vegetation was very small and only 0.05 ha occurs within the Project area.

3.6.3 Flora diversity

A total of 208 flora taxa (including subspecies and varieties) representing 55 families and 142 genera were recorded in the Study Area during the GHD field survey. This total comprised 145 (69.7 %) native taxa and 63 (30.3 %) introduced taxa.

3.6.4 Conservation significant flora

The GHD field survey did not record any EPBC Act or WC Act-listed flora taxa within the Project area. However, two DPaW Priority-listed flora taxa were recorded within the broader Study Area. These were:

- *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) (Priority 1)
- *Hemigenia platyphylla* (Priority 4)

***Eremophila glabra* subsp. York (P.G. Wilson 12172 B) (Priority 1)**

During the field survey *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) was recorded in one of the locations in which it had previously been recorded, at Saint Andrews Church Reserve (Plate 2). A targeted search for this species was undertaken within the Study Area at this location, as well as opportunistically in the adjacent reserve. Eighteen individual plants were recorded at this location, with a couple of these occurrences forming clumps up to 2 m across. However, only one of these plants was recorded within the Study Area with the remaining seventeen recorded directly adjacent to the Study Area (see Figure 3 GHD 2015, Appendix B).



Plate 2 *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) in situ within the Study Area

***Hemigenia platyphylla* (Priority 4)**

Hemigenia platyphylla was recorded in four separate locations within the Study Area and in areas adjoining the Study Area at the western and eastern end of Mt Hardey Nature Reserve; however, only two of the plants occur within the Study Area (see Figure 3 GHD 2015, Appendix B).



Plate 3 *Hemigenia platyphylla* in situ within the Study Area

3.6.5 Potential impacts

Main Roads have kept clearing of vegetation to a minimum for the safe construction and operation of the Project.

The Project will result in direct loss of 38.85 ha native vegetation ranging from *Very good* to *Degraded* condition. Of the vegetation to be cleared within the Project area 4.92 ha is *Excellent-Very Good* to *Very Good – Good* condition.

The local and regional impacts on the loss of vegetation associations have been assessed using the mapped extent of the Beard (1979) vegetation associations within the Project area. The Project will result in the clearing of a portion of three *Vulnerable* vegetation associations (352, 694 and 1049) which are all below 30 % threshold level for the state, IBRA bioregion and subregion.

The extent of clearing required for this Project for each of the vegetation association is less than 1 % at the state, IBRA bioregion, and local government levels (Table 2).

The Project will potentially result in a range of impacts on vegetation including:

- A reduction in the extent of remnant vegetation
- Fragmentation of remnant vegetation within the local area
- Reduction in the viability of the remaining vegetation onsite and loss or disruption of ecological function as a result of clearing and edge effects
- Other indirect impacts – e.g. removal of vegetation onsite may impact downstream drainage and waterways

While it is not expected there will be a significant change during final design, clearing areas may differ slightly due to unforeseen circumstances. Regardless, clearing will only be undertaken where it is required for the road and related infrastructure (fencing, services etc). No clearing is proposed for temporary work areas such as site offices, storage areas or access tracks.

Other potential impacts to vegetation from the project are discussed below:

- Changes to the existing drainage and hydrology that can alter the floristic composition of vegetation: hydrological management will aim to replicate existing hydrology, given this management measure it is not expected that vegetation will be impacted by this aspect.
- Disturbance of adjacent conservation flora: Two conservation significant flora taxa are located outside of the Project area. There will be no direct impact on known occurrences

of conservation significant flora. The Project is unlikely to result in indirect impacts to these taxa given appropriate management measures included in a Project EMP.

- Other indirect impacts such as dust and sedimentation of drainage areas: these impacts are likely restricted to the construction phase only and are not expected to be significant.

3.7 Weeds and declared plants

The GHD field assessment recorded 63 introduced taxa during the field survey (GHD 2015). Fifty-six of these species were considered naturalised; however, seven had been planted along the roadside and were not considered to naturally occur. Roadside plantings were generally restricted to the area at the York end and in the settlements, such as Kuarling.

Two of the species have been listed by the federal government as Weeds of National Significance (WoNS): *Tamarix aphylla* and *Lycium ferocissimum* (African Boxthorn). Athel Pine is also a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), and two other Declared Pests: *Moraea* spp. (Cape Tulip) and *Echium plantagineum* (Paterson's Curse) were also recorded within the Study Area. None of the Declared Pests have been allocated a management/control category in the York/Beverley/Quairading shires. The recorded locations of the WoNS and Declared Pests within the Study Area have been mapped at Figure 4 GHD 2015 (Appendix B).

3.7.1 Potential impacts

There is a moderate risk of spreading these weed taxa or introducing new weed taxa into the Project area and adjacent areas during the construction works. Hygiene management and monitoring will be required to prevent spread of significant weeds into adjacent conservation reserves.

None of the Declared Pests have been allocated a management/control category in the York/Beverley/Quairading shires but management to reduce the risk of spreading the Athel Tree and Boxthorn should be undertaken where possible.

3.8 Dieback

The Project area lies within a rainfall zone of approximately 400 mm per annum (with less rainfall than the nearest station at Beverley at 418 mm), which is at the driest extent for the likely presence and survival of *Phytophthora* (dieback) species. The vegetation within the Project area is not highly susceptible to dieback, with few Proteaceous species present, and it is considered that specific dieback management is not required for this Project. Furthermore, it is understood construction will only be undertaken in dry conditions, which will further reduce any risks associated with dieback.

3.9 Fauna and fauna habitats

3.9.1 Fauna diversity

A search of the NatureMap database (DPaW 2007–) identified 233 fauna species as previously recorded within 5 km of the Project area, including 225 native and eight introduced species. These results consisted of 118 birds, 49 reptiles, 20 mammals, ten amphibians, and 36 invertebrates.

A total of 61 fauna species were recorded in the overall Study Area during the spring reconnaissance survey. This total consisted of 57 birds, two reptiles and two mammals, of which 57 are native species and four are introduced species. No conservation significant fauna species were recorded during the spring field survey (GHD 2015, Appendix B).

3.9.2 Fauna habitats

There is a total of 38.85 ha of fauna habitat associated with native vegetation within the Project area comprising six broad fauna habitat types. The majority of this habitat comprises Eucalypt woodlands and scattered remnant roadside trees:

- Eucalypt woodlands (15.77 ha)
- Saline areas along drainage lines (0.64 ha)
- Salt Sheoak (*Casuarina obesa*) in lower lying areas (2.56 ha)
- Mixed heathland (0.05 ha)
- Scattered roadside trees (19.82 ha)
- Highly modified areas (dominated by weeds) (16.85 ha)

A description of each of these habitat types is provided in GHD 2015 (Appendix B).

3.9.3 Ecological linkages and wildlife corridors

At a local scale, the vegetation within the roadside reserve (including the Project area) retains limited connectivity to other areas of habitat, and is surrounded by a cleared agricultural landscape. As a result, due to the high degree of habitat fragmentation in the surrounding area, there are locations where the strip of roadside vegetation along the Project area provides the only link to other bushland remnants. In these areas the habitat fragments are poorly connected, which presents barriers to the dispersal of fauna species, in addition to the barrier effects of the existing road.

The rivers (e.g. Mackie and Avon River) and drainage lines throughout the local area provide some connectivity to other areas of habitat, as they mostly retain some native riparian vegetation which would provide corridors for wildlife movement. There are also areas within the Project area that are immediately adjacent to larger bushland remnants, which are further connected to other patches of habitat. An example of this can be seen around SLK 37 (Section 3), to the south-west of Balkuling. There are also several roadside reserves immediately adjacent to the Project area, which provide linkages to larger areas of remnant vegetation in typically good condition (e.g. Mt Hardey Nature Reserve (Class C) at SLK 10, St Andrews Church Nature Reserve (local reserve) at SLK 23.5, Mawson Nature Reserve (Class A) at SLK 42.5).

These local linkages are important, particularly for species like the Red-tailed Phascogale ground-dwelling fauna including reptiles and small mammals as they provide more shelter and foraging opportunities.

At a regional scale, the roadside reserve (including the Project area) retains very few vegetated links to any larger habitat corridors (ecological linkages) within the Wheatbelt region. This is due to the remaining remnant vegetation in the region consisting of variously sized habitat fragments surrounded by agricultural farmland, resulting in there being very few substantial ecological linkages. As described above, the Project area retains local linkages to some conservation reserves and areas, however at a regional scale, the habitat within the roadside reserve (including the Project area) is not connected to any larger areas of remnant habitat (such as Merredin Peak which is one of the larger reserves in the region).

3.9.4 Conservation significant fauna

No conservation significant fauna species were recorded during the spring field survey.

The results of the field survey were combined with the results of the desktop assessment to provide a likelihood of occurrence assessment for the 24 conservation significant fauna species

identified during the desktop searches. Three of these species were considered likely to occur within the Project area:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Red-tailed Phascogale (*Phascogale calura*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Rainbow Bee-eater (*Merops ornatus*) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act.

The remaining 21 conservation significant species identified in the desktop assessment are considered unlikely or highly unlikely to occur within the Project area.

Carnaby's Black Cockatoo

The field survey carried out by GHD during September 2014 was undertaken during the breeding season of Carnaby's Black Cockatoo, however no birds were sighted and there were no evidence of breeding, foraging or roosting recorded within the Project area. A description of the extent of the foraging, potential breeding and roosting habitat for the species within the GHD Study Area and Project area are summarised in Table 5.

Table 5 Summary of Black Cockatoo habitat within the Study Area and Project area

Habitat type	Presence within the Study Area (GHD 2015)	Presence within the Project area
Foraging habitat	<p>Estimated total area of suitable foraging habitat = 55.15 ha including:</p> <ul style="list-style-type: none"> • 28.29 ha of Eucalypt woodland • Approximately 26.86 ha of scattered roadside Eucalypt trees that also provide foraging habitat. <p>No evidence of foraging by Black Cockatoos was recorded within the Study Area.</p>	<p>Estimated total area of suitable foraging habitat = 35.59 ha including:</p> <ul style="list-style-type: none"> • 15.77 ha of Eucalypt woodland • 19.82 ha of scattered roadside Eucalypt trees that also provide foraging habitat. <p>No evidence of foraging by Black Cockatoos was recorded within the Project area.</p>
Potential breeding habitat	<p>1176 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 76 contain hollows, including:</p> <ul style="list-style-type: none"> • 52 Wandoo (<i>Eucalyptus wandoo</i>) ≥300 mm DBH with hollows <ul style="list-style-type: none"> – 675 Wandoo ≥300 mm DBH (with no hollows recorded) • 6 Salmon Gum (<i>Eucalyptus salmonophloia</i>) ≥300 mm DBH with hollows • 228 Salmon Gum ≥300 mm DBH (with no hollows recorded) • 6 York Gum (<i>Eucalyptus loxophleba</i>) ≥500 mm DBH with hollows • 197 York Gum ≥500 mm DBH (with no hollows recorded) • 12 stags (dead trees) ≥500 mm 	<p>592 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 20 contain hollows, including:</p> <ul style="list-style-type: none"> • 12 Wandoo ≥300 mm DBH with hollows • 296 Wandoo ≥300 mm DBH (with no hollows recorded) • 3 Salmon Gum ≥300 mm DBH with hollows • 136 Salmon Gum ≥300 mm DBH (with no hollows recorded) • 5 York Gum ≥500 mm DBH with hollows • 140 York Gum ≥500 mm DBH (with no hollows recorded) <p>The 20 trees with hollows within the Project area provide nesting opportunities for the Carnaby's</p>

	DBH with hollows The 76 trees with hollows within the Study Area provide nesting opportunities for the Carnaby's Black Cockatoo (hollows with an entrance diameter greater than 20 cm). None of these trees showed any recent or historical signs of breeding (nesting use) by Carnaby's Black Cockatoo.	Black Cockatoo (hollows with an entrance diameter greater than 20 cm). None of these trees showed any recent or historical signs of breeding (nesting use) by Carnaby's Black Cockatoo.
Actual breeding habitat	No breeding events were recorded by any species of Black Cockatoo during the current survey.	
Roosting habitat	No roosting sites were recorded as being used by Black Cockatoos. Suitable roosting habitat occurs throughout the Project area and consists of Eucalypt woodland and tall mature trees located in proximity to permanent water sources (e.g. farm dams).	

Table notes: Scattered tree habitat based on field surveys and review of canopy cover analysis of aerial imagery for parts of the GHD 2014 survey for the Study Area (GHD 2015).

Red-tailed Phascogale

There were no observations of the Red-tailed Phascogale recorded during the September 2014 field survey (GHD 2015); however the survey did not use methods to target this species. There is suitable habitat for this species throughout the Project area and particularly in areas of Wandoo woodland with nesting resources including tree hollows and cavities and continuous canopy connectivity. Overall there is at least 59.16 ha consisting of Eucalypt woodland (55.15 ha) and Sheoak woodland (3.98 ha) habitat present within the Study Area. There is 38.15 ha of habitat within the Project area consisting of Eucalypt woodland and scattered roadside Eucalyptus trees (35.59 ha) and Sheoak woodland (2.56 ha) that would provide suitable habitat resources for this species. This habitat includes scattered roadside tree habitat including single tree and small clumps of trees which are general separated (e.g. by greater than 10 m) from other remnant vegetation. This is considered important habitat for the Red-tailed Phascogale as it contributes to local habitat connectivity. Furthermore, Wandoo and *Allocasuarina huegeliana* trees are scattered throughout the various types of Eucalypt woodlands. The areas that would provide the greatest value to the species include the patches of habitat (within the Project area) that are connected to larger areas of remnant habitat.

Rainbow Bee-eater

No observations or evidence of the Rainbow Bee-eater was recorded during the September 2014 field survey (GHD 2015). This species is widespread throughout Australia and occurs in a wide range of habitat types and is a reasonably common bird in the south-west of Western Australia. This species will utilise a large variety of habitat types and may potentially occur throughout the entire Project area on an opportunistic basis. There are numerous records of the species scattered throughout the Wheatbelt, and it is mostly likely that the species would utilise the Project area for foraging and during dispersal. While Rainbow Bee-eaters will utilise a wide-range of habitats to nest, there was no habitat recorded during the current assessment (GHD 2015) within the Project area suitable for the species to breed.

3.9.5 Potential impacts

Construction phase impacts

- Loss of habitat - clearing would result in the permanent loss of up to 38.85 ha of fauna habitat, including potential habitat for fauna species of conservation significance. Furthermore, this clearing would also serve to reduce the functionality of the remaining habitat alongside the road. The impacts are likely to lead to incremental losses (i.e. fragmentation, barrier effects, edge effects).

- Impacts to Carnaby's Black Cockatoo are predicted as a result of the Project. The Project area provides foraging, potential breeding and roosting habitat for Carnaby's Black Cockatoo. The key potential impacts to Carnaby's Black Cockatoo resulting from clearing of the Project area is the loss of habitat including:
 - Loss of an estimated 35.59 ha of habitat including foraging and potential breeding and roosting habitat.
 - Loss of potential breeding habitat includes 592 potential habitat trees.
 - 20 of these trees contains suitable hollows for breeding (see Figure 5 GHD 2015, Appendix B).
 - The remaining 572 of these trees do not contain suitable breeding hollows at present but have a DBH greater than 300 mm or 500 mm and have the potential to develop a suitable nest hollow in the future.
- The Red-tailed Phascogale has been identified as likely to occur within the Project area. Given that the Project is located within the known breeding range of the species and that there is preferred habitat within the Project area (e.g. in the form of hollow-bearing Eucalypts and Allocasuarina), it has been assumed that the species could utilise the habitat within the Project area for breeding and therefore likely to be impacted as a result of the Project. The key potential impacts to Red-tailed Phascogale resulting from clearing of the Project area is:
 - Loss of an estimated 38.15 ha of suitable habitat including foraging, nesting and breeding habitat (i.e. hollow bearing trees). It is difficult to estimate the number of hollow-bearing trees within the Project area as counts for hollows suitable for Red-tailed Phascogale were not undertaken, however the presence of hollows (e.g. 20 hollows of suitable size for breeding for Carnaby's Black Cockatoo) and additional smaller hollows provides an indication that potentially suitable hollows for breeding may be present within the Project area.
- Injury and mortality - native fauna including the Red-tailed Phascogale are susceptible to injury and/or death during two stages of the Project: 1) the construction phase; and 2) the operation phase of the new road. During the construction phase of the Project, habitat clearance may result in the injury or death of fauna. Some species are more susceptible than others (e.g. can more readily evade injury such as birds). The Red-tailed Phascogale is susceptible to injury / death given its crepuscular behaviour. Furthermore, many species including the Red-tailed Phascogale are not able to cover large distances rapidly making them more susceptible to injury / death during the clearing phase of the Project. Black Cockatoo's may also be susceptible to injury or death during construction; particularly during the breeding season when young is nest (hollow) dependent.

Operational phase

- Mortality due to vehicle collision (road kill) - during the operation phase of the Project the local wildlife populations including the local Red-tailed Phascogale may be reduced as a result of the upgraded road. The proposed road would create additional barriers to the movement of fauna (e.g. the loss of some segments of the roadside corridor), consequently increasing the likelihood of fauna and vehicle collisions.
- Gradual and cumulative impacts (fragmentation and edge effects) – the proposed Project may reduce the overall connectivity of habitat available to the fauna including conservation significant fauna (e.g. the Red-tailed Phascogale) in the locality. The proposed Project is likely to divide areas of remnant vegetation (e.g. by creating gaps in the existing roadside reserve) and associated fauna habitat, particularly the local habitat

linkages. The Project is likely to exacerbate existing fragmentation effects and edge effects in the locality.

3.10 Heritage

3.10.1 Non-indigenous heritage

A search of the State Heritage Register (Inherit database) including the Municipal Inventories of the Shires of York and Quairading has indicated that there are two heritage places within ~120 m of the Project area (Figure , Appendix A).

The two properties are at Greenhills, being St Andrews Church (~SLK 23, immediately adjacent to the Project area) and Koorawilla Homestead group (~SLK 24, approximately >100 m from the Project area).

3.10.2 Potential impacts

Impacts from construction vibration could have a detrimental impact on these buildings, as well as vibration from use of the road, with the new road being slightly closer to them.

Further investigations will be needed to determine the impacts (if any) to these heritage sites. Consultation, if required, will occur with the State Heritage Office and Shire of York regarding potential impacts to these sites.

3.10.3 Aboriginal heritage

A search of the Department of Aboriginal Affairs site register indicated the presence of two registered sites:

- ID 3536 Swan River which intersects the Project at one un-named tributary of the Mackie River, at approximately 20.83 SLK – see Figure Appendix A. The Swan River site is mythological, and covers all parts of the Swan/Avon Rivers and many of its tributaries. The site boundary generally includes the bed and banks of the rivers/creeks, and potentially, flood plain zones.
- ID 5671 Jacobs Well (modified tree) east of Mawson which intersects the Project at approximately 46 SLK – see Figure , Appendix A. The site is classified as stored data/not a site.

3.10.4 Potential impacts

For Site 3536 (Swan River) the Project activities will require some ground disturbance within the site, in the vicinity of creek/river culverts and bridges. A Regulation 10 application to disturb the site is likely to be required, depending on the construction activities and their potential impact on the relevant river and creek banks and the immediately adjacent areas.

No further action is required for site 5671. Main Roads will not be impacting this site and no further action is required in relation to the Project approvals.

Main Roads has completed an Aboriginal Heritage Risk Assessment (AHRA) for each of the three sections of the Project. These findings of these assessments are at Appendix C.

4. Environmental Management

The aim of environmental management is to minimise the environmental impacts associated with the proposed works as well as to identify areas of responsibility for the implementation of management strategies. A project specific EMP has been developed to manage environmental impacts associated with the project. The EMP is provided in Appendix D.

The Project is expected to be delivered through a construction contract with environmental management measures outlined in a Construction EMP. The environmental management measures listed in the following section should form the basis for this plan.

Key environmental aspects

The key environmental aspects and impacts for the proposed Project were identified through the EIA process. The key relevant environmental aspects identified during this process and addressed in this EIA include:

- Terrestrial fauna – fauna species of conservation significance
- Flora and vegetation

Other environmental factors have been identified as requiring less detailed assessment as they pose a lower risk and can be readily managed through Main Roads' procedures and adherence to regulations. These factors include:

- Dust, noise and vibration
- Waste and hydrocarbon management
- Dieback and weeds
- Watercourses and drainage
- ASS and contaminated sites
- Amenity
- Aboriginal heritage – it should be noted that although discussed in this EIA heritage will be assessed and managed separately under the AH Act.

5. Commonwealth Aspects and Impacts

Matters of National Environmental Significance (MNES) are factors that require legislated protection in order to conserve biodiversity, protect World Heritage and National Heritage Places, and comply with international treaties. MNES are listed and protected under the EPBC Act. An assessment was undertaken to determine whether the Project will impact upon MNES and require referral to the Commonwealth. The existing environment, nature and extent of impact or potential impact to the following MNES were assessed with regard to the Project (Table 6).

As a result of this assessment it is considered that the Project may have a negative impact on populations of the Red-tailed Phascogale and Carnaby's Black Cockatoo, therefore referral is recommended (see Section 8).

Table 6 Assessment of MNES and likely impact

MNES	Existing Environment and Likely Impact
<p>Nationally listed threatened species or ecological communities</p>	<p>Fauna The results of the field survey were combined with the results of the desktop assessment to provide a likelihood of occurrence assessment. Two species were considered likely to occur within the Project area based on the habitat types present within the Project area and species habitat requirements. These are:</p> <ul style="list-style-type: none"> • Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act. • Red-tailed Phascogale (<i>Phascogale calura</i>) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act. <p>Flora No Federally listed plant species or communities are likely to be present, based on the likelihood of occurrence assessment for the Project area.</p> <p>Ecological communities No Federally listed communities are likely to be present, based on the likelihood of occurrence assessment for the Project area.</p>
<p>Justification of likely impact</p>	<p>Project activities will directly or indirectly impact the following species:</p> <p>Carnaby's Black Cockatoo The key potential impacts to Carnaby's Black Cockatoo resulting from clearing of the Project area is the loss of habitat including:</p> <ul style="list-style-type: none"> • Loss of an estimated 35.59 ha of habitat including foraging and potential breeding and roosting habitat • Loss of potential breeding habitat includes 592 potential habitat trees. • 20 of these trees contains suitable hollows for breeding (see Figure 5 GHD 2015, Appendix B) • The remaining 572 of these trees do not contain suitable breeding hollows at present but have a DBH greater than 300 mm or 500 mm and have the potential to develop a suitable nest hollow in the future. <p>Red Tailed Phascogale The key potential impacts to Red-tailed Phascogale resulting from clearing of the Project area is:</p> <ul style="list-style-type: none"> • Loss of an estimated 38.15 ha of suitable habitat including foraging, nesting and breeding habitat (i.e. hollow bearing trees). It is difficult to estimate the number of hollow-bearing trees within the Project area as counts for hollows suitable for Re-tailed Phascogale were not undertaken, however the presence of hollows (e.g. 20 hollows of suitable size for breeding for Carnaby's Black Cockatoo) and additional smaller hollows provides an indication that potentially suitable hollows for breeding may be present within the Project area.

MNES	Existing Environment and Likely Impact
<i>Methodology</i>	<p>Reference to a number of sources was made to provide the relevant information for assessment of impact. These are:</p> <ul style="list-style-type: none"> • DotE Protected Matters Search Tool Report June 2015 • GHD, 2015. York to Merredin Road Widening SLK 1.95 -15, SLK 19-29 and SLK 29-51 Biological Assessment (unpublished report for Main Roads Western Australia, 2015) • Department of the Environment (DotE) 2015, SPRAT Profile for the Red-tailed Phascogale and Carnaby's Black Cockatoo (retrieved June 2015) • Department of the Environment (DotE) 2013c, Matters of National Environmental Significance: Significant impact guidelines 1.1. Commonwealth of Australia 2013 • Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2012, Environment Protection and Biodiversity Act 1999 referral guidelines for three threatened black cockatoo species: Carnaby's Black Cockatoo (endangered) <i>Calyptorhynchus latirostris</i>, Baudin's Black Cockatoo (vulnerable) <i>Calyptorhynchus baudinii</i> and Forest red-tailed Black Cockatoo (vulnerable) <i>Calyptorhynchus banksia naso</i>, Australian Government Canberra.
Migratory species	<p>One listed migratory species was considered likely to occur within the Project area, based on the desktop and field assessment.</p> <ul style="list-style-type: none"> • Rainbow Bee-eater (<i>Merops ornatus</i>) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act
<i>Justification of likely impact</i>	<p>Rainbow Bee-Eater</p> <p>No observations or evidence of the Rainbow Bee-eater was recorded during the September 2014 field survey (GHD 2015). This species will utilise a large variety of habitat types and may potentially occur throughout the entire Project area on an opportunistic basis. There are numerous records of the species scattered throughout the Wheatbelt, and it is mostly likely that the species would utilise the Project area for foraging and during dispersal. While Rainbow Bee-eaters will utilise a wide-range of habitats to nest, there was no habitat recorded during the current assessment (GHD 2015) within the Project area suitable for the species to breed. However, the species is unlikely to rely solely on the habitats available in the proposed Project area.</p>
<i>Methodology</i>	<p>Reference to a number of sources was made to provide the relevant information for assessment of impact. These are:</p> <ul style="list-style-type: none"> • DotE Protected Matters Search Tool Report June 2015 • GHD, 2015. York to Merredin Road Widening SLK 1.95 -15, SLK 19-29 and SLK 29-51 Biological Assessment (unpublished report for Main Roads Western Australia, 2015) • Department of the Environment (DotE) 2013c, Matters of National Environmental Significance: Significant impact guidelines 1.1. Commonwealth of Australia 2013
Wetlands of International Importance	No Wetlands of International Importance with 5 km of Project area.
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, June 2015.
World Heritage Properties	No world heritage properties within 5 km of the Project area
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, June 2015.

MNES	Existing Environment and Likely Impact
National Heritage Places	No world heritage properties within 5 km of the Project area.
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, June 2015.
Commonwealth Land or Marine Areas	Project activities are not located on or near Commonwealth land or marine areas. Commonwealth land or marine areas will not be impacted by the activities associated with the project.
<i>Justification of likely impact</i>	N/A
<i>Methodology</i>	DotE Protected Matters Search Tool Report, June 2015.
Nuclear Actions	Not relevant to the proposed activity.
<i>Justification of likely impact</i>	No Project actions involve nuclear actions. Therefore no project impact on this matter.
<i>Methodology</i>	N/A
Water Resource	Not relevant to the proposed activity.
<i>Justification of likely impact</i>	No project actions involve a significant water resource. Therefore no project impact on this matter.
<i>Methodology</i>	N/A.

6. Summary of the assessment

6.1 Environmental impact assessment

The impact assessment considered the potential impact, its duration and magnitude, and the residual impact post mitigation. The majority of Project aspects were considered low risk impacts as they are considered to be temporary and/or will not be substantially different from existing site conditions. It is expected that they can be appropriately managed during the construction phase to prevent substantial environmental harm.

The key Project aspects that are considered to be moderate - high risk impacts include:

- Terrestrial fauna – the loss of potential fauna habitat for two species of conservation significant fauna (Red-tailed Phascogale and Carnaby's Black Cockatoo). This will result in the overall reduction of habitat for both species and potentially impact local populations of both species.
- Flora and vegetation – loss of *Vulnerable* vegetation. The local and regional impacts on the loss of vegetation associations have been assessed using the mapped extent of the Beard (1979) vegetation associations within the Project area. The Project will result in the clearing of a portion of three *Vulnerable* vegetation associations (352, 694 and 1049) which are all below 30 % threshold level for the state, IBRA bioregion and subregion.

Aboriginal heritage is also considered to be a low risk impact, however in the event that artefacts or material of Aboriginal origin is discovered, this aspect will require management during both the construction and operation phases to avoid impacts.

6.2 Residual environmental impacts

Residual environmental impacts are those impacts that remain after mitigation measures have been applied. The avoidance and mitigation measures outlined in the EMP (Appendix D) aim to minimise the potential impacts to the Carnaby's Black Cockatoo and Red-tailed Phascogale as a result of the Project. However, it is unlikely that the level of impact will be reduced so as to avoid a significant impact. Therefore it is still considered likely that the loss of the potential breeding trees for the Project with respect to similar potentially suitable breeding habitat in the local area is substantial.

The clearance of habitat from the Project area for the Red-tailed Phascogale and Carnaby's Black Cockatoo, in particular the potential breeding habitat is likely to reduce the availability of breeding habitat in the future. This may in turn lead to a long-term decrease in the size of the local populations of Carnaby's Black Cockatoos and Red-tailed Phascogale due to the lack of available breeding resources; therefore the Project is likely to have significant residual impacts to the Carnaby's Black Cockatoos and Red-tailed Phascogale.

The potential residual environmental impacts for this Project are:

- The loss of 38.85 ha of native vegetation ranging from *Very good* to *Degraded* condition. Of the vegetation to be cleared within the Project area, 4.92 ha is *Excellent-Very Good* to *Very Good* – *Good* condition
- Approximately 15.81 ha of this vegetation represents three *Vulnerable* vegetation associations (352, 694 and 1049) which are all below 30% threshold level for the state, IBRA bioregion and subregion
- The loss of 35.59 ha of habitat including 592 potential habitat trees (tree with a DBH of greater than 300 mm or 500 mm) of which 20 of these trees contains suitable hollows for breeding for Carnaby's Black Cockatoo

- It is considered that clearance of this habitat, in particular the potential breeding habitat (including 592 potential breeding trees, 20 with hollows suitable for breeding) is likely to result in a shortage of hollows in the local area, thus reducing the availability of potential breeding habitat in the future for Carnaby's Black Cockatoo
- The loss of an estimated 38.15 ha of suitable habitat including potential breeding habitat (i.e. hollow bearing trees) for the Red-tailed Phascogale
- It is considered that clearance of up to 38.15 ha of habitat, in particular the potential breeding habitat is likely to result in a shortage of hollows in the local area, thus reducing the availability of breeding habitat in the future for the Red-tailed Phascogale
- Furthermore the road reserve (including the Project area) is likely to support dispersal of the species in a highly cleared and fragmented landscape. The clearing associated with the Project is likely to reduce the functionality of this habitat for dispersal for the Red-tailed Phascogale.

7. Stakeholder Consultation

Consultation with key stakeholders has been undertaken for this Project in accordance with Main Roads internal processes. Letters were sent to the following stakeholders in November 2014:

- Department of the Environment
- Conservation Council
- Department of Water
- Shire of York
- Shire of Quairading

Copies of the stakeholder response are provided in Appendix E.

An Aboriginal Heritage Risk Assessment was completed for the Project and found the project has a low risk of impacting known or unknown heritage sites due to the high level of existing disturbance. Further consultation is not considered necessary (Appendix C).

8. Decision to Refer

This section details the requirements for environmental approvals for the Project.

8.1 Referral to the Department of the Environment

The Commonwealth EPBC Act provides legislative protection for MNES, including all nationally threatened fauna and flora species and ecological communities. An action must be referred to DoE under the EPBC Act if it will have, or is likely to have, a significant impact on any of the MNES.

GHD has prepared an EPBC referral on behalf of Main Roads to address the potential impacts of the Project to relevant MNES, in particular potential impacts to the Endangered Red-tailed Phascogale and Carnaby's Black Cockatoo.

It was determined after reviewing the DoE Significant Impact Policy Statement 1.1 (DoE 2013) that the Clearing of up to 38.85 ha of fauna habitat for the Project is likely to have a significant impact on the Red-tailed Phascogale and Carnaby's Black Cockatoo.

The Project area provides foraging, potential breeding and roosting habitat for Carnaby's Black Cockatoo. The key potential impacts to Carnaby's Black Cockatoo resulting from clearing of the Project area is the loss of 35.59 ha habitat including 592 potential habitat trees (tree with a DBH of greater than 300 mm or 500 mm) of which 20 of these trees contains suitable hollows for breeding.

It is considered that clearance of this habitat, in particular the potential breeding habitat (including 592 potential breeding trees, 20 with hollows suitable for breeding) is likely to result in a shortage of hollows in the local area, thus reducing the availability of potential breeding habitat in the future. This may in turn lead to a long-term decrease in the size of the local population of Carnaby's Black Cockatoo due to the lack of available breeding resources.

The Project area provides potential foraging, nesting, breeding and dispersal habitat for the Red-tailed Phascogale. The key potential impacts to Red-tailed Phascogale resulting from clearing of the Project area is the loss of an estimated 38.15 ha of suitable habitat including potential breeding habitat (i.e. hollow bearing trees).

The Project is considered likely to lead to a long-term decrease in the size of a local population of Red-tailed Phascogale. It is considered that clearance of up to 38.15 ha of habitat, in particular the potential breeding habitat is likely to result in a shortage of hollows in the local area, thus reducing the availability of breeding habitat in the future. This may in turn lead to a long-term decrease in the size of the local population of Red-tailed Phascogale due to the lack of available breeding resources. Furthermore the road reserve (including the Project area) is likely to support dispersal of the species in a highly cleared and fragmented landscape. The clearing associated with the Project is likely to reduce the functionality of this habitat for dispersal which may contribute to local population decline.

No other MNES that could potentially occur within the Project area were deemed to be substantially impacted after a review of the DoE Significant Impact Policy Statement 1.1 guidelines.

8.2 Referral to the Environmental Protection Authority

In deciding whether a proposal will be subject to the formal environmental impact assessment process under the *Environmental Protection Act 1986* (EP Act), the EPA takes into account the environmental significance of any potential impacts that may result from the implementation of the scheme or proposal.

This EIA report has determined the Project is unlikely to require referral to the WA Environmental Protection Authority. This is due to the low significance of its impacts to the surrounding environment except for impacts to native vegetation and fauna habitats. The potential impacts from the loss of native vegetation clearing and loss of fauna habitat for the Project may be effectively assessed through the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Therefore with consideration of the environmental values discussed in the EIA report including MNES, it is considered unlikely that the Project would require referral to the EPA under Section 38 of the EP Act.

8.3 Department of Environment Regulation

Assessment bilateral agreement between Western Australia and the Commonwealth

The clearing of native vegetation in Western Australia requires a permit under Part V of the EP Act, unless an exemption applies. Main Roads has been granted a State-wide vegetation clearing permit (Clearing Permit CPS 818) which allows it to clear native vegetation for road realignment projects and associated construction activities (including preconstruction activities). The Main Roads Purpose Permit (CPS 818) requires an assessment of the Project clearing against the Ten Clearing Principles and, where at variance, an environmental offset is required. The Project was assessed against the 'Ten Clearing Principles' as part of the Assessment Report undertaken by Main Roads for the Project.

The Commonwealth of Australia and Western Australia governments have entered into a bilateral agreement under the EPBC Act relating to environmental assessment (assessment bilateral agreement). Specifically, this agreement now includes the clearing permit assessment process under Part V Division 2 of the EP Act. Under the assessment bilateral agreement, if a native vegetation clearing permit is required and the clearing will have or is likely to have an impact on a MNES, the assessment of the clearing application including the potential impacts to the MNES can be conducted by the Department of Environment and Regulation (DER) or Department of Mines and Petroleum (DMP) under delegation.

The EIA process identified that the Project required referral under Commonwealth legislation due to potential impacts to fauna species listed under the EPBC Act, particularly Carnaby's Black Cockatoo and Red-tailed Phascogale. If the project is deemed a Controlled Action, it is likely to be assessed under this agreement and a project specific clearing permit will be applied for.

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Appendices

Appendix A Figures

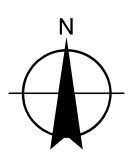
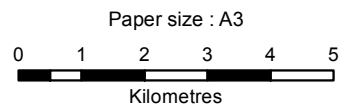
Figure 1 Project Location

Figure 2 Heritage Sites and Conservation Reserves

Figure 3 Environmental Constraints

Figure 4 Vegetation types of the Project area

Figure 5 Vegetation condition of the Project area



LEGEND

- SLK Points
- ▭ Project Envelope
- ▭ Project Area
- ▭ Study Area

Map Projection: Transverse Mercator
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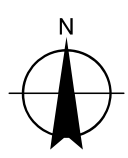
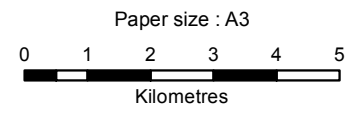
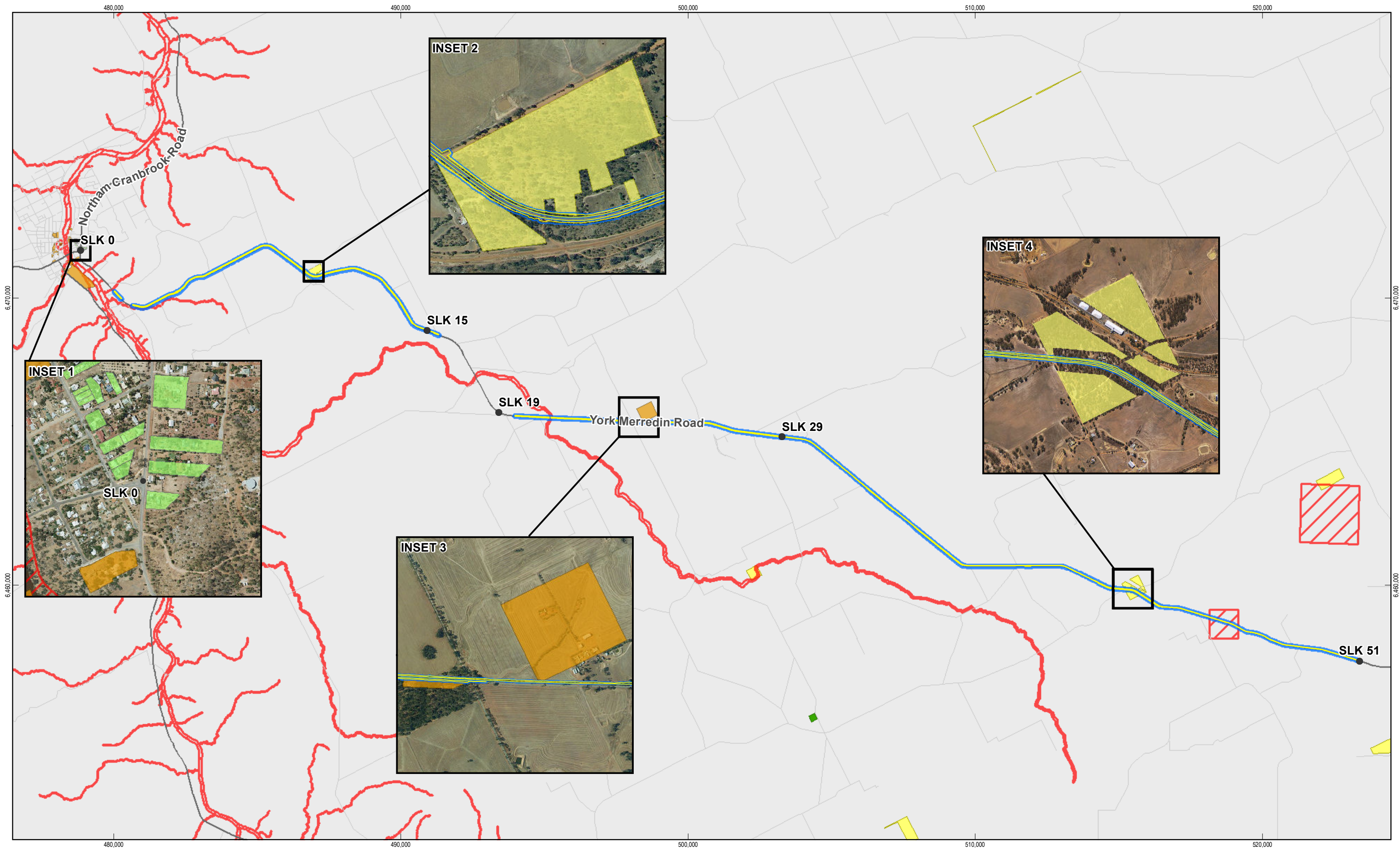
Main Roads Western Australia
 York-Merredin Road Widening
 Environmental Impact Assessment

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 Date | 27 Jul 2015

Locality

Figure 1

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 Data source: MRWA: Road Network - 201411; GHD: SLK Points - 20140926, Project Area, Project Envelope - 20150619. Created by: jmontaignies



LEGEND

- Project Area
- Project Envelope
- Aboriginal Heritage Sites
- European Heritage Sites**
- State Register
- Local Government
- DPaW Managed Lands**
- 5(1)(h) Reserve
- Nature Reserve



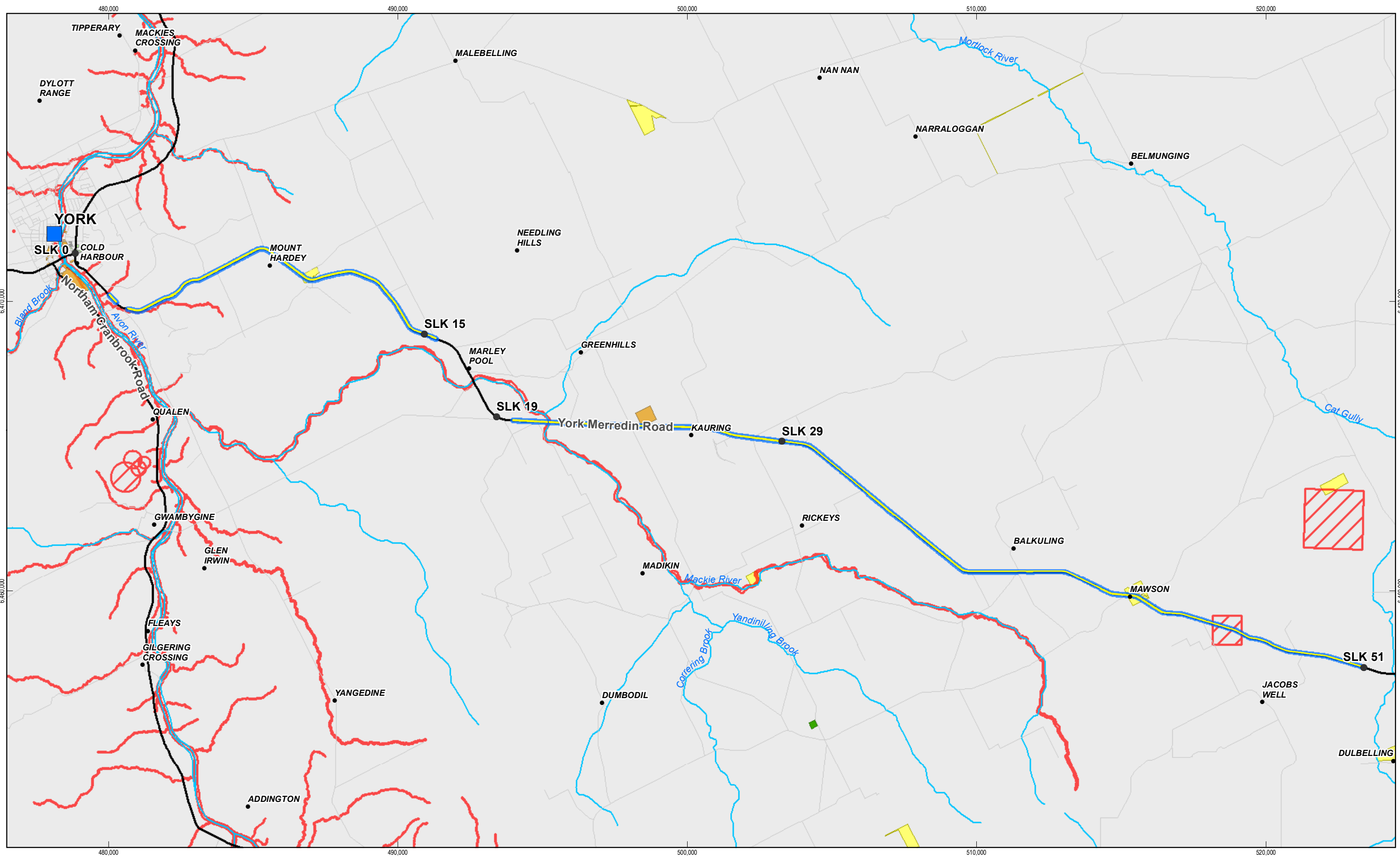
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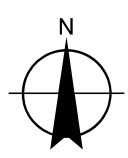
Heritage sites and conservation reserves

Figure 2

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 Grid: Map Grid of Australia 1994, Zone 50



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— Local Road	Project Envelope	European Heritage Sites	5(1)(h) Reserve
— River		State Register	Nature Reserve
		Local Government	

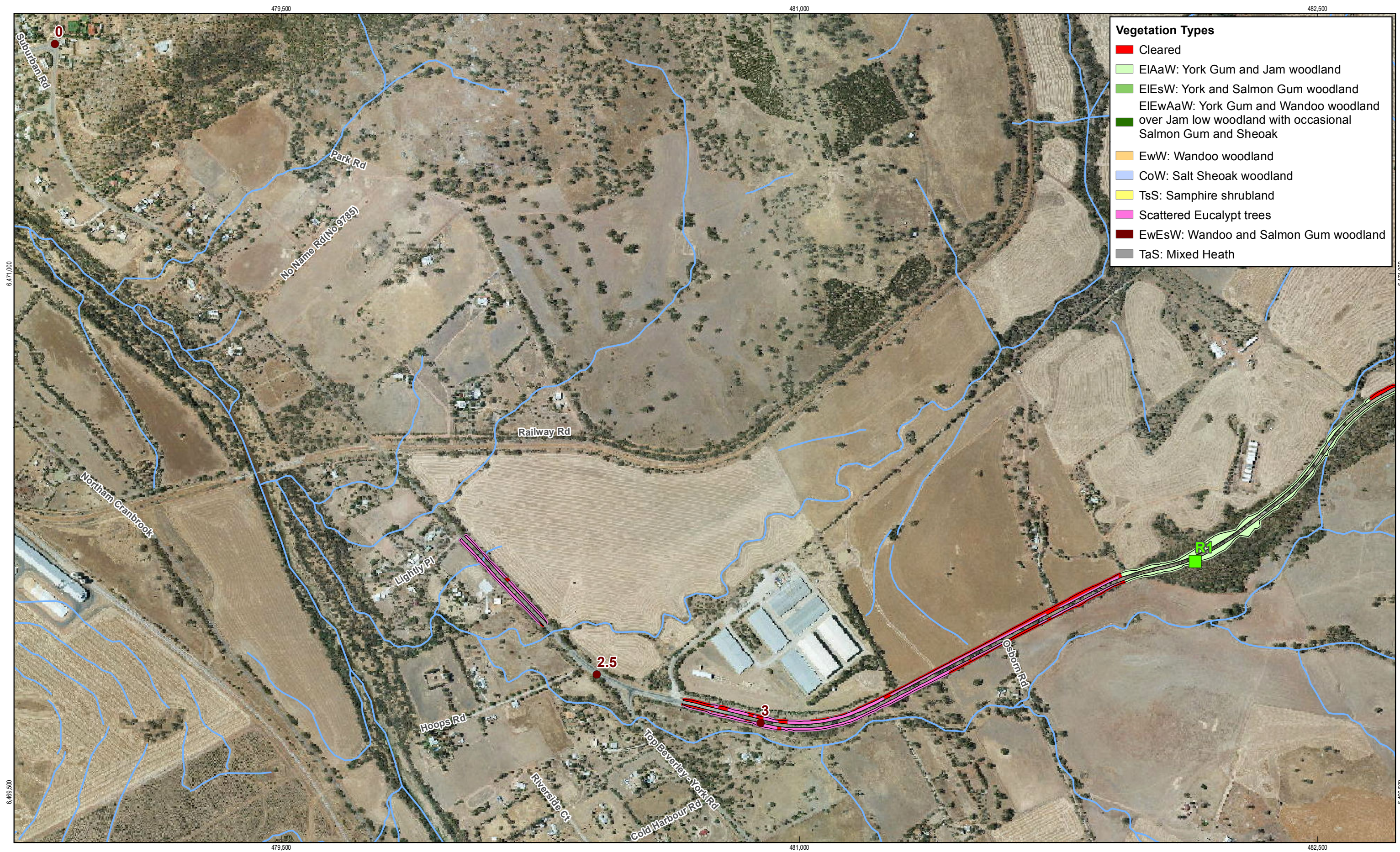


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Environmental constraints

Figure 3



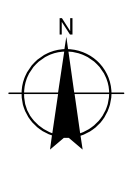
Vegetation Types

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LEGEND

- SLK Points
- Quadrat Locations
- Hydrology
- Project Area

Conservation Significant Flora

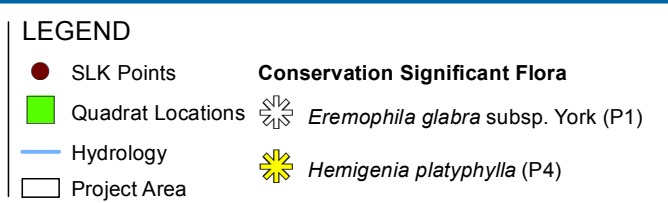
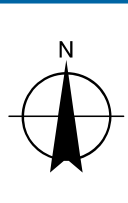
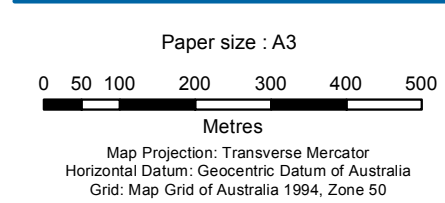
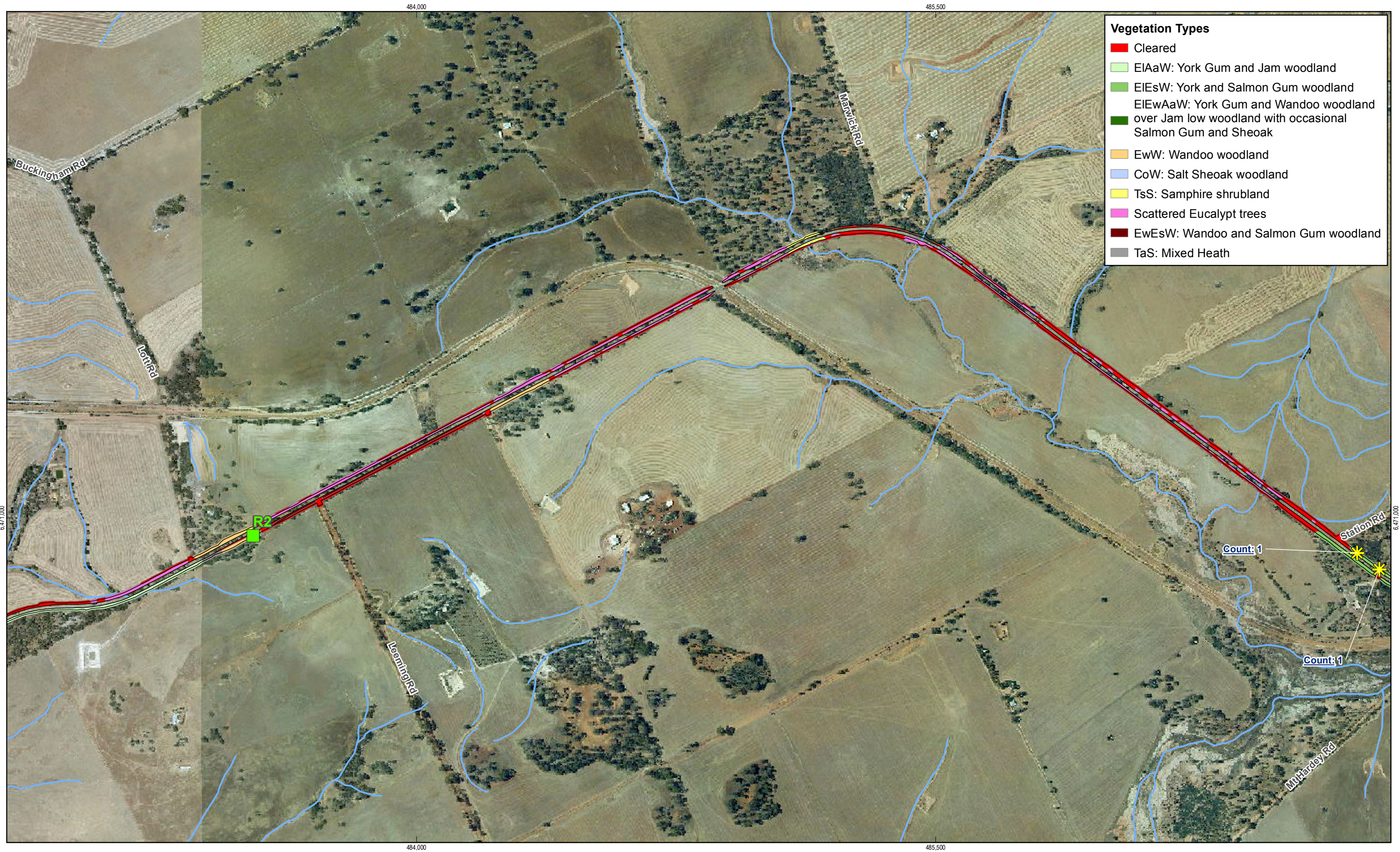
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- Hemigenia platyphylla* (P4)



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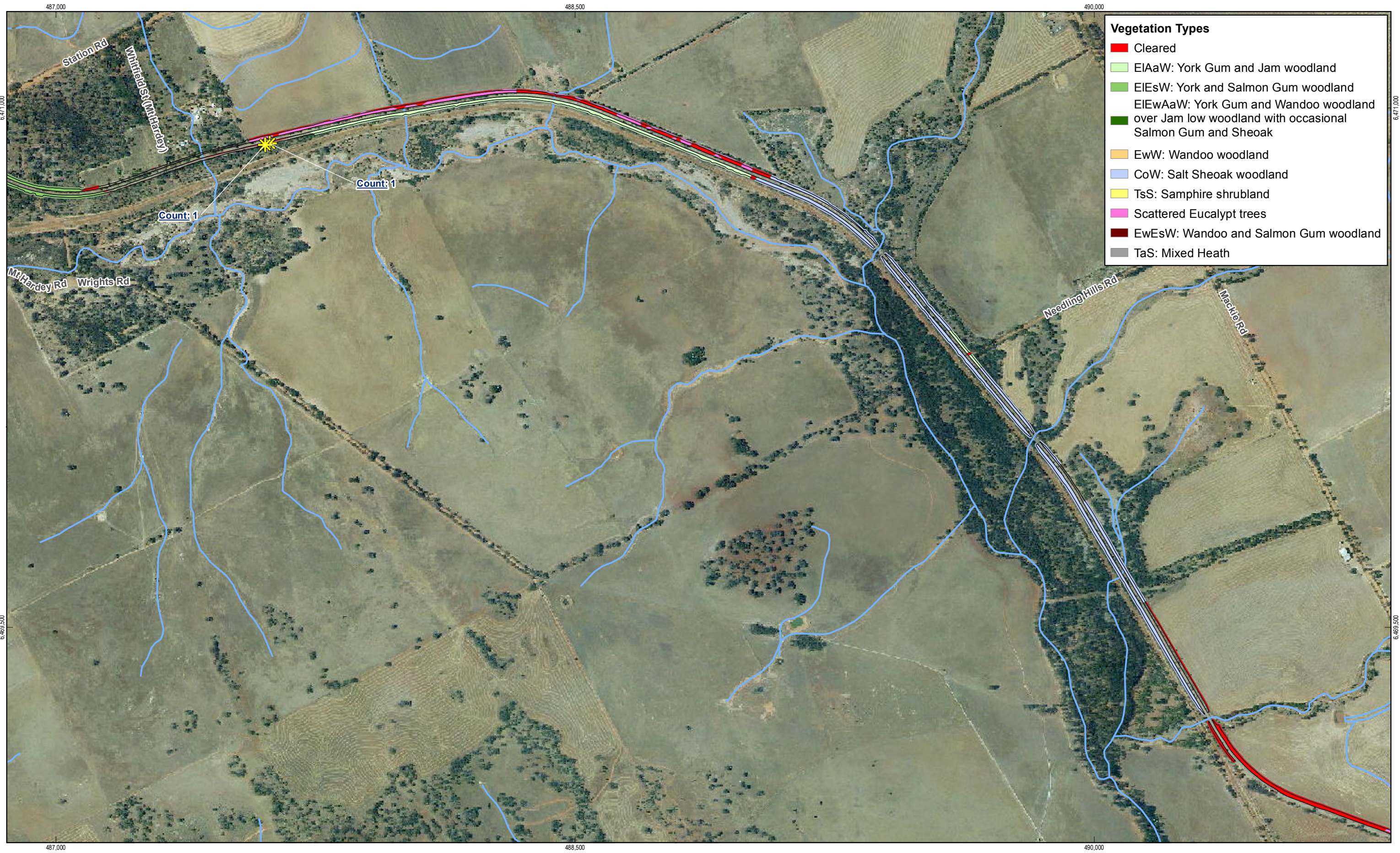
Vegetation types, quadrat locations
and conservation significant flora 2015 **Figure 4**



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Vegetation types, quadrat locations
and conservation significant flora 2015 **Figure 4**



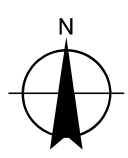
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LEGEND

- SLK Points
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- Hydrology
- Project Area

Conservation Significant Flora

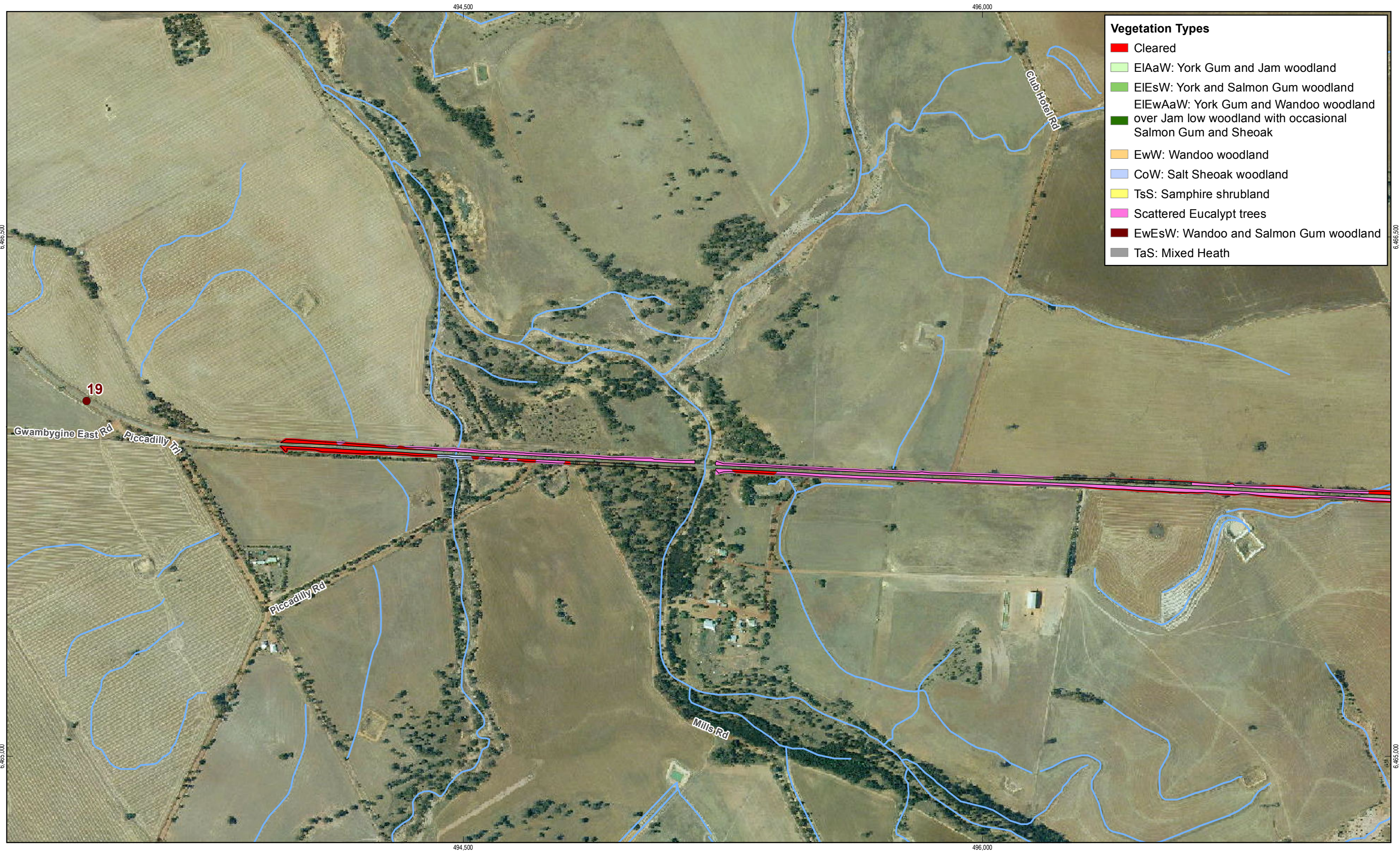
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Vegetation types, quadrat locations
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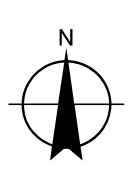
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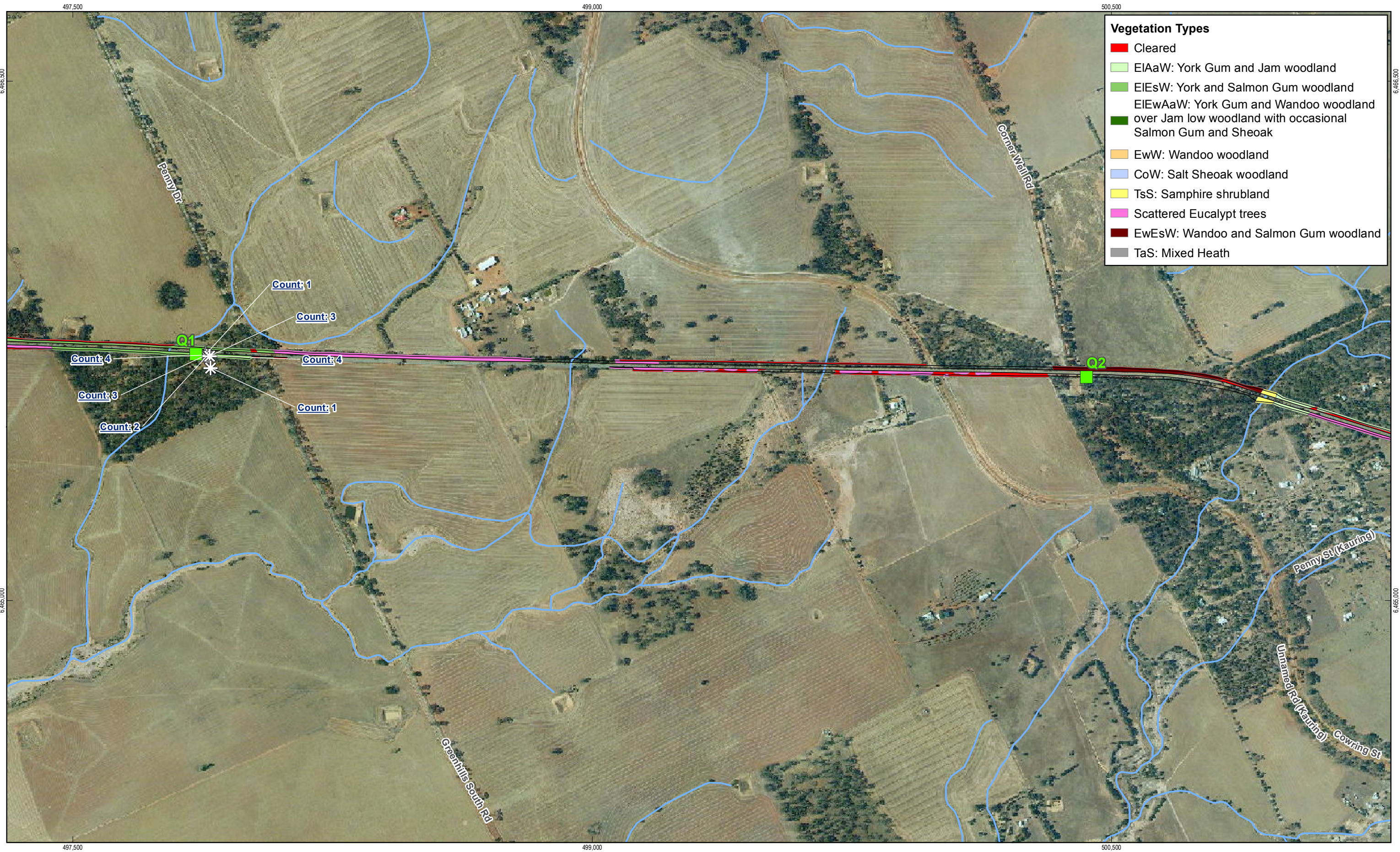
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Vegetation types, quadrat locations
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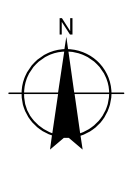
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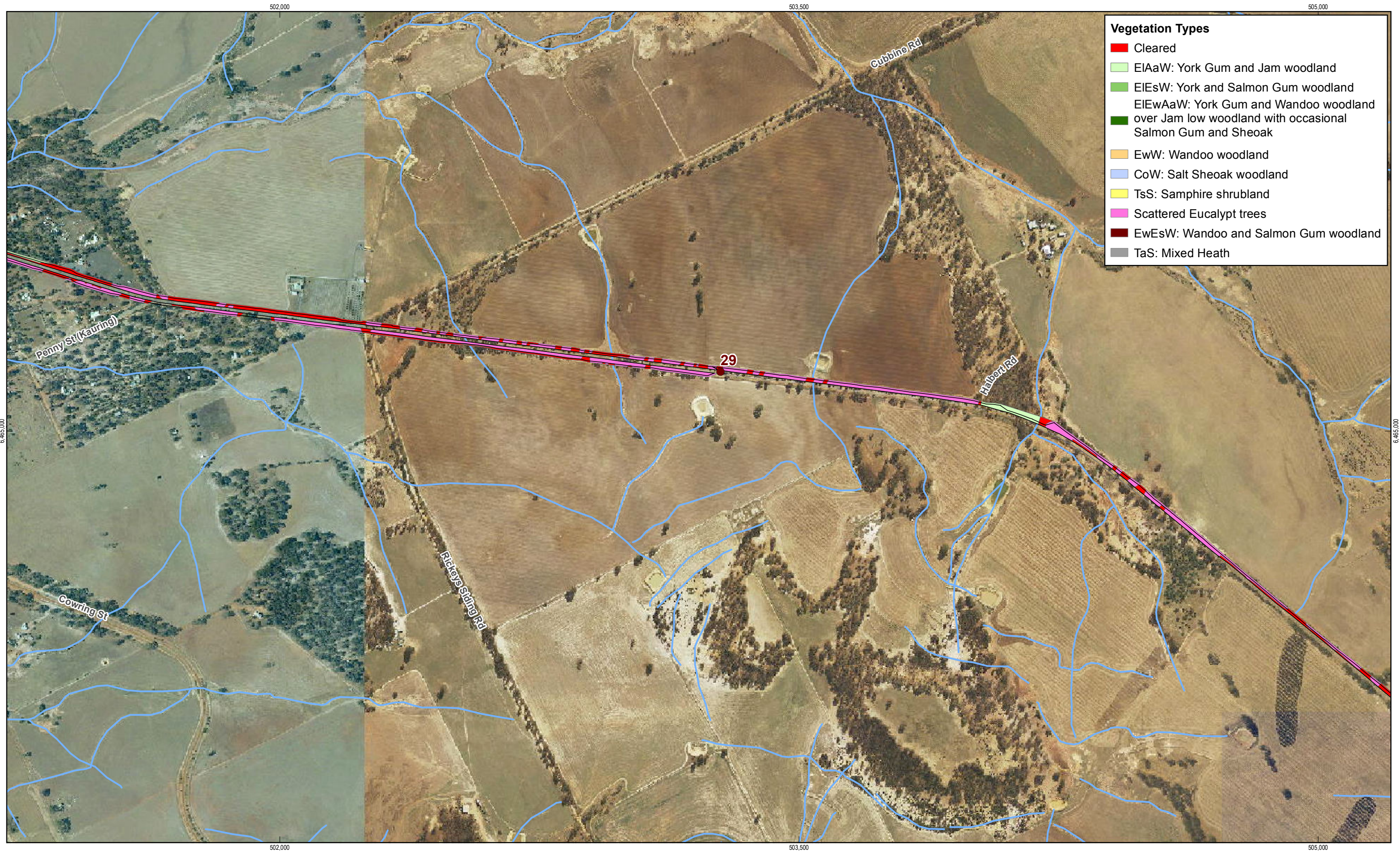
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Vegetation types, quadrat locations
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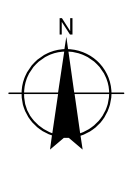
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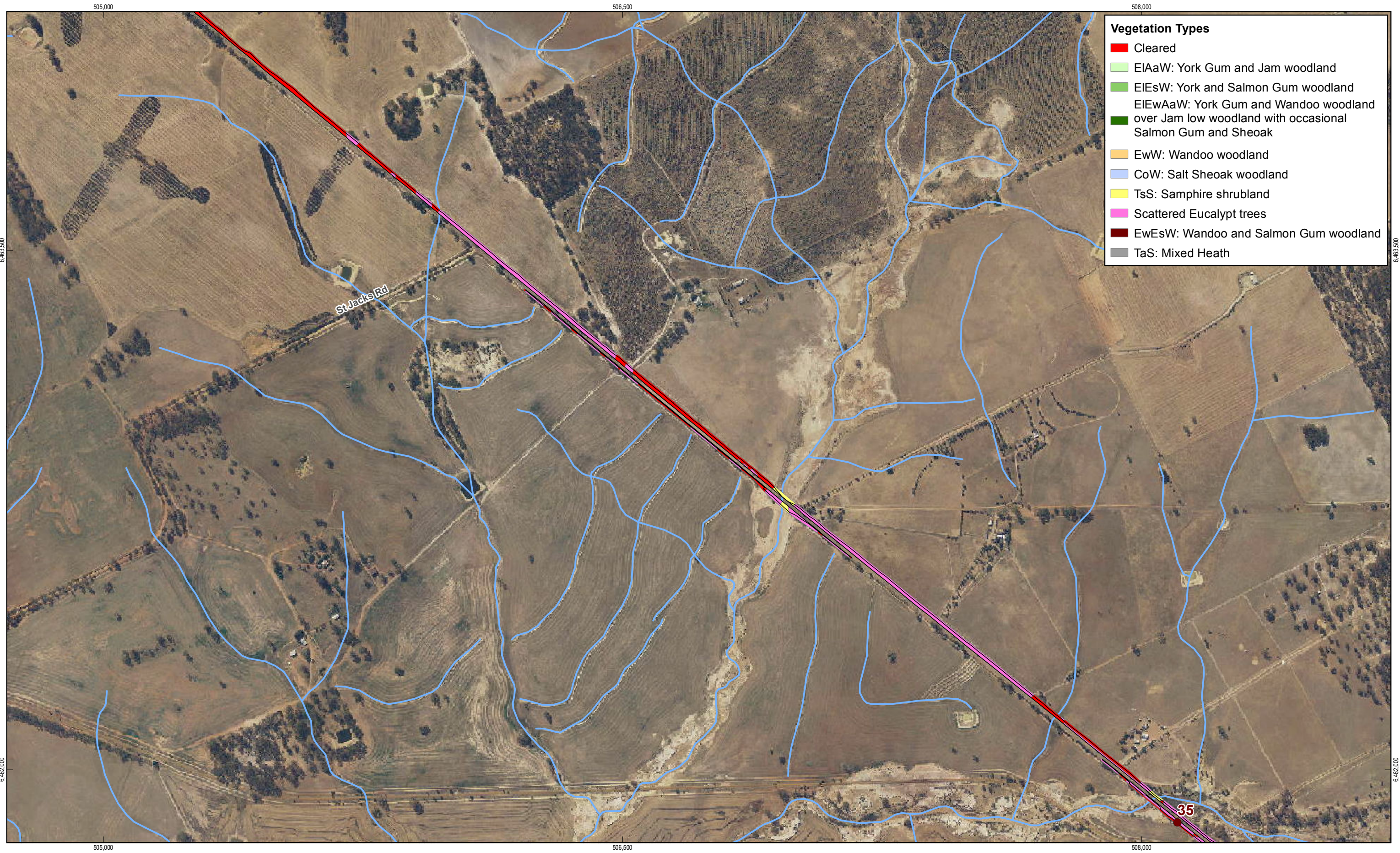
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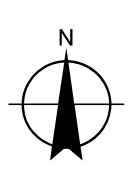
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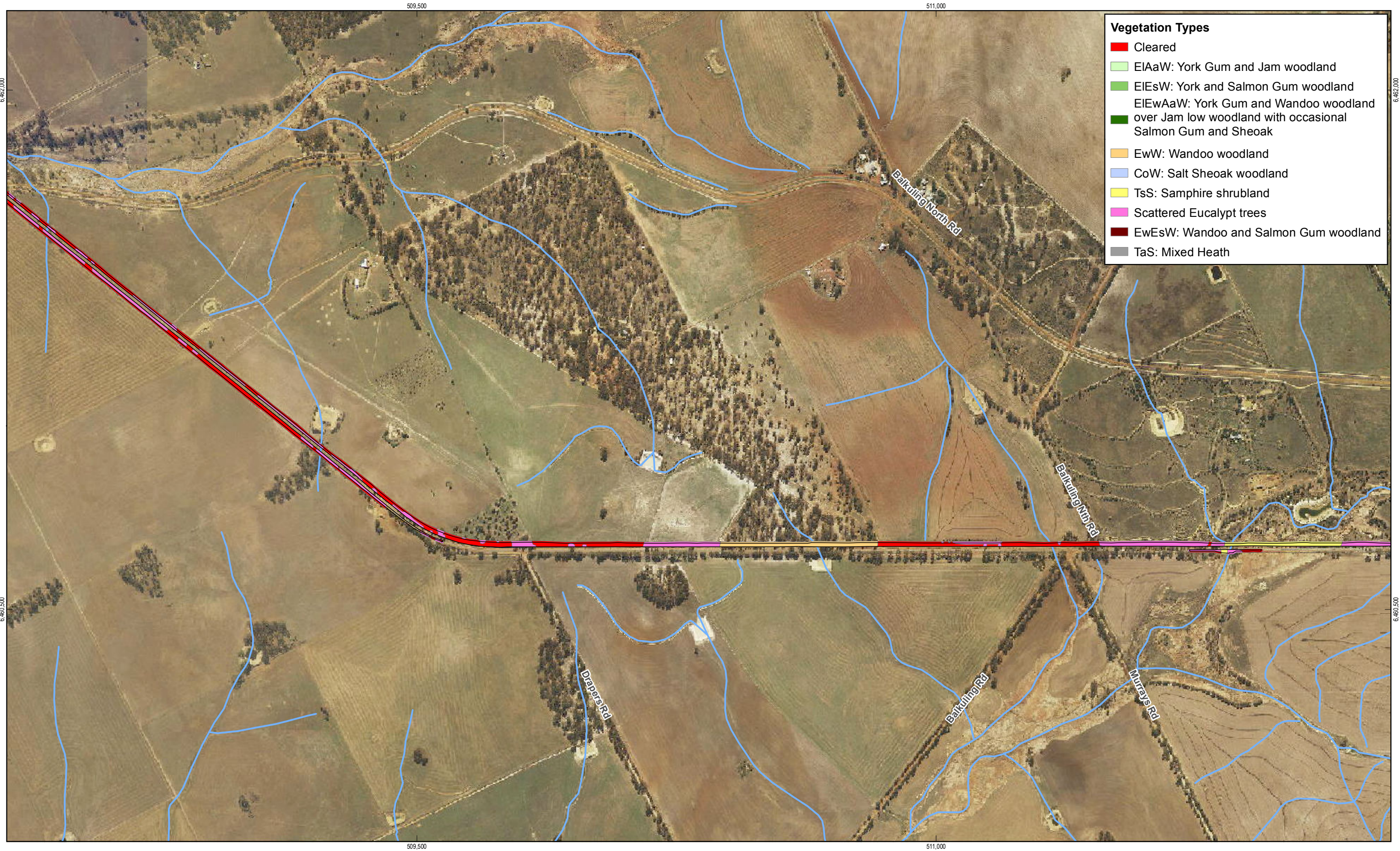
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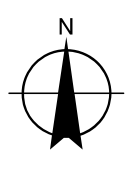
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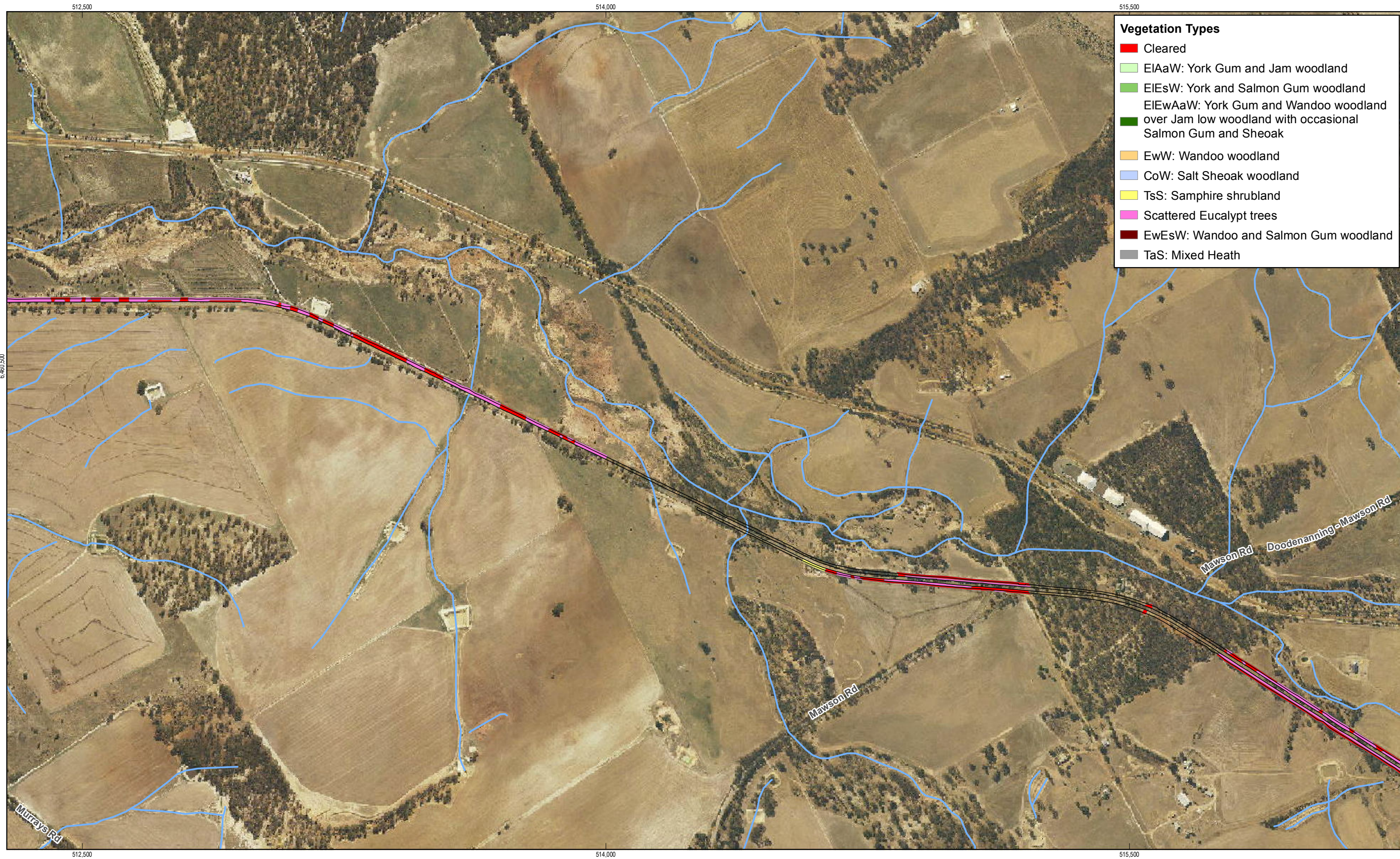
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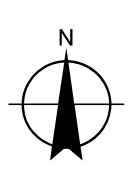
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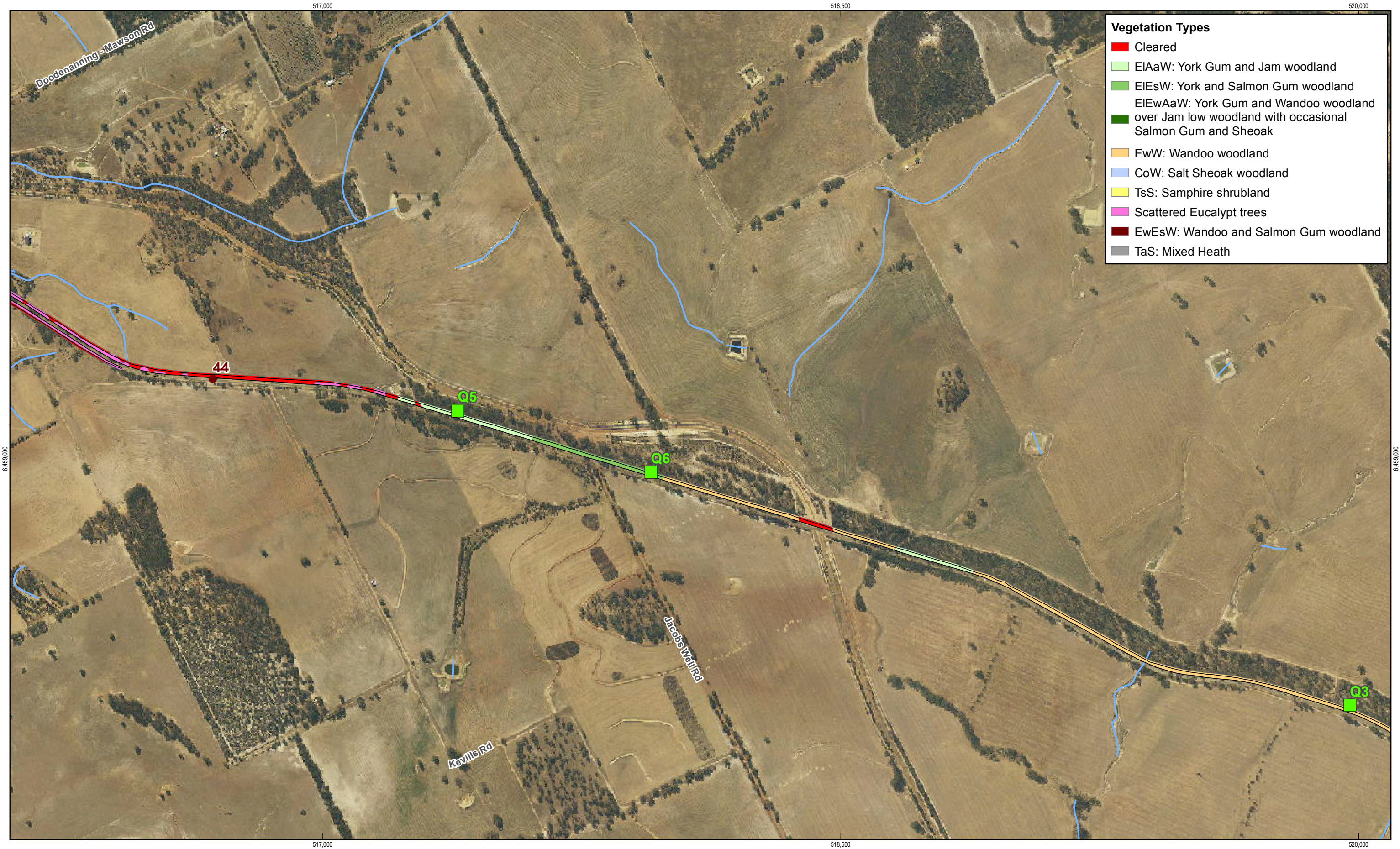
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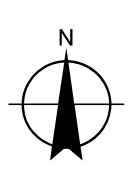
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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



LEGEND

- SLK Points
- Quadrat Locations
- Hydrology
- Project Area

Conservation Significant Flora

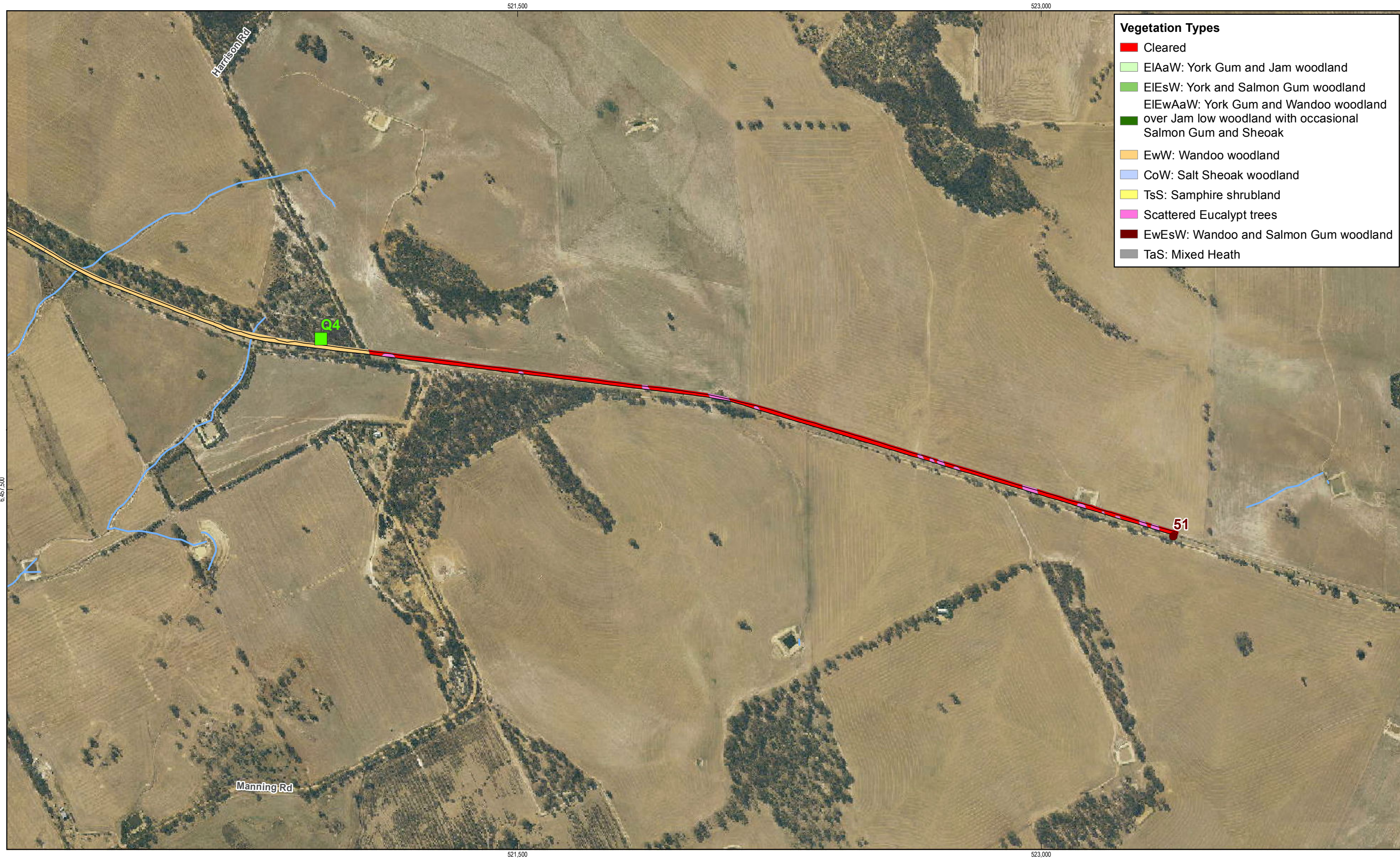
- Eremophila glabra* subsp. York (P1)
- Hemigenia platyphylla* (P4)

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Main Roads Western Australia
York-Merredin Road Widening
Environmental Impact Assessment

Job Number | 61-32010
Revision | 0
Date | 27 Jul 2015

Vegetation types, quadrat locations
and conservation significant flora 2015 **Figure 4**



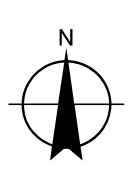
Vegetation Types

- Cleared
- EIAaW: York Gum and Jam woodland
- EIEsW: York and Salmon Gum woodland
- EIEwAaW: York Gum and Wandoo woodland over Jam low woodland with occasional Salmon Gum and Sheoak
- EwW: Wandoo woodland
- CoW: Salt Sheoak woodland
- TsS: Samphire shrubland
- Scattered Eucalypt trees
- EwEsW: Wandoo and Salmon Gum woodland
- TaS: Mixed Heath

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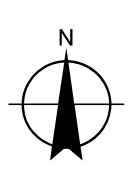
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LEGEND

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Main Roads Western Australia
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Vegetation condition and significant weed locations 2015

Figure 5



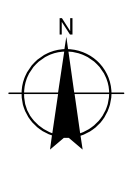
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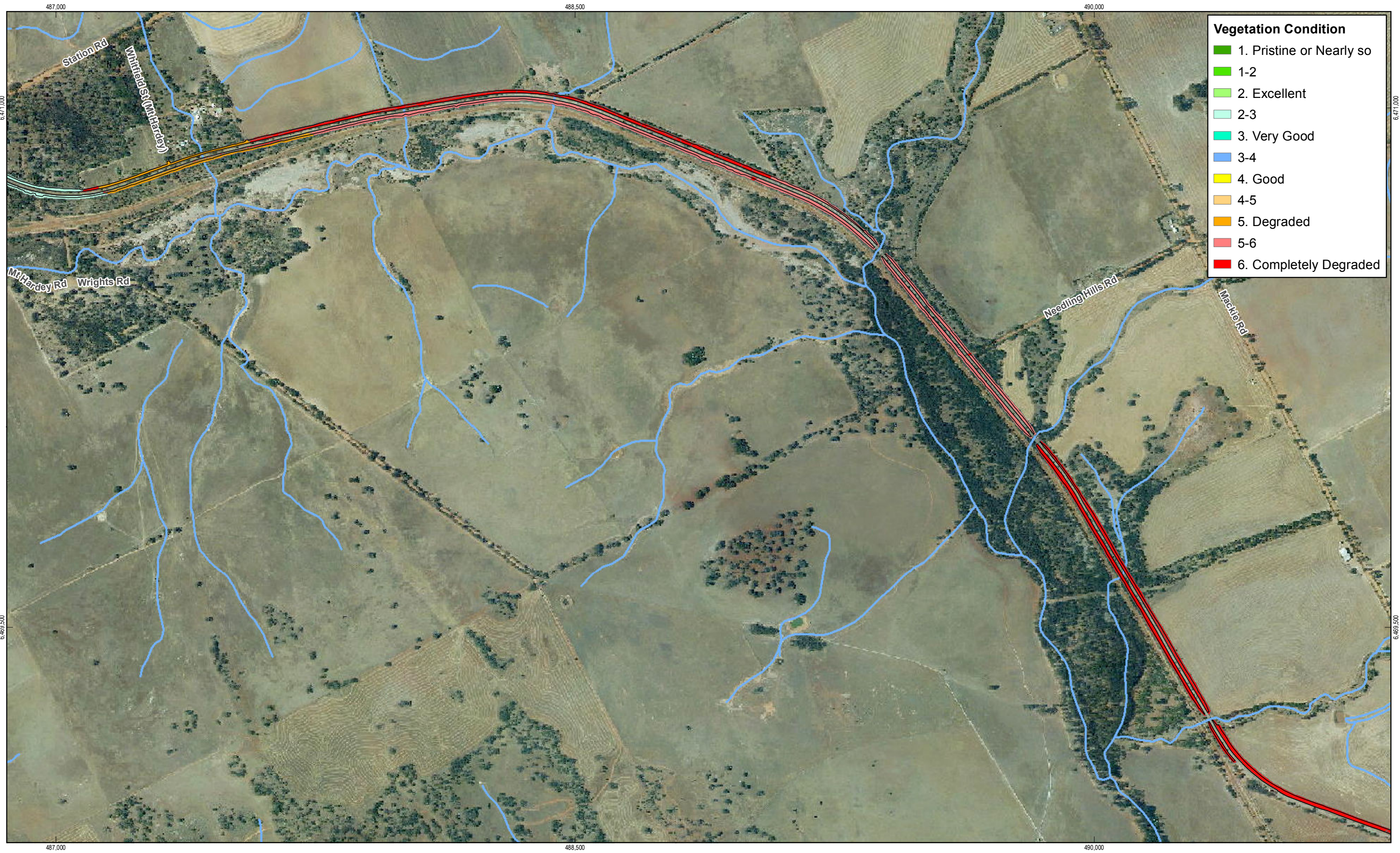


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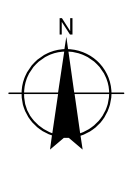
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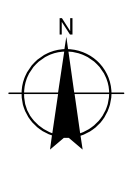
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Vegetation condition and significant weed locations 2015 **Figure 5**



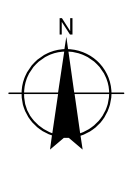
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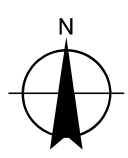
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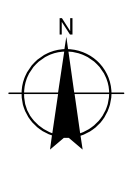
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Vegetation condition and significant weed locations 2015 Figure 5

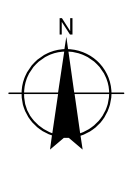


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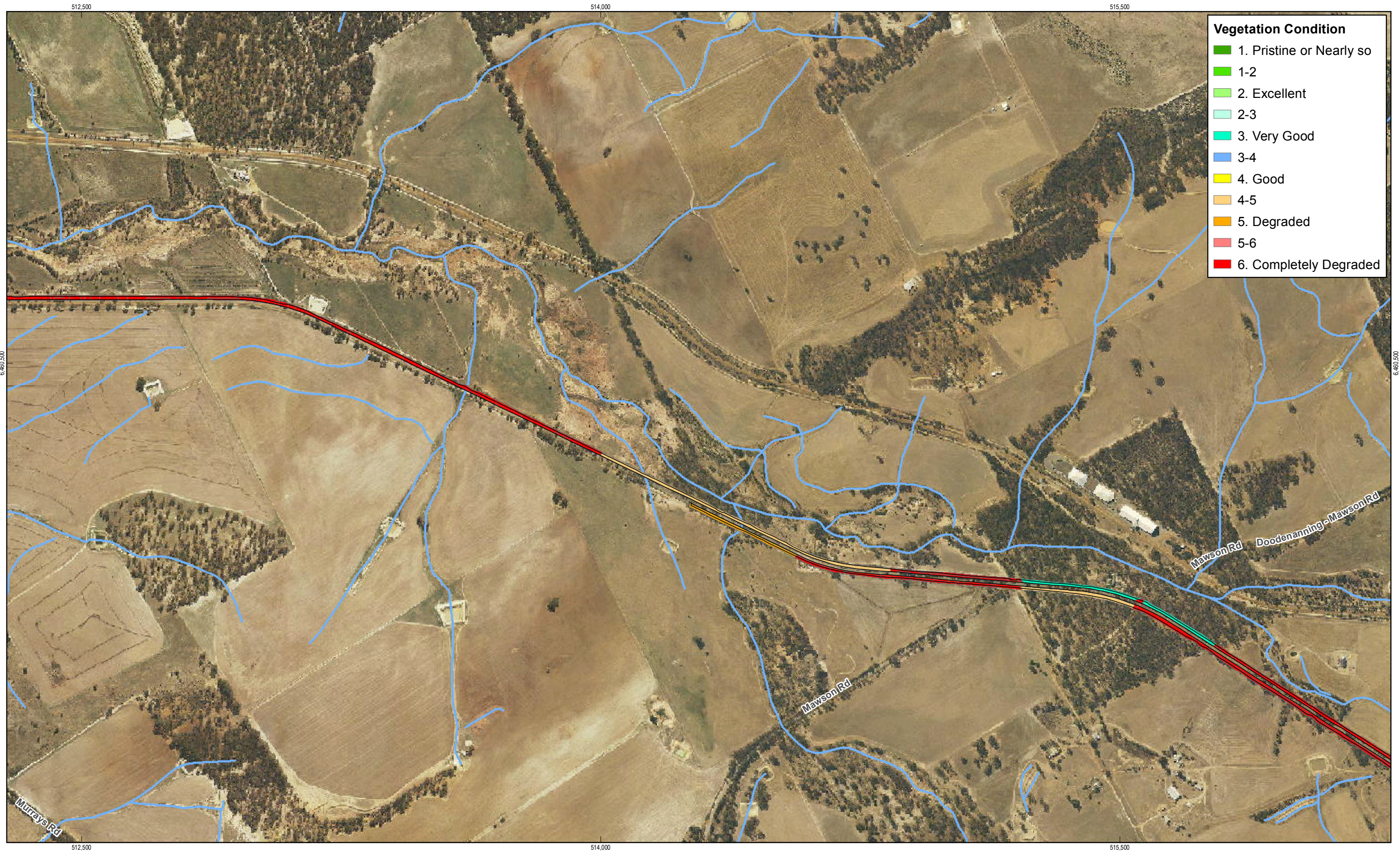


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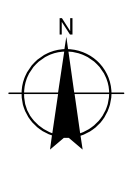
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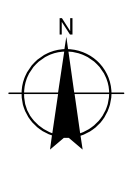
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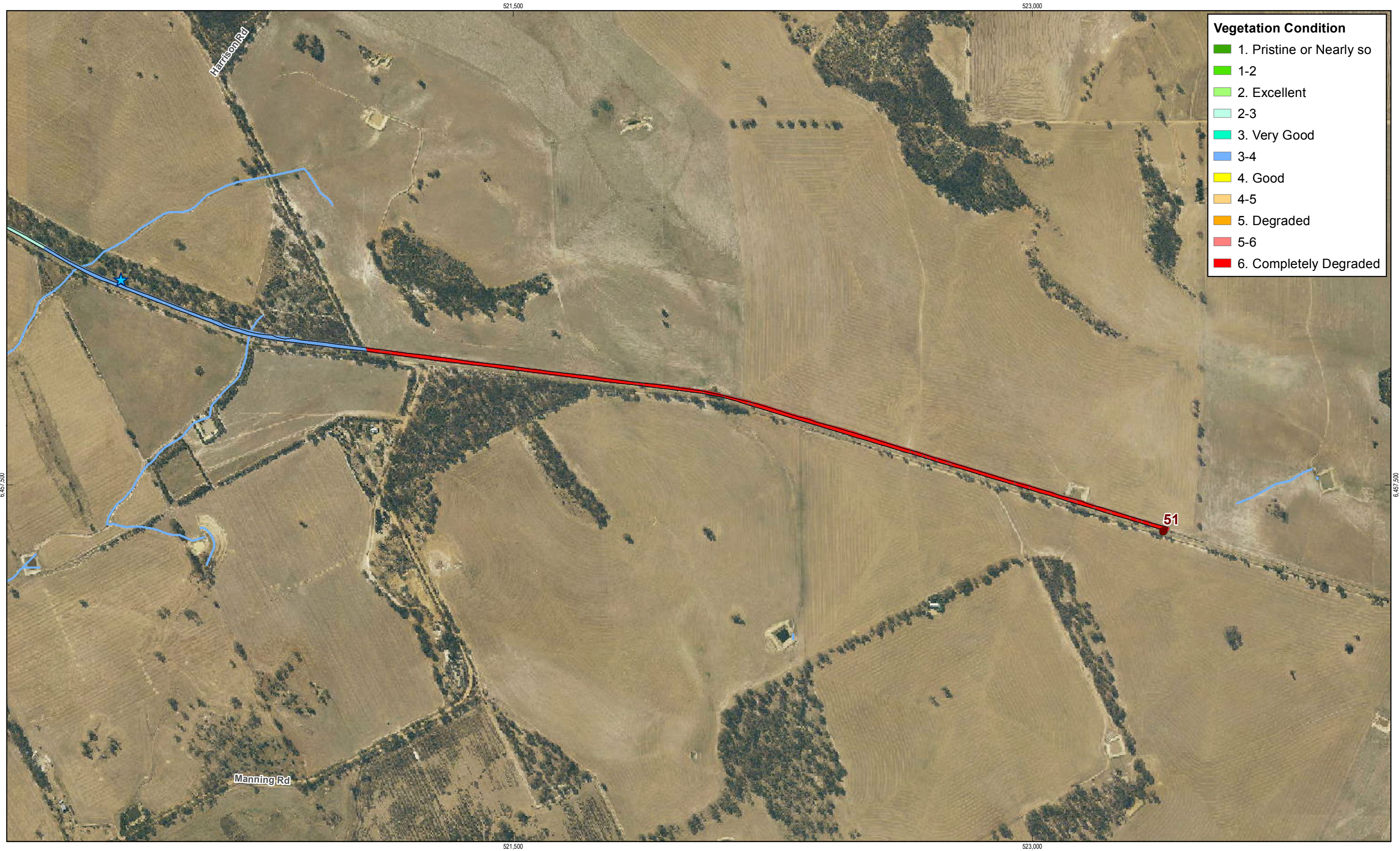


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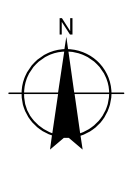
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Vegetation condition and
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Figure 5

Appendix B Biological Assessment Report (GHD 2015)



Main Roads Western Australia
York to Merredin Road Widening SLK 0-15, SLK 19-29 and
SLK 29-51
Biological Assessment

November 2014

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the Report.

Main Roads Western Australia (Main Roads) is proposing to upgrade three sections of the York-Merredin Road, in the Avon Wheatbelt region of Western Australia. Main Roads commissioned GHD Pty Ltd (GHD) to undertake a biological assessment for the areas of the York-Merredin Road proposed for upgrading (the Study Area). The Study Area included three sections of road, Section 1 (SLK 0 to SLK 15), Section 2 (SLK 19 to SLK 29) and Section 3 (SLK 29 to SLK 51). Some sections of the Study Area included the whole road reserve while others included only the northern side of the road.

GHD undertook a desktop assessment of the Study Area and a Level 1 flora and fauna field assessment from the 9 to 11 September 2014.

Subsequent to the field survey Main Roads provided a refined Clearing Area which is the area that will potentially be required to be cleared for the Project. Calculations on the extent of vegetation type, condition, habitat, potential cockatoo breeding trees and counts of conservation significant species within the Clearing Area was undertaken as part of this assessment.

Biological assessment results

This assessment identified the following biological features of the site:

- Two Department of Parks and Wildlife (DPAW) managed properties are adjacent the Study Area: Hardey Nature Reserve (Class C) and a Nature Reserve at Mawson (Class A). In addition, at approximately SLK 23 to SLK 23.5 there is a reserve and crown land associated with Saint Andrew's church and cemetery, which contains remnant vegetation and at approximately SLK 25 there is a local reserve named Cowering Well Conservation Reserve on the north side of the road.
- The extent of Beard's (1979) vegetation associations 352, 694 and 1049 which have been mapped across the majority of the Study Area are all below the 30 % threshold level for the state, IBRA bioregion and subregion and are considered *Vulnerable*. Vegetation association 947, which occurs in a small patch at the eastern end of the Study Area, is above the 30% threshold level for the state, IBRA bioregion and subregion but below the threshold level at the local government level. However, while these vegetation associations have been mapped within the Study Area there was limited remnant vegetation that corresponded to these associations, as much of the Study Area has been cleared. The areas of remnant vegetation within the Study Area are discussed below.
- The Study Area occurs within the road reserve and much of the road reserve has been either historically cleared or is highly modified. Some areas (13.33 ha of the Study Area and 9.63 ha of the Clearing Area) were completely cleared with no native vegetation remaining. However 54.81 ha of the road reserve (40.92 ha within the Clearing Area) supported an overstorey of scattered native Eucalypt species over a highly cleared understorey dominated by weeds. The dominant tree species within the road reserve were species that naturally occur within the area, including York Gum (*Eucalyptus loxophleba*), Wandoo (*Eucalyptus wandoo*) and Salmon Gum (*Eucalyptus salmonophloia*). While the majority of the Study Area was highly modified, there were some areas that retained native vegetation (33.86 ha within the Study Area and 19.84 ha within the Clearing Area). These areas predominantly occurred within sections of the road reserve that were adjacent to remnant native vegetation, both within private property and

in reserves, within drainage lines, within sections of road reserve in which the cadastre was very wide and on rocky rises, where the rocks would have inhibited past clearing. Towards the western end of the Study Area the remnant vegetation was predominantly York Gum and Jam (*Acacia acuminata*) woodland. Towards the centre and eastern side of the Study Area there were sections of York and Salmon Gum woodland with patches of Wandoo woodland over a diverse, mixed shrubland on rises and slopes. Within Section 1 there was one small patch of mixed shrubland that occurred on a rocky rise, surrounded by Wandoo woodland. Drainage lines throughout the Study Area supported samphire shrublands with *Juncus* sedgelands with Salt Sheoak (*Casurina obesa*) and York Gum fringing the drainage areas. Within one section of Section 1 there was a low-lying area that was dominated by Salt Sheoak woodland along the edge of the road.

- 13.32 ha of the Study Area was mapped in vegetation condition *Good* or better (Keighery 1994) and 4.95 ha of the Clearing Area has been mapped in vegetation condition *Good* or better.
- The vegetation types mapped within the Study Area as 'York Gum and Jam woodland', 'York and Salmon Gum woodland', 'Wandoo woodland', 'York Gum and Wandoo woodland over Jam low woodland' and 'Wandoo and Salmon Gum woodland' are all considered to be representative of the Eucalypt Woodlands within the Western Australian Wheatbelt Priority 3 Priority Ecological Community. There is 18.4 ha of these vegetation types in Condition 5 (Degraded) or greater within the Study Area and 8.37 ha within the Clearing Area.
- The Study Area crosses a number of creek and river crossings which were mapped as vegetation type 'Samphire shrubland and sedges with fringing Casuarina and York Gum' (TsS). This vegetation was often degraded and dominated by weedy species. 1.11 ha of this vegetation type occurs within the Study Area and 0.94 ha within the Clearing Area.
- A total of 208 flora taxa (including subspecies and varieties) representing 55 families and 142 genera were recorded in the Study Area during the GHD field survey. This total comprised 145 (69.7%) native taxa and 63 (30.3%) introduced taxa.
- The GHD field survey did not record any *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Wildlife Conservation Act 1950* (WC Act)-listed flora taxa within the Study Area, however, two DPaW Priority-listed flora taxa were recorded. These were: *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) (Priority 1) and *Hemigenia platyphylla* (Priority 4).
- Six broad fauna habitat types occur within the Study Area, which are broadly aligned with the vegetation associations, and include Eucalypt woodlands, saline areas, Salt Sheoak (*Casuarina obesa*) in lower lying areas, mixed heath, scattered roadside and highly modified areas.
- There is a total of 88.66 ha of fauna habitat associated with remnant native vegetation within the Study Area, and 60.76 ha within the Clearing Area. The majority of this habitat comprises roadside trees (54.81 ha, or 62% of the Study Area and 40.92 ha or 67% of the Clearing Area).
- The native fauna habitat types recorded in the Study Area are not well-represented in the local area or throughout the Wheatbelt region, given that historic broadscale clearing has resulted in a mostly cleared agricultural landscape with only isolated habitat remnants remaining. As a result, the fauna habitat present within the Study Area provides important linkage, facilitating landscape connectivity and providing for fauna dispersal between larger isolated bushland fragments.

- The results of the fauna field survey recorded a total of 61 fauna species, including 57 birds, two reptiles and two mammals. Fifty-seven of these are native fauna species and four are introduced species.
- No conservation significant fauna species (EPBC Act, WC Act or DPaW Priority-listed) were recorded during the spring field survey, however three species are considered likely to occur, the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), the Red-tailed Phascogale (*Phascogale calura*) and the Rainbow Bee-eater (*Merops ornatus*).
- The Study Area is located within the known breeding range of Carnaby's Black Cockatoo, and there is suitable foraging, breeding and roosting habitat for the species within the Study Area. There is an estimated¹ 41.99 ha of foraging habitat within the Study Area and 25.61 ha within the Clearing Area. A total of 1176 potential breeding habitat trees with a DBH \geq 300 mm (for Salmon Gum and Wandoo) or DBH \geq 500 mm (for York Gum) were recorded within the Study Area, including 485 potential breeding trees within the Clearing Area. Of the trees that occur within the Study Area, 76 currently contain hollows and within the Clearing Area, 16 currently contain hollows.
- There is 28.29 ha of suitable Eucalypt woodland habitat for the Red-tailed Phascogale throughout the Study Area, and 15.38 ha within the Clearing Area.

Conclusions

Although the majority of the Study Area occurs in a degraded and predominantly cleared road reserve, there is important habitat (e.g. native woodland habitats with large numbers of native trees and scattered remnant trees) for conservation significant fauna including the Carnaby's Black Cockatoo and Red-tailed Phascogale.

There are a number of locations within the Study Area that have ecological value, including small areas that contain remnant vegetation in excellent condition. These areas support Eucalypt woodlands which are considered a Priority 3 PEC 'Eucalypt Woodlands in the Western Australian Wheatbelt.

It is recommended that impacts on the Priority 1 flora species, *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) be avoided and management measures implemented to ensure that indirect impacts to this species do not occur during construction.

It also recommended that impacts on to the habitat of the Carnaby's Black Cockatoo and Red-tailed Phascogale be avoided where possible and management measures implemented to ensure that direct and indirect impacts to these species do not occur during and after construction. Clearing for the Project will result in a loss of habitat for both of these species, including a considerable amount of habitat for the Carnaby's Black Cockatoo. Based on the potential impacts to both species due to this loss of habitat, it is recommended that the Project be referred to the Commonwealth Department of the Environment (DotE).

Although it is expected that the Project will only require clearing of a thin strip directly adjacent to the existing road for the road widening activities, management measures will be required to ensure that indirect impacts on adjacent areas of remnant vegetation of high ecological value, are minimised.

¹ This estimate is based on the area Eucalypt woodland habitat + 25% of the area of roadside trees (i.e. 25% of the area of the scattered roadside tree habitat type provides tree cover that would provide foraging habitat).

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Appendix B – Legislation, Background Information and Conservation Codes

Appendix C – Desktop Searches

Appendix D – Flora Data

Appendix E – Fauna Data

1. Introduction

1.1 Background

Main Roads Western Australia (Main Roads) is proposing to upgrade three sections of York-Merredin Road, in the Avon Wheatbelt region of Western Australia. Gradual and steady increases in traffic levels along the road have occurred as a result of increased grain freight movements in the area. The width of the existing road is unsuitable for the increased traffic and upgrade works are required to improve the road geometry and general road safety attributes.

Main Roads have completed a preliminary environmental assessment for the three sections of York-Merredin Road. The assessment found that a number of conservation significant species may be present in the Study Area, including the Red-tailed Phascogale (*Phascogale calura*), Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Threatened (Declared Rare) Flora. Therefore, Main Roads require a biological survey for the Study Area. The purpose of the survey will be to delineate key flora and fauna values and determine the presence of conservation significant species or habitat. The outcomes of the survey will be used in the environmental assessment and approvals process.

1.2 Scope of works

Main Roads commissioned GHD Pty Ltd (GHD) to undertake a biological assessment for the areas of the York-Merredin Road proposed for upgrading (the Study Area). The biological assessment included the following aspects:

- A desktop assessment of the Study Area prior to the field survey work to identify all biological constraints, which may be in, or nearby the Study Area which included:
 - Identification of broad vegetation types using Beard (1979) mapping
 - Identification of conservation significant species likely to be present in the Study Area and a likelihood of occurrence assessment
- A field survey to verify the desktop assessment findings which included:
 - Identification of wetland or watercourse vegetation and a calculation of the hectares of such vegetation in the Study Area
 - Mapping of vegetation condition within the Study Area using the Keighery (1994) condition rating scale
 - Mapping of vegetation types within the Study Area
 - Assessment of the plant species diversity, density, composition, structure and weed cover of the Study Area through the use of quadrats
 - Targeted survey for Carnaby's Black Cockatoo including mapping of suitable roosting habitat, feeding habitat, breeding trees and hollows
 - Recording of any conservation significant flora identified within the Study Area
 - Identification and mapping of any Threatened or Priority Ecological Communities
 - Identification and mapping of any Weeds of National Significance or Declared Pests
- Preparation of a concise report that details the findings of the biological survey and also includes:
 - Mapping of relevant environmental constraints
 - An assessment of the biological Matters of National Environmental Significance (MNES) to determine whether potential impacts on MNES as protected under the

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are likely to require referral of the project to the Commonwealth Department of the Environment (DotE)

- An assessment of all biological aspects likely to require referral of the project to the Environmental Protection Authority (EPA);
- Determination of the legislative context of environmental aspects required for the assessment

1.3 Study Area

The Study Area for this Project included three sections along York Merredin Road between York and Quairading in the Avon Wheatbelt region of Western Australia. The Study Area crosses three shires, the Shire of York in the west of the Study Area, the Shire of Beverley in the middle and the Shire of Quairading in the east of the Study Area. The three sections of the Study Area are detailed in Table 1.

Table 1 Study Area details

Section	Straight Line Kilometre (SLKs)	Location	Size (ha)
Section 1	SLK 0 and SLK 15	North and south of the road between SLK 0 and SLK 2.5, SLK 3 and SLK 14.3. Only the north side of the road between SLK 14.3 and 15	35.41 ha
Section 2	SLK 19 to SLK 29	North and south of the road between SLK 19 and SLK 29.	27.09 ha
Section 3	SLK 29 to SLK 51	Only the north of the road between SLK 29 and SLK 35. North and south of the road between SLK 35 and SLK 36.8. Only north of the road between SLK 36.8 and SLK 41.6. North and south of the road between SLK 41.6 and SLK 44. Only north of the road between SLK 44 and SLK 51.	39.50 ha
Total	48 km – all sections combined		102 ha – all sections combined

The Study Area is the area surveyed during the field assessment, and included the road reserve north and south of the road, or on one side of the road only. Between approximately SLK 44.6 and 48.5 the road reserve was very wide; however the Study Area only included a width of 30 m from the road centreline (north side of the road). The Study Area is shown in Figure 1. The Study Area includes only the road reserve in each of the three sections as detailed in Table 1.

1.3.1 Clearing Area

The proposed Clearing Area is the area that will potentially be required to be cleared for the Project. Calculations on the extent of vegetation type, condition, habitat, potential cockatoo breeding trees and counts of conservation significant species within the Clearing Area were calculated as part of this assessment. The proposed Clearing Area is detailed in Table 2.

Table 2 Clearing Area details

Section	Straight Line Kilometre (SLKs)	Size (ha)
Section 1	SLK 0 and SLK 15	24.97 ha
Section 2	SLK 19 to SLK 29	19.23 ha
Section 3	SLK 29 to SLK 51	26.19 ha
Total	48 km – all sections combined	70.39 ha – all sections combined

There are small sections of the Clearing Area that occur outside of the road reserve, within private property and thus were outside of the Study Area. These areas are a result of a buffer placed on the Clearing Area by Main Roads and it is unlikely that these areas will be impacted by the Project. The sections of Clearing Area outside the Study Area were not included in the calculations.

1.4 Limitations and assumptions

This report has been prepared by GHD for Main Roads and may only be used and relied on by Main Roads for the purpose agreed between GHD and the Main Roads as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Main Roads arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Main Roads and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

It should be noted that the flora and fauna survey is based upon the Study Area shown in Figure 1, Appendix A and further assessment would be required should the Study Area significantly

change. It should be noted that sections of the Clearing Area are outside of the Study Area, and outside of the road reserve. These areas were not included in the assessment.

2. Methodology

2.1 Vegetation and flora

GHD undertook a vegetation and flora survey that was based upon the requirements of the EPA's *Guidance for the Assessment of Environmental Factors 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004a). The survey was a Level 1 survey as defined by the EPA Guidance 51 and included a desktop assessment and a field survey.

2.1.1 Desktop assessment

As part of the flora and vegetation desktop assessment, GHD undertook a review of the following information sources:

- Current and relevant literature sources relating to the Study Area, including *Wheatbelt Baseline Project: Benchmarking Wheatbelt Vegetation* (Harvey and Keighery 2012) and *The Avon Native Vegetation Map Project* (Department of Environment and Conservation (DEC) and the Wheatbelt NRM 2011)
- Beard (1979) vegetation mapping
- The Department of Parks and Wildlife (DPaW) and WA Museum (WAM) NatureMap database (DPaW 2007–) to identify threatened and priority listed flora species previously recorded within the Study Area (5 km buffer)
- A review of the DPaW Threatened and Priority flora databases (Threatened and Priority Flora database (TPFL) and Western Australian Herbarium specimen database (WAHERB) for the area (5 km buffer)
- A review of DPaW Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) databases to determine the potential for TECs or PECs to be present within the Study Area (5 km buffer)
- A review of the DotE Protected Matters Search Tool (PMST) (DotE 2014a) to identify threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as potentially occurring within the Study Area and identify any TECs previously identified as occurring or potentially occurring within the Study Area (5 km buffer)
- Review of aerial photography and desktop assessment results to identify areas with potential to contain threatened flora, priority listed flora and TECs.

2.1.2 Field survey

GHD conducted a three day field survey from 9 to 11 September 2014 in order to verify and ground truth the results of the desktop assessment, identify and describe dominant vegetation units, assess vegetation condition, and identify and record vascular flora taxa present within the Study Area.

Field survey methodology involved a combination of sampling using quadrats, relevés², walking transects through the Study Area and opportunistic sampling. The majority of the Study Area was considered highly modified and degraded with little remnant vegetation remaining. As such, for the majority of the Study Area it was considered that walking transects and recording of

² Relevés are sampling sites similar to quadrats but which are not marked on the ground and are an approximate defined area

species was the most appropriate sampling method. Quadrats were established in areas of remnant vegetation. A total of six non-permanent quadrats and two releves were established during the field surveys. Quadrat locations have been mapped at Figure 3, Appendix A.

Quadrats and releves

Quadrats were established in areas that are representative of a vegetation assemblage. The quadrats were 10 m x 10 m in size, with shape and/or size adjusted as necessary to best represent assemblages that are not able to be captured in a 10 m x 10 m releve or where the strip of vegetation within the road reserve was thinner than 10 m. In two locations the size of the vegetation was restricted and was very close to the road and sampling was undertaken using an unbound releve (of approximately 100 m²) rather than a quadrat. However, the releve was scored in the same manner as the quadrat. Quadrats and releves were uniquely numbered starting from Q01, Q02, R01 and so on. Field data at each quadrat and releve were recorded on a pro-forma data sheet and include the parameters indicated in Table 3.

Data collection for each quadrat and releve followed the requirements as stipulated by DPaW with vegetation descriptions being consistent with the National Vegetation Information System (NVIS), Australian Vegetation Attribute Manual (ESCAVI 2003).

Table 3 Data collected during the field survey

Aspect	Measurement
Collection attributes	Personnel/recorder; date, quadrat dimensions, photograph of the quadrat/releve.
Physical features	Aspect, soil attributes. Ground surface cover. Leaf and wood litter.
Location of important features	Coordinates recorded in GDA94 datum using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m.
Vegetation condition	Vegetation condition was assessed using the condition rating scale devised by Keighery (1994).
Disturbance	Level and nature of disturbances (e.g. weed presence, fire — and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer. List of all species within the quadrat including average height and cover (using a modified Braun-Blanquet scale)

Vegetation units

Vegetation units were identified and boundaries delineated using a combination of aerial photography and field data including quadrat and transect data together with field and mapping notes. Similarities in landforms and soil types were taken into account.

Vegetation units were described based on their structure, dominant taxa and cover abundance, as defined by quadrat, releve and transect data. Vegetation unit descriptions follow the NVIS (ESCAVI 2003). Vegetation unit descriptions were consistent with NVIS Level V (Association), which are grouped within NVIS Level III (Broad Floristic Formation). At Level V up to three strata and a maximum of three taxa per stratum are used to describe the association (ESCAVI 2003). NVIS is the DPaW preferred vegetation classification system (EPA and DEC 2010).

Vegetation condition

The vegetation condition of the Study Area was assessed and mapped in accordance with the vegetation condition rating scale developed by Keighery (1994). This scale recognises the intactness of vegetation, which is defined by the following:

- Completeness of structural levels.
- Extent of weed invasion.

- Historical disturbance from tracks and other clearing or dumping.
- The potential for natural or assisted regeneration.

The scale consists of six rating levels as outlined in Table 4.

Table 4 Vegetation condition rating scale (Keighery 1994)

Condition rating	Vegetation condition	Description
1	Pristine or Nearly So	No obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

Flora identification and nomenclature

Species that were well known to the survey botanist were identified in the field; all other species were collected and assigned a unique collection number to facilitate tracking. Plant species were identified by the use of local and regional flora keys and by comparison with the named species held at the Western Australian Herbarium. When necessary, plant taxonomists considered to be authorities on particular plant groups were consulted.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (WA Herbarium 1998–) and the EPBC Act Threatened species database provided by DotE (2014b).

Nomenclature used in this report follows that used by the Western Australian Herbarium as reported on *FloraBase* (WA Herbarium 1998–).

Targeted surveys for conservation significant flora

Prior to the field survey, information obtained from the desktop assessments (e.g. aerial photography, geology, soils and topography data, TPFL, *NatureMap* and WAHERB database search results) was reviewed to determine potential conservation significant flora taxa and locations. Additionally, ecological information (e.g. habitat, associated flora taxa and phenology) was sourced from *FloraBase* (WA Herbarium 1998–) and other relevant publications where available, to provide further details.

Potential habitat were searched by transect sampling and opportunistic sampling. Locations within the Study Area with differing hydrology, fire or disturbance history to the surrounding areas were also searched where identified.

When conservation significant flora were identified, the location of each individual was recorded by GPS, or if the stand was extensive the boundary recorded by GPS.

2.2 Fauna

GHD ecologists conducted a reconnaissance fauna survey of the Study Area that was consistent with a Level 1 assessment (reconnaissance survey) in accordance with the EPA

Guidance Statement No. 56 *Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b). The survey was a Level 1 survey as defined by the EPA Guidance 56 and included a desktop assessment and a field survey. The survey also included a targeted assessment of Black Cockatoo habitat within the Study Area. Nomenclature follows that used by the Western Australian Museum and the DPaW NatureMap database, as it is deemed to contain the most up-to-date species information for Western Australia, with the exception of birds, which uses Christidis and Boles (2008).

2.2.1 Desktop assessment

As part of the fauna desktop assessment, GHD undertook a review of the following information sources:

- A review of the DPaW NatureMap database (DPaW 2007–) fauna species previously recorded within a 5 km buffer of the Study Area.
- A review of the DotE PMST (DotE 2014a) to identify fauna species listed under the EPBC Act potentially occurring within 5 km of the Study Area.
- A review of all desktop information to identify habitat types within the Study Area that have the potential to support conservation significant species. These areas were targeted during the field survey to allow for confirmation of key habitat elements (including habitat condition, presence of refuge sites, key food sources, suitable vegetation strata, suitability of soils for digging).

2.2.2 Field survey

GHD undertook a Level 1 fauna survey (reconnaissance survey) and targeted Black Cockatoo habitat assessment of the Study Area concurrently with the vegetation and flora assessment from 9 to 11 September 2014. The fauna field survey was undertaken to identify and describe the dominant fauna habitat types and their condition, assess habitat connectivity, identify and record fauna species within the general Study Area and undertake targeted searching for conservation significant fauna taxa and their habitats.

Habitat assessment

The fauna habitat assessment included:

- Habitat structure (e.g. vegetation type, presence/absence of overstorey, midstorey, understorey, ground cover)
- Presence/absence of refuge including: fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge
- Presence/absence of waterways including type, extent and habitat quality within waterways
- Location of habitat within the surrounding landscape and habitat connectivity
- Land use history
- Identification of wildlife corridors within and immediately adjacent to the Study Area
- Evaluation of the likelihood of occurrence of listed fauna within the habitat (based on presence of suitable habitat)
- A representative photograph of each habitat type
- Mapping of the fauna habitat types within the Study Area

Opportunistic fauna searches

Opportunistic fauna searches were also conducted across the Study Area. Opportunistic searches involved:

- Searching through microhabitats including turning over logs or rocks, turning over leaf litter and examining tree hollows and hollow logs
- Visual and aural surveys. This accounted for many bird species potentially utilising the Study Area
- Searching the Study Area for tracks, scats, bones, diggings and feeding areas for both native and feral fauna

Targeted survey for conservation significant fauna

During the field survey, searches for conservation significant fauna species habitat was conducted. These searches included:

- Identification of key habitat features as identified during the desktop assessment
- Identification and evaluation and mapping of habitat types likely to support conservation significant fauna species
- Recording of Global Positioning System (GPS) locations of any conservation significant fauna species (accuracy approximately ± 5 m).

Targeted survey for Carnaby's Black Cockatoo

In addition to the targeted searches for conservation significant fauna species, a targeted habitat assessment for the Carnaby's Black Cockatoos was undertaken. The aim of the habitat assessment was to assess the presence, quality and extent of habitat for Carnaby's Black Cockatoo within the Study Area. The assessment involved visual and aural assessment of the Study Area identifying breeding habitat (presence/absence of actual and potential breeding trees), foraging habitat, roosting areas, current activity and any other signs of use by Carnaby's Black Cockatoos. For the purpose of this assessment, the DSEWPaC (2012) Black Cockatoo referral guidelines were used to define breeding, foraging and night roosting habitat.

Information collected during the field survey included:

- Foraging habitat – the location and extent of suitable Carnaby's Black Cockatoo foraging habitat was identified and mapped for the Study Area, based on the vegetation associations and presence/absence of known foraging species. During the field surveys any direct or indirect evidence of foraging by Carnaby's Black Cockatoos was recorded via GPS.
- Breeding habitat – suitable breeding habitat for Carnaby's Black Cockatoos is defined by DSEWPaC (2012) as trees of species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow. For most tree species, suitable DBH is 500 mm. For Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*), suitable DBH is 300 mm (DSEWPaC 2012). Breeding habitat was identified and recorded via GPS, and mapped according to the presence of suitable breeding trees (including the presence and size of tree hollows). On average, Carnaby's Black Cockatoos are known to nest in hollows with an entrance diameter greater than 20-30 cm (Johnstone and Storr 1998; Groom 2010). Therefore, during the field survey a suitable nesting hollow currently able to support breeding was defined as a tree hollow with an entrance diameter greater than 20 cm. All trees with hollows with an entrance diameter less than 20 cm were also recorded.

- Night roosting habitat – suitable roosting habitat is defined by DSEWPaC (2012). Suitable roosting habitat was identified based on the presence of suitable tall trees, proximity of known roosting sites (for Carnaby's Black Cockatoo – Department of Planning Western Australia 2011) and the presence of suitable foraging habitat.
- Opportunistic observations (both visual and aural) of Black Cockatoos within the Study Area and surrounding region.

This information was used to map and calculate the amount of foraging habitat, potential breeding habitat and night roosting sites within the Study Area. Any area containing known foraging species or potential nesting trees was considered as habitat for Black Cockatoos. It is important to note that the accuracy of the GPS used to record breeding habitat is approximately ± 5 m, and therefore location data for individual trees includes up to ± 5 m error.

2.3 Desktop and field assessment limitations

Desktop investigations use a variety of online resources such as the WAM and DPaW NatureMap database (DPaW 2007–), and the EPBC Act PMST. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD. The PMST database is used to identify species listed under the EPBC Act. This database draws on various sources to report on the potential of the species occurrence within the area. The EPBC Act search tool is broad-scale in its reporting and often the specific habitat requirements of the species do not occur within the Study Area. For this reason not all species reported by the search tool need to be considered in management decisions. The NatureMap database reports on actual records of the species within the designated area and can provide more accurate information of the likelihood of species presence.

The limitations and constraints associated with the field survey are discussed in Table 5.

Table 5 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information.	Minor	Broad scale (1:1,000,000) mapping by Beard (1979) and DEC and the Wheatbelt NRM (2011) is available.
Scope (what life forms were sampled etc.)	Nil	Vascular flora and terrestrial vertebrate fauna were sampled during the survey. Non-vascular flora, invertebrate and aquatic fauna were not assessed as part of survey.
Proportion of flora collected and identified (based on sampling, timing and intensity)	Minor	The survey was a Level 1 survey, and took place during one season in one year. The survey took place during early Spring which is the optimal time of year for identifying species within the region of the Study Area. Nine native taxa could not be identified to species level due to lack of identifying features; however these species are unlikely to be conservation significant species. The majority of species encountered had flowering or fruiting material and could be suitably identified. <i>See also Timing/weather/season/cycle below</i>
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Nil	The Study Area was sufficiently traversed for the purpose of this survey. Complete flora and fauna surveys can require multiple surveys, at different times of year, and over a period of a number of years to enable observation of all species present. Some degree of variability is likely if subsequent surveys were to occur. However, given the degraded nature of the majority of the Study Area the extent of survey is considered sufficient for the purpose of this assessment.
Mapping reliability	Minor	High resolution ESRI aerial imagery was available. Data was recorded in the field using a hand-held GPS tool and certain atmospheric factors and other sources of error can affect the accuracy of such GPS receivers. On average, the GPS units used during this field survey (Garmin GPS unit and Trimble Nomad Juno unit) have an accuracy to approximately ± 5 m. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies.
Timing/weather/season/cycle	Minor	The survey was conducted from 9 to 11 September 2014 (early Spring). Rainfall records from Beverley Weather Station (station no. 10515) indicate that the rainfall for the four months prior to the survey was 242.7 mm (May-August) which is approximately 10 % less than the long-term mean for the same period (268.1 mm). However, the amount of rainfall can still be considered suitable for a Level 1 survey. The weather conditions during the survey were sunny with daily maximum temperatures ranging from 19 to 21.4 °C and daily minimum temperatures of 7.4 to 12.6 °C (at Beverley station no. 10515). 1.4 mm of rainfall was recorded during the field survey (BoM 2014).
Determination of species	Minor	Nine native specimens were not able to be identified to species level due to lack of flowering or fruiting material. Additionally some species, particularly grasses, may have been overlooked due to lack of material; however this is unlikely to affect the results of the survey, as these species are not likely to be conservation significant species. In general

Aspect	Constraint	Comment
		<p>it was possible to identify the majority of flora species located in the Study Area.</p> <p>The taxonomy and conservation status of Western Australian flora is dynamic. This report was prepared in reliance on taxonomy and conservation status current at the time, but it should be noted this may change.</p>
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	There were no disturbances present within the Study Area that would have affected the results of the survey.
Intensity (in retrospect, was the intensity adequate)	Nil	The vascular flora of the Study Area was sampled in accordance with EPA (2004a) and terrestrial fauna sampled in accordance with EPA (2004b). A single season Level 1 survey of the Study Area was undertaken.
Resources	Nil	Adequate resources were employed during the field survey. A total of 6 person days were spent undertaking the survey.
Access restrictions	Nil	The entire Study Area was accessible and there were no access restrictions.
Experience levels	Nil	The survey ecologists are practitioners suitably qualified and experienced in their respective fields. The zoologist that conducted the field survey has more than three years' experience and the botanist has more than six years conducting botanical surveys in Western Australia.

3. Results – desktop assessment

3.1 Climate

The Study Area is located in the Central Wheatbelt region of Western Australia and experiences a temperate climate with distinctly dry and hot summers and cool, wet winters.

The Bureau of Meteorology (BoM) Beverley station (site number: 010515) is the nearest weather station to the Study Area (approximately 20 to 45 km from the western/eastern ends of the Study Area), with continuous long-term data. Climatic data from this site indicates the mean maximum temperature of the area ranges from 16.8 °C in July to 34.3 °C in January, and the mean minimum temperature of the area ranges from 5 °C in August to 16.7 °C in February. The mean annual rainfall is 418.3 mm, with an average of 51.8 rain days per year (BoM 2014).

Climatic data for the region is summarised in Plate 1 (Source: data from BoM 2014).

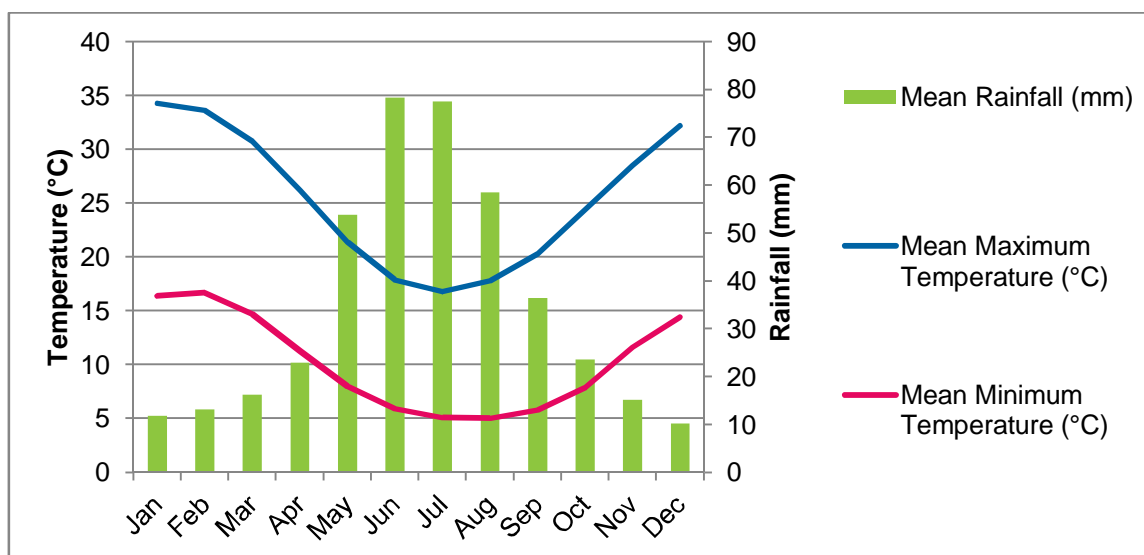


Plate 1 Mean Annual Temperatures and Rainfall for Beverley weather station (010515) (BoM 2014)

3.2 Conservation reserves and areas

Two DPaW managed properties occur adjacent to the Study Area:

- Hardey Nature Reserve (Class C) – is located on the north and south side of the road, at approximately SLK 10 in Section 1. The Nature Reserve occurs directly adjacent to the Study Area.
- Nature Reserve at Mawson (Class A) – is located on both sides of road, between approximately SLK 42.2 and SLK 43, within Section 3. Mawson occurs directly adjacent to the Study Area.

At approximately SLK 23 to SLK 23.5 there is a reserve and crown land associated with Saint Andrew's church and cemetery, which contains remnant vegetation. At approximately SLK 25 there is a local reserve named Cowering Well Conservation Reserve on the north side of the road.

3.3 Regional biogeography

The Study Area is situated in the Southwest Botanical Province of Western Australia (Beard 1990) within the Avon Wheatbelt (AVW) bioregion described by the Interim Biogeographic Region of Western Australia (IBRA; DotE 2014b). IBRA divides the Australian continent into 89 biogeographic regions based on similar climate, geology, landform, vegetation and fauna (DotE 2014b).

The Avon Wheatbelt is an area of active drainage dissecting a Tertiary plateau in the Yilgarn Craton. The Avon Wheatbelt is a gently undulating landscape of low relief with Proteaceous scrub-heaths, rich in endemics on residual lateritic uplands and derived sandplains, mixed Eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on Quaternary alluvials and eluvials (Beecham 2001).

The Study Area is located within the Katanning (AVW02) IBRA subregion. The Katanning subregion is an erosional surface of gently undulating rises to low hills with abrupt breakaways. In this area continuous stream channels flow in most years and colluvial processes are active. The soil of the Katanning subregion has been formed in colluvium or in-situ weathered rock. The vegetation of this area includes woodland of Wandoo, York Gum and Salmon Gum with Jam and Casuarina (Beecham 2001). Dominant land uses for the subregion include: cultivation (dry land agriculture) and grazing with small areas retained for conservation, as crown reserves and rural residential (Beecham 2001). The majority of ecosystems in the Katanning subregion have been extensively cleared and are under threat from competing land use, weeds, rising water tables and altered fire regimes.

3.4 Vegetation and flora

3.4.1 Broad vegetation mapping

Broad scale (1:250,000) vegetation mapping of the region was completed by Beard (1979) and digitised by Shepherd et al (2002) at an association level. Beard (1979) mapping indicates that four vegetation associations are present across the Study Area, as detailed in Table 6 and mapped in Figure 2, Appendix A.

Beard describes the vegetation of the York system, which covers the entire Study Area, in his 1979 publication (Beard 1979). The area is undulating and the higher ground is capped by dissected remnants of laterite crusts which are described as “mallet ridges” which support a woodland of *Eucalyptus astringens* and *Eucalyptus accedens*, sometimes with heath on the summits. Below the breakaways the bulk of the country is covered by York Gum (*Eucalyptus loxophleba*) woodland and Wandoo (*Eucalyptus wandoo*). Sometimes York Gum and Wandoo occur in mixture, sometimes topographically separated with Wandoo on the upper and York gum on the lower slopes. *Eucalyptus salmonophloia* can also occasionally appear. The yellow sandplains along the valley appear to have been covered by scrub-heath of the *Banksia-Xylomelum* alliance which is the ultimate south-eastern extent of the alliance (Beard 1979).

Table 6 Beard (1979) vegetation associations mapped within the Study Area

Beard (1979) Vegetation Association	Section 1	Section 2	Section 3
694: Shrublands; scrub-heath on yellow sandplain <i>Banksia-Xylomelum</i> alliance in the Geraldton Sandplain & Avon-	Small patch at approximately SLK 6-7	N/A	N/A

Beard (1979) Vegetation Association	Section 1	Section 2	Section 3
Wheatbelt Regions			
352: Medium woodland; York gum	Mapped across the majority of Section 1, except for a small section at SLK 6-7	Occurs across the majority of Section 2, from SLK 19 until 27.5	N/A
1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	N/A	Occurs in the eastern end of Section 2, from SLK 27.5 to 29	Occurs across the majority of Section 3
947: Medium woodland; powderbark & mallet	N/A	N/A	Occurs in a small patch at the eastern end of Section 3, at approximately SLK 50 and 51.

The (then) Department of Environment and Conservation (DEC) and the Wheatbelt NRM (2011) undertook a project in combining existing native vegetation mapping of the Wheatbelt. This mapping is provided on the *Naturemap* website and was accessed to determine the vegetation of the Study Area.

3.4.2 Broad vegetation association extent

Beard mapping has been adapted and digitised by Shepherd *et al.* (2002). The extent of Beard's (1979) vegetation associations have been determined by the state-wide vegetation remaining extent calculations maintained by DPaW (latest update 2012 – Government of Western Australia 2013). As shown in Table 7, the extent of vegetation associations 352, 694 and 1049 are all below 30 % threshold level for the state, IBRA bioregion and subregion and are considered *Vulnerable*. Vegetation association 947 is above the 30 % threshold level for the state, IBRA bioregion and subregion but below the threshold level at the local government level.

Table 7 Vegetation association extent

Vegetation association	Scale	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	% Current Extent in All DPaW managed lands
IBRA bioregion (Avon Wheatbelt)		9,517,109.9	1,778,407.08	18.69	9.7
IBRA subregion (Katanning)		2,992,929.35	409,618.23	13.69	11.34
352: Medium woodland; York gum	State	724,272.97	143,677.92	19.84	8.67
	Bioregion	630,581.76	110,128.6	17.46	9.25
	Sub-region	337,875.88	37,246.78	11.02	1.95
	LGA (Shire of York)	89,947.59	8,617.77	9.58	0.63
694: Shrublands; scrub-heath on yellow sandplain <i>Banksia-Xylomelum</i> alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	State	346,493.81	67,339.93	19.43	47.26
	Bioregion	173,921.55	12,192.19	7.01	12.91
	Sub-region	94,465.31	6,947.63	7.35	11.62
	LGA (Shire of York)	3,861.69	392.86	10.17	4.91
947: Medium woodland;	State	34,032.69	11,787.36	34.64	40.66
	Bioregion	34,016.89	11,775.31	34.62	40.60

Vegetation association	Scale	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	% Current Extent in All DPaW managed lands
powderbark & mallet	Sub-region	34,016.89	11,775.31	34.62	40.60
	LGA (Shire of Quairading)	3,392.03	796.15	23.47	0.3
1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	State	833,384.77	56,843.2	6.82	5.76
	Bioregion	833,384.77	56,843.2	6.82	5.76
	Sub-region	255,402.63	20,575.63	8.06	1.34
	LGA (Shire of York)	22,472.17	2,433.1	10.83	0.14
	LGA (Shire of Beverley)	39,715.35	3,002.84	7.56	1.42
	LGA (Shire of Quairading)	88,403.35	5,728.39	6.48	2.83

(Beard 1979; Government of Western Australia 2013).
LGA Local government area

3.4.3 Conservation significant ecological communities

A search of the EPBC Act PMST (DotE 2014a) did not identify any federally listed TECs within 20 km of the Study Area. A search of the DPaW TEC/PEC databases identified one DPaW-listed PEC occurring within 20 km of the Study Area (Figure 2 Appendix A):

- Pools of the Avon and Dale Rivers: Priority 1
Deep pools and natural braided sections of the fresh to brackish Avon and Dale Rivers

The buffer area of this PEC intersects the western end of the Study Area; however, there is no riverine environment within the Study Area and this PEC will not occur within the Study Area.

3.4.4 Flora diversity

A search of the *NatureMap* database (DPaW 2007–) identified 910 plant taxa, representing 94 families and 326 genera that have previously been recorded within 5 km of the Study Area. This total comprised 800 native flora taxa and 110 naturalised (non-native) flora taxa.

The Wheatbelt benchmarking project (Harvey and Keighery 2012) details average species richness for a number of woodland vegetation types including:

- *Eucalyptus salmonophloia* (Salmon Gum) woodland 21.5 species per 100m²
- *Eucalyptus wandoo* (Wandoo) woodland 44 species per 100m²
- *Eucalyptus loxophleba* (York Gum) woodland 33.4 species per 100m²

3.4.5 Conservation significant flora

Desktop searches of the EPBC Act PMST database (DotE 2014a), *NatureMap* database (DPaW 2007–), DPaW TPFL and WAHERB databases identified the presence/potential presence of 43 conservation significant flora taxa within 5 km of the Study Area.

Only one of these species, *Eremophila glabra* sp. York (P.G. Wilson 12172 B) (Priority 1) has been previously recorded within the Study Area.

Likelihood of occurrence assessment

A likelihood of occurrence assessment (based on the range, habitat requirements and previous records of the species) was conducted for all conservation significant taxa identified in the desktop assessment (Table D.2, Appendix D). The assessment concluded that 31 taxa could possibly occur and 12 taxa are unlikely to occur in the Study Area.

3.5 Fauna

3.5.1 Fauna diversity

A search of the *NatureMap* database (DPaW 2007–) identified 233 fauna species as previously recorded within 5 km of the Study Area, including 225 native and eight introduced species (Appendix E). These results consisted of 118 birds, 49 reptiles, 20 mammals, ten amphibians, and 36 invertebrates.

3.5.2 Conservation significant fauna

Desktop searches of the EPBC Act PMST (DotE 2014a) and DPaW *NatureMap* records (DPaW 2007–) identified the presence/potential presence of 24 conservation significant fauna taxa within 5 km of the Study Area (Appendix E). In addition to these, the desktop searches identified one marine bird species as potentially occurring within 5 km of the Study Area. This species has been excluded from this assessment as no marine habitat is present within the Study Area.

A likelihood of occurrence assessment was conducted for the 24 conservation significant fauna species identified in the desktop assessment. This assessment is presented in Section 4.3.4.

4. Results – field assessment

4.1 Vegetation

4.1.1 Vegetation types


Prior to European settlement the Study Area is likely to have supported a variety of Eucalypt woodlands including York Gum (*Eucalyptus loxophleba*) and Jam (*Acacia acuminata*) woodlands, Wandoo (*E. wandoo*) woodlands, York Gum and Salmon Gum (*E. salmonophloia*) woodlands and Wandoo and Salmon Gum woodlands. However, the Study Area occurs within a road reserve and much of the road reserve has been either historically cleared or is otherwise highly modified. Some areas (13.33 ha) of the Study Area were completely cleared with no native vegetation remaining. However the majority of the road reserve supported an overstorey of scattered native Eucalypt species over a highly cleared understorey dominated by weeds. The dominant tree species within the road reserve were species that naturally occur within the area, including York Gum, Wandoo and Salmon Gum. 54.81 ha of the Study Area consisted of road reserve with scattered Eucalypts over weeds.

While the majority of the Study Area was highly modified there were some areas that retained native vegetation. These areas predominantly occurred within sections of the road reserve that were adjacent to remnant native vegetation, both within private property and in reserves, within sections of road reserve in which the cadastre was very wide and on rocky rises where the rocks would have inhibited past clearing. Towards the western end of the Study Area the remnant vegetation was predominantly York Gum and Jam woodland. Towards the centre and eastern side of the Study Area there were sections of York and Salmon Gum woodland with patches of Wandoo woodland over a diverse, mixed shrubland on rises and slopes. Within Section 1 there was one small patch of mixed shrubland that occurred on a rocky rise, surrounded by Wandoo woodland.

Drainage lines throughout the Study Area supported samphire shrublands with *Juncus* sedgelands with Salt Sheoak (*Casurina obesa*) and York Gum fringing the drainage areas. Within one section of Section 1 there was a low-lying area that was dominated by Salt Sheoak woodland along the edge of the road.


During the field assessment seven native vegetation types and two highly modified vegetation types were identified within the Study Area and described based on field observations. These vegetation types have been mapped in Figure 3, Appendix A and are detailed in Table 8.


Table 8 Vegetation associations within the Study Area


Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>EIAaW</p> <p>U+ ^<i>Eucalyptus loxophleba</i>, ^<i>Acacia acuminata</i>, <i>Allocasuarina huegeliana</i> ^tree\7,6\i; M ^<i>Gastrolobium spinosum</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Austrostipa elegantissima</i> ^shrub, grass\2,3\i; G G ^<i>Ehrharta longiflora</i>, <i>Avena barbata</i>, <i>Lawrencella rosea</i> ^grass, forb\1\bi</p>	<p>York Gum and Jam woodland:</p> <p>Woodland of <i>Eucalyptus loxophleba</i>, <i>Acacia acuminata</i> and <i>Allocasuarina huegeliana</i> over open shrubland of <i>Gastrolobium spinosum</i>, <i>Ptilotus divaricatus</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Enchylaena lanata</i> and <i>Acacia erinacea</i> over grassland of <i>Austrostipa elegantissima</i>, <i>Ehrharta longiflora</i>, <i>Avena barbata</i>, over scattered herbs of <i>Ptilotus holosericeus</i>, <i>Tricoryne tenella</i>, <i>Rhodanthe</i> spp., <i>Lawrencella rosea</i>, <i>Trachymene ornata</i></p>	<p>various</p>	<p>Total Study Area: 8.03 ha Section 1: 5.29 ha Section 2: 0.64 Section 3: 2.1 ha</p> <p>Total Clearing Area: 4.8 ha Section 1: 3.83 ha Section 2: 0.27 Section 3: 0.7 ha</p> <p>Releve 01, Quadrat 5</p> <p>Average species richness per 100 m² 22.5 species (14 natives, 8.5 weeds)</p>	<p>352: Medium woodland; York gum (Beard 1979)</p> <p>York Gum Woodland (Harvey and Keighery 2012)</p>	


³ For a definition of symbology and vegetation descriptions see ESCAVI 2003


⁴ Based on quadrats/relevés – limited due to limited areas of good quality vegetation


Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>EIEsW</p> <p>U+ <i>Eucalyptus loxophleba</i>, <i>E. salmonophloia</i>; M <i>Acacia erinacea</i>, <i>Gastrolobium trilobum</i>, <i>Templetonia sulcata</i>; G <i>Ehrharta longiflora</i>, <i>Austrostipa elegantissima</i>, <i>Trachymene ornata</i>, grass, forb</p>	<p>York and Salmon Gum woodland:</p> <p>Woodland of <i>Eucalyptus loxophleba</i> and <i>E. salmonophloia</i> over shrubland of <i>Acacia erinacea</i>, <i>Rhagodia preissii</i>, <i>Gastrolobium trilobum</i>, <i>Enchylaena lanata</i>, <i>Templetonia sulcata</i>; over grassland and herbland of <i>Ehrharta longiflora</i>, <i>Austrostipa elegantissima</i>, <i>Oxalis pes-caprae</i>, <i>Trachymene ornata</i>, <i>Ursinia anthemoides</i></p>	<p>various</p>	<p>Total Study Area: 4.28 ha Section 1: 1.57 ha Section 2: 1.53 ha Section 3: 1.18 ha</p> <p>Total Clearing Area: 2.9 ha Section 1: 1.11 ha Section 2: 1.3 ha Section 3: 0.49 ha</p> <p>Quadrat 1 Quadrat 6</p> <p>Average species richness per 100 m² 18.5 species (8 natives, 10.5 weeds)</p>	<p>1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet (Beard 1979) Salmon and York Gum Woodland (Harvey and Keighery 2012)</p>	


Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>EwW</p> <p>U ^<i>Eucalyptus wandoo</i>, Vtree\7, 6r; M+ ^<i>Gastrolobium obovatum</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Austrostipa</i> <i>elegantissima</i> ^shrub, grass\2c; G ^<i>Desmocladius</i> spp., <i>Lepidosperma tenue</i>, <i>Opercularia vaginata</i> ^grass, forb\1i</p>	<p>Wandoo woodland</p> <p>Woodland of <i>Eucalyptus wandoo</i> over mixed shrubland of <i>Gastrolobium obovatum</i>, <i>G. parviflorum</i>, <i>Hypocalymma angustifolium</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Dampiera lavandulacea</i> and grassland of <i>Austrostipa elegantissima</i>, <i>Neurachne alopecuroidea</i> and <i>Rytidosperma setaceum</i> over mixed sedgeland and herbland of <i>Desmocladius</i> spp., <i>Lepidosperma tenue</i>, <i>Opercularia vaginata</i> and scattered herbs including <i>Podolepis capillaris</i>, <i>Trachymene ornata</i>, <i>Goodenia berardiana</i>.</p> <p>Scattered patches throughout this vegetation were dominated by <i>Allocasuarina humilis</i> and <i>Hakea</i> spp.</p>	<p>Various, but often on low rises and slopes</p>	<p>Total Study Area: 8.9 ha Section 1: 0.06 ha Section 3: 8.84 ha</p> <p>Total Clearing Area: 3.3 ha Section 1: 0.06 ha Section 3: 3.24ha</p> <p>Quadrat 3 Quadrat 4</p> <p>Average species richness per 100 m² 31 species (26.5 natives, 4.5 weeds)</p>	<p>1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet (Beard 1979)</p> <p>Wandoo woodland (Harvey and Keighery 2012)</p>	


Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>TsS U+ ^<i>Tecticornia</i> spp., <i>Juncus acutus</i>, <i>Juncus radula</i>\shrub, rush\1\i</p>	<p>Samphire shrubland and sedges with fringing Casuarina and York Gum Shrubland of <i>Tecticornia</i> sp. and sedgeland of <i>Juncus acutus</i>, <i>J. radula</i>.</p>	<p>drainage lines/salt flats</p>	<p>Total Study Area: 1.12 ha Section 1: 0.26 ha Section 2: 0.18 Section 3: 0.68 ha</p> <p>Total Clearing Area: 0.94 ha Section 1: 0.21 ha Section 2: 0.13 Section 3: 0.60 ha</p>	<p>N/A</p>	

Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
CoW U+ ^ <i>Casuarina obesa</i> Ytree\6\c	Salt Sheoak woodland Woodland of <i>Casuarina obesa</i> over introduced species	road culverts	Total Study Area: 3.99 ha Section 1: 3.58 ha Section 2: 0.41 Total Clearing Area: 3.43 ha Section 1: 3.13 ha Section 2: 0.3 ha	N/A	

Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>EIEwAaW</p> <p>U+ ^<i>Eucalyptus wandoo</i>, ^<i>Eucalyptus loxophleba</i>, ^<i>Allocasuarina huegeliana</i> Ytree\7, 6\i; M ^<i>Gastrolobium trilobum</i>, ^<i>Dampiera lavandulacea</i>, ^<i>Enchylaena lanata</i>, ^shrub\2\r; G ^<i>Ehrharta longiflora</i>, ^<i>Austrostipa elegantissima</i>, ^<i>Neurachne alopecuroidea</i>, ^grass, forb\1\i</p>	<p>York Gum and Wandoo woodland over Jam low woodland, with occasional Salmon Gum and Sheoak</p> <p>Woodland of <i>Eucalyptus wandoo</i> and <i>E. loxophleba</i> over low woodland of <i>Allocasuarina huegeliana</i> and <i>Acacia acuminata</i> over low shrubland of <i>Gastrolobium trilobum</i>, <i>Dampiera lavandulacea</i>, <i>Enchylaena lanata</i>, over grassland of <i>*Ehrharta longiflora</i>, <i>Austrostipa elegantissima</i>, <i>Neurachne alopecuroidea</i></p>		<p>Total Study Area: 3.8 ha Section 1: 2.06 ha Section 3: 1.74 ha</p> <p>Total Clearing Area: 1.58 ha Section 1: 0.31 ha Section 3: 1.28 ha</p> <p>Occurs in thin linear strips, often highly degraded – no quadrats undertaken</p>	<p>1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet (Beard 1979)</p> <p>Wandoo and York Gum (Woodland (Harvey and Keighery 2012)</p>	

Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>EwEsW</p> <p>U+ <i>Eucalyptus wandoo</i>, <i>Eucalyptus salmonophloia</i> tree\7, 6\i; M <i>Gastrolobium trilobum</i>, <i>Dampiera lavandulacea</i>, <i>Enchylaena lanata</i>, shrub\2\r; G <i>Ehrharta longiflora</i>, <i>Austrostipa elegantissima</i>, <i>Neurachne alopecuroidea</i>, grass, forb\1\i</p>	<p>Wandoo and Salmon Gum woodland Woodland of <i>Eucalyptus wandoo</i> and <i>E. salmonophloia</i> over low woodland of <i>Acacia acuminata</i> and <i>Allocasuarina huegeliana</i> over shrubland of <i>Gastrolobium trilobum</i>, <i>Templetonia sulcata</i>, <i>G. obovatum</i> and <i>Xanthorrhoea drummondii</i> and grassland of <i>Austrostipa elegantissima</i> and <i>Neurachne alopecuroidea</i> over herbland of <i>Dampiera lavandulacea</i></p>		<p>Total Study Area: 3.27 ha Section 1: 1.51 ha Section 2: 1.76</p> <p>Total Clearing Area: 2.81 ha Section 1: 1.47 ha Section 2: 1.34</p> <p>Quadrat 2 Average species richness per 100 m² 39 species (32 natives, 7 weeds)</p>	<p>1049: Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet (Beard 1979)</p> <p>Salmon Gum and Wandoo Woodland (Harvey and Keighery 2012)</p>	

Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
<p>TaS</p> <p>U ^<i>Eucalyptus salmonophloia</i>, <i>E. wandoo</i> ^tree\6\; M+ ^ <i>Trymalium angustifolium</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Gastrolobium</i> spp. ^shrub, \2\c; G ^<i>Avena barbata</i>, <i>Neurachne alopecuroidea</i>, <i>Briza maxima</i> ^grass, forb\1\bi</p>	<p>Mixed Heath</p> <p>Tall Open scrub of <i>Trymalium angustifolium</i> over open mixed heath of <i>Trymalium angustifolium</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Gastrolobium parviflorum</i>, <i>G. obovatum</i>, <i>G. spinosum</i> over grassland of <i>Austrostipa elegantissima</i>, <i>Neurachne alopecuroidea</i>, *<i>Briza maxima</i>, *<i>Ehrharta longiflora</i> over mixed herbland of *<i>Oxalis pes-caprae</i>, *<i>Romulea rosea</i>, <i>Burchardia congesta</i>, <i>Hydrocotyle pilifera</i>, and <i>Stylidium repens</i>, with scattered <i>Eucalyptus salmonophloia</i> and <i>E. wandoo</i></p>	<p>rocky rise</p>	<p>Total Study Area: 0.47 ha Section 1: 0.47 ha</p> <p>Total Clearing Area: 0.08 ha Section 1: 0.08 ha</p> <p>Very small area (less than 0.5 ha) within Section 1 – highly restricted</p> <p>Releve 02</p> <p>Species richness per 100 m² 30 species (23 natives, 7 weeds)</p>	<p>694 Shrublands; scrub-heath on yellow sandplain banksia-xylomelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions (Beard 1979)</p>	

Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
N/A	<p>Scattered Eucalypt trees (especially York Gum, Wandoo and Salmon Gum) over weeds with scattered shrubs, including <i>Enchylaena</i> spp. along roadside.</p> <p>Dominant weeds included <i>*Bromus arenarius</i>, <i>*Ehrharta longifolia</i>, <i>*Avena barbata</i>, <i>*Oxalis pes-caprae</i>, <i>*Brassica spp.</i>, <i>*Arctotheca calendula</i>, <i>*Lolium rigidum</i></p>		<p>Total Study Area: 54.81 ha Section 1: 16.89 ha Section 2: 15.72 ha Section 3: 22.2 ha</p> <p>Total Clearing Area: 40.92 ha Section 1: 11.48 ha Section 2: 11.87 ha Section 3: 17.57 ha</p>		

Vegetation association (NVIS V vegetation description and NVIS map-unit ³)	General vegetation description (using definitions of Keighery 1994)	Landform and/or substrate	Mapped extents in the Study Area and Clearing Area (ha) and representative sample locations Average species richness ⁴	Equivalent to Beard (1979) vegetation associations and Wheatbelt benchmarking vegetation types (Harvey and Keighery 2012)	Indicative photograph
N/A	Cleared	N/A	<p>Total Study Area: 13.33 ha Section 1: 3.72 ha Section 2: 6.85 ha Section 3: 2.76 ha</p> <p>Total Clearing Area: 9.63 ha Section 1: 3.3 ha Section 2: 4.03 ha Section 3: 2.3 ha</p>	N/A	

4.1.2 Conservation significant vegetation

The remnant vegetation within the Study Area was predominantly composed of Eucalypt woodlands. Eucalypt Woodlands within the Western Australian Wheatbelt are considered a Priority 3 PEC as defined by DPaW:

- Eucalypt woodlands of the Western Australian Wheatbelt (Priority 3)
Eucalypt-dominated woodlands in the Western Australian Wheatbelt region as defined by the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions with the specific exceptions of: woodlands and forests dominated by Jarrah (*E. marginata*) or Marri (*Corymbia calophylla*) where they occur without York Gum present; and non-woodland communities dominated by eucalypts, specifically those dominated by eucalypts with a mallee growth form. Community is defined primarily by its structure as a woodland. The presence in the canopy layer of eucalypt trees - most commonly salmon gum (*Eucalyptus salmonophloia*), York gum (*Eucalyptus loxophleba*), red morrel (*Eucalyptus longicornis*) or gimlet (*Eucalyptus salubris*) defines the Wheatbelt woodlands.

The vegetation types mapped within the Study Area as 'York Gum and Jam woodland' (EIAaW), 'York and Salmon Gum woodland' (EIEsW), 'Wandoo woodland' (EwW), 'York Gum and Wandoo woodland over Jam low woodland' (EIEwAaW) and 'Wandoo and Salmon Gum woodland' (EwEsW) are all considered to be representative of the Eucalypt Woodlands within the Western Australian Wheatbelt PEC. However, some degraded sections of these vegetation types can no longer be considered as a woodland, and it is likely that only the areas mapped as Condition 5 (Degraded) or higher can be considered as an intact community. 18.4 ha of these Eucalypt woodlands in Condition 5 (Degraded) or better occur within the Study Area and 8.37 ha within the Clearing Area. 12.73 ha of this vegetation is in Condition 4 (Good) or better within the Study area and 4.87 ha within the Clearing Area.

4.1.3 Other significant vegetation

During the field survey the vegetation was assessed to determine whether any vegetation occurs within the Study Area that may be considered as significant due to reasons defined by the EPA (2004a), such as scarcity and a role as a refuge (described further in Appendix B). The majority of the Study Area was highly degraded and did not contain vegetation that can be considered an intact vegetation type. The majority of the remnant vegetation supported woodland vegetation types which are considered to be significant as they are considered to be the PEC 'Eucalypt woodlands of the Western Australian Wheatbelt'.

The 'Mixed Heath' vegetation that occurred on the top of a small rocky rise at about SLK 6 was unusual in that it was not recorded anywhere else within the Study Area and it supported an unusual combination of species. However, the extent of this vegetation was very small and only 0.47 ha occurs within the Study Area and only 0.08 ha within the Clearing Area.

The Study Area crosses a number of creek and river crossings which were mapped as vegetation type 'Samphire shrubland and sedges with fringing Casuarina and York Gum' (TsS). This vegetation was often degraded and dominated by weedy species. 1.11 ha of this vegetation type occurs within the Study Area and 0.94 ha within the Clearing Area.

4.1.4 Vegetation condition

The majority of the Study Area (67.26 ha, 66 %) and the Clearing Area (50.41 ha, 72 %) was either cleared or almost completely cleared, with scattered native trees. These areas were rated Condition 6 (*Completely Degraded*). Sections of the road reserve that contained scattered natives but which did not have an intact vegetation structure and were dominated by weeds,

including some areas of regrowth vegetation, were rated Condition 5- 6 (*Degraded – Completely Degraded*) (15.87 ha in the Study Area and 11.54 ha in the Clearing Area).

Within the Study Area there were some areas of remnant vegetation and these areas ranged in Condition from 2 (*Excellent*) to 4 (*Good*). The majority of the vegetation adjacent to the road had been impacted by previous clearing and works associated with the road and while some layers of the vegetation structure remained intact, the understorey was generally highly impacted by weeds, 5.36 ha of this vegetation was rated as Condition 4 or 4-5 within the Study Area and 3.64 ha within the Clearing Area. However, there were some areas where the vegetation structure remained intact, with a diverse understorey, but with some low-level weed invasion. These areas were rated between Condition 2-3 (*Excellent-Very Good*), Condition 3 (*Very Good*) and Condition 3-4 (*Very Good – Good*) (total 12.02 ha in the Study Area and 4.46 ha in the Clearing Area). These areas generally occurred adjacent to the nature reserves and within the wide road reserve at approximately SLK 44.6 to 48.5 where the vegetation has been buffered from degrading processes by the presence of intact vegetation directly adjacent to it. In the Wandoo woodland at approximately SLK 48.5, in the eastern end of the area of wide road reserve, the vegetation health appeared to be in decline, with a number of dead and dying species.

The vegetation condition ratings within the Study Area have been mapped at Figure 4, Appendix A and are detailed in Table 9. The extents of the vegetation condition ratings within the Clearing Area are detailed in Table 10.

Table 9 Extents of vegetation condition ratings mapped within the Study Area

Vegetation Condition	Section 1 extent (ha)	Section 2 extent (ha)	Section 3 extent (ha)	Total
Condition 2-3	0.51	-	5.62	6.13
Condition 3 (Very Good)	0.47	-	1.49	1.97
Condition 3-4	0.22	-	3.70	3.92
Condition 4 (Good)	-	-	1.19	1.19
Condition 4-5	-	3.29	0.89	4.18
Condition 5 (Degraded)	1.09	-	0.40	1.50
Condition 5-6	11.61	4.12	0.13	15.87
Condition 6 (Completely Degraded)	21.50	19.67	26.08	67.26

Table 10 Extents of vegetation condition ratings mapped within the Clearing Area

Vegetation Condition	Section 1 extent (ha)	Section 2 extent (ha)	Section 3 extent (ha)	Total
Condition 2-3	0.11	-	1.77	1.88
Condition 3 (Very Good)	0.08	-	0.81	0.89
Condition 3-4	0.19	-	1.50	1.69
Condition 4 (Good)	-	-	0.49	0.49
Condition 4-5	-	2.64	0.51	3.15
Condition 5 (Degraded)	0.28	-	0.07	0.35
Condition 5-6	8.67	2.77	0.10	11.54
Condition 6 (Completely Degraded)	15.64	13.83	20.94	50.41

4.2 Flora

4.2.1 Flora diversity

A total of 208 flora taxa (including subspecies and varieties) representing 55 families and 142 genera were recorded in the Study Area during the GHD field survey. This total comprised 145 (69.7 %) native taxa and 63 (30.3 %) introduced taxa.

Dominant families recorded from the Study Area included:

- Fabaceae 26 taxa
- Asteraceae 22 taxa
- Poaceae 21 taxa
- Myrtaceae 17 taxa

Dominant genera recorded from the Study Area included:

- *Acacia* 8 taxa
- *Drosera* 6 taxa
- *Eucalyptus* 5 taxa
- *Lepidosperma* 5 taxa

The flora taxa recorded for each Section is detailed in Table 11.

Table 11 Number of flora taxa recorded during the field survey in each Section of the Study Area

Number recorded	Section 1	Section 2	Section 3
Taxa	103	132	113
Families	40	42	39
Genera	84	92	92
Native taxa	59 (57.3 % of total)	106 (80.3 % of total)	69 (61.1 % of total)
Introduced taxa	44 (42.7 % of total)	26 (19.7 % of total)	44 (38.9 % of total)
Dominant families	Poaceae - 14 taxa Myrtaceae - 11 taxa Fabaceae - 11 taxa Asteraceae - 11 taxa	Poaceae - 15 taxa Myrtaceae - 11 taxa Asteraceae - 17 taxa Fabaceae - 15 taxa	Poaceae - 18 taxa Fabaceae - 13 taxa Asteraceae - 15 taxa
Dominant genera	<i>Drosera</i> - 4 taxa	<i>Acacia</i> - 7 taxa <i>Eucalyptus</i> - 5 taxa	<i>Acacia</i> - 4 taxa

A flora list for the Study Area is provided in Table D.3, Appendix D.

4.2.2 Conservation significant flora

The GHD field survey did not record any EPBC Act or WC Act-listed flora taxa within the Study Area, however, two DPaW Priority-listed flora taxa were recorded. These were:

- *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) (Priority 1)
- *Hemigenia platyphylla* (Priority 4)

A brief description of each of these taxa is provided below (Source: WA Herbarium 1998–). The conservation significant flora species recorded during the field survey have been mapped at Figure 3, Appendix A.

***Eremophila glabra* subsp. York (P.G. Wilson 12172 B) (Priority 1)**

Eremophila glabra subsp. York (P.G. Wilson 12172 B) is a prostrate, spreading shrub 6 to 10 cm high by 1 to 2 m wide. This subspecies has glabrous, green, slightly toothed leaves and a yellowish-green flower with pink anthers (Brown and Buirchell 2011).

Eremophila glabra subsp. York (P.G. Wilson 12172 B) is a subspecies of the widespread *E. glabra*. This subspecies is restricted in distribution to an area between Beverley, York and Dowerin and grows in *Eucalyptus loxophleba* (York Gum) woodlands (Brown and Buirchell 2011). There are only two known locations of this subspecies recorded on Florabase (WA Herbarium 1998–) and Naturemap (DPaW 2007–).

During the field survey *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) was recorded in one of the locations in which it had previously been recorded, at Saint Andrews Church Reserve (Plate 2; Plate 3). A targeted search for this species was undertaken within the Study Area at this location, as well as opportunistically in the adjacent reserve. Eighteen individual plants were recorded at this location, with a couple of these occurrences forming clumps up to 2 m across. However, only four of these plants were recorded within the Clearing Area with the remaining seventeen recorded directly adjacent to the Study Area (Figure 3, Appendix A). This species appears very restricted in distribution at this location.



Plate 2 *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) in situ within the Study Area



Plate 3 *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) in situ within the Study Area, habit

***Hemigenia platyphylla* (Priority 4)**

Hemigenia platyphylla is a spreading shrub that grows up to 1.5 m high. This species has blue-purple flowers in September to November. *Hemigenia platyphylla* grows in sandy and loamy soils, on granite rocks and slopes. There are eighteen records of this species on Florabase (WA Herbarium 1998–) and Naturemap (DPaW 2007–) which show disjunct populations, with a number of records in the York-Beverley area, a number within the Stirling Ranges and scattered locations within the Darling Range.

Hemigenia platyphylla was recorded in four separate locations within Section 1 of the Study Area (within the Clearing Area) at the western and eastern end of Mt Hardey Nature Reserve (Figure 3, Appendix A).



Plate 4 *Hemigenia platyphylla* in situ within the Study Area



Plate 5 *Hemigenia platyphylla* in situ within the Study Area, habit

4.2.3 Other significant flora

The flora species recorded during the field surveys were assessed to determine whether any were regarded as other 'significant flora' as defined by the EPA (2004a). No species regarded as range extensions or new taxa were recorded within the Study Area.

4.2.4 Introduced flora (weeds)

The GHD field assessment recorded 63 introduced taxa during the field survey. Fifty-six of these species were considered naturalised; however, seven had been planted along the roadside and were not considered to naturally occur. Roadside plantings were generally restricted to the area at the York end and in the settlements, such as Kuarung.

The majority of the Study Area was a highly modified, and often previously cleared, road reserve with large areas completely dominated by introduced species. The disturbed road reserves were dominated by weedy grasses, including: **Avena barbata* (Bearded Oat), **Briza maxima* (Blowfly Grass), **Bromus diandrus* (Great Brome), **Ehrharta* spp. (Veldt grass) and **Eragrostis curvula* (African Love Grass) and herbs, including: **Lupinus* spp. (Lupins), **Trifolium* spp. (Clovers), **Erodium* spp., **Mesembryanthemum nodiflorum* (Ice Plant) and **Oxalis pes-caprae* (Soursob). Brassicaceae species including **Raphanus raphanistrum* (Wild Radish) and **Brassica* species (Turnip/Mustard) were widespread throughout the road reserves.

There were a number of areas of remnant vegetation within the Study Area that were in relatively good condition (as discussed in Section 4.1.4). These areas contained reduced numbers of introduced species; however some weedy species were recorded throughout the intact bushland, including: **Briza maxima*, **Ehrharta* spp., **Pentameris airoides* (False Hairgrass), **Hypochaeris* sp., **Monoculus monstrosus* (Stinking Roger), **Lysimachia arvensis* (Pimpernel), **Romulea rosea* (Guildford Grass), **Arctotheca calendula* (Cape Weed) and **Urisina anthemioides*

Two of the species have been listed by the federal government as Weeds of National Significance (WoNS): **Tamarix aphylla* (Athel Tree - Plate 6) and **Lycium ferocissimum* (African Boxthorn - Plate 7). Athel Pine is also a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), and two other Declared Pests: **Moraea* spp. (Cape Tulip) and **Echium plantagineum* (Paterson's Curse) were also recorded within the Study Area. None of the Declared Pests have been allocated a management/control category in the York/Beverley/Quairading shires. The recorded locations of the WoNS and Declared Pests within the Study Area have been mapped at Figure 4, Appendix A.



Plate 6 Athel Tree within the Study Area



Plate 7 African Boxthorn within the Study Area

4.3 Fauna

4.3.1 Fauna habitat types

A total of six broad fauna habitat types were identified within the Study Area during the field survey, based on the predominant landforms, soils and vegetation structure. These fauna habitat types are closely aligned with the vegetation associations outlined in Section 4.1, and include:

- Eucalypt woodlands (28.29 ha)
- Saline areas along drainage lines (1.11 ha)
- Salt Sheoak (*Casuarina obesa*) in lower lying areas (3.98 ha)
- Mixed heathland (0.47 ha)
- Scattered roadside trees (54.81 ha)
- Highly modified areas (13.33 ha)

A description of each of these habitat types is provided in Table 12. There is a total of 88.66 ha of fauna habitat associated with remnant native vegetation within the Study Area, and 60.76 ha


within the Clearing Area. The majority of this habitat comprises roadside trees (54.81 ha, or 62% of the Study Area).



Overall, the habitats of the Study Area transition between the remnant native vegetation that would have existed prior to clearing in the Wheatbelt, and areas that previously cleared or highly modified and now only comprise of mature roadside trees or introduced species. While a large proportion of the vegetation of the Study Area is degraded, the roadside vegetation that remains provide shelter, foraging and nesting resources for a variety of fauna species.



The remnant native vegetation includes lower lying areas over sands that surround creeklines and drainage areas and are dominated by Swamp Sheoak (*Casuarina obesa*) as well as saline flats that are dominated by chenopods. As the topography changes, the vegetation transitions into York Gum (*Eucalyptus loxophleba*) and Jam (*Acacia acuminata*) woodlands typically on loamy soils in the western end of the Study Area, and then further into York Gum and Salmon Gum (*Eucalyptus salmonophloia*) woodlands in the central and eastern parts of the Study Area (Sections 2 and 3). On the rises, there are Wandoo woodlands with a typically low diverse shrubland over gravelly or sandy loams.


Large sections of the Study Area are however highly degraded and/or modified and therefore do not reflect these native vegetation associations. In these areas there are rows of mature Eucalypt trees (including Wandoo, Salmon Gum and York Gum) in the roadside between the road edge and the fence line, which either exist over degraded native vegetation, or over an understorey of pasture grasses and weeds. It is obvious in places that these mature Eucalypts have previously been planted as they are in single rows over a modified understorey of pasture grasses and other weed species. Whereas there are other sections where the roadside trees are more scattered and the understorey consists of some native flora species, and the vegetation is highly degraded.

Table 12 Fauna habitat types within the Study Area

Habitat type and extent	Corresponding vegetation association (section 4.1)	Description	Indicative photo
<p>Eucalypt woodlands</p> <p>Study Area: 28.29 ha</p> <p>Clearing Area: 15.38 ha</p>	<p>York and Salmon Gum woodland (EIEsW)</p> <p>York Gum and Jam woodland (EIAaW)</p> <p>Wandoo woodland (EwW)</p> <p>York Gum and Wandoo woodland over Jam low woodland (EIEwAaW)</p> <p>Wandoo and Salmon Gum woodland (EwEsW)</p>	<p>Eucalypt woodlands dominate the Study Area, and comprise of a variety of different woodland types including York Gum (<i>Eucalyptus loxophleba</i>), Salmon Gum (<i>E. salmonophloia</i>) and Wandoo (<i>E. wandoo</i>). The dominant Eucalypt species in these woodlands varies based on the predominant landforms and soils in the area, with Wandoo woodlands typically occurring on slopes and low rises.</p> <p>These woodlands vary in structural diversity-comprising of a scattered mid-storey shrub layer to a lower storey of herbs, sedges and grasses. There are also areas where the ground cover is relatively dense and provides foraging opportunities and refuge areas for ground-dwelling mammals and small reptiles. Throughout these woodland there are also several micro-habitat features, such as tree hollows, cavities and hollow logs which would provide habitat for the conservation significant Red-tailed Phascogale and Carnaby's Black-Cockatoo. Most of the Eucalypt species in the Study Area readily form hollows, which provide important habitat for birds such as Galahs, Parrots and Cockatoos.</p> <p>There are sections of this habitat type that are in Good condition which provide particularly high value habitat for fauna species, typically located in or adjacent to reserves or larger patches of remnant vegetation in private property. There is also some disturbance to this habitat type, such as previous clearing for infrastructure, and weed incursion. However, although these disturbances have resulted in some areas having little to no understorey, the vegetation mostly remains intact.</p> <p>This habitat type is not well represented in the Study Area or locality. Due to large scale clearing in the Wheatbelt region, the areas of Eucalypt woodland are not considered to be well represented at a regional scale.</p>	

Habitat type and extent	Corresponding vegetation association (section 4.1)	Description	Indicative photo
<p>Saline areas along drainage lines</p> <p>Study Area: 1.11 ha</p> <p>Clearing Area: 0.94 ha</p>	<p>Samphire shrubland and sedges with fringing <i>Casuarina</i> and York Gum (TsS)</p>	<p>There are some very small patches of saline habitat associated with saline soils surrounding drainage lines within the Study Area. These drainage lines are dominated by samphire (<i>Tecticornia</i> sp.), <i>Juncus acutus</i> and <i>J. radula</i> and are bordered by Salt Sheoak (<i>Casuarina obesa</i>) and York Gum.</p> <p>These saline areas are likely to be seasonally inundated and provide some habitat for fauna species, including some frogs and water birds, as well as foraging opportunities for birds and refuge areas for small reptiles. There has been some disturbance to this habitat type, including weed incursion and previous clearing.</p> <p>This habitat type is not well represented in the Study Area and is unlikely to be well represented in the surrounding region.</p>	
<p>Salt Sheoak woodland in lower lying area</p> <p>Study Area: 3.98 ha</p> <p>Clearing Area: 3.43 ha</p>	<p>Salt Sheoak woodland (CoW)</p>	<p>There was one small area of Salt Sheoak (<i>Casuarina obesa</i>) woodland in a lower lying area in Sections 1 of the Study Area. The habitat in these areas is fairly uniform and consists of relatively dense Salt Sheoak trees over predominantly weeds species.</p> <p>This woodland habitat provides refuge areas and foraging opportunities for small to medium bird species, however there is limited groundcover to provide refuge for ground-dwelling fauna. There has been some disturbance to this habitat type, including historical grazing, weed incursion dominating the ground layer and past clearing for tracks.</p> <p>This habitat type is not well represented in the Study Area and is unlikely to be well represented in the surrounding region.</p>	

Habitat type and extent	Corresponding vegetation association (section 4.1)	Description	Indicative photo
<p>Mixed heathland</p> <p>Study Area: 0.47 ha</p> <p>Clearing Area: 0.08 ha</p>	<p>Mixed heath (TaS)</p>	<p>A very small area of mixed heath was recorded on a rocky rise in Section 1 of the Study Area. This heathland was dominated by mixed heath species including <i>Trymalium angustifolium</i>, <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>, <i>Gastrolobium parviflorum</i>, <i>G. obovatum</i> and <i>G. spinosum</i> with some scattered Salmon Gum and Wandoo. The dense heath layer provides good cover for ground-dwelling fauna and provides foraging opportunities and refuge areas for small birds.</p> <p>There has been some limited disturbance to this habitat type, including weed incursion in the fringing vegetation. This habitat type is not well represented in the Study Area or surrounding region.</p>	
<p>Scattered roadside</p> <p>Study Area: 54.81 ha</p> <p>Clearing Area: 40.92 ha</p>	<p>Scattered Eucalypt trees (especially York Gum, Wandoo and Salmon Gum) over weeds with scattered shrubs along roadside</p>	<p>Scattered roadside trees occur throughout the Study Area (including Sections 1, 2 and 3) and provide some limited habitat for fauna species. These areas mostly comprise of mature York Gum, Wandoo and Salmon Gum trees over a highly cleared understorey dominated by weeds (largely introduced grasses). The majority of these trees are remnant; however there are some that were planted in a single row adjacent to the road.</p> <p>The mature trees provide important habitat for a range of bird species, and in particular provide hollows which are important as nesting resources for larger birds species such as Cockatoos, Parrots and Lorikeets, as well as the conservation significant Carnaby's Black Cockatoo.</p> <p>This habitat type is not well represented in the Study Area and is unlikely to be well represented in the surrounding region.</p>	

Habitat type and extent	Corresponding vegetation association (section 4.1)	Description	Indicative photo
<p>Highly modified areas</p> <p>Study Area: 13.33 ha</p> <p>Clearing Area: 9.63 ha</p>	<p>Cleared</p>	<p>There are large portions of the road reserve that are highly modified and are partially cleared and/or dominated by introduced species. These highly modified areas are in Degraded condition and have been impacted by a number of disturbances such as past clearing, agriculture, railway lines, roads, tracks, and weed incursion. They consist of little or no overstorey or shrub species, and comprised of mainly pasture grasses and other weeds including crop plants, such as wheat (<i>Triticum aestivum</i>). Isolated trees include Wandoo, York gum, Salmon Gum, Rock Sheoak and well as several introduced Eucalypt species. This vegetation would provide very limited habitat for fauna species, however in some areas the scattered trees or shrubs may provide cover for birds and reptiles, as well as foraging opportunities for small birds.</p>	

4.3.2 Fauna habitat connectivity

In agricultural landscapes of Western Australia (primarily the Wheatbelt region), roadside reserves of remnant native vegetation are an important component, facilitating landscape connectivity and providing for fauna dispersal between larger isolated bushland fragments. Native fauna and feral animals utilize these corridors for movement between otherwise isolated remnants of native vegetation as 'stepping stones'. The persistence of these 'stepping stones' is important for the native fauna populations in the Wheatbelt, to ensure connectivity of habitat patches for movement and dispersal. The fauna habitats present within the Study Area are connected both locally and regionally to other habitat linkages, and therefore play an important function in linking the habitat patches in a fragmented landscape and enhancing wildlife dispersal.

Local linkages

At a local scale, the vegetation within the Study Area retains limited connectivity to other areas of habitat, and is surrounded by a cleared agricultural landscape. As a result, due to the high degree of habitat fragmentation in the surrounding area, there are places where the strip of roadside vegetation within the Study Area provides the only link to other bushland remnants. In these areas the habitat fragments are poorly connected, which presents barriers to the dispersal of fauna species, in addition to the barrier effects of the existing road.

The rivers (e.g. Mackie River) and drainage lines throughout the Study Area provide some connectivity to other areas of habitat, as they mostly retain some native riparian vegetation which would provide corridors for wildlife movement. There are also some areas with the Study Area that is immediately adjacent to larger bushland remnants, which are further connected to other patches of habitat. An example of this can be seen around SLK 37 (Section 3), to the south-west of Balkuling, where a remnant woodland patch extends to the north into other patches which are connected via other patches to the north.

There are also several roadside reserves immediately adjacent to the Study Area, which provide linkages to larger areas of remnant vegetation in typically good condition. These include Mt Hardey Nature Reserve (Class C) at SLK 10, St Andrews Church Nature Reserve (local reserve) at SLK 23.5, Mawson Nature Reserve (Class A) at SLK 42.5 and Cowering Well Conservation Reserve (local reserve) at SLK 25. These local linkages are important, particularly for ground-dwelling fauna including reptiles and small mammals as they provide more shelter and foraging opportunities. It has also been shown that such small habitat remnants are primarily used by birds moving to and from adjacent areas of native vegetation, such as road verges. The value of small remnants of vegetation as parts of the overall habitat network decreases with their isolation, and is strongly linked to the use of road verges by bird species (Fortin and Arnold 1997; Saunders 1989).

Regional linkages

At a regional scale, the Study Area retains very few links to any larger habitat corridors within the Wheatbelt region. This is due to the remaining remnant vegetation in the region consisting of variously sized habitat fragments surrounded by agricultural farmland, resulting in there being very few substantial ecological linkages. As described above, the Study Area retains local linkages to conservation reserves and areas, however at a regional scale, the habitat within the Study Area is not connected to any larger areas of remnant habitat such as the larger reserves in the region (e.g. Merredin Peak). The median size of nature reserves managed by the DPaW within the Wheatbelt is 116 ha, whereas other government reserves have a median size of less than 4 ha (Gibson *et. al.* 2004), and as a result these reserves provide a limited network of habitat due to their size.

4.3.3 Fauna diversity

A total of 61 fauna species were recorded in the overall Study Area during the spring reconnaissance survey. This total consisted of 57 birds, two reptiles and two mammals, of which 57 are native species and four are introduced species. A list of these species is provided in Appendix E.

Section 1

Within Section 1, a total of 51 fauna species were recorded, comprising 48 birds, two reptiles and one mammal. Three of these fauna species are introduced species.

Section 2

Within Section 2, a total of 54 fauna species were recorded, comprising 52 birds and two mammals. Four of these species are introduced species.

Section 3

Within Section 3, a total of 44 fauna species were recorded, comprising 43 birds and one mammal. Three of these fauna species are introduced species.

4.3.4 Conservation significant fauna

No conservation significant fauna species were recorded during the spring field survey.

Likelihood of occurrence assessment

The results of the field survey were combined with the results of the desktop assessment to provide a likelihood of occurrence assessment for the 24 conservation significant fauna species identified during the desktop searches, as outlined in Section 3.5.2.

This assessment was based on the species biology, habitat requirements, the quality and availability of suitable habitat and records of the species in the area. The assessment concluded that three species are considered likely to occur, 16 species are unlikely to occur and five species are highly unlikely to occur in with Study Area (Appendix E). The three species considered likely to occur include:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Red-tailed Phascogale (*Phascogale calura*) – listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.
- Rainbow Bee-eater (*Merops ornatus*) – listed as Migratory under the EPBC Act and under Schedule 3 (Migratory birds protected under an international agreement) of the WC Act.

A description of each of these species and their associated habitat within the Study Area is provided below (see section 4.3.4).

Carnaby's Black Cockatoo

In the south-west of Western Australia, the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) mostly occurs in the Wheatbelt, where the species breeds between July/August to January/February. The Carnaby's Black Cockatoo is highly mobile and displays a seasonal migratory pattern that is linked to breeding, with the majority of birds moving to the higher rainfall coastal areas to forage during the non-breeding season (DSEWPaC 2012). The species is listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.

The Study Area is located within the known breeding range of Carnaby's Black Cockatoo (DSEWPaC 2012), and there is suitable habitat for the species within the Study Area. The field survey was carried out during the breeding season of Carnaby's Black Cockatoo, however no birds were sighted and there were no evidence of breeding, foraging or roosting recorded within the Study Area. A description of the extent of the foraging, potential breeding and roosting habitat for the species within the Study Area and Clearing Area is summarised in Table 13.

Overall there is approximately 83.10 ha of remnant vegetation within the Study Area and 56.31 ha within the Clearing Area that provides habitat for the Carnaby's Black Cockatoo, which includes both scattered roadside trees and Eucalypt woodlands of Salmon Gum (*Eucalyptus salmonophloia*), Wandoo (*Eucalyptus wandoo*) and York Gum (*Eucalyptus loxophleba*). This remnant vegetation provides foraging, roosting and potential breeding habitat for the species. The 13.33 ha of completely cleared and highly modified habitat in the Study Area is not included in the extent of Carnaby's Black Cockatoo habitat as it does not provide any foraging, roosting or nesting resources for the species.

Foraging habitat

Overall there is 28.29 ha of suitable Eucalypt woodland foraging habitat for Carnaby's Black Cockatoo within the Study Area, and 15.38 ha within the Clearing Area. In addition, the 54.81 ha of scattered roadside Eucalypt trees within the Study Area and 40.92 ha within the Clearing Area also provide foraging habitat for the Carnaby's Black Cockatoo. In order to estimate the area of this habitat type that would provide foraging habitat, field observations of the approximate percentage of the area which contained tree cover were taken into account. It is estimated that approximately 50% of the area of this habitat type contains tree cover, and 25% includes the sealed road itself⁵.

Therefore the estimated total area of suitable foraging habitat within the Study Area is 41.99 ha and within the Clearing Area is 25.61 ha (Eucalypt woodland ha + 25% of ha of roadside trees). It is important to note that this is an estimation of the total area of suitable foraging habitat and was not precisely calculated based on the area of canopy of the roadside Eucalypt trees.

Breeding habitat

The habitat assessment identified 1176 potential breeding trees with a suitable DBH throughout the Study Area, of which 76 trees contained hollows. Within the Clearing Area there are 485 potential breeding trees, 16 of which contained hollows. Nine of the trees within the Study Area contained hollows that were of a suitable size to currently provide nesting opportunities for the Carnaby's Black Cockatoo (hollows with an entrance diameter greater than 20 cm). None of these trees showed any recent or historical signs of breeding (nesting use) by Carnaby's Black Cockatoo. A summary of the extent of foraging and breeding habitat within each Section is provided in Table 14.

⁵ Area calculations for this vegetation type/habitat type included the road surface.

Table 13 Summary and extent of Carnaby's Black Cockatoo habitat within the Study Area and Clearing Area

Habitat type	Presence within the Study Area	Presence within the Clearing Area
Foraging habitat	<p>28.29 ha of Eucalypt woodland foraging habitat and up to 54.81 ha of scattered roadside Eucalypt trees that also provide foraging habitat.</p> <p>Estimated total area of suitable foraging habitat⁶: 41.99 ha</p> <p>No evidence of foraging by Black Cockatoos was recorded within the Study Area.</p>	<p>15.38 ha of Eucalypt woodland foraging habitat and up to 40.92 ha of scattered roadside Eucalypt trees that also provide foraging habitat.</p> <p>Estimated total area of suitable foraging habitat: 25.61 ha</p> <p>No evidence of foraging by Black Cockatoos was recorded within the Clearing Area.</p>
Actual breeding habitat	No breeding events were recorded by any species of Black Cockatoo.	
Potential breeding habitat	<p>1176 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 76 contain hollows, including:</p> <ul style="list-style-type: none"> • 52 Wandoo (<i>Eucalyptus wandoo</i>) ≥300 mm DBH with hollows • 675 Wandoo (<i>Eucalyptus wandoo</i>) ≥300 mm DBH • 6 Salmon Gum (<i>Eucalyptus salmonophloia</i>) ≥300 mm DBH with hollows • 228 Salmon Gum (<i>Eucalyptus salmonophloia</i>) ≥300 mm DBH • 6 York Gum (<i>Eucalyptus loxophleba</i>) ≥500 mm DBH with hollows • 197 York Gum (<i>Eucalyptus loxophleba</i>) ≥500 mm DBH • 12 stags (dead trees) ≥500 mm DBH with hollows 	<p>485 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 16 contain hollows, including:</p> <ul style="list-style-type: none"> • 8 Wandoo (<i>Eucalyptus wandoo</i>) ≥300 mm DBH with hollows • 227 Wandoo (<i>Eucalyptus wandoo</i>) ≥300 mm DBH • 3 Salmon Gum (<i>Eucalyptus salmonophloia</i>) ≥300 mm DBH with hollows • 113 Salmon Gum (<i>Eucalyptus salmonophloia</i>) ≥300 mm DBH • 5 York Gum (<i>Eucalyptus loxophleba</i>) ≥500 mm DBH with hollows • 129 York Gum (<i>Eucalyptus loxophleba</i>) ≥500 mm DBH • 0 stags (dead trees) ≥500 mm DBH with hollows
Roosting habitat	<p>No roosting sites were recorded as being used by Black Cockatoos.</p> <p>Suitable roosting habitat occurs throughout the Study Area and consists of Eucalypt woodland and tall mature trees located in proximity to permanent water sources (e.g. farm dams).</p>	

⁶ Eucalypt woodland ha + 25% of ha of roadside trees

Table 14 Summary and extent of Carnaby's Black Cockatoo foraging and potential breeding habitat within each Section

Section	Foraging habitat ⁷		Potential breeding habitat within the Study Area	Potential breeding habitat within the Clearing Area
	Study Area	Clearing Area		
1	14.72 ha	9.64 ha	<p>308 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 6 contain hollows.</p> <ul style="list-style-type: none"> • 3 Wandoo with hollows • 159 Wandoo • 70 Salmon Gum • 3 York Gum with hollows • 73 York Gum 	<p>228 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 5 contain hollows.</p> <ul style="list-style-type: none"> • 3 Wandoo with hollows • 114 Wandoo • 53 Salmon Gum • 2 York Gum with hollows • 56 York Gum
2	7.86 ha	5.87 ha	<p>236 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 14 contain hollows.</p> <ul style="list-style-type: none"> • 8 Wandoo with hollows • 80 Wandoo • 5 Salmon Gum with hollows • 74 Salmon Gum • 1 York Gum with hollows • 68 York Gum 	<p>147 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 9 contain hollows.</p> <ul style="list-style-type: none"> • 5 Wandoo with hollows • 51 Wandoo • 3 Salmon Gum with hollows • 45 Salmon Gum • 1 York Gum with hollows • 42 York Gum
3	19.41 ha	10.10 ha	<p>632 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 56 contain hollows.</p> <ul style="list-style-type: none"> • 41 Wandoo with hollows • 436 Wandoo • 1 Salmon Gum with hollows • 84 Salmon Gum • 2 York Gum with hollows • 56 York Gum • 12 stags (dead trees) with hollows 	<p>110 potential breeding habitat trees with DBH ≥ 300 mm (for Salmon Gum and Wandoo) and DBH ≥ 500 mm (for York Gum), of which 2 contain hollows.</p> <ul style="list-style-type: none"> • 62 Wandoo • 15 Salmon Gum • 2 York Gum with hollows • 31 York Gum

⁷ Eucalypt woodland ha + 25% of ha of roadside trees

Red-tailed Phascogale

The Red-tailed Phascogale is a small arboreal dasyurid that inhabits Wandoo (*Eucalyptus wandoo*) and dense Sheoak (*Allocasuarina huegeliana*) woodland associations with populations being most dense in the latter vegetation type (DotE 2014c). The species is confined to remnant patches of vegetation containing suitable habitat in the central and southern Wheatbelt, where vegetation is long unburnt or burning is infrequent. This provides the continuous canopy cover to assist their arboreal habits. Trees need to be of a sufficient age to provide hollows for nesting in limbs or logs, and grass trees need to have ample skirts to provide cover. The species can also be found inhabiting letter boxes, ceiling cavities and other opportunistic refuges. This suggests that although their habitat preference is clear, they will use other vegetation types and artificial refuges, in lower densities, as nesting sites where preferred habitat is not available (DotE 2014c). The species is listed as Endangered under the EPBC Act and under Schedule 1 (Threatened) of the WC Act.

The Study Area is located at the northern extent of the Red-tailed Phascogale's currently known range and the species has been recently recorded near the eastern end of the Study Area (near SLK 51) in a remnant patch of Wandoo woodland in 2010 (DPaW 2007–). There is some suitable habitat for this species scattered throughout the Study Area and particularly in areas of Wandoo woodland with nesting resources including tree hollows and cavities, hollow logs and continuous canopy connectivity. Overall there is 28.29 ha of Eucalypt woodland habitat present within the Study Area and 15.38 ha within the Clearing Area, that would provide suitable habitat resources for this species. Furthermore, Wandoo and *Allocasuarina huegeliana* trees are scattered throughout the various types of Eucalypt woodlands.

The areas that would provide the greatest value to the species include the patches of habitat that are connected to larger areas of remnant habitat. As for the Black Cockatoo species, approximately 54.81 ha of the Study Area and 40.92 ha of the Clearing Area contains scattered roadside tree habitat. This is also considered important for the Red-tailed Phascogale as it provides for habitat connectivity, albeit fragmented, within the road reserve.

Rainbow Bee-eater

The Rainbow Bee-eater (*Merops ornatus*) is reasonably common bird in the south-west of Western Australia and there is 28.29 ha of suitable Eucalypt woodland habitat for the species throughout the Study Area, and 15.38 ha within the Clearing Area. In addition, given that this species is able to utilise a large variety of different habitat types, it may potentially occur throughout the entire Study Area on an opportunistic basis. There are numerous records of the species scattered throughout the Wheatbelt, and it is mostly likely that the species would utilise the Study Area for foraging and during dispersal. However while Rainbow Bee-eaters will utilise a wide-range of habitats to nest, there is no habitat within the Study Area suitable for the species to breed.

Migratory species

Five of the 23 conservation significant fauna species identified in the desktop assessment are listed as Migratory under both the EPBC Act and under Schedule 3 of the WC Act. All of these six species are birds, with four listed as 'Migratory Wetland' species and two listed as 'Migratory Terrestrial' species under the EPBC Act. None of these six bird species are considered likely to occur in the Study Area based on the lack of suitable habitat. As outlined in the likelihood of occurrence assessment in Appendix E, there is no suitable wetland habitat for the Common Sandpiper (*Actitis hypoleucos*), Great Egret (*Ardea modesta*), Cattle Egret (*Ardea ibis*) or Australian Painted Snipe (*Rostratula australis*) within the Study Area, and the White-bellied Sea-Eagle (*Haliaeetus leucogaster*) is considered unlikely to utilise the terrestrial habitat within the

Study Area. The Rainbow Bee-eater is reasonably common bird in the south-west of Western Australia and may occasionally utilise the Study Area for foraging and during dispersal.

4.3.5 Introduced fauna

Four introduced species were recorded during the field assessment, including the European Rabbit (*Oryctolagus cuniculus*), the Sheep (*Ovis aries*), the Rainbow Lorikeet (*Trichoglossus haematodus*) and the Laughing Kookaburra (*Dacelo novaeguineae*). Scattered evidence of the European Rabbit was observed throughout the Study Area in Section 2, and Sheep were observed in the areas of the Study Area adjacent to paddocks where the fencing was damaged. Both the Rainbow Lorikeet and the Laughing Kookaburra were also observed throughout the Study Area.

5. Environmental approvals and referrals

5.1 Federal approvals

5.1.1 Matters of National Environmental Significance

Referral to DoE under the EPBC Act is triggered if a proposed action has/or potentially has a significant impact on any MNES. An assessment of the Project against each of the biological MNES is provided in Table 15. This assessment is based on the entire Clearing Area.

Table 15 Assessment of the key biological constraints within Clearing Area against MNES

Matters of National Environmental Significance	Present	Section 1	Section 2	Section 3	Total
Threatened Species (flora) and Ecological Communities	None present	None			
Threatened Species (fauna)	None present Two fauna species considered likely to occur	<ul style="list-style-type: none"> Loss of an estimated⁸ 9.64 ha of foraging habitat and 228 potential breeding trees for Carnaby's Black Cockatoo (5 of which currently contain hollows). Loss of 6.77 ha Eucalypt woodland habitat and scattered remnant trees for the Red-tailed Phascogale. 	<ul style="list-style-type: none"> Loss of 5.87 ha of foraging habitat and 147 potential breeding trees for Carnaby's Black Cockatoo (9 of which currently contain hollows). Loss of 2.91 ha woodland habitat and scattered remnant trees for the Red-tailed Phascogale. 	<ul style="list-style-type: none"> Loss of 10.10 ha of foraging habitat and 110 potential breeding trees for Carnaby's Black Cockatoo (2 of which currently contain hollows). Loss of 5.71 ha woodland habitat and scattered remnant trees for the Red-tailed Phascogale. 	<ul style="list-style-type: none"> Loss of an estimated 25.61 ha of foraging habitat and 485 potential breeding trees for Carnaby's Black Cockatoo (16 of which currently contain hollows). Loss of 15.38 ha woodland habitat and scattered remnant trees for the Red-tailed Phascogale.
Listed Migratory Species	None present One species considered likely to occur	Loss of 28.29 ha of foraging and dispersal woodland habitat for the Rainbow Bee-eater. This species utilises a wide-range of habitats and is likely to use the Study Area for foraging and dispersal. However, the species is unlikely to rely solely on the habitats available in the proposed Clearing Area.			

⁸ Estimate based on area of Eucalypt woodland + 25% of area of scattered roadside trees

5.1.1 Significance of impacts to Carnaby's Black Cockatoo

The Clearing Area is located within the modelled distribution and the known breeding range of the Carnaby's Black Cockatoo and foraging, roosting and potential breeding habitat is present within the Clearing Area. An estimate of 25.61 ha of suitable foraging habitat and 485 potential breeding habitat trees with a of DBH \geq 300 mm for Salmon Gum and Wandoo or DBH \geq 500 mm for York Gum were recorded within the Clearing Area (of which 16 contain hollows).

In order to review the potential issues to the Black Cockatoo species within the Clearing Area, the DotE (DSEWPaC 2012) EPBC Act referral guidelines for three threatened Black Cockatoo species were consulted. Within these guidelines, DotE provides a risk table that gives guidance on what it views as risks/impacts to Black Cockatoos that will trigger referral. Risk is broken into three categories: high, uncertain and low and primarily focuses on breeding, feeding and roosting areas as well as indirect impacts. If there is uncertainty with regard to risks on Black Cockatoos then the DotE recommends referring the Project or contacting the DotE to ensure legal certainty.

Clearing of the Clearing Area would be considered likely to trigger referral to the DotE due to:

- **Clearing or degradation of any part of a vegetation community known to contain breeding habitat (high risk)** – 485 potential breeding habitat trees with a of DBH \geq 300 mm for Salmon Gum and Wandoo or DBH \geq 500 mm for York Gum. A total of 469 of these are of a suitable DBH to develop a nest hollow for Carnaby's Black Cockatoo breeding in the future and 16 of these currently contain hollows.
- **Clearing of more than 1 ha of quality foraging (high risk)** – There is an estimated 25.61 ha of suitable foraging habitat within the Clearing Area, consisting of Eucalypt woodland and scattered roadside Eucalypt trees. Salmon Gum, Wandoo and York Gum all provide high quality foraging vegetation for Carnaby's Black Cockatoo (Groom 2011).

Both of these impacts are considered to have high risk of significant impact to Carnaby's Black Cockatoo, as outlined in DSEWPaC (2012). Therefore it is recommended that the Project be referred to the DotE.

5.1.2 Significance of impacts to Red-tailed Phascogale

The Clearing Area is located at northern extent of the Red-tailed Phascogale's currently known range and there is suitable woodland habitat containing Wandoo and *Allocasuarina* with a variety of nesting resources (e.g. tree hollows) located within the Clearing Area. This Wandoo woodland habitat is located on rises and slopes at the eastern end of the Study Area. Wandoo trees are also present in other types of mixed Eucalypt woodland throughout the Clearing Area, however areas located immediately adjacent to reserves or larger areas of remnant habitat within the Clearing Area would be of the greatest value to the Red-tailed Phascogale. Clearing of the entire Clearing Area is likely to result in the loss up to 15.38 ha of Eucalypt woodland habitat for the Red-tailed Phascogale and additional scattered tree habitat which is important for connectivity.

In the absence of species specific guidelines the DotE Significant impact guidelines 1.1 (DotE 2013) were consulted to decide whether or not a referral under the EPBC Act may be required for the Red-tailed Phascogale with regard to this Project. The Project in its current form will remove at least 15.38 ha of potential woodland habitat and scattered tree habitat for this species. This will in turn, reduce the availability of suitable habitat and nesting resources for the Red-tailed Phascogale from the locality and within the region. The habitat types suitable for the Red-tailed Phascogale within the Clearing Area comprise of vegetation types that are not well represented (i.e. in some cases < 30% of the original extent remains), thus the Project is considered likely to trigger referral to the DotE.

5.2 State approvals

5.2.1 Environmental Protection Authority

Significant proposals must be referred to the EPA under Section 38 of the *Environmental Protection Act 1986* (EP Act). In deciding whether a proposal will be subject to the formal environmental impact assessment process, the EPA takes into account the environmental significance of any potential impacts that may result from the implementation of the scheme or proposal.

In the absence of a broader environmental assessment, the majority of the likely environmental impacts associated with the Project are linked to native vegetation clearing and loss of fauna habitat. The potential impacts from the loss of native vegetation clearing and loss of fauna habitat for the Project may be effectively assessed through the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Therefore with consideration to the biological values discussed in this report and in the absence of a broader environmental assessment, it is considered unlikely that the Project would require referral to the EPA under Section 38 of the EP Act.

5.2.2 Department of Environment and Regulation

The clearing of vegetation in Western Australia requires a permit under Part V of the EP Act, unless an exemption applies.

Main Roads has been granted a State-wide vegetation clearing permit (Clearing Permit CPS 818/11) which allows Main Roads to clear native vegetation for road realignment projects and associated construction activities (including preconstruction activities). CPS 818 requires an assessment against the 'Ten Clearing Principles' to clear native vegetation for road works. The Permit does not authorise the clearance of native vegetation for project activities where:

- The clearing may be seriously at variance with the clearing principles
- Those project activities are incorporated in any proposal that is referred to and assessed under Part IV of the EP Act by the EPA

In October 2013, changes were made to the Clearing Permit CPS 818, which requires the preparation of a Preliminary Clearing Impact Assessment (PCIA)/Clearing Impact Assessment (CIA) (or combined Assessment Report) and a Vegetation Management Plan (VMP) to be undertaken as part of Main Roads projects that clear native vegetation using CPS 818. A PCIA/CIA/Assessment Report and VMP are required for this Project, which should include an assessment against the Ten Clearing Principles.

6. Conclusions

The majority of the Study Area occurs in a degraded and predominantly cleared road reserve. These areas retain little intact native vegetation; however, these areas do contain native woodland habitats with large numbers of native trees and scattered remnant trees which provide important habitat for conservation significant fauna including the Carnaby's Black Cockatoo and Red-tailed Phascogale.

There are a number of locations within the Study Area that have ecological value, including small areas that contain remnant vegetation in excellent condition. These areas support Eucalypt woodlands which are considered a Priority 3 PEC 'Eucalypt Woodlands in the Western Australian Wheatbelt. The sections of the Study Area that have the highest ecological value include:

- A very small patch of Mixed Heath vegetation in Very Good condition on the top of a rocky rise at approximately SLK 6.
- Good quality vegetation within the road reserve directly adjacent to Hardey Nature Reserve, at approximately SLK 10 in Section 1.
- Good quality vegetation that supports a highly restricted Priority 1 flora species, *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) (Priority 1), adjacent to Saint Andrew's church at approximately SLK 23
- Vegetation within the road reserve, adjacent to good quality vegetation at the western end of Kauring, approximately SLK 26
- Excellent condition vegetation, including Wandoo woodland with a highly diverse understorey, within a wide section of road reserve between SLK 44.6 to 48.5
- Vegetation adjacent to the reserve at Mawson, between approximately SLK 42.2 and SLK 43, within Section 3.

It is expected that the Project will only require clearing of a thin strip directly adjacent to the existing road for the road widening activities. However, management measures will be required to ensure that indirect impacts on the adjacent areas of remnant vegetation of high ecological value, such as through the introduction of weeds or changes to hydrology, are minimised.

It is recommended that impacts on the Priority 1 flora species, *Eremophila glabra* subsp. York (P.G. Wilson 12172 B) be avoided where possible and management measures implemented to ensure that indirect impacts to this species do not occur during construction.

It is recommended that impacts on the habitat of the Carnaby's Black Cockatoo and Red-tailed Phascogale be avoided where possible and management measures implemented to ensure that direct and indirect impacts to these species do not occur during and after construction.

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Appendices

Appendix A - Figures

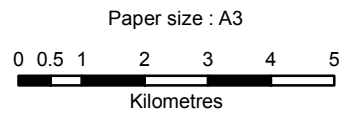
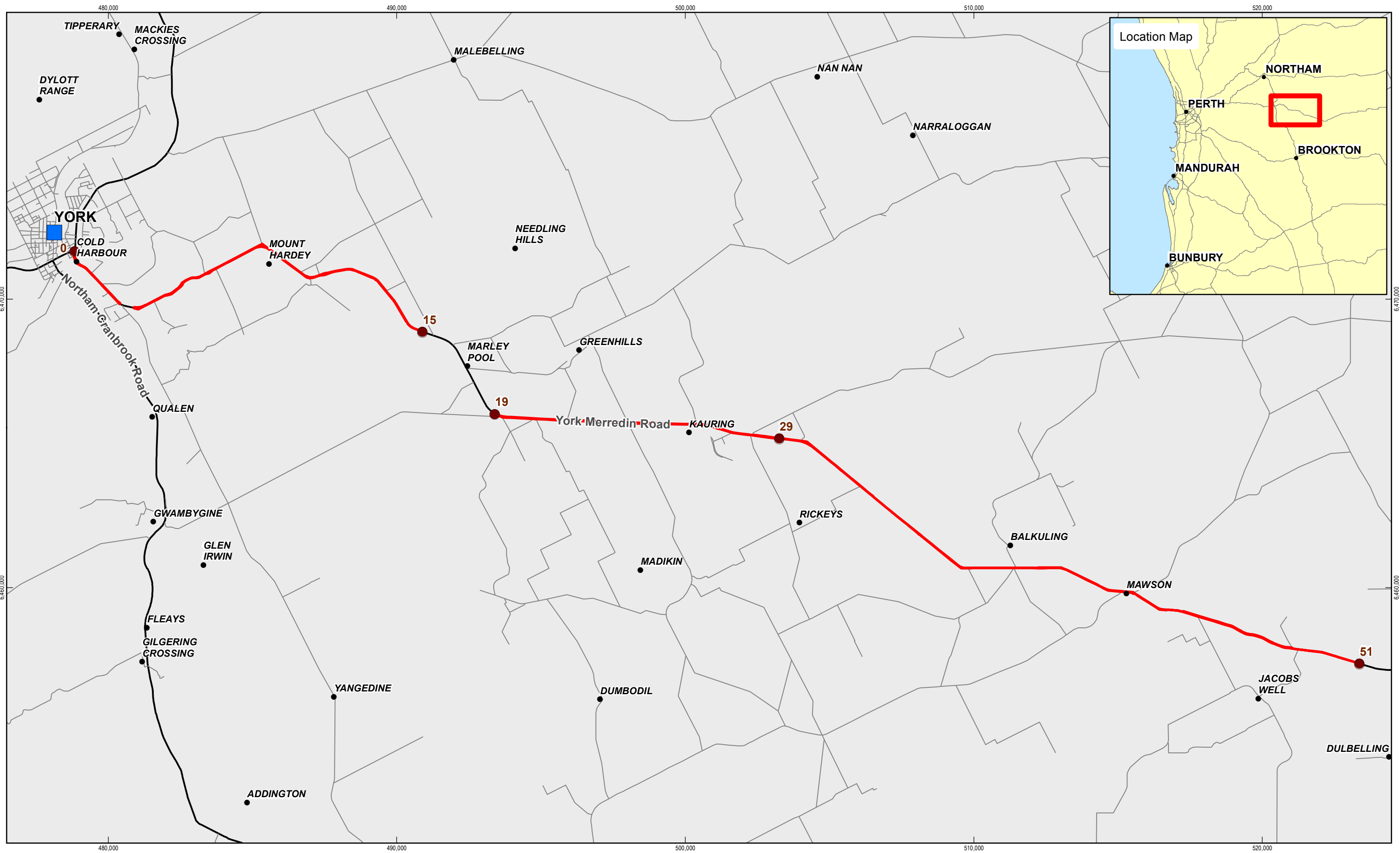
Figure 1 Study Area location

Figure 2 Biological context

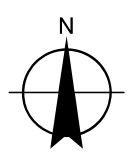
Figure 3 Vegetation types and quadrat locations

Figure 4 Vegetation condition and significant weed locations

Figure 5 Fauna habitat and significant fauna locations



Map Projection: Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia
 Grid: Map Grid of Australia 1994, Zone 50



- LEGEND**
- SLK Points
 - Study Area



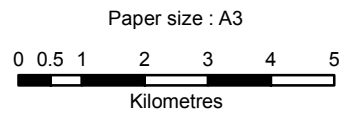
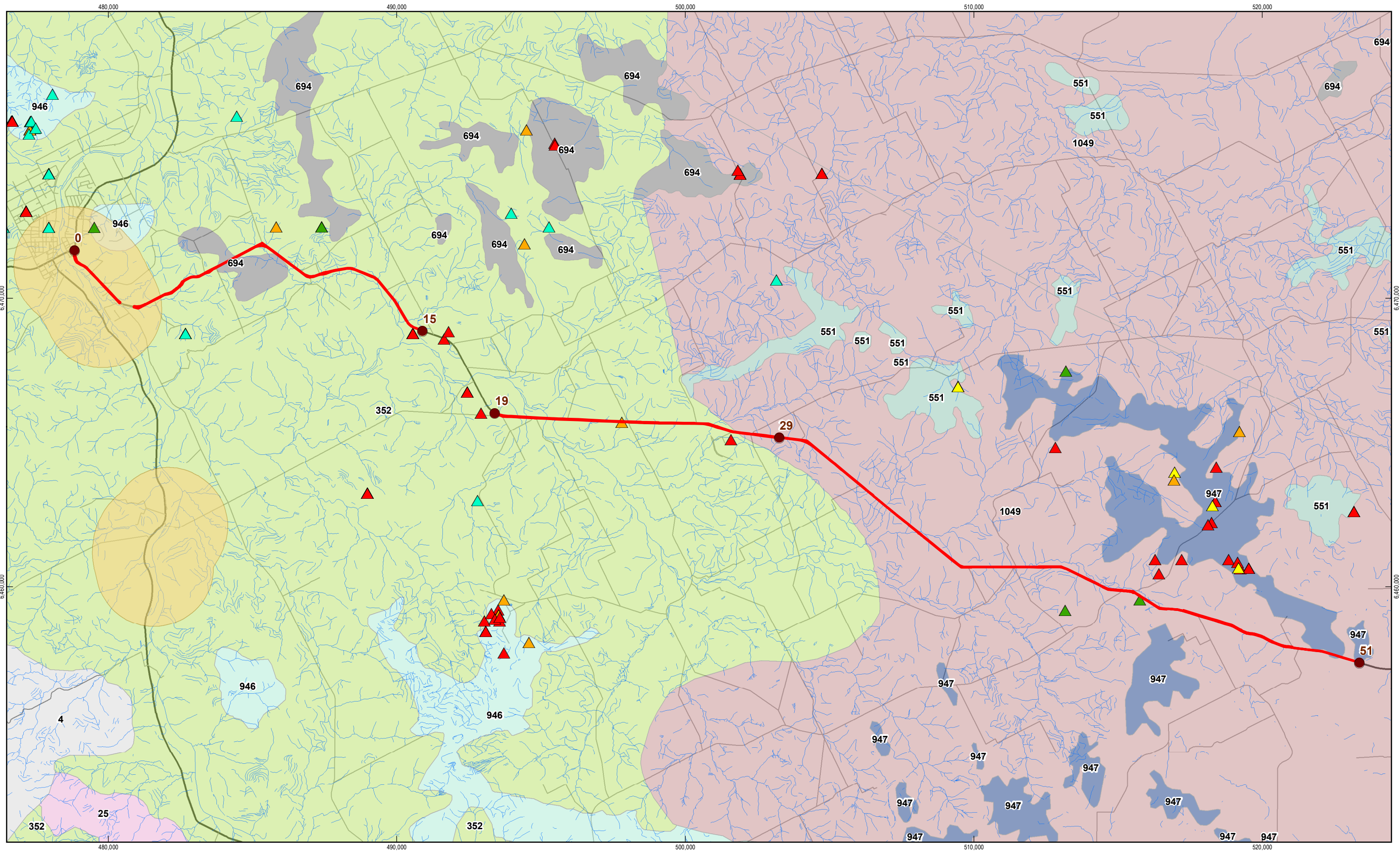
Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

Job Number	61-31161
Revision	0
Date	24 Nov 2014

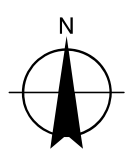
Study area location

Figure 1

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 © 2014. Whilst every care has been taken to prepare this map, GHD, GA and MRWA make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
 Data source: MRWA - Road Network - 201411; GHD: SLK Points - 20140926; Study Area - 20140926. Created by: jbmteignies



Map Projection: Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia
 Grid: Map Grid of Australia 1994, Zone 50



LEGEND	
● SLK Points	Pre-European Veg
— Hydrology	25
▭ Study Area	352
▭ TEC/PEC	551
▭ 694	Threatened & Priority Flora
▭ 946	T
▭ 947	Priority 1
▭ 1049	Priority 2
	Priority 3
	Priority 4



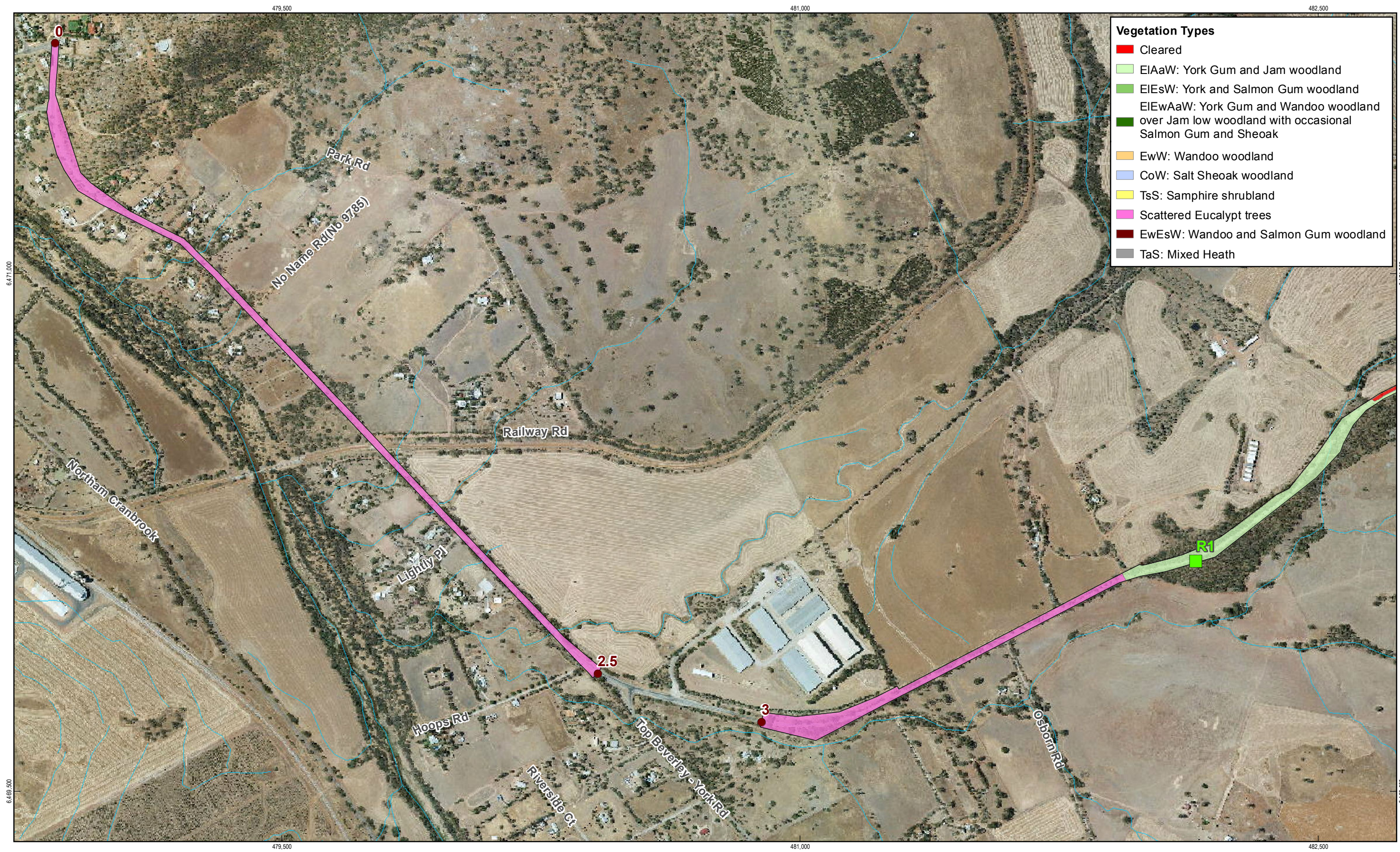
Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

Job Number | 61-31161
 Revision | 0
 Date | 24 Nov 2014

Biological context

Figure 2

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 © 2014. Whilst every care has been taken to prepare this map, GHD, DPaW, DAFWA, Landgate and MRWA make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
 Data source: MRWA - Road Network - 201411; Landgate: Hydrology - 20140904; DPaW: TPFL - 20140904; WA Herbarium - 20140904; DAFWA: PreEuropean Vegetation - 20120814; GHD: SLK Points - 20140926, Study Area - 20140926. Created by: jbmteignies



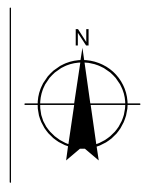
Vegetation Types

- Cleared
- EIaA: York Gum and Jam woodland
- EIEsW: York and Salmon Gum woodland
- EIEwAaW: York Gum and Wandoo woodland over Jam low woodland with occasional Salmon Gum and Sheoak
- EwW: Wandoo woodland
- CoW: Salt Sheoak woodland
- TsS: Sampire shrubland
- Scattered Eucalypt trees
- EwEsW: Wandoo and Salmon Gum woodland
- TaS: Mixed Heath

Paper size : A3

0 50 100 200 300 400 500
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



LEGEND

- SLK Points
- Quadrat Locations
- Hydrology
- Study Area

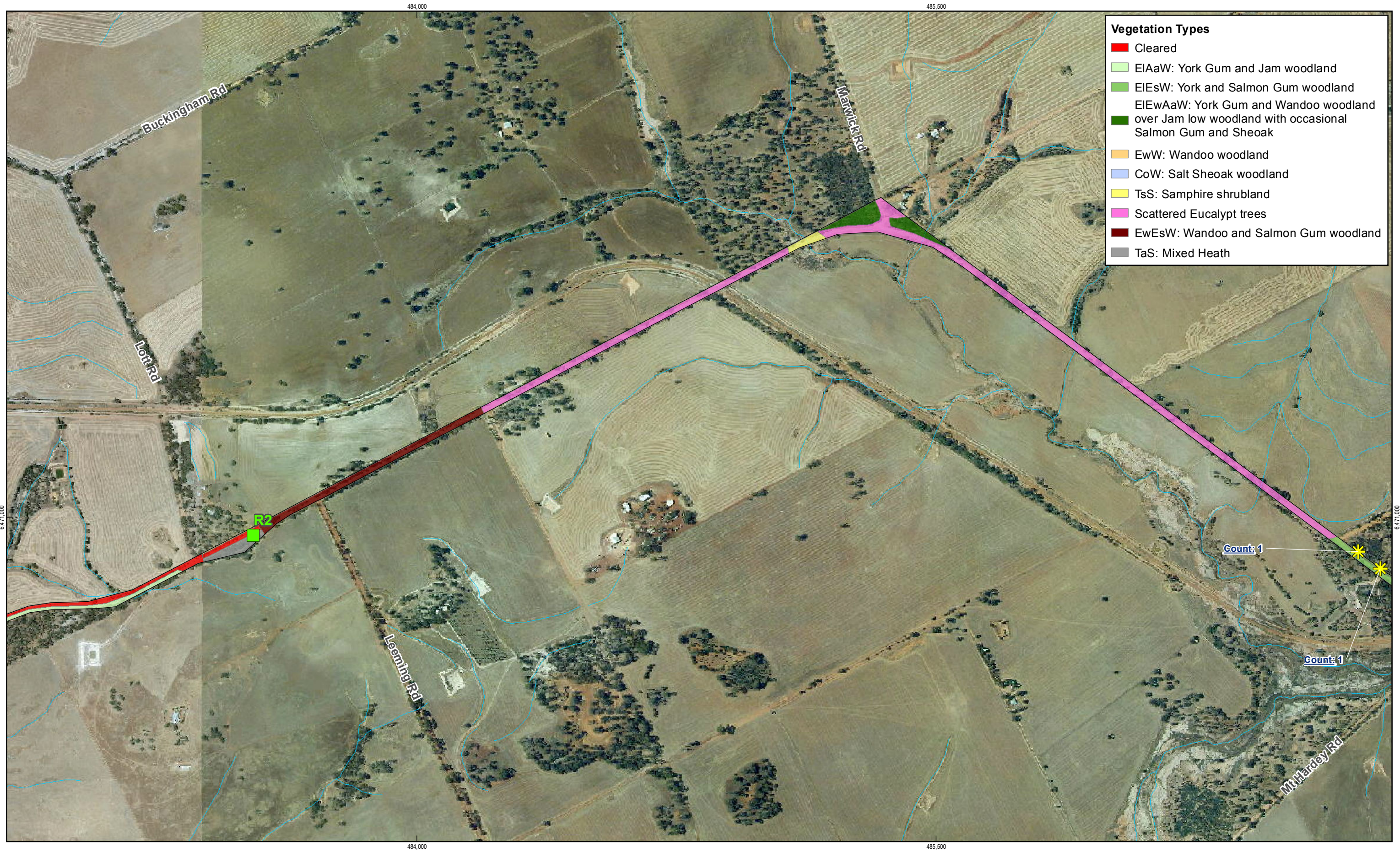
Conservation Significant Flora

- ✻ *Eremophila glabra* subsp. York (P1)
- ✻ *Hemigenia platyphylla* (P4)



Main Roads Western Australia	Job Number	61-31161
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Biological Survey	Date	24 Nov 2014

Vegetation types, quadrat locations and conservation significant flora **Figure 3**



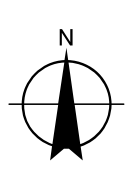
Vegetation Types

- Cleared
- EIAaW: York Gum and Jam woodland
- EIEsW: York and Salmon Gum woodland
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- CoW: Salt Sheoak woodland
- TsS: Samphire shrubland
- Scattered Eucalypt trees
- EwEsW: Wandoo and Salmon Gum woodland
- TaS: Mixed Heath

Paper size : A3

0 50 100 200 300 400 500
Metres

Map Projection: Transverse Mercator
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Grid: Map Grid of Australia 1994, Zone 50



LEGEND

- SLK Points
- Quadrat Locations
- Hydrology
- Study Area

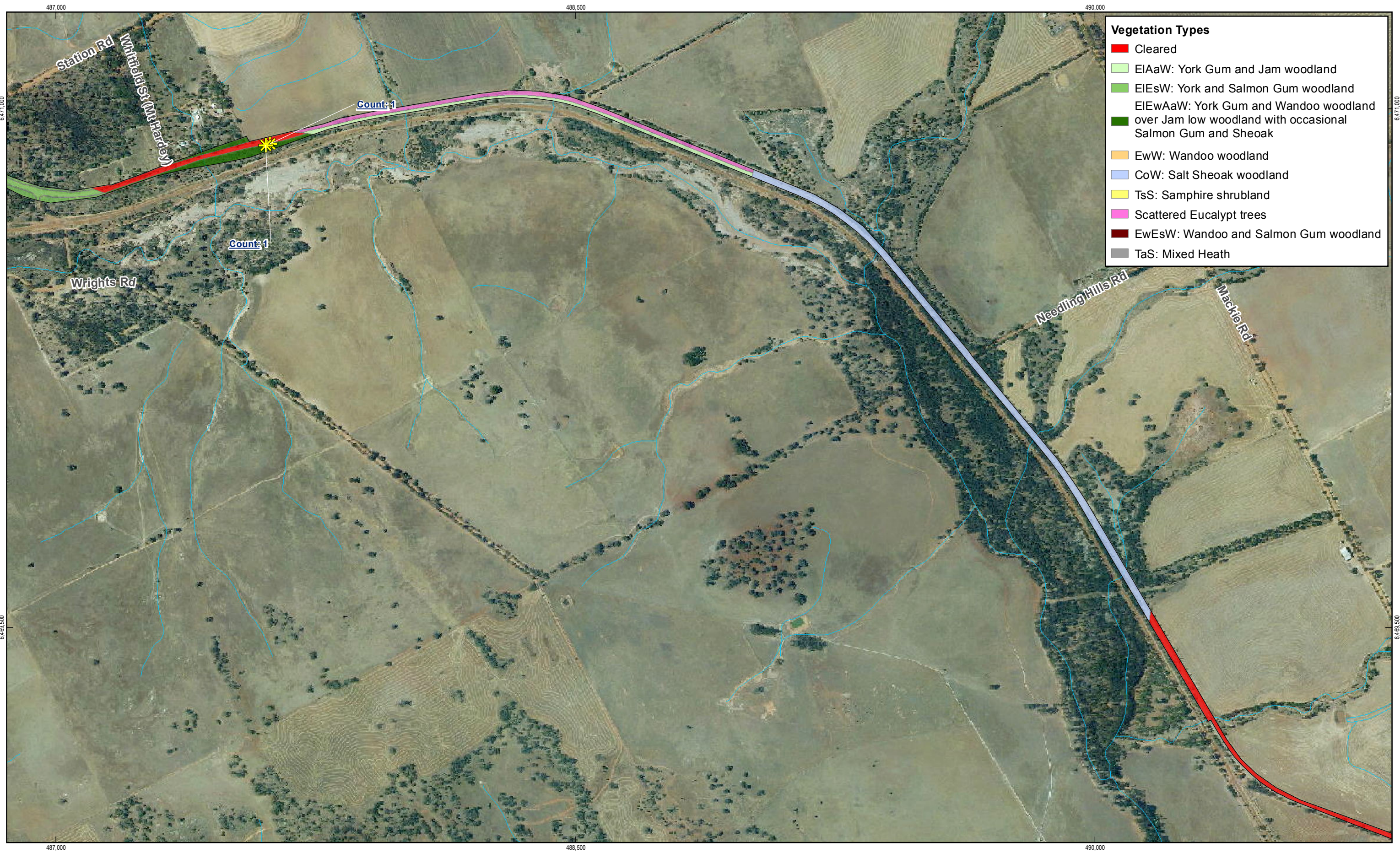
Conservation Significant Flora

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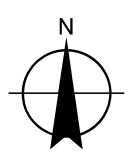
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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



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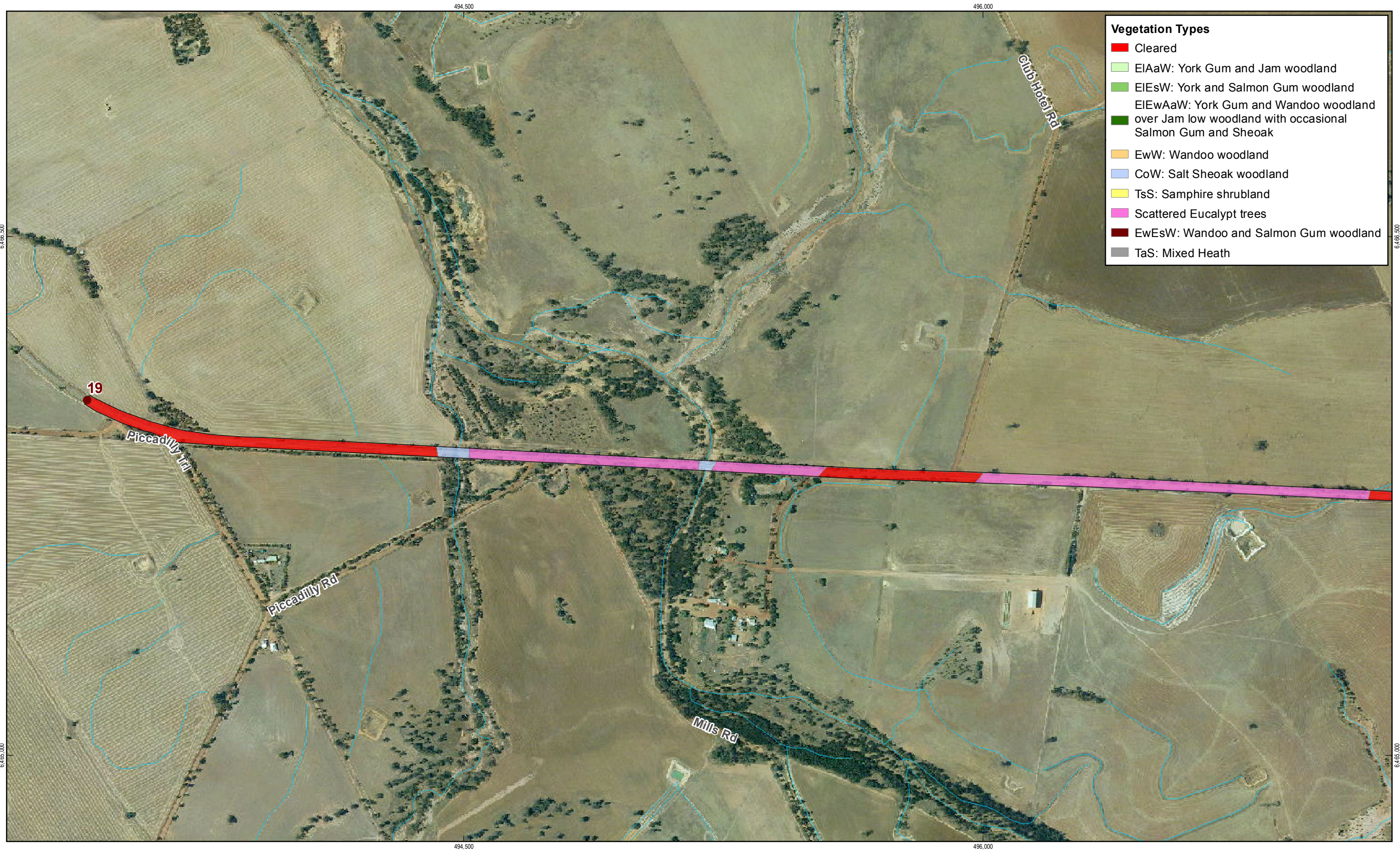
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Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

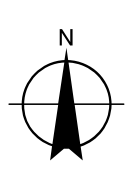
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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



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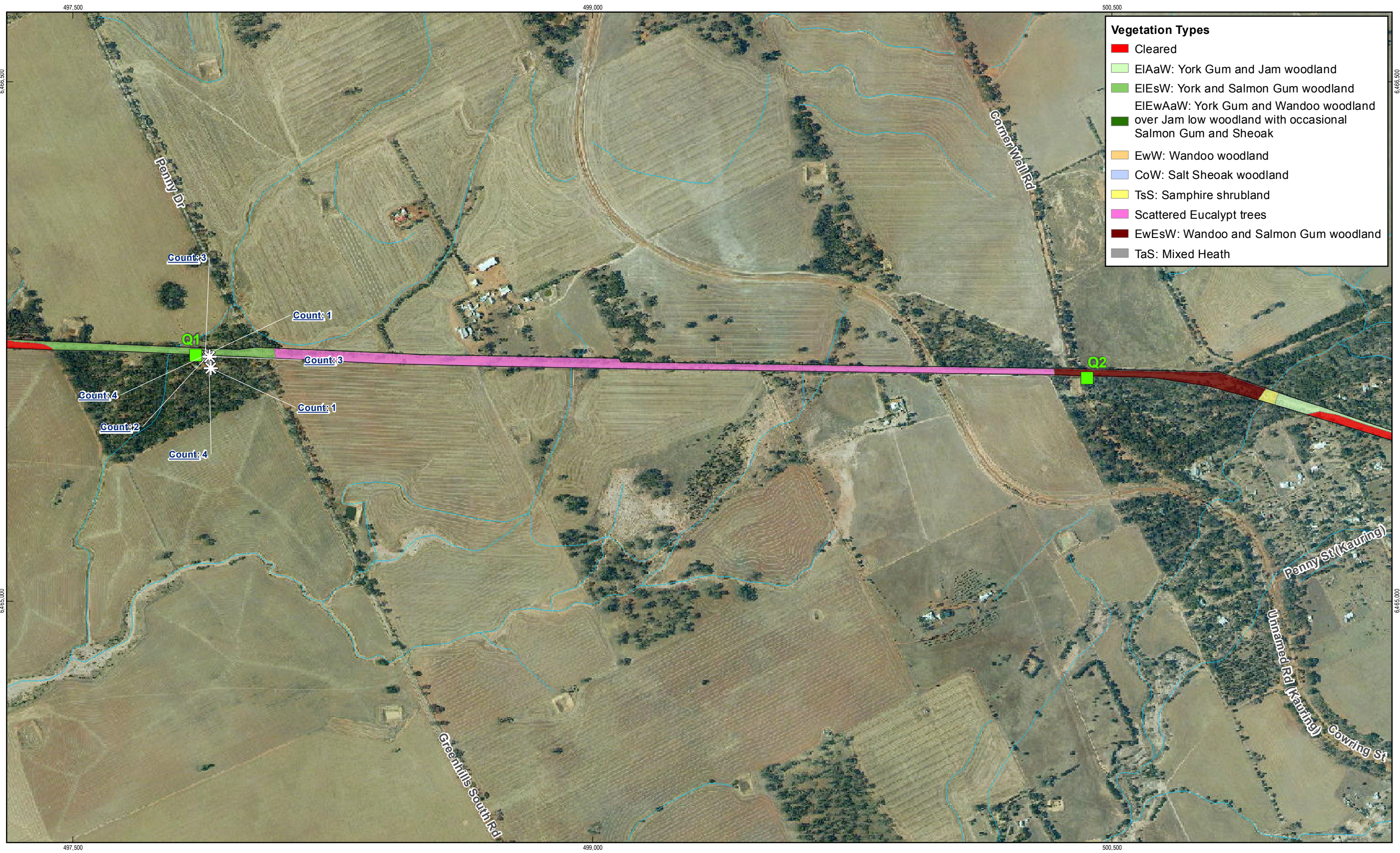
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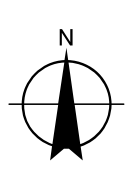
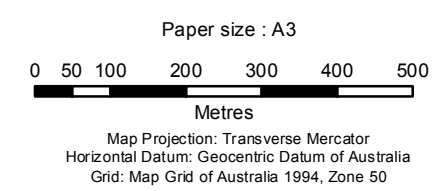
Main Roads Western Australia
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 Biological Survey

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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



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- LEGEND**
- SLK Points
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 - Hydrology
 - Study Area
- Conservation Significant Flora**
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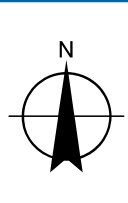
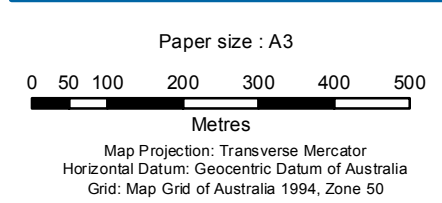
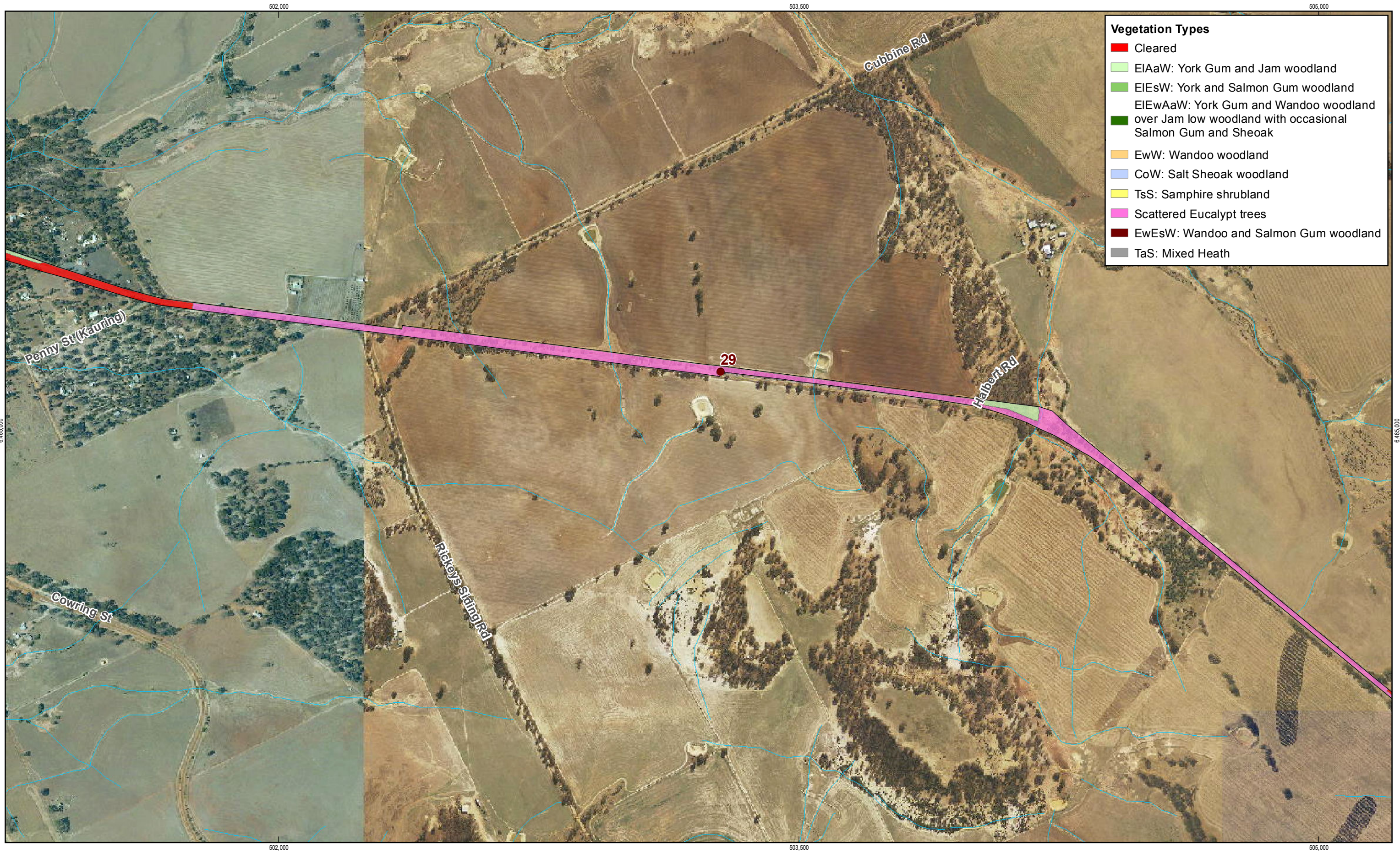


Main Roads Western Australia
York-Merredin Road Widening
Biological Survey

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Revision | 0
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Vegetation types, quadrat locations and conservation significant flora **Figure 3**

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Data source: MRWA - Road Network - 201411; Landgate: Hydrology - 20140904; GHD: SLK Points - 20140926, Study Area - 20140926, Quadrat Locations - 20141003, Priority Flora - 20141003, Vegetation Types - 20140930 Created by: jbmteignies



LEGEND

● SLK Points	Conservation Significant Flora
■ Quadrat Locations	☼ <i>Eremophila glabra</i> subsp. York (P1)
— Hydrology	☼ <i>Hemigenia platyphylla</i> (P4)
□ Study Area	

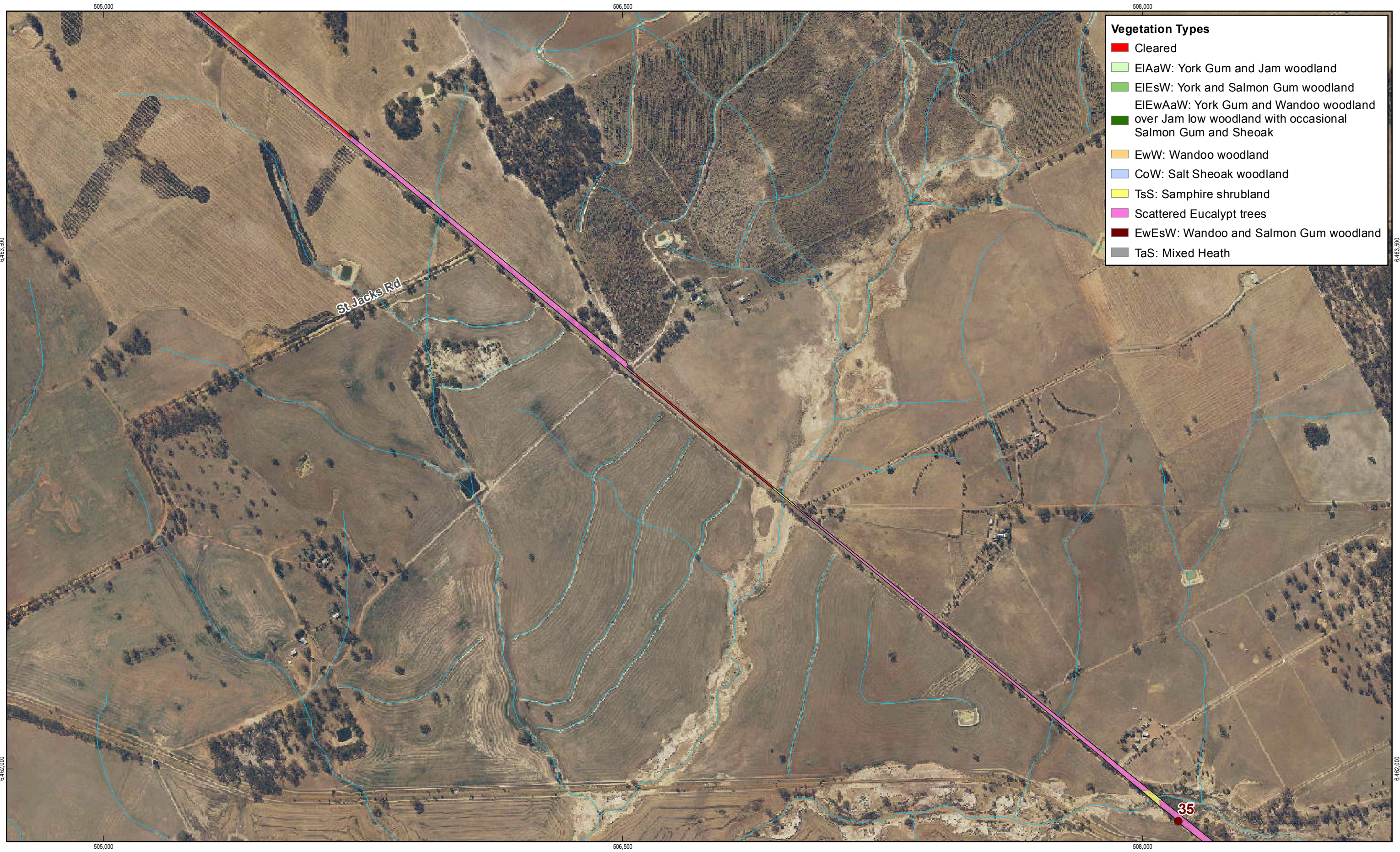


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York-Merredin Road Widening
Biological Survey

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Vegetation types, quadrat locations and conservation significant flora **Figure 3**

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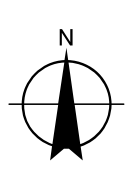
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Paper size : A3

0 50 100 200 300 400 500
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



LEGEND

- SLK Points
- Quadrat Locations
- Hydrology
- Study Area

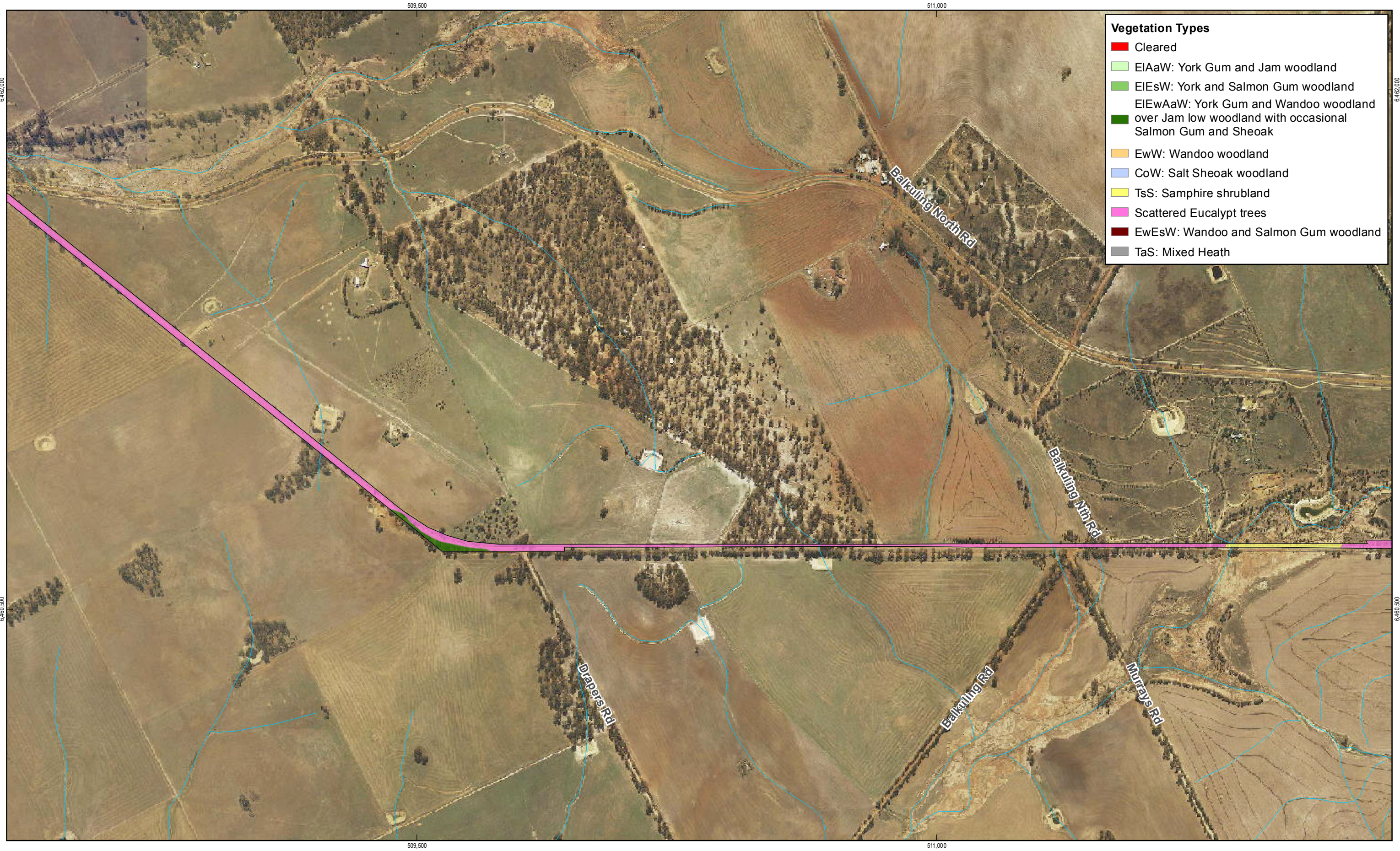
Conservation Significant Flora

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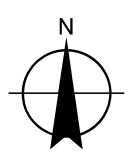
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York-Merredin Road Widening	Revision	0
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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



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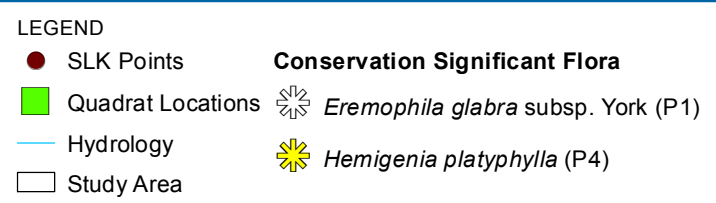
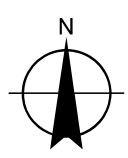
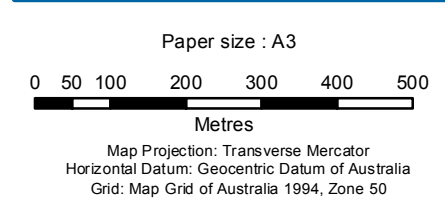
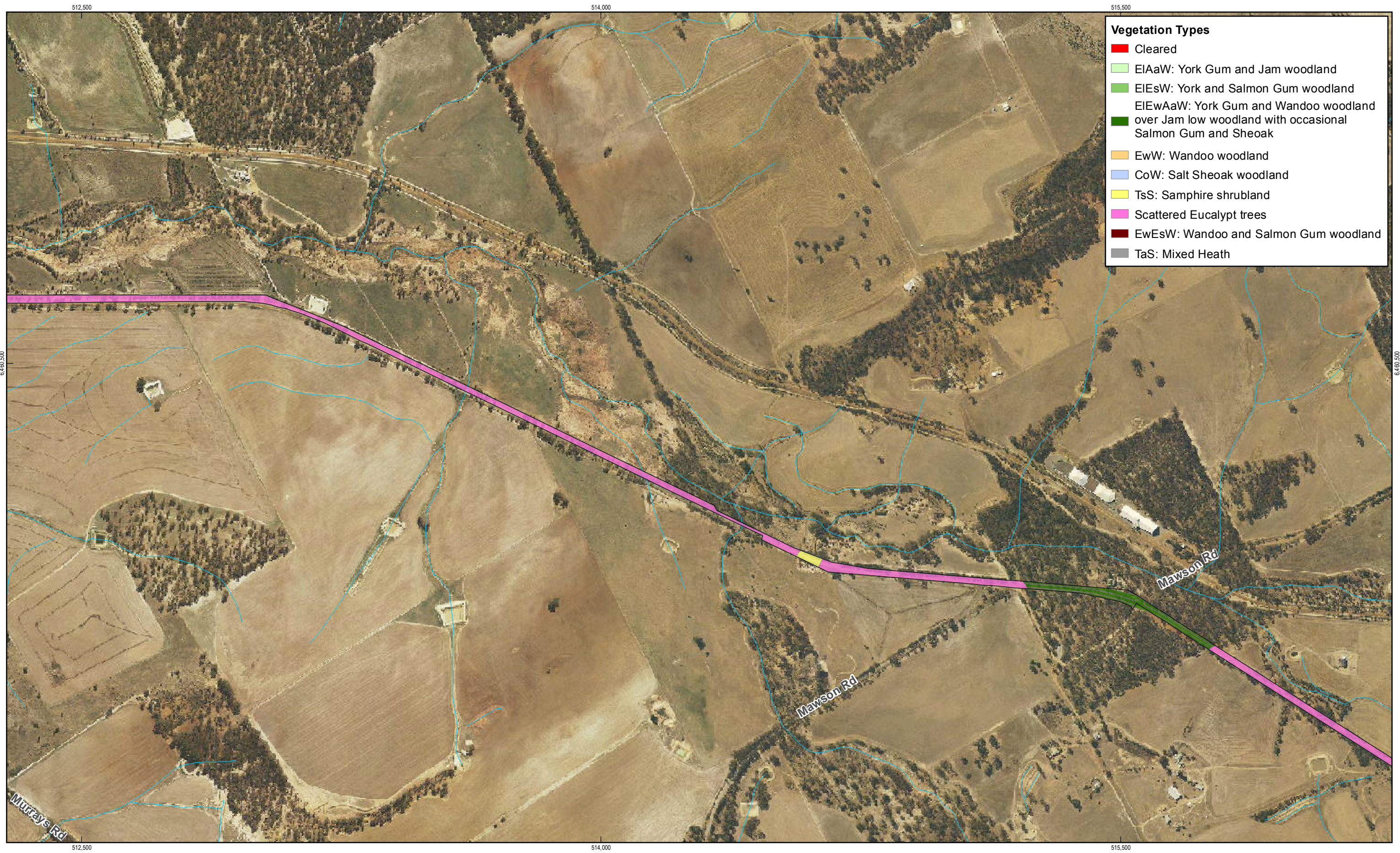
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 York-Merredin Road Widening
 Biological Survey

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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



Main Roads Western Australia
York-Merredin Road Widening
Biological Survey

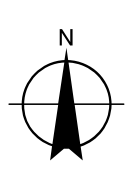
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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



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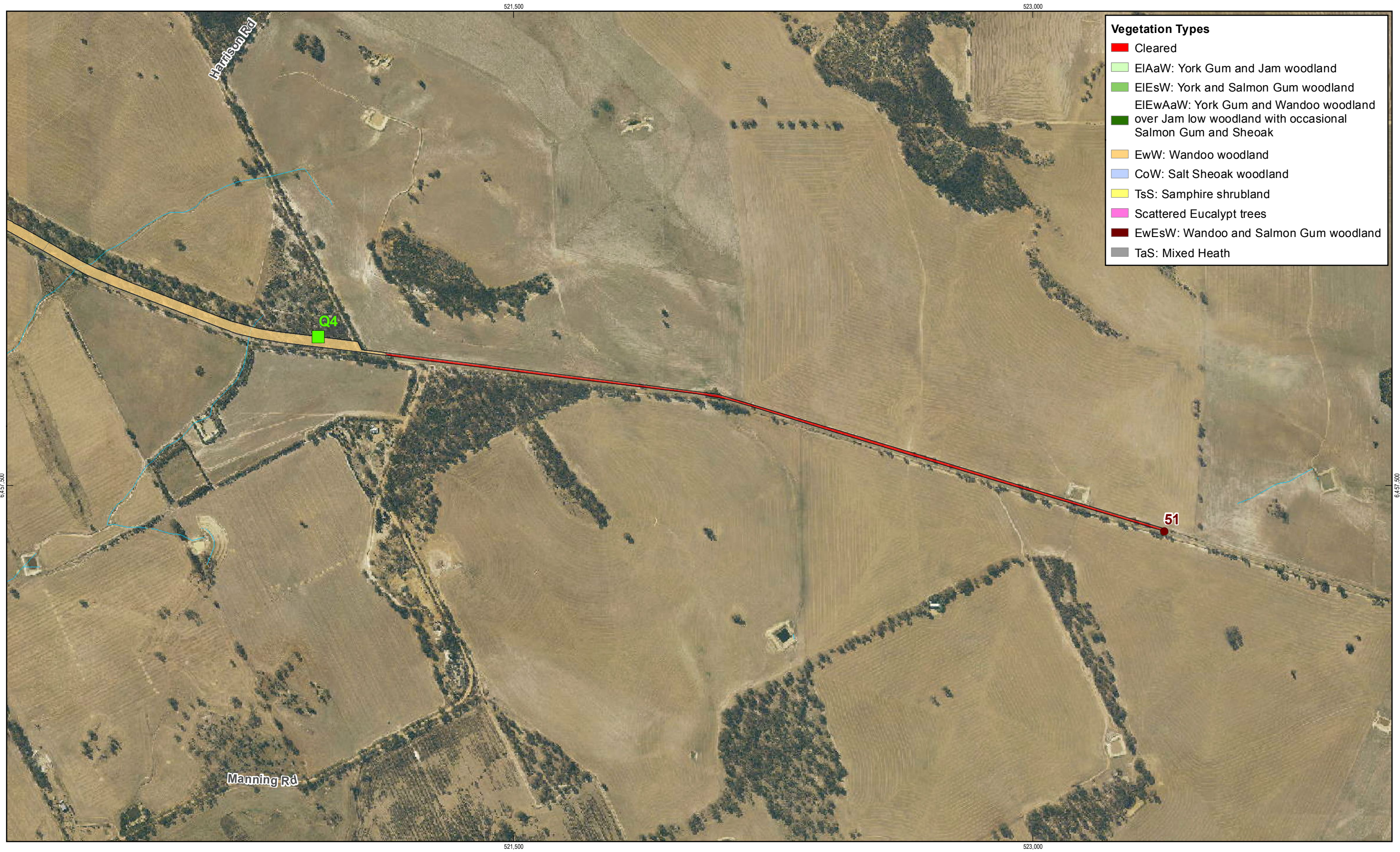
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Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

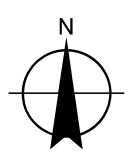
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Vegetation types, quadrat locations and conservation significant flora **Figure 3**



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 - Hydrology
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Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

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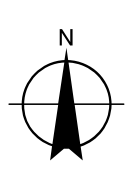
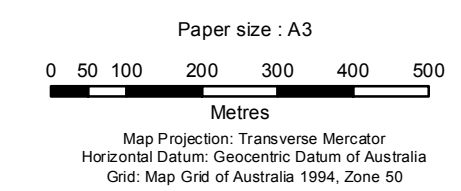
Vegetation types, quadrat locations and conservation significant flora **Figure 3**

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Vegetation Condition

1. Pristine or Nearly so
1-2
2. Excellent
2-3
3. Very Good
3-4
4. Good
4-5
5. Degraded
5-6
6. Completely Degraded



LEGEND

● SLK Points	Significant Weeds	★ * <i>Moraea miniata</i>
— Hydrology	★ * <i>Echium plantagineum</i>	★ * <i>Tamarix aphylla</i>
□ Study Area	★ * <i>Lycium ferocissimum</i>	



Main Roads Western Australia
York-Merredin Road Widening
Biological Survey

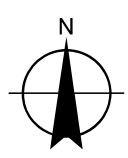
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Vegetation condition and significant weed locations

Figure 4



Paper size : A3
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 Horizontal Datum: Geocentric Datum of Australia
 Grid: Map Grid of Australia 1994, Zone 50



LEGEND

- SLK Points
- Hydrology
- Study Area
- Significant Weeds**
- ★ **Echium plantagineum*
- ★ **Lycium ferocissimum*
- ★ **Moraea miniata*
- ★ **Tamarix aphylla*



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 York-Merredin Road Widening
 Biological Survey

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**Vegetation condition
 and significant weed locations**

Figure 4

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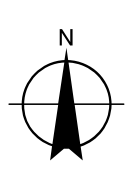
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Metres

Map Projection: Transverse Mercator
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LEGEND

- SLK Points
- Hydrology
- Study Area
- Significant Weeds**
- ★ **Moraea miniata*
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Main Roads Western Australia
York-Merredin Road Widening
Biological Survey

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**Vegetation condition
and significant weed locations**

Figure 4



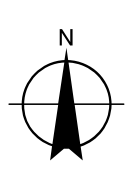
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LEGEND

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- Study Area
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Main Roads Western Australia
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**Vegetation condition
and significant weed locations**

Figure 4



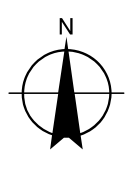
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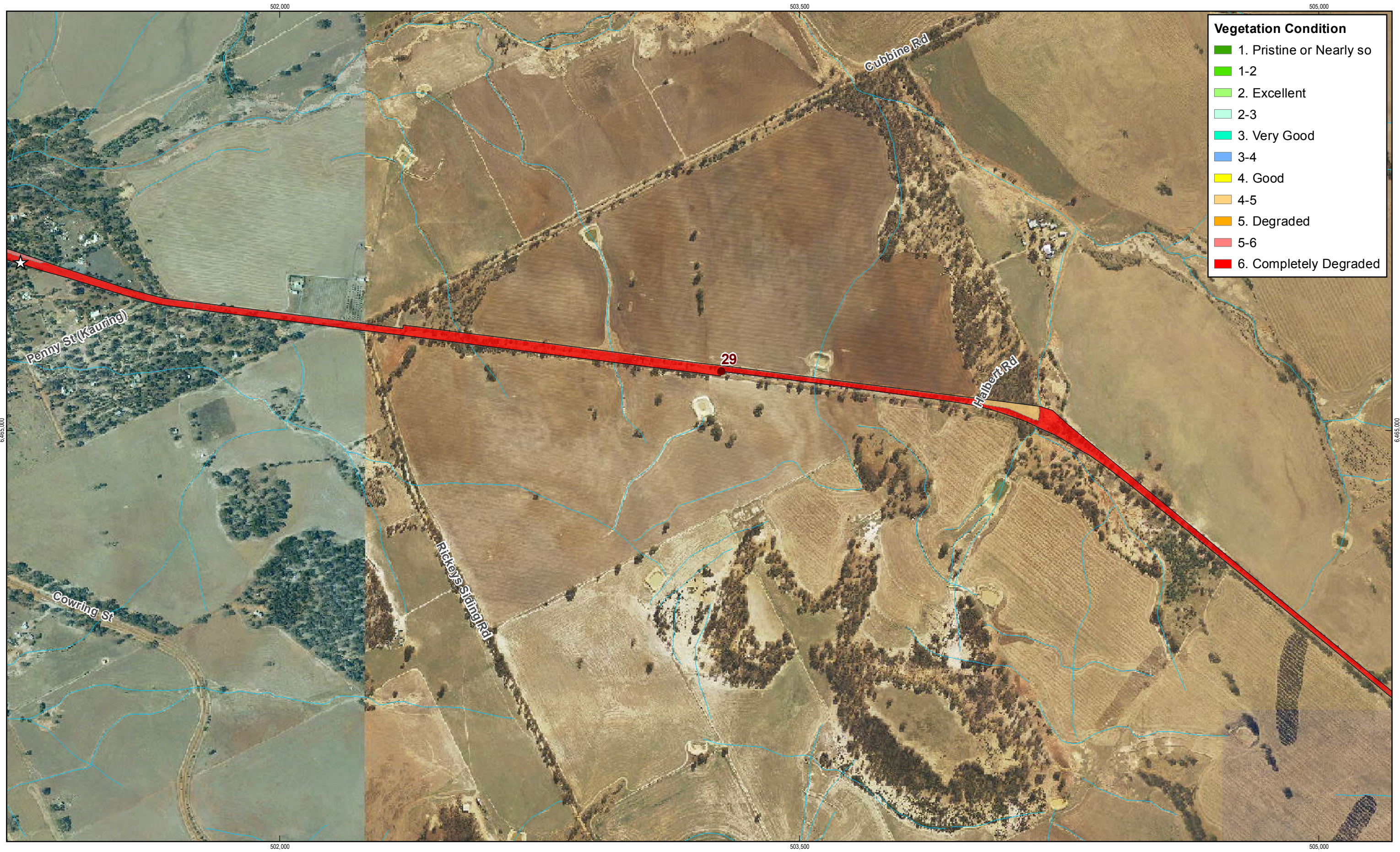
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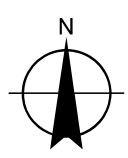
**Vegetation condition
and significant weed locations**

Figure 4

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Paper size : A3
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LEGEND

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Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

Job Number	61-31161
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Vegetation condition
 and significant weed locations

Figure 4



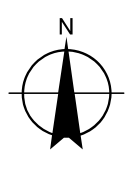
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LEGEND

- SLK Points
- Hydrology
- Study Area
- Significant Weeds**
- ★ **Echium plantagineum*
- ★ **Lycium ferocissimum*
- ★ **Moraea miniata*
- ★ **Tamarix aphylla*



Main Roads Western Australia
York-Merredin Road Widening
Biological Survey

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**Vegetation condition
and significant weed locations**

Figure 4



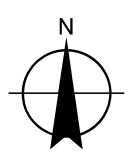
Vegetation Condition

- 1. Pristine or Nearly so
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good
- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded

Paper size : A3

0 50 100 200 300 400 500
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



LEGEND

- SLK Points
- Hydrology
- Study Area
- Significant Weeds**
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Main Roads Western Australia
York-Merredin Road Widening
Biological Survey

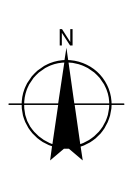
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Vegetation condition and significant weed locations

Figure 4



Paper size : A3
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LEGEND

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Main Roads Western Australia
 York-Merredin Road Widening
 Biological Survey

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Vegetation condition
 and significant weed locations

Figure 4

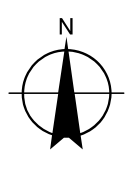


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Biological Survey

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**Vegetation condition
and significant weed locations**

Figure 4



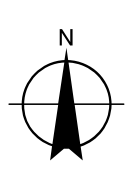
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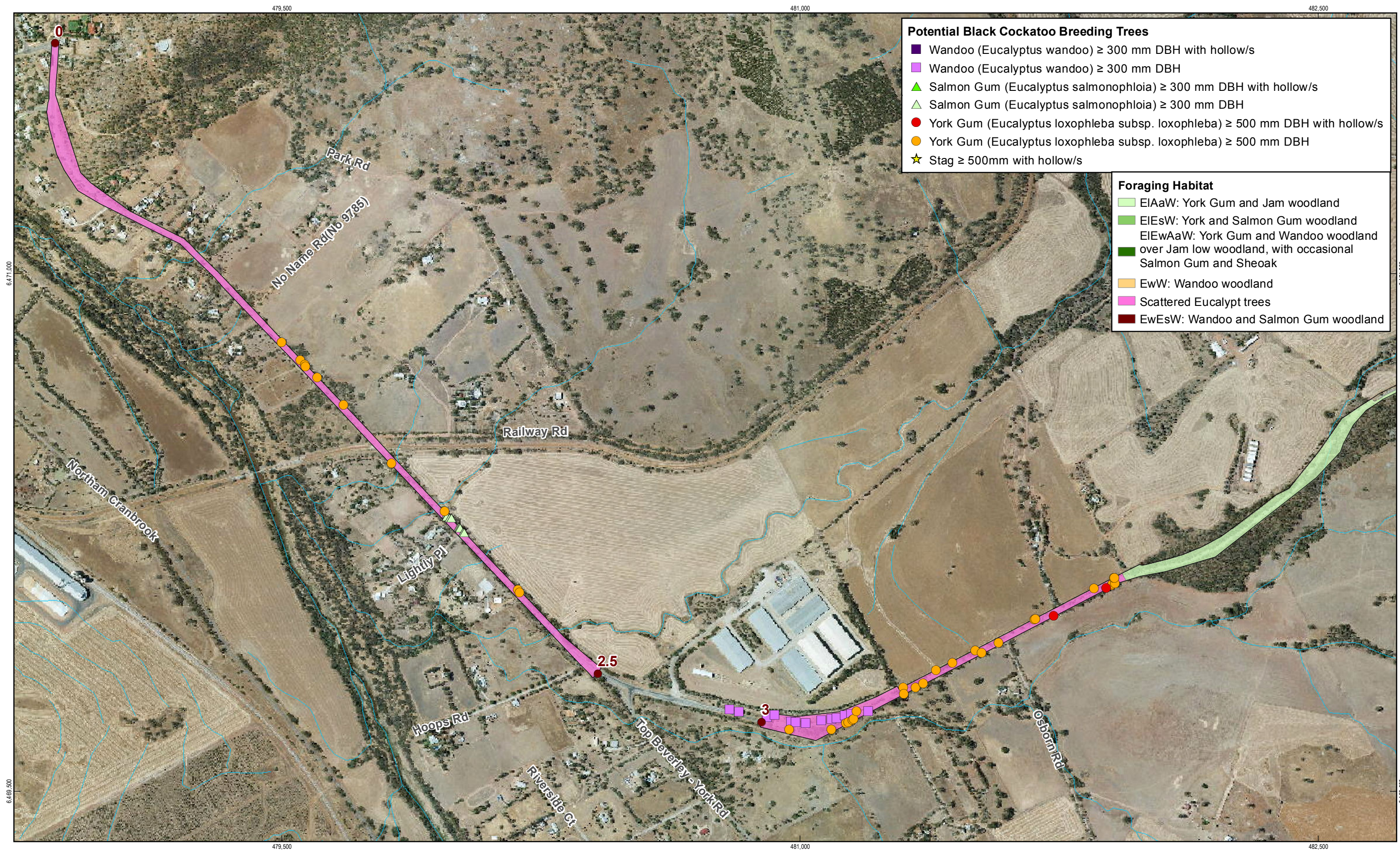


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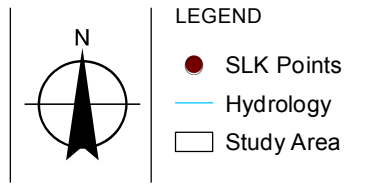
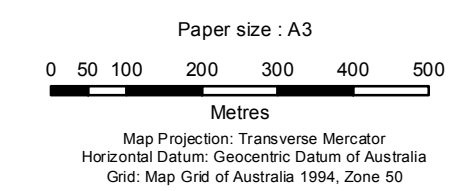
**Vegetation condition
and significant weed locations**

Figure 4



- Potential Black Cockatoo Breeding Trees**
- Wandoo (*Eucalyptus wandoo*) ≥ 300 mm DBH with hollow/s
 - Wandoo (*Eucalyptus wandoo*) ≥ 300 mm DBH
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 - EIEsW: York and Salmon Gum woodland
 - EIEwAaW: York Gum and Wandoo woodland over Jam low woodland, with occasional Salmon Gum and Sheoak
 - EwW: Wandoo woodland
 - Scattered Eucalypt trees
 - EwEsW: Wandoo and Salmon Gum woodland

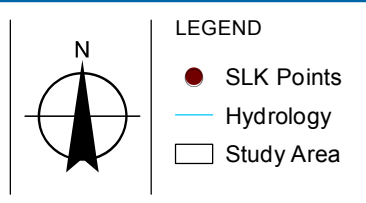
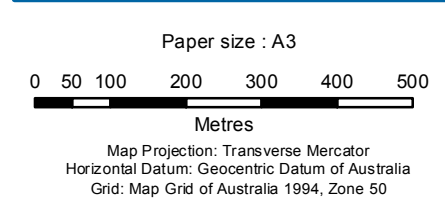
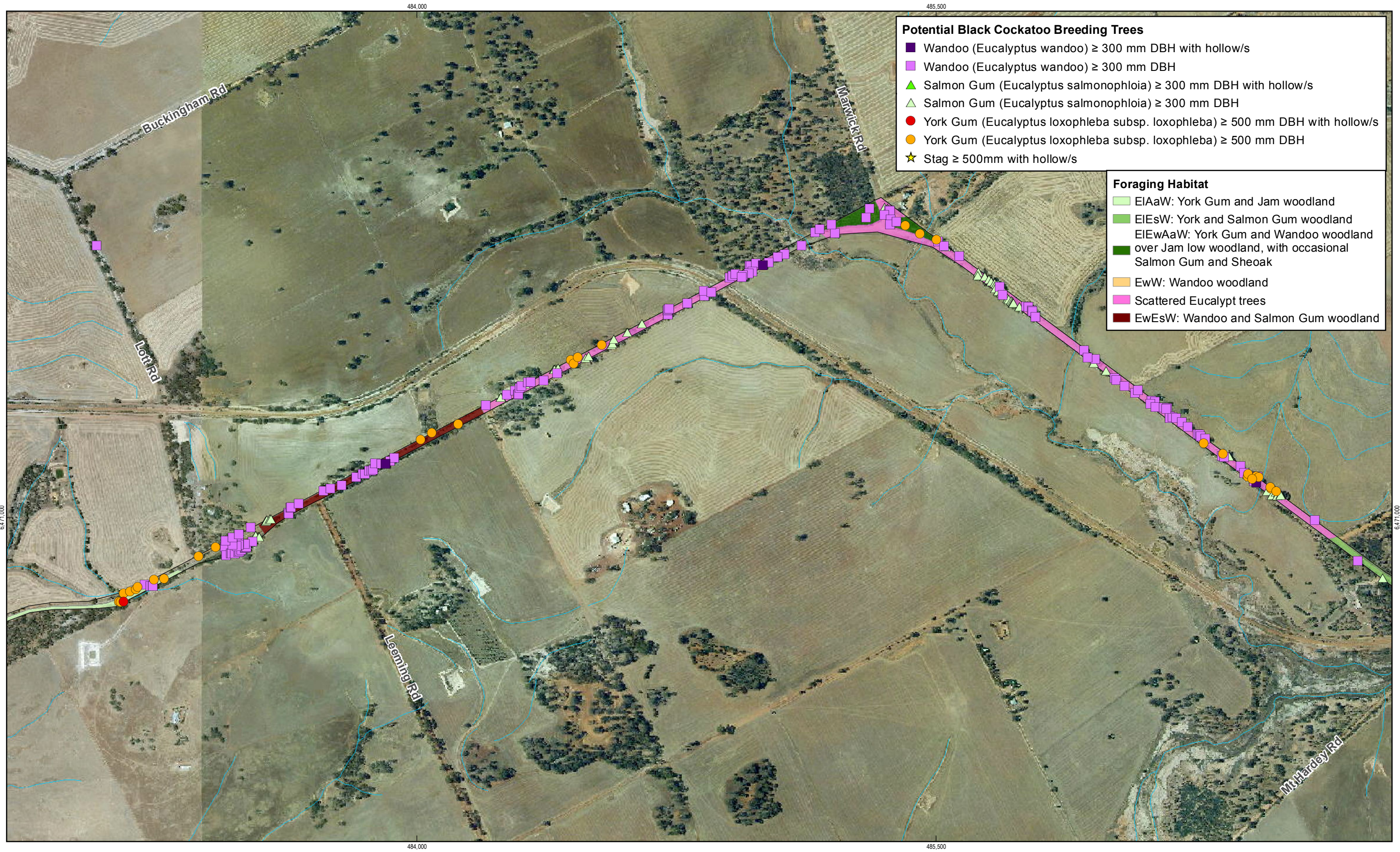


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Fauna habitat and significant fauna locations

Figure 5



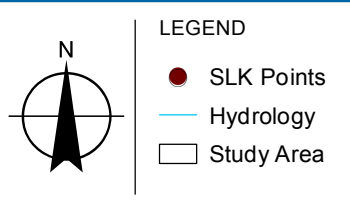
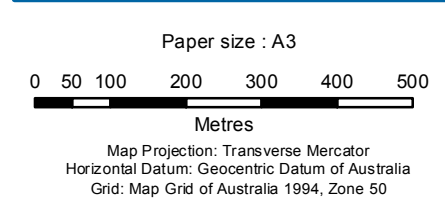
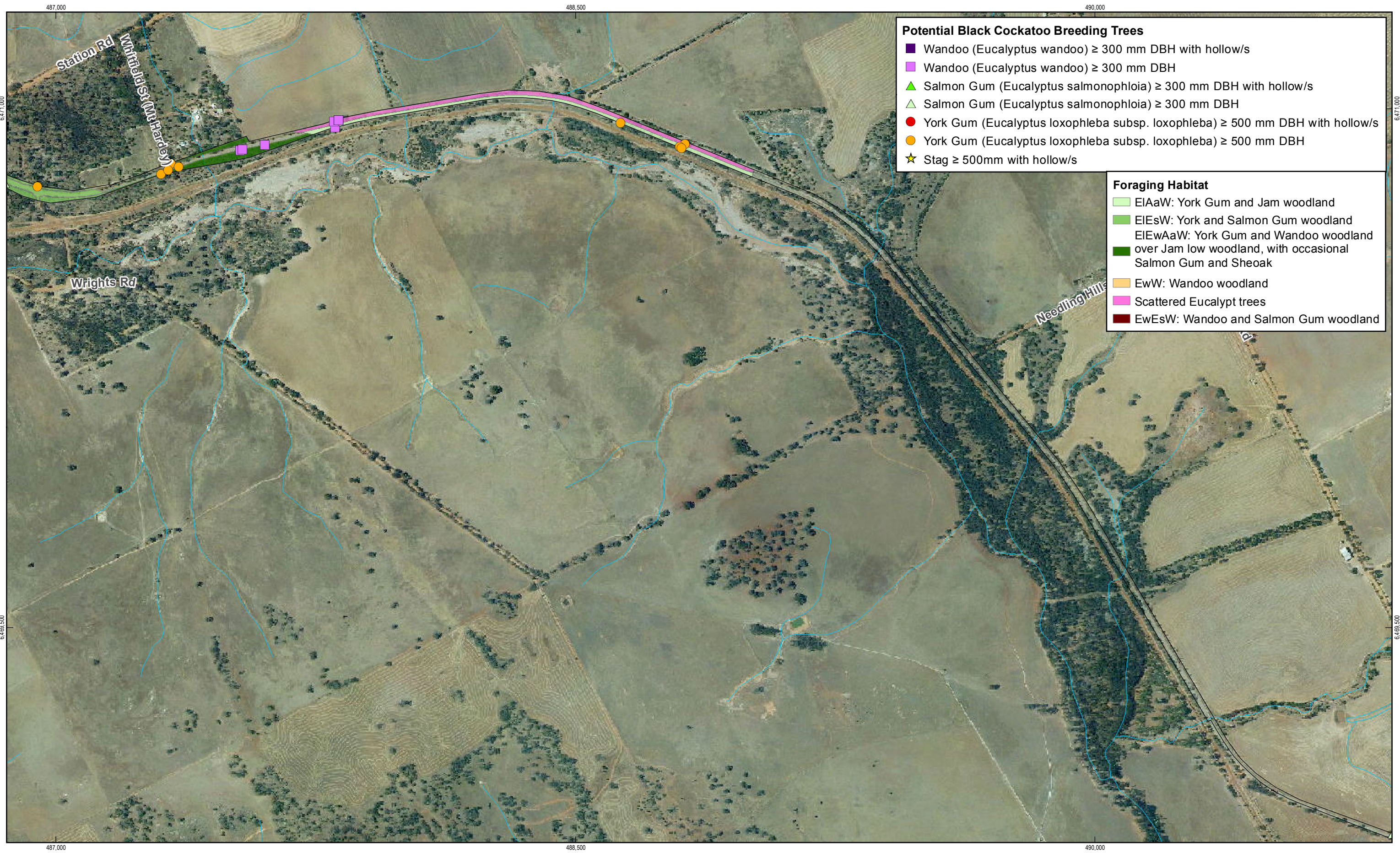
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York-Merredin Road Widening
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Fauna habitat and significant fauna locations

Figure 5

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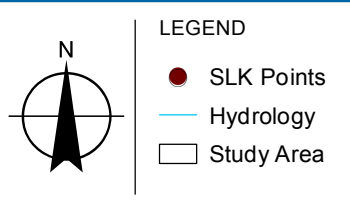
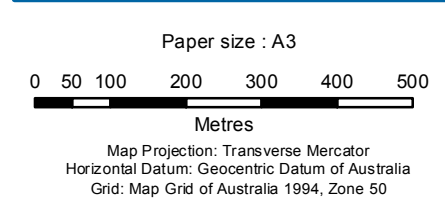
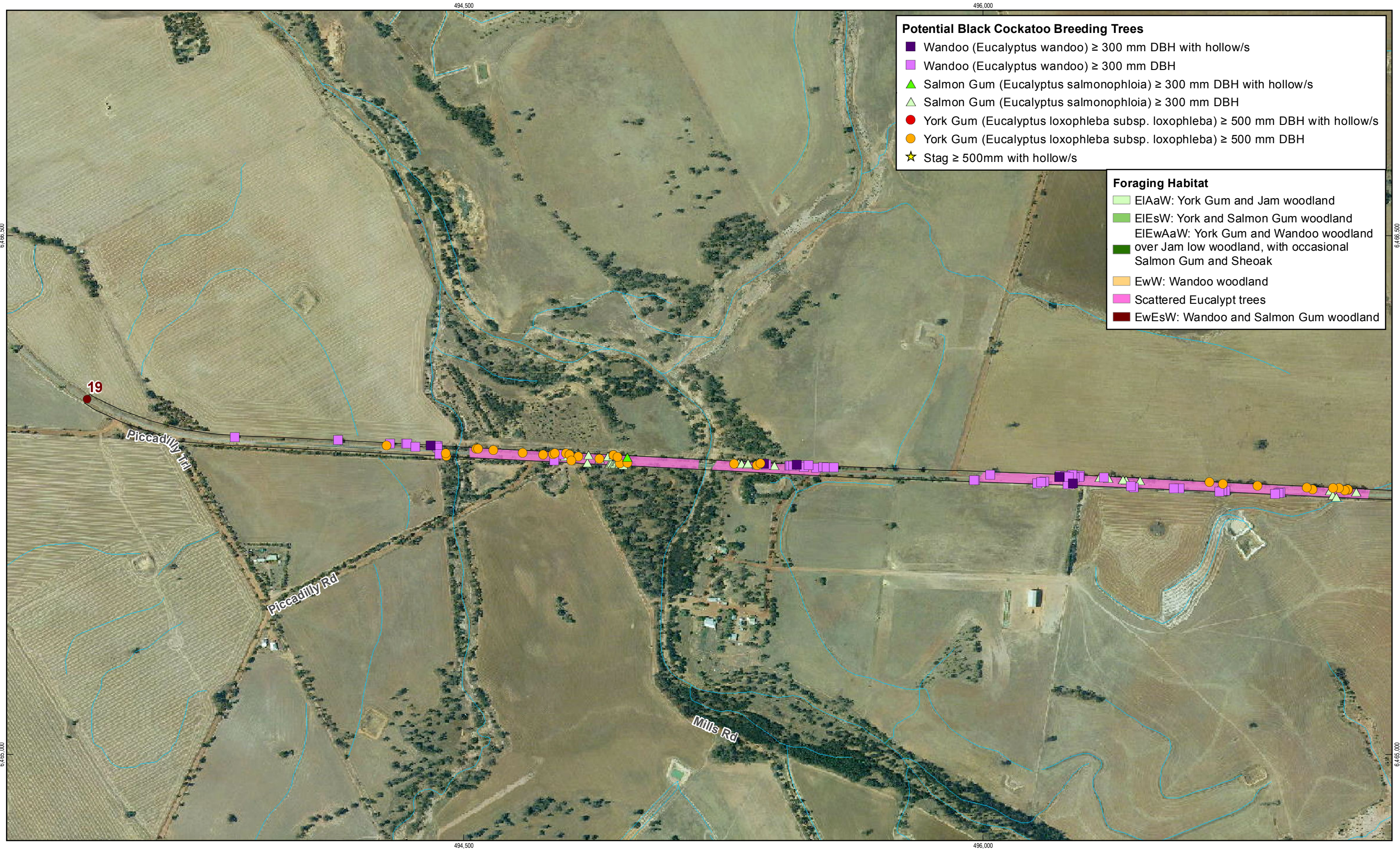
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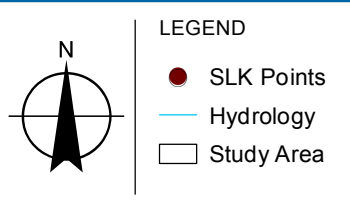
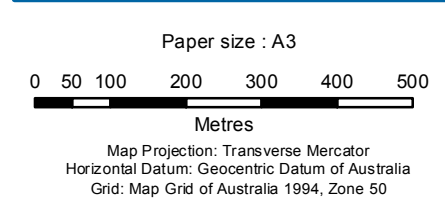
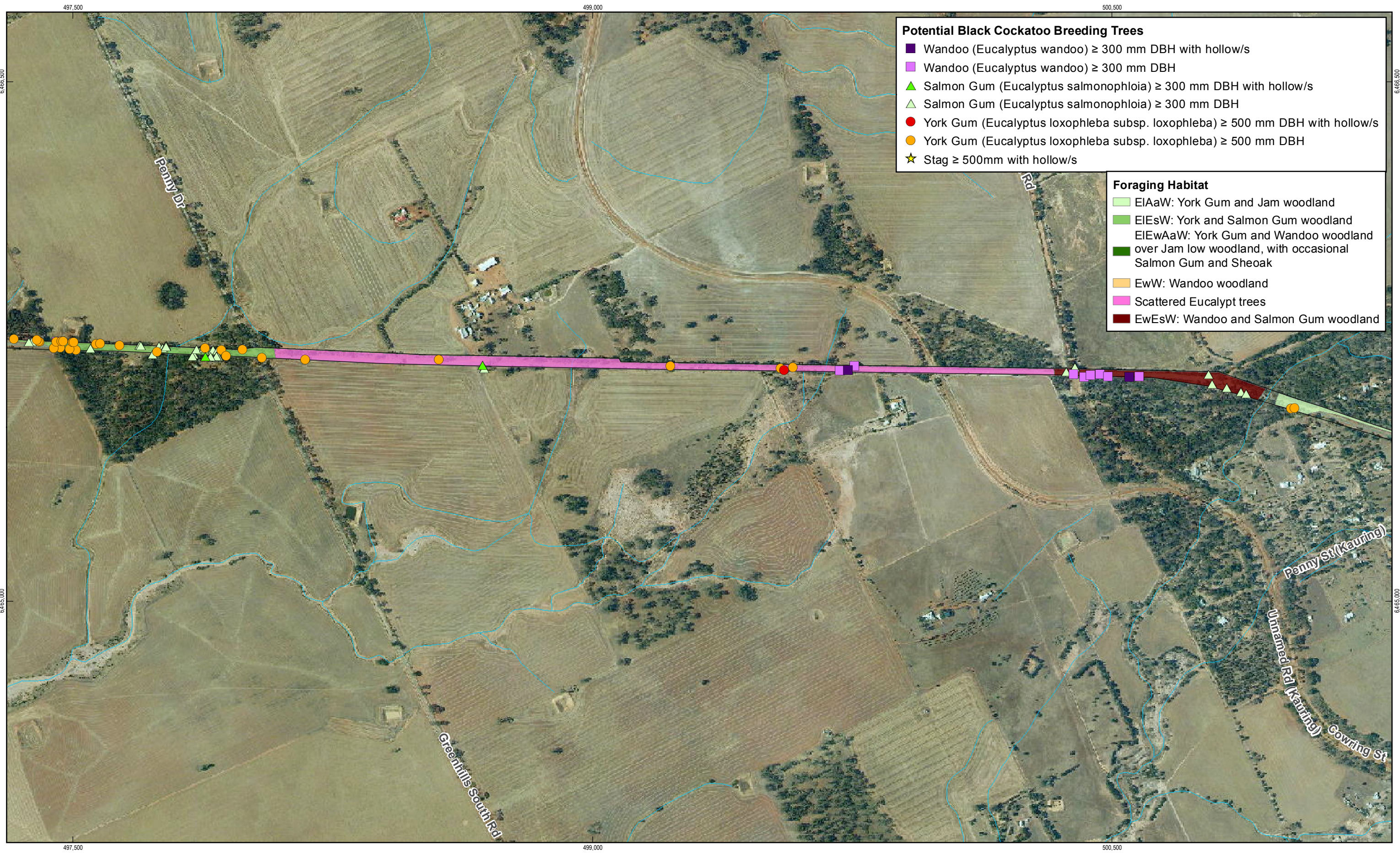
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Fauna habitat and significant fauna locations

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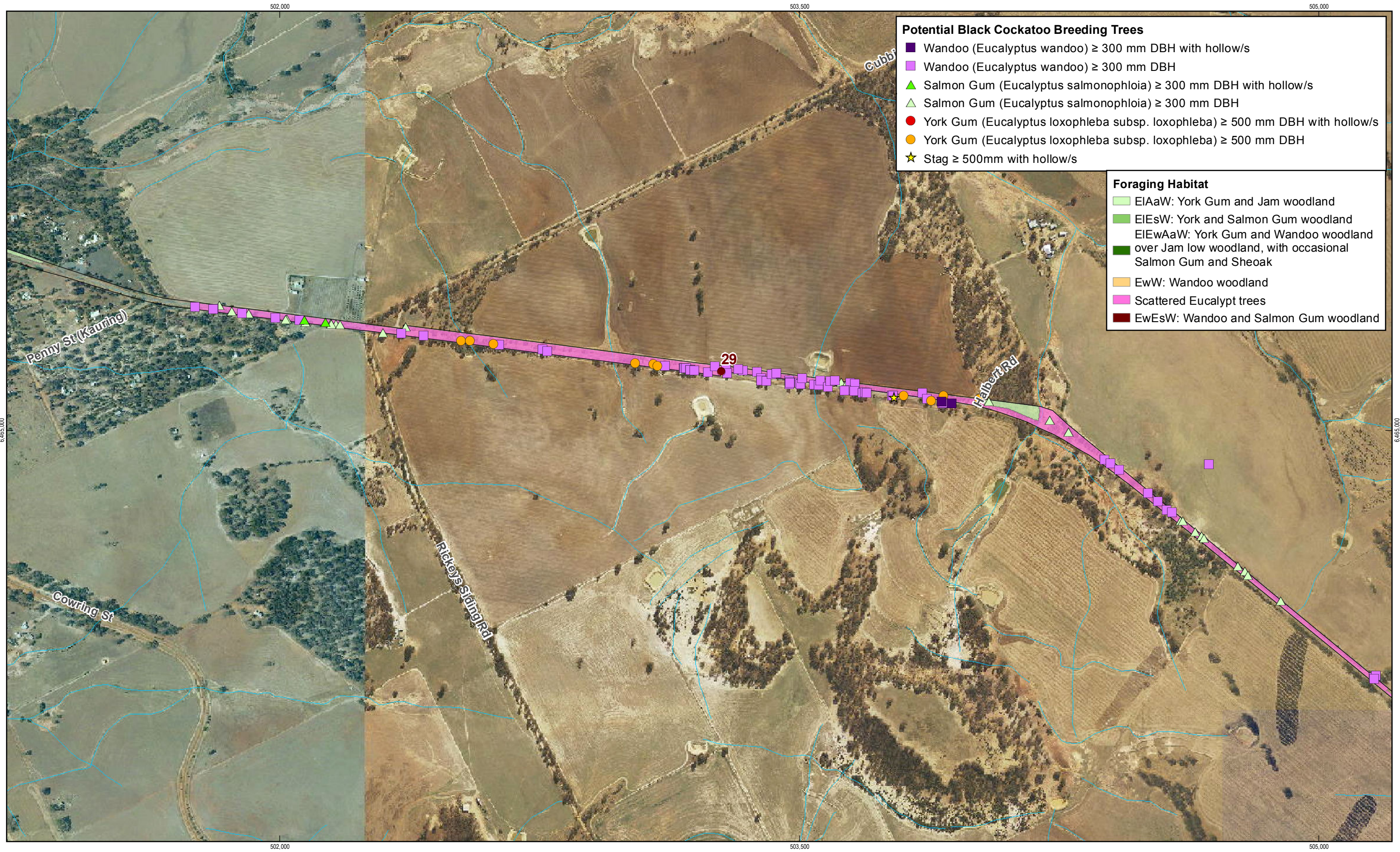
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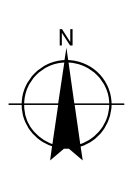
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 Grid: Map Grid of Australia 1994, Zone 50



- LEGEND**
- SLK Points
 - Hydrology
 - Study Area



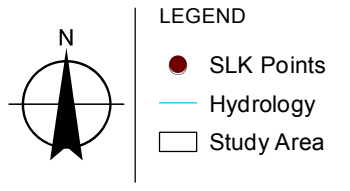
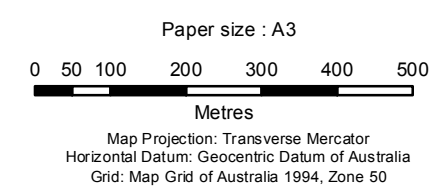
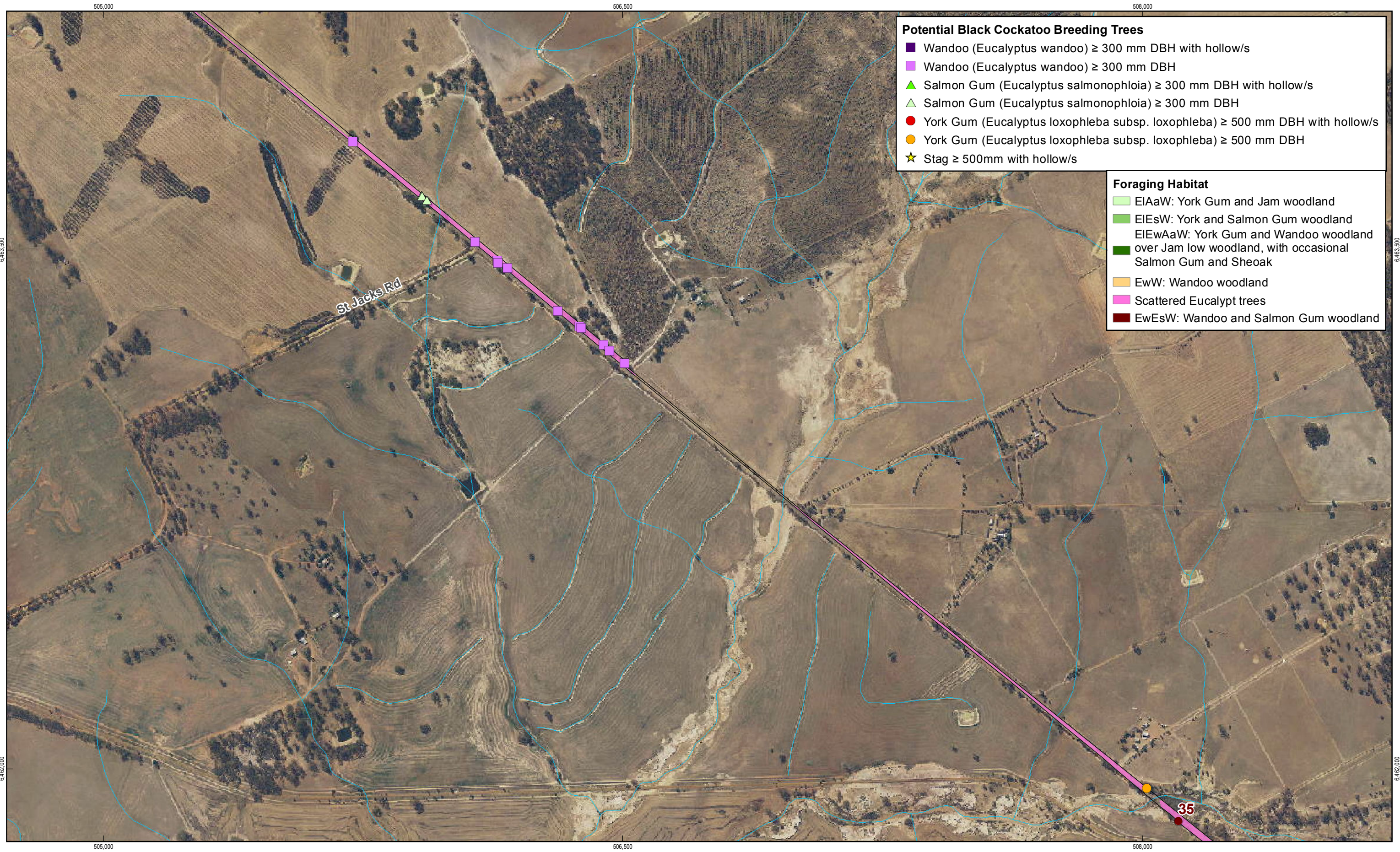
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 Biological Survey

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Fauna habitat and significant fauna locations

Figure 5

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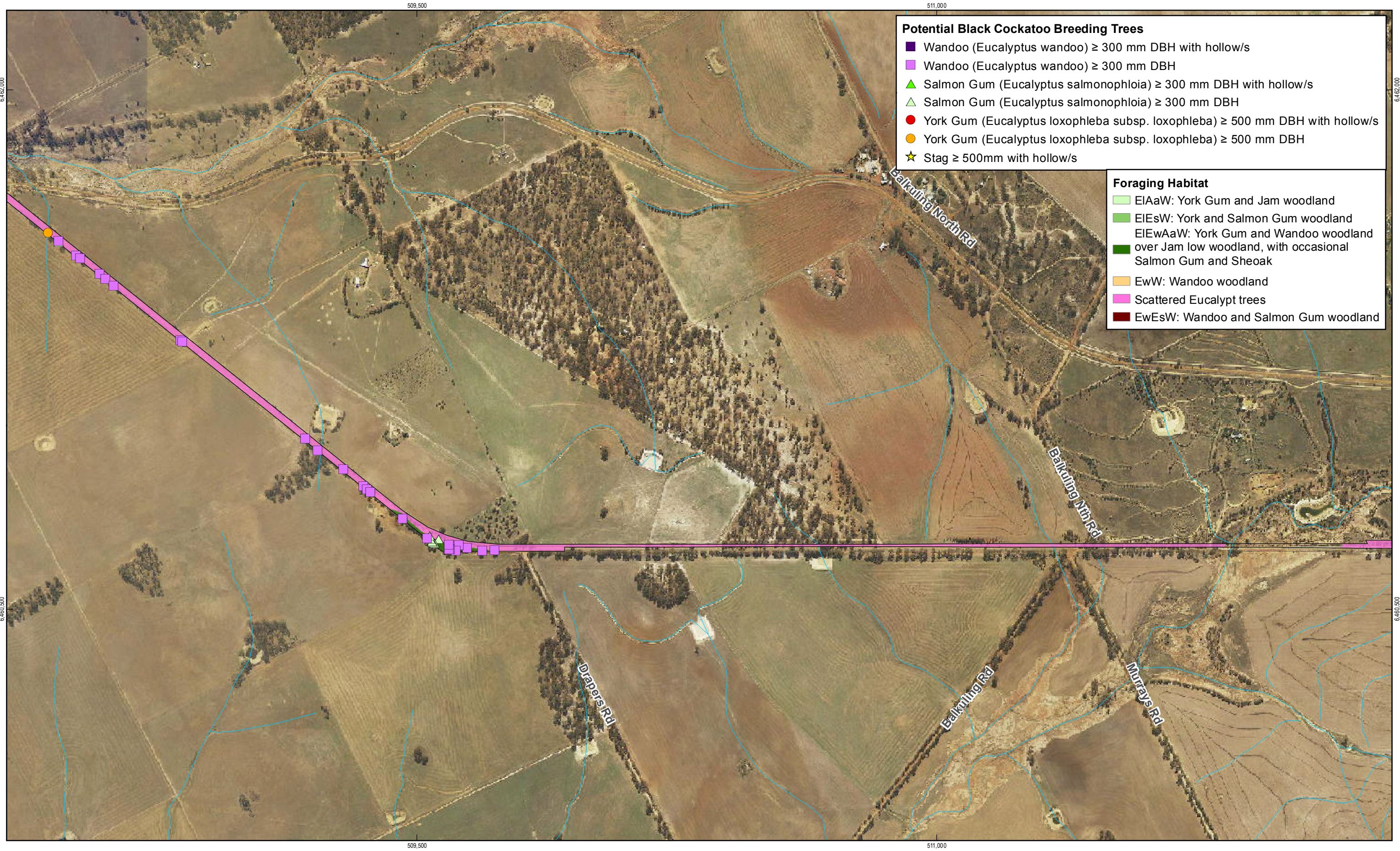
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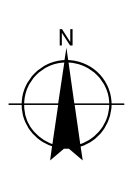
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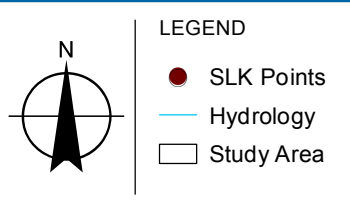
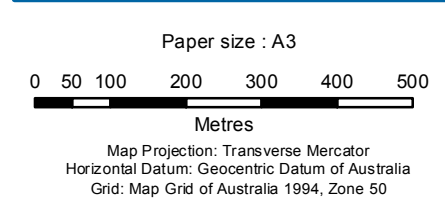
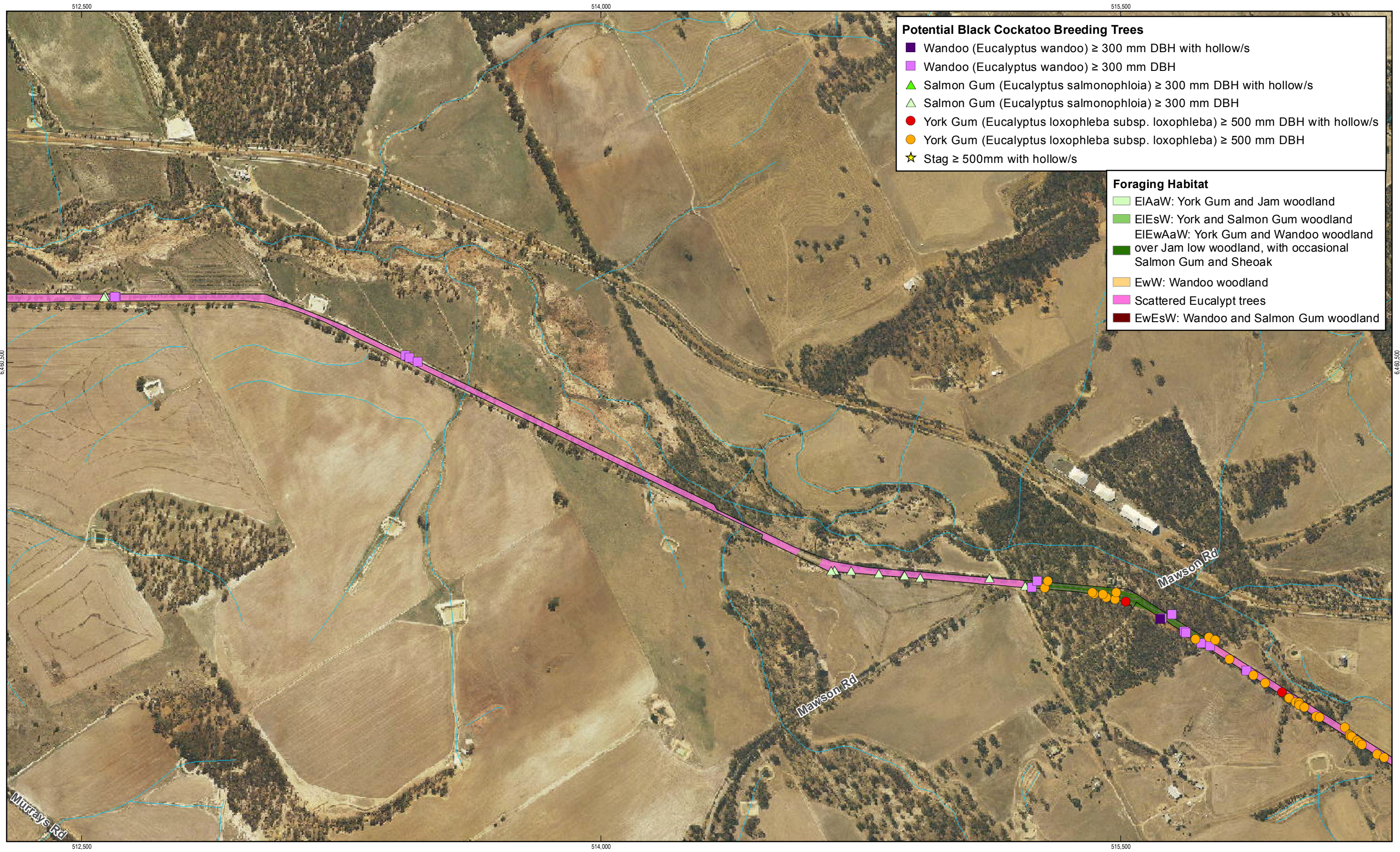
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Fauna habitat and significant fauna locations

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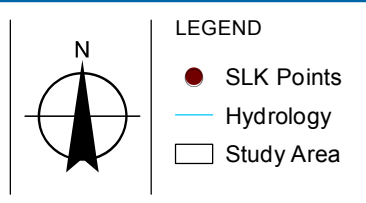
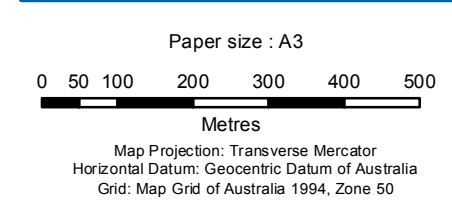
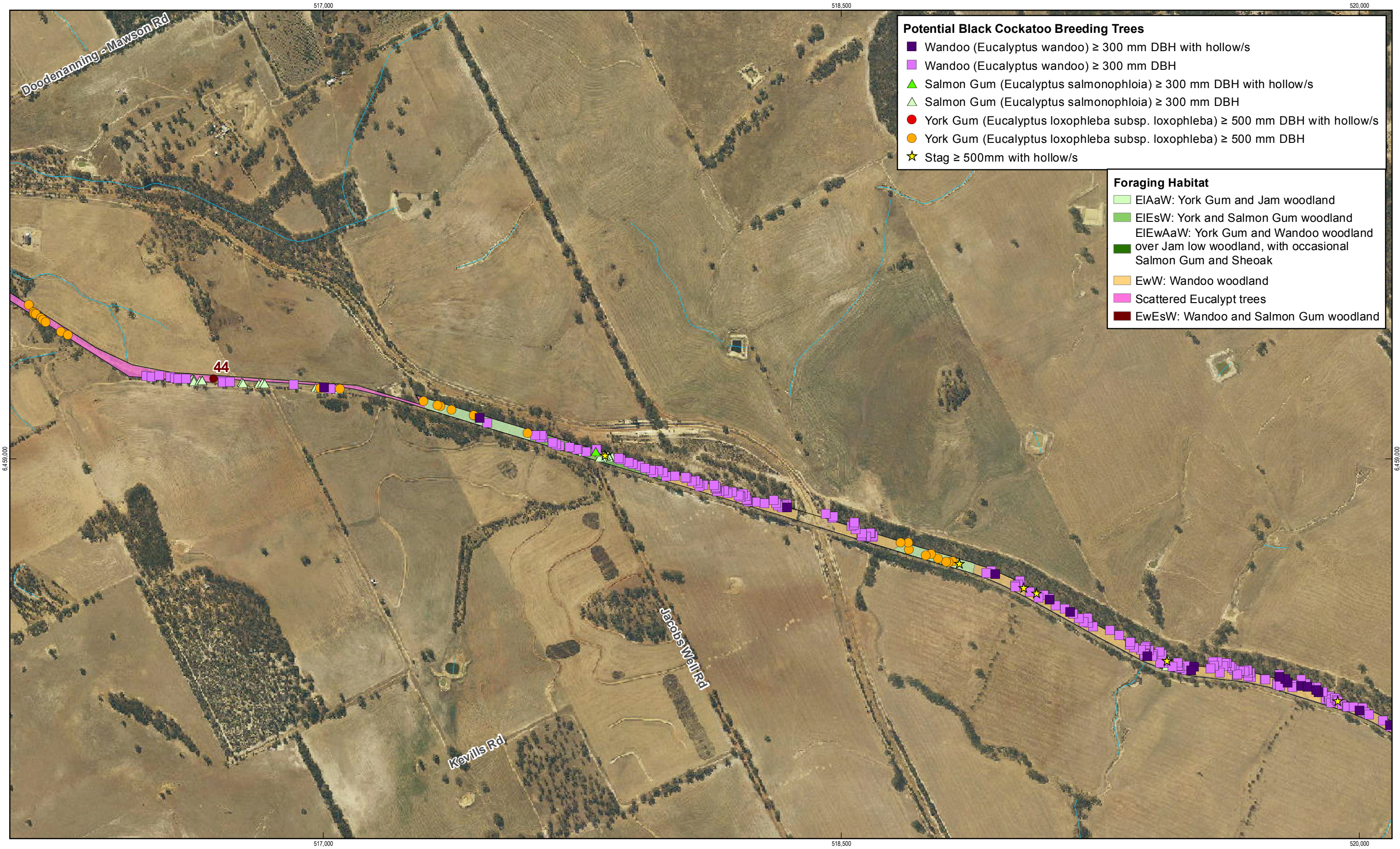
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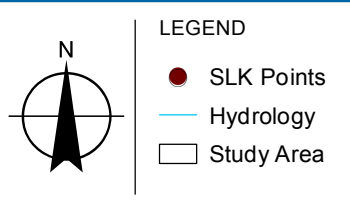
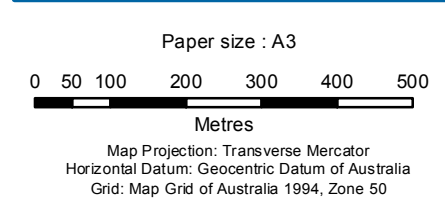
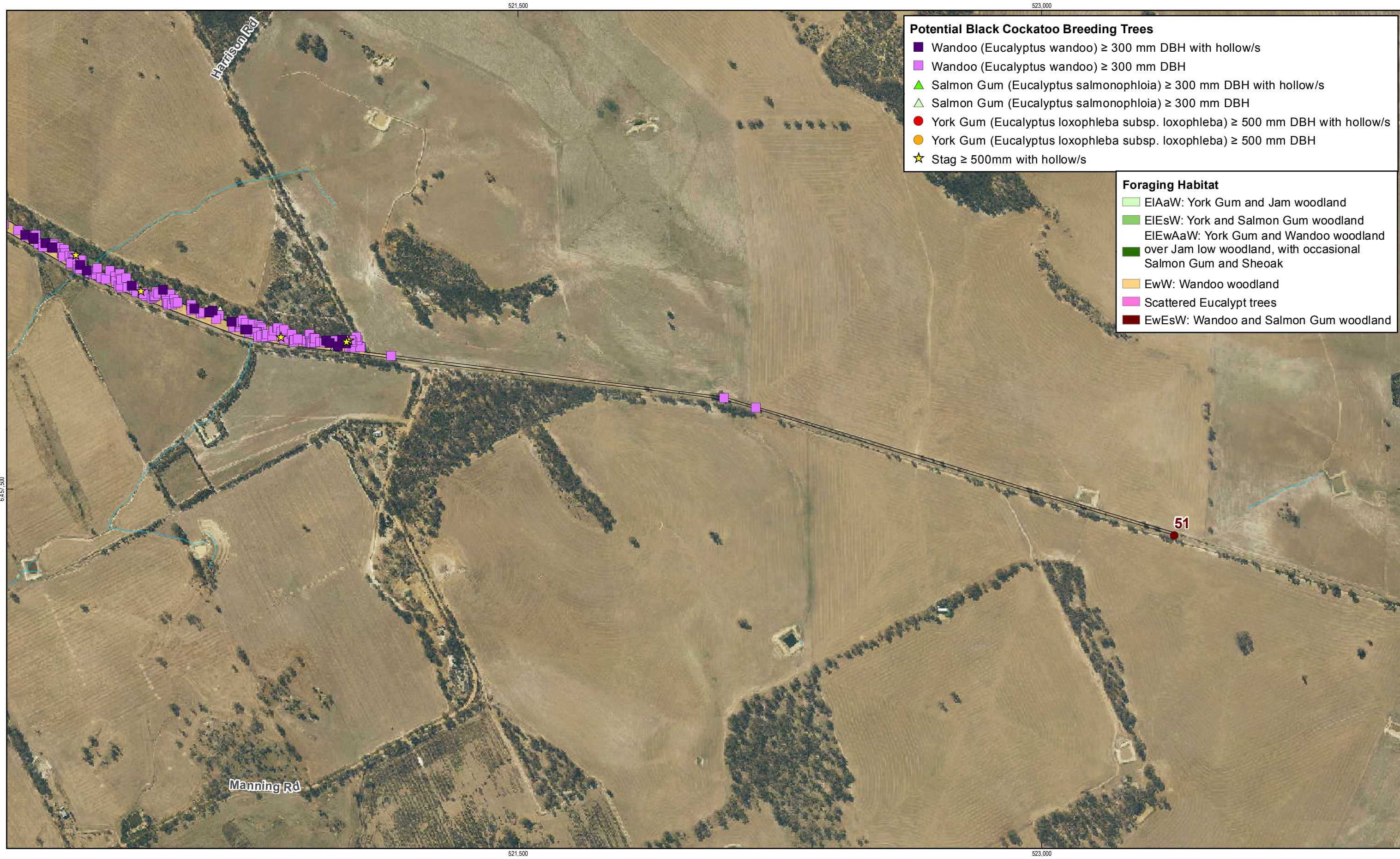
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Appendix B – Legislation, Background Information and Conservation Codes

Federal Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance (MNES).

There are currently nine MNES protected under the EPBC Act, these include:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Australian Government Minister for the Environment.

State Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. It provides for an Environmental Protection Authority (EPA), for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the above.

State Environmental Protection (Clearing of Native Vegetation) Regulations 2004

Clearing of native vegetation in Western Australia requires a permit from the Department of Environment and Regulation (DER) (formerly the Department of Environment and Conservation – DEC), unless exemptions apply. Native vegetation includes aquatic and terrestrial vegetation indigenous to Western Australia, and intentionally planted vegetation declared by regulation to be native, but not vegetation planted in a plantation or planted with commercial intent.

In the EP Act Section 51A, clearing is defined as the killing or destruction of; the removal of; the severing or ringbarking of trunks or stems of; or the doing of substantial damage of some or all of the native vegetation in an area, including the flooding of land, the burning of vegetation, the grazing of stock or an act or activity that results in the above.

When making a decision to grant or refuse a permit to clear native vegetation the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

- a. Native vegetation should not be cleared if it comprises a high level of biodiversity.

- b. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
- c. Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
- d. Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
- e. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- f. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- g. Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
- h. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.
- i. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- j. Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

There are a number of Environmentally Sensitive Areas (ESAs) within Western Australia where exemptions in regulations do not apply. ESAs include locations of threatened communities and species.

ESAs are declared by a notice under Section 51B of the EP Act. Table outlines the aspects of areas declared as ESA (under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 – Reg 6).

Table A.1 Aspects of Environmentally Sensitive Areas

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
An area that is registered on the Register of the National Estate (RNE), because of its natural values, under the Australian Heritage Commission Act 1975 of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a TEC.
A Bush Forever Site.
The areas covered by the following policies:
a) The Environmental Protection (Gnangara Mound Crown Land) Policy 1992.
b) The Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002.
The areas covered by the lakes to which the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (SCPL) (EPP Lakes) applies.
Protected wetlands as defined in the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998.
Areas of fringing native vegetation in the policy area as defined in the Environmental Protection (Swan and Canning Rivers) Policy 1997.

State Wildlife Conservation Act 1950

The *Wildlife Conservation Act 1950* (WC Act) provides for the conservation and protection of wildlife. It is administered by the DPaW and applies to both flora and fauna. Any person wanting to capture, collect, disturb or study fauna requires a permit to do so. A permit is required under the WC Act if removal of threatened species is required.

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) provides for the declaration of Declared Pests by the Department of Agriculture and Food Western Australia (DAFWA) which are prohibited organisms or organisms for which a declaration under Section 22(2) is in force.

The BAM Act replaces the repealed *Agriculture and Related Resources Protection Act 1976* (ARRP Act).

Vegetation and Flora

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State WC Act is the primary wildlife conservation legislation in Western Australia.

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia's Biological Diversity (ANZECC 2000) and in EPA Position Statement No. 2 on environmental protection of native vegetation in Western Australia (EPA 2000).

From a purely biodiversity perspective and taking no account of any other land degradation issues, there are a number of key criteria now being applied to the clearing of native vegetation in Western Australia (EPA 2000).

- The "threshold level" below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30 percent of the pre-European extent of the vegetation type.
- A level of 10 percent of the original extent is regarded as being a level representing Endangered.
- Clearing which would put the threat level into the class below should be avoided.
- From a biodiversity perspective, stream reserves should generally be in the order of at least 200 metres (m) wide.

The extent of remnant native vegetation has been assessed by Shepherd et al. (2002) and the Government of Western Australia (2013), based on broadscale vegetation association mapping by Beard (1979).

Conservation significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TEC) are protected under the EPBC Act administered by the Department of the Environment (DotE) (formerly the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)). The DPaW also maintains a list of TECs for Western Australia; some of which are also protected under the EPBC Act. TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable (Table B.1).

Possible TECs that do not meet survey criteria are added to the DPaW Priority Ecological Community (PEC) List under Priorities 1, 2 and 3 (Table B.2). These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation.

Table B.1 Conservation codes and definitions for Threatened Ecological Communities endorsed by the Western Australian Minister for the Environment and listed under the *Environment Protection and Biodiversity Conservation Act 1999*

Status	Description
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future
Endangered (EN)	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future
Vulnerable (VU)	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future
Western Australia conservation categories	
Presumed Totally Destroyed (PD)	The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Table B.2 Conservation categories and definitions for Priority Ecological Communities as listed by the Department of Parks and Wildlife

Category	Description
Priority 1	<p>Poorly known ecological communities.</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
Priority 2	<p>Poorly known ecological communities.</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
Priority 3	<p>Poorly known ecological communities.</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
Priority 4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
Priority 5	<p>Conservation Dependent ecological communities.</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Other significant vegetation

Vegetation may be significant for a range of reasons, other than a statutory listing as a TEC or because the extent is below a threshold level. The EPA (2004a) states that significant vegetation may include vegetation that includes the following:

- Scarcity
- Unusual species
- Novel combinations of species
- A role as a refuge
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of the range of a unit (particularly, a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- A restricted distribution

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Conservation significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the WC Act can warrant referral to the DoE and/or the EPA. According to the DPaW (WA Herbarium 1998–): "Threatened flora are plants which have been assessed as being at risk of extinction. In Western Australia the term Declared Rare Flora (DRF) is applied to Threatened flora due to the laws regarding threatened flora conservation. The WC Act is the primary wildlife conservation legislation in the State and the Minister for the Environment can declare taxa (species, subspecies or variety) as "Rare Flora" if they are considered to be in danger of extinction, rare or otherwise in need of special protection." For the purposes of this report, flora listed by the WC Act as DRF is described as Threatened.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act (Table B.3). The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN).

The State conservation level of fauna species and their significance status is assessed under the State WC Act (*Wildlife Conservation (Specially Protected Fauna) Notice 2010(2)*). This Act uses a set of Schedules (Table B.4) but also classifies species using some of the IUCN categories. Schedule 3 fauna species are those which are "subject to an agreement between the Government of Australia and the Governments of Japan, China and the Republic of Korea relating to the protection of migratory birds, are declared to be fauna that is in need of special protection".

In Western Australia, the DPaW also maintains a list of Priority listed flora species. Conservation codes for Priority species are assigned by the DPaW to define the level of conservation significance (Table B.4). Priority species are not currently protected under the WC Act.

For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DPaW Priority species are considered conservation significant.

Table B.3 Conservation categories and definitions for *Environment Protection and Biodiversity Conservation Act 1999* listed flora and fauna species

Conservation category	Definition
Extinct	Taxa not definitely located in the wild during the past 50 years
Extinct in the Wild	Taxa known to survive only in captivity
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Taxa facing a very high risk of extinction in the wild in the near future
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term
Near Threatened	Taxa that risk becoming Vulnerable in the wild
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened

Table B.4 Conservation codes and descriptions for Western Australian flora and fauna

Code	Conservation category	Description
Wildlife Conservation Act 1950		
T	Schedule 1 under the WC Act	Threatened Fauna (Fauna that is rare or is likely to become extinct) Threatened Flora (Declared Rare Flora – Extant) Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such. CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild. EN: Endangered – considered to be facing a very high risk of extinction in the wild. VU: Vulnerable – considered to be facing a high risk of extinction in the wild.
X	Schedule 2 under the WC Act	Presumed Extinct Fauna Presumed Extinct Flora (Declared Rare Flora – Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
IA	Schedule 3 under the WC Act	Birds protected under an international agreement. Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.

Code	Conservation category	Description
S	Schedule 4 under the WC Act	Other specially protected fauna. Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.
DPaW Priority Listed		
1	Priority One: Poorly-known taxa	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
2	Priority Two: Poorly-known taxa	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
3	Priority Three: Poorly-known taxa	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
4	Priority Four: Rare, Near Threatened and other taxa in need of monitoring	(a) Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. (b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
5	Priority 5: Conservation Dependent taxa	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

Migratory species listed under the EPBC Act

The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)

- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

Other significant flora and fauna

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than as Threatened (Declared Rare) Flora or Priority Flora. The EPA (2004a) states that significant flora may include taxa that have:

- A keystone role in a particular habitat for threatened species or supporting large populations representing a significant proportion of the local regional population of a species
- Relic status
- Anomalous features that indicate a potential new discovery
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- The presence of restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism/a restricted distribution
- Being poorly reserved

The application of the degree of significance may apply at a range of scales.

Introduced plants (weeds)

Declared Pests

The Department of Agriculture and Food Western Australia (DAFWA) maintains a list of Declared Pests for Western Australia that have been declared under the BAM Act. If a Pest is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the specific category of control. Declared Pests are gazetted under categories, which define the action required. The category may apply to the whole of the State, districts, individual properties or even paddocks. Categories of control are defined in Table B.5. Among the factors considered in categorising Declared Pests are:

- The impact of the plant on individuals, agricultural production and the community in general
- Whether it is already established in the area
- The feasibility and cost of possible control measures

Table B.5 Department of Agriculture and Food (Western Australia) Categories for Declared Pests under the *Biosecurity and Agriculture Management Act 2007*

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

Control class code	Description
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

- Invasiveness
- Impacts
- Potential for spread
- Socio-economic and environmental values

Australian state and territory governments have identified thirty two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012 (Australian Government 2012).

Environmental weeds

“Environmental weeds are plants that establish themselves in natural ecosystems (marine, aquatic and terrestrial) and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade” (CALM 1999). The Environmental Weed Strategy for Western Australia (EWSWA) was published in 1999. This document provides direction and an approach to tackling environmental weeds in WA (CALM 1999). Following on from this strategy (in 2008), in an effort to address invasive weeds and implement an integrated approach to weed management on DPaW-managed lands in WA, the Weed Prioritisation Process was developed (DPaW 2013). A series of workshops were held in each of the nine DPaW regions with the purpose of scoring all weeds which occurred in each of the DPaW regions according to the following key attributes (DPaW 2013):

- Potential distribution and impact
- Invasiveness
- Current distribution
- Feasibility of control
- Weed management ability
- Weed risk

This process resulted in the following five ratings for each weed species (DPaW 2013):

- Very high (VH)
- High (H)
- Medium (M)
- Low (L)
- Negligible (N)

The suggested management actions for each species range from no action required (the weed species ranking is as low as to not warrant any investment in regional strategic management actions), through targeted control to reduce infestation or spread, to species requiring state-wide

eradication (DPaW 2013). A total of 1350 weeds were rated through this process as high, moderate, mild or low, with 34 weed species being rated as high (DPaW 2013).

The prioritisation for individual weeds within a DPaW region should be treated as a guide and does not diminish any other requirements of land managers or developers e.g. Declared Plants requirements of the BAM Act or Ministerial requirements under Part IV of the EP Act (DPaW 2013).

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Appendix C – Desktop Searches

Naturemap (DPaW 2007-)

Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool
(DotE 2014a)

NatureMap Flora Report (5km) - York to Merredin

Created By Laura Zimmermann on 27/08/2014

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Group By Family

Family	Species	Records
Aizoaceae	1	1
Alliaceae	1	1
Amaranthaceae	11	22
Anarthriaceae	1	1
Apiaceae	11	19
Apocynaceae	1	2
Araliaceae	7	36
Asparagaceae	29	84
Aspleniaceae	1	2
Asteraceae	67	240
Boraginaceae	4	6
Boryaceae	2	12
Brassicaceae	4	8
Bryaceae	5	6
Campanulaceae	7	10
Caryophyllaceae	5	6
Casuarinaceae	7	26
Celastraceae	3	8
Centrolepidaceae	3	3
Chenopodiaceae	13	22
Colchicaceae	3	11
Convolvulaceae	2	2
Crassulaceae	5	16
Cupressaceae	1	1
Cyperaceae	24	50
Dasygongonaceae	1	11
Dilleniaceae	14	56
Dioscoreaceae	1	2
Ditrichaceae	2	2
Droseraceae	21	48
Elaeocarpaceae	1	1
Ericaceae	14	30
Euphorbiaceae	4	7
Fabaceae	105	336
Fissidentaceae	1	2
Frankeniaceae	1	1
Funariaceae	1	1
Gentianaceae	1	1
Geraniaceae	3	12
Gigaspermaceae	1	1
Goodeniaceae	28	66
Gyrostemonaceae	3	5
Haemodoraceae	8	25
Haloragaceae	5	9
Hemerocallidaceae	6	20
Hypericaceae	2	2
Hypoxidaceae	2	2
Iridaceae	18	32
Isoetaceae	1	2
Juncaceae	8	14
Juncaginaceae	5	6
Lamiaceae	12	32
Lauraceae	5	8
Linaceae	1	1
Loganiaceae	3	6
Loranthaceae	2	2
Lythraceae	1	1
Malvaceae	9	44
Marsileaceae	1	3
Myrtaceae	85	224
Nyctaginaceae	2	3
Orchidaceae	55	150
Orobanchaceae	1	4
Oxalidaceae	3	7
Papaveraceae	3	3
Phrymaceae	1	1
Phyllanthaceae	3	9
Pittosporaceae	4	10
Plantaginaceae	2	2
Poaceae	64	192
Polygalaceae	4	13
Polygonaceae	2	2
Portulacaceae	4	10
Pottiaceae	5	9
Primulaceae	1	2

Proteaceae	63	173
Pteridaceae	3	8
Ranunculaceae	1	1
Resedaceae	1	1
Restionaceae	10	22
Rhamnaceae	13	30
Rosaceae	1	1
Rubiaceae	3	11
Rutaceae	5	10
Santalaceae	3	6
Sapindaceae	6	15
Scrophulariaceae	10	14
Solanaceae	8	14
Stylidiaceae	24	65
Surianaceae	1	2
Tamaricaceae	1	1
Thymelaeaceae	7	19
Urticaceae	1	1
Xanthorrhoeaceae	1	3
TOTAL	910	2424

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Aizoaceae				
1.	2809 <i>Gunnioopsis rubra</i>			
Alliaceae				
2.	1375 <i>Allium neapolitanum</i> (Naples Onion)	Y		
Amaranthaceae				
3.	2716 <i>Ptilotus declinatus</i> (Curved Mulla Mulla)			
4.	2717 <i>Ptilotus divaricatus</i> (Climbing Mulla Mulla)			
5.	2718 <i>Ptilotus drummondii</i> (Narrowleaf Mulla Mulla)			
6.	11260 <i>Ptilotus drummondii</i> var. <i>drummondii</i> (Pussytail)			
7.	41506 <i>Ptilotus gaudichaudii</i> subsp. <i>gaudichaudii</i>			
8.	2732 <i>Ptilotus holosericeus</i>			
9.	2733 <i>Ptilotus humilis</i>			
10.	2751 <i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
11.	2760 <i>Ptilotus spathulatus</i>			
12.	2763 <i>Ptilotus stirlingii</i> (Stirling's Mulla Mulla)			
13.	40841 <i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>			
Anarthriaceae				
14.	18049 <i>Lyginia imberbis</i>			
Apiaceae				
15.	6208 <i>Actinotus superbus</i>			
16.	12040 <i>Apium prostratum</i> var. <i>prostratum</i> (Sea Celery)			
17.	6215 <i>Chlaenosciadium gardneri</i>			
18.	6218 <i>Daucus glochidiatus</i> (Australian Carrot)			
19.	6247 <i>Platysace cirrosa</i> (Karna)			
20.	6248 <i>Platysace commutata</i>			
21.	6252 <i>Platysace effusa</i>			
22.	6255 <i>Platysace juncea</i>			
23.	6257 <i>Platysace maxwellii</i> (Karno)			
24.	6283 <i>Xanthosia atkinsoniana</i>			
25.	6285 <i>Xanthosia ciliata</i>			
Apocynaceae				
26.	6599 <i>Rhyncharrhena linearis</i> (Bush Bean, Wintjulanypa)			
Araliaceae				
27.	6226 <i>Hydrocotyle callicarpa</i> (Small Pennywort)			
28.	6236 <i>Hydrocotyle pilifera</i>			
29.	11546 <i>Hydrocotyle pilifera</i> var. <i>glabrata</i>			
30.	6239 <i>Hydrocotyle rugulosa</i>			
31.	6268 <i>Trachymene cyanopetala</i>			
32.	6279 <i>Trachymene ornata</i> (Spongefruit)			
33.	6280 <i>Trachymene pilosa</i> (Native Parsnip)			
Asparagaceae				
34.	1265 <i>Arthropodium curvipes</i>			
35.	8779 <i>Asparagus asparagoides</i> (Bridal Creeper)	Y		
36.	11299 <i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>			
37.	1281 <i>Chamaescilla spiralis</i>			
38.	8788 <i>Chamaescilla versicolor</i>			
39.	1215 <i>Chamaexeros fimbriata</i>			
40.	1217 <i>Chamaexeros serra</i> (Little Fringe-leaf)			
41.	1287 <i>Dichopogon capillipes</i>			
42.	1288 <i>Dichopogon fimbriatus</i> (Chocolate Lily)			
43.	11815 <i>Laxmannia grandiflora</i> subsp. <i>grandiflora</i>			
44.	1305 <i>Laxmannia omnifertilis</i>			
45.	1306 <i>Laxmannia paleacea</i>			
46.	11911 <i>Laxmannia ramosa</i> subsp. <i>ramosa</i>			
47.	1309 <i>Laxmannia squarrosa</i>			
48.	1223 <i>Lomandra caespitosa</i> (Tufted Mat Rush)			
49.	1226 <i>Lomandra effusa</i> (Scented Matrush)			
50.	1246 <i>Lomandra suaveolens</i>			
51.	1312 <i>Sowerbaea laxiflora</i> (Purple Tassels)			
52.	1333 <i>Thysanotus glaucifolius</i>			
53.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
54.	1343 <i>Thysanotus patersonii</i>			
55.	1345 <i>Thysanotus pseudojunceus</i>			
56.	1346 <i>Thysanotus pyramidalis</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
57.	1348 <i>Thysanotus rectantherus</i>			
58.	1351 <i>Thysanotus sparteus</i>			
59.	1354 <i>Thysanotus tenellus</i>			
60.	1355 <i>Thysanotus tenuis</i>		P3	
61.	1357 <i>Thysanotus thyrsoides</i>			
62.	1358 <i>Thysanotus triandrus</i>			

Aspleniaceae

63.	65 <i>Pleurosorus rutifolius</i> (Blanket Fern)			
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Asteraceae

64.	7817 <i>Actinobole uliginosum</i> (Flannel Cudweed)			
65.	7838 <i>Arctotheca calendula</i> (Cape Weed)	Y		
66.	7842 <i>Argyroglossis turbinata</i>			
67.	7856 <i>Blennospora drummondii</i>			
68.	7857 <i>Blennospora phlegmatocarpa</i>			
69.	7871 <i>Brachyscome ciliaris</i>			
70.	7875 <i>Brachyscome glandulosa</i>			
71.	7878 <i>Brachyscome iberidifolia</i>			
72.	7882 <i>Brachyscome perpusilla</i>			
73.	7903 <i>Calotis hispidula</i> (Bindy Eye)			
74.	8447 <i>Calotis lappulacea</i> (Yellow Burr-daisy)			
75.	7909 <i>Carduus pycnocephalus</i> (Slender Thistle)	Y		
76.	7924 <i>Ceratogyne obionoides</i> (Wingwort)			
77.	7933 <i>Chthonocephalus pseudevax</i> (Woolly Groundheads)			
78.	7937 <i>Cirsium vulgare</i> (Spear Thistle)	Y		
79.	7944 <i>Cotula bipinnata</i> (Ferny Cotula)	Y		
80.	12739 <i>Erymophyllum ramosum</i>			
81.	12740 <i>Erymophyllum tenellum</i>			
82.	16311 <i>Gazania linearis</i>	Y		
83.	12780 <i>Gilberta tenuifolia</i>			
84.	8002 <i>Gnephosis tenuissima</i>			
85.	8024 <i>Helichrysum leucopsidium</i>			
86.	12741 <i>Hyalosperma cotula</i>			
87.	12742 <i>Hyalosperma demissum</i>			
88.	15447 <i>Hyalosperma glutinosum</i> subsp. <i>glutinosum</i>			
89.	8086 <i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
90.	18585 <i>Lagenophora huegelii</i>			
91.	13284 <i>Lawrencella rosea</i>			
92.	12630 <i>Millotia major</i>			
93.	8105 <i>Millotia myosotidifolia</i>			
94.	14344 <i>Millotia tenuifolia</i> var. <i>tenuifolia</i> (Soft Millotia)			
95.	29418 <i>Monoculus monstrosus</i>	Y		
96.	32716 <i>Olearia lehmanniana</i>			
97.	8143 <i>Olearia paucidentata</i> (Autumn Scrub Daisy)			
98.	8149 <i>Olearia rudis</i> (Rough Daisybush)			
99.	12645 <i>Ozothamnus lepidophyllus</i>			
100.	8172 <i>Podolepis canescens</i> (Bright Podolepis, Grey Podolepis)			
101.	8173 <i>Podolepis capillaris</i> (Wiry Podolepis)			
102.	8177 <i>Podolepis lessonii</i>			
103.	8181 <i>Podolepis tepperi</i>			
104.	8182 <i>Podotheca angustifolia</i> (Sticky Longheads)			
105.	8184 <i>Podotheca gnaphalioides</i> (Golden Long-heads)			
106.	8188 <i>Pogonolepis stricta</i>			
107.	13255 <i>Pterochaeta paniculata</i>			
108.	8195 <i>Quinetia urvillei</i>			
109.	15035 <i>Rhodanthe corymbosa</i>			
110.	13294 <i>Rhodanthe laevis</i>			
111.	13234 <i>Rhodanthe manglesii</i>			
112.	13296 <i>Rhodanthe polycephala</i>			
113.	13252 <i>Rhodanthe pygmaea</i>			
114.	13309 <i>Rhodanthe spicata</i>			
115.	8205 <i>Senecio gilbertii</i>		P1	
116.	8207 <i>Senecio glossanthus</i> (Slender Groundsel)			
117.	25883 <i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>			
118.	14583 <i>Siloxerus multiflorus</i>			
119.	8230 <i>Sonchus asper</i> (Rough Sowthistle)	Y		
120.	8231 <i>Sonchus oleraceus</i> (Common Sowthistle)	Y		
121.	8251 <i>Trichocline spathulata</i> (Native Gerbera)			
122.	8253 <i>Triptilodiscus pygmaeus</i>			
123.	8255 <i>Ursinia anthemoides</i> (Ursinia)	Y		

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124.	38388	<i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	Y		
125.	8257	<i>Vellereophyton dealbatum</i> (<i>White Cudweed</i>)	Y		
126.	8260	<i>Vittadinia australasica</i>			
127.	8275	<i>Waitzia acuminata</i> (<i>Orange Immortelle</i>)			
128.	13331	<i>Waitzia acuminata</i> var. <i>acuminata</i>			
129.	13328	<i>Waitzia nitida</i>			
130.	19938	<i>Xerochrysum bracteatum</i>			
Boraginaceae					
131.	6681	<i>Echium plantagineum</i> (<i>Paterson's Curse</i>)	Y		
132.	17491	<i>Halgania cyanea</i> var. <i>cyanea</i>			
133.	29716	<i>Halgania</i> sp. <i>Wongan Hills</i> (K.F. Kenneally 2393)			
134.	6669	<i>Phacelia tanacetifolia</i>	Y		
Boryaceae					
135.	1267	<i>Borya constricta</i>			
136.	1273	<i>Borya sphaerocephala</i> (<i>Pincushions</i>)			
Brassicaceae					
137.	3044	<i>Lepidium rotundum</i> (<i>Veined Peppergrass</i>)			
138.	3061	<i>Raphanus raphanistrum</i> (<i>Wild Radish</i>)	Y		
139.	3068	<i>Sinapis arvensis</i> (<i>Charlock</i>)	Y		
140.	3076	<i>Stenopetalum filifolium</i>			
Bryaceae					
141.	32330	<i>Bryum argenteum</i>			
142.	32376	<i>Gemmabryum dichotomum</i>			
143.	32380	<i>Gemmabryum pachythecum</i>			
144.	32381	<i>Gemmabryum preissianum</i>			
145.	32417	<i>Ptychostomum angustifolium</i>			
Campanulaceae					
146.	7396	<i>Isotoma hypocrateriformis</i> (<i>Woodbridge Poison</i>)			
147.	9289	<i>Lobelia anceps</i> (<i>Angled Lobelia</i>)			
148.	7402	<i>Lobelia gibbosa</i> (<i>Tall Lobelia</i>)			
149.	7408	<i>Lobelia tenuior</i> (<i>Slender Lobelia</i>)			
150.	7384	<i>Wahlenbergia capensis</i> (<i>Cape Bluebell</i>)	Y		
151.	7386	<i>Wahlenbergia gracilenta</i> (<i>Annual Bluebell</i>)			
152.	7389	<i>Wahlenbergia preissii</i>			
Caryophyllaceae					
153.	19825	<i>Petrohragia dubia</i>	Y		
154.	15972	<i>Silene gallica</i> var. <i>gallica</i>	Y		
155.	2912	<i>Spergula arvensis</i> (<i>Corn Spurry</i>)	Y		
156.	2914	<i>Spergularia diandra</i> (<i>Lesser Sand Spurry</i>)	Y		
157.	2915	<i>Spergularia rubra</i> (<i>Sand Spurry</i>)	Y		
Casuarinaceae					
158.	13904	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>			
159.	1721	<i>Allocasuarina campestris</i>			
160.	1727	<i>Allocasuarina fibrosa</i> (<i>Woolly Sheoak</i>)		T	
161.	1731	<i>Allocasuarina huegeliana</i> (<i>Rock Sheoak, Kwool</i>)			
162.	1732	<i>Allocasuarina humilis</i> (<i>Dwarf Sheoak</i>)			
163.	1734	<i>Allocasuarina microstachya</i>			
164.	1742	<i>Casuarina obesa</i> (<i>Swamp Sheoak, Kuli</i>)			
Celastraceae					
165.	4725	<i>Psammomoya choretroides</i>			
166.	9070	<i>Stackhousia pubescens</i> (<i>Downy Stackhousia</i>)			
167.	43540	<i>Stackhousia</i> sp. <i>Red-blotched corolla</i> (A. Markey 911)		P3	
Centrolepidaceae					
168.	1121	<i>Centrolepis aristata</i> (<i>Pointed Centrolepis</i>)			
169.	1125	<i>Centrolepis drummondiana</i>			
170.	1134	<i>Centrolepis polygyna</i> (<i>Wiry Centrolepis</i>)			
Chenopodiaceae					
171.	11489	<i>Atriplex acutibractea</i> subsp. <i>karoniensis</i>			
172.	2476	<i>Atriplex semilunaris</i> (<i>Annual Saltbush</i>)			
173.	2480	<i>Atriplex suberecta</i>			
174.	2483	<i>Chenopodium album</i> (<i>Fat Hen</i>)	Y		
175.	11530	<i>Chenopodium desertorum</i> subsp. <i>microphyllum</i>			
176.	2510	<i>Enchylaena lanata</i>			
177.	2511	<i>Enchylaena tomentosa</i> (<i>Barrier Saltbush</i>)			
178.	2541	<i>Maireana enchylaenoides</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
179.	2581 <i>Rhagodia drummondii</i>			
180.	2584 <i>Rhagodia preissii</i>			
181.	11254 <i>Rhagodia preissii</i> subsp. <i>preissii</i>			
182.	2609 <i>Sclerolaena diacantha</i> (Grey Copperburr)			
183.	2612 <i>Sclerolaena eurotioides</i> (Fluffy Bindii)			
Colchicaceae				
184.	12770 <i>Burchardia congesta</i>			
185.	1395 <i>Wurmbea drummondii</i> (York Gum Nancy)			
186.	1403 <i>Wurmbea tenella</i> (Eight Nancy)			
Convolvulaceae				
187.	6614 <i>Convolvulus remotus</i>			
188.	6659 <i>Wilsonia humilis</i> (Silky Wilsonia)			
Crassulaceae				
189.	17701 <i>Crassula closiana</i>			
190.	3137 <i>Crassula colorata</i> (Dense Stonecrop)			
191.	11563 <i>Crassula colorata</i> var. <i>colorata</i>			
192.	3139 <i>Crassula exserta</i>			
193.	3142 <i>Crassula natans</i>	Y		
Cupressaceae				
194.	36560 <i>Callitris arenaria</i> (Sandplain Cypress)			
Cyperaceae				
195.	746 <i>Baumea riparia</i>			
196.	760 <i>Caustis dioica</i>			
197.	783 <i>Cyperus congestus</i> (Dense Flat-sedge)	Y		
198.	794 <i>Cyperus gymnocaulos</i> (Spiny Flat-sedge)			
199.	815 <i>Cyperus tenellus</i> (Tiny Flatsedge)	Y		
200.	816 <i>Cyperus tenuiflorus</i> (Scaly Sedge)	Y		
201.	20200 <i>Isolepis cernua</i> var. <i>setiformis</i>			
202.	928 <i>Lepidosperma brunonianum</i>			
203.	930 <i>Lepidosperma costale</i>			
204.	936 <i>Lepidosperma leptostachyum</i>			
205.	944 <i>Lepidosperma scabrum</i>			
206.	33279 <i>Lepidosperma</i> sp. <i>Bandalup Scabrid</i> (N. Eveleigh 10798)			
207.	16284 <i>Lepidosperma</i> sp. <i>P1 small head</i> (M.D. Tindale 166A)			
208.	947 <i>Lepidosperma tenue</i>			
209.	954 <i>Mesomelaena preissii</i>			
210.	956 <i>Mesomelaena stygia</i>			
211.	972 <i>Schoenus armeria</i>			
212.	982 <i>Schoenus clandestinus</i>			
213.	991 <i>Schoenus grammatophyllus</i>			
214.	994 <i>Schoenus humilis</i>			
215.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
216.	1009 <i>Schoenus pleiostemoneus</i>			
217.	18164 <i>Schoenus</i> sp. <i>smooth culms</i> (K.R. Newbey 7823)			
218.	1019 <i>Schoenus subflavus</i> (Yellow Bog-rush)			
Dasypogonaceae				
219.	19310 <i>Calectasia pignattiana</i>		T	
Dilleniaceae				
220.	5108 <i>Hibbertia acerosa</i> (Needle Leaved Guinea Flower)			
221.	19682 <i>Hibbertia avonensis</i>			
222.	5114 <i>Hibbertia commutata</i>			
223.	5121 <i>Hibbertia drummondii</i>			
224.	5124 <i>Hibbertia exasperata</i>			
225.	14457 <i>Hibbertia glabriuscula</i>		P3	
226.	20059 <i>Hibbertia hemignosta</i>			
227.	20045 <i>Hibbertia hibbertioides</i>			
228.	20046 <i>Hibbertia hibbertioides</i> var. <i>hibbertioides</i>			
229.	5134 <i>Hibbertia huegelii</i>			
230.	5146 <i>Hibbertia montana</i>		P4	
231.	5157 <i>Hibbertia polystachya</i>			
232.	5166 <i>Hibbertia rupicola</i>			
233.	5173 <i>Hibbertia subvaginata</i>			
Dioscoreaceae				
234.	1509 <i>Dioscorea hastifolia</i> (Warrine, Warrarn)			
Ditrichaceae				
235.	32351 <i>Eccremidium pulchellum</i>			

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236.	32478 <i>Pleuridium nervosum</i> var. <i>nervosum</i>			
Droseraceae				
237.	15709 <i>Drosera androsacea</i> (Cone Sundew)			
238.	13219 <i>Drosera bulbosa</i> subsp. <i>bulbosa</i>			
239.	3098 <i>Drosera glanduligera</i> (Pimpernel Sundew)			
240.	13195 <i>Drosera helodes</i>			
241.	3101 <i>Drosera heterophylla</i> (Swamp Rainbow)			
242.	3105 <i>Drosera leucoblata</i> (Wheel Sundew)			
243.	3106 <i>Drosera macrantha</i> (Bridal Rainbow)			
244.	14298 <i>Drosera macrantha</i> subsp. <i>macrantha</i>			
245.	3107 <i>Drosera macrophylla</i> (Showy Sundew)			
246.	13387 <i>Drosera macrophylla</i> subsp. <i>macrophylla</i>			
247.	13388 <i>Drosera macrophylla</i> subsp. <i>monantha</i>			
248.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
249.	13215 <i>Drosera menziesii</i> subsp. <i>basifolia</i>			
250.	15710 <i>Drosera miniata</i> (Orange Sundew)			
251.	3123 <i>Drosera platystigma</i> (Black-eyed Sundew)			
252.	3124 <i>Drosera pulchella</i> (Pretty Sundew)			
253.	3125 <i>Drosera pycnoblata</i> (Pearly Sundew)			
254.	3131 <i>Drosera stolonifera</i> (Leafy Sundew)			
255.	3132 <i>Drosera stricticaulis</i> (Erect Sundew)			
256.	3133 <i>Drosera subhirtella</i> (Sunny Rainbow)			
257.	3135 <i>Drosera zonaria</i> (Painted Sundew)			
Elaeocarpaceae				
258.	4546 <i>Tetratheca virgata</i>			
Ericaceae				
259.	6300 <i>Andersonia aristata</i> (Rice Flower)			
260.	6305 <i>Andersonia brevifolia</i>			
261.	6314 <i>Andersonia lehmanniana</i>			
262.	6324 <i>Astroloma compactum</i>			
263.	6326 <i>Astroloma epacridis</i>			
264.	6330 <i>Astroloma macrocalyx</i> (Swan Berry)			
265.	6334 <i>Astroloma pallidum</i> (Kick Bush)			
266.	6336 <i>Astroloma serratifolium</i> (Kondrung)			
267.	6374 <i>Leucopogon conostephioides</i>			
268.	6384 <i>Leucopogon cymbiformis</i>		P2	
269.	6386 <i>Leucopogon dielsianus</i>			
270.	6430 <i>Leucopogon planifolius</i>			
271.	28311 <i>Leucopogon</i> sp. Great Southern (R.S. Cowan A 586)			
272.	34163 <i>Leucopogon</i> sp. Newdegate (M. Hislop 3585)			
Euphorbiaceae				
273.	4607 <i>Chrozophora tinctoria</i> (Turnsole)	Y		
274.	4626 <i>Euphorbia drummondii</i> (Caustic Weed, Piwi)			
275.	4714 <i>Stachystemon brachyphyllus</i>			
276.	20537 <i>Stachystemon virgatus</i>			
Fabaceae				
277.	16159 <i>Acacia acanthoclada</i> subsp. <i>acanthoclada</i>			
278.	3200 <i>Acacia acuminata</i> (Jam, Mangard)			
279.	3206 <i>Acacia aestivalis</i>			
280.	3235 <i>Acacia baxteri</i> (Baxter's Wattle)			
281.	3238 <i>Acacia bidentata</i>			
282.	3252 <i>Acacia campylophylla</i>		P3	
283.	3274 <i>Acacia crassistipula</i>			
284.	14067 <i>Acacia cuneifolia</i>		P4	
285.	18194 <i>Acacia ericksoniae</i>			
286.	3324 <i>Acacia erinacea</i>			
287.	3347 <i>Acacia gilbertii</i>			
288.	3366 <i>Acacia hemiteles</i>			
289.	15475 <i>Acacia heteroclita</i> subsp. <i>heteroclita</i>			
290.	3378 <i>Acacia inaequiloba</i>			
291.	3385 <i>Acacia inophloia</i>		P3	
292.	3408 <i>Acacia lasiocalyx</i> (Silver Wattle, Wilyurwur)			
293.	3409 <i>Acacia lasiocarpa</i> (Panjang)			
294.	11519 <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>			
295.	15721 <i>Acacia lasiocarpa</i> var. <i>sedifolia</i>			
296.	3420 <i>Acacia ligustrina</i>			
297.	16976 <i>Acacia lirellata</i>			Y
298.	16978 <i>Acacia lirellata</i> subsp. <i>lirellata</i>			

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299.	3438 <i>Acacia meisneri</i>		P3	
300.	3442 <i>Acacia microbotrya</i> (Manna Wattle, Kalyang)			
301.	3451 <i>Acacia multispicata</i>			
302.	3464 <i>Acacia obovata</i>			
303.	3486 <i>Acacia phaeocalyx</i>		P3	
304.	15483 <i>Acacia pulchella</i> var. <i>pulchella</i>			
305.	3515 <i>Acacia restiacea</i>			
306.	16147 <i>Acacia rostellata</i>			
307.	3525 <i>Acacia rostelifera</i> (Summer-scented Wattle)			
308.	30033 <i>Acacia saligna</i> subsp. <i>lindleyi</i>			
309.	3541 <i>Acacia sessilis</i>			
310.	3542 <i>Acacia sessilis</i> spica			
311.	3543 <i>Acacia shuttleworthii</i>			
312.	20339 <i>Acacia</i> sp. <i>Kokeby</i> (L. Preiss 937)			
313.	14039 <i>Acacia</i> sp. <i>P174</i> (J.M. Brown 228)			
314.	15484 <i>Acacia sphacelata</i> subsp. <i>sphacelata</i>			
315.	3557 <i>Acacia stenoptera</i> (Narrow Winged Wattle)			
316.	3596 <i>Acacia viscifolia</i>			
317.	3597 <i>Acacia volubilis</i>		T	
318.	3710 <i>Bossiaea eriocarpa</i> (Common Brown Pea)			
319.	3719 <i>Bossiaea spinescens</i>			
320.	13111 <i>Chorizema aciculare</i> subsp. <i>laxum</i>			
321.	12974 <i>Chorizema rhynchotropis</i>			
322.	3793 <i>Daviesia angulata</i>			
323.	3796 <i>Daviesia benthamii</i>			
324.	11367 <i>Daviesia benthamii</i> subsp. <i>benthamii</i>			
325.	15656 <i>Daviesia brachyphylla</i>			
326.	3797 <i>Daviesia cardiophylla</i>			
327.	3800 <i>Daviesia costata</i>			
328.	41921 <i>Daviesia decurrens</i> subsp. <i>Hamata</i> (M.D. Crisp 6610)			
329.	12326 <i>Daviesia hakeoides</i> subsp. <i>subnuda</i>			
330.	3816 <i>Daviesia incrassata</i>			
331.	16583 <i>Daviesia intricata</i> subsp. <i>intricata</i>			
332.	3819 <i>Daviesia longifolia</i>			
333.	3821 <i>Daviesia microphylla</i>			
334.	3829 <i>Daviesia pachyloma</i>			
335.	20367 <i>Dillwynia laxiflora</i>			
336.	20742 <i>Eutaxia rubricarina</i>		P3	
337.	3895 <i>Gastrolobium calycinum</i> (York Road Poison)			
338.	20475 <i>Gastrolobium capitatum</i>			
339.	20516 <i>Gastrolobium cyanophyllum</i>			
340.	3898 <i>Gastrolobium densifolium</i> (Mallet Poison)		P4	
341.	3906 <i>Gastrolobium ilicifolium</i>			
342.	3910 <i>Gastrolobium obovatum</i> (Boat-leaved Poison)			
343.	10981 <i>Gastrolobium parviflorum</i>			
344.	3913 <i>Gastrolobium parvifolium</i> (Berry Poison)			
345.	3924 <i>Gastrolobium spinosum</i> (Prickly Poison)			
346.	3927 <i>Gastrolobium stowardii</i>			
347.	3930 <i>Gastrolobium trilobum</i> (Bullock Poison)			
348.	3936 <i>Genista linifolia</i> (Flaxleaf Broom)	Y		
349.	3952 <i>Gompholobium obcordatum</i>			
350.	3956 <i>Gompholobium shuttleworthii</i>			
351.	3957 <i>Gompholobium tomentosum</i> (Hairy Yellow Pea)			
352.	3964 <i>Hovea chorizemifolia</i> (Holly-leaved Hovea)			
353.	3966 <i>Hovea pungens</i> (Devil's Pins, Puyenak)			
354.	3992 <i>Isotropis cuneifolia</i> (Granny Bonnets)			
355.	19700 <i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>			
356.	3995 <i>Isotropis juncea</i> (Slender Lamb Poison)			
357.	3997 <i>Jacksonia alata</i>			
358.	4005 <i>Jacksonia condensata</i>			
359.	4010 <i>Jacksonia floribunda</i> (Holly Pea)			
360.	14750 <i>Jacksonia quairading</i>		T	
361.	4024 <i>Jacksonia racemosa</i>			
362.	4025 <i>Jacksonia restioides</i>			
363.	4029 <i>Jacksonia sternbergiana</i> (Stinkwood, Kapur)			
364.	4044 <i>Kennedia prostrata</i> (Scarlet Runner)			
365.	11528 <i>Labichea lanceolata</i> subsp. <i>brevifolia</i>			
366.	4066 <i>Lupinus cosentinii</i>	Y		
367.	4079 <i>Medicago polymorpha</i> (Burr Medic)	Y		

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368.	4091 <i>Mirbelia floribunda</i> (Purple Mirbelia)			
369.	4097 <i>Mirbelia ramulosa</i>			
370.	4100 <i>Mirbelia spinosa</i>			
371.	4104 <i>Mirbelia trichocalyx</i>			
372.	4248 <i>Templetonia aculeata</i>			
373.	4258 <i>Templetonia sulcata</i> (Centipede Bush)			
374.	4291 <i>Trifolium arvense</i> (Hare's Foot Clover)	Y		
375.	17542 <i>Trifolium arvense</i> var. <i>arvense</i>	Y		
376.	4292 <i>Trifolium campestre</i> (Hop Clover)	Y		
377.	4313 <i>Trifolium subterraneum</i> (Subterranean Clover)	Y		
378.	4315 <i>Trifolium tomentosum</i> (Woolly Clover)	Y		
379.	15509 <i>Trifolium tomentosum</i> var. <i>tomentosum</i>	Y		
380.	9008 <i>Urodon dasyphyllus</i> (Mop Bushpea)			
381.	11474 <i>Vicia sativa</i> subsp. <i>nigra</i>	Y		
Fissidentaceae				
382.	32367 <i>Fissidens megalotis</i>			
Frankeniaceae				
383.	5209 <i>Frankenia pauciflora</i> (Seaheath)			
Funariaceae				
384.	32370 <i>Funaria hygrometrica</i>			
Gentianaceae				
385.	16524 <i>Cicendia quadrangularis</i>	Y		
Geraniaceae				
386.	4332 <i>Erodium botrys</i> (Long Storksbill)	Y		
387.	4335 <i>Erodium cygnorum</i> (Blue Heronsbill)			
388.	4345 <i>Pelargonium havlasae</i>			
Gigaspermaceae				
389.	32384 <i>Gigaspermum repens</i>			
Goodeniaceae				
390.	7413 <i>Brunonia australis</i> (Native Cornflower)			
391.	7425 <i>Dampiera carinata</i> (Summer Dampiera)			
392.	7438 <i>Dampiera eriocephala</i> (Woolly-headed Dampiera)			
393.	7448 <i>Dampiera incana</i> (Hoary Dampiera)			
394.	7449 <i>Dampiera juncea</i> (Rush-like Dampiera)			
395.	7451 <i>Dampiera lavandulacea</i>			
396.	7453 <i>Dampiera lindleyi</i>			
397.	7458 <i>Dampiera obliqua</i>			
398.	7471 <i>Dampiera sacculata</i> (Pouched Dampiera)			
399.	7495 <i>Goodenia berardiana</i>			
400.	29362 <i>Goodenia coerulea</i>			
401.	12516 <i>Goodenia convexa</i>			
402.	12520 <i>Goodenia fasciculata</i>			
403.	12522 <i>Goodenia glareicola</i>			
404.	12523 <i>Goodenia helmsii</i>			
405.	12551 <i>Goodenia micrantha</i>			
406.	7531 <i>Goodenia occidentalis</i>			
407.	7534 <i>Goodenia piniifolia</i> (Pine-leaved Goodenia)			
408.	19285 <i>Goodenia pulchella</i> subsp. <i>Wheatbelt</i> (L.W. Sage & F. Hort 795)			
409.	7541 <i>Goodenia pusilliflora</i> (Smallflower Goodenia)			
410.	7568 <i>Lechenaultia biloba</i> (Blue Leschenaultia)			
411.	7590 <i>Lechenaultia tubiflora</i> (Heath Leschenaultia)			
412.	7618 <i>Scaevola humifusa</i> (Procumbent Scaevola)			
413.	7636 <i>Scaevola platyphylla</i> (Broad-leaved Fanflower)			
414.	13181 <i>Scaevola repens</i> var. <i>angustifolia</i>			
415.	13182 <i>Scaevola repens</i> var. <i>repens</i>			
416.	7656 <i>Velleia cynopotamica</i>			
417.	7666 <i>Verreauxia reinwardtii</i> (Common Verreauxia)			
Gyrostemonaceae				
418.	2778 <i>Codonocarpus cotinifolius</i> (Native Poplar, Kundurangu)			
419.	2784 <i>Gyrostemon ramulosus</i> (Corkybark)			
420.	2788 <i>Gyrostemon subnudus</i>			
Haemodoraceae				
421.	1417 <i>Blancoa canescens</i> (Winter Bell)			
422.	12035 <i>Conostylis caricina</i> subsp. <i>caricina</i>			
423.	1444 <i>Conostylis petrophiloides</i>			
424.	1447 <i>Conostylis pusilla</i>			

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425.	1454 <i>Conostylis setigera</i> (Bristly Cottonhead)			
426.	11597 <i>Conostylis setigera</i> subsp. <i>setigera</i>			
427.	1465 <i>Haemodorum discolor</i>			
428.	1483 <i>Tribonanthes longipetala</i>			
Haloragaceae				
429.	6143 <i>Glischrocaryon aureum</i> (Common Popflower)			
430.	6149 <i>Gonocarpus cordiger</i>			
431.	6157 <i>Gonocarpus intricatus</i>		P4	
432.	6159 <i>Gonocarpus nodulosus</i>			
433.	6161 <i>Gonocarpus pithyoides</i>			
Hemerocallidaceae				
434.	23501 <i>Agrostocrinum scabrum</i> subsp. <i>scabrum</i>			
435.	1276 <i>Caesia micrantha</i> (Pale Grass Lily)			
436.	1259 <i>Dianella revoluta</i> (Blueberry Lily)			
437.	1260 <i>Stypandra glauca</i> (Blind Grass)			
438.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
439.	1363 <i>Tricoryne tenella</i>			
Hypericaceae				
440.	5180 <i>Hypericum gramineum</i> (Small St John's Wort)			
441.	5182 <i>Hypericum perforatum</i> (St John's Wort)	Y		
Hypoxidaceae				
442.	43763 <i>Pauridia glabella</i>			
443.	43761 <i>Pauridia occidentalis</i> var. <i>occidentalis</i>			
Iridaceae				
444.	18392 <i>Freesia alba</i> x <i>leichtlinii</i>	Y		
445.	20854 <i>Gladiolus watsonius</i>	Y		
446.	1526 <i>Hesperanthes falcata</i>	Y		
447.	1532 <i>Ixia maculata</i> (Yellow Ixia)	Y		
448.	19179 <i>Moraea flaccida</i> (One-leaf Cape Tulip)	Y		
449.	1535 <i>Moraea fugax</i>	Y		
450.	19178 <i>Moraea lewisiae</i>	Y		
451.	19180 <i>Moraea miniata</i> (Two-leaf Cape Tulip)	Y		
452.	19177 <i>Moraea setifolia</i>	Y		
453.	1537 <i>Orthrosanthus laxus</i> (Morning Iris)			
454.	11442 <i>Orthrosanthus laxus</i> var. <i>gramineus</i> (Grass-leaved Orthrosanthus)			
455.	11749 <i>Orthrosanthus laxus</i> var. <i>laxus</i> (Morning Iris)			
456.	1543 <i>Patersonia drummondii</i> (Drummond's Patersonia)			
457.	14485 <i>Romulea flava</i> var. <i>minor</i>	Y		
458.	1556 <i>Romulea rosea</i> (Guildford Grass)	Y		
459.	11544 <i>Romulea rosea</i> var. <i>australis</i> (Guildford Grass)	Y		
460.	14924 <i>Romulea rosea</i> var. <i>communis</i>	Y		
461.	1560 <i>Sparaxis pillansii</i> (Harlequin Flower)	Y		
Isoetaceae				
462.	11 <i>Isoetes drummondii</i> (Quillwort)			
Juncaceae				
463.	20454 <i>Juncus acutus</i> subsp. <i>acutus</i>	Y		
464.	1178 <i>Juncus bufonius</i> (Toad Rush)	Y		
465.	1179 <i>Juncus caespiticus</i> (Grassy Rush)			
466.	11922 <i>Juncus kraussii</i> subsp. <i>australiensis</i>			
467.	1188 <i>Juncus pallidus</i> (Pale Rush)			
468.	1194 <i>Juncus radula</i>			
469.	1195 <i>Juncus subsecundus</i> (Finger Rush)			
470.	1198 <i>Luzula meridionalis</i> (Field Woodrush)			
Juncaginaceae				
471.	33276 <i>Triglochin isingiana</i>			
472.	146 <i>Triglochin minutissima</i>			
473.	147 <i>Triglochin mucronata</i>			
474.	18587 <i>Triglochin nana</i>			
475.	19174 <i>Triglochin</i> sp. A <i>Flora of Australia</i> (G.J. Keighery 2477)			
Lamiaceae				
476.	41025 <i>Dasymalla terminalis</i> (Native Foxglove)			
477.	6834 <i>Hemiandra coccinea</i>		P3	
478.	6836 <i>Hemiandra incana</i>			
479.	6839 <i>Hemiandra pungens</i> (Snakebush)			
480.	6856 <i>Hemigenia incana</i> (Silky Hemigenia)			
481.	6864 <i>Hemigenia platyphylla</i>			

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			P4	
482.	17209 <i>Lachnostachys verbascifolia</i> var. <i>verbascifolia</i>			
483.	6888 <i>Microcorys capitata</i>			
484.	6894 <i>Microcorys lenticularis</i>			
485.	6899 <i>Microcorys obovata</i>			
486.	6797 <i>Physopsis spicata</i> (Hill River Lambstail)			
487.	9247 <i>Westringia rigida</i> (Stiff Westringia)			
Lauraceae				
488.	2951 <i>Cassytha flava</i> (Dodder Laurel)			
489.	2952 <i>Cassytha glabella</i> (Tangled Dodder Laurel)			
490.	11211 <i>Cassytha glabella</i> forma <i>dispar</i>			
491.	2956 <i>Cassytha pomiformis</i> (Dodder Laurel)			
492.	11799 <i>Cassytha racemosa</i> forma <i>racemosa</i>			
Linaceae				
493.	4362 <i>Linum marginale</i> (Wild Flax)			
Loganiaceae				
494.	6508 <i>Logania flaviflora</i> (Yellow Logania)			
495.	16825 <i>Phyllangium divergens</i>			
496.	16824 <i>Phyllangium sulcatum</i>			
Loranthaceae				
497.	2380 <i>Amyema miquelii</i> (Stalked Mistletoe)			
498.	2383 <i>Amyema preissii</i> (Wireleaf Mistletoe)			
Lythraceae				
499.	5281 <i>Lythrum hyssopifolia</i> (Lesser Loosestrife)	Y		
Malvaceae				
500.	5013 <i>Guichenotia micrantha</i> (Small Flowered Guichenotia)			
501.	5014 <i>Guichenotia sarotes</i>			
502.	5023 <i>Keraudrenia integrifolia</i> (Common Firebush)			
503.	19892 <i>Keraudrenia velutina</i> subsp. <i>velutina</i>			
504.	5034 <i>Lasiopetalum glabratum</i>			
505.	4961 <i>Malva parviflora</i> (Marshmallow)	Y		
506.	5080 <i>Thomasia foliosa</i>			
507.	13495 <i>Thomasia glabripetala</i>		T	
508.	5089 <i>Thomasia montana</i> (Hill Thomasia)		T	
Marsileaceae				
509.	74 <i>Marsilea drummondii</i> (Common Nardoo)			
Myrtaceae				
510.	5341 <i>Baeckea crispiflora</i>			
511.	11379 <i>Baeckea crispiflora</i> var. <i>tenuior</i>			
512.	29814 <i>Baeckea preissiana</i>			
513.	20455 <i>Baeckea</i> sp. <i>fine-leaved</i> (C.M. Lewis 517)			
514.	5378 <i>Beaufortia bracteosa</i>			
515.	5385 <i>Beaufortia incana</i>			
516.	5391 <i>Beaufortia schaueri</i> (Pink Bottlebrush)			
517.	5403 <i>Calothamnus brevifolius</i>		P4	
518.	35816 <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>			
519.	5429 <i>Calothamnus sanguineus</i> (Silky-leaved Blood flower, Pindak)			
520.	5439 <i>Calytrix angulata</i> (Yellow Starflower)			
521.	13654 <i>Calytrix breviseta</i> subsp. <i>stipulosa</i>			
522.	5461 <i>Calytrix glutinosa</i>			
523.	5465 <i>Calytrix leschenaultii</i>			
524.	5476 <i>Calytrix sapphirina</i>			
525.	5479 <i>Calytrix strigosa</i>			
526.	5487 <i>Calytrix violacea</i>			
527.	14353 <i>Chamelaucium</i> sp. <i>Dryandra</i> (D. Rose 446)		P2	
528.	5498 <i>Chamelaucium uncinatum</i> (Geraldton Wax)			
529.	5541 <i>Eremaea pauciflora</i>			
530.	14104 <i>Eremaea pauciflora</i> var. <i>pauciflora</i>			
531.	5545 <i>Eucalyptus accedens</i> (Powderbark Wandoo)			
532.	5548 <i>Eucalyptus albida</i> (White-leaved Mallee)			
533.	12895 <i>Eucalyptus arachnaea</i> subsp. <i>arachnaea</i>			
534.	5557 <i>Eucalyptus astringens</i> (Brown Mallet, Malard)			
535.	17969 <i>Eucalyptus astringens</i> subsp. <i>astringens</i>			
536.	12903 <i>Eucalyptus capillosa</i> subsp. <i>capillosa</i> (Wheatbelt Wandoo)			
537.	11978 <i>Eucalyptus celastroides</i> subsp. <i>virella</i>			
538.	5628 <i>Eucalyptus drummondii</i> (Drummond's Gum)			

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539.	5637 <i>Eucalyptus eremophila</i> (Tall Sand Mallee)			
540.	42027 <i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> (Red-flowered Mallee)			
541.	42026 <i>Eucalyptus erythronema</i> subsp. <i>inornata</i> (Red-flowered Mallee)		P3	
542.	5642 <i>Eucalyptus exilis</i> (Boyagin Mallee)		P4	
543.	5643 <i>Eucalyptus falcata</i> (Silver Mallet, Dulyumuk)			
544.	18521 <i>Eucalyptus flocktoniae</i> subsp. <i>flocktoniae</i>			
545.	5673 <i>Eucalyptus horistes</i>			
546.	5675 <i>Eucalyptus incrassata</i> (Lerp Mallee)			
547.	11295 <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> (York Gum)			
548.	16886 <i>Eucalyptus loxophleba</i> x <i>wandoo</i>		P4	
549.	5705 <i>Eucalyptus macrocarpa</i> (Mottlecah, Mudelka)			
550.	13530 <i>Eucalyptus macrocarpa</i> subsp. <i>macrocarpa</i> (Mottlecah)			
551.	20047 <i>Eucalyptus orthostemon</i>			
552.	16201 <i>Eucalyptus phenax</i>			
553.	12866 <i>Eucalyptus pluricaulis</i> subsp. <i>pluricaulis</i>			
554.	5763 <i>Eucalyptus rudis</i> (Flooded Gum, Kulurda)			
555.	13511 <i>Eucalyptus rudis</i> subsp. <i>rudis</i>			
556.	5766 <i>Eucalyptus salmonophloia</i> (Salmon Gum, Wurak)			
557.	13034 <i>Eucalyptus sargentii</i> subsp. <i>sargentii</i>			
558.	19653 <i>Eucalyptus thamnoides</i>			
559.	19655 <i>Eucalyptus thamnoides</i> subsp. <i>megista</i>			
560.	5796 <i>Eucalyptus uncinata</i> (Hook-leaved Mallee)			
561.	5797 <i>Eucalyptus wandoo</i> (Wandoo, Wondu)			
562.	12906 <i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>			
563.	5817 <i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
564.	15498 <i>Kunzea glabrescens</i> (Spearwood)			
565.	5847 <i>Leptospermum erubescens</i> (Roadside Teatree)			
566.	5876 <i>Melaleuca aspalathoides</i>			
567.	17982 <i>Melaleuca carrii</i>			
568.	15749 <i>Melaleuca eurystoma</i>			
569.	19486 <i>Melaleuca hamata</i>			
570.	5931 <i>Melaleuca leptospermoides</i>			
571.	41120 <i>Melaleuca marginata</i>			
572.	5949 <i>Melaleuca platycalyx</i>			
573.	5956 <i>Melaleuca pungens</i>			
574.	5958 <i>Melaleuca radula</i> (Graceful Honeymyrtle)			
575.	5959 <i>Melaleuca raphiophylla</i> (Swamp Paperbark)			
576.	20290 <i>Melaleuca scalena</i>			
577.	5962 <i>Melaleuca sciotostyla</i> (Wongan Melaleuca)		T	
578.	5975 <i>Melaleuca subtrigona</i>			
579.	15673 <i>Melaleuca tuberculata</i>			
580.	18232 <i>Melaleuca tuberculata</i> var. <i>tuberculata</i>			
581.	12388 <i>Verticordia acerosa</i> var. <i>preissii</i>			
582.	12395 <i>Verticordia bifimbriata</i>			
583.	6073 <i>Verticordia chrysantha</i>			
584.	12402 <i>Verticordia chrysanthella</i>			
585.	12411 <i>Verticordia densiflora</i> var. <i>cespitosa</i>			
586.	15432 <i>Verticordia densiflora</i> var. <i>densiflora</i>			
587.	12422 <i>Verticordia eriocephala</i> (Common Cauliflower)			
588.	6082 <i>Verticordia grandiflora</i> (Claw Featherflower)			
589.	12430 <i>Verticordia huegellii</i> var. <i>stylosa</i>			
590.	14714 <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	
591.	6107 <i>Verticordia pennigera</i>			
592.	6109 <i>Verticordia picta</i> (Painted Featherflower)			
593.	12458 <i>Verticordia serrata</i> var. <i>ciliata</i>			
594.	15613 <i>Verticordia tumida</i> subsp. <i>tumida</i>			
Nyctaginaceae				
595.	2770 <i>Boerhavia coccinea</i> (Tar Vine, Wituka)			
596.	2775 <i>Boerhavia schomburgkiana</i>			
Orchidaceae				
597.	1577 <i>Caladenia barbarossa</i> (Dragon Orchid)			
598.	1580 <i>Caladenia cairnsiana</i> (Zebra Orchid)			
599.	15579 <i>Caladenia chapmanii</i>			
600.	11136 <i>Caladenia denticulata</i>			
601.	1586 <i>Caladenia discoidea</i> (Dancing Orchid)			
602.	1588 <i>Caladenia drummondii</i> (Winter Spider Orchid)			
603.	11165 <i>Caladenia falcata</i>			
604.	11106 <i>Caladenia filifera</i>			
605.	15348 <i>Caladenia flava</i> subsp. <i>flava</i>			

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606.	15502 <i>Caladenia footeana</i>			
607.	15354 <i>Caladenia hirta</i> subsp. <i>hirta</i>			
608.	1598 <i>Caladenia integra</i> (Mantis Orchid, Smooth-lipped Spider Orchid)		P4	
609.	15363 <i>Caladenia longicauda</i> subsp. <i>eminens</i>			
610.	1603 <i>Caladenia longiclavata</i> (Clubbed Spider Orchid)			
611.	15377 <i>Caladenia reptans</i> subsp. <i>reptans</i>			
612.	1614 <i>Caladenia roei</i> (Ant Orchid)			
613.	1589 <i>Caladenia x ericksoniae</i>			
614.	15398 <i>Caladenia xantha</i>			
615.	15114 <i>Cyanicula gemmata</i>			
616.	10916 <i>Cyrtostylis huegelii</i>			
617.	12944 <i>Diuris amplissima</i>			
618.	12943 <i>Diuris brumalis</i>			
619.	11049 <i>Diuris corymbosa</i>			
620.	1638 <i>Diuris setacea</i> (Bristly Donkey Orchid)			
621.	1640 <i>Drakaea glyptodon</i> (King-in-his-carriage)			
622.	1643 <i>Elythranthera brunonis</i> (Purple Enamel Orchid)			
623.	20718 <i>Ericksonella saccharata</i>			
624.	1646 <i>Eriochilus dilatatus</i> (White Bunny Orchid)			
625.	15413 <i>Eriochilus dilatatus</i> subsp. <i>undulatus</i>			
626.	10802 <i>Eriochilus tenuis</i>			
627.	1653 <i>Leporella fimbriata</i> (Hare Orchid)			
628.	15418 <i>Leptoceras menziesii</i>			
629.	1657 <i>Microtis alba</i> (White Mignonette Orchid)			
630.	8814 <i>Microtis brownii</i>			
631.	15419 <i>Microtis media</i> subsp. <i>media</i>			
632.	20460 <i>Pheledenia deformis</i>			
633.	1669 <i>Prasophyllum cyphochilum</i> (Pouched Leek Orchid)			
634.	1671 <i>Prasophyllum elatum</i> (Tall Leek Orchid)			
635.	16688 <i>Prasophyllum gracile</i>			
636.	1677 <i>Prasophyllum macrostachyum</i> (Laughing Leek Orchid)			
637.	1682 <i>Prasophyllum sargentii</i>			
638.	44302 <i>Pterostylis brunneola</i>			
639.	10870 <i>Pterostylis ciliata</i>			
640.	10778 <i>Pterostylis picta</i>			
641.	1693 <i>Pterostylis recurva</i> (Jug Orchid)			
642.	12217 <i>Pterostylis sanguinea</i>			
643.	1696 <i>Pterostylis sargentii</i> (Frog Greenhood)			
644.	1697 <i>Pterostylis scabra</i> (Bronze Shell Orchid)			
645.	18657 <i>Pterostylis</i> sp. <i>inland</i> (A.C. Beaglehole 11880)			
646.	1698 <i>Pterostylis vittata</i> (Banded Greenhood)			
647.	1700 <i>Spiculaea ciliata</i> (Elbow Orchid)			
648.	1701 <i>Thelymitra antennifera</i> (Vanilla Orchid)			
649.	19822 <i>Thelymitra latiloba</i>			
650.	11053 <i>Thelymitra macrophylla</i>			
651.	20736 <i>Thelymitra maculata</i>			
Orobanchaceae				
652.	7089 <i>Parentucellia latifolia</i> (Common Bartsia)	Y		
Oxalidaceae				
653.	33256 <i>Oxalis bowiei</i> (Bowie Wood Sorrel)	Y		
654.	30375 <i>Oxalis exilis</i>			
655.	4351 <i>Oxalis flava</i> (Pinkbulb Soursob)	Y		
Papaveraceae				
656.	8365 <i>Fumaria bastardii</i>	Y		
657.	2970 <i>Fumaria densiflora</i> (Denseflower Fumitory)	Y		
658.	31532 <i>Fumaria muralis</i> subsp. <i>muralis</i>	Y		
Phrymaceae				
659.	7084 <i>Mimulus repens</i> (Creeping Monkey Flower)			
Phyllanthaceae				
660.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
661.	4689 <i>Poranthera ericoides</i> (Heath Poranthera)			
662.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
Pittosporaceae				
663.	25798 <i>Billardiera fusiformis</i> (Australian Bluebell)			
664.	3169 <i>Cheiranthra preissiana</i>			
665.	19421 <i>Marianthus bicolor</i> (Painted Marianthus)			
666.	19744 <i>Pittosporum angustifolium</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Plantaginaceae				
667.	7297 <i>Plantago coronopus</i> (Buckshorn Plantain)	Y		
668.	7299 <i>Plantago debilis</i>			
Poaceae				
669.	184 <i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
670.	185 <i>Aira cupaniana</i> (Silvery Hairgrass)	Y		
671.	186 <i>Aira elegantissima</i>	Y		
672.	12025 <i>Amphipogon caricinus</i> var. <i>caricinus</i>			
673.	199 <i>Amphipogon strictus</i> (Greybeard Grass)			
674.	200 <i>Amphipogon turbinatus</i>			
675.	207 <i>Aristida contorta</i> (Bunched Kerosene Grass)			
676.	210 <i>Aristida holathera</i>			
677.	17233 <i>Austrostipa campylachne</i>			
678.	17237 <i>Austrostipa elegantissima</i>			
679.	17238 <i>Austrostipa eremophila</i>			
680.	17241 <i>Austrostipa hemipogon</i>			
681.	17244 <i>Austrostipa macalpinei</i>			
682.	17245 <i>Austrostipa mollis</i>			
683.	17246 <i>Austrostipa nitida</i>			
684.	17249 <i>Austrostipa puberula</i>			
685.	17250 <i>Austrostipa pycnostachya</i>			
686.	17251 <i>Austrostipa scabra</i>			
687.	17252 <i>Austrostipa scabra</i> subsp. <i>scabra</i>			
688.	37421 <i>Austrostipa</i> sp. <i>Marchagee</i> (B.R. Maslin 1407)			
689.	17254 <i>Austrostipa tenuifolia</i>			
690.	17255 <i>Austrostipa trichophylla</i>			
691.	17257 <i>Austrostipa variabilis</i>			
692.	233 <i>Avena barbata</i> (Bearded Oat)	Y		
693.	8661 <i>Brachypodium distachyon</i> (False Brome)	Y		
694.	244 <i>Briza maxima</i> (Blowfly Grass)	Y		
695.	245 <i>Briza minor</i> (Shivery Grass)	Y		
696.	246 <i>Bromus alopecuroides</i>	Y		
697.	249 <i>Bromus diandrus</i> (Great Brome)	Y		
698.	250 <i>Bromus hordeaceus</i> (Soft Brome)	Y		
699.	252 <i>Bromus madritensis</i> (Madrid Brome)	Y		
700.	253 <i>Bromus rubens</i> (Red Brome)	Y		
701.	271 <i>Chloris truncata</i> (Windmill Grass)			
702.	281 <i>Cymbopogon oblectus</i> (Silkyheads)			
703.	283 <i>Cynodon dactylon</i> (Couch)	Y		
704.	349 <i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
705.	376 <i>Eragrostis curvula</i> (African Lovegrass)	Y		
706.	378 <i>Eragrostis dielsii</i> (Mallee Lovegrass)			
707.	379 <i>Eragrostis elongata</i> (Clustered Lovegrass)			
708.	415 <i>Eriachne ovata</i>			
709.	8476 <i>Hordeum hystrix</i> (Mediterranean Region Barley Grass)	Y		
710.	449 <i>Hordeum leporinum</i> (Barley Grass)	Y		
711.	19955 <i>Lachnagrostis plebeia</i>			
712.	8682 <i>Lolium loliaceum</i> (Stiff Ryegrass)	Y		
713.	478 <i>Lolium rigidum</i> (Wimmera Ryegrass)	Y		
714.	490 <i>Monachather paradoxus</i>			
715.	492 <i>Neurachne alopecuroidea</i> (Foxtail Mulga Grass)			
716.	502 <i>Panicum capillare</i> (Witchgrass)	Y		
717.	507 <i>Panicum miliaceum</i> (Millet Panic)	Y		
718.	516 <i>Parapholis incurva</i> (Coast Barbgrass)	Y		
719.	533 <i>Paspalum vaginatum</i> (Salt Water Couch)	Y		
720.	550 <i>Phalaris canariensis</i> (Canary Grass)	Y		
721.	557 <i>Piptatherum miliaceum</i> (Rice Millet)	Y		
722.	582 <i>Polypogon monspeliensis</i> (Annual Beardgrass)	Y		
723.	591 <i>Puccinellia ciliata</i> (Puccinellia)	Y		
724.	31672 <i>Puccinellia longior</i>			
725.	40431 <i>Rytidosperma acerosum</i>			
726.	40425 <i>Rytidosperma caespitosum</i>			
727.	40427 <i>Rytidosperma setaceum</i>			
728.	40440 <i>Rytidosperma</i> sp. <i>Goomalling</i> (A.G. Guinness et al. OAKP 10/63)			
729.	635 <i>Sporobolus virginicus</i> (Marine Couch)			
730.	11018 <i>Vulpia muralis</i>	Y		
731.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
732.	33101 <i>Vulpia myuros</i> forma <i>myuros</i>	Y		

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Polygalaceae				
733.	4553 <i>Comesperma drummondii</i> (Drummond's Milkwort)			
734.	4555 <i>Comesperma integerrimum</i>			
735.	4561 <i>Comesperma scoparium</i> (Broom Milkwort)			
736.	4566 <i>Comesperma volubile</i> (Love Creeper)			
Polygonaceae				
737.	2409 <i>Emex australis</i> (Doublegee)	Y		
738.	2412 <i>Muehlenbeckia adpressa</i> (Climbing Lignum)			
Portulacaceae				
739.	44184 <i>Calandrinia baccata</i>			
740.	2846 <i>Calandrinia calyptata</i> (Pink Purslane)			
741.	2853 <i>Calandrinia eremaea</i> (Twining Purslane)			
742.	2854 <i>Calandrinia granulifera</i> (Pygmy Purslane)			
Pottiaceae				
743.	32315 <i>Barbula calycina</i>			
744.	32346 <i>Didymodon torquatus</i>			
745.	32437 <i>Syntrichia antarctica</i>			
746.	32438 <i>Syntrichia pagorum</i>			
747.	32451 <i>Triquetrella papillata</i>			
Primulaceae				
748.	36375 <i>Lysimachia arvensis</i> (Pimpernel)	Y		
Proteaceae				
749.	1775 <i>Adenanthos cygnorum</i> (Common Woollybush)			
750.	11837 <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> (Common Woollybush)			
751.	32681 <i>Banksia armata</i> (Prickly Dryandra)			
752.	32682 <i>Banksia armata</i> var. <i>armata</i>			
753.	32683 <i>Banksia armata</i> var. <i>ignicida</i>			
754.	1812 <i>Banksia cuneata</i> (Quairading Banksia)			T
755.	32523 <i>Banksia fraseri</i> var. <i>fraseri</i>			
756.	32518 <i>Banksia hewardiana</i>			
757.	32516 <i>Banksia horrida</i> (Prickly Dryandra)			P3
758.	32136 <i>Banksia purdieana</i>			
759.	32088 <i>Banksia rufa</i>			
760.	32076 <i>Banksia sessilis</i> (Parrot Bush, Pudjak)			
761.	32080 <i>Banksia sessilis</i> var. <i>sessilis</i>			
762.	11868 <i>Banksia sphaerocarpa</i> var. <i>caesia</i>			
763.	32045 <i>Banksia squarrosa</i> subsp. <i>squarrosa</i>			
764.	32031 <i>Banksia vestita</i> (Summer Dryandra)			
765.	16856 <i>Conospermum amoenum</i> subsp. <i>cuneatum</i>			
766.	1870 <i>Conospermum eatoniae</i>			P3
767.	15518 <i>Conospermum filifolium</i> subsp. <i>filifolium</i>			
768.	14002 <i>Conospermum galeatum</i>			T
769.	1882 <i>Conospermum stoechadis</i> (Common Smokebush)			
770.	15520 <i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>			
771.	1991 <i>Grevillea disjuncta</i>			
772.	2001 <i>Grevillea eriostachya</i> (Flame Grevillea, Kaliny-kalinypa)			
773.	2002 <i>Grevillea eryngioides</i> (Curly Grevillea)			
774.	8832 <i>Grevillea excelsior</i> (Flame Grevillea)			
775.	2014 <i>Grevillea hakeoides</i>			
776.	13432 <i>Grevillea hakeoides</i> subsp. <i>hakeoides</i>			
777.	14415 <i>Grevillea insignis</i> subsp. <i>insignis</i>			
778.	2022 <i>Grevillea integrifolia</i> (Entire-leaved Grevillea)			
779.	2042 <i>Grevillea monticola</i>			
780.	2056 <i>Grevillea paniculata</i>			
781.	2066 <i>Grevillea pilulifera</i> (Woolly-flowered Grevillea)			
782.	2095 <i>Grevillea spinosissima</i>			
783.	2102 <i>Grevillea tenuiflora</i> (Tassel Grevillea)			
784.	2116 <i>Grevillea uncinulata</i> (Hook-leaf Grevillea)			
785.	12824 <i>Grevillea vestita</i> subsp. <i>vestita</i>			
786.	2125 <i>Hakea aculeata</i> (Column Hakea)			T
787.	2145 <i>Hakea corymbosa</i> (Cauliflower Hakea)			
788.	11924 <i>Hakea cygna</i> subsp. <i>cygna</i> (Swan Fruit Hakea)			
789.	2157 <i>Hakea erecta</i>			
790.	2164 <i>Hakea gilbertii</i>			
791.	2166 <i>Hakea incrassata</i> (Marble Hakea)			
792.	2175 <i>Hakea lissocarpha</i> (Honey Bush)			
793.	2187 <i>Hakea nitida</i> (Frog Hakea)			
794.	2196 <i>Hakea preissii</i> (Needle Tree, Dandjin)			

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795.	19131 <i>Hakea scoparia</i> subsp. <i>scoparia</i>			
796.	2211 <i>Hakea subsulcata</i>			
797.	2214 <i>Hakea trifurcata</i> (Two-leaf Hakea)			
798.	2227 <i>Isopogon divergens</i> (Spreading Coneflower)			
799.	2229 <i>Isopogon dubius</i> (Pincushion Coneflower)			
800.	2247 <i>Lambertia ilicifolia</i> (Holly-leaved Honeysuckle)			
801.	2270 <i>Persoonia quinquenervis</i>			
802.	2273 <i>Persoonia saccata</i> (Snottygobble)			
803.	2286 <i>Petrophile brevifolia</i>			
804.	14395 <i>Petrophile glauca</i>			
805.	14450 <i>Petrophile misturata</i>			
806.	20053 <i>Petrophile squamata</i> subsp. <i>northern</i> (J. Monks 40)			
807.	16869 <i>Synaphea cuneata</i>			
808.	15971 <i>Synaphea flabelliformis</i>			
809.	16761 <i>Synaphea interioris</i>			
810.	2329 <i>Synaphea spinulosa</i>			
811.	16763 <i>Synaphea tripartita</i>		P3	
Pteridaceae				
812.	31 <i>Cheilanthes austrotenuifolia</i>			
813.	34 <i>Cheilanthes distans</i> (Bristly Cloak Fern)			
814.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
Ranunculaceae				
815.	16087 <i>Clematis delicata</i>			
Resedaceae				
816.	3085 <i>Reseda luteola</i> (Wild Mingnonette)	Y		
Restionaceae				
817.	17663 <i>Desmocladius asper</i>			
818.	17662 <i>Desmocladius lateriticus</i>			
819.	17846 <i>Desmocladius parthenicus</i>			
820.	17840 <i>Desmocladius quiricanus</i>			
821.	1070 <i>Hypolaena exsulca</i>			
822.	1073 <i>Lepidobolus chaetocephalus</i> (Bristle-headed Chaff Rush)			
823.	1075 <i>Lepidobolus preissianus</i>			
824.	18074 <i>Lepidobolus preissianus</i> subsp. <i>preissianus</i>			
825.	1092 <i>Loxocarya cinerea</i>			
826.	15835 <i>Loxocarya striata</i>			
Rhamnaceae				
827.	31571 <i>Cryptandra intermedia</i>			
828.	4800 <i>Cryptandra leucopogon</i>			
829.	9076 <i>Cryptandra myriantha</i>			
830.	4809 <i>Cryptandra pungens</i>			
831.	4810 <i>Cryptandra scoparia</i>			
832.	16197 <i>Stenanthemum emarginatum</i>			
833.	16198 <i>Stenanthemum intricatum</i>			
834.	15065 <i>Stenanthemum notiale</i> subsp. <i>notiale</i>			
835.	31711 <i>Stenanthemum yorkense</i>		P1	
836.	4839 <i>Trymalium angustifolium</i>			
837.	15144 <i>Trymalium ledifolium</i> var. <i>lineare</i>			
838.	13479 <i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>			
839.	33418 <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>			
Rosaceae				
840.	10931 <i>Rosa chinensis</i> x <i>moschata</i>	Y		
Rubiaceae				
841.	7321 <i>Galium divaricatum</i>	Y		
842.	7350 <i>Opercularia rubioides</i>		P3	
843.	18255 <i>Opercularia vaginata</i> (Dog Weed)			
Rutaceae				
844.	4398 <i>Asterolasia grandiflora</i>		P4	
845.	4409 <i>Boronia coerulescens</i>			
846.	4443 <i>Boronia subsessilis</i>			
847.	15268 <i>Diplolaena graniticola</i>			
848.	4457 <i>Diplolaena microcephala</i> (Lesser Diplolaena)			
Santalaceae				
849.	10765 <i>Exocarpos sparteus</i> (Broom Ballart, Djuk)			
850.	2356 <i>Santalum acuminatum</i> (Quandong, Warrnga)			
851.	2359 <i>Santalum spicatum</i> (Sandalwood, Wilarak)			

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Sapindaceae				
852.	4746 <i>Diplopeltis huegelii</i>			
853.	18589 <i>Diplopeltis huegelii</i> subsp. <i>lehmannii</i>			
854.	4755 <i>Dodonaea bursariifolia</i>			
855.	4760 <i>Dodonaea divaricata</i>			
856.	4775 <i>Dodonaea pinifolia</i>			
857.	4782 <i>Dodonaea viscosa</i> (Sticky Hopbush)			
Scrophulariaceae				
858.	7055 <i>Dischisma capitatum</i> (Woolly-headed <i>Dischisma</i>)	Y		
859.	14895 <i>Eremophila decipiens</i> subsp. <i>decipiens</i>			
860.	7215 <i>Eremophila glabra</i> (Tar Bush)			
861.	29377 <i>Eremophila glabra</i> subsp. <i>York</i> (P.G. Wilson 12172 B)		P1	
862.	17174 <i>Eremophila glabra</i> subsp. <i>elegans</i>			
863.	7231 <i>Eremophila lehmanniana</i>			
864.	7268 <i>Eremophila serpens</i> (Snake <i>Eremophila</i>)		P4	
865.	17161 <i>Eremophila subfloccosa</i> subsp. <i>subfloccosa</i>			
866.	13405 <i>Phyllopodium cordatum</i>	Y		
867.	7113 <i>Zaluzianskya divaricata</i> (Spreading Night Phlox)	Y		
Solanaceae				
868.	11454 <i>Anthocercis anisantha</i> subsp. <i>anisantha</i>			
869.	6947 <i>Anthocercis ilicifolia</i>			
870.	6960 <i>Datura ferox</i> (Fierce Thornapple)	Y		
871.	6968 <i>Lycium ferocissimum</i> (African Boxthorn)	Y		
872.	6976 <i>Nicotiana occidentalis</i> (Native Tobacco)			
873.	6978 <i>Nicotiana rotundifolia</i> (Round-leaved Tobacco)			
874.	7005 <i>Solanum elaeagnifolium</i> (White Horse Nettle, Silverleaf Nightshade)	Y		
875.	7025 <i>Solanum oldfieldii</i>			
Stylidiaceae				
876.	7670 <i>Levenhookia dubia</i> (Hairy Stylewort)			
877.	7677 <i>Levenhookia stipitata</i> (Common Stylewort)			
878.	7679 <i>Stylidium adpressum</i> (Trigger-on-stilts)			
879.	30278 <i>Stylidium androsaceum</i>			
880.	7692 <i>Stylidium breviscapum</i> (Boomerang Triggerplant)			
881.	7696 <i>Stylidium calcaratum</i> (Book Triggerplant)			
882.	7698 <i>Stylidium caricifolium</i> (Milkmaids)			
883.	7702 <i>Stylidium ciliatum</i> (Golden Triggerplant)			
884.	23472 <i>Stylidium coroniforme</i> subsp. <i>amblyphyllum</i>		P1	
885.	7713 <i>Stylidium dichotomum</i> (Pins-and-needles)			
886.	11808 <i>Stylidium diuroides</i> subsp. <i>diuroides</i>			
887.	7721 <i>Stylidium emarginatum</i> (Biddy-four-legs)			
888.	19251 <i>Stylidium eriopodium</i>			
889.	19400 <i>Stylidium hortiorum</i>			
890.	7749 <i>Stylidium leptophyllum</i> (Needle-leaved Triggerplant)			
891.	20610 <i>Stylidium perula</i>			
892.	7773 <i>Stylidium petiolare</i> (Horn Triggerplant)			
893.	7774 <i>Stylidium piliferum</i> (Common Butterfly Triggerplant)			
894.	7785 <i>Stylidium repens</i> (Matted Triggerplant)			
895.	7795 <i>Stylidium scabridum</i> (Moth Triggerplant)		P4	
896.	17510 <i>Stylidium</i> sp. <i>Kalbarri</i> (A. Carr 145)			
897.	31605 <i>Stylidium</i> sp. <i>Narembeen</i> (W.E. Blackall s.n. /09/1929)			
898.	7801 <i>Stylidium squamellosum</i> (Maize Trigger Plant)		P2	
899.	9304 <i>Stylidium zeicolor</i> (Maize Triggerplant)			
Surianaceae				
900.	3181 <i>Stylobasium australe</i>			
Tamaricaceae				
901.	33020 <i>Tamarix parviflora</i>	Y		
Thymelaeaceae				
902.	5231 <i>Pimelea angustifolia</i> (Narrow-leaved <i>Pimelea</i>)			
903.	5232 <i>Pimelea argentea</i> (Silvery Leaved <i>Pimelea</i>)			
904.	11928 <i>Pimelea ciliata</i> subsp. <i>ciliata</i>			
905.	11402 <i>Pimelea imbricata</i> var. <i>piligera</i>			
906.	5259 <i>Pimelea preissii</i>			
907.	5269 <i>Pimelea sylvestris</i>			
908.	5272 <i>Pimelea villifera</i>			
Urticaceae				
909.	1762 <i>Parietaria debilis</i> (Pellitory)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
910.	1252 <i>Xanthorrhoea drummondii</i>			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Fauna Report (5km) - York to Merredin

Created By Laura Zimmermann on 27/08/2014

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Group By Species Group

Species Group	Species	Records
Amphibian	10	89
Bird	118	1616
Invertebrate	36	82
Mammal	20	99
Reptile	49	328
TOTAL	233	2214

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amphibian				
1.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
2.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
3.	25408 <i>Heleioporus albopunctatus</i> (Western Spotted Frog)			
4.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
5.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
6.	25420 <i>Myobatrachus gouldii</i> (Turtle Frog)			
7.	25421 <i>Neobatrachus albipes</i> (White-footed Trilling Frog)			
8.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
9.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
10.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
Bird				
11.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
12.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
13.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
14.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
15.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
16.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
17.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
18.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
19.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
20.	24301 <i>Aegotheles cristatus</i> subsp. <i>cristatus</i> (Australian Owlet-nightjar)			
21.	24312 <i>Anas gracilis</i> (Grey Teal)			
22.	24313 <i>Anas platyrhynchos</i> (Mallard)			
23.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
24.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
25.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
26.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
27.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
28.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
29.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
30.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
31.	24352 <i>Artamus cinereus</i> subsp. <i>melanops</i> (Black-faced Woodswallow)			
32.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
33.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
34.	24318 <i>Aythya australis</i> (Hardhead)			
35.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
36.	24723 <i>Cacatua pastinator</i> subsp. <i>butleri</i> (Butler's Corella)			
37.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
38.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
39.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
40.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)		T	
41.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
42.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
43.	24833 <i>Cincloramphus cruralis</i> (Brown Songlark)			
44.	24834 <i>Cincloramphus mathewsi</i> (Rufous Songlark)			
45.	24396 <i>Climacteris rufa</i> (Rufous Treecreeper)			
46.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
47.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
48.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
49.	24416 <i>Corvus bennetti</i> (Little Crow)			
50.	25592 <i>Corvus coronoides</i> (Australian Raven)			
51.	24673 <i>Coturnix ypsilophora</i> subsp. <i>australis</i> (Brown Quail)			
52.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
53.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
54.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
55.	24322 <i>Cygnus atratus</i> (Black Swan)			
56.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
57.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
58.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
59.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
60.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
61.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
62.	25621 <i>Falco berigora</i> (Brown Falcon)			
63.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
64.	24472 <i>Falco cenchroides</i> subsp. <i>cenchrus</i> (Australian Kestrel)			
65.	25623 <i>Falco longipennis</i> (Australian Hobby)			
66.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
67.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
68.	25727 <i>Fulica atra</i> (Eurasian Coot)			
69.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
70.	-13853 <i>Gallus gallus</i>			
71.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
72.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
73.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
74.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
75.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
76.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
77.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
78.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
79.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
80.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
81.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
82.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
83.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
84.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
85.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
86.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
87.	25693 <i>Microeca fascians</i> (Jacky Winter)			
88.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
89.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
90.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
91.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
92.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
93.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
94.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
95.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
96.	24658 <i>Petroica cucullata</i> (Hooded Robin)			
97.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
98.	24660 <i>Petroica multicolor</i> subsp. <i>campbelli</i> (Scarlet Robin)			
99.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
100.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
101.	25669 <i>Phylidonyris nigra</i> (White-cheeked Honeyeater)			
102.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
103.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
104.	-13957 <i>Platycercus eximius</i>			
105.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
106.	24750 <i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
107.	24751 <i>Platycercus zonarius</i> subsp. <i>zonarius</i> (Port Lincoln Parrot)			
108.	24681 <i>Polocephalus polocephalus</i> (Hoary-headed Grebe)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
109.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
110.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
111.	42344 <i>Purnella albifrons</i> (White-fronted Honeyeater)			
112.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
113.	25613 <i>Rhipidura fuliginosa</i> (Grey Fantail)			
114.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
115.	30948 <i>Smicronis brevirostris</i> (Weebill)			
116.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
117.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
118.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
119.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
120.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
121.	30871 <i>Taeniopygia guttata subsp. castanotis</i> (Zebra Finch)			
122.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
123.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
124.	24851 <i>Turnix velox</i> (Little Button-quail)			
125.	24852 <i>Tyto alba subsp. delicatula</i> (Barn Owl)			
126.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
127.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
128.	24856 <i>Zosterops lateralis subsp. gouldi</i> (Grey-breasted White-eye)			
Invertebrate				
129.	33902 <i>Aganippe castellum</i> (Tree-stem Trapdoor Spider)		P4	
130.	-12754 <i>Aname mainae</i>			
131.	-12792 <i>Antichiropus variabilis subsp. ingens</i>			Y
132.	-1868 <i>Argiope protensa</i>			
133.	-12279 <i>Artoria impedita</i>			
134.	<i>Baiami volucripes</i>			
135.	-1888 <i>Cormocephalus aurantiipes</i>			
136.	-12862 <i>Crustulina bicruciatata</i>			
137.	-12975 <i>Cryptoerithus quobba</i>			
138.	-13653 <i>Dingosa serrata</i>			
139.	-1766 <i>Ethmostigmus rubripes</i>			
140.	-11966 <i>Geogarypus connatus</i>			
141.	-13389 <i>Geogarypus taylori</i>			
142.	-1770 <i>Grayenulla australensis</i>			
143.	-11867 <i>Hoggicosa storri</i>			
144.	-12268 <i>Holconia westralia</i>			
145.	33917 <i>Idiosoma nigrum</i> (Shield-backed Trapdoor Spider)		T	
146.	-1771 <i>Isopedella saundersi</i>			
147.	33978 <i>Ixalodectes flectocercus</i> (cricket)		P1	
148.	-1834 <i>Lampona cylindrata</i>			
149.	-12172 <i>Lamponella kimba</i>			
150.	-11912 <i>Lycosa gilberta</i>			
151.	-12980 <i>Lycosa godeffroyi</i>			
152.	-12393 <i>Missulena occatoria</i>			
153.	-12354 <i>Mitzoruga insularis</i>			
154.	-12974 <i>Molycris vokes</i>			
155.	-12741 <i>Nomindra leeuweni</i>			
156.	-12902 <i>Notsodipus visio</i>			
157.	-13173 <i>Pediana occidentalis</i>			
158.	-1789 <i>Scolopendra laeta</i>			
159.	-1942 <i>Scolopendra morsitans</i>			
160.	-13718 <i>Synsphyronus mimulus</i>			
161.	-13661 <i>Tasmanicosa leuckartii</i>			
162.	-11918 <i>Thereuopoda lesueurii</i>			
163.	-12253 <i>Urodacus novaehollandiae</i>			
164.	-12804 <i>Withius piger</i>			
Mammal				
165.	24039 <i>Canis lupus subsp. dingo</i> (Dingo)	Y		
166.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
167.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattle Bat)			
168.	24041 <i>Felis catus</i> (Cat)	Y		
169.	24215 <i>Hydromys chrysogaster</i> (Water-rat)		P4	
170.	24128 <i>Lagostrophus fasciatus subsp. fasciatus</i> (Bernier Is. Banded Hare-wallaby, Mermine)		T	
171.	24133 <i>Macropus irma</i> (Western Brush Wallaby)		P4	
172.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte)		T	
173.	24223 <i>Mus musculus</i> (House Mouse)	Y		
174.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
175.	24098 <i>Phascogale calura</i> (Red-tailed Phascogale, Kenngoos)		T	

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
176.	24099 <i>Phascogale tapoatafa</i> subsp. <i>tapoatafa</i> (Southern Brush-tailed Phascogale, Wambenger)		T	
177.	24241 <i>Pseudomys shortridgei</i> (Heath Mouse, Dayang)		T	
178.	24108 <i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
179.	24109 <i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)			
180.	24111 <i>Sminthopsis gilberti</i> (Gilbert's Dunnart)			
181.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
182.	24185 <i>Tadarida australis</i> (White-striped Freetail-bat)			
183.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
184.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		

Reptile

185.	25241 <i>Antaresia stimsoni</i> subsp. <i>stimsoni</i> (Stimson's Python)			
186.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			
187.	25236 <i>Aspidites ramsayi</i> (Woma)		S	
188.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
189.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
190.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
191.	24918 <i>Crenadactylus ocellatus</i> subsp. <i>ocellatus</i> (Clawless Gecko)			
192.	30893 <i>Cryptoblepharus buchananii</i>			
193.	25020 <i>Cryptoblepharus plagiocephalus</i>			
194.	24883 <i>Ctenophorus ornatus</i> (Ornate Crevice-Dragon)			
195.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
196.	25039 <i>Ctenotus fallens</i>			
197.	25463 <i>Ctenotus pantherinus</i> (Leopard Ctenotus)			
198.	25065 <i>Ctenotus pantherinus</i> subsp. <i>pantherinus</i> (Leopard Ctenotus)			
199.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
200.	24929 <i>Diplodactylus granariensis</i> subsp. <i>granariensis</i>			
201.	24940 <i>Diplodactylus pulcher</i>			
202.	25251 <i>Echiopsis curta</i> (Bardick)			
203.	25109 <i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
204.	24959 <i>Gehyra variegata</i>			
205.	42408 <i>Hesperoedura reticulata</i>			
206.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
207.	25131 <i>Lerista distinguenda</i>			
208.	25005 <i>Lialis burtonis</i>			
209.	41413 <i>Liopholis multiscutata</i> (Bull Skink)			
210.	30935 <i>Lucasium maini</i>			
211.	25184 <i>Menetia greyii</i>			
212.	24904 <i>Moloch horridus</i> (Thorny Devil)			
213.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)		S	
214.	25192 <i>Morethia obscura</i>			
215.	25249 <i>Neelaps calonotos</i> (Black-striped Snake)		P3	
216.	25253 <i>Parasuta gouldii</i>			
217.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
218.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
219.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
220.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
221.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
222.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
223.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
224.	25271 <i>Ramphotyphlops australis</i>			
225.	25273 <i>Ramphotyphlops bituberculatus</i>			
226.	25288 <i>Ramphotyphlops waitii</i>			
227.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
228.	25518 <i>Strophurus spinigerus</i>			
229.	24943 <i>Strophurus spinigerus</i> subsp. <i>inornatus</i>			
230.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
231.	25207 <i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
232.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
233.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			

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S - Other specially protected fauna
1 - Priority 1
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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 08/09/14 11:47:10

[Summary](#)

[Details](#)

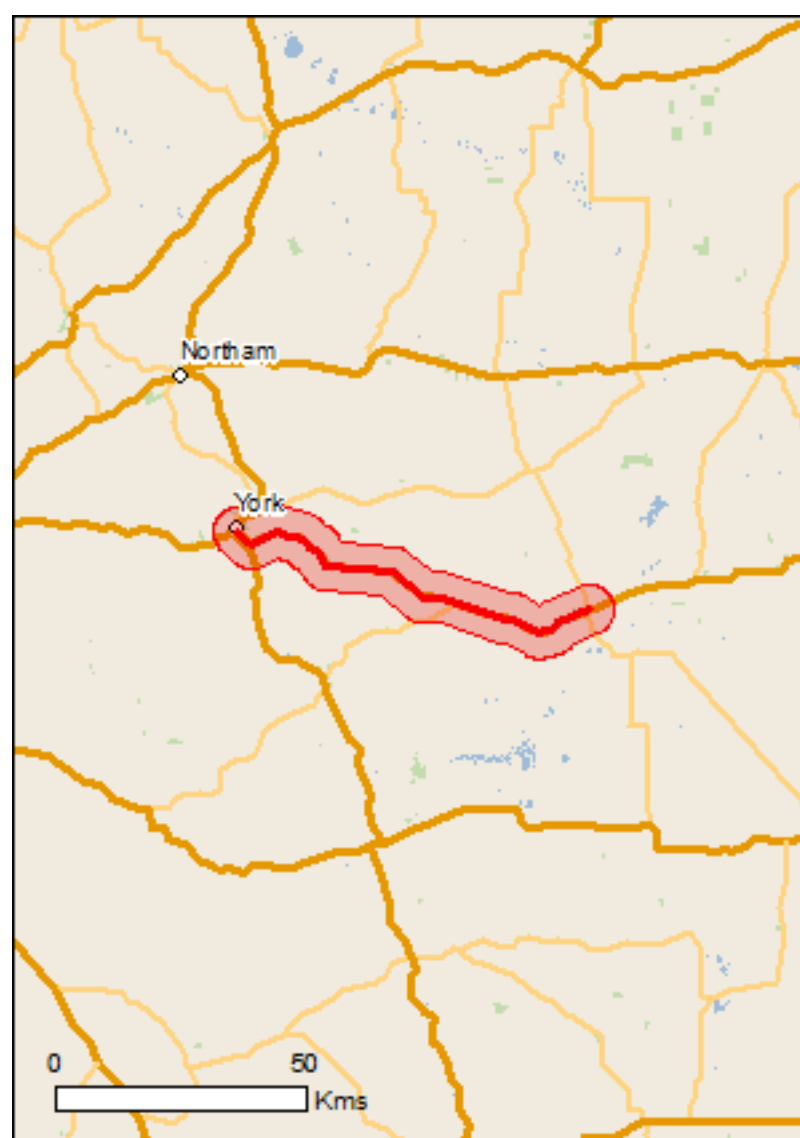
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

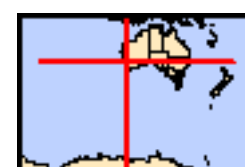
[Acknowledgements](#)



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[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	30
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	74
State and Territory Reserves:	6
Regional Forest Agreements:	None
Invasive Species:	21
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Phascogale calura Red-tailed Phascogale [316]	Endangered	Species or species habitat known to occur within area
Other		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia ataxiphylla subsp. magna Large-fruited Tammin Wattle [64823]	Endangered	Species or species habitat likely to occur within area
Allocasuarina fibrosa Woolly Sheoak [17455]	Vulnerable	Species or species habitat likely to occur within area
Banksia cuneata Matchstick Banksia, Quairading Banksia [9827]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Banksia oligantha Wagin Banksia [20697]	Endangered	Species or species habitat may occur within area
Boronia capitata subsp. capitata a shrub [29156]	Endangered	Species or species habitat likely to occur within area
Calectasia pignattiana Stilted Tinsel Lily [82018]	Vulnerable	Species or species habitat known to occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat may occur within area
Eucalyptus pruiniramis Midlands Gum, Jingymia Gum [56403]	Endangered	Species or species habitat may occur within area
Gastrolobium diabolophyllum Bodallin Poison [78384]	Critically Endangered	Species or species habitat may occur within area
Gastrolobium hamulosum Hook-point Poison [9212]	Endangered	Species or species habitat may occur within area
Grevillea dryandroides subsp. hirsuta Hairy Phalanx Grevillea [64577]	Endangered	Species or species habitat likely to occur within area
Grevillea scapigera Corrigin Grevillea [12195]	Endangered	Species or species habitat may occur within area
Guichenotia seorsiflora [82693]	Critically Endangered	Species or species habitat may occur within area
Hakea aculeata Column Hakea [11191]	Vulnerable	Species or species habitat known to occur within area
Jacksonia quairading Quairading Jacksonia, Quairading Stinkwood [67417]	Endangered	Species or species habitat likely to occur within area
Melaleuca sciotostyla Wongan Melaleuca [24324]	Endangered	Species or species habitat known to occur within area
Rhizanthella gardneri Underground Orchid, Western Australian Underground Orchid [20109]	Endangered	Species or species habitat likely to occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area
Stylidium coroniforme Wongan Hills Triggerplant, Wongan Triggerplant [10122]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Symonanthus bancroftii Bancrofts Symonanthus [12837]	Endangered	Species or species habitat may occur within area
Thomasia glabripetala Sandplain Thomasia [56547]	Vulnerable	Species or species habitat likely to occur within area
Verticordia staminosa subsp. staminosa Wongan Featherflower [55825]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
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Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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Migratory Terrestrial Species

Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
---	--	--

Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
---	--	--

Migratory Wetlands Species

Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
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Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
--	--	--

Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
---	-------------	--

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
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Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
--	--	---

Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur
--	--	--

Name	Threatened	Type of Presence within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Places on the RNE [[Resource Information](#)]

Note that not all Indigenous sites may be listed.

Name	State	Status
Indigenous		
Frieze Cave Painting Site	WA	Registered
Historic		
Avon Valley Landscape Area	WA	Indicative Place
Hartleap Farmhouse and Outbuildings	WA	Indicative Place
Hillside Farmhouse	WA	Indicative Place
ANZ Bank including Quarters	WA	Registered
Albion Hotel (former) including Grounds	WA	Registered
Anglican Church of the Holy Trinity including Rectory	WA	Registered
Balladong Farm Buildings	WA	Registered
Balladong Farm Group	WA	Registered
Bank of Australasia (former)	WA	Registered
Blands Brook and Bridge	WA	Registered
Bridge House including Gardens	WA	Registered
Brook Cottage	WA	Registered
Bygraves	WA	Registered
CWA House	WA	Registered
Castle Hotel	WA	Registered
Cemetery	WA	Registered
Central Buildings	WA	Registered
Clementine House	WA	Registered
Collins Building	WA	Registered
Convent of Mercy (former)	WA	Registered
Davies Buildings	WA	Registered
Faversham House and Barns	WA	Registered
Fire Station	WA	Registered
Flour Mill	WA	Registered
Four Shops	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House and Grounds	WA	Registered
House and Outbuildings	WA	Registered

Name	State	Status
House and Outbuildings	WA	Registered
Imperial Hotel including Outbuildings	WA	Registered
Kairey Cottage	WA	Registered
Korrawilla	WA	Registered
Langsford House	WA	Registered
Laureville	WA	Registered
Look Out For Train Cottage (former)	WA	Registered
Marwicks Barn	WA	Registered
Masonic Hall	WA	Registered
Old Cemetery Site	WA	Registered
Police Quarters (former)	WA	Registered
Railway Station including Platform and Quarters	WA	Registered
Redmile House and Grounds	WA	Registered
Residency Museum	WA	Registered
Sargents Pharmacy (former)	WA	Registered
Settlers House including Courtyard and Gardens	WA	Registered
Shops	WA	Registered
Shops	WA	Registered
Shops and Residence Over including building behind (former)	WA	Registered
Spencers Bakery (former)	WA	Registered
St Patricks Catholic Church and Presbytery	WA	Registered
Stone House	WA	Registered
Swing Bridge	WA	Registered
Uniting Church and Hall	WA	Registered
War Memorial and Park	WA	Registered
Westpac Bank including Residence	WA	Registered
York Coop including Building and Grounds	WA	Registered
York Courthouse including Police Station and Gaol (former)	WA	Registered
York Historic Town	WA	Registered
York Hospital (former)	WA	Registered
York Hotel	WA	Registered
York Motor Museum	WA	Registered
York Post Office	WA	Registered
York Primary School	WA	Registered
York Public Library	WA	Registered
York Town Hall	WA	Registered

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Dangin	WA
Dulbelling	WA
Quairading Spring	WA
Unnamed WA26897	WA
Unnamed WA40642	WA
Unnamed WA46074	WA

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Cygnus olor Mute Swan [962]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Coordinates

-31.891493 116.773311,-31.908981 116.796657,-31.889161 116.843349,-31.897323
116.862575,-31.897323 116.877681,-31.90082 116.888667,-31.91481 116.899654,-31.917141
116.913386,-31.941617 116.928493,-31.950939 117.046596,-31.991714 117.102901,
-31.990549 117.137233,-32.021991 117.252589,-32.021991 117.263576,-32.045275
117.308894,-32.040619 117.324,-32.040619 117.33224,-32.028977 117.343227,-32.009183
117.358158

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix D – Flora Data

Likelihood of occurrence assessment for conservation significant flora taxa potentially occurring within the Study Area

Flora species recorded within the Study Area during the field survey

Quadrat Data

Table D.1 Guiding parameters for flora likelihood of occurrence assessment

Likelihood of occurrence	Guiding parameters
Known	Species previously recorded within the Study Area.
Likely	Species is relatively wide spread, has been previously recorded within 10 km of the Study Area and suitable habitat occurs within the Study Area OR Species is rare but has been previously recorded within 100 m of the Study Area and suitable habitat occurs at the Study Area
Possible	Species previously recorded within 10 km with suitable habitat occurring at the Study Area.
Unlikely	Suitable habitat for the species does not occur at the Study Area OR Suitable habitat does occur but the species has a highly restricted distribution, is very rare and only known from a limited number of populations The Study Area is outside the species' natural distribution.

Table D.2 Likelihood of occurrence assessment for conservation significant flora taxa potentially occurring within the Study Area

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Asteraceae	<i>Senecio gilbertii</i>		P1	Erect, slender perennial, herb, to 1.5 m high. Fl. yellow, Sep to Nov.	Peaty sand. Swamps, slopes.	DPaW databases	Possible
Casuarinaceae	<i>Allocasuarina fibrosa</i>	Vu	T	Dioecious shrub, 0.5-1.5 m high, cone with long tangled coarse hairs. Fl. red/brown, Jul to Aug.	Sand over laterite. Low ridges, quartz outcrops. Four populations south of Tammin and east of Quairading. Grows in tall open heath	Naturemap/ PMST DPaW databases	Possible
Celastraceae	<i>Stackhousia</i> sp. Red-blotched corolla (A. Markey 911)		P3	Unknown	granite, whity sandy clay over granite	Naturemap DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Chenopodiaceae	<i>Roycea pycnophylloides</i>	En	T	Perennial, herb, forming densely branched, silvery mats to 1 m wide. Fl. Sep.	Sandy soils, clay. Saline flats. Salt lakes	PMST	Unlikely. Suitable habitat limited, and not recorded within 10 km of the Study Area
Cyperaceae	<i>Centrolepis caespitosa</i>	En	P4	Tufted annual, herb (forming a rounded cushion up to 25 mm across). Fl. Oct to Dec.	White sand, clay. Salt flats, wet areas.	PMST	Possible
Dilleniaceae	<i>Hibbertia montana</i>		P4	Erect, straggling or sprawling shrub, 0.1-0.7 m high. Fl. yellow, Jul to Oct.	Loam over granite, lateritic soils, gravel. Granite rocks, lateritic ridges & boulders, hills.	Naturemap DPaW databases	Possible
Fabaceae	<i>Acacia ataxiphylla</i> subsp. <i>magna</i>	En	T	Spreading to ascending shrub, 0.3-0.6 m high. Fl. yellow, Jun to Jul. \	Sandy soils. Lateritic ironstone rises, flats. Endemic to the Cundedin-Tammin area of WA where it occurs over a range of approximately 15km (Harris and Brown 2003)	PMST DPaW databases	Unlikely. The Study Area is not within the known range of this species.
Fabaceae	<i>Acacia cuneifolia</i>		P4	Erect or straggly shrub, 1-3 m high. Fl. yellow, Jul to Oct.	Sand, clay or loam over granite. Granite outcrops & hills, rocky watercourses.	DPaW databases	Possible.
Fabaceae	<i>Acacia lirellata</i> subsp. <i>lirellata</i>		P3	Bushy procumbent to erect shrub, 0.3-2(-3) m high, to 4 m wide. Fl. yellow, Jun to Aug.	Sandy & loamy soils.	DPaW databases	Possible
Fabaceae	<i>Acacia phaeocalyx</i>		P3	Intricately branched, sprawling or compact, pungent shrub, 0.3-0.6(-0.8) m high. Fl. yellow, Apr to Jun	Yellow or white sand, often over laterite. Flats, hillsides. In scrub and tall shrubland (Maslin 2001).	Naturemap DPaW databases	Possible
Fabaceae	<i>Acacia ridleyana</i>		P3	Spreading, sprawling shrub, 0.2-0.9 m high, 0.5-2 m wide. Fl. yellow, Aug to Dec.	Grey or yellow/brown sand, gravelly clay, granitic loam.	DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Fabaceae	<i>Gastrolobium hamulosum</i>	En	T	Low shrub, 0.2-0.45 m high. Fl. yellow&orange&red&purple, Aug to Oct.	Sandy, often gravelly soils or clay. Flats, slopes, ridges. Populations from near Watheroo, Carani, Calingiri, east of New Norcia, near Bindi Bindi and at Wongan Hills	PMST	Unlikely. The Study Area is not within the known range of this species.
Hemerocallidaceae	<i>Arnocrinum drummondii</i>		P3	Rhizomatous, perennial, herb, 0.15-0.5 m high. Fl. purple, Sep to Dec.	White or yellow sand.	Naturemap DPaW databases	Possible
Lamiaceae	<i>Dasymalla (was Pityrodia) axillaris</i>	CE	T	This species is a low, diffuse shrub to 0.3m high. Flowers red to yellowish-scarlet, July to December (DotE 2014e)	This species occurs in the Morawa area in sandy soils. It is thought to be a disturbance opportunist (DotE 2014e)	PMST	Unlikely. The Study Area is not within the known range of this species.
Lamiaceae	<i>Hemigenia platyphylla</i>		P4	Spreading shrub, 0.2-1.5 m high. Fl. blue-purple, Sep to Nov.	Sandy & loamy soils. Granite rocks, slopes.	DPaW databases	Possible
Malvaceae	<i>Guichenotia seorsiflora</i>	CE	T	Multi-stemmed shrub, to 0.6 m high. Fl. pink/pink-cream, Jul to Sep.	Sandy clay with lateritic gravel. Breakaways.	PMST	Possible.
Malvaceae	<i>Thomasia glabripetala</i>	Vu	T	Open shrub, to 1.5 m high. Fl. pink-purple, Sep to Oct.	Yellow/brown sand. Areas east of York, often on road verges. Found on deep yellow sand over gravel and forms part of the open scrub layer in Eucalyptus wandoo woodland (DotE 2014a).	Naturemap/ PMST DPaW databases	Possible
Malvaceae	<i>Thomasia montana</i>	Vu	T	Upright shrub, 0.5-1 m high. Fl. blue-purple-red, Sep to Oct.	Loamy soils. Rocky granite knolls, lateritic hills. Occurs on elevated sites at moist sites with soil derived from granite. Associated vegetation includes Eucalyptus wandoo, Corymbia calophylla and Allocasuarina huegeliana (DotE 2014b)	Naturemap DPaW databases	Possible
Myrtaceae	<i>Chamelaucium</i> sp. Dryandra (D. Rose 446)		P2	Unknown	lateritic soil, ridges, breakaways, ironstone gravel	Naturemap DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Myrtaceae	<i>Darwinia thymoides</i> subsp. St Ronans (J.J. Alford & G.J. Keighery 64)		P1		Hilltop, sand over laterite	DPaW databases	Possible
Myrtaceae	<i>Darwinia</i> sp. Wyalgima Hill (L.W. Sage, J.P. Pigott & E.B. Pigott LWS1549)		P1	Compact, erect, aromatic shrub, 0.5-0.7 m high. Fl. green, Sep.	Brown lateritic soil. Hills, ridge lines.	DPaW databases	Possible
Myrtaceae	<i>Eucalyptus erythronema</i> subsp. <i>inornata</i>		P3	Mallee, bark smooth throughout. Branchlets not waxy, flowers pale creamy yellow (Nicholle and French 2012).	Restricted to central wheatbelt, grows in a variety of landscapes, usually in sites of good drainage from lateritic and sandy gravel rises to slight slopes of pale red to grey loams. Often occurs with <i>E. salmonphloia</i> and/or <i>E. wandoo</i> (Nicholle and French 2012)	Naturemap DPaW databases	Possible
Myrtaceae	<i>Eucalyptus exilis</i>		P4	Whipstick mallee, 2-6 m high, bark smooth. Fl. white, Aug to Oct.	Grey sand, gravelly loam. Lateritic ridges.	Naturemap DPaW databases	Possible
Myrtaceae	<i>Eucalyptus loxophleba</i> x <i>wandoo</i>		P4	Mallee or tree, 4-20 m high, bark rough black-brown on trunk.	Sandy clay or loam.	Naturemap DPaW databases	Possible
Myrtaceae	<i>Eucalyptus pruiniramis</i>	En	T	Mallee or tree, 2.5-7 m high, often with straggly, tumbledown crown; bark rough & ribbony at base, smooth above. Fl. cream, Dec.	Skeletal soils over sandstone or laterite. Rocky hillslopes. Occurs between Mogumber and Arrino, north of Three Springs	PMST	Unlikely. The Study Area is not within the known range of this species.
Myrtaceae	<i>Melaleuca sciotostyla</i>	En	T	Spreading shrub, 0.6-1.5 m high. Fl. Aug.	Orange clayey sand with lateritic pebbles. Scree slopes.	PMST DPaW databases	Possible
Myrtaceae	<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan.	Sand, sandy clay. Winter-wet depressions.	Naturemap DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Myrtaceae	<i>Verticordia staminosa</i> subsp. <i>staminosa</i>	En	T	Spreading shrub, 0.15-0.6 m high. Fl. green-yellow/yellow-brown, Jul to Oct.	Soil pockets. Granite outcrops. Occurs in the Wongan Hills area.	PMST	Unlikely. This species has a restricted distribution and the Study Area is not within its known range
Orchidaceae	<i>Caladenia integra</i>		P4	Tuberous, perennial, herb, 0.2-0.5 m high. Fl. green & red, Sep to Oct	Clayey loam. Granite outcrops, rocky slopes.	DPaW databases	Possible
Orchidaceae	<i>Rhizanthella gardneri</i>	En	T	Tuberous, perennial, herb, flowers develop under the surface and break through as they mature; flowers c. 6 mm long, 5 mm wide. Fl. pink-purple, May to Jul.	Sand. Grows in association with <i>Melaleuca uncinata</i> .	PMST	Unlikely. The Study Area is not within the known range of this species.
Proteaceae	<i>Banksia oligantha</i>	En	T	Non-lignotuberous shrub, to 3 m high. Fl. red & cream/orange-brown, Oct to Nov. Erect shrub or small tree to 5m with few main stems, superficially resembles <i>Banksia sessilis</i> when not in flower (DEC 2008)	Yellow or yellow-brown sand. Occurs over a range of about 100km in deep white to white-grey, yellow-brown sands between Harrismith and Kojonup. Generally found in tall open low woodland over heath in which it is sometimes dominant (DEC 2008a)	PMST	Unlikely. The Study Area is not within the known range of this species.
Proteaceae	<i>Banksia rufa</i> subsp. <i>tutanningensis</i>		P2	Bushy, erect, non-lignotuberous shrub, 0.5-1.5 m high. Fl. yellow-orange, Sep to Oct.	Lateritic rises.	Naturemap DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Proteaceae	<i>Grevillea dryandroides</i> subsp. <i>hirsuta</i>	En	T	Prostrate, vigorously suckering shrub, 0.05-0.3 m high. Fl. red/pink-red, May or Sep to Nov.	White or yellow sand, laterite. Found over a range of approximately 250 km, between the Cadoux area and Corrigin. Most populations found on narrow disturbed roadsides which are severely weed infested (DEC 2008b)	PMST	Possible. The Study Area is not within the known range of this species, it occurs approximately 25km south of the Study Area; however, it may contain suitable habitat and it is unknown whether the Study Area has been previously searched for this species
Proteaceae	<i>Grevillea scapigera</i>	En	T	Suckering, prostrate to weakly ascending shrub, 0.15-0.4 m high, up to 1.8 m wide. Fl. white/yellow-green, Feb or Oct to Nov.	Sandy or gravelly lateritic soils. Restricted to the Corrigin area.	PMST	Unlikely. This species has a restricted distribution and the Study Area is not within its known range
Proteaceae	<i>Hakea aculeata</i>	Vu	T	Lignotuberous shrub (with several erect or ascending stems), to 3 m high. Fl. yellow, Oct.	Sand, loam or clay. Road verge. Often occurs on road reserve, on higher ground or hill tops on pale white loamy sand and gravelly soil and in clay. Occurs in tall shrubland, scrub and heath (DotE 2014c)	Naturemap/ PMST DPaW databases	Possible
Rhamnaceae	<i>Stenanthemum yorkense</i>		P1	Low and spreading shrub, 0.1-0.15 m high. Flowering period unknown, fruiting material collected in July	Grey-white sand, brown loam with laterite pebbles. Hilltops and ridges. Known from a single collection in the York area, from a quartzite hilltop with <i>Eucalyptus accedens</i> and <i>Allocasuarina</i> (Rye 2007)	Naturemap DPaW databases	Possible
Rutaceae	<i>Asterolasia grandiflora</i>		P4	Slender open shrub, 0.2-0.6(-0.8) m high. Fl. pink/white, Jul to Oct.	Lateritic soils, clay over granite. Breakaways, hills.	Naturemap DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Rutaceae	<i>Boronia capitata</i> subsp. <i>capitata</i>	En	T	Slender shrub, 0.3-1.3 m high. Fl. pink, Aug to Dec or Feb.	Sand, often over laterite. Sandplains. This species is found only in the Tutanning area, east of Pingelly (DotE 2014d)	PMST	Unlikely. The Study Area is not within the known range of this species.
Scrophulariaceae	<i>Eremophila glabra</i> subsp. York (P.G. Wilson 21172 B)		P1	A restricted subspecies with a prostrate habit and distinctive yellowish-green corolla with pink or red anthers. Flowering July to September	Records between Beverly, York and Dowerin, grown in Eucalyptus loxophleba woodlands with scattered low Acacia, Olearia and Daviesia species (Brown and Buirchell 2011)	Naturemap DPaW databases	Possible
Scrophulariaceae	<i>Eremophila serpens</i>		P4	Prostrate, creeping, forming large patches shrub, 0.03-0.4 m high, forming large patches to 2 m wide. Fl. green/yellow-green, Sep to Dec or Mar to May.	White/grey sand, alluvium, loam. Winter-wet depressions, sub-saline flats, drainage lines, salt lakes.	Naturemap	Unlikely. This species is known from the approximately 180 km from the Study Area. The record on Naturemap is likely to be an error.
Solanaceae	<i>Symonanthus bancroftii</i>	En	T	Shrub, 0.15-0.25 m high. Fl. white, Sep.	Geographically restricted to two highly degraded areas in the Shire of Bruce Rock. Only known from one natural population and two translocated populations (DEC 2006)	PMST	Unlikely. This species has a restricted distribution and the Study Area is not within its known range
Stylidiaceae	<i>Stylidium coroniforme</i> subsp. <i>amblyphyllum</i>	(En - Stylidium coroniforme listed)	P1	Rosetted perennial, herb, 0.08-0.15 m high, Leaves narrowly oblanceolate, 1-2 cm long, 0.8-1.5 mm wide, apex blunt or very shortly mucronate, marginate, glabrous. Scape glabrous at base, glandular on inflorescence axis. Inflorescence racemose, or paniculate. Flowers September and October (Wege and Coates 2007)	Lateritic soils. Breakaways. Eucalypt woodland, Dryandra shrubland. Known from a small cluster of populations near Quairading (north of York -Merredin road) on private property (Wege and Coates 2007)	Naturemap/ PMST* DPaW databases	Possible

Family	Taxon	Status - Federal	Status - State	Description	Habitat	Source	Likelihood of Occurrence
Stylidiaceae	<i>Stylidium scabridum</i>		P4	Rosetted perennial, herb, 0.05-0.24 m high, Leaves tufted, linear, 2.5-9.5 cm long, 0.7-2 mm wide, apex acute to mucronate, margin involute, scabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout, pilose at base. Inflorescence racemose. Fl. pink, Sep to Nov	Sand. Open woodland or heath.	Naturemap DPaW databases	Possible

**Stylidium coroniforme* has been recently split into two subspecies, which isn't reflected in the EPBC Act PMST search - however for the purpose of this assessment it is assumed that the subspecies *amblyphyllum* is relevant to this search area

Legend:

CE Critically Endangered

En Endangered

Vu Vulnerable

T Threatened (Declared Rare Flora)

P Priority (listed by Department of Parks and Wildlife)

PMST Protected Matters Search Tool

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DotE (2014e) SPRAT information for *Pityrodia axillaris* (Native Foxglove) Retrieved July 2014 from <http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora>

DEC (2006) Bailey's *Symonanthus* (*Symonanthus bancroftii*) Interim Recovery Plan 2006-2011. Interim Recovery Plan No. 225. Department of Environment and Conservation, Western Australia.

Table D.3 Flora species recorded within the Study Area during the field survey

Family	Genus	Species	Status	Section 1	Section 2	Section 3
Aizoaceae	<i>Mesembryanthemum</i>	<i>nodiflorum</i>	*	x	x	x
Amaranthaceae	<i>Ptilotus</i>	<i>divaricatus</i>			x	x
Amaranthaceae	<i>Ptilotus</i>	<i>holosericeus</i>			x	
Amaranthaceae	<i>Ptilotus</i>	<i>polystachyus</i>		x	x	x
Apocynaceae	<i>Rhyncharrhena</i>	<i>linearis</i>				x
Araliaceae	<i>Hydrocotyle</i>	<i>pilifera</i> var. <i>glabrata</i>		x	x	x
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		x	x	x
Asparagaceae	<i>Dichopogon</i>	<i>preissii</i>			x	
Asparagaceae	<i>Sowerbaea</i>	<i>laxiflora</i>		x		x
Asparagaceae	<i>Thysanotus</i>	<i>pyramidalis</i>		x	x	x
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	x	x	x
Asteraceae	<i>Blennospora</i>	<i>drummondii</i>				x
Asteraceae	<i>Brachyscome</i>	<i>?ciliaris</i>			x	x
Asteraceae	<i>Brachyscome</i>	sp. (insufficient material)			x	
Asteraceae	<i>Calotis</i>	<i>hispidula</i>			x	x
Asteraceae	<i>Cotula</i>	<i>bipinnata</i>	*	x		x
Asteraceae	<i>Cotula</i>	<i>coronopifolia</i>	*	x		
Asteraceae	<i>Gazania</i>	<i>linearis</i>			x	
Asteraceae	<i>Hyalosperma</i>	<i>glutinosum</i> subsp. <i>glutinosum</i>		x	x	x
Asteraceae	<i>Hypochoeris</i>	sp. (insufficient material)	*	x	x	x
Asteraceae	<i>Lagenophora</i>	<i>huegelii</i>		x	x	x
Asteraceae	<i>Lawrencella</i>	<i>rosea</i>		x	x	x
Asteraceae	<i>Monoculus</i>	<i>monstrosus</i>	*	x	x	x
Asteraceae	<i>Podolepis</i>	<i>capillaris</i>			x	x
Asteraceae	<i>Podolepis</i>	<i>lessonii</i>			x	x
Asteraceae	<i>Quinetia</i>	<i>urvillei</i>			x	
Asteraceae	<i>Rhodanthe</i>	<i>manglesii</i>		x	x	
Asteraceae	<i>Rhodanthe</i>	<i>polycephala</i>			x	x
Asteraceae	<i>Rhodanthe</i>	<i>pygmaea</i>			x	
Asteraceae	<i>Ursinia</i>	<i>antheroides</i>	*	x	x	x
Asteraceae	<i>Vittadinia</i>	<i>australasica</i> var. <i>australasica</i>				x
Asteraceae	<i>Waitzia</i>	<i>nitida</i>		x		
Boraginaceae	<i>Echium</i>	<i>plantagineum</i>	* DP	x		
Boraginaceae	<i>Halgania</i>	<i>cyanea</i>				x
Boryaceae	<i>Borya</i>	<i>sphaerocephala</i>		x	x	x
Brassicaceae	<i>Brassica</i>	<i>napus</i>	*	x	x	x
Brassicaceae	<i>Brassica</i>	<i>tournefortii</i>	*	x	x	x

Family	Genus	Species	Status	Section 1	Section 2	Section 3
Brassicaceae	<i>Lepidium</i>	<i>africanum</i>	*		x	
Brassicaceae	<i>Lepidium</i>	<i>rotundum</i>			x	
Brassicaceae	<i>Raphanus</i>	<i>raphanistrum</i>	*	x		x
Caryophyllaceae	<i>Silene</i>	<i>gallica</i> var. <i>gallica</i>	*	x		
Casuarinaceae	<i>Allocasuarina</i>	<i>huegeliana</i>		x	x	x
Casuarinaceae	<i>Allocasuarina</i>	<i>humilis</i>		x	x	x
Casuarinaceae	<i>Casuarina</i>	<i>obesa</i>		x	x	
Chenopodiaceae	<i>Atriplex</i>	sp. (insufficient material)		x		x
Chenopodiaceae	<i>Enchylaena</i>	<i>lanata/tomentosa</i> complex		x	x	x
Chenopodiaceae	<i>Rhagodia</i>	<i>preissii</i>				x
Chenopodiaceae	<i>Tecticornia</i>	? <i>indica</i> subsp. <i>bidens</i>				x
Colchicaceae	<i>Burchardia</i>	<i>congesta</i>		x		
Crassulaceae	<i>Crassula</i>	<i>closiana</i>				
Crassulaceae	<i>Crassula</i>	<i>colorata</i>		x	x	x
Crassulaceae	<i>Crassula</i>	<i>decumbens</i> var. <i>decumbens</i>				x
Cucurbitaceae	<i>Cucumis</i>	<i>myriocarpus</i>	*			x
Cupressaceae	<i>Callitris</i>	<i>preissii</i>			x	
Cyperaceae	<i>Isolepis</i>	<i>cernua</i> var. <i>setiformis</i>				x
Cyperaceae	<i>Lepidosperma</i>	<i>costale</i>			x	x
Cyperaceae	<i>Lepidosperma</i>	<i>leptostachyum</i>			x	
Cyperaceae	<i>Lepidosperma</i>	sp. (insufficient material)			x	
Cyperaceae	<i>Lepidosperma</i>	<i>tenua</i>		x	x	x
Cyperaceae	<i>Mesomelaena</i>	<i>preissii</i>			x	
Dilleniaceae	<i>Hibbertia</i>	<i>exasperata</i>			x	
Droseraceae	<i>Drosera</i>	<i>bulbosa</i>		x		
Droseraceae	<i>Drosera</i>	<i>glanduligera</i>		x		
Droseraceae	<i>Drosera</i>	<i>macrantha</i>		x		
Droseraceae	<i>Drosera</i>	<i>menziesii</i>			x	
Droseraceae	<i>Drosera</i>	sp. (insufficient material)				
Droseraceae	<i>Drosera</i>	<i>subhirtella</i>		x	x	x
Ericaceae	<i>Astroloma</i>	sp. (insufficient material)			x	
Fabaceae	<i>Acacia</i>	<i>acuminata</i>		x	x	x
Fabaceae	<i>Acacia</i>	<i>baxteri</i>			x	
Fabaceae	<i>Acacia</i>	<i>bidentata</i>		x		
Fabaceae	<i>Acacia</i>	<i>erinacea</i>			x	x
Fabaceae	<i>Acacia</i>	<i>hemiteles</i>			x	
Fabaceae	<i>Acacia</i>	<i>lasiocarpa</i> var. <i>bracteolata</i>		x	x	x

Family	Genus	Species	Status	Section 1	Section 2	Section 3
Fabaceae	<i>Acacia</i>	<i>meisneri</i>			x	x
Fabaceae	<i>Acacia</i>	<i>microbotrya</i>			x	
Fabaceae	<i>Bossiaea</i>	<i>spinescens</i>				
Fabaceae	<i>Chamaecytisus</i>	<i>palmensis</i>	*		x	x
Fabaceae	<i>Chorizema</i>	<i>aciculare</i> subsp. <i>laxum</i>			x	
Fabaceae	<i>Daviesia</i>	<i>hakeoides</i> subsp. <i>subnuda</i>				x
Fabaceae	<i>Gastrolobium</i>	<i>obovatum</i>		x	x	
Fabaceae	<i>Gastrolobium</i>	<i>parviflorum</i>		x	x	
Fabaceae	<i>Gastrolobium</i>	<i>spinosum</i>		x		
Fabaceae	<i>Gastrolobium</i>	<i>trilobum</i>			x	x
Fabaceae	<i>Jacksonia</i>	<i>restioides</i>			x	
Fabaceae	<i>Lupinus</i>	<i>angustifolius</i>	*	x		x
Fabaceae	<i>Medicago</i>	<i>polymorpha</i>				x
Fabaceae	<i>Templetonia</i>	<i>sulcata</i>				x
Fabaceae	<i>Trifolium</i>	<i>arvense</i>	*	x		
Fabaceae	<i>Trifolium</i>	<i>campestre</i>	*	x		
Fabaceae	<i>Trifolium</i>	<i>hirtum</i>	*		x	x
Fabaceae	<i>Trifolium</i>	sp. (insufficient material)		x	x	
Fabaceae	<i>Vicia</i>	<i>sativa</i>	*	x		x
Fabaceae	? <i>Vicia</i>	sp. (insufficient material)				x
Gentianaceae	<i>Cicendia</i>	sp. (insufficient material)	*			
Geraniaceae	<i>Erodium</i>	<i>cygnorum</i>	*	x	x	x
Goodeniaceae	<i>Dampiera</i>	<i>lavandulacea</i>		x	x	x
Goodeniaceae	<i>Dampiera</i>	<i>sacculata</i>			x	
Goodeniaceae	<i>Goodenia</i>	<i>berardiana</i>		x	x	x
Goodeniaceae	<i>Goodenia</i>	<i>convexa</i>			x	
Goodeniaceae	<i>Lechenaultia</i>	<i>biloba</i>			x	
Goodeniaceae	<i>Velleia</i>	<i>cycnopotamica</i>		x	x	
Haemodoraceae	<i>Conostylis</i>	<i>pusilla</i>			x	
Haloragaceae	<i>Glischrocaryon</i>	<i>aureum</i>			x	x
Haloragaceae	<i>Gonocarpus</i>	<i>nodulosus</i>			x	
Hemerocallidaceae	<i>Caesia</i>	<i>micrantha</i>			x	x
Hemerocallidaceae	<i>Dianella</i>	<i>revoluta</i>		x	x	x
Hemerocallidaceae	<i>Stypandra</i>	<i>glauca</i>		x	x	
Hemerocallidaceae	<i>Tricoryne</i>	<i>tenella</i>			x	
Iridaceae	<i>Chasmanthe</i>	<i>floribunda</i>	*	x		
Iridaceae	<i>Freesia</i>	<i>alba x leichtlinii</i>	*	x		x
Iridaceae	<i>Moraea</i>	sp.	* DP	x		x
Iridaceae	<i>Orthrosanthus</i>	<i>laxus</i> var. <i>gramineus</i>		x	x	x

Family	Genus	Species	Status	Section 1	Section 2	Section 3
Iridaceae	<i>Romulea</i>	<i>rosea</i> var. <i>communis</i>	*	x	x	x
Iridaceae	<i>Sparaxis</i>	<i>bulbifera</i>	*			x
Iridaceae	<i>Sparaxis</i>	<i>pillansii</i>	*			x
Juncaceae	<i>Juncus</i>	<i>acutus</i>	*	x		x
Juncaceae	<i>Juncus</i>	<i>radula</i>				x
Lamiaceae	<i>Hemigenia</i>	<i>platyphylla</i>	P4		x	x
Lamiaceae	<i>Lavandula</i>	<i>stoechas</i>	*			x
Lamiaceae	<i>Rosmarinus</i>	<i>officinalis</i>	*planted			x
Loganiaceae	<i>Phyllangium</i>	<i>sulcatum</i>			x	x
Loranthaceae	<i>Amyema</i>	<i>miquelii</i>		x	x	
Loranthaceae	<i>Amyema</i>	<i>preissii</i>		x		x
Malvaceae	<i>Thomasia</i>	<i>foliosa</i>		x	x	
Myrtaceae	<i>Baeckea</i>	<i>crispiflora</i>			x	
Myrtaceae	<i>Beaufortia</i>	sp.	*planted	x		
Myrtaceae	<i>Callistemon</i>	<i>glauca</i>	*planted	x		
Myrtaceae	<i>Calytrix</i>	<i>breviseta</i> subsp. <i>stipulosa</i>		x	x	
Myrtaceae	<i>Corymbia</i>	<i>citriodora</i>	*planted		x	
Myrtaceae	<i>Eucalyptus</i>	<i>longicornis</i>			x	
Myrtaceae	<i>Eucalyptus</i>	<i>loxophleba</i> subsp. <i>loxophleba</i>		x	x	x
Myrtaceae	<i>Eucalyptus</i>	<i>salmonophloia</i>		x	x	x
Myrtaceae	<i>Eucalyptus</i>	sp.	*planted		x	
Myrtaceae	<i>Eucalyptus</i>	<i>torquata</i>	*planted		x	
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i> subsp. <i>wandoo</i>		x	x	x
Myrtaceae	<i>Hypocalymma</i>	<i>angustifolium</i>		x	x	x
Myrtaceae	<i>Kunzea</i>	sp.	*planted	x		
Myrtaceae	<i>Leptospermum</i>	<i>erubescens</i>		x	x	
Myrtaceae	<i>Melaleuca</i>	<i>cuticularis</i>				x
Myrtaceae	<i>Melaleuca</i>	<i>hamata</i>		x		
Myrtaceae	<i>Melaleuca</i>	<i>radula</i>		x		
Orchidaceae	<i>Caladenia</i>	<i>falcata</i>			x	
Orchidaceae	<i>Caladenia</i>	<i>flava</i> subsp. <i>flava</i>			x	x
Orchidaceae	<i>Cyanicula</i>	<i>gemmata</i>			x	
Orchidaceae	<i>Pterostylis</i>	sp. (insufficient material)				x
Orchidaceae	sp. (insufficient material)			x	x	
Orobanchaceae	<i>Parentucellia</i>	<i>latifolia</i>		x	x	
Oxalidaceae	<i>Oxalis</i>	<i>glabra</i>	*			x
Oxalidaceae	<i>Oxalis</i>	<i>pes-caprae</i>	*	x		x
Oxalidaceae	<i>Oxalis</i>	<i>purpurea</i>	*			x
Papaveraceae	<i>Fumaria</i>	<i>muralis</i>	*	x		

Family	Genus	Species	Status	Section 1	Section 2	Section 3
Pittosporaceae	<i>Pittosporum</i>	<i>angustifolium</i>			x	
Poaceae	<i>Aristida</i>	<i>contorta</i>				x
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		x	x	x
Poaceae	<i>Austrostipa</i>	<i>scabra</i>			x	x
Poaceae	<i>Austrostipa</i>	sp. (insufficient material)			x	x
Poaceae	<i>Avena</i>	<i>barbata</i>	*	x	x	x
Poaceae	<i>Avena</i>	sp. (insufficient material)	*		x	x
Poaceae	<i>Briza</i>	<i>maxima</i>	*	x	x	x
Poaceae	<i>Bromus</i>	<i>diandrus</i>	*	x	x	x
Poaceae	<i>Bromus</i>	<i>rubens</i>	*	x	x	x
Poaceae	<i>Chloris</i>	<i>truncata</i>	*			x
Poaceae	<i>Cynodon</i>	<i>dactylon</i>	*	x		
Poaceae	<i>Ehrharta</i>	<i>calycina</i>	*			x
Poaceae	<i>Ehrharta</i>	<i>longiflora</i>	*	x	x	x
Poaceae	<i>Eragrostis</i>	<i>curvula</i>	*	x		x
Poaceae	<i>Hordeum</i>	<i>leporinum</i>	*	x	x	x
Poaceae	<i>Lolium</i>	<i>perenne</i>	*	x	x	x
Poaceae	<i>Lolium</i>	<i>rigidum</i>	*	x		
Poaceae	<i>Neurachne</i>	<i>alopecuroidea</i>		x	x	x
Poaceae	<i>Pentameris</i>	<i>airoides</i>	*	x	x	x
Poaceae	<i>Rytidosperma</i>	<i>setaceum</i>			x	
Poaceae	<i>Triticum</i>	<i>aestivum</i>	*	x	x	x
Polygalaceae	<i>Comesperma</i>	<i>integerrimum</i>			x	
Polygalaceae	<i>Comesperma</i>	<i>volubile</i>			x	
Portulacaceae	<i>Calandrinia</i>	<i>calyptrata</i>				x
Portulacaceae	<i>Calandrinia</i>	<i>eremaea</i>		x	x	
Primulaceae	<i>Lysimachia</i>	<i>arvensis</i>	*	x	x	x
Proteaceae	<i>Banksia</i>	<i>armata</i> var. <i>ignicida</i>			x	
Proteaceae	<i>Banksia</i>	<i>fraseri</i> var. <i>fraseri</i>			x	
Proteaceae	<i>Grevillea</i>	<i>huegelii</i>			x	
Proteaceae	<i>Grevillea</i>	<i>paniculata</i>			x	x
Proteaceae	<i>Hakea</i>	<i>lissocarpha</i>			x	
Proteaceae	<i>Hakea</i>	<i>preissii</i>	*	x		x
Proteaceae	<i>Hakea</i>	<i>scoparia</i> subsp. <i>scoparia</i>			x	
Pteridaceae	<i>Cheilanthes</i>	<i>austrotenuifolia</i>		x	x	
Restionaceae	<i>Desmocladius</i>	<i>asper</i>				x
Restionaceae	<i>Desmocladius</i>	sp. (insufficient material)			x	
Restionaceae	<i>Lepidobolus</i>	<i>preissianus</i>			x	
Rhamnaceae	<i>Cryptandra</i>	<i>arbutiflora</i> var. <i>arbutiflora</i>		x		

Family	Genus	Species	Status	Section 1	Section 2	Section 3
Rhamnaceae	<i>Stenanthemum</i>	<i>tridentatum</i>			x	
Rhamnaceae	<i>Trymalium</i>	<i>angustifolium</i>		x		
Rubiaceae	<i>Opercularia</i>	<i>vaginata</i>		x	x	x
Santalaceae	<i>Santalum</i>	<i>acuminatum</i>			x	x
Santalaceae	<i>Santalum</i>	<i>spicatum</i>		x		
Sapindaceae	<i>Dodonaea</i>	<i>pinifolia</i>			x	
Scrophulariaceae	<i>Eremophila</i>	<i>glabra</i> subsp. York (P.G. Wilson 12172 B)	P1			x
Scrophulariaceae	<i>Phyllopodium</i>	<i>cordatum</i>	*	x		x
Scrophulariaceae	<i>Zaluzianskya</i>	<i>divaricata</i>	*	x		
Solanaceae	<i>Lycium</i>	<i>ferocissimum</i>	* WoNS	x		
Solanaceae	<i>Solanum</i>	<i>nigrum</i>	*			x
Stylidiaceae	<i>Stylidium</i>	<i>androsaceum</i>				
Stylidiaceae	<i>Stylidium</i>	<i>leptophyllum</i>			x	
Stylidiaceae	<i>Stylidium</i>	<i>piliferum</i>			x	
Stylidiaceae	<i>Stylidium</i>	<i>repens</i>		x		
Tamaricaceae	<i>Tamarix</i>	<i>aphylla</i>	* DP/ WoNS			x
Xanthorrhoeaceae	<i>Xanthorrhoea</i>	<i>drummondii</i>		x	x	x

Legend

* introduced species

P Priority listed by Department of Parks and Wildlife

DP Declared Pest under the *Biosecurity and Agriculture Management Act 2007*

WoNS Weed of National Significance

Quadrat Data Sheets: York – Merredin Road

Site	Q1	Project	York – Merredin Road
Type:	Quadrat	Size:	5 x 20
Date:	09/09/14	Described by:	MD & JR
Co-ordinates:	MGA 50	497855 mE	6465712 mN
Location:	Section 2, St Andrews Church		
Landform:	Low section, next to the road		
Drainage:	Good drain		
Soil Colour & Type:	Grey clayey-sandy-loam		
Slope Type & Aspect	Negligible		
Vegetation Condition:	Very Good (3) – Good (4)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Altered by roadworks, drainage from road, but overstorey still intact, rubbish, weeds		
Surface Component:	Loose soil		
Leaf Litter	Sparse	Wood Litter	Sparse
NVIS Vegetation Description	U+ ^ <i>Eucalyptus loxophleba</i> , <i>E. salmonophloia</i> tree\7i; M ^ <i>Rhagodia preissii</i> , <i>Enchylaena lanata</i> , <i>Templetonia sulcata</i> ; ^shrub\3i; G ^ <i>Ehrharta longiflora</i> , <i>Austrostipa elegantissima</i> , <i>Oxalis pes-caprae</i> , ^grass, forb\1i		



Q1 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>salmonophloia</i>		U1	2-10	16
Myrtaceae	<i>Eucalyptus</i>	<i>loxophleba</i>		U2	10-30	10
Fabaceae	<i>Templetonia</i>	<i>sulcata</i>		M1	2-10	1.7
Fabaceae	<i>Acacia</i>	<i>meisneri</i>		M1	T	1.6
Chenopodiaceae	<i>Rhagodia</i>	<i>preissii</i>		M2	10-30	0.8
Chenopodiaceae	<i>Enchylaena</i>	<i>lanata</i>		M2	2-10	0.6
Xanthorrhoeaceae	<i>Xanthorrhoea</i>	<i>drummondii</i>		M2	T	0.6
Poaceae	<i>Ehrharta</i>	<i>longiflora</i>	*	G1	10-30	0.5
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		G1	N	0.6
Iridaceae	<i>Sparaxis</i>	<i>pillansii</i>	*	G1	N	0.3

Quadrat Data Sheets: York – Merredin Road

Brassicaceae	<i>Raphanus</i>	<i>raphanistrum</i>	*	G1	N	0.3
Poaceae	<i>Bromus</i>	<i>rubens</i>	*	G1	N	0.2
Poaceae	<i>Lolium</i>	<i>perenne</i>	*	G1	N	0.2
Poaceae	<i>Triticum</i>	<i>aestivum</i>	*	G1	T	0.3
Poaceae	<i>Avena</i>	sp. (insufficient material)	*	G1	T	0.3
Fabaceae	<i>Lupinus</i>	<i>angustifolius</i>	*	G1	T	0.3
Oxalidaceae	<i>Oxalis</i>	<i>pes-caprae</i>	*	G2	2-10	0.2
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	G2	N	0.1
Asteraceae	<i>Hypochaeris</i>	sp.	*	G2	N	0.1
Poaceae	<i>Pentameris</i>	<i>airoides</i>	*	G2	N	0.05
Brassicaceae	<i>Brassica</i>	<i>napus</i>	*	G2	T	0.2
Fabaceae	? <i>Vicia</i>	sp. (insufficient material)		G2	T	0.2
Asteraceae	<i>Vittadinia</i>	<i>australasica</i> var. <i>australasica</i>		G2	T	0.2
Chenopodiaceae	<i>Atriplex</i>	sp. (insufficient material)		G2	T	0.2
Fabaceae	<i>Medicago</i>	<i>polymorpha</i>		G2	T	0.1
Crassulaceae	<i>Crassula</i>	<i>colarata</i>		G2	T	0.05

* introduced species;

25 species

Quadrat Data Sheets: York – Merredin Road

Site	Q2	Project	York – Merredin Road
Type:	Quadrat	Size:	10 x 10
Date:	09/09/14	Described by:	MD & JR
Co-ordinates:	MGA 50	500429 mE	6465646 mN
Location:	Section 2, Kuarung		
Landform:	Plain		
Drainage:	Good drain		
Soil Colour & Type:	Brown loamy-sand		
Slope Type & Aspect	Negligible		
Vegetation Condition:	Very Good (3)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Edge effects, close to cleared road edge, rubbish, weeds		
Surface Component:	Loose soil		
Leaf Litter	Moderate	Wood Litter	Moderate
NVIS Vegetation Description	U+ ^Eucalyptus wandoo, ^Allocasuarina huegeliana, Acacia acuminata ^tree\7, 6\i; M ^Gastrolobium trilobum, Dampiera lavandulacea, Enchylaena lanata, ^shrub\2\i; G ^Ehrharta longiflora, Austrostipa elegantissima, Neurachne alopecuroidea, ^grass, forb\1\i		



Q2 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i> subsp. <i>wandoo</i>		U1	10-30	15
Casuarinaceae	<i>Allocasuarina</i>	<i>huegeliana</i>		U2	10-30	4
Fabaceae	<i>Acacia</i>	<i>acuminata</i>		U2	2-10	8.5
Santalaceae	<i>Santalum</i>	<i>acuminatum</i>		M1	T	2
Fabaceae	<i>Gastrolobium</i>	<i>trilobum</i>		M2	2-10	0.9
Goodeniaceae	<i>Dampiera</i>	<i>lavandulacea</i>		M2	2-10	0.3
Chenopodiaceae	<i>Rhagodia</i>	<i>preissii</i>		M2	N	0.4
Fabaceae	<i>Acacia</i>	<i>lasiocarpa</i> var. <i>bracteolata</i>		M2	T	0.4
Chenopodiaceae	<i>Enchylaena</i>	<i>lanata</i>		M2	T	0.3

Quadrat Data Sheets: York – Merredin Road

Fabaceae	<i>Acacia</i>	<i>meisneri</i>		M2	T	0.3
Poaceae	<i>Ehrharta</i>	<i>longiflora</i>		G1	30-70	0.3
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		G1	2-10	0.5
Poaceae	<i>Neurachne</i>	<i>alopecuroidea</i>		G1	2-10	0.4
Iridaceae	<i>Moraea</i>	<i>miniata</i>	* DP	G1	2-10	0.3
Asteraceae	<i>Monoculus</i>	<i>monstrosus</i>	*	G1	N	0.3
Hemerocallidaceae	<i>Caesia</i>	<i>micrantha</i>		G1	N	0.3
Asteraceae	<i>Podolepis</i>	<i>capillaris</i>		G1	N	0.3
Asteraceae	<i>Hyalosperma</i>	<i>glutinosum</i> subsp. <i>glutinosum</i>		G1	N	0.1
Poaceae	<i>Ehrharta</i>	<i>calycina</i>		G1	T	0.3
Cyperaceae	<i>Lepidosperma</i>	<i>tenuis</i>		G1	T	0.2
Asteraceae	<i>Ursinia</i>	<i>anthemoides</i>	*	G1	T	0.2
Restionaceae	<i>Desmocladius</i>	<i>asper</i>		G1	T	0.2
Rubiaceae	<i>Opercularia</i>	<i>vaginata</i>		G1	T	0.1
Amaranthaceae	<i>Ptilotus</i>	<i>polystachyus</i>		G1	T	0.1
Asparagaceae	<i>Thysanotus</i>	<i>pyramidalis</i>		G2	N	climber
Asteraceae	<i>Lawrencella</i>	<i>rosea</i>		G2	N	0.3
Asteraceae	<i>Blennospora</i>	<i>drummondii</i>		G2	N	0.2
Iridaceae	<i>Romulea</i>	<i>rosea</i> var. <i>communis</i>	*	G2	N	0.1
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	G2	N	0.1
Loganiaceae	<i>Phyllangium</i>	<i>sulcatum</i>		G2	N	0.1
Asteraceae	<i>Hypochaeris</i>	sp.	*	G2	N	0.05
Araliaceae	<i>Hydrocotyle</i>	<i>pilifera</i> var. <i>glabrata</i>		G2	N	0.05
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.05
Asteraceae	<i>Brachyscome</i>	<i>?ciliaris</i>		G2	N	0.05
Asteraceae	<i>Lagenophora</i>	<i>huegelii</i>		G2	N	0.05
Portulacaceae	<i>Calandrinia</i>	<i>calyptata</i>		G2	N	0.05
Primulaceae	<i>Lysimachia</i>	<i>arvensis</i>	*	G2	T	0.1
Orchidaceae	<i>Caladenia</i>	<i>flava</i> subsp. <i>flava</i>		G2	T	0.1
Boryaceae	<i>Borya</i>	<i>sphaerocephala</i>		G2	T	0.05

* introduced species; DP Declared Pest

39 species

Quadrat Data Sheets: York – Merredin Road

Site	Q3	Project	York – Merredin Road
Type:	Quadrat	Size:	10 x 10
Date:	10/09/14	Described by:	MD
Co-ordinates:	MGA 50	519975 mE	6458287 mN
Location:	Section 3, SLK 47, north side of road		
Landform:	Low rise, within undulating terrain		
Drainage:	Good drain		
Soil Colour & Type:	Brown loamy sand		
Slope Type & Aspect	Negligible		
Vegetation Condition:	Excellent (2)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Disturbances nearby but vegetation within quadrat in excellent condition, some weeds & rubbish		
Surface Component:	Loose soil		
Leaf Litter	Moderate	Wood Litter	Sparse
NVIS Vegetation Description	U [^] <i>Eucalyptus wandoo</i> , [^] tree\7, 6\; M+ [^] <i>Gastrolobium obovatum</i> , <i>G. parviflorum</i> , <i>Hypocalymma angustifolium</i> [^] shrub, grass\2\c; G [^] <i>Desmocladus</i> spp., <i>Lepidosperma tenue</i> , <i>Opercularia vaginata</i> [^] grass, forb\1\i		



Q3 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i> subsp. <i>wandoo</i>		U1	2-10	9
Myrtaceae	<i>Hypocalymma</i>	<i>angustifolium</i>		M1	10-30	0.6
Fabaceae	<i>Gastrolobium</i>	<i>obovatum</i>		M1	10-30	0.5
Fabaceae	<i>Gastrolobium</i>	<i>parviflorum</i>		M1	2-10	0.8
Fabaceae	<i>Acacia</i>	<i>lasiocarpa</i> var. <i>bracteolata</i>		M1	2-10	0.4
Goodeniaceae	<i>Dampiera</i>	<i>lavandulacea</i>		M1	2-10	0.3
Lamiaceae	<i>Hemigenia</i>	<i>platyphylla</i>	P4	M1	T	0.5

Quadrat Data Sheets: York – Merredin Road

Fabaceae	<i>Gastrolobium</i>	<i>trilobum</i>		M1	T	0.4
Myrtaceae	<i>Calytrix</i>	<i>brevisetata</i> subsp. <i>stipulosa</i>		M1	T	0.3
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		M2	30-70	0.6
Poaceae	<i>Neurachne</i>	<i>alopecuroidea</i>		M2	2-10	0.3
Poaceae	<i>Rytidosperma</i>	<i>setaceum</i>		M2	2-10	0.3
Asparagaceae	<i>Thysanotus</i>	<i>pyramidalis</i>		M2	N	climber
Haloragaceae	<i>Glischrocaryon</i>	<i>aureum</i>		M2	T	0.3
Droseraceae	<i>Drosera</i>	<i>subhirtella</i>		M3	N	climber
Restionaceae	<i>Desmocladus</i>	sp. (insufficient material)		G1	30-70	0.2
Cyperaceae	<i>Lepidosperma</i>	<i>tenue</i>		G1	2-10	0.3
Asteraceae	<i>Monoculus</i>	<i>monstrosus</i>	*	G1	N	0.3
Hemerocallidaceae	<i>Caesia</i>	<i>micrantha</i>		G1	N	0.2
Poaceae	<i>Briza</i>	<i>maxima</i>		G1	T	0.1
Rubiaceae	<i>Opercularia</i>	<i>vaginata</i>		G2	2-10	0.1
Goodeniaceae	<i>Goodenia</i>	<i>berardiana</i>		G2	N	0.2
Asteraceae	<i>Rhodanthe</i>	<i>manglesii</i>		G2	N	0.1
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.1
Boryaceae	<i>Borya</i>	<i>sphaerocephala</i>		G2	N	0.1
Iridaceae	<i>Romulea</i>	<i>rosea</i> var. <i>communis</i>	*	G2	N	0.05
Goodeniaceae	<i>Velleia</i>	<i>cycnopotamica</i>		G2	N	0.05
Asteraceae	<i>Hypochaeris</i>	sp.	*	G2	N	0.05
Araliaceae	<i>Hydrocotyle</i>	<i>pilifera</i> var. <i>glabrata</i>		G2	N	0.05
Poaceae	<i>Pentameris</i>	<i>airoides</i>	*	G2	N	0.05
Crassulaceae	<i>Crassula</i>	<i>colarata</i>		G2	N	0.05
Haloragaceae	<i>Gonocarpus</i>	<i>nodulosus</i>		G2	N	0.05
Orobanchaceae	<i>Parentucellia</i>	<i>latifolia</i>		G2	N	0.05
Fabaceae	<i>Trifolium</i>	sp. (insufficient material)		G2	N	0.05

* introduced species

35 species

Quadrat Data Sheets: York – Merredin Road

Site	Q4	Project	York – Merredin Road
Type:	Quadrat	Size:	10 x 10
Date:	10/09/14	Described by:	MD
Co-ordinates:	MGA 50	520936 mE	6457931 mN
Location:	Section 2, near Manning Road		
Landform:	Upper slope, in very gentle undulating terrain		
Drainage:	Good drain		
Soil Colour & Type:	Brown sandy-loam		
Slope Type & Aspect	Negligible - gentle		
Vegetation Condition:	Very Good (3) – Good (4)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Vegetation structure good but lots of plants dead and dying, old logging, exotic weeds, rubbish		
Surface Component:	Loose soil		
Leaf Litter	Moderate	Wood Litter	Moderate
NVIS Vegetation Description	U+ <i>Eucalyptus wandoo</i> , tree; M+ <i>Gastrolobium trilobum</i> , <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> , <i>Austrostipa elegantissima</i> shrub, grass; G <i>Podolepis capillaris</i> , <i>Trachymene ornata</i> , <i>Godoenia berardiana</i> forb, grass		



Q4 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i> subsp. <i>wandoo</i>		U1	10-30	12
Fabaceae	<i>Gastrolobium</i>	<i>trilobum</i>		M1	2-10	1.2
Fabaceae	<i>Acacia</i>	<i>lasiocarpa</i> var. <i>bracteolata</i>		M2	2-10	0.3
Droseraceae	<i>Drosera</i>	<i>subhirtella</i>		M2	T	climber
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		M2	2-10	0.6
Cyperaceae	<i>Lepidosperma</i>	sp. (insufficient material)		M2	2-10	0.6
Amaranthaceae	<i>Ptilots</i>	<i>divaricatus</i>		G1	N	0.3

Quadrat Data Sheets: York – Merredin Road

Poaceae	<i>Neurachne</i>	<i>alopecuroidea</i>		G1	N	0.4
Poaceae	<i>Briza</i>	<i>maxima</i>	*	G1	N	0.4
Poaceae	<i>Triticum</i>	<i>aestivum</i>	*	G1	N	0.3
Asparagaceae	<i>Thysanotus</i>	<i>pyramidalis</i>		G2	N	climber
Asteraceae	<i>Lawrencella</i>	<i>rosea</i>		G2	N	0.1
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	G2	N	0.05
Primulaceae	<i>Lysimachia</i>	<i>arvensis</i>	*	G2	N	0.05
Iridaceae	<i>Romulea</i>	<i>rosea</i> var. <i>communis</i>	*	G2	N	0.05
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.05
Asteraceae	<i>Rhodanthe</i>	<i>manglesii</i>		G2	N	0.05
Goodeniaceae	<i>Goodenia</i>	<i>berardiana</i>		G2	N	0.05
Asteraceae	<i>Calotis</i>	<i>hispidula</i>		G2	N	0.05
Loganiaceae	<i>Phyllangium</i>	<i>sulcatum</i>		G2	N	0.05
Asteraceae	<i>Podolepis</i>	<i>capillaris</i>		G2	N	0.05
Asteraceae	<i>Brachyscome</i>	<i>?ciliaris</i>		G2	N	0.05
Goodeniaceae	<i>Velleia</i>	<i>cynopotamica</i>		G2	N	0.05
Stylidiaceae	<i>Stylidium</i>	<i>leptophyllum</i>		G2	N	0.05
Asteraceae	<i>Rhodanthe</i>	<i>pygmaea</i>		G2	N	0.05
Asteraceae	<i>Quinetia</i>	<i>urvillei</i>		G2	N	0.05
Orchidaceae	sp. (insufficient material)			G2	T	0.1

* introduced species

27 species

Quadrat Data Sheets: York – Merredin Road

Site	Q5	Project	York – Merredin Road
Type:	Quadrat	Size:	10 x 10
Date:	10/09/14	Described by:	MD
Co-ordinates:	MGA 50	517391 mE	6459140 mN
Location:	Section 3		
Landform:	Plain		
Drainage:	Good drain		
Soil Colour & Type:	Brown sandy-loam		
Slope Type & Aspect	Negligible		
Vegetation Condition:	Very Good (3)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Midstorey altered but under and over-storey in very good condition, rubbish, weeds and clearing from roadworks nearby		
Surface Component:	Loose soil		
Leaf Litter	Moderate	Wood Litter	Moderate
NVIS Vegetation Description	U+ <i>Eucalyptus loxophleba</i> , tree; M <i>Ptilotus divaricatus</i> , <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> , <i>Enchylaena lanata</i> shrub, grass; G <i>Acacia erinacea</i> , <i>Ptilotus holosericeus</i> , <i>Tricoryne tenella</i> shrub forb, grass		



Q5 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>loxophleba</i>		U1	30-70	12
Amaranthaceae	<i>Ptilotus</i>	<i>divaricatus</i>		M1	2-10	0.3
Chenopodiaceae	<i>Enchylaena</i>	<i>lanata</i>		M1	T	0.1
Poaceae	<i>Bromus</i>	<i>rubens</i>	*	M2	T	0.3
Poaceae	<i>Lolium</i>	<i>perenne</i>	*	M2	T	0.3
Asparagaceae	<i>Dichopogon</i>	<i>preissii</i>		M2	T	0.2
Poaceae	<i>Avena</i>	<i>barbata</i>	*	M2	T	0.2
Brassicaceae	<i>Brassica</i>	<i>tournefortii</i>	*	M2	T	0.2
Asteraceae	<i>Brachyscome</i>	sp. (insufficient		M2	T	0.2

Quadrat Data Sheets: York – Merredin Road

		material)				
Asteraceae	<i>Monoculus</i>	<i>monstrosus</i>	*	M2	T	0.1
Fabaceae	<i>Acacia</i>	<i>erinacea</i>		G1	2-10	0.1
Amaranthaceae	<i>Ptilotus</i>	<i>holosericeus</i>		G1	2-10	0.05
Asteraceae	<i>Rhodanthe</i>	<i>polycephala</i>		G1	N	0.1
Hemerocallidaceae	<i>Tricoryne</i>	<i>tenella</i>		G1	N	0.1
Portulacaceae	<i>Calandrinia</i>	<i>eremaea</i>		G1	N	0.05
Geraniaceae	<i>Erodium</i>	<i>cygnorum</i>	*	G2	N	0.05
Crassulaceae	<i>Crassula</i>	<i>colorata</i>		G2	N	0.05
Asteraceae	<i>Rhodanthe</i>	<i>pygmaea</i>		G2	N	0.05
Asteraceae	<i>Ursinia</i>	<i>anthemoides</i>	*	G2	T	0.1
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	G2	T	0.05
Primulaceae	<i>Lysimachia</i>	<i>arvensis</i>	*	G2	T	0.05
Brassicaceae	<i>Lepidium</i>	<i>rotundum</i>		G2	T	0.05

* introduced species

22 species

Quadrat Data Sheets: York – Merredin Road

Site	Q6	Project	York – Merredin Road
Type:	Quadrat	Size:	10 x 10
Date:	10/09/14	Described by:	MD
Co-ordinates:	MGA 50	517951 mE	6458962 mN
Location:	Section 2, near railway crossing		
Landform:	Undulating terrain, on very slight rise		
Drainage:	Good drain		
Soil Colour & Type:	Brown sandy-loam		
Slope Type & Aspect	Negligible		
Vegetation Condition:	Good (4)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Very close to road, overstorey in good condition, understorey degraded, exotic weeds and animal disturbance		
Surface Component:	Humus/Litter		
Leaf Litter	Plentiful	Wood Litter	Plentiful
NVIS Vegetation Description	U+ <i>Eucalyptus salmonophloia</i> , <i>E wandoo</i> \tree\7i; M <i>Gastrolobium trilobu</i> , <i>Grevillea huegelii</i> , <i>Austrostipa</i> sp. \shrub, grass\1r; G <i>Dichopogon preissii</i> , <i>Trachymene ornata</i> , <i>Ursinia anthemoides</i> \shrub forb, grass\1bi		



Q6 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>salmonophloia</i>		U1	10-30	16
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i> subsp. <i>wandoo</i>		U1	10-30	10
Fabaceae	<i>Gastrolobium</i>	<i>trilobum</i>		M1	2-10	0.4
Proteaceae	<i>Grevillea</i>	<i>huegelii</i>		M1	T	0.3
Poaceae	<i>Austrostipa</i>	sp. (insufficient material)		M1	2-10	0.3
Asparagaceae	<i>Dichopogon</i>	<i>preissii</i>		G1	N	0.2
Iridaceae	<i>Romulea</i>	<i>rosea</i> var. <i>communis</i>	*	G2	N	0.1
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.05

Quadrat Data Sheets: York – Merredin Road

Asteraceae	<i>Hypochaeris</i>	sp.	*	G2	N	0.05
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.05
Asteraceae	<i>Ursinia</i>	<i>anthemoides</i>	*	G2	T	0.1
Aizoaceae	<i>Mesembryanthemum</i>	<i>nodiflorum</i>	*	G2	T	0.05

* introduced species

12 species

Quadrat Data Sheets: York – Merredin Road

Site	R1	Project	York – Merredin Road
Type:	Releve	Size:	5 x 20
Date:	11/09/14	Described by:	MD
Co-ordinates:	MGA 50	482146 mE	6470168 mN
Location:	Section 1, near railway crossing		
Landform:	Hill crest, rocky ridge		
Drainage:	Good drain		
Soil Colour & Type:	Brown sandy-loam		
Slope Type & Aspect	Moderate		
Vegetation Condition:	<i>Degraded</i> (5), some patches in condition <i>Good</i> (4)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Very weedy, overstorey intact but mid- and under-storey highly degraded with few native species		
Surface Component:	Some loose soil, some surface plates/boulders		
Leaf Litter	Plentiful	Wood Litter	Plentiful
NVIS Vegetation Description	U+ <i>Eucalyptus loxophleba</i> , <i>Acacia acuminata</i> , <i>Allocasuarina huegeliana</i> <i>tree</i> ; M <i>Gastrolobium spinosum</i> , <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> , <i>Austrostipa elegantissima</i> . <i>shrub, grass</i> ; G <i>Ehrharta longiflora</i> , <i>Avena barbata</i> , <i>Lawrencella rosea</i> <i>grass, forb</i>		



R1 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>loxophleba</i> subsp <i>loxophleba</i>		U1	10-30	8
Fabaceae	<i>Acacia</i>	<i>acuminata</i>		U1	10-30	4
Casuarinaceae	<i>Allocasuarina</i>	<i>huegeliana</i>		U1	2-10	3
Fabaceae	<i>Acacia</i>	<i>lasiocarpa</i> var. <i>bracteolata</i>		M1	2-10	0.9
Fabaceae	<i>Gastrolobium</i>	<i>spinosum</i>		M1	T	0.8
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		M1	2-10	0.6
Poaceae	<i>Ehrharta</i>	<i>longiflora</i>		G1	10-30	0.3

Quadrat Data Sheets: York – Merredin Road

Iridaceae	sp. (insufficient material)			G1	2-10	0.3
Poaceae	<i>Avena</i>	<i>barbata</i>	*	G1	2-10	0.4
Iridaceae	<i>Moraea</i>	<i>miniata</i>	* DP	G1	N	0.2
Asteraceae	<i>Monoculus</i>	<i>monstrosus</i>	*	G1	N	0.2
Poaceae	<i>Triticum</i>	<i>aestivum</i>	*	G1	T	0.1
Asparagaceae	<i>Thysanotus</i>	<i>pyramidalis</i>		G1	T	climber
Asteraceae	<i>Waitzia</i>	<i>nitida</i>		G2	N	0.3
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	G2	N	0.1
Asteraceae	<i>Ursinia</i>	<i>anthemoides</i>	*	G2	N	0.1
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.05
Asteraceae	<i>Lawrencella</i>	<i>rosea</i>		G2	N	0.05
Primulaceae	<i>Lysimachia</i>	<i>arvensis</i>	*	G2	N	0.05
Asteraceae	<i>Rhodanthe</i>	<i>manglesii</i>		G2	T	0.3
Goodeniaceae	<i>Goodenia</i>	<i>berardiana</i>		G2	T	0.1
Geraniaceae	<i>Erodium</i>	<i>cygnorum</i>	*	G2	T	0.05
Portulacaceae	<i>Calandrinia</i>	<i>eremaea</i>		G2	T	0.05

* introduced species; DP Declared Pest

23 species

Quadrat Data Sheets: York – Merredin Road

Site	R2	Project	York – Merredin Road
Type:	Releve	Size:	10 x 10
Date:	11/09/14	Described by:	MD
Co-ordinates:	MGA 50	483528 mE	6470949 mN
Location:	Section 1, ~ SLK 7		
Landform:	Hill crest, rocky ridge		
Drainage:	Good drain		
Soil Colour & Type:	Brown sandy-loam		
Slope Type & Aspect	Gentle		
Vegetation Condition:	Very Good (3)		
Fire Age & Intensity:	Old (>5 years)		
Disturbances:	Small patch, fragmented but in relatively good condition, rocky so never been cleared, some exotic weeds		
Surface Component:	Some loose soil, some stones, surface plates/boulders		
Leaf Litter	Sparse	Wood Litter	Sparse
NVIS Vegetation Description	U ^ <i>Eucalyptus salmonophloia</i> , <i>E. wandoo</i> \tree\6r; M+ ^ <i>Trymalium angustifolium</i> , <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> , <i>Gastrolobium</i> spp. ^shrub, \2c; G ^^ <i>Avena barbata</i> , <i>Neurachne alopecuroidea</i> , <i>Briza maxima</i> ^grass, forb\1\bi		



R2 Flora List

Family	Genus	Species	Status	Sub-stratum (NVIS)	Foliage Cover (%)	Average Height (m)
Myrtaceae	<i>Eucalyptus</i>	<i>salmonophloia</i>		U1	2-10	6
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i> subsp. <i>wandoo</i>		U1	T	8
Rhamnaceae	<i>Trymalium</i>	<i>angustifolium</i>		M1	2-10	2.1
Fabaceae	<i>Gastrolobium</i>	<i>parviflorum</i>		M2	2-10	1.1
Hemerocallidaceae	<i>Dianella</i>	<i>revoluta</i>		M3	T	0.6
Rhamnaceae	<i>Trymalium</i>	<i>angustifolium</i>		M3	10-30	0.5
Fabaceae	<i>Acacia</i>	<i>lasiocarpa</i> var. <i>bracteolata</i>		M3	10-30	0.6
Fabaceae	<i>Gastrolobium</i>	<i>obovatum</i>		M3	10-30	0.5

Quadrat Data Sheets: York – Merredin Road

Fabaceae	<i>Gastrolobium</i>	<i>spinosum</i>		M3	2-10	0.5
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>		M3	2-10	0.6
Chenopodiaceae	<i>Enchylaena</i>	<i>lanata</i>		G1	N	0.2
Rhamnaceae	<i>Cryptandra</i>	<i>arbutiflora</i> var. <i>arbutiflora</i>		G1	T	0.3
Malvaceae	<i>Thomasia</i>	<i>foliosa</i>		G1	T	0.3
Poaceae	<i>Avena</i>	<i>barbata</i>	*	G1	10-30	0.3
Poaceae	<i>Neurachne</i>	<i>alopecuroidea</i>		G1	2-10	0.3
Poaceae	<i>Briza</i>	<i>maxima</i>		G1	2-10	0.3
Poaceae	<i>Ehrharta</i>	<i>longiflora</i>		G1	2-10	0.4
Cyperaceae	<i>Lepidosperma</i>	<i>tenuis</i>		G1	T	0.2
Hemerocallidaceae	<i>Stypandra</i>	<i>glaucis</i>		G1	T	0.3
Colchicaceae	<i>Burchardia</i>	<i>congesta</i>		G1	T	0.3
Oxalidaceae	<i>Oxalis</i>	<i>pes-caprae</i>	*	G2	10-30	0.1
Iridaceae	<i>Romulea</i>	<i>rosea</i> var. <i>communis</i>	*	G2	2-10	0.1
Asteraceae	<i>Cotula</i>	<i>bipinnata</i>	*	G2	N	0.05
Araliaceae	<i>Hydrocotyle</i>	<i>pilifera</i> var. <i>glabrata</i>		G2	N	0.05
Asteraceae	<i>Lagenophora</i>	<i>huegelii</i>		G2	N	0.05
Araliaceae	<i>Trachymene</i>	<i>ornata</i>		G2	N	0.05
Stylidiaceae	<i>Stylidium</i>	<i>repens</i>		G2	N	0.05
Asteraceae	<i>Arctotheca</i>	<i>calendula</i>	*	G2	N	0.1
Iridaceae	<i>Moraea</i>	<i>miniata</i>	* DP	G2	N	0.1
Asteraceae	<i>Hypochaeris</i>	<i>sp.</i>	*	G2	T	0.05
Orchidaceae	sp. (insufficient material)			G2	T	0.05

* introduced species; DP Declared Pest

30 species

Appendix E – Fauna Data

Table E.1 Fauna species list

Family	Genus	Species	Common Name	Status	Section 1: SLK 0 - SLK 15	Section 2: SLK 19 - SLK 29	Section 3: SLK 29 - SLK 51
Birds							
Acanthizidae	<i>Acanthiza</i>	<i>apicalis</i>	Inland Thornbill		✓	✓	✓
Acanthizidae	<i>Acanthiza</i>	<i>chrysorrhoa</i>	Yellow-rumped Thornbill		✓	✓	✓
Acanthizidae	<i>Calamanthus</i>	<i>campestris</i>	Rufous Fieldwren			✓	✓
Acanthizidae	<i>Gerygone</i>	<i>fusca</i>	Western Gerygone		✓	✓	✓
Acanthizidae	<i>Smicromis</i>	<i>brevirostris</i>	Weebill		✓	✓	✓
Accipitridae	<i>Accipiter</i>	<i>fasciatus fasciatus</i>	Brown Goshawk		✓	✓	✓
Accipitridae	<i>Haliastur</i>	<i>sphenurus</i>	Whistling Kite		✓	✓	✓
Anatidae	<i>Anas</i>	<i>superciliosa</i>	Pacific Black Duck			✓	✓
Anatidae	<i>Chenonetta</i>	<i>jubata</i>	Australian Wood Duck		✓	✓	
Artamidae	<i>Artamus</i>	<i>cinereus</i>	Black-faced Woodswallow		✓	✓	✓
Artamidae	<i>Artamus</i>	<i>personatus</i>	Masked Woodswallow		✓	✓	✓
Artamidae	<i>Cracticus</i>	<i>nigrogularis</i>	Pied Butcherbird		✓		
Artamidae	<i>Cracticus</i>	<i>torquatus</i>	Grey Butcherbird		✓	✓	✓
Artamidae	<i>Cracticus</i>	<i>tibicen</i>	Australian Magpie		✓	✓	✓
Cacatuidae	<i>Cacatua</i>	<i>tenuirostris</i>	Long-billed Corella		✓	✓	✓
Cacatuidae	<i>Cacatua</i>	<i>pastinator</i>	Western Corella		✓	✓	✓
Cacatuidae	<i>Eolophus</i>	<i>roseicapillus</i>	Galah		✓	✓	✓
Campephagidae	<i>Coracina</i>	<i>novaeollandiae</i>	Black-faced Cuckoo-Shrike		✓	✓	✓
Campephagidae	<i>Lalage</i>	<i>sueurii</i>	White-winged Triller		✓	✓	✓
Casuariidae	<i>Dromaius</i>	<i>novaeollandiae</i>	Emu		✓		
Columbidae	<i>Columba</i>	<i>livia</i>	Feral pigeon		✓	✓	✓
Columbidae	<i>Ocyphaps</i>	<i>lophotes</i>	Crested Pigeon		✓	✓	✓

Family	Genus	Species	Common Name	Status	Section 1: SLK 0 - SLK 15	Section 2: SLK 19 - SLK 29	Section 3: SLK 29 - SLK 51
Columbidae	<i>Streptopelia</i>	<i>senegalensis</i>	Laughing Dove		✓	✓	✓
Corvidae	<i>Corvus</i>	<i>coronoides</i>	Australian Raven		✓	✓	✓
Cuculidae	<i>Cacomantis</i>	<i>flabelliformis</i>	Fan-tailed Cuckoo			✓	
Cuculidae	<i>Cacomantis</i>	<i>pallidus</i>	Pallid Cuckoo		✓	✓	✓
Cuculidae	<i>Chalcites</i>	<i>basalis</i>	Horsefield Bronze Cuckoo		✓	✓	✓
Halcyonidae	<i>Dacelo</i>	<i>novaeguineae</i>	Laughing Kookaburra	*	✓	✓	✓
Hirundinidae	<i>Hirundo</i>	<i>neoxena</i>	Welcome Swallow		✓	✓	✓
Maluridae	<i>Malurus</i>	<i>splendens</i>	Splendid Fairy-wren		✓	✓	✓
Maluridae	<i>Malurus</i>	<i>leucopterus</i>	White-winged Fairy-wren		✓	✓	
Megaluridae	<i>Cincloramphus</i>	<i>mathewsi</i>	Rufous Songlark		✓	✓	✓
Megaluridae	<i>Cincloramphus</i>	<i>cruralis</i>	Brown Songlark			✓	✓
Megaluridae	<i>Megalurus</i>	<i>gramineus</i>	Little Grassbird		✓		
Meliphagidae	<i>Acanthorhynchus</i>	<i>superciliosus</i>	Western Spinebill			✓	✓
Meliphagidae	<i>Anthochaera</i>	<i>carunculata</i>	Red Wattlebird		✓	✓	✓
Meliphagidae	<i>Lichenostomus</i>	<i>virescens</i>	Singing Honeyeater		✓	✓	✓
Meliphagidae	<i>Lichenostomus</i>	<i>ornatus</i>	Yellow-plumed Honeyeater		✓	✓	✓
Meliphagidae	<i>Acanthagenys</i>	<i>rufogularis</i>	Spiny-cheeked Honeyeater		✓	✓	✓
Meliphagidae	<i>Lichmera</i>	<i>indistincta</i>	Brown Honeyeater		✓	✓	✓
Meliphagidae	<i>Manorina</i>	<i>flavigula</i>	Yellow-throated Miner		✓	✓	✓
Meliphagidae	<i>Melithreptus</i>	<i>lunatus</i>	White-naped Honeyeater		✓	✓	
Monarchidae	<i>Grallina</i>	<i>cyanoleuca</i>	Magpie-lark		✓	✓	✓
Motacillidae	<i>Anthus</i>	<i>australis australis</i>	Australian Pipit		✓		
Nankeen Kestrel	<i>Falco</i>	<i>cenchroides</i>	Nankeen Kestrel		✓	✓	✓
Neosittidae	<i>Daphoenositta</i>	<i>chrysoptera</i>	Varied Sittella			✓	

Family	Genus	Species	Common Name	Status	Section 1: SLK 0 - SLK 15	Section 2: SLK 19 - SLK 29	Section 3: SLK 29 - SLK 51
Pachycephalidae	<i>Colluricincla</i>	<i>harmonica</i>	Grey Shrike-thrush		✓	✓	✓
Pachycephalidae	<i>Pachycephala</i>	<i>rufiventris</i>	Rufous Whistler		✓	✓	✓
Pardalotidae	<i>Pardalotus</i>	<i>striatus melanocephalus</i>	Striated Pardalote		✓	✓	✓
Pardalotidae	<i>Pardalotus</i>	<i>punctatus</i>	Spotted Pardalote		✓	✓	✓
Pomatostomidae	<i>Pomatostomus</i>	<i>superciliosus</i>	White-browed Babbler			✓	
Psittacidae	<i>Barnardius</i>	<i>zonarius semiorquatus</i>	Twenty-eight Parrot		✓	✓	✓
Psittacidae	<i>Polytelis</i>	<i>anthopeplus</i>	Regent Parrot			✓	
Psittacidae	<i>Trichoglossus</i>	<i>haematodus</i>	Rainbow Lorikeet	*	✓	✓	✓
Rhipiduridae	<i>Rhipidura</i>	<i>leucophrys</i>	Willie Wagtail		✓	✓	✓
Strigidae	<i>Ninox</i>	<i>novaeeseelandiae</i>	Southern Boobook			✓	
Threskiornithidae	<i>Threskiornis</i>	<i>spiniollis</i>	Straw-necked Ibis		✓		
Reptiles							
Elapidae	<i>Pseudonaja</i>	<i>affinis affinis</i>	Dugite		✓		
Scincidae	<i>Tiliqua</i>	<i>rugosa rugosa</i>	Bobtail		✓		
Mammals							
Bovidae	<i>Ovis</i>	<i>aries</i>	Sheep	*	✓	✓	✓
Leporidae	<i>Oryctolagus</i>	<i>cuniculus</i>	Rabbit	*		✓	

Table E.2 Definitions for fauna likelihood of occurrence assessment

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within the Project Area.
Likely	Species are likely to occur in the Project Area where there is suitable habitat within the Project Area and there are recent records of occurrence of the species in close proximity to the Project Area. OR Species known distribution overlaps with the Project Area and there is suitable habitat within the Project Area.
Unlikely	Species assessed as unlikely include: Those species previously recorded within 10 km of the Project Area, however: <ul style="list-style-type: none">• There is limited habitat in the Project Area (i.e. the type, quality and quantity of the habitat is generally poor or restricted).• The suitable habitat within the Project Area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the Project Area. OR Those species that have a known distribution overlapping with the Project Area, however: <ul style="list-style-type: none">• There is limited habitat in the Project Area (i.e. the type, quality and quantity of the habitat is generally poor or restricted).• The suitable habitat within the Project Area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the Project Area
Highly unlikely	Species that are considered highly unlikely to occur in the Project Area include: <ul style="list-style-type: none">• Those species that have no suitable habitat within the Project Area.• Those species that have become locally extinct, or are not known to have ever been present in the region of the Project Area.

Table E.3 Conservation significant fauna likelihood of occurrence assessment

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Birds							
Baudin's Black Cockatoo (<i>Calyptorhynchus baudinii</i>)	T	V	X		Baudin's Black Cockatoo occurs in high-rainfall areas, usually at sites that are heavily forested and dominated by Marri (<i>Corymbia calophylla</i>) and Eucalyptus species, especially Karri (<i>E. diversicolor</i>) and Jarrah (<i>E. marginata</i>). The species also occurs in woodlands of Wandoo (<i>E. wandoo</i>), Blackbutt (<i>E. patens</i>), Flooded Gum (<i>E. rudis</i>), and Yate (<i>E. cornuta</i>). Baudin's Black Cockatoo breeds in the Jarrah, Marri and Karri forests of the deep south-west in areas averaging more than 750 mm of rainfall annually. Preferred roosts are in areas with a dense canopy close to permanent sources of water that provide the birds with protection from weather conditions (DSEWPaC 2012).	<p><u>Habitat</u> Suitable foraging habitat and potential breeding habitat throughout the Study Area.</p> <p><u>Records</u> Scattered records in the region, however the Study Area does not occur within known distribution.</p>	<p>Unlikely While the Baudin's Black Cockatoo has sporadically been recorded in the region, the Study Area is located outside this species known range.</p>
Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>)	T	E	X	X	This species mainly occurs in uncleared or remnant native eucalypt woodlands and in shrubland or kwongan heathland dominated by Hakea, Dryandra, Banksia and Grevillea species. The species also occurs in forests containing Marri (<i>Corymbia calophylla</i>), Jarrah (<i>Eucalyptus marginata</i>) or Karri (<i>E. diversicolor</i>). Breeding usually occurs in the Wheatbelt region of Western Australia, with flocks moving to the higher rainfall coastal areas to forage after the breeding season. Feeds on the seeds of a variety of native plants, including <i>Allocasuarina</i> spp., <i>Banksia</i> spp., <i>Dryandra</i> spp., <i>Eucalyptus</i> spp., <i>Grevillea</i> spp. and <i>Hakea</i> spp. and some introduced plants (DSEWPaC 2012).	<p><u>Habitat</u> Suitable foraging habitat and potential breeding habitat throughout the Study Area.</p> <p><u>Records</u> Scattered recent records in the region, and the Study Area is located within the known breeding range.</p>	<p>Likely There is suitable habitat for the Carnaby's Black Cockatoo (including foraging, roosting and potential breeding) within the Study Area and there are recent records in close proximity.</p>

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Australian Peregrine Falcon (<i>Falco peregrinus</i> subsp. <i>macropus</i>)	S4		X		The Peregrine Falcon is seen occasionally anywhere in the south-west of Western Australia. It is found everywhere from woodlands to open grasslands and coastal cliffs - though less frequently in desert regions. The species nests primarily on ledges of cliffs, shallow tree hollows, and ledges of building in cities (Morcombe 2004).	<p><u>Habitat</u> Very limited habitat and the species is unlikely to utilise or rely upon the terrestrial habitats in the Study Area. The Peregrine Falcon is an aerial hunter which predominantly preys upon other birds. The scattered tree hollows may provide potential nesting habitat for the species.</p> <p><u>Records</u> Scattered records in the region.</p>	Unlikely While the Peregrine Falcon may occasionally fly over the Study Area, there is limited habitat to support the species within the Study Area.
Malleefowl (<i>Leipoa ocellata</i>)	T	V		X	The Malleefowl generally occurs in semi-arid areas of Western Australia, from Carnarvon to south east of the Eyre Bird Observatory (south-east Western Australia). It occupies shrublands and low woodlands that are dominated by mallee vegetation, as well as native pine <i>Callitris</i> woodlands, Acacia shrublands, Broombush (<i>Melaleuca uncinata</i>) vegetation or coastal heathlands. The nest is a large mound of sand or soil and organic matter (Jones and Goth 2008; Morcombe, 2004). They prefer vegetation with a dense understorey of shrubs and their breeding habitat is characterized by light soil and an abundant leaf litter, which is used in the construction of nesting mounds. Density of the canopy cover is an important feature associated with high breeding densities, with grazed areas generally having much lower densities. In the WA Wheatbelt, Malleefowl distribution is associated with landscapes with lower rainfall, greater amounts of mallee and shrubland that occur as large remnants, and lighter soil surface textures.	<p><u>Habitat</u> No suitable habitat within the Study Area.</p> <p><u>Records</u> There are only very historic records of the Malleefowl in the region, prior to widespread clearing for agriculture.</p>	Highly unlikely There is no suitable habitat for the Malleefowl in the Study Area.

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Australian Painted Snipe (<i>Rostratula australis</i>)	T	E, Mi		X	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. Australian Painted Snipe breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. The species rarely occurs in south-western Australia, where it was once more common (DotE 2014).	<u>Habitat</u> No suitable wetland habitat. <u>Records</u> No records in the region.	Highly unlikely There is no suitable habitat for the Australian Painted Snipe in the Study Area.
Mammals							
Chuditch (<i>Dasyurus geoffroii</i>)	T	V	X	X	The Chuditch inhabits eucalypt forest (especially Jarrah, <i>Eucalyptus marginata</i>), dry woodland and mallee shrublands. In Jarrah forest, Chuditch populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest. Most diurnal resting sites in sclerophyll forest consist of hollow logs or earth burrows (Van Dyke and Strahan 2008). The species can travel large distances, has a large home range and is sparsely populated through a large portion of its range.	<u>Habitat</u> The larger remnants of vegetation within the road reserve may provide potential habitat for dispersal. <u>Records</u> Scattered records in the region.	Unlikely There is very limited suitable habitat for the Chuditch in the Study Area and given fragmented and limited connectivity of the habitat within the Study Area, there is limited suitability for Chuditch.
Water-rat (<i>Hydromys chrysogaster</i>)	P4		X		Water-rats live primarily in a wide variety of freshwater habitats, from sub-alpine streams and other inland waterways to lakes, swamps, farm dams and irrigation channels and are thought to be one of the few native species to have at least partially benefited from human encroachment (Gardner and Serena 1995).	<u>Habitat</u> Very limited freshwater or riparian habitat. <u>Records</u> Some scattered records in rivers, creeks and drainage lines in the region, including near York.	Unlikely There is very limited suitable habitat for the Water-rat in the Study Area.

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Bernier Is. Banded Hare- wallaby (<i>Lagostrophus fasciatus</i> subsp. <i>fasciatus</i>)	T	V	X		The Rufous Hare-wallaby (Bernier Island) exists as a single population on Bernier Island, Western Australia. This Rufous Hare-wallaby (Bernier Island) occurs in all habitat types on Bernier Island, including dunes, heath, grassland and low scrub in proportion to their availability (DotE 2014).	<u>Habitat</u> No suitable habitat within the Study Area. <u>Records</u> One historic record of a Banded Hare Wallaby from near York in 1922. This record is likely as error, as this sub-species only occurs on Bernier Island.	Highly unlikely The local record of this species is historic and likely to be an error as this sub-species only occurs on Bernier Island.
Western Brush Wallaby (<i>Macropus irma</i>)	P4		X		The Western Brush Wallaby is a grazer found primarily in open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some larger areas of mallee and heathland, and is uncommon in karri forest. This species was once very common in the south-west of Western Australia but has undergone a reduction in range and a significant decline in abundance in its current habitat. (Van Dyke & Strahan 2008).	<u>Habitat</u> Very restricted to the larger remnants of vegetation within the road reserve which the wallaby may pass through occasionally via linkages to other areas of suitable woodland habitat. <u>Records</u> Scattered records in the region.	Unlikely Due to the long linear nature of the Study Area, and the lack of connectivity to substantially larger tracts of native vegetation, this species is unlikely to occur.
Greater Bilby (<i>Macrotis lagotis</i>)	T	V	X		The Greater Bilby occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. In the south of its range, the Greater Bilby lives on rises and ridges among sparse grasses, especially Mitchell Grass and short shrubs. In Western Australia there are disjunct populations in the Gibson Desert, south-western Kimberley, inland areas of the Pilbara and northern Great Sandy Desert.	<u>Habitat</u> No suitable habitat within the Study Area. <u>Records</u> No recent records in the region. Closest record in proximity is dated 1921	Unlikely There is no suitable habitat for the Greater Bilby within the Study Area and the species has experienced a substantial decline in its distribution. This species was formerly found in south-western Australia but is now locally extinct.

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Red-tailed Phascogale (<i>Phascogale calura</i>)	T	E	X	X	The Red-tailed Phascogale inhabits Wandoo (<i>Eucalyptus wandoo</i>) and dense Sheoak (<i>Allocasuarina huegeliana</i>) woodland associations, with populations being most dense in the latter vegetation type. The species prefers vegetation that is unburnt for a long time, which provides continuous canopy cover to assist their arboreal habits. Trees need to be of a sufficient age to provide hollows for nesting in limbs or logs, and grass trees need to have ample skirts to provide cover. Small, scattered populations still occur in remnant vegetation in the Wheatbelt (DotE 2014).	<p>Habitat There is some limited suitable Wandoo and <i>Allocasuarina huegeliana</i> woodland habitat within the Study Area which is restricted to thin linear strips within the Study Area.</p> <p>Records Most recent records of the Red-tailed Phascogale occur in the Wheatbelt between Brookton and Katanning. However there is one recent record of the species in 2010 at the very eastern end of the Study Area (SLK 51). This record is from a remnant patch of Wandoo woodland.</p>	<p>Likely The Wandoo and <i>Allocasuarina huegeliana</i> habitat within the Study Area would provide the most value to the Red-tailed Phascogale, and the larger remnant patches provide potential habitat for the species.</p>
Southern Brush-tailed Phascogale (<i>Phascogale tapoatafa</i> subsp. <i>tapoatafa</i>)	T		X		The Southern Brush-tailed Phascogale typically occurs in dry sclerophyll forests and open woodlands with a generally sparse ground-storey, which contain suitable nesting resources such as tree hollows, rotted stumps and tree cavities (Van Dyck and Strahan, 2008).	<p>Habitat Very restricted habitat with suitable nesting resources within the Study Area.</p> <p>Records Closest record in proximity to the Study Area dated 1974 near York. The Study is located at the northern of the species range.</p>	<p>Unlikely There is very limited suitable habitat for the Southern Brush-tailed Phascogale within the Study Area. The cleared agricultural land surrounding the Study Area would reduce this species likelihood of occurrence.</p>

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Heath Mouse (<i>Pseudomys shortridgei</i>)	T	V	X		The Heath Mouse has a disjunct range across southern Australia, occurring in south-west Victoria, southern South Australia and southern Western Australia. In Western Australia, it is known from Fitzgerald River National Park, Lake Magenta Reserve, the Lake Biddy area, Dragon Rocks Reserve, Hyden and Ravensthorpe. The species occurs in mallee scrub over heath and mixed scrub (with <i>Banksia</i> spp.) over sedge, unburnt for at least 20 years in areas with 350 mm annual rainfall. Mallee species include <i>Eucalyptus gardneri</i> subsp. <i>ravensthorpensis</i> and soils typically include loamy sands or sandy loams with a lateritic scree and clayey soils with a stony component (DotE 2014).	<p><u>Habitat</u> No suitable habitat within the Study Area.</p> <p><u>Records</u> Scattered historic records in the region. One record in 2004 from a private property near York.</p>	Unlikely There is no suitable habitat for the Heath Mouse in the Study Area.
Reptiles							
Woma (<i>Aspidites ramsayi</i>)	S4		X		The Woma inhabits woodlands, heaths and shrublands, often with spinifex. It occurs in the sub-humid and arid areas across Australia's interior with a separate sub-population occurring in the Wheatbelt and Goldfields of Western Australia. The Woma shelters mainly in abandoned monitor and mammal burrows and in soil cracks (Wilson and Swan 2013).	<p><u>Habitat</u> Some limited woodland habitat within remnant vegetation in the road reserve, which is restricted to thin linear strips within the Study Area.</p> <p><u>Records</u> Scattered historic records in the region. On record near Quairading from 1981.</p>	Unlikely There is limited suitable habitat for the Woma within the Study Area.
Carpet Python (<i>Morelia spilota subsp. imbricata</i>)	S4		X		The Carpet Python occurs in a large range of habitats including woodlands, forests and dense coastal scrub, on granite and limestone outcrops and along watercourses. It is often arboreal and preys on birds, other reptiles and small to medium size mammals. The carpet python generally occurs in large, undisturbed bush; and areas, preferring coastal limestone and woodlands on the Swan Coastal Plain (Bush <i>et al.</i> 2010).	<p><u>Habitat</u> Some limited woodland habitat within remnant vegetation in the road reserve, which is restricted to thin linear strips within the Study Area.</p> <p><u>Records</u> Scattered historic records along the Study Area.</p>	Unlikely There is limited suitable habitat for the Carpet Python within the Study Area. This species may potentially pass through areas of the Study Area adjacent to larger remnants of vegetation.

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Black-striped Snake (<i>Neelaps calonotos</i>)	P3		X		This species is restricted to the sandy coastal strip, between Mandurah and Dongara. It occurs on dunes and sand-plains vegetated with heaths and eucalypt/banksia woodlands. This species is seriously threatened by increasing development and habitat loss within its restricted distribution (Wilson and Swan, 2013).	<p><u>Habitat</u> No suitable habitat within the Study Area.</p> <p><u>Records</u> One record near York which is likely to be an error. This species is restricted to the coastal plain.</p>	<p>Highly unlikely The local record of this species is likely to be an error as the Black-striped Snake only occurs on the coastal plain.</p>
Invertebrates							
Tree-stem Trapdoor Spider (<i>Aganippe castellum</i>)	P4		X		The Tree-Stem Trapdoor Spider is a medium-sized spider, dark brown to black in colour, and has large anterior lateral eyes that project beyond the edge of the carapace. There are currently 22 known populations of the species in the south-west of Western Australia. They extend to the north as far north as Pintharuka Nature Reserve (Morawa Shire), south to the Merredin townsite, and east to Southern Cross. The Tree-Stem Trapdoor Spider prefers habitats in flood-prone depressions and flats that support myrtaceous shrub communities. The burrows of this species are specially designed with an aboveground entrance to withstand occasional sheet flooding. These spiders generally build their nests against the stems of trees such as Broombush (<i>Melaleuca uncinata</i>), Sheoaks (such as <i>Allocasuarina acutivalvis</i>) and other Myrtaceous shrubs in sandy loam soils (Avon Catchment Council 2007).	<p><u>Habitat</u> Very limited suitable habitat within the Study Area.</p> <p><u>Records</u> One record north 5 km of the Study Area in private property from 2004.</p>	<p>Unlikely Given the very specific habitat requirements of this species and that the Study Area only consists of very thin strips of vegetation, the Tree-Stem Trapdoor Spider is considered unlikely to occur.</p>

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Shield-backed Trapdoor Spider (<i>Idiosoma nigrum</i>)	T	V	X	X	The Shield-backed Trapdoor Spider is endemic to Western Australia and known from three locations. One location consists of a number of severely fragmented populations in the central and northern Wheatbelt. The second and third locations are at Jack Hills and Weld Range, two isolated populations approximately 200 km further north, in more arid areas. The Shield-backed Trapdoor Spider typically inhabits clay soils of eucalypt woodlands and acacia vegetation, and relies heavily on leaf-litter and twigs to build its burrow (DotE 2014).	<p><u>Habitat</u> No suitable habitat within the Study Area.</p> <p><u>Records</u> Several historic records from near York (1971-4), Quairading (1954) and 8 km north-east of Kauring. One more recent record 8 km north-east of Mawson in <i>Eucalyptus argyphaea</i> woodland with <i>Melaleuca uncinata</i> and <i>Eucalyptus wandoo</i>.</p>	Unlikely There is no suitable habitat for this species within the Study Area.
Beverley Shield-back Cricket (<i>Ixalodectes flectocercus</i>)	P1		X		The Beverley Shield-back Cricket is known from patches of heath vegetation that remain in the Wheatbelt near Beverley, Western Australia. There are only five records of the species, one from Beverley (date: 1896), one from Quairading (date: 1999), one from Kokerbin Nature Reserve (date: 1999), and two from Nokaning (date: 1999).	<p><u>Habitat</u> No suitable heath habitat within the Study Area.</p> <p><u>Records</u> The nearest record to the Study Area is located near Quairading.</p>	Unlikely There is no suitable habitat for this species within the Study Area.

Migratory fauna likelihood of occurrence assessment

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / Records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Migratory wetland birds							
Common Sandpiper (<i>Actitis hypoleucos</i>)	IA	Mi	X		Habitat for the Common Sandpiper is varied, including coastal and interior wetlands – narrow muddy edges of billabongs, river pools, mangroves, among rocks and snags, reefs or rocky beaches. This species avoids wide open mudflats and is widespread and scattered, common on the north and west coasts and uncommon in the south-east and interior (Morcombe 2004).	<p><u>Habitat</u> No suitable wetland habitat within the Study Area.</p> <p><u>Records</u> Very scattered records in the region. One record within the Study Area west of Kauring in 2008.</p>	<p>Unlikely There is no suitable habitat for this species within the Study Area.</p>
Great Egret (<i>Ardea modesta</i>)	IA	Mi	X	X	The Eastern Great Egret is widespread in Australia where it inhabits a wide range of wetland habitats including swamps and marshes, margins of rivers and lakes, damp or flooded grasslands, pasture or agricultural lands, reservoirs, sewerage treatment ponds, drainage channels, salt pans, salt marshes, mangrove, and a range of coastal/marine habitats (DotE 2014)	<p><u>Habitat</u> No suitable habitat within the Study Area.</p> <p><u>Records</u> Several records around York and Toodyay.</p>	<p>Unlikely There is no suitable habitat for this species within the Study Area.</p>
Cattle Egret (<i>Ardea ibis</i>)	IA	Mi		X	The Cattle Egret is a common and widespread species, which typical habitat includes tropical and temperate grasslands, wooded lands and terrestrial wetlands. It often forages away from water on low lying grasslands (often inundated), improved pastures and croplands and roosts in trees, or amongst ground vegetation in or near lakes and swamps (Morcombe 2004).	<p><u>Habitat</u> No suitable habitat within the Study Area.</p> <p><u>Records</u> No records in the Wheatbelt region.</p>	<p>Highly unlikely This species only occurs in coastal or near costal habitat.</p>

Common name (species name)	Status		Search		Description & habitat requirements	Extent of habitat with Project Area / Records	Likelihood of occurrence
	WC Act/ DPaW	EPBC Act	<i>Nature Map</i>	EPBC PMST			
Migratory terrestrial birds							
White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)	IA	Mi		X	The White-bellied Sea-Eagle occurs in coastal habitats (especially those close to the sea-shore as well as any habitat characterized by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). It also occurs in the vicinity of estuaries, mangroves, swamps, lagoons and floodplains, often far inland along major rivers (Morcombe 2004).	<u>Habitat</u> No suitable habitat within the Study Area. <u>Records</u> No records in the Wheatbelt region.	Unlikely This species typically only occurs in coastal or near coastal habitat.
Rainbow Bee-eater (<i>Merops ornatus</i>)	IA	Mi	X	X	Open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It also inhabits sand dune systems in coastal areas and at inland sites that are in close proximity to water (Morcombe 2004).	<u>Habitat</u> Very limited suitable habitat for foraging within the Study Area. <u>Records</u> Numerous records throughout the Wheatbelt region.	Likely The Rainbow Bee-eater may occasionally utilise the woodland habitat within the Study Area for foraging. There is no suitable habitat for nesting for this species.

Refer to Appendix B for conservation code descriptions.

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0	M Dilly	C Grabham		C Grabham		24/11/14

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Appendix C Aboriginal Heritage Risk Assessment (AHRA)

FORM – Aboriginal Heritage Risk Assessment

Introduction

The purpose of this Form is to identify the risk a project has to impact Aboriginal Heritage site(s) as defined by the Aboriginal Heritage Act 1972 (AHA). The risk assessment is based on the Department of Aboriginal Affairs *Cultural Heritage Due Diligence Guidelines*. Version 3.0, 30 April 2013.

MRWA Project Information

Project Details					
Title	York Merredin Road SLK 19-29			TRIM FILE#	13/1082
Road Name & No.	York Merredin Road	Start SLK	19	End SLK	29
Total size of Proposed Ground Disturbance (m²): 100000 (10 ha)		In Previously Disturbed areas (m²): 100000 (10 ha)		In Undisturbed areas (m²): 0	
Additional Project Information					
Widening along road mostly in existing disturbance area with some tree clearing. One river crossing, Mackie branch of the Swan River is a heritage site (Site ID 3536). Works at crossing will be limited to the already disturbed area in the road reserve and involve culvert improvement/culvert widening.					

DAA Aboriginal Heritage Information System – Search Results

AHIS Sites Search *			
Description of Search area	Search within 100m of project using ArcGIS		
No. of Registered Sites in Search Area	1	No. of AHIS sites impacted by proposed works	0
No. of Other Heritage Places in Search Area	Lodged: 0	Insufficient Data: 0	Stored Data: 0
AHIS Surveys conducted over entire project area	<input checked="" type="checkbox"/> Yes	Survey type:	<input checked="" type="checkbox"/> Ethnographic
	<input type="checkbox"/> No		<input type="checkbox"/> Archaeological
Date of Surveys	Many	Consultant used	Many
Additional Information			
Whole river is an ethnographic site.			

*MRWA should exercise caution in areas where no surveys have been completed, or where surveys have only been completed for parts of the area where the proposed activity is intended. Caution is required because heritage surveys over only part of the land may not have identified all possible sites. Sole reliance on information contained in the Register may not be sufficient and consultation in the first instance with the PHO is recommended in these situations.

FORM – Aboriginal Heritage Risk Assessment

Previous Land Use (Indicate the most appropriate level with a X)		
X	DAA/MRWA Categories	DAA/MRWA Description
	Built Environment	Urban land use, towns, metropolitan region,
X	Significantly Altered Environment	Cultivated and cleared land, farmland; rehabilitated landscape
	Moderately Altered Environment	Partially cleared lands, revegetated landscape
	Minimally Altered Environment	Urban bushland, regrowth areas, slightly disturbed natural bushland
	Unaltered Environment	Protected areas or pristine environment

Likely Land Impact or Disturbance from Activity (Indicate the most appropriate level with a X)		
X	Categories	Description
	Negligible	Activities which are non-invasive and cause negligible or no impact to the land may include: <ul style="list-style-type: none"> • walking, photography, filming for assessing project scope, vegetation and heritage; • magnetic surveys; • use of existing tracks, water courses; • environmental monitoring; • water and soils sampling; • fossicking using hand held instruments; • spatial measurement; and • scientific research, using hand held tools.
	Minimal	Activities that cause minimal disturbance to the land may include: <ul style="list-style-type: none"> • cultivation/grazing in areas previously cultivated/grazed; • maintenance of existing paths, walls, roads, tracks, bridges, public infrastructure and community utilities within the existing footprint and adjacent service areas; • feral animal eradication, weed, vermin and pest control, vegetation control and fire control; and • light vehicular access and camping.
X	Moderate	Activities that cause moderate disturbance to the land may include: <ul style="list-style-type: none"> • maintenance of bridges that disturb river bed and/or banks; • sampling using hand held rig or rig mounted on a light vehicle; • new fire breaks; • road widening within existing corridor; • re-vegetation; • temporary power lines, material stockpiles, camps, and • surface vegetation clearing.
	Significant	Activities that cause significant disturbance to the land may include: <ul style="list-style-type: none"> • creation of new roads, borrow pits or tracks; • new public access ways, bridges, culverts, flood remediation and erosion levies; • intensive soil/core sampling; • new pipelines; • significant reclamation works; and • major landscaping/contouring.
	Major	Activities that cause major and lasting disturbance to the land may include: <ul style="list-style-type: none"> • large-scale land clearing; • material extraction; • mechanical earthmoving, blasting; • major construction works; and • large scale changes to waterways.

FORM – Aboriginal Heritage Risk Assessment

ABORIGINAL HERITAGE RISK MATRIX					
LIKELY IMPACT ON HERITAGE SITES					
	Negligible	Minimal	Moderate	Significant	Major
Built Environment.	Low	Low	Low	Low	Medium
Significantly Altered	Low	Low	Low	Medium	High
Moderately Altered	Low	Low	Medium	Medium,	High
Minimally Altered	Low	Medium	Medium	High	High
Unaltered	Low	Medium	High	High	High

Risk Rating	Actions
Low	Consult with the Principal Heritage Officer, if uncertain how to proceed. A range of further actions may be required, including: <ul style="list-style-type: none"> Consult the DAA; Desktop survey; Aboriginal consultation.
Medium (Review; Exercise Caution)	Consult with the Principal Heritage Officer. A range of further actions may be required, including: <ul style="list-style-type: none"> Consult the DAA; Desktop survey; Aboriginal consultation, Ethnographic survey Archaeological survey.
High (Consult; Survey; Approvals)	Consult with the Principal Heritage Officer. A range of further actions may be required, including: <ul style="list-style-type: none"> Desktop survey, Consult the DAA Aboriginal consultation, Ethnographic survey Archaeological survey. Application for s18 of the AHA approval Application for Reg 10 of the AHR approval Cultural Heritage Management Plan (CHMP)

Risk Rating (see Risk Matrix)
LOW

Further Actions Possibly Required (tick applicable):

None	Consult with DAA	Aboriginal consultation	Ethnographic Survey	Archaeological Survey	s18 approval	Reg. 10 approval	CHMP
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Completed by	<i>Signature</i> <u><i>R Lupton</i></u>	<i>Date</i> <u>17/4/2014</u>
Environment Officer	<i>Name</i> <u>Rochelle Lupton</u>	<i>Title</i> <u>Environment Officer</u>
Reviewed by	<i>Signature</i> <u><i>CRHammond</i></u>	<i>Date</i> <u>17/4/14</u>
Principal Heritage Officer	<i>Name</i> <u>Clint Hammond</u>	<i>Title</i> <u>PHO</u>

FORM – Aboriginal Heritage Risk Assessment

Principal Heritage Officer's Comments

A Reg 10 approval will be needed if culvert widening is occurring with the river. Happy to assist in applying for this approval.

FORM – Aboriginal Heritage Risk Assessment

Introduction

The purpose of this Form is to identify the risk a project has to impact Aboriginal Heritage site(s) as defined by the Aboriginal Heritage Act 1972 (AHA). The risk assessment is based on the Department of Aboriginal Affairs *Cultural Heritage Due Diligence Guidelines*. Version 3.0, 30 April 2013.

MRWA Project Information

Project Details			
Title	York Merredin Road SLK 0-15	TRIM FILE#	13/1082
Road Name & No.	York Merredin Road	Start SLK	0
		End SLK	15
Total size of Proposed Ground Disturbance (m²): 150000 (15 ha)	In Previously Disturbed areas (m²): 150000 (15 hectares)	In Undisturbed areas (m²): 0	
Additional Project Information			
Widening along road mostly in existing disturbance area with some tree clearing. Two river crossings, Avon branch of the Swan River is a heritage site (Site ID 3536). Works at two crossings will be limited to the already disturbed area in the road reserve and involve culvert improvement/culvert widening.			

DAA Aboriginal Heritage Information System – Search Results

AHIS Sites Search *			
Description of Search area	Search within 100m of project using ArcGIS		
No. of Registered Sites in Search Area	1	No. of AHIS sites impacted by proposed works	0
No. of Other Heritage Places in Search Area	Lodged: 0	Insufficient Data: 0	Stored Data: 0
AHIS Surveys conducted over entire project area	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Survey type:	<input checked="" type="checkbox"/> Ethnographic <input type="checkbox"/> Archaeological
Date of Surveys	Many	Consultant used	Many
Additional Information			
Whole river is an ethnographic site.			

*MRWA should exercise caution in areas where no surveys have been completed, or where surveys have only been completed for parts of the area where the proposed activity is intended. Caution is required because heritage surveys over only part of the land may not have identified all possible sites. Sole reliance on information contained in the Register may not be sufficient and consultation in the first instance with the PHO is recommended in these situations.

FORM – Aboriginal Heritage Risk Assessment

Previous Land Use (Indicate the most appropriate level with a X)		
X	DAA/MRWA Categories	DAA/MRWA Description
	Built Environment	Urban land use, towns, metropolitan region,
X	Significantly Altered Environment	Cultivated and cleared land, farmland; rehabilitated landscape
	Moderately Altered Environment	Partially cleared lands, revegetated landscape
	Minimally Altered Environment	Urban bushland, regrowth areas, slightly disturbed natural bushland
	Unaltered Environment	Protected areas or pristine environment

Likely Land Impact or Disturbance from Activity (Indicate the most appropriate level with a X)		
X	Categories	Description
	Negligible	Activities which are non-invasive and cause negligible or no impact to the land may include: <ul style="list-style-type: none"> • walking, photography, filming for assessing project scope, vegetation and heritage; • magnetic surveys; • use of existing tracks, water courses; • environmental monitoring; • water and soils sampling; • fossicking using hand held instruments; • spatial measurement; and • scientific research, using hand held tools.
	Minimal	Activities that cause minimal disturbance to the land may include: <ul style="list-style-type: none"> • cultivation/grazing in areas previously cultivated/grazed; • maintenance of existing paths, walls, roads, tracks, bridges, public infrastructure and community utilities within the existing footprint and adjacent service areas; • feral animal eradication, weed, vermin and pest control, vegetation control and fire control; and • light vehicular access and camping.
X	Moderate	Activities that cause moderate disturbance to the land may include: <ul style="list-style-type: none"> • maintenance of bridges that disturb river bed and/or banks; • sampling using hand held rig or rig mounted on a light vehicle; • new fire breaks; • road widening within existing corridor; • re-vegetation; • temporary power lines, material stockpiles, camps, and • surface vegetation clearing.
	Significant	Activities that cause significant disturbance to the land may include: <ul style="list-style-type: none"> • creation of new roads, borrow pits or tracks; • new public access ways, bridges, culverts, flood remediation and erosion levies; • intensive soil/core sampling; • new pipelines; • significant reclamation works; and • major landscaping/contouring.
	Major	Activities that cause major and lasting disturbance to the land may include: <ul style="list-style-type: none"> • large-scale land clearing; • material extraction; • mechanical earthmoving, blasting; • major construction works; and • large scale changes to waterways.

FORM – Aboriginal Heritage Risk Assessment

ABORIGINAL HERITAGE RISK MATRIX					
LIKELY IMPACT ON HERITAGE SITES					
	Negligible	Minimal	Moderate	Significant	Major
Built Environment.	Low	Low	Low	Low	Medium
Significantly Altered	Low	Low	Low	Medium	High
Moderately Altered	Low	Low	Medium	Medium,	High
Minimally Altered	Low	Medium	Medium	High	High
Unaltered	Low	Medium	High	High	High

Risk Rating	Actions
Low	Consult with the Principal Heritage Officer, if uncertain how to proceed. A range of further actions may be required, including: <ul style="list-style-type: none"> Consult the DAA; Desktop survey; Aboriginal consultation.
Medium (Review; Exercise Caution)	Consult with the Principal Heritage Officer. A range of further actions may be required, including: <ul style="list-style-type: none"> Consult the DAA; Desktop survey; Aboriginal consultation, Ethnographic survey Archaeological survey.
High (Consult; Survey; Approvals)	Consult with the Principal Heritage Officer. A range of further actions may be required, including: <ul style="list-style-type: none"> Desktop survey, Consult the DAA Aboriginal consultation, Ethnographic survey Archaeological survey. Application for s18 of the AHA approval Application for Reg 10 of the AHR approval Cultural Heritage Management Plan (CHMP)

Risk Rating (see Risk Matrix)
LOW

Further Actions Possibly Required (tick applicable):

None	Consult with DAA	Aboriginal consultation	Ethnographic Survey	Archaeological Survey	s18 approval	Reg. 10 approval	CHMP
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Completed by

Signature *R Lupton*
 Name Rochelle Lupton

Date 17/4/2014
 Title Environment Officer

Reviewed by
 Principal Heritage Officer

Signature *CRHammond*
 Name Clint Hammond

Date 17/4/2014
 Title PHO

FORM – Aboriginal Heritage Risk Assessment

Principal Heritage Officer's Comments

A Reg 10 approval will be needed if culvert widening is occurring with the river. Happy to assist in applying for this approval.

FORM – Aboriginal Heritage Risk Assessment

Introduction

The purpose of this Form is to identify the risk a project has to impact Aboriginal Heritage site(s) as defined by the Aboriginal Heritage Act 1972 (AHA). The risk assessment is based on the Department of Aboriginal Affairs *Cultural Heritage Due Diligence Guidelines*. Version 3.0, 30 April 2013.

MRWA Project Information

Project Details			
Title	York Merredin Road Widening SLK 29-51	TRIM FILE#	13/1082
Road Name & No.	York Merredin Road Widening	Start SLK	29
End SLK	51		
Total size of Proposed Ground Disturbance (m²): 22 ha to be confirmed	In Previously Disturbed areas (m²): 11 ha (approx.) to be confirmed	In Undisturbed areas (m²): 11 ha (approx.) to be confirmed	
Additional Project Information			
<p>Widening along road mostly in existing disturbance area and some native vegetation clearing. Widening is within the road reserve.</p> <p>Culverts along the road will be upgraded.</p>			

DAA Aboriginal Heritage Information System – Search Results

AHIS Sites Search *			
Description of Search area	A search of the heritage register was undertaken; one Stored Data site was identified in the project area.		
No. of Registered Sites in Search Area	0	No. of AHIS sites impacted by proposed works	0
No. of Other Heritage Places in Search Area	Lodged: 0	Insufficient Data: 0	Stored Data: 1
AHIS Surveys conducted over entire project area	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Survey type:	<input type="checkbox"/> Ethnographic <input type="checkbox"/> Archaeological
Date of Surveys		Consultant used	
Additional Information			
<p>Project intersections site 5671 Jacobs Well which is Stored Data/Not a Site</p>			

*MRWA should exercise caution in areas where no surveys have been completed, or where surveys have only been completed for parts of the area where the proposed activity is intended. Caution is required because heritage surveys over only part of the land may not have identified all possible sites. Sole reliance on information contained in the Register may not be sufficient and consultation in the first instance with the PHO is recommended in these situations.

FORM – Aboriginal Heritage Risk Assessment

Previous Land Use (Indicate the most appropriate level with a X)		
X	DAA/MRWA Categories	DAA/MRWA Description
	Built Environment	Urban land use, towns, metropolitan region,
X	Significantly Altered Environment	Cultivated and cleared land, farmland; rehabilitated landscape
X	Moderately Altered Environment	Partially cleared lands, revegetated landscape
	Minimally Altered Environment	Urban bushland, regrowth areas, slightly disturbed natural bushland
	Unaltered Environment	Protected areas or pristine environment

Likely Land Impact or Disturbance from Activity (Indicate the most appropriate level with a X)		
X	Categories	Description
	Negligible	Activities which are non-invasive and cause negligible or no impact to the land may include: <ul style="list-style-type: none"> • walking, photography, filming for assessing project scope, vegetation and heritage; • magnetic surveys; • use of existing tracks, water courses; • environmental monitoring; • water and soils sampling; • fossicking using hand held instruments; • spatial measurement; and • scientific research, using hand held tools.
	Minimal	Activities that cause minimal disturbance to the land may include: <ul style="list-style-type: none"> • cultivation/grazing in areas previously cultivated/grazed; • maintenance of existing paths, walls, roads, tracks, bridges, public infrastructure and community utilities within the existing footprint and adjacent service areas; • feral animal eradication, weed, vermin and pest control, vegetation control and fire control; and • light vehicular access and camping.
X	Moderate	Activities that cause moderate disturbance to the land may include: <ul style="list-style-type: none"> • maintenance of bridges that disturb river bed and/or banks; • sampling using hand held rig or rig mounted on a light vehicle; • new fire breaks; • road widening within existing corridor; • re-vegetation; • temporary power lines, material stockpiles, camps, and • surface vegetation clearing.
	Significant	Activities that cause significant disturbance to the land may include: <ul style="list-style-type: none"> • creation of new roads, borrow pits or tracks; • new public access ways, bridges, culverts, flood remediation and erosion levies; • intensive soil/core sampling; • new pipelines; • significant reclamation works; and • major landscaping/contouring.
	Major	Activities that cause major and lasting disturbance to the land may include: <ul style="list-style-type: none"> • large-scale land clearing; • material extraction; • mechanical earthmoving, blasting; • major construction works; and • large scale changes to waterways.

FORM – Aboriginal Heritage Risk Assessment

ABORIGINAL HERITAGE RISK MATRIX					
LIKELY IMPACT ON HERITAGE SITES					
	Negligible	Minimal	Moderate	Significant	Major
Built Environment.	Low	Low	Low	Low	Medium
Significantly Altered	Low	Low	Low	Medium	High
Moderately Altered	Low	Low	Medium	Medium,	High
Minimally Altered	Low	Medium	Medium	High	High
Unaltered	Low	Medium	High	High	High

Risk Rating	Actions
Low	Consult with the Principal Heritage Officer, if uncertain how to proceed. A range of further actions may be required, including: <ul style="list-style-type: none"> Consult the DAA; Desktop survey; Aboriginal consultation.
Medium (Review; Exercise Caution)	Consult with the Principal Heritage Officer. A range of further actions may be required, including: <ul style="list-style-type: none"> Consult the DAA; Desktop survey; Aboriginal consultation, Ethnographic survey Archaeological survey.
High (Consult; Survey; Approvals)	Consult with the Principal Heritage Officer. A range of further actions may be required, including: <ul style="list-style-type: none"> Desktop survey, Consult the DAA Aboriginal consultation, Ethnographic survey Archaeological survey. Application for s18 of the AHA approval Application for Reg 10 of the AHR approval Cultural Heritage Management Plan (CHMP)

Risk Rating (see Risk Matrix)
LOW to MEDIUM

Further Actions Possibly Required (tick applicable):

None	Consult with DAA	Aboriginal consultation	Ethnographic Survey	Archaeological Survey	s18 approval	Reg. 10 approval	CHMP
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Completed by

Signature *R Lupton*
 Name Rochelle Lupton

Date 17/4/2014
 Title Environment Officer

Reviewed by

Principal Heritage Officer

Signature *CRHammond*
 Name Clint Hammond

Date 17/4/2014
 Title PHO

FORM – Aboriginal Heritage Risk Assessment

Principal Heritage Officer's Comments

Appendix D Environmental Management Plan

Environmental Management Plan – York to Merredin Road Widening – SLK 0-51

Introduction

This Environmental Management Plan (EMP) has been developed for the Project area following the completion of the Environmental Impact Assessment (EIA) report. The aim of this EMP is to minimise the environmental impacts associated with the proposed works as well as to identify areas of responsibilities required for the implementation of management strategies.

This EMP addresses specific issues that were identified during the EIA. The project management measures identified within this EMP are in addition to the standard environmental management contract specifications used for Category 2 projects. Main Roads' standard environmental contract specifications (Specifications 203, 204, 301, 302 and 304) are to be adhered to where appropriate.

It is critical that all clearing works are carried out in accordance with the management measures prescribed in Specifications 301 (Clearing) and 302 (Earthworks).

The areas that require special management will be addressed in terms of:

- the timing of the various management actions
- the topic (e.g. vegetation)
- the actions that are necessary to minimise the impact
- the responsible party for implementing the action

Communication Plan

Environmental issues specific to the project will be communicated as follows:

Method	Frequency	Participants	Reference	Record
<i>Project Site</i>				
Induction	Prior to Work	All personnel and subcontractors	Wheatbelt Environmental Induction	Induction Record
Toolbox Meetings	Daily	Project Personnel		Minutes of Meeting
Contract Meetings	When determined in contract	Main Roads' Project Manager and Contractor Project Manager		Minutes of Meeting
<i>Authority Consultation</i>				
Department of Environment Regulation	As required	Main Roads' Project Manager and Contractor Project Manager	-	Minutes of meeting

External Communication and Complaints

A complaints register shall be maintained. All complaints received shall be forwarded to the Main Roads' Project Manager for action. Serious complaints shall be investigated within 24 hours of the complaint being received.

Monitoring, Auditing and Compliance

The clearing area will be monitored prior to clearing by the Environment Officer.

The Site Supervisor will audit this EMP within 2 weeks of the start of the project, and fortnightly after. A record will be kept upon completion of the project to display compliance with this EMP.

Contingency Measures

Due to the scale and nature of the project, no contingency measures are identified as the inherent environmental risks are small.

EMP Accountability

Persons Name	Persons Role	Contact Details
Project Manager	Ardeshir Bahmani	0448973742
Site Supervisor	Matt Hopper	0407911341
Environment Officer	Rochelle Lupton	0435042502
Ecologist	To be advised	

ENVIRONMENTAL MANAGEMENT PLAN

Project Component	Management Action	Monitoring/ Maintenance Program	Responsible Person	Completion Timeframe
Standard Record Keeping Management				
Record Keeping	<ul style="list-style-type: none"> Ensure standard record keeping requirements are completed within 3 months of completion of the project activities. 	Post-construction record maintenance.	Project Manager and Environment Officer	Within 3 months of completion of the project activities
Project Specific Aspects				
Reserves and conservation areas	<ul style="list-style-type: none"> No clearing is permitted at the Class A reserve, located 42.34 SLK. 			
Aboriginal Heritage Sites Swan River (including Avon River, Mackie River and some tributaries) - SLK 20.83, crosses Mackie River And in the event of unknown sites being unearthed during construction process	<ul style="list-style-type: none"> Ensure on-site construction personnel are aware of the location of all Aboriginal heritage sites on site and the requirement to avoid impacting them. Clearly demarcate the boundaries of heritage sites where the possibility of site disturbance may occur. No disturbance is permitted to the heritage site located at SLK 20.8. A 5 m disturbance zone will be applied to this heritage site to prevent interference. In the event that human skeletal material is discovered, work will cease immediately and the Police will be contacted. If the skeletal remains are determined to be of Aboriginal origin, the Department of Aboriginal Affairs will be contacted as soon as practicable. In the event that artefacts or material of Aboriginal origin is discovered, work will cease within 25 metres of the material and a qualified archaeologist will investigate the item(s) and take appropriate actions (i.e. contact DAA). Liquid spills, stormwater and runoff materials will be managed to ensure project activities and drainage do not adversely affect heritage sites or any wetland or water body including creeks, springs, swamps and soaks. 	Pre-construction/ construction surveillance.	Project Manager	Duration of construction period
European Heritage Sites	<ul style="list-style-type: none"> Ensure on-site construction personnel are aware of European heritage sites and the requirement to 	Pre-construction/ construction surveillance.	Project Manager Site Supervisor	Duration of construction period

<p>St Andrew's Church and cemetery 12 Panmure Road, house 36 Suburban Road and others</p>	<p>protect them.</p> <ul style="list-style-type: none"> • Demarcate heritage sites for protection where appropriate. • Machinery vibration kept to the minimum practical • Ensure compliance requirements for machinery • In the event that a heritage is disturbed, activities will be reported to the State Heritage Office or Shire of York. 			
<p>Dust</p>	<ul style="list-style-type: none"> • Clear vegetation only when necessary and treat areas requiring soil stabilisation as soon as practicable. • Ensure dust lift is highly controlled where nearby rural residential properties are located and near the in the York townsite area through regular soil watering, road sweeping and treatment of temporary stockpiles. • Surface watering, spreading of hydromulch or similar will be used to protect loose surfaces or cleared areas. • Apply dust suppression techniques to sealed roads on or near the project site that are affected by excessive dust. • Minimise or cease project activities during periods of high wind or when excessive dust is generated, when works are occurring near sensitive areas such as in the town of York. • Inform nearby sensitive receptors including adjoining communities of activities that may cause excessive dust and respond quickly to complaints by community members. • Provide signage for suitable speed limits to be used for vehicle movement as part of a Traffic Management Plan. 	<p>Construction and post-construction maintenance</p>	<p>Contractor</p>	<p>Duration of construction period</p>
<p>Pollution and Litter</p>	<ul style="list-style-type: none"> • All waste materials from the Project area will be removed from the site upon completion of the project and to the satisfaction of the Project Manager or Site Supervisor. • Construction waste and other rubbish will be contained in bins with lids (where practicable) and removed regularly. 	<p>Construction and post-construction maintenance</p>	<p>Contractor</p>	<p>Duration of construction period</p>

<p>Noise and Vibration</p>	<ul style="list-style-type: none"> • Ensure compliance with all applicable statutory requirements and any heritage protection requirements (for vibration) if required. • Adopt construction techniques where possible that will minimise vibration impacts within nearby sensitive receptors, particularly for compaction operations. • Limit construction activity to normal business hours and liaise with the Shires or York or Quairading if construction activities are required outside of these hours. • Install alternative requirements to audible reversing alarms, where practicable. 	<p>Construction maintenance</p>	<p>Contractor/Project Manager</p>	<p>Duration of construction period</p>
<p>Surface Drainage</p> <p>Watercourse crossings including all watercourses planned for new culverts and culvert upgrades</p>	<ul style="list-style-type: none"> • Road design should maintain existing surface water flows and incorporate soil erosion control measures. • Vegetation removal and soil disturbance will be minimised, where practicable. • Disturbed areas will be stabilised soon after construction activities are completed. • Existing natural drainage paths and channels along the road or the vicinity of the Project area will not be unnecessarily blocked or restricted during project construction. • Vehicle and equipment wash down areas will be located away from environmentally sensitive areas (See Figure 1 - Attached. These areas include: • No on-site storage of fuel, oils and other contaminant materials will be permitted within 50 m of a watercourse. 	<p>Pre-construction/ construction surveillance.</p>	<p>Project Manager</p>	<p>Duration of construction period</p>
<p>Groundwater</p>	<ul style="list-style-type: none"> • All spills will be contained immediately and removed within 24 hours to minimise the potential for contaminants to enter groundwater. • Spills to be reported as an incident to the Environment Officer for record keeping purposes. 	<p>Construction maintenance</p>	<p>Project Manager Environment Officer</p>	<p>Duration of construction period</p>
<p>Hazardous Materials</p> <p>Proximity to Avon River, Mackie River and tributaries</p>	<ul style="list-style-type: none"> • Bulk fuel and hazardous material storage areas will be bunded and managed in compliance with applicable Australian Standards. • Vehicle servicing will be undertaken at designated areas, at least 100 m away from watercourses. • Site personnel shall be trained in the use of 	<p>Construction maintenance</p>	<p>Contractor/Project Manager</p>	<p>Duration of construction period</p>

	<p>emergency Fire suppressant equipment.</p> <ul style="list-style-type: none"> • Spill trays and spill response equipment will be available near fuel storage or refuelling areas. • All hazardous material spills will be reported according to statutory requirements. • Hazardous materials will be disposed of at an approved and certified facility. • Temporary storage of bitumen, asphalt, concrete or aggregate shall occur at designated depots or controlled hardstands located within the Project area. • Pre-coating of aggregate will only occur in approved and designated areas. 			
Fire	<ul style="list-style-type: none"> • No fires shall be lit within the Project area. • Machinery will be fitted with approved spark arresting exhaust systems. • All vehicles, plant and equipment to be fitted with fire extinguishers and restricted and to designated cleared areas. • A water tanker/fire fighter unit will be on site at all times during project construction and personnel trained in their use. • All hot works will be undertaken in accordance with standard safety procedures • Construction personnel will extinguish and report fires occurring within the Project area. 	Construction maintenance	Contractor/Project Manager	Duration of construction period
Visual Amenity	<ul style="list-style-type: none"> • Stockpiles and other materials will be stored in designated areas and kept in a neat and tidy condition at all times. • The duration of ground disturbing activities will be limited as far as practicable. 	Construction maintenance	Contractor/Project Manager	Duration of construction period
Rehabilitation				
Topsoil	<ul style="list-style-type: none"> • Topsoil will be managed according to Main Roads Topsoil Management Guideline (TRIM Doc D12#256186). • The movement of topsoil will be restricted to the limits of the Project area. • Where possible construction activities will be undertaken in summer to reduce the potential for soil erosion and drainage line siltation due to 	Construction and post-construction maintenance	Project Manager/Contractor	During and post construction

	vegetation removal and heavy rains.			
Flora and fauna				
Species specific management actions – Red-tailed Phascogale and Carnaby's Black Cockatoo	Implement the mitigation measures proposed in species specific management plan for the pre-construction, construction and post-construction phase of the Project within the Project area. The measures have been designed to assist all parties involved in the Project to manage the identified potential impacts that may result from the Project actions, particularly during the construction phase of the Project. The Species Specific Management Plan is attached below.	Pre-construction/ construction surveillance. Construction and post-construction maintenance	Contractor/Project Manager, Environment Officer and Ecologist	Duration of construction period

Species specific management plan – Red-tailed phascogale and Carnaby’s Black Cockatoo

The aim of this species specific management plan is to minimise the environmental impacts associated with the proposed works to the Red-tailed Phascogale and Carnaby’s Black Cockatoo as well as to identify areas of responsibilities required for the implementation of management measures.

The two key objectives of the avoidance and mitigation management measures are to:

1. Avoid, then minimise the clearing of Carnaby’s Black Cockatoo and Red-tailed Phascogale habitats
2. Avoid direct impacts (e.g. injury or death) to individual Carnaby’s Black Cockatoos and Red-tailed Phascogale during the construction process

In order to gauge the success of these key objectives, relevant management targets and key performance indicators have been identified (Table 1).

Table 1 Objectives & Key Performance Indicators for avoidance and mitigation measures

Objective	Target	Key Performance Indicator
Avoid, then minimise the clearing of habitat	No clearing or disturbance to habitat during construction outside of the disturbance footprint, as delineated in the field and outlined in detailed design plans.	<p>Presence of delineating fencing or tape and signage around areas of retained habitat outside the approved clearance area.</p> <p>The clearing area will be established by a surveyor and pegged and then checked by a member of the MR environment team before clearing is approved and then it will be checked again after clearing.</p> <p>Number of reported incidents of delineating fencing or tape missing or not installed around fauna habitat outside the approved clearance area.</p> <p>Number of reported incidents of clearing or disturbance exceeding area marked in field and design plans.</p> <p>Ongoing construction area inspections and reports to assess clearing operations.</p>
	No damage has occurred to habitat outside of approved clearing areas during construction.	Number of reported incidents (including the area of) habitat or feeding area damaged, or number of potential nesting trees lost or damaged during construction.
Avoid direct impacts (e.g. injury or death) to individual Carnaby’s Black Cockatoo and Red-tailed Phascogale during the construction process	Occurrence of nesting Black Cockatoos and breeding Red-tailed Phascogale to be clearly identified and marked. Information to be gained from pre-clearance survey – See Table 2	Nesting trees identified in mapping and marked on site.
	No trees outside the approved disturbance footprint to be disturbed.	Number of reported incidents of disturbance to trees outside the approved area.
	No individuals injured or killed during construction.	Fauna encounter records – number of injured or killed as a result of construction activities.

Avoidance and mitigation measures

Refinement of disturbance footprint

During the detailed design process for the Project Main Roads will aim to refine the design to reduce the Project area to a smaller area by positioning the disturbance footprint directly adjacent to the road within the more degraded areas where possible.

Incorporation of fauna sensitive road design elements

Main Roads will install signage at least two points along Sections 2 and 3 (one along each of the north and south bound lanes) to alert drivers to the presence of flying Black Cockatoos. The signage will be incorporated in to the final design plan of the road and will be implemented permanently.

Delineation of disturbance footprint

One of the key strategies to avoid impacts to native vegetation, fauna and habitat during the construction phase of the Project is to strictly adhere to clearing and disturbance boundaries. The clearing area will be established by a surveyor and pegged and then checked by a member of the Main Roads environment team before clearing is approved and then it will be checked again after clearing. These measures have been outlined in Table 2 below.

Early education

Early education of the Project team of the issues relating to the Black Cockatoo and Red-tailed Phascogale and communication of these design measures to the Project team at an early stage of the Project will ensure all possible efforts are made to manage the potential impacts. These measures have been outlined in Table 6. Mandatory site inductions will be required for all site personnel and the morning toolbox will include education regarding the Black Cockatoo.

Timing of construction

As far as practical clearing and disturbance of Black Cockatoo and Red-tailed Phascogale habitat will be timed to prevent coinciding with the breeding season (July – January¹). Where this is not possible additional mitigation measures will be implemented.

Implementation

The avoidance and mitigation measures listed in Table 2 will be implemented by Main Roads and /or the construction contractor(s) during the design, construction and post construction phases of the Project. Areas of responsibility are likely to include the following organisations and/or personnel:

- Main Roads (MR) Project management team - will provide the necessary information needed regarding the implementation of the mitigation measures.
- Construction contractor(s) and their staff – the construction contractor will provide the necessary information needed regarding the timing of the project and/or implementation of the mitigation measures.
- Environmental Officer- the Wheatbelt Environment Officer will ensure all record keeping is maintained and provided to Main Roads and the relevant authorities where appropriate
- Ecologist – suitably qualified ecologist with experience undertaking pre-clearance fauna surveys, fauna relocation, and handling of Black Cockatoos. The ecologist would hold all appropriate licences with Department of Parks and Wildlife (DPaW) (Ethics approval, regulation 15 and/or

¹ For Carnaby's Cockatoo July is the beginning of the move back out to the Wheatbelt in search of suitable nesting hollows. The nesting season lasts from late winter through spring and into early summer - <http://www.environment.gov.au/biodiversity/threatened/publications/carnabys-black-cockatoo-calyptorhynchus-latiostris>
For Red-tailed Phascogale – the mating period ends during winter with young generally born during August with young remaining dependent through to the end of summer when young are weaned and start to disperse http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=316#life_cycle

regulation 17) and be able to operate safely with the construction team. The ecologist would be the only person responsible for the handling of any fauna.

Table 2 identifies the person/s responsible for implementing the avoidance and mitigation measures during the various phases of the Project. The responsibility of particular measures can be delegated, though overall responsibility will remain with the listed person. The proposed measures assume two scenarios:

- Scenario 1 - Clearing to be undertaken during the breeding season (non-preferred)
- Scenario 2 - Clearing to be undertaken outside the breeding season (preferred)

If clearing or disturbance of Carnaby's Black Cockatoo and Red-tailed Phascogale habitat is required during the breeding season (July – January considering both species) the following mitigation will be applied:

- Each section of the project will be surveyed by a qualified ecologist prior to clearing to identify if any Carnaby's Black Cockatoo or Red-tailed Phascogale are breeding within the area proposed to be cleared.
- A relocation protocol will be established including relocation procedures for when eggs are found and / or young and adults are found.
- Any trees where breeding Carnaby's Black Cockatoos are identified will be left until the chick has vacated the nest, where possible.

The construction phase measures listed in Table 2 are relevant regardless of the assumed scenario, however, relocation protocols will only be applied if species are found.

Reporting, review and updates

Reporting of incidents which are considered non-compliant or for monitoring purposes will be completed pursuant to the CEMP or equivalent environmental management plan developed by Main Roads and/or the Construction Contractor.

Any relevant changes or updates to knowledge, standards, policies and procedures will be incorporated wherever possible prior to the commencement of construction.

Table 2. Avoidance and mitigation measures

Project phase	Objective	Avoidance and mitigation measure	Timing	Responsibility
Scenario 1 - Construction to be undertaken during the breeding season				
Pre-construction (planning)	Avoid direct impacts to individuals during the construction process	Development and implementation of a DPaW approved handling and relocation protocol.	Approved protocol at least two months prior to construction of first section	Ecologist and Environmental Officer
Pre-construction (prior to construction)	Avoid direct impacts to individuals during the construction process	Undertake pre-clearance surveys of trees identified as having hollows suitable for Carnaby's Black Cockatoo and Red-tailed Phascogale 2.	Surveys to be undertaken one week prior to commencement of construction using approved protocols.	Ecologist and Environmental Officer
Scenario 2 - Construction to be undertaken outside the breeding season				
Pre-construction (prior to construction)	Avoid direct impacts to individuals during the construction process	Check all trees identified as having suitable hollows for both species to remove any fauna in the hollows prior to clearing.	Immediately prior to construction	Main Roads and/or Construction Contractor Ecologist
Construction	Avoid, then minimise the clearing of habitat	Clearly delineate the extent of the disturbance footprint (clearing footprint) with coloured pegs. Prior to clearing/ construction operations the surveyor will mark out the clearing line and this will be checked by Main Roads Environment Officer to determine that it is clearly defined and compliant with permits. The extent of this clearing will be clearly communicated in documentation and accurately demarcated on-ground.	Prior to construction	Main Roads Site Supervisor Construction Contractor Environmental Officer
		All project construction personnel will be inducted prior to the	Prior to construction and during	Main Roads Site

² See GHD 2014b for trees identified as having suitable hollows for Black Cockatoo species within the Project area.

		commencement of works. The induction program will include communication about the 'No Go Areas', importance and consequences of entering/disturbing these areas.	construction (at first toolbox meeting of each week)	Supervisor Construction Contractor Environmental Officer
		Regular review of the disturbance footprint boundary to ensure 'No Go Areas' are clearly delineated	During construction – checked each day prior to commencement of construction	Main Roads Site Supervisor Construction Contractor
		Restrict construction personnel to the disturbance footprint including designated access routes and parking areas.	Entire construction phase	Main Roads and/or Construction Contractor
		Fauna encountered during the construction process shall be given the chance to move on if there is no threat to the person's safety in doing so. The Ecologist will be suitably experienced and licensed and will be available at all times during the clearing phase to interact with fauna that cannot move away freely.	Entire construction phase	Main Roads and/or Construction Contractor Site Environmental Officer
Post construction	Avoid direct impacts to individuals during the construction process	Monitoring of relocated individuals including young and / or adults according to the approved protocols where found.	During and post construction according to the approved protocols	Ecologist and Environmental Officer

Appendix E Stakeholder Consultation



Enquiries: Rochelle Lupton

Our Ref: 13/1082-02

18 November 2014

Your Ref:

Manager - Native Vegetation Conservation Branch
Department of Environment Regulation
Locked Bag 33
CLOISTERS SQUARE WA 6850

Dear Officer,

INVITATION FOR SUBMISSION, YORK MERREDIN ROAD WIDENING SLK 0 TO 51

Main Roads Wheatbelt Region is proposing to upgrade and widen three sections of the York-Merredin Road, in the Avon Wheatbelt region of Western Australia. These sections are located from SLK 0 to SLK 15, SLK 15 to SLK 19 and SLK 19 to SLK 51. Works are proposed to increase road user safety and improve road usability. Works will include the clearing of vegetation and the widening of the lane to a sealed width of 9m.

An assessment was undertaken by Main Roads Environmental Officers in early 2014 to identify significant trees and these were avoided where possible, with the road widening only occurring on one side in some locations.

In accordance with State-wide Purpose Permit CPS 818/11, your input is requested for the clearing proposed for this project. The conditions of the Main Roads State-wide Clearing Permit require an assessment of the environmental impacts of the project against the "Ten Clearing Principles". It is a condition of CPS 818/11 that where the clearing of native vegetation is at variance to the Clearing Principles (as described in Schedule 5 of the *Environmental Protection Act 1986*), Main Roads is required to invite submissions from interested parties on the impacts of this clearing.

An initial assessment found that the proposed clearing will be at variance to Principle 'b' relating to clearing of habitat significant to fauna indigenous to Western Australia. The project is also at variance to Principle 'e' relating to the clearing of vegetation in an extensively cleared landscape. The project may also be at variance to Principle 'f', vegetation growing in association with a wetland or watercourse.

Main Roads commissioned GHD to complete a flora and fauna assessment on the project area in August 2014, including an assessment of Black Cockatoo habitat and a search for Declared Rare Flora.

The results of the assessment identified the project in Beard Vegetation Associations 352, 694, 1049 and 947. Vegetation Associations 352, 694 and 1049 are below the 30% threshold level for the state. These Vegetation Associations are listed as 'Vulnerable' and are extensively cleared. The majority of the project clearing area is highly disturbed and was identified as Completely Degraded condition (Keighery 1994).

No conservation significant fauna species were recorded during the spring field survey. The project is located within the known breeding range of Carnaby's Black Cockatoo, and there is suitable foraging, breeding and roosting habitat for the species within the project area. No Carnaby's Black Cockatoos were recorded during the field assessment. The assessment was undertaken during their breeding season and birds were likely to be observed if present. There is an estimated 25.61 ha of Carnaby's Cockatoo habitat within the project area. A total of 1176 potential breeding habitat trees were recorded during the field assessment, of which 485 were within the project clearing area. 76 trees with hollows were recorded during the field assessment and 16 of these are present in the project area. In addition, 15.38 ha of suitable Eucalypt woodland habitat for the Red-tailed Phascogale was recorded. The project will be referred to the Department of the Environment for consideration.

The project crosses a number of creek and river crossings which were mapped as vegetation type 'Sapphire shrubland and sedges with fringing Casuarina and York Gum'. This vegetation was often degraded and dominated by weed species. Approximately 0.94 ha of this vegetation type is within the project area.

Main Roads will manage native vegetation clearing and environmental impacts associated with the project through the implementation of a Vegetation Management Plan which is endorsed by the Department of Environment Regulation. An Environmental Management Plan will also be developed and forwarded to the Department of the Environment when the project is referred.

To offset the project clearing, Main Roads proposes to provide a contribution to the Offset Bank towards the purchasing of suitable conservation land by the Department of Parks and Wildlife.

Should you wish to provide comment on the project clearing impacts, please send your submission to Main Roads' Northam office by 22 December 2014. If you require any further information please contact me on (08) 9323 4012.

Yours sincerely



Rochelle Lupton
ENVIRONMENT OFFICER WHEATBELT

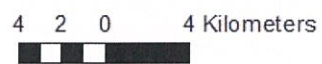
Figure 1 - Project Area



Legend

— Project Area

1 cm = 3 km





Enquiries: Rochelle Lupton

Our Ref: 13/1082-02

18 November 2014

Your Ref:

The Department of Water
Swan-Avon Regional Office
7 Ellam Street
VICTORIA PARK WA 6100

Dear Officer,

INVITATION FOR SUBMISSION, YORK MERREDIN ROAD WIDENING SLK 0 TO 51

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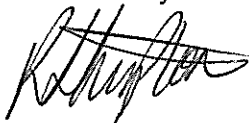
The project crosses a number of creek and river crossings which were mapped as vegetation type 'Sapphire shrubland and sedges with fringing Casuarina and York Gum'. This vegetation was often degraded and dominated by weed species. Approximately 0.94 ha of this vegetation type is within the project area.

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Yours sincerely



Rochelle Lupton
ENVIRONMENT OFFICER WHEATBELT

Figure 1 - Project Area



Legend

— Project Area

1 cm = 3 km





Enquiries: Rochelle Lupton

Our Ref: 13/1082-02

18 November 2014

Your Ref:

Mr Piers Verstegen - Director
Conservation Council WA
City West Lotteries House, 2 Delhi Street
WEST PERTH WA 6005

Dear Mr Verstegen,

INVITATION FOR SUBMISSION, YORK MERREDIN ROAD WIDENING SLK 0 TO 51

Main Roads Wheatbelt Region is proposing to upgrade and widen three sections of the York-Merredin Road, in the Avon Wheatbelt region of Western Australia. These sections are located from SLK 0 to SLK 15, SLK 15 to SLK 19 and SLK 19 to SLK 51. Works are proposed to increase road user safety and improve road usability. Works will include the clearing of vegetation and the widening of the lane to a sealed width of 9m.

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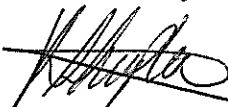
The project crosses a number of creek and river crossings which were mapped as vegetation type 'Samphire shrubland and sedges with fringing Casuarina and York Gum'. This vegetation was often degraded and dominated by weed species. Approximately 0.94 ha of this vegetation type is within the project area.

Main Roads will manage native vegetation clearing and environmental impacts associated with the project through the implementation of a Vegetation Management Plan which is endorsed by the Department of Environment Regulation. An Environmental Management Plan will also be developed and forwarded to the Department of the Environment when the project is referred..

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Yours sincerely



Rochelle Lupton
ENVIRONMENT OFFICER WHEATBELT

Figure 1 - Project Area



Legend

— Project Area

1 cm = 3 km



GHD

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A Napier / C Grabham	D Farrar		D Farrar		29/07/2015

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Appendix C - Desktop searches

NatureMap Flora Report (5km) - York to Merredin

Created By Laura Zimmermann on 27/08/2014

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Group By Family

Family	Species	Records
Aizoaceae	1	1
Alliaceae	1	1
Amaranthaceae	11	22
Anarthriaceae	1	1
Apiaceae	11	19
Apocynaceae	1	2
Araliaceae	7	36
Asparagaceae	29	84
Aspleniaceae	1	2
Asteraceae	67	240
Boraginaceae	4	6
Boryaceae	2	12
Brassicaceae	4	8
Bryaceae	5	6
Campanulaceae	7	10
Caryophyllaceae	5	6
Casuarinaceae	7	26
Celastraceae	3	8
Centrolepidaceae	3	3
Chenopodiaceae	13	22
Colchicaceae	3	11
Convolvulaceae	2	2
Crassulaceae	5	16
Cupressaceae	1	1
Cyperaceae	24	50
Dasygongonaceae	1	11
Dilleniaceae	14	56
Dioscoreaceae	1	2
Ditrichaceae	2	2
Droseraceae	21	48
Elaeocarpaceae	1	1
Ericaceae	14	30
Euphorbiaceae	4	7
Fabaceae	105	336
Fissidentaceae	1	2
Frankeniaceae	1	1
Funariaceae	1	1
Gentianaceae	1	1
Geraniaceae	3	12
Gigaspermaceae	1	1
Goodeniaceae	28	66
Gyrostemonaceae	3	5
Haemodoraceae	8	25
Haloragaceae	5	9
Hemerocallidaceae	6	20
Hypericaceae	2	2
Hypoxidaceae	2	2
Iridaceae	18	32
Isoetaceae	1	2
Juncaceae	8	14
Juncaginaceae	5	6
Lamiaceae	12	32
Lauraceae	5	8
Linaceae	1	1
Loganiaceae	3	6
Loranthaceae	2	2
Lythraceae	1	1
Malvaceae	9	44
Marsileaceae	1	3
Myrtaceae	85	224
Nyctaginaceae	2	3
Orchidaceae	55	150
Orobanchaceae	1	4
Oxalidaceae	3	7
Papaveraceae	3	3
Phrymaceae	1	1
Phyllanthaceae	3	9
Pittosporaceae	4	10
Plantaginaceae	2	2
Poaceae	64	192
Polygalaceae	4	13
Polygonaceae	2	2
Portulacaceae	4	10
Pottiaceae	5	9
Primulaceae	1	2

Proteaceae	63	173
Pteridaceae	3	8
Ranunculaceae	1	1
Resedaceae	1	1
Restionaceae	10	22
Rhamnaceae	13	30
Rosaceae	1	1
Rubiaceae	3	11
Rutaceae	5	10
Santalaceae	3	6
Sapindaceae	6	15
Scrophulariaceae	10	14
Solanaceae	8	14
Stylidiaceae	24	65
Surianaceae	1	2
Tamaricaceae	1	1
Thymelaeaceae	7	19
Urticaceae	1	1
Xanthorrhoeaceae	1	3
TOTAL	910	2424

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Aizoaceae				
1.	2809 <i>Gunnioopsis rubra</i>			
Alliaceae				
2.	1375 <i>Allium neapolitanum</i> (Naples Onion)	Y		
Amaranthaceae				
3.	2716 <i>Ptilotus declinatus</i> (Curved Mulla Mulla)			
4.	2717 <i>Ptilotus divaricatus</i> (Climbing Mulla Mulla)			
5.	2718 <i>Ptilotus drummondii</i> (Narrowleaf Mulla Mulla)			
6.	11260 <i>Ptilotus drummondii</i> var. <i>drummondii</i> (Pussytail)			
7.	41506 <i>Ptilotus gaudichaudii</i> subsp. <i>gaudichaudii</i>			
8.	2732 <i>Ptilotus holosericeus</i>			
9.	2733 <i>Ptilotus humilis</i>			
10.	2751 <i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
11.	2760 <i>Ptilotus spathulatus</i>			
12.	2763 <i>Ptilotus stirlingii</i> (Stirling's Mulla Mulla)			
13.	40841 <i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>			
Anarthriaceae				
14.	18049 <i>Lyginia imberbis</i>			
Apiaceae				
15.	6208 <i>Actinotus superbus</i>			
16.	12040 <i>Apium prostratum</i> var. <i>prostratum</i> (Sea Celery)			
17.	6215 <i>Chlaenosciadium gardneri</i>			
18.	6218 <i>Daucus glochidiatus</i> (Australian Carrot)			
19.	6247 <i>Platysace cirrosa</i> (Karna)			
20.	6248 <i>Platysace commutata</i>			
21.	6252 <i>Platysace effusa</i>			
22.	6255 <i>Platysace juncea</i>			
23.	6257 <i>Platysace maxwellii</i> (Karno)			
24.	6283 <i>Xanthosia atkinsoniana</i>			
25.	6285 <i>Xanthosia ciliata</i>			
Apocynaceae				
26.	6599 <i>Rhyncharrhena linearis</i> (Bush Bean, Wintjulanypa)			
Araliaceae				
27.	6226 <i>Hydrocotyle callicarpa</i> (Small Pennywort)			
28.	6236 <i>Hydrocotyle pilifera</i>			
29.	11546 <i>Hydrocotyle pilifera</i> var. <i>glabrata</i>			
30.	6239 <i>Hydrocotyle rugulosa</i>			
31.	6268 <i>Trachymene cyanopetala</i>			
32.	6279 <i>Trachymene ornata</i> (Spongefruit)			
33.	6280 <i>Trachymene pilosa</i> (Native Parsnip)			
Asparagaceae				
34.	1265 <i>Arthropodium curvipes</i>			
35.	8779 <i>Asparagus asparagoides</i> (Bridal Creeper)	Y		
36.	11299 <i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>			
37.	1281 <i>Chamaescilla spiralis</i>			
38.	8788 <i>Chamaescilla versicolor</i>			
39.	1215 <i>Chamaexeros fimbriata</i>			
40.	1217 <i>Chamaexeros serra</i> (Little Fringe-leaf)			
41.	1287 <i>Dichopogon capillipes</i>			
42.	1288 <i>Dichopogon fimbriatus</i> (Chocolate Lily)			
43.	11815 <i>Laxmannia grandiflora</i> subsp. <i>grandiflora</i>			
44.	1305 <i>Laxmannia omnifertilis</i>			
45.	1306 <i>Laxmannia paleacea</i>			
46.	11911 <i>Laxmannia ramosa</i> subsp. <i>ramosa</i>			
47.	1309 <i>Laxmannia squarrosa</i>			
48.	1223 <i>Lomandra caespitosa</i> (Tufted Mat Rush)			
49.	1226 <i>Lomandra effusa</i> (Scented Matrush)			
50.	1246 <i>Lomandra suaveolens</i>			
51.	1312 <i>Sowerbaea laxiflora</i> (Purple Tassels)			
52.	1333 <i>Thysanotus glaucifolius</i>			
53.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
54.	1343 <i>Thysanotus patersonii</i>			
55.	1345 <i>Thysanotus pseudojunceus</i>			
56.	1346 <i>Thysanotus pyramidalis</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
57.	1348 <i>Thysanotus rectantherus</i>			
58.	1351 <i>Thysanotus sparteus</i>			
59.	1354 <i>Thysanotus tenellus</i>			
60.	1355 <i>Thysanotus tenuis</i>		P3	
61.	1357 <i>Thysanotus thyrsoides</i>			
62.	1358 <i>Thysanotus triandrus</i>			

Aspleniaceae

63.	65 <i>Pleurosorus rutifolius</i> (Blanket Fern)			
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Asteraceae

64.	7817 <i>Actinobole uliginosum</i> (Flannel Cudweed)			
65.	7838 <i>Arctotheca calendula</i> (Cape Weed)	Y		
66.	7842 <i>Argyroglossis turbinata</i>			
67.	7856 <i>Blennospora drummondii</i>			
68.	7857 <i>Blennospora phlegmatocarpa</i>			
69.	7871 <i>Brachyscome ciliaris</i>			
70.	7875 <i>Brachyscome glandulosa</i>			
71.	7878 <i>Brachyscome iberidifolia</i>			
72.	7882 <i>Brachyscome perpusilla</i>			
73.	7903 <i>Calotis hispidula</i> (Bindy Eye)			
74.	8447 <i>Calotis lappulacea</i> (Yellow Burr-daisy)			
75.	7909 <i>Carduus pycnocephalus</i> (Slender Thistle)	Y		
76.	7924 <i>Ceratogyne obionoides</i> (Wingwort)			
77.	7933 <i>Chthonocephalus pseudevax</i> (Woolly Groundheads)			
78.	7937 <i>Cirsium vulgare</i> (Spear Thistle)	Y		
79.	7944 <i>Cotula bipinnata</i> (Ferny Cotula)	Y		
80.	12739 <i>Erymophyllum ramosum</i>			
81.	12740 <i>Erymophyllum tenellum</i>			
82.	16311 <i>Gazania linearis</i>	Y		
83.	12780 <i>Gilberta tenuifolia</i>			
84.	8002 <i>Gnephosis tenuissima</i>			
85.	8024 <i>Helichrysum leucopsidium</i>			
86.	12741 <i>Hyalosperma cotula</i>			
87.	12742 <i>Hyalosperma demissum</i>			
88.	15447 <i>Hyalosperma glutinosum</i> subsp. <i>glutinosum</i>			
89.	8086 <i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
90.	18585 <i>Lagenophora huegelii</i>			
91.	13284 <i>Lawrencella rosea</i>			
92.	12630 <i>Millotia major</i>			
93.	8105 <i>Millotia myosotidifolia</i>			
94.	14344 <i>Millotia tenuifolia</i> var. <i>tenuifolia</i> (Soft Millotia)			
95.	29418 <i>Monoculus monstrosus</i>	Y		
96.	32716 <i>Olearia lehmanniana</i>			
97.	8143 <i>Olearia paucidentata</i> (Autumn Scrub Daisy)			
98.	8149 <i>Olearia rudis</i> (Rough Daisybush)			
99.	12645 <i>Ozothamnus lepidophyllus</i>			
100.	8172 <i>Podolepis canescens</i> (Bright Podolepis, Grey Podolepis)			
101.	8173 <i>Podolepis capillaris</i> (Wiry Podolepis)			
102.	8177 <i>Podolepis lessonii</i>			
103.	8181 <i>Podolepis tepperi</i>			
104.	8182 <i>Podotheca angustifolia</i> (Sticky Longheads)			
105.	8184 <i>Podotheca gnaphalioides</i> (Golden Long-heads)			
106.	8188 <i>Pogonolepis stricta</i>			
107.	13255 <i>Pterochaeta paniculata</i>			
108.	8195 <i>Quinetia urvillei</i>			
109.	15035 <i>Rhodanthe corymbosa</i>			
110.	13294 <i>Rhodanthe laevis</i>			
111.	13234 <i>Rhodanthe manglesii</i>			
112.	13296 <i>Rhodanthe polycephala</i>			
113.	13252 <i>Rhodanthe pygmaea</i>			
114.	13309 <i>Rhodanthe spicata</i>			
115.	8205 <i>Senecio gilbertii</i>		P1	
116.	8207 <i>Senecio glossanthus</i> (Slender Groundsel)			
117.	25883 <i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>			
118.	14583 <i>Siloxerus multiflorus</i>			
119.	8230 <i>Sonchus asper</i> (Rough Sowthistle)	Y		
120.	8231 <i>Sonchus oleraceus</i> (Common Sowthistle)	Y		
121.	8251 <i>Trichocline spathulata</i> (Native Gerbera)			
122.	8253 <i>Triptilodiscus pygmaeus</i>			
123.	8255 <i>Ursinia anthemoides</i> (Ursinia)	Y		

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
124.	38388	<i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	Y		
125.	8257	<i>Vellereophyton dealbatum</i> (<i>White Cudweed</i>)	Y		
126.	8260	<i>Vittadinia australasica</i>			
127.	8275	<i>Waitzia acuminata</i> (<i>Orange Immortelle</i>)			
128.	13331	<i>Waitzia acuminata</i> var. <i>acuminata</i>			
129.	13328	<i>Waitzia nitida</i>			
130.	19938	<i>Xerochrysum bracteatum</i>			
Boraginaceae					
131.	6681	<i>Echium plantagineum</i> (<i>Paterson's Curse</i>)	Y		
132.	17491	<i>Halgania cyanea</i> var. <i>cyanea</i>			
133.	29716	<i>Halgania</i> sp. <i>Wongan Hills</i> (K.F. Kenneally 2393)			
134.	6669	<i>Phacelia tanacetifolia</i>	Y		
Boryaceae					
135.	1267	<i>Borya constricta</i>			
136.	1273	<i>Borya sphaerocephala</i> (<i>Pincushions</i>)			
Brassicaceae					
137.	3044	<i>Lepidium rotundum</i> (<i>Veined Peppergrass</i>)			
138.	3061	<i>Raphanus raphanistrum</i> (<i>Wild Radish</i>)	Y		
139.	3068	<i>Sinapis arvensis</i> (<i>Charlock</i>)	Y		
140.	3076	<i>Stenopetalum filifolium</i>			
Bryaceae					
141.	32330	<i>Bryum argenteum</i>			
142.	32376	<i>Gemmabryum dichotomum</i>			
143.	32380	<i>Gemmabryum pachythecum</i>			
144.	32381	<i>Gemmabryum preissianum</i>			
145.	32417	<i>Ptychostomum angustifolium</i>			
Campanulaceae					
146.	7396	<i>Isotoma hypocrateriformis</i> (<i>Woodbridge Poison</i>)			
147.	9289	<i>Lobelia anceps</i> (<i>Angled Lobelia</i>)			
148.	7402	<i>Lobelia gibbosa</i> (<i>Tall Lobelia</i>)			
149.	7408	<i>Lobelia tenuior</i> (<i>Slender Lobelia</i>)			
150.	7384	<i>Wahlenbergia capensis</i> (<i>Cape Bluebell</i>)	Y		
151.	7386	<i>Wahlenbergia gracilenta</i> (<i>Annual Bluebell</i>)			
152.	7389	<i>Wahlenbergia preissii</i>			
Caryophyllaceae					
153.	19825	<i>Petrohragia dubia</i>	Y		
154.	15972	<i>Silene gallica</i> var. <i>gallica</i>	Y		
155.	2912	<i>Spergula arvensis</i> (<i>Corn Spurry</i>)	Y		
156.	2914	<i>Spergularia diandra</i> (<i>Lesser Sand Spurry</i>)	Y		
157.	2915	<i>Spergularia rubra</i> (<i>Sand Spurry</i>)	Y		
Casuarinaceae					
158.	13904	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>			
159.	1721	<i>Allocasuarina campestris</i>			
160.	1727	<i>Allocasuarina fibrosa</i> (<i>Woolly Sheoak</i>)		T	
161.	1731	<i>Allocasuarina huegeliana</i> (<i>Rock Sheoak, Kwool</i>)			
162.	1732	<i>Allocasuarina humilis</i> (<i>Dwarf Sheoak</i>)			
163.	1734	<i>Allocasuarina microstachya</i>			
164.	1742	<i>Casuarina obesa</i> (<i>Swamp Sheoak, Kuli</i>)			
Celastraceae					
165.	4725	<i>Psammomoya choretroides</i>			
166.	9070	<i>Stackhousia pubescens</i> (<i>Downy Stackhousia</i>)			
167.	43540	<i>Stackhousia</i> sp. <i>Red-blotched corolla</i> (A. Markey 911)		P3	
Centrolepidaceae					
168.	1121	<i>Centrolepis aristata</i> (<i>Pointed Centrolepis</i>)			
169.	1125	<i>Centrolepis drummondiana</i>			
170.	1134	<i>Centrolepis polygyna</i> (<i>Wiry Centrolepis</i>)			
Chenopodiaceae					
171.	11489	<i>Atriplex acutibractea</i> subsp. <i>karoniensis</i>			
172.	2476	<i>Atriplex semilunaris</i> (<i>Annual Saltbush</i>)			
173.	2480	<i>Atriplex suberecta</i>			
174.	2483	<i>Chenopodium album</i> (<i>Fat Hen</i>)	Y		
175.	11530	<i>Chenopodium desertorum</i> subsp. <i>microphyllum</i>			
176.	2510	<i>Enchylaena lanata</i>			
177.	2511	<i>Enchylaena tomentosa</i> (<i>Barrier Saltbush</i>)			
178.	2541	<i>Maireana enchylaenoides</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
179.	2581 <i>Rhagodia drummondii</i>			
180.	2584 <i>Rhagodia preissii</i>			
181.	11254 <i>Rhagodia preissii</i> subsp. <i>preissii</i>			
182.	2609 <i>Sclerolaena diacantha</i> (Grey Copperburr)			
183.	2612 <i>Sclerolaena eurotioides</i> (Fluffy Bindii)			
Colchicaceae				
184.	12770 <i>Burchardia congesta</i>			
185.	1395 <i>Wurmbea drummondii</i> (York Gum Nancy)			
186.	1403 <i>Wurmbea tenella</i> (Eight Nancy)			
Convolvulaceae				
187.	6614 <i>Convolvulus remotus</i>			
188.	6659 <i>Wilsonia humilis</i> (Silky Wilsonia)			
Crassulaceae				
189.	17701 <i>Crassula closiana</i>			
190.	3137 <i>Crassula colorata</i> (Dense Stonecrop)			
191.	11563 <i>Crassula colorata</i> var. <i>colorata</i>			
192.	3139 <i>Crassula exserta</i>			
193.	3142 <i>Crassula natans</i>	Y		
Cupressaceae				
194.	36560 <i>Callitris arenaria</i> (Sandplain Cypress)			
Cyperaceae				
195.	746 <i>Baumea riparia</i>			
196.	760 <i>Caustis dioica</i>			
197.	783 <i>Cyperus congestus</i> (Dense Flat-sedge)	Y		
198.	794 <i>Cyperus gymnocaulos</i> (Spiny Flat-sedge)			
199.	815 <i>Cyperus tenellus</i> (Tiny Flatsedge)	Y		
200.	816 <i>Cyperus tenuiflorus</i> (Scaly Sedge)	Y		
201.	20200 <i>Isolepis cernua</i> var. <i>setiformis</i>			
202.	928 <i>Lepidosperma brunonianum</i>			
203.	930 <i>Lepidosperma costale</i>			
204.	936 <i>Lepidosperma leptostachyum</i>			
205.	944 <i>Lepidosperma scabrum</i>			
206.	33279 <i>Lepidosperma</i> sp. <i>Bandalup Scabrid</i> (N. Eveleigh 10798)			
207.	16284 <i>Lepidosperma</i> sp. <i>P1 small head</i> (M.D. Tindale 166A)			
208.	947 <i>Lepidosperma tenue</i>			
209.	954 <i>Mesomelaena preissii</i>			
210.	956 <i>Mesomelaena stygia</i>			
211.	972 <i>Schoenus armeria</i>			
212.	982 <i>Schoenus clandestinus</i>			
213.	991 <i>Schoenus grammatophyllus</i>			
214.	994 <i>Schoenus humilis</i>			
215.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
216.	1009 <i>Schoenus pleiostemoneus</i>			
217.	18164 <i>Schoenus</i> sp. <i>smooth culms</i> (K.R. Newbey 7823)			
218.	1019 <i>Schoenus subflavus</i> (Yellow Bog-rush)			
Dasypogonaceae				
219.	19310 <i>Calectasia pignattiana</i>		T	
Dilleniaceae				
220.	5108 <i>Hibbertia acerosa</i> (Needle Leaved Guinea Flower)			
221.	19682 <i>Hibbertia avonensis</i>			
222.	5114 <i>Hibbertia commutata</i>			
223.	5121 <i>Hibbertia drummondii</i>			
224.	5124 <i>Hibbertia exasperata</i>			
225.	14457 <i>Hibbertia glabriuscula</i>		P3	
226.	20059 <i>Hibbertia hemignosta</i>			
227.	20045 <i>Hibbertia hibbertioides</i>			
228.	20046 <i>Hibbertia hibbertioides</i> var. <i>hibbertioides</i>			
229.	5134 <i>Hibbertia huegelii</i>			
230.	5146 <i>Hibbertia montana</i>		P4	
231.	5157 <i>Hibbertia polystachya</i>			
232.	5166 <i>Hibbertia rupicola</i>			
233.	5173 <i>Hibbertia subvaginata</i>			
Dioscoreaceae				
234.	1509 <i>Dioscorea hastifolia</i> (Warrine, Warrarn)			
Ditrichaceae				
235.	32351 <i>Eccremidium pulchellum</i>			

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236.	32478 <i>Pleuridium nervosum</i> var. <i>nervosum</i>			
Droseraceae				
237.	15709 <i>Drosera androsacea</i> (Cone Sundew)			
238.	13219 <i>Drosera bulbosa</i> subsp. <i>bulbosa</i>			
239.	3098 <i>Drosera glanduligera</i> (Pimpernel Sundew)			
240.	13195 <i>Drosera helodes</i>			
241.	3101 <i>Drosera heterophylla</i> (Swamp Rainbow)			
242.	3105 <i>Drosera leucoblata</i> (Wheel Sundew)			
243.	3106 <i>Drosera macrantha</i> (Bridal Rainbow)			
244.	14298 <i>Drosera macrantha</i> subsp. <i>macrantha</i>			
245.	3107 <i>Drosera macrophylla</i> (Showy Sundew)			
246.	13387 <i>Drosera macrophylla</i> subsp. <i>macrophylla</i>			
247.	13388 <i>Drosera macrophylla</i> subsp. <i>monantha</i>			
248.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
249.	13215 <i>Drosera menziesii</i> subsp. <i>basifolia</i>			
250.	15710 <i>Drosera miniata</i> (Orange Sundew)			
251.	3123 <i>Drosera platystigma</i> (Black-eyed Sundew)			
252.	3124 <i>Drosera pulchella</i> (Pretty Sundew)			
253.	3125 <i>Drosera pycnoblata</i> (Pearly Sundew)			
254.	3131 <i>Drosera stolonifera</i> (Leafy Sundew)			
255.	3132 <i>Drosera stricticaulis</i> (Erect Sundew)			
256.	3133 <i>Drosera subhirtella</i> (Sunny Rainbow)			
257.	3135 <i>Drosera zonaria</i> (Painted Sundew)			
Elaeocarpaceae				
258.	4546 <i>Tetratheca virgata</i>			
Ericaceae				
259.	6300 <i>Andersonia aristata</i> (Rice Flower)			
260.	6305 <i>Andersonia brevifolia</i>			
261.	6314 <i>Andersonia lehmanniana</i>			
262.	6324 <i>Astroloma compactum</i>			
263.	6326 <i>Astroloma epacridis</i>			
264.	6330 <i>Astroloma macrocalyx</i> (Swan Berry)			
265.	6334 <i>Astroloma pallidum</i> (Kick Bush)			
266.	6336 <i>Astroloma serratifolium</i> (Kondrung)			
267.	6374 <i>Leucopogon conostephioides</i>			
268.	6384 <i>Leucopogon cymbiformis</i>		P2	
269.	6386 <i>Leucopogon dielsianus</i>			
270.	6430 <i>Leucopogon planifolius</i>			
271.	28311 <i>Leucopogon</i> sp. Great Southern (R.S. Cowan A 586)			
272.	34163 <i>Leucopogon</i> sp. Newdegate (M. Hislop 3585)			
Euphorbiaceae				
273.	4607 <i>Chrozophora tinctoria</i> (Turnsole)	Y		
274.	4626 <i>Euphorbia drummondii</i> (Caustic Weed, Piwi)			
275.	4714 <i>Stachystemon brachyphyllus</i>			
276.	20537 <i>Stachystemon virgatus</i>			
Fabaceae				
277.	16159 <i>Acacia acanthoclada</i> subsp. <i>acanthoclada</i>			
278.	3200 <i>Acacia acuminata</i> (Jam, Mangard)			
279.	3206 <i>Acacia aestivalis</i>			
280.	3235 <i>Acacia baxteri</i> (Baxter's Wattle)			
281.	3238 <i>Acacia bidentata</i>			
282.	3252 <i>Acacia campylophylla</i>		P3	
283.	3274 <i>Acacia crassistipula</i>			
284.	14067 <i>Acacia cuneifolia</i>		P4	
285.	18194 <i>Acacia ericksoniae</i>			
286.	3324 <i>Acacia erinacea</i>			
287.	3347 <i>Acacia gilbertii</i>			
288.	3366 <i>Acacia hemiteles</i>			
289.	15475 <i>Acacia heteroclita</i> subsp. <i>heteroclita</i>			
290.	3378 <i>Acacia inaequiloba</i>			
291.	3385 <i>Acacia inophloia</i>		P3	
292.	3408 <i>Acacia lasiocalyx</i> (Silver Wattle, Wilyurwur)			
293.	3409 <i>Acacia lasiocarpa</i> (Panjang)			
294.	11519 <i>Acacia lasiocarpa</i> var. <i>bracteolata</i>			
295.	15721 <i>Acacia lasiocarpa</i> var. <i>sedifolia</i>			
296.	3420 <i>Acacia ligustrina</i>			
297.	16976 <i>Acacia lirellata</i>			Y
298.	16978 <i>Acacia lirellata</i> subsp. <i>lirellata</i>			

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299.	3438 <i>Acacia meisneri</i>		P3	
300.	3442 <i>Acacia microbotrya</i> (Manna Wattle, Kalyang)			
301.	3451 <i>Acacia multispicata</i>			
302.	3464 <i>Acacia obovata</i>			
303.	3486 <i>Acacia phaeocalyx</i>		P3	
304.	15483 <i>Acacia pulchella</i> var. <i>pulchella</i>			
305.	3515 <i>Acacia restiacea</i>			
306.	16147 <i>Acacia rostellata</i>			
307.	3525 <i>Acacia rostelifera</i> (Summer-scented Wattle)			
308.	30033 <i>Acacia saligna</i> subsp. <i>lindleyi</i>			
309.	3541 <i>Acacia sessilis</i>			
310.	3542 <i>Acacia sessilis</i> spica			
311.	3543 <i>Acacia shuttleworthii</i>			
312.	20339 <i>Acacia</i> sp. <i>Kokeby</i> (L. Preiss 937)			
313.	14039 <i>Acacia</i> sp. <i>P174</i> (J.M. Brown 228)			
314.	15484 <i>Acacia sphacelata</i> subsp. <i>sphacelata</i>			
315.	3557 <i>Acacia stenoptera</i> (Narrow Winged Wattle)			
316.	3596 <i>Acacia viscifolia</i>			
317.	3597 <i>Acacia volubilis</i>		T	
318.	3710 <i>Bossiaea eriocarpa</i> (Common Brown Pea)			
319.	3719 <i>Bossiaea spinescens</i>			
320.	13111 <i>Chorizema aciculare</i> subsp. <i>laxum</i>			
321.	12974 <i>Chorizema rhynchotropis</i>			
322.	3793 <i>Daviesia angulata</i>			
323.	3796 <i>Daviesia benthamii</i>			
324.	11367 <i>Daviesia benthamii</i> subsp. <i>benthamii</i>			
325.	15656 <i>Daviesia brachyphylla</i>			
326.	3797 <i>Daviesia cardiophylla</i>			
327.	3800 <i>Daviesia costata</i>			
328.	41921 <i>Daviesia decurrens</i> subsp. <i>Hamata</i> (M.D. Crisp 6610)			
329.	12326 <i>Daviesia hakeoides</i> subsp. <i>subnuda</i>			
330.	3816 <i>Daviesia incrassata</i>			
331.	16583 <i>Daviesia intricata</i> subsp. <i>intricata</i>			
332.	3819 <i>Daviesia longifolia</i>			
333.	3821 <i>Daviesia microphylla</i>			
334.	3829 <i>Daviesia pachyloma</i>			
335.	20367 <i>Dillwynia laxiflora</i>			
336.	20742 <i>Eutaxia rubricarina</i>		P3	
337.	3895 <i>Gastrolobium calycinum</i> (York Road Poison)			
338.	20475 <i>Gastrolobium capitatum</i>			
339.	20516 <i>Gastrolobium cyanophyllum</i>			
340.	3898 <i>Gastrolobium densifolium</i> (Mallet Poison)		P4	
341.	3906 <i>Gastrolobium ilicifolium</i>			
342.	3910 <i>Gastrolobium obovatum</i> (Boat-leaved Poison)			
343.	10981 <i>Gastrolobium parviflorum</i>			
344.	3913 <i>Gastrolobium parvifolium</i> (Berry Poison)			
345.	3924 <i>Gastrolobium spinosum</i> (Prickly Poison)			
346.	3927 <i>Gastrolobium stowardii</i>			
347.	3930 <i>Gastrolobium trilobum</i> (Bullock Poison)			
348.	3936 <i>Genista linifolia</i> (Flaxleaf Broom)	Y		
349.	3952 <i>Gompholobium obcordatum</i>			
350.	3956 <i>Gompholobium shuttleworthii</i>			
351.	3957 <i>Gompholobium tomentosum</i> (Hairy Yellow Pea)			
352.	3964 <i>Hovea chorizemifolia</i> (Holly-leaved Hovea)			
353.	3966 <i>Hovea pungens</i> (Devil's Pins, Puyenak)			
354.	3992 <i>Isotropis cuneifolia</i> (Granny Bonnets)			
355.	19700 <i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>			
356.	3995 <i>Isotropis juncea</i> (Slender Lamb Poison)			
357.	3997 <i>Jacksonia alata</i>			
358.	4005 <i>Jacksonia condensata</i>			
359.	4010 <i>Jacksonia floribunda</i> (Holly Pea)			
360.	14750 <i>Jacksonia quairading</i>		T	
361.	4024 <i>Jacksonia racemosa</i>			
362.	4025 <i>Jacksonia restioides</i>			
363.	4029 <i>Jacksonia sternbergiana</i> (Stinkwood, Kapur)			
364.	4044 <i>Kennedia prostrata</i> (Scarlet Runner)			
365.	11528 <i>Labichea lanceolata</i> subsp. <i>brevifolia</i>			
366.	4066 <i>Lupinus cosentinii</i>	Y		
367.	4079 <i>Medicago polymorpha</i> (Burr Medic)	Y		

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368.	4091 <i>Mirbelia floribunda</i> (Purple Mirbelia)			
369.	4097 <i>Mirbelia ramulosa</i>			
370.	4100 <i>Mirbelia spinosa</i>			
371.	4104 <i>Mirbelia trichocalyx</i>			
372.	4248 <i>Templetonia aculeata</i>			
373.	4258 <i>Templetonia sulcata</i> (Centipede Bush)			
374.	4291 <i>Trifolium arvense</i> (Hare's Foot Clover)	Y		
375.	17542 <i>Trifolium arvense</i> var. <i>arvense</i>	Y		
376.	4292 <i>Trifolium campestre</i> (Hop Clover)	Y		
377.	4313 <i>Trifolium subterraneum</i> (Subterranean Clover)	Y		
378.	4315 <i>Trifolium tomentosum</i> (Woolly Clover)	Y		
379.	15509 <i>Trifolium tomentosum</i> var. <i>tomentosum</i>	Y		
380.	9008 <i>Urodon dasyphyllus</i> (Mop Bushpea)			
381.	11474 <i>Vicia sativa</i> subsp. <i>nigra</i>	Y		
Fissidentaceae				
382.	32367 <i>Fissidens megalotis</i>			
Frankeniaceae				
383.	5209 <i>Frankenia pauciflora</i> (Seaheath)			
Funariaceae				
384.	32370 <i>Funaria hygrometrica</i>			
Gentianaceae				
385.	16524 <i>Cicendia quadrangularis</i>	Y		
Geraniaceae				
386.	4332 <i>Erodium botrys</i> (Long Storksbill)	Y		
387.	4335 <i>Erodium cygnorum</i> (Blue Heronsbill)			
388.	4345 <i>Pelargonium havlasae</i>			
Gigaspermaceae				
389.	32384 <i>Gigaspermum repens</i>			
Goodeniaceae				
390.	7413 <i>Brunonia australis</i> (Native Cornflower)			
391.	7425 <i>Dampiera carinata</i> (Summer Dampiera)			
392.	7438 <i>Dampiera eriocephala</i> (Woolly-headed Dampiera)			
393.	7448 <i>Dampiera incana</i> (Hoary Dampiera)			
394.	7449 <i>Dampiera juncea</i> (Rush-like Dampiera)			
395.	7451 <i>Dampiera lavandulacea</i>			
396.	7453 <i>Dampiera lindleyi</i>			
397.	7458 <i>Dampiera obliqua</i>			
398.	7471 <i>Dampiera sacculata</i> (Pouched Dampiera)			
399.	7495 <i>Goodenia berardiana</i>			
400.	29362 <i>Goodenia coerulea</i>			
401.	12516 <i>Goodenia convexa</i>			
402.	12520 <i>Goodenia fasciculata</i>			
403.	12522 <i>Goodenia glareicola</i>			
404.	12523 <i>Goodenia helmsii</i>			
405.	12551 <i>Goodenia micrantha</i>			
406.	7531 <i>Goodenia occidentalis</i>			
407.	7534 <i>Goodenia piniifolia</i> (Pine-leaved Goodenia)			
408.	19285 <i>Goodenia pulchella</i> subsp. <i>Wheatbelt</i> (L.W. Sage & F. Hort 795)			
409.	7541 <i>Goodenia pusilliflora</i> (Smallflower Goodenia)			
410.	7568 <i>Lechenaultia biloba</i> (Blue Leschenaultia)			
411.	7590 <i>Lechenaultia tubiflora</i> (Heath Leschenaultia)			
412.	7618 <i>Scaevola humifusa</i> (Procumbent Scaevola)			
413.	7636 <i>Scaevola platyphylla</i> (Broad-leaved Fanflower)			
414.	13181 <i>Scaevola repens</i> var. <i>angustifolia</i>			
415.	13182 <i>Scaevola repens</i> var. <i>repens</i>			
416.	7656 <i>Velleia cynopotamica</i>			
417.	7666 <i>Verreauxia reinwardtii</i> (Common Verreauxia)			
Gyrostemonaceae				
418.	2778 <i>Codonocarpus cotinifolius</i> (Native Poplar, Kundurangu)			
419.	2784 <i>Gyrostemon ramulosus</i> (Corkybark)			
420.	2788 <i>Gyrostemon subnudus</i>			
Haemodoraceae				
421.	1417 <i>Blancoa canescens</i> (Winter Bell)			
422.	12035 <i>Conostylis caricina</i> subsp. <i>caricina</i>			
423.	1444 <i>Conostylis petrophiloides</i>			
424.	1447 <i>Conostylis pusilla</i>			

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425.	1454 <i>Conostylis setigera</i> (Bristly Cottonhead)			
426.	11597 <i>Conostylis setigera</i> subsp. <i>setigera</i>			
427.	1465 <i>Haemodorum discolor</i>			
428.	1483 <i>Tribonanthes longipetala</i>			
Haloragaceae				
429.	6143 <i>Glischrocaryon aureum</i> (Common Popflower)			
430.	6149 <i>Gonocarpus cordiger</i>			
431.	6157 <i>Gonocarpus intricatus</i>		P4	
432.	6159 <i>Gonocarpus nodulosus</i>			
433.	6161 <i>Gonocarpus pithyoides</i>			
Hemerocallidaceae				
434.	23501 <i>Agrostocrinum scabrum</i> subsp. <i>scabrum</i>			
435.	1276 <i>Caesia micrantha</i> (Pale Grass Lily)			
436.	1259 <i>Dianella revoluta</i> (Blueberry Lily)			
437.	1260 <i>Stypandra glauca</i> (Blind Grass)			
438.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
439.	1363 <i>Tricoryne tenella</i>			
Hypericaceae				
440.	5180 <i>Hypericum gramineum</i> (Small St John's Wort)			
441.	5182 <i>Hypericum perforatum</i> (St John's Wort)	Y		
Hypoxidaceae				
442.	43763 <i>Pauridia glabella</i>			
443.	43761 <i>Pauridia occidentalis</i> var. <i>occidentalis</i>			
Iridaceae				
444.	18392 <i>Freesia alba</i> x <i>leichtlinii</i>	Y		
445.	20854 <i>Gladiolus watsonius</i>	Y		
446.	1526 <i>Hesperanthes falcata</i>	Y		
447.	1532 <i>Ixia maculata</i> (Yellow Ixia)	Y		
448.	19179 <i>Moraea flaccida</i> (One-leaf Cape Tulip)	Y		
449.	1535 <i>Moraea fugax</i>	Y		
450.	19178 <i>Moraea lewisiae</i>	Y		
451.	19180 <i>Moraea miniata</i> (Two-leaf Cape Tulip)	Y		
452.	19177 <i>Moraea setifolia</i>	Y		
453.	1537 <i>Orthrosanthus laxus</i> (Morning Iris)			
454.	11442 <i>Orthrosanthus laxus</i> var. <i>gramineus</i> (Grass-leaved Orthrosanthus)			
455.	11749 <i>Orthrosanthus laxus</i> var. <i>laxus</i> (Morning Iris)			
456.	1543 <i>Patersonia drummondii</i> (Drummond's Patersonia)			
457.	14485 <i>Romulea flava</i> var. <i>minor</i>	Y		
458.	1556 <i>Romulea rosea</i> (Guildford Grass)	Y		
459.	11544 <i>Romulea rosea</i> var. <i>australis</i> (Guildford Grass)	Y		
460.	14924 <i>Romulea rosea</i> var. <i>communis</i>	Y		
461.	1560 <i>Sparaxis pillansii</i> (Harlequin Flower)	Y		
Isoetaceae				
462.	11 <i>Isoetes drummondii</i> (Quillwort)			
Juncaceae				
463.	20454 <i>Juncus acutus</i> subsp. <i>acutus</i>	Y		
464.	1178 <i>Juncus bufonius</i> (Toad Rush)	Y		
465.	1179 <i>Juncus caespiticus</i> (Grassy Rush)			
466.	11922 <i>Juncus kraussii</i> subsp. <i>australiensis</i>			
467.	1188 <i>Juncus pallidus</i> (Pale Rush)			
468.	1194 <i>Juncus radula</i>			
469.	1195 <i>Juncus subsecundus</i> (Finger Rush)			
470.	1198 <i>Luzula meridionalis</i> (Field Woodrush)			
Juncaginaceae				
471.	33276 <i>Triglochin isingiana</i>			
472.	146 <i>Triglochin minutissima</i>			
473.	147 <i>Triglochin mucronata</i>			
474.	18587 <i>Triglochin nana</i>			
475.	19174 <i>Triglochin</i> sp. A <i>Flora of Australia</i> (G.J. Keighery 2477)			
Lamiaceae				
476.	41025 <i>Dasymalla terminalis</i> (Native Foxglove)			
477.	6834 <i>Hemiandra coccinea</i>		P3	
478.	6836 <i>Hemiandra incana</i>			
479.	6839 <i>Hemiandra pungens</i> (Snakebush)			
480.	6856 <i>Hemigenia incana</i> (Silky Hemigenia)			
481.	6864 <i>Hemigenia platyphylla</i>			

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			P4	
482.	17209 <i>Lachnostachys verbascifolia</i> var. <i>verbascifolia</i>			
483.	6888 <i>Microcorys capitata</i>			
484.	6894 <i>Microcorys lenticularis</i>			
485.	6899 <i>Microcorys obovata</i>			
486.	6797 <i>Physopsis spicata</i> (Hill River Lambstail)			
487.	9247 <i>Westringia rigida</i> (Stiff Westringia)			
Lauraceae				
488.	2951 <i>Cassytha flava</i> (Dodder Laurel)			
489.	2952 <i>Cassytha glabella</i> (Tangled Dodder Laurel)			
490.	11211 <i>Cassytha glabella</i> forma <i>dispar</i>			
491.	2956 <i>Cassytha pomiformis</i> (Dodder Laurel)			
492.	11799 <i>Cassytha racemosa</i> forma <i>racemosa</i>			
Linaceae				
493.	4362 <i>Linum marginale</i> (Wild Flax)			
Loganiaceae				
494.	6508 <i>Logania flaviflora</i> (Yellow Logania)			
495.	16825 <i>Phyllangium divergens</i>			
496.	16824 <i>Phyllangium sulcatum</i>			
Loranthaceae				
497.	2380 <i>Amyema miquelii</i> (Stalked Mistletoe)			
498.	2383 <i>Amyema preissii</i> (Wireleaf Mistletoe)			
Lythraceae				
499.	5281 <i>Lythrum hyssopifolia</i> (Lesser Loosestrife)	Y		
Malvaceae				
500.	5013 <i>Guichenotia micrantha</i> (Small Flowered Guichenotia)			
501.	5014 <i>Guichenotia sarotes</i>			
502.	5023 <i>Keraudrenia integrifolia</i> (Common Firebush)			
503.	19892 <i>Keraudrenia velutina</i> subsp. <i>velutina</i>			
504.	5034 <i>Lasiopetalum glabratum</i>			
505.	4961 <i>Malva parviflora</i> (Marshmallow)	Y		
506.	5080 <i>Thomasia foliosa</i>			
507.	13495 <i>Thomasia glabripetala</i>		T	
508.	5089 <i>Thomasia montana</i> (Hill Thomasia)		T	
Marsileaceae				
509.	74 <i>Marsilea drummondii</i> (Common Nardoo)			
Myrtaceae				
510.	5341 <i>Baeckea crispiflora</i>			
511.	11379 <i>Baeckea crispiflora</i> var. <i>tenuior</i>			
512.	29814 <i>Baeckea preissiana</i>			
513.	20455 <i>Baeckea</i> sp. <i>fine-leaved</i> (C.M. Lewis 517)			
514.	5378 <i>Beaufortia bracteosa</i>			
515.	5385 <i>Beaufortia incana</i>			
516.	5391 <i>Beaufortia schaueri</i> (Pink Bottlebrush)			
517.	5403 <i>Calothamnus brevifolius</i>		P4	
518.	35816 <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>			
519.	5429 <i>Calothamnus sanguineus</i> (Silky-leaved Blood flower, Pindak)			
520.	5439 <i>Calytrix angulata</i> (Yellow Starflower)			
521.	13654 <i>Calytrix breviseta</i> subsp. <i>stipulosa</i>			
522.	5461 <i>Calytrix glutinosa</i>			
523.	5465 <i>Calytrix leschenaultii</i>			
524.	5476 <i>Calytrix sapphirina</i>			
525.	5479 <i>Calytrix strigosa</i>			
526.	5487 <i>Calytrix violacea</i>			
527.	14353 <i>Chamelaucium</i> sp. <i>Dryandra</i> (D. Rose 446)		P2	
528.	5498 <i>Chamelaucium uncinatum</i> (Geraldton Wax)			
529.	5541 <i>Eremaea pauciflora</i>			
530.	14104 <i>Eremaea pauciflora</i> var. <i>pauciflora</i>			
531.	5545 <i>Eucalyptus accedens</i> (Powderbark Wandoo)			
532.	5548 <i>Eucalyptus albida</i> (White-leaved Mallee)			
533.	12895 <i>Eucalyptus arachnaea</i> subsp. <i>arachnaea</i>			
534.	5557 <i>Eucalyptus astringens</i> (Brown Mallet, Malard)			
535.	17969 <i>Eucalyptus astringens</i> subsp. <i>astringens</i>			
536.	12903 <i>Eucalyptus capillosa</i> subsp. <i>capillosa</i> (Wheatbelt Wandoo)			
537.	11978 <i>Eucalyptus celastroides</i> subsp. <i>virella</i>			
538.	5628 <i>Eucalyptus drummondii</i> (Drummond's Gum)			

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539.	5637 <i>Eucalyptus eremophila</i> (Tall Sand Mallee)			
540.	42027 <i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> (Red-flowered Mallee)			
541.	42026 <i>Eucalyptus erythronema</i> subsp. <i>inornata</i> (Red-flowered Mallee)		P3	
542.	5642 <i>Eucalyptus exilis</i> (Boyagin Mallee)		P4	
543.	5643 <i>Eucalyptus falcata</i> (Silver Mallet, Dulyumuk)			
544.	18521 <i>Eucalyptus flocktoniae</i> subsp. <i>flocktoniae</i>			
545.	5673 <i>Eucalyptus horistes</i>			
546.	5675 <i>Eucalyptus incrassata</i> (Lerp Mallee)			
547.	11295 <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> (York Gum)			
548.	16886 <i>Eucalyptus loxophleba</i> x <i>wandoo</i>		P4	
549.	5705 <i>Eucalyptus macrocarpa</i> (Mottlecah, Mudelka)			
550.	13530 <i>Eucalyptus macrocarpa</i> subsp. <i>macrocarpa</i> (Mottlecah)			
551.	20047 <i>Eucalyptus orthostemon</i>			
552.	16201 <i>Eucalyptus phenax</i>			
553.	12866 <i>Eucalyptus pluricaulis</i> subsp. <i>pluricaulis</i>			
554.	5763 <i>Eucalyptus rudis</i> (Flooded Gum, Kulurda)			
555.	13511 <i>Eucalyptus rudis</i> subsp. <i>rudis</i>			
556.	5766 <i>Eucalyptus salmonophloia</i> (Salmon Gum, Wurak)			
557.	13034 <i>Eucalyptus sargentii</i> subsp. <i>sargentii</i>			
558.	19653 <i>Eucalyptus thamnoides</i>			
559.	19655 <i>Eucalyptus thamnoides</i> subsp. <i>megista</i>			
560.	5796 <i>Eucalyptus uncinata</i> (Hook-leaved Mallee)			
561.	5797 <i>Eucalyptus wandoo</i> (Wandoo, Wondu)			
562.	12906 <i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>			
563.	5817 <i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
564.	15498 <i>Kunzea glabrescens</i> (Spearwood)			
565.	5847 <i>Leptospermum erubescens</i> (Roadside Teatree)			
566.	5876 <i>Melaleuca aspalathoides</i>			
567.	17982 <i>Melaleuca carrii</i>			
568.	15749 <i>Melaleuca eurystoma</i>			
569.	19486 <i>Melaleuca hamata</i>			
570.	5931 <i>Melaleuca leptospermoides</i>			
571.	41120 <i>Melaleuca marginata</i>			
572.	5949 <i>Melaleuca platycalyx</i>			
573.	5956 <i>Melaleuca pungens</i>			
574.	5958 <i>Melaleuca radula</i> (Graceful Honeymyrtle)			
575.	5959 <i>Melaleuca raphiophylla</i> (Swamp Paperbark)			
576.	20290 <i>Melaleuca scalena</i>			
577.	5962 <i>Melaleuca sciotostyla</i> (Wongan Melaleuca)		T	
578.	5975 <i>Melaleuca subtrigona</i>			
579.	15673 <i>Melaleuca tuberculata</i>			
580.	18232 <i>Melaleuca tuberculata</i> var. <i>tuberculata</i>			
581.	12388 <i>Verticordia acerosa</i> var. <i>preissii</i>			
582.	12395 <i>Verticordia bifimbriata</i>			
583.	6073 <i>Verticordia chrysantha</i>			
584.	12402 <i>Verticordia chrysanthella</i>			
585.	12411 <i>Verticordia densiflora</i> var. <i>cespitosa</i>			
586.	15432 <i>Verticordia densiflora</i> var. <i>densiflora</i>			
587.	12422 <i>Verticordia eriocephala</i> (Common Cauliflower)			
588.	6082 <i>Verticordia grandiflora</i> (Claw Featherflower)			
589.	12430 <i>Verticordia huegellii</i> var. <i>stylosa</i>			
590.	14714 <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	
591.	6107 <i>Verticordia pennigera</i>			
592.	6109 <i>Verticordia picta</i> (Painted Featherflower)			
593.	12458 <i>Verticordia serrata</i> var. <i>ciliata</i>			
594.	15613 <i>Verticordia tumida</i> subsp. <i>tumida</i>			
Nyctaginaceae				
595.	2770 <i>Boerhavia coccinea</i> (Tar Vine, Wituka)			
596.	2775 <i>Boerhavia schomburgkiana</i>			
Orchidaceae				
597.	1577 <i>Caladenia barbarossa</i> (Dragon Orchid)			
598.	1580 <i>Caladenia cairnsiana</i> (Zebra Orchid)			
599.	15579 <i>Caladenia chapmanii</i>			
600.	11136 <i>Caladenia denticulata</i>			
601.	1586 <i>Caladenia discoidea</i> (Dancing Orchid)			
602.	1588 <i>Caladenia drummondii</i> (Winter Spider Orchid)			
603.	11165 <i>Caladenia falcata</i>			
604.	11106 <i>Caladenia filifera</i>			
605.	15348 <i>Caladenia flava</i> subsp. <i>flava</i>			

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606.	15502 <i>Caladenia footeana</i>			
607.	15354 <i>Caladenia hirta</i> subsp. <i>hirta</i>			
608.	1598 <i>Caladenia integra</i> (Mantis Orchid, Smooth-lipped Spider Orchid)		P4	
609.	15363 <i>Caladenia longicauda</i> subsp. <i>eminens</i>			
610.	1603 <i>Caladenia longiclavata</i> (Clubbed Spider Orchid)			
611.	15377 <i>Caladenia reptans</i> subsp. <i>reptans</i>			
612.	1614 <i>Caladenia roei</i> (Ant Orchid)			
613.	1589 <i>Caladenia x ericksoniae</i>			
614.	15398 <i>Caladenia xantha</i>			
615.	15114 <i>Cyanicula gemmata</i>			
616.	10916 <i>Cyrtostylis huegelii</i>			
617.	12944 <i>Diuris amplissima</i>			
618.	12943 <i>Diuris brumalis</i>			
619.	11049 <i>Diuris corymbosa</i>			
620.	1638 <i>Diuris setacea</i> (Bristly Donkey Orchid)			
621.	1640 <i>Drakaea glyptodon</i> (King-in-his-carriage)			
622.	1643 <i>Elythranthera brunonis</i> (Purple Enamel Orchid)			
623.	20718 <i>Ericksonella saccharata</i>			
624.	1646 <i>Eriochilus dilatatus</i> (White Bunny Orchid)			
625.	15413 <i>Eriochilus dilatatus</i> subsp. <i>undulatus</i>			
626.	10802 <i>Eriochilus tenuis</i>			
627.	1653 <i>Leporella fimbriata</i> (Hare Orchid)			
628.	15418 <i>Leptoceras menziesii</i>			
629.	1657 <i>Microtis alba</i> (White Mignonette Orchid)			
630.	8814 <i>Microtis brownii</i>			
631.	15419 <i>Microtis media</i> subsp. <i>media</i>			
632.	20460 <i>Pheledenia deformis</i>			
633.	1669 <i>Prasophyllum cyphochilum</i> (Pouched Leek Orchid)			
634.	1671 <i>Prasophyllum elatum</i> (Tall Leek Orchid)			
635.	16688 <i>Prasophyllum gracile</i>			
636.	1677 <i>Prasophyllum macrostachyum</i> (Laughing Leek Orchid)			
637.	1682 <i>Prasophyllum sargentii</i>			
638.	44302 <i>Pterostylis brunneola</i>			
639.	10870 <i>Pterostylis ciliata</i>			
640.	10778 <i>Pterostylis picta</i>			
641.	1693 <i>Pterostylis recurva</i> (Jug Orchid)			
642.	12217 <i>Pterostylis sanguinea</i>			
643.	1696 <i>Pterostylis sargentii</i> (Frog Greenhood)			
644.	1697 <i>Pterostylis scabra</i> (Bronze Shell Orchid)			
645.	18657 <i>Pterostylis</i> sp. <i>inland</i> (A.C. Beaglehole 11880)			
646.	1698 <i>Pterostylis vittata</i> (Banded Greenhood)			
647.	1700 <i>Spiculaea ciliata</i> (Elbow Orchid)			
648.	1701 <i>Thelymitra antennifera</i> (Vanilla Orchid)			
649.	19822 <i>Thelymitra latiloba</i>			
650.	11053 <i>Thelymitra macrophylla</i>			
651.	20736 <i>Thelymitra maculata</i>			
Orobanchaceae				
652.	7089 <i>Parentucellia latifolia</i> (Common Bartsia)	Y		
Oxalidaceae				
653.	33256 <i>Oxalis bowiei</i> (Bowie Wood Sorrel)	Y		
654.	30375 <i>Oxalis exilis</i>			
655.	4351 <i>Oxalis flava</i> (Pinkbulb Soursob)	Y		
Papaveraceae				
656.	8365 <i>Fumaria bastardii</i>	Y		
657.	2970 <i>Fumaria densiflora</i> (Denseflower Fumitory)	Y		
658.	31532 <i>Fumaria muralis</i> subsp. <i>muralis</i>	Y		
Phrymaceae				
659.	7084 <i>Mimulus repens</i> (Creeping Monkey Flower)			
Phyllanthaceae				
660.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
661.	4689 <i>Poranthera ericoides</i> (Heath Poranthera)			
662.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
Pittosporaceae				
663.	25798 <i>Billardiera fusiformis</i> (Australian Bluebell)			
664.	3169 <i>Cheiranthra preissiana</i>			
665.	19421 <i>Marianthus bicolor</i> (Painted Marianthus)			
666.	19744 <i>Pittosporum angustifolium</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Plantaginaceae				
667.	7297 <i>Plantago coronopus</i> (Buckshorn Plantain)	Y		
668.	7299 <i>Plantago debilis</i>			
Poaceae				
669.	184 <i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
670.	185 <i>Aira cupaniana</i> (Silvery Hairgrass)	Y		
671.	186 <i>Aira elegantissima</i>	Y		
672.	12025 <i>Amphipogon caricinus</i> var. <i>caricinus</i>			
673.	199 <i>Amphipogon strictus</i> (Greybeard Grass)			
674.	200 <i>Amphipogon turbinatus</i>			
675.	207 <i>Aristida contorta</i> (Bunched Kerosene Grass)			
676.	210 <i>Aristida holathera</i>			
677.	17233 <i>Austrostipa campylachne</i>			
678.	17237 <i>Austrostipa elegantissima</i>			
679.	17238 <i>Austrostipa eremophila</i>			
680.	17241 <i>Austrostipa hemipogon</i>			
681.	17244 <i>Austrostipa macalpinei</i>			
682.	17245 <i>Austrostipa mollis</i>			
683.	17246 <i>Austrostipa nitida</i>			
684.	17249 <i>Austrostipa puberula</i>			
685.	17250 <i>Austrostipa pycnostachya</i>			
686.	17251 <i>Austrostipa scabra</i>			
687.	17252 <i>Austrostipa scabra</i> subsp. <i>scabra</i>			
688.	37421 <i>Austrostipa</i> sp. <i>Marchagee</i> (B.R. Maslin 1407)			
689.	17254 <i>Austrostipa tenuifolia</i>			
690.	17255 <i>Austrostipa trichophylla</i>			
691.	17257 <i>Austrostipa variabilis</i>			
692.	233 <i>Avena barbata</i> (Bearded Oat)	Y		
693.	8661 <i>Brachypodium distachyon</i> (False Brome)	Y		
694.	244 <i>Briza maxima</i> (Blowfly Grass)	Y		
695.	245 <i>Briza minor</i> (Shivery Grass)	Y		
696.	246 <i>Bromus alopecuroides</i>	Y		
697.	249 <i>Bromus diandrus</i> (Great Brome)	Y		
698.	250 <i>Bromus hordeaceus</i> (Soft Brome)	Y		
699.	252 <i>Bromus madritensis</i> (Madrid Brome)	Y		
700.	253 <i>Bromus rubens</i> (Red Brome)	Y		
701.	271 <i>Chloris truncata</i> (Windmill Grass)			
702.	281 <i>Cymbopogon oblectus</i> (Silkyheads)			
703.	283 <i>Cynodon dactylon</i> (Couch)	Y		
704.	349 <i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
705.	376 <i>Eragrostis curvula</i> (African Lovegrass)	Y		
706.	378 <i>Eragrostis dielsii</i> (Mallee Lovegrass)			
707.	379 <i>Eragrostis elongata</i> (Clustered Lovegrass)			
708.	415 <i>Eriachne ovata</i>			
709.	8476 <i>Hordeum hystrix</i> (Mediterranean Region Barley Grass)	Y		
710.	449 <i>Hordeum leporinum</i> (Barley Grass)	Y		
711.	19955 <i>Lachnagrostis plebeia</i>			
712.	8682 <i>Lolium loliaceum</i> (Stiff Ryegrass)	Y		
713.	478 <i>Lolium rigidum</i> (Wimmera Ryegrass)	Y		
714.	490 <i>Monachather paradoxus</i>			
715.	492 <i>Neurachne alopecuroidea</i> (Foxtail Mulga Grass)			
716.	502 <i>Panicum capillare</i> (Witchgrass)	Y		
717.	507 <i>Panicum miliaceum</i> (Millet Panic)	Y		
718.	516 <i>Parapholis incurva</i> (Coast Barbgrass)	Y		
719.	533 <i>Paspalum vaginatum</i> (Salt Water Couch)	Y		
720.	550 <i>Phalaris canariensis</i> (Canary Grass)	Y		
721.	557 <i>Piptatherum miliaceum</i> (Rice Millet)	Y		
722.	582 <i>Polypogon monspeliensis</i> (Annual Beardgrass)	Y		
723.	591 <i>Puccinellia ciliata</i> (Puccinellia)	Y		
724.	31672 <i>Puccinellia longior</i>			
725.	40431 <i>Rytidosperma acerosum</i>			
726.	40425 <i>Rytidosperma caespitosum</i>			
727.	40427 <i>Rytidosperma setaceum</i>			
728.	40440 <i>Rytidosperma</i> sp. <i>Goomalling</i> (A.G. Guinness et al. OAKP 10/63)			
729.	635 <i>Sporobolus virginicus</i> (Marine Couch)			
730.	11018 <i>Vulpia muralis</i>	Y		
731.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
732.	33101 <i>Vulpia myuros</i> forma <i>myuros</i>	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Polygalaceae				
733.	4553 <i>Comesperma drummondii</i> (Drummond's Milkwort)			
734.	4555 <i>Comesperma integerrimum</i>			
735.	4561 <i>Comesperma scoparium</i> (Broom Milkwort)			
736.	4566 <i>Comesperma volubile</i> (Love Creeper)			
Polygonaceae				
737.	2409 <i>Emex australis</i> (Doublegee)	Y		
738.	2412 <i>Muehlenbeckia adpressa</i> (Climbing Lignum)			
Portulacaceae				
739.	44184 <i>Calandrinia baccata</i>			
740.	2846 <i>Calandrinia calyptata</i> (Pink Purslane)			
741.	2853 <i>Calandrinia eremaea</i> (Twining Purslane)			
742.	2854 <i>Calandrinia granulifera</i> (Pygmy Purslane)			
Pottiaceae				
743.	32315 <i>Barbula calycina</i>			
744.	32346 <i>Didymodon torquatus</i>			
745.	32437 <i>Syntrichia antarctica</i>			
746.	32438 <i>Syntrichia pagorum</i>			
747.	32451 <i>Triquetrella papillata</i>			
Primulaceae				
748.	36375 <i>Lysimachia arvensis</i> (Pimpernel)	Y		
Proteaceae				
749.	1775 <i>Adenanthos cygnorum</i> (Common Woollybush)			
750.	11837 <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> (Common Woollybush)			
751.	32681 <i>Banksia armata</i> (Prickly Dryandra)			
752.	32682 <i>Banksia armata</i> var. <i>armata</i>			
753.	32683 <i>Banksia armata</i> var. <i>ignicida</i>			
754.	1812 <i>Banksia cuneata</i> (Quairading Banksia)		T	
755.	32523 <i>Banksia fraseri</i> var. <i>fraseri</i>			
756.	32518 <i>Banksia hewardiana</i>			
757.	32516 <i>Banksia horrida</i> (Prickly Dryandra)		P3	
758.	32136 <i>Banksia purdieana</i>			
759.	32088 <i>Banksia rufa</i>			
760.	32076 <i>Banksia sessilis</i> (Parrot Bush, Pudjak)			
761.	32080 <i>Banksia sessilis</i> var. <i>sessilis</i>			
762.	11868 <i>Banksia sphaerocarpa</i> var. <i>caesia</i>			
763.	32045 <i>Banksia squarrosa</i> subsp. <i>squarrosa</i>			
764.	32031 <i>Banksia vestita</i> (Summer Dryandra)			
765.	16856 <i>Conospermum amoenum</i> subsp. <i>cuneatum</i>			
766.	1870 <i>Conospermum eatoniae</i>		P3	
767.	15518 <i>Conospermum filifolium</i> subsp. <i>filifolium</i>			
768.	14002 <i>Conospermum galeatum</i>		T	
769.	1882 <i>Conospermum stoechadis</i> (Common Smokebush)			
770.	15520 <i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>			
771.	1991 <i>Grevillea disjuncta</i>			
772.	2001 <i>Grevillea eriostachya</i> (Flame Grevillea, Kaliny-kalinypa)			
773.	2002 <i>Grevillea eryngioides</i> (Curly Grevillea)			
774.	8832 <i>Grevillea excelsior</i> (Flame Grevillea)			
775.	2014 <i>Grevillea hakeoides</i>			
776.	13432 <i>Grevillea hakeoides</i> subsp. <i>hakeoides</i>			
777.	14415 <i>Grevillea insignis</i> subsp. <i>insignis</i>			
778.	2022 <i>Grevillea integrifolia</i> (Entire-leaved Grevillea)			
779.	2042 <i>Grevillea monticola</i>			
780.	2056 <i>Grevillea paniculata</i>			
781.	2066 <i>Grevillea pilulifera</i> (Woolly-flowered Grevillea)			
782.	2095 <i>Grevillea spinosissima</i>			
783.	2102 <i>Grevillea tenuiflora</i> (Tassel Grevillea)			
784.	2116 <i>Grevillea uncinulata</i> (Hook-leaf Grevillea)			
785.	12824 <i>Grevillea vestita</i> subsp. <i>vestita</i>			
786.	2125 <i>Hakea aculeata</i> (Column Hakea)		T	
787.	2145 <i>Hakea corymbosa</i> (Cauliflower Hakea)			
788.	11924 <i>Hakea cygna</i> subsp. <i>cygna</i> (Swan Fruit Hakea)			
789.	2157 <i>Hakea erecta</i>			
790.	2164 <i>Hakea gilbertii</i>			
791.	2166 <i>Hakea incrassata</i> (Marble Hakea)			
792.	2175 <i>Hakea lissocarpha</i> (Honey Bush)			
793.	2187 <i>Hakea nitida</i> (Frog Hakea)			
794.	2196 <i>Hakea preissii</i> (Needle Tree, Dandjin)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
795.	19131 <i>Hakea scoparia</i> subsp. <i>scoparia</i>			
796.	2211 <i>Hakea subsulcata</i>			
797.	2214 <i>Hakea trifurcata</i> (Two-leaf Hakea)			
798.	2227 <i>Isopogon divergens</i> (Spreading Coneflower)			
799.	2229 <i>Isopogon dubius</i> (Pincushion Coneflower)			
800.	2247 <i>Lambertia ilicifolia</i> (Holly-leaved Honeysuckle)			
801.	2270 <i>Persoonia quinquenervis</i>			
802.	2273 <i>Persoonia saccata</i> (Snottygobble)			
803.	2286 <i>Petrophile brevifolia</i>			
804.	14395 <i>Petrophile glauca</i>			
805.	14450 <i>Petrophile misturata</i>			
806.	20053 <i>Petrophile squamata</i> subsp. <i>northern</i> (J. Monks 40)			
807.	16869 <i>Synaphea cuneata</i>			
808.	15971 <i>Synaphea flabelliformis</i>			
809.	16761 <i>Synaphea interioris</i>			
810.	2329 <i>Synaphea spinulosa</i>			
811.	16763 <i>Synaphea tripartita</i>		P3	
Pteridaceae				
812.	31 <i>Cheilanthes austrotenuifolia</i>			
813.	34 <i>Cheilanthes distans</i> (Bristly Cloak Fern)			
814.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
Ranunculaceae				
815.	16087 <i>Clematis delicata</i>			
Resedaceae				
816.	3085 <i>Reseda luteola</i> (Wild Mingnonette)	Y		
Restionaceae				
817.	17663 <i>Desmocladius asper</i>			
818.	17662 <i>Desmocladius lateriticus</i>			
819.	17846 <i>Desmocladius parthenicus</i>			
820.	17840 <i>Desmocladius quiricanus</i>			
821.	1070 <i>Hypolaena exsulca</i>			
822.	1073 <i>Lepidobolus chaetocephalus</i> (Bristle-headed Chaff Rush)			
823.	1075 <i>Lepidobolus preissianus</i>			
824.	18074 <i>Lepidobolus preissianus</i> subsp. <i>preissianus</i>			
825.	1092 <i>Loxocarya cinerea</i>			
826.	15835 <i>Loxocarya striata</i>			
Rhamnaceae				
827.	31571 <i>Cryptandra intermedia</i>			
828.	4800 <i>Cryptandra leucopogon</i>			
829.	9076 <i>Cryptandra myriantha</i>			
830.	4809 <i>Cryptandra pungens</i>			
831.	4810 <i>Cryptandra scoparia</i>			
832.	16197 <i>Stenanthemum emarginatum</i>			
833.	16198 <i>Stenanthemum intricatum</i>			
834.	15065 <i>Stenanthemum notiale</i> subsp. <i>notiale</i>			
835.	31711 <i>Stenanthemum yorkense</i>		P1	
836.	4839 <i>Trymalium angustifolium</i>			
837.	15144 <i>Trymalium ledifolium</i> var. <i>lineare</i>			
838.	13479 <i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>			
839.	33418 <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>			
Rosaceae				
840.	10931 <i>Rosa chinensis</i> x <i>moschata</i>	Y		
Rubiaceae				
841.	7321 <i>Galium divaricatum</i>	Y		
842.	7350 <i>Opercularia rubioides</i>		P3	
843.	18255 <i>Opercularia vaginata</i> (Dog Weed)			
Rutaceae				
844.	4398 <i>Asterolasia grandiflora</i>		P4	
845.	4409 <i>Boronia coerulescens</i>			
846.	4443 <i>Boronia subsessilis</i>			
847.	15268 <i>Diplolaena graniticola</i>			
848.	4457 <i>Diplolaena microcephala</i> (Lesser Diplolaena)			
Santalaceae				
849.	10765 <i>Exocarpos sparteus</i> (Broom Ballart, Djuk)			
850.	2356 <i>Santalum acuminatum</i> (Quandong, Warrga)			
851.	2359 <i>Santalum spicatum</i> (Sandalwood, Wilarak)			

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Sapindaceae				
852.	4746 <i>Diplopeltis huegelii</i>			
853.	18589 <i>Diplopeltis huegelii</i> subsp. <i>lehmannii</i>			
854.	4755 <i>Dodonaea bursariifolia</i>			
855.	4760 <i>Dodonaea divaricata</i>			
856.	4775 <i>Dodonaea pinifolia</i>			
857.	4782 <i>Dodonaea viscosa</i> (Sticky Hopbush)			
Scrophulariaceae				
858.	7055 <i>Dischisma capitatum</i> (Woolly-headed <i>Dischisma</i>)	Y		
859.	14895 <i>Eremophila decipiens</i> subsp. <i>decipiens</i>			
860.	7215 <i>Eremophila glabra</i> (Tar Bush)			
861.	29377 <i>Eremophila glabra</i> subsp. <i>York</i> (P.G. Wilson 12172 B)		P1	
862.	17174 <i>Eremophila glabra</i> subsp. <i>elegans</i>			
863.	7231 <i>Eremophila lehmanniana</i>			
864.	7268 <i>Eremophila serpens</i> (Snake <i>Eremophila</i>)		P4	
865.	17161 <i>Eremophila subfloccosa</i> subsp. <i>subfloccosa</i>			
866.	13405 <i>Phyllopodium cordatum</i>	Y		
867.	7113 <i>Zaluzianskya divaricata</i> (Spreading Night Phlox)	Y		
Solanaceae				
868.	11454 <i>Anthocercis anisantha</i> subsp. <i>anisantha</i>			
869.	6947 <i>Anthocercis ilicifolia</i>			
870.	6960 <i>Datura ferox</i> (Fierce Thornapple)	Y		
871.	6968 <i>Lycium ferocissimum</i> (African Boxthorn)	Y		
872.	6976 <i>Nicotiana occidentalis</i> (Native Tobacco)			
873.	6978 <i>Nicotiana rotundifolia</i> (Round-leaved Tobacco)			
874.	7005 <i>Solanum elaeagnifolium</i> (White Horse Nettle, Silverleaf Nightshade)	Y		
875.	7025 <i>Solanum oldfieldii</i>			
Stylidiaceae				
876.	7670 <i>Levenhookia dubia</i> (Hairy Stylewort)			
877.	7677 <i>Levenhookia stipitata</i> (Common Stylewort)			
878.	7679 <i>Stylidium adpressum</i> (Trigger-on-stilts)			
879.	30278 <i>Stylidium androsaceum</i>			
880.	7692 <i>Stylidium breviscapum</i> (Boomerang Triggerplant)			
881.	7696 <i>Stylidium calcaratum</i> (Book Triggerplant)			
882.	7698 <i>Stylidium caricifolium</i> (Milkmaids)			
883.	7702 <i>Stylidium ciliatum</i> (Golden Triggerplant)			
884.	23472 <i>Stylidium coroniforme</i> subsp. <i>amblyphyllum</i>		P1	
885.	7713 <i>Stylidium dichotomum</i> (Pins-and-needles)			
886.	11808 <i>Stylidium diuroides</i> subsp. <i>diuroides</i>			
887.	7721 <i>Stylidium emarginatum</i> (Biddy-four-legs)			
888.	19251 <i>Stylidium eriopodium</i>			
889.	19400 <i>Stylidium hortiorum</i>			
890.	7749 <i>Stylidium leptophyllum</i> (Needle-leaved Triggerplant)			
891.	20610 <i>Stylidium perula</i>			
892.	7773 <i>Stylidium petiolare</i> (Horn Triggerplant)			
893.	7774 <i>Stylidium piliferum</i> (Common Butterfly Triggerplant)			
894.	7785 <i>Stylidium repens</i> (Matted Triggerplant)			
895.	7795 <i>Stylidium scabridum</i> (Moth Triggerplant)		P4	
896.	17510 <i>Stylidium</i> sp. <i>Kalbarri</i> (A. Carr 145)			
897.	31605 <i>Stylidium</i> sp. <i>Naremben</i> (W.E. Blackall s.n. /09/1929)			
898.	7801 <i>Stylidium squamellosum</i> (Maize Trigger Plant)		P2	
899.	9304 <i>Stylidium zeicolor</i> (Maize Triggerplant)			
Surianaceae				
900.	3181 <i>Stylobasium australe</i>			
Tamaricaceae				
901.	33020 <i>Tamarix parviflora</i>	Y		
Thymelaeaceae				
902.	5231 <i>Pimelea angustifolia</i> (Narrow-leaved <i>Pimelea</i>)			
903.	5232 <i>Pimelea argentea</i> (Silver Leaved <i>Pimelea</i>)			
904.	11928 <i>Pimelea ciliata</i> subsp. <i>ciliata</i>			
905.	11402 <i>Pimelea imbricata</i> var. <i>piligera</i>			
906.	5259 <i>Pimelea preissii</i>			
907.	5269 <i>Pimelea sylvestris</i>			
908.	5272 <i>Pimelea villifera</i>			
Urticaceae				
909.	1762 <i>Parietaria debilis</i> (Pellitory)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
910.	1252 <i>Xanthorrhoea drummondii</i>			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Fauna Report (5km) - York to Merredin

Created By Laura Zimmermann on 27/08/2014

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Group By Species Group

Species Group	Species	Records
Amphibian	10	89
Bird	118	1616
Invertebrate	36	82
Mammal	20	99
Reptile	49	328
TOTAL	233	2214

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amphibian				
1.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
2.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
3.	25408 <i>Heleioporus albopunctatus</i> (Western Spotted Frog)			
4.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
5.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
6.	25420 <i>Myobatrachus gouldii</i> (Turtle Frog)			
7.	25421 <i>Neobatrachus albipes</i> (White-footed Trilling Frog)			
8.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
9.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
10.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
Bird				
11.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
12.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
13.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
14.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
15.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
16.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
17.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
18.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
19.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
20.	24301 <i>Aegotheles cristatus</i> subsp. <i>cristatus</i> (Australian Owlet-nightjar)			
21.	24312 <i>Anas gracilis</i> (Grey Teal)			
22.	24313 <i>Anas platyrhynchos</i> (Mallard)			
23.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
24.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
25.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
26.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
27.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
28.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
29.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
30.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
31.	24352 <i>Artamus cinereus</i> subsp. <i>melanops</i> (Black-faced Woodswallow)			
32.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
33.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
34.	24318 <i>Aythya australis</i> (Hardhead)			
35.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
36.	24723 <i>Cacatua pastinator</i> subsp. <i>butleri</i> (Butler's Corella)			
37.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
38.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
39.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
40.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)		T	
41.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
42.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
43.	24833 <i>Cincloramphus cruralis</i> (Brown Songlark)			
44.	24834 <i>Cincloramphus mathewsi</i> (Rufous Songlark)			
45.	24396 <i>Climacteris rufa</i> (Rufous Treecreeper)			
46.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
47.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
48.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
49.	24416 <i>Corvus bennetti</i> (Little Crow)			
50.	25592 <i>Corvus coronoides</i> (Australian Raven)			
51.	24673 <i>Coturnix ypsilophora</i> subsp. <i>australis</i> (Brown Quail)			
52.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
53.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
54.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
55.	24322 <i>Cygnus atratus</i> (Black Swan)			
56.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
57.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
58.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
59.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
60.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
61.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
62.	25621 <i>Falco berigora</i> (Brown Falcon)			
63.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
64.	24472 <i>Falco cenchroides</i> subsp. <i>cenchrus</i> (Australian Kestrel)			
65.	25623 <i>Falco longipennis</i> (Australian Hobby)			
66.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
67.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
68.	25727 <i>Fulica atra</i> (Eurasian Coot)			
69.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
70.	-13853 <i>Gallus gallus</i>			
71.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
72.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
73.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
74.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
75.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
76.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
77.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
78.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
79.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
80.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
81.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
82.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
83.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
84.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
85.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
86.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
87.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
88.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
89.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
90.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
91.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
92.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
93.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
94.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
95.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
96.	24658 <i>Petroica cucullata</i> (Hooded Robin)			
97.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
98.	24660 <i>Petroica multicolor</i> subsp. <i>campbelli</i> (Scarlet Robin)			
99.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
100.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
101.	25669 <i>Phylidonyris nigra</i> (White-cheeked Honeyeater)			
102.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
103.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
104.	-13957 <i>Platycercus eximius</i>			
105.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
106.	24750 <i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
107.	24751 <i>Platycercus zonarius</i> subsp. <i>zonarius</i> (Port Lincoln Parrot)			
108.	24681 <i>Polocephalus polocephalus</i> (Hoary-headed Grebe)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
109.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
110.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
111.	42344 <i>Purnella albifrons</i> (White-fronted Honeyeater)			
112.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
113.	25613 <i>Rhipidura fuliginosa</i> (Grey Fantail)			
114.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
115.	30948 <i>Smicronis brevirostris</i> (Weebill)			
116.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
117.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
118.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
119.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
120.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
121.	30871 <i>Taeniopygia guttata</i> subsp. <i>castanotis</i> (Zebra Finch)			
122.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
123.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
124.	24851 <i>Turnix velox</i> (Little Button-quail)			
125.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
126.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
127.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
128.	24856 <i>Zosterops lateralis</i> subsp. <i>gouldi</i> (Grey-breasted White-eye)			
Invertebrate				
129.	33902 <i>Aganippe castellum</i> (Tree-stem Trapdoor Spider)		P4	
130.	-12754 <i>Aname mainae</i>			
131.	-12792 <i>Antichiropus variabilis</i> subsp. <i>ingens</i>			Y
132.	-1868 <i>Argiope protensa</i>			
133.	-12279 <i>Artoria impedita</i>			
134.	<i>Baiami volucripes</i>			
135.	-1888 <i>Cormocephalus aurantiipes</i>			
136.	-12862 <i>Crustulina bicrucata</i>			
137.	-12975 <i>Cryptoerithus quobba</i>			
138.	-13653 <i>Dingosa serrata</i>			
139.	-1766 <i>Ethmostigmus rubripes</i>			
140.	-11966 <i>Geogarypus connatus</i>			
141.	-13389 <i>Geogarypus taylori</i>			
142.	-1770 <i>Grayenulla australensis</i>			
143.	-11867 <i>Hoggicosa storri</i>			
144.	-12268 <i>Holconia westralia</i>			
145.	33917 <i>Idiosoma nigrum</i> (Shield-backed Trapdoor Spider)		T	
146.	-1771 <i>Isopedella saundersi</i>			
147.	33978 <i>Ixalodectes flectocercus</i> (cricket)		P1	
148.	-1834 <i>Lampona cylindrata</i>			
149.	-12172 <i>Lamponella kimba</i>			
150.	-11912 <i>Lycosa gilberta</i>			
151.	-12980 <i>Lycosa godeffroyi</i>			
152.	-12393 <i>Missulena occatoria</i>			
153.	-12354 <i>Mitzoruga insularis</i>			
154.	-12974 <i>Molycris vokes</i>			
155.	-12741 <i>Nomindra leeuweni</i>			
156.	-12902 <i>Notsodipus visio</i>			
157.	-13173 <i>Pediana occidentalis</i>			
158.	-1789 <i>Scolopendra laeta</i>			
159.	-1942 <i>Scolopendra morsitans</i>			
160.	-13718 <i>Synsphyronus mimulus</i>			
161.	-13661 <i>Tasmanicosa leuckartii</i>			
162.	-11918 <i>Thereuopoda lesueurii</i>			
163.	-12253 <i>Urodacus novaehollandiae</i>			
164.	-12804 <i>Withius piger</i>			
Mammal				
165.	24039 <i>Canis lupus</i> subsp. <i>dingo</i> (Dingo)	Y		
166.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
167.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
168.	24041 <i>Felis catus</i> (Cat)	Y		
169.	24215 <i>Hydromys chrysogaster</i> (Water-rat)		P4	
170.	24128 <i>Lagostrophus fasciatus</i> subsp. <i>fasciatus</i> (Bernier Is. Banded Hare-wallaby, Mermine)		T	
171.	24133 <i>Macropus irma</i> (Western Brush Wallaby)		P4	
172.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte)		T	
173.	24223 <i>Mus musculus</i> (House Mouse)	Y		
174.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
175.	24098 <i>Phascogale calura</i> (Red-tailed Phascogale, Kenngoos)		T	

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
176.	24099 <i>Phascogale tapoatafa</i> subsp. <i>tapoatafa</i> (Southern Brush-tailed Phascogale, Wambenger)		T	
177.	24241 <i>Pseudomys shortridgei</i> (Heath Mouse, Dayang)		T	
178.	24108 <i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
179.	24109 <i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)			
180.	24111 <i>Sminthopsis gilberti</i> (Gilbert's Dunnart)			
181.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
182.	24185 <i>Tadarida australis</i> (White-striped Freetail-bat)			
183.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
184.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		

Reptile

185.	25241 <i>Antaresia stimsoni</i> subsp. <i>stimsoni</i> (Stimson's Python)			
186.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			
187.	25236 <i>Aspidites ramsayi</i> (Woma)		S	
188.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
189.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
190.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
191.	24918 <i>Crenadactylus ocellatus</i> subsp. <i>ocellatus</i> (Clawless Gecko)			
192.	30893 <i>Cryptoblepharus buchananii</i>			
193.	25020 <i>Cryptoblepharus plagiocephalus</i>			
194.	24883 <i>Ctenophorus ornatus</i> (Ornate Crevice-Dragon)			
195.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
196.	25039 <i>Ctenotus fallens</i>			
197.	25463 <i>Ctenotus pantherinus</i> (Leopard Ctenotus)			
198.	25065 <i>Ctenotus pantherinus</i> subsp. <i>pantherinus</i> (Leopard Ctenotus)			
199.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
200.	24929 <i>Diplodactylus granariensis</i> subsp. <i>granariensis</i>			
201.	24940 <i>Diplodactylus pulcher</i>			
202.	25251 <i>Echiopsis curta</i> (Bardick)			
203.	25109 <i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
204.	24959 <i>Gehyra variegata</i>			
205.	42408 <i>Hesperoedura reticulata</i>			
206.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
207.	25131 <i>Lerista distinguenda</i>			
208.	25005 <i>Lialis burtonis</i>			
209.	41413 <i>Liopholis multiscutata</i> (Bull Skink)			
210.	30935 <i>Lucasium maini</i>			
211.	25184 <i>Menetia greyii</i>			
212.	24904 <i>Moloch horridus</i> (Thorny Devil)			
213.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)		S	
214.	25192 <i>Morethia obscura</i>			
215.	25249 <i>Neelaps calonotos</i> (Black-striped Snake)		P3	
216.	25253 <i>Parasuta gouldii</i>			
217.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
218.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
219.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
220.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
221.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
222.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
223.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
224.	25271 <i>Ramphotyphlops australis</i>			
225.	25273 <i>Ramphotyphlops bituberculatus</i>			
226.	25288 <i>Ramphotyphlops waitii</i>			
227.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
228.	25518 <i>Strophurus spinigerus</i>			
229.	24943 <i>Strophurus spinigerus</i> subsp. <i>inornatus</i>			
230.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
231.	25207 <i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
232.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
233.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 08/09/14 11:47:10

[Summary](#)

[Details](#)

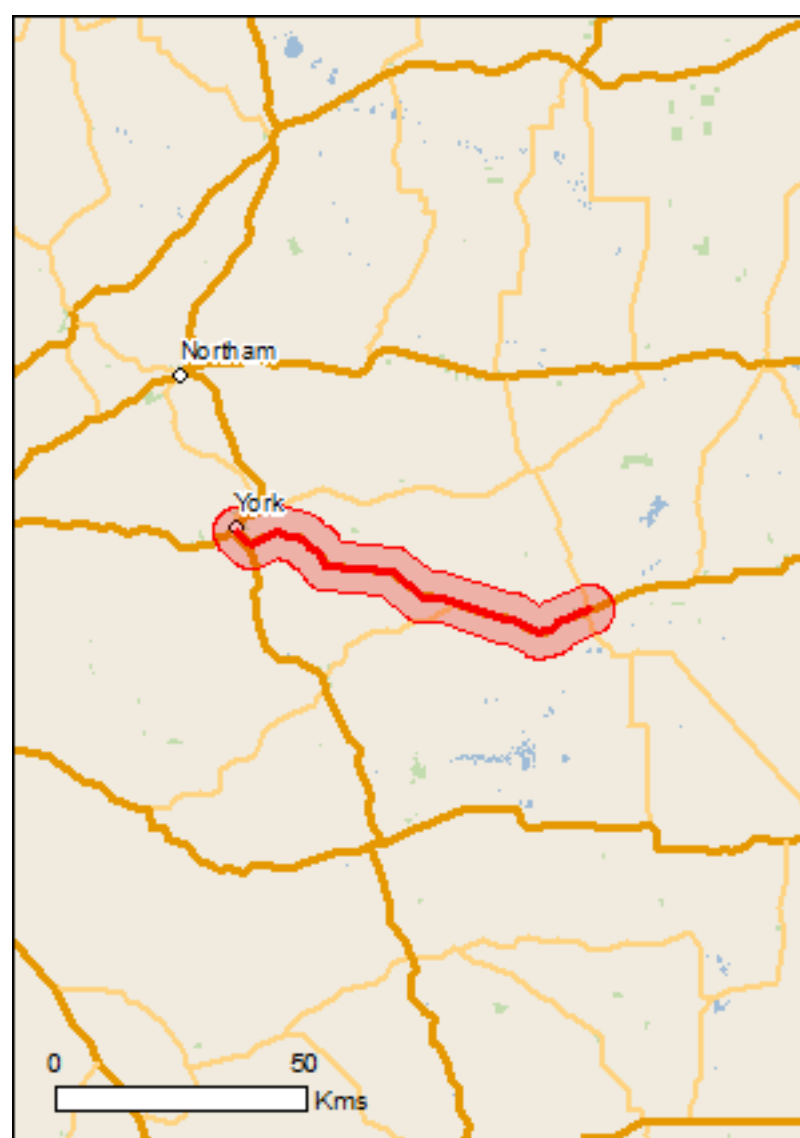
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

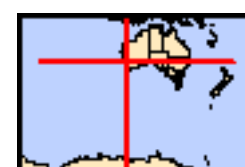
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[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	30
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	74
State and Territory Reserves:	6
Regional Forest Agreements:	None
Invasive Species:	21
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Phascogale calura Red-tailed Phascogale [316]	Endangered	Species or species habitat known to occur within area
Other		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia ataxiphylla subsp. magna Large-fruited Tammin Wattle [64823]	Endangered	Species or species habitat likely to occur within area
Allocasuarina fibrosa Woolly Sheoak [17455]	Vulnerable	Species or species habitat likely to occur within area
Banksia cuneata Matchstick Banksia, Quairading Banksia [9827]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Banksia oligantha Wagin Banksia [20697]	Endangered	Species or species habitat may occur within area
Boronia capitata subsp. capitata a shrub [29156]	Endangered	Species or species habitat likely to occur within area
Calectasia pignattiana Stilted Tinsel Lily [82018]	Vulnerable	Species or species habitat known to occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat may occur within area
Eucalyptus pruiniramis Midlands Gum, Jingymia Gum [56403]	Endangered	Species or species habitat may occur within area
Gastrolobium diabolophyllum Bodallin Poison [78384]	Critically Endangered	Species or species habitat may occur within area
Gastrolobium hamulosum Hook-point Poison [9212]	Endangered	Species or species habitat may occur within area
Grevillea dryandroides subsp. hirsuta Hairy Phalanx Grevillea [64577]	Endangered	Species or species habitat likely to occur within area
Grevillea scapigera Corrigin Grevillea [12195]	Endangered	Species or species habitat may occur within area
Guichenotia seorsiflora [82693]	Critically Endangered	Species or species habitat may occur within area
Hakea aculeata Column Hakea [11191]	Vulnerable	Species or species habitat known to occur within area
Jacksonia quairading Quairading Jacksonia, Quairading Stinkwood [67417]	Endangered	Species or species habitat likely to occur within area
Melaleuca sciotostyla Wongan Melaleuca [24324]	Endangered	Species or species habitat known to occur within area
Rhizanthella gardneri Underground Orchid, Western Australian Underground Orchid [20109]	Endangered	Species or species habitat likely to occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area
Stylidium coroniforme Wongan Hills Triggerplant, Wongan Triggerplant [10122]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Symonanthus bancroftii Bancrofts Symonanthus [12837]	Endangered	Species or species habitat may occur within area
Thomasia glabripetala Sandplain Thomasia [56547]	Vulnerable	Species or species habitat likely to occur within area
Verticordia staminosa subsp. staminosa Wongan Featherflower [55825]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
---	--	--

Migratory Terrestrial Species

Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
---	--	--

Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
---	--	--

Migratory Wetlands Species

Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
--	--	---

Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
--	--	--

Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
---	-------------	--

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
---	--	--

Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
--	--	---

Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur
--	--	--

Name	Threatened	Type of Presence within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Places on the RNE [[Resource Information](#)]

Note that not all Indigenous sites may be listed.

Name	State	Status
Indigenous		
Frieze Cave Painting Site	WA	Registered
Historic		
Avon Valley Landscape Area	WA	Indicative Place
Hartleap Farmhouse and Outbuildings	WA	Indicative Place
Hillside Farmhouse	WA	Indicative Place
ANZ Bank including Quarters	WA	Registered
Albion Hotel (former) including Grounds	WA	Registered
Anglican Church of the Holy Trinity including Rectory	WA	Registered
Balladong Farm Buildings	WA	Registered
Balladong Farm Group	WA	Registered
Bank of Australasia (former)	WA	Registered
Blands Brook and Bridge	WA	Registered
Bridge House including Gardens	WA	Registered
Brook Cottage	WA	Registered
Bygraves	WA	Registered
CWA House	WA	Registered
Castle Hotel	WA	Registered
Cemetery	WA	Registered
Central Buildings	WA	Registered
Clementine House	WA	Registered
Collins Building	WA	Registered
Convent of Mercy (former)	WA	Registered
Davies Buildings	WA	Registered
Faversham House and Barns	WA	Registered
Fire Station	WA	Registered
Flour Mill	WA	Registered
Four Shops	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House	WA	Registered
House and Grounds	WA	Registered
House and Outbuildings	WA	Registered

Name	State	Status
House and Outbuildings	WA	Registered
Imperial Hotel including Outbuildings	WA	Registered
Kairey Cottage	WA	Registered
Korrawilla	WA	Registered
Langsford House	WA	Registered
Laureville	WA	Registered
Look Out For Train Cottage (former)	WA	Registered
Marwicks Barn	WA	Registered
Masonic Hall	WA	Registered
Old Cemetery Site	WA	Registered
Police Quarters (former)	WA	Registered
Railway Station including Platform and Quarters	WA	Registered
Redmile House and Grounds	WA	Registered
Residency Museum	WA	Registered
Sargents Pharmacy (former)	WA	Registered
Settlers House including Courtyard and Gardens	WA	Registered
Shops	WA	Registered
Shops	WA	Registered
Shops and Residence Over including building behind (former)	WA	Registered
Spencers Bakery (former)	WA	Registered
St Patricks Catholic Church and Presbytery	WA	Registered
Stone House	WA	Registered
Swing Bridge	WA	Registered
Uniting Church and Hall	WA	Registered
War Memorial and Park	WA	Registered
Westpac Bank including Residence	WA	Registered
York Coop including Building and Grounds	WA	Registered
York Courthouse including Police Station and Gaol (former)	WA	Registered
York Historic Town	WA	Registered
York Hospital (former)	WA	Registered
York Hotel	WA	Registered
York Motor Museum	WA	Registered
York Post Office	WA	Registered
York Primary School	WA	Registered
York Public Library	WA	Registered
York Town Hall	WA	Registered

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Dangin	WA
Dulbelling	WA
Quairading Spring	WA
Unnamed WA26897	WA
Unnamed WA40642	WA
Unnamed WA46074	WA

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Cygnus olor Mute Swan [962]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Coordinates

-31.891493 116.773311,-31.908981 116.796657,-31.889161 116.843349,-31.897323
116.862575,-31.897323 116.877681,-31.90082 116.888667,-31.91481 116.899654,-31.917141
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117.308894,-32.040619 117.324,-32.040619 117.33224,-32.028977 117.343227,-32.009183

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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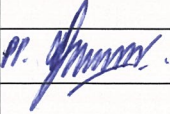
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		Name	Signature	Name	Signature	Date
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