Main Roads Western Australia

ABN: 50 860 676 021

Mitchell Freeway Extension (Hester Avenue to Romeo Road) EPBC 2018/8367

Construction Environmental Management Plan

December 2019

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Signed

M Baetge.

Full name (please print)

MARNI BAETGE

Organisation (please print)

MAIN ROADS WESTERN AUSTRALIA.

Date 16/12/2019

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Glossary

Abbreviation / Term	Definition
BWSCP TEC	Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community
CEMP	Construction Environmental Management Plan
CoE	Clean on Entry and/or Exit
DE	Development Envelope
DEE	Department of the Environment and Energy
EMP Guidelines	Environmental Management Plan Guidelines (DotE 2014a)
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FRTBC	Forest Red-tailed Black Cockatoo
ha	Hectare
km	Kilometre
m	Metre
Main Roads	Main Roads Western Australia
MNES	Matters of National Environmental Significance
Suitably qualified person	A person who has professional qualifications and at least three years of relevant work experience surveying for Black Cockatoo and who can give authoritative assessment, advice and analysis on performance relative to the subject matter using relevant protocols, standards, methods or literature. If the person does not have appropriate professional qualifications, the person must have at least five years of work experience related to the subject matter and can give an authoritative assessment, advice and analysis on performance relative to the subject matter using relevant protocols, standards, methods or literature.
TEC	Threatened Ecological Community
WA	Western Australia
WoNS	Weeds of National Significance

1. Introduction

1.1 Background

Main Roads Western Australia (Main Roads) proposes to extend Mitchell Freeway from Hester Avenue to Romeo Road, including an upgrade to Wanneroo Road from Dunstan Road to Trian Road (the Proposal, EPBC 2018/8367).

On 5 April 2019, a delegate of the Minister for the Environment determined the Proposal was a controlled action under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and that it will be assessed by Preliminary Documentation. In the decision advice, the Department of the Environment and Energy (DEE) advised it considered the Proposal likely to have a significant impact on Matters of National Environmental Significance (MNES) including:

- Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (BWSCP TEC)
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*)
- Forest Red-tailed Black Cockatoo (FRTBC, *Calyptorhynchus banksii naso*).

On 1 May 2019, the DEE requested Main Road provide additional information for the Preliminary Documentation, including a draft Construction Environmental Management Plan (CEMP) consistent with the Department's *Environmental Management Plan Guidelines* (the EMP Guidelines, DotE 2014a).

1.2 Purpose and structure of this Plan

This CEMP has been prepared and is structured in accordance with the EMP Guidelines to support the Commonwealth assessment of EPBC 2018/8367.

This CEMP outlines the actions required to mitigate and manage the impacts from Proposal construction activities on MNES, as described in the Proposal Preliminary Documentation (GHD 2019a).

1.3 Objectives of this Plan

This CEMP sets out the following objectives for environmental outcomes, to address the potential impacts and risks to MNES from Proposal construction activities:

1. To avoid unauthorised impacts to BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC.
2. To avoid edge impacts into adjacent areas of BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC outside the Development Envelope.
3. To avoid injury or mortality to Carnaby's Cockatoo and FRTBC during vegetation clearing and construction.

2. Project Description

2.1 Proposed works

Main Roads proposes to extend Mitchell Freeway north from Hester Avenue to Romeo Road, including an upgrade to Wanneroo Road from Dunstan Road to Trian Road (the Proposal). Figure 1 presents the Proposal location and Development Envelope (DE). The DE comprises an area of approximately 249 ha.

Mitchell Freeway is the main arterial road that connects the northern suburban areas with Perth's central business district. The freeway currently terminates at Hester Avenue. Perth's north-west suburbs have experienced continuing strong growth, averaging 6000 new residents per year over the past four decades.

The Proposal will extend the Mitchell Freeway a further 5.6 km from Hester Avenue to Romeo Road, as well as upgrading Wanneroo Road to a dual carriageway for 5.5 km from Dunstan Road to Trian Road. The Proposal will improve accessibility, travel times and road safety as well as sustaining jobs and enabling regional development in Perth's northern suburbs.

The Mitchell Freeway extension works include:

- Constructing a new 5.6 km four lane freeway (two lanes in each direction)
- Completion of northbound on ramp and southbound off ramp at Hester Avenue interchange
- Grade separated interchange at Lukin Drive
- Rail tunnel for the existing rail to exit the freeway median to Butler train station
- Terminate freeway at Romeo Road
- Principal Shared Path on the western side of the freeway
- Romeo Road constructed as dual carriageway with 2 lanes east to Wanneroo Road
- Footpaths/shared paths proposed for Romeo Road
- New/upgraded at-grade intersections at Romeo Road/Wanneroo Road.

The Wanneroo Road upgrade works include:

- Constructing a 5.5 km dual carriageway from Dunstan Road to Trian Road. Existing carriageway to be used where possible
- Intersection improvement to Wanneroo Road and Nowergup Road
- Improvements to the old Wanneroo Road alignment currently acting as a service road
- Modifications to formalise the service road providing safe access and egress to adjoining properties.

2.2 Proposed schedule

Proposal construction works are scheduled to commence in June 2021 and be completed by April 2024. These dates are subject to change depending on a number of factors and will be updated accordingly.

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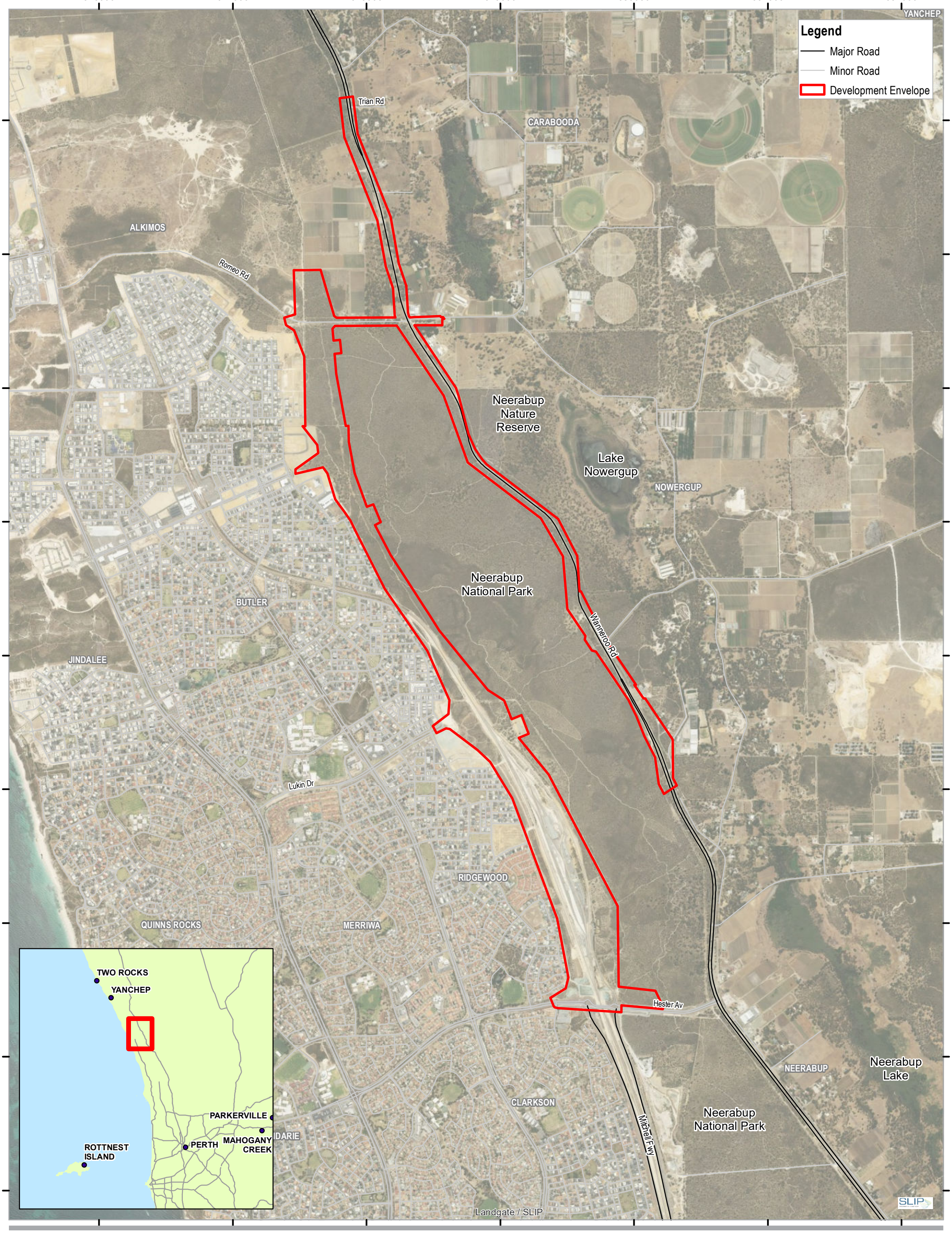

Paper Size ISO A3

0 0.25 0.5 0.75 1

Kilometres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

Main Roads Western Australia
SR155 Mitchell Fwy Extension EPBC PD

Proposal location and Development Envelope

Project No.	**61-38302**
Revision No.	**0**
Date	**10/09/2019**

FIGURE 1

G:\61\38302\GIS\Maps\Working\Figures\6138302_001_Locality_Rev0.mxd
Print date: 10 Sep 2019 - 13:03

Data source: GHD: EPBC Development Envelope - 20190531; ABS: Local Government Areas - 20190220; MRWA: Road network - 20190114; LGATE: Imagery - August 2018; Geoscience Australia: Geodata topo series 3. Created by: afeeney

3. Potential Environmental Impacts and Risks

3.1 Threats to Matters of National Environmental Significance

3.1.1 Controlling provisions

The Proposal has been determined a controlled action under the EPBC Act due to the likelihood of significant impacts on listed threatened species and communities (Sections 18 and 18A of the Act), including:

- Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (BWSCP TEC) – Endangered
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – Endangered
- Forest Red-tailed Black Cockatoo (FRTBC, *Calyptorhynchus banksii naso*) – Vulnerable.

The Preliminary Documentation (GHD 2019a) provides details of the environmental values relating to the above MNES. This information is summarised below, in Section 3.1.2.

3.1.2 Environmental values

Locality

The DE lies adjacent to Neerabup National Park and Neerabup Nature Reserve (Figure 1). The DE is located on the Spearwood Dunes landform, comprising well-drained, calcareous soils. To the east of the DE lies a chain of wetlands including Lakes Carabooda, Nowergup and Neerabup. West of the DE lies the Perth-Butler railway and the Butler and Ridgewood suburban areas.

Biological survey

Main Roads commissioned GHD (2019b) to complete a biological survey during spring 2018 over the DE and its vicinity, which included:

- A single season detailed and targeted vegetation and flora survey that encompassed the DE with a 50 m approx. buffer (400.0 ha), which was defined as the survey area in GHD (2019b)
- Reconnaissance vegetation and flora survey over an extended survey area as defined in GHD (2019b) (646.5 ha) including:
  - Land between Mitchell Freeway and Wanneroo Road, within Neerabup National Park, between Hester Avenue and Karaborup Road
  - Approximate 1.7 km long by 600 m wide corridor east of Wanneroo Road including part of Neerabup Nature Reserve
  - Approximate 1.9 km long by 700 m wide corridor around Romeo Road to the north
- The extended survey was undertaken to provide local context of environmental values, and enable definition of the wider extent and condition of patches of BWSCP TEC that occur within the DE
- Level 2 fauna assessment and targeted habitat assessment for Carnaby's Cockatoo and FRTBC. The Black Cockatoo habitat assessment included identification of potential breeding trees within the DE and buffer (the survey area), including monitoring of trees with

potential breeding hollows. Tree plots were undertaken in the extended survey area to extrapolate Black Cockatoo habitat and potential for trees with potential breeding hollows.

Banksia Woodlands of the Swan Coastal Plain TEC

GHD (2019b) concluded the BWSCP TEC covers approximately 349 ha over 13 patches within and in the vicinity of the DE. The largest patch accounts for approximately 82% (285 ha) of the mapped BWSCP TEC, which is primarily within Neerabup National Park and outside the DE. The large patch within the Neerabup National Park includes a large area of Excellent condition vegetation, which occurs outside the DE. GHD (2019b) concluded the DE covers 50.07 ha of BWSCP TEC over seven patches.

Table 1 presents the condition of the TEC in the survey area and in the DE, which indicates the TEC within the DE is relatively degraded compared to that of surrounding vegetation, particularly that of Neerabup National Park.

Table 1 Banksia Woodlands of the Swan Coastal Plain TEC

Vegetation condition	Area within total survey area (ha)	Area within DE (ha)
Excellent	50.22	0
Excellent-Very Good	110.51	4.41
Very Good	114.51	16.74
Very Good-Good	28.85	5.61
Good	27.61	13.73
Good-Degraded	12.62	6.52
Degraded	4.79	2.53
Degraded-Completed Degraded	0.53	0.53
Total	**349.64**	**50.07**

Black Cockatoo habitat

GHD (2019b) identified a total of 328 potential breeding trees within the DE, as presented in Table 2. Of these trees, eight had hollows suitable for Black Cockatoo breeding. These trees had between one to four potentially suitable hollows present for a total of 22 suitable hollows. The 22 suitable hollows were monitored in August, November and January/February 2018/2019, during which no Black Cockatoo use was evident or recorded (GHD 2019b).

Table 2 Potential Black Cockatoo breeding trees within the DE

Tree species	Number of potential breeding trees	Number of trees with suitable hollows (large or signs of use)	Number of suitable hollows (large/medium or signs of use)*
Tuart	256	8	22
Jarrah	58	-	-
Marri	11	-	-
Flooded Gum	2	-	-
Other eucalypt species	1	-	-
Total	**328**	**8**	**22**

GHD (2019b) surveyed 29 tree plots in the extended survey area, recording an average of approximately 20.8 potential breeding trees per ha (GHD 2019b). This density of trees was comparable to the density recorded in the DE. The tree plot data suggests the survey area outside the DE may support in the order of 2800 potential breeding trees, within the Tuart forest and Jarrah woodland mapped in the survey area outside the DE. Potential breeding trees may also be present in other areas including Banksia woodlands and cleared/disturbed areas.

GHD (2019b) mapped approximately 132 ha of foraging habitat for Carnaby's Cockatoo and approximately 104 ha of foraging habitat for FRTBC within the DE, as presented in Table 3.

Table 3 Black Cockatoo foraging habitat

Habitat type	Carnaby's Cockatoo foraging habitat – by condition (ha)			Forest Red-tailed Black Cockatoo foraging habitat – by condition (ha)		
	High	Medium	Low	High	Medium	Low
Banksia woodland	61.50	-	-	-	61.50	-
Tuart forest	-	8.56	-	-	8.56	-
Jarrah woodland	6.29	-	-	6.29	-	-
Mixed Heathland	27.82	-	-	-	-	-
Scattered natives over weeds, Cleared/highly disturbed	-	-	20.59	-	-	20.59
Revegetation	-	-	7.31	-	-	7.31
Total foraging habitat	**95.61**	**8.56**	**27.90**	**6.29**	**70.06**	**27.90**

GHD (2019b) recorded potential roosting trees within the buffer zone but outside of the DE, close to the intersection of Wanneroo Road and Romeo Road. No roosting was recorded during the biological survey, however the Tuart forest and Jarrah woodland vegetation within the DE has potential to support roosting habitat (GHD 2019a).

The DE and adjacent vegetation is considered to represent breeding habitat for Carnaby's Cockatoo, due to the availability of potential breeding trees and quality foraging resources (GHD 2019a). The DE and adjacent vegetation is not considered to provide breeding habitat for FRTBC, lying well away from recorded breeding areas and being devoid of large Marri trees with suitable hollows (GHD 2019a).

Other threatened ecological communities and threatened species

The biological survey (GHD 2019b) did not record any other EPBC Act listed threatened ecological communities or threatened flora or fauna species within the survey area.

Weeds

GHD (2019b) recorded within the survey area a total of eight Declared Pests under the Western Australian *Biosecurity and Management Act 2007*, including three Weeds of National Significance (WoNS):

- **Moraea flaccida* (One-leaf Cape Tulip) – Declared Pest
- **Gomphocarpus fruticosus* (Narrowleaf Cottonbush) – Declared Pest
- **Echium plantagineum* (Paterson's Curse) – Declared Pest

- **Solanum linnaeanum* (Apple of Sodom) – Declared Pest
- **Opuntia stricta* (Common Prickly Pear) - Declared Pest and WoNS
- **Lantana camara* (Common Lantana) - Declared Pest and WoNS
- **Asparagus asparagoides* (Bridal Creeper) – Declared Pest and WoNS
- **Zantedeschia aethiopica* (Arum lily) – Declared Pest.

The predominant Declared Pests recorded in the DE are *A. asparagoides* and *M. flaccida*, with isolated records of other Declared Pests.

Dieback

Glevan Consulting (2019) undertook a *Phytophthora* dieback occurrence assessment of the DE. The assessment classified all assessable vegetation as Uninfested, with three of twelve samples showing the presence of *P. nicotianae* and the other nine samples negative for *Phytophthora* species (Glevan 2019). No samples recorded *P. cinnamomi*. Previous surveys (2000, 2001 and 2013) recorded *P. multivora* at two locations along the western boundary of the DE, adjacent to the Butler and Ridgewood suburbs, and *P. nicotianae* at one location along Wanneroo Road (Glevan 2019). The closest record of *P. cinnamomi* is approximately 5 km to the north-east of the DE (Glevan 2019).

Despite the disturbance and degradation currently occurring there is no evidence of the presence of *P. cinnamomi* or expression of dieback within the DE and its vicinity, including in the highly vulnerable *Banksia attenuata*. This suggests the presence of calcareous soils (and dry, elevated sands) of the Spearwood Dunes may retard the introduction and/or spread of *Phytophthora* and provide a degree of resistance to dieback expression. Areas with calcareous soils are not considered 'protectable' areas vulnerable to dieback (CALM 2003, DotE 2014b).

3.2 Potential impacts

This section provides a summary of potential impacts to MNES from Proposal construction activities, based on the detailed assessment of impacts presented in the Preliminary Documentation (GHD 2019a).

3.2.1 Direct impacts

The Proposal construction activities will result in direct impacts to the BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC within the DE, as follows:

- Clearing of up to 50.07 ha of BWSCP TEC
- Clearing of up to 328 potential breeding trees for Black Cockatoos
- Clearing of up to eight trees containing between one to four potentially suitable hollows for Black Cockatoo nesting (up to 22 potentially suitable hollows total)
- Clearing of up to 95.61 ha of high quality foraging habitat, 8.56 ha of medium quality foraging habitat and 27.90 ha of low quality foraging habitat for Carnaby's Cockatoo
- Clearing of up to 6.29 ha of high quality foraging habitat, 70.06 ha of medium quality foraging habitat and 27.90 ha of low quality foraging habitat for FRTBC.

Based on the current concept design, Main Roads estimates approximately 60 ha of native vegetation within the DE will either be retained or landscaped/revegetated with a mix of local, native species suitable as Carnaby's Cockatoo and FRTBC foraging habitat.

The Proposal construction activities have potential to result in direct impacts to Carnaby's Cockatoo and FRTBC individuals due to:

- Clearing of large trees causing death of breeding or roosting birds
- Construction vehicle collisions causing death of birds.

Although breeding was not recorded during the survey (GHD 2019b), there is potential for Carnaby's Cockatoo to breed within the DE during the construction phase, at one or more of the eight trees identified with suitable hollows. Breeding mainly occurs during the early July to mid-December period.

It is considered highly unlikely the DE would support breeding by FRTBC during the construction period.

Although roosting was not recorded within the DE during the survey (GHD 2019b), there is potential for Carnaby's Cockatoo and/or FRTBC to roost within the DE during the construction phase in one or more of the large trees present in the Tuart or Jarrah woodland as well as disturbed roadside areas. Roosting may potentially occur throughout the year.

3.2.2 Indirect impacts

The Proposal construction activities have potential to cause indirect impacts to the BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC within and adjacent to the DE, as follows:

- Introduction and/or spread of dieback (*P. cinnamomi*)
- Spread and/or introduction of weeds
- Nutrient application
- Surface water runoff
- Spills of hazardous materials and wastes
- Fire.

The introduction and/or spread of dieback and/or weeds and nutrient application would result in long term impacts, whereas surface runoff, hydrocarbon/waste spills and fire would result in short term impacts. The DE lies adjacent to good condition native vegetation, TEC and Black Cockatoo habitat within the Neerabup National Park and Neerabup Nature Reserve.

Potential long-term indirect impacts

Dieback assessment found all assessable areas as uninfected with Dieback (Glevan 2019). Although the DE is devoid of dieback expression and is underlain by well-drained, calcareous soils, there remains potential for construction activities to spread *Phytophthora* from existing isolated infestations of *P. nicotianae* and *P. multivora*, and introduce *Phythophthora* with imported soil/plant materials or on construction plant or vehicles. The DE and adjacent land contains dieback susceptible species, notably *Banksia attenuata*.

The DE and adjacent land contains areas of infestation with Declared Pests, notably *Asparagus asparagoides* (Bridal Creeper, also a WoNS) and also *Moraea flaccida* (One-leaf Cape Tulip). Construction activities have potential to spread existing weed infestations as well as introduce weeds with imported soil/plant materials or on construction plant or vehicles. Weeds spread or introduced within the DE will require management during operations and may spread into adjacent land.

The replacement of remnant vegetation with planted vegetation has potential to cause runoff and/or leaching of nutrients from inappropriate use of fertilisers. The runoff/leaching of nutrients may encourage weed growth within the DE, which will require management during operations and may spread into adjacent land.

Potential short-term indirect impacts

Construction activities have potential to cause uncontrolled surface runoff from compacted and paved areas resulting in erosion and sediment discharge, as well as accidental spills of hazardous materials or wastes. These discharges could result in localised impact to vegetation condition within and adjacent to the DE.

Construction activities have potential to result in fires through hot works, operation of vehicles with spark ignition engines, and inappropriate disposal of cigarettes. Fire may spread from the DE into surrounding areas and potentially affect large areas of Neerabup National Park or Neerabup Nature Reserve.

3.3 Risk assessment

A risk assessment has been undertaken of the potential impacts identified for the Proposal construction activities, in accordance with the EMP Guidelines. The risk assessment adopts likelihood and consequence criteria and a risk matrix presented in Table 4, Table 5 and Table 6.

Table 7 presents the risk assessment results, incorporating management objectives and measures to generate a residual risk outcome for each identified risk. Section 4 provides implementation details for the management objectives and measures.

Table 4 Likelihood criteria

Likelihood	Criteria
Highly likely	Is expected to occur during the construction period
Likely	Will probably occur during the construction period
Possible	Might occur during the construction period
Unlikely	Could occur during construction but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 5 Consequence criteria

Consequence	Criteria
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental value and real danger of continuing
Critical	Severe widespread loss of environmental value and irrecoverable environmental damage

Table 6 Risk ranking matrix

Likelihood	Consequence				
	Minor	Moderate	High	Major	Critical
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Table 7 Risk assessment of Proposal construction activities to MNES

Management Objective / Desired Outcome	Issue (Event or Circumstance)	Cause	Management Measures	Residual risk		
				Likelihood	Consequence	Risk rating
To avoid unauthorised impacts to BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC	Loss of BWSCP TEC and/or habitat for Carnaby's Cockatoo and FRTBC	• Clearing more than 50.07 ha BWSCP TEC • Clearing more than 95.61 ha of high quality foraging habitat, 8.56 ha of medium foraging habitat and 27.90 ha of low quality foraging habitat for Carnaby's Cockatoo • Clearing more than 6.29 ha of high quality foraging habitat, 70.06 ha of medium quality foraging habitat and 27.90 ha of low quality foraging habitat for FRTBC • Clearing of BWSCP TEC or Black Cockatoo habitat outside the approved area.	• All currently identified Black Cockatoo potential breeding trees within the construction site boundary not required to be cleared will be marked and identified as no-go areas, demarcated on relevant drawings and provided to the Construction Contractor Representative • Vegetation to be retained will be clearly marked with flagging on site • All clearing areas will be marked with flagging and approved by the Main Roads Superintendent prior to clearing commencing • Additional areas required for construction such as laydown areas, stockpile areas and vehicle turn around, will be located in areas cleared for permanent works or areas that do not contain BWSCP TEC or Black Cockatoo habitat • Clearing will be avoided for any temporary construction activities.	Unlikely	High	Medium
To avoid edge impacts into adjacent areas of BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC outside the Development Envelope	Degradation in condition of BWSCP TEC and/or habitat for Carnaby's Cockatoo and FRTBC	• Growth of listed pest plant species in the DE during construction • Introduction or spread of weeds and dieback impacting on vegetation health or condition from plant and machinery • Introduction or spread of weeds and dieback impacting on vegetation health of condition from unauthorised site access.	• Declared Plants within the construction site boundary will be treated according to their Control Codes and advice from Department of Primary Industries and Regional Development (DPIRD), with the aim of eradication where possible but as a minimum prevent off site movement (refer to Appendix A) • WoNS and environmental weeds within the construction site boundary will be treated according to the weed control management outlined by Weeds Australia (http://weeds.ala.org.au/) with the aim of controlling off-site movement (refer to Appendix A) • Topsoil containing Declared Pests or WoNS shall not be reused in landscaping or revegetation. • All heavy plant and machinery will be inspected by the contractor prior to entry at the work site and be confirmed to be clean and free of vegetation and soil material • Topsoil from infected or potentially infected *Phytophthora* dieback areas (including within 20 m of mapped P. *multivora* and P. *nicotianae* infected sites) shall be segregated and not used in non-infected areas • Clean on Entry and/or Exit (CoE) procedures will be implemented on site, and entry and exit records kept for CoE points.	Unlikely	Moderate	Low
		Reduced vegetation health or impacts to faunal health due to construction dust emissions	• Water carts and/or surface stabilization measures (e.g. hydro mulch) will be used to minimise dust generated from cleared areas • Dust generating activities will be suspended at the direction of the Construction Contractors Environmental Representative if deemed too dusty and will not recommence without approval of same • Vehicle speeds will be limited to between 40-80km/hr on site for safety purposes and this will consequently reduce dust generated.	Rare	Moderate	Low

Management Objective / Desired Outcome	Issue (Event or Circumstance)	Cause	Management Measures	Residual risk		
				Likelihood	Consequence	Risk rating
		Damage to foraging habitat from accidental fires caused by construction activities	• All hot work will be undertaken in accordance with Contractor's hot work procedure. This will be reviewed and approved by the Main Roads Superintendent prior to work commencing • All vehicles, plant and equipment to be fitted with fire extinguishers and restricted to designated cleared areas unless involved in clearing operations • Fire danger ratings and Shire vehicle movement bans to be observed and the requirements of these implemented	Rare	Major	Medium
		Damage to foraging habitat from changes to drainage flow	• Temporary drainage structures within or adjacent to BWSCP TEC or Black Cockatoo habitat will be designed and constructed such that scouring or erosion within adjacent vegetated areas does not occur.	Unlikely	Minor	Low
	Loss of soil resources, spread of weeds and runoff / leaching of excess nutrients	Earthworks and landscaping of road reserve	• Topsoil within the DE will be harvested, stockpiled and reused in accordance with Main Roads *Environmental Guideline* Topsoil Management • Landscaping within the road reserve will use local native species in accordance with Main Roads Specification 304 (Revegetation and Landscaping) and Main Roads *Environmental Guideline* Revegetation Planning and Techniques.	Unlikely	Minor	Low
To avoid injury or mortality to Carnaby's Cockatoo and FRTBC during vegetation clearing and construction	Fauna mortality during construction	Vehicle interaction with fauna	• Where trees that are known to be Black Cockatoo habitat are retained but are located within 10 m of the edge of the road seal the risk of fauna strike will be assessed to determine if wildlife hazard signage is required • Speed limits between 40-80km/hr will be applied throughout the construction site for safety purposes which will consequently reduce the risk of fauna strikes during construction • A list of local wildlife rescue organisations and carers will be maintained on site to contact in the event of fauna injury • Revegetation designs shall not include foraging or breeding plant species within 10 m of the road.	Possible	Minor	Low
		Clearing of active breeding trees	• Within 7 days prior to clearing, trees with hollows used by or suitable for use by Carnaby's Cockatoo will be inspected by a suitably qualified person to confirm that there are no hollows being used by Carnaby's Cockatoo within the area to be cleared.	Rare	Major	Medium

4. Environmental Management Measures

4.1 Implementation

Table 8 provides detail of the management measures to be put in place to achieve the outcomes identified in the risk assessment, including the performance targets/completion criteria, implementation timing, monitoring, reporting and corrective action.

4.2 Monitoring program

A number of activities will be undertaken to monitor and report implementation of management measures and achievement of completion criteria. Monitoring activities are mapped to each management measure in Table 8. Table 9 describes the monitoring in more detail and includes relevant monitoring guidelines or methods and responsible people.

4.3 Managing uncertainty

This CEMP has been developed based on varying data and information sources. This data and information has informed the risk assessments and management measures contained within the CEMP and therefore, any limitations or uncertainties with this data or information may impact the accuracy of this CEMP. Table 10 contains measures for managing uncertainty so that the CEMP continues to be based on the most up to date and relevant information and data.

Table 8 Management measures to mitigate construction impacts to MNES

Management Objective / Desired Outcome	Management Measures	Performance Target/Completion Criteria	Timing	Monitoring/Reporting Activity	Corrective Action Trigger(s)	Corrective Action	Corrective Action Responsibility
To avoid unauthorised impacts to BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC	All currently identified Black Cockatoo potential breeding trees within the construction site boundary that are not required to be cleared will be marked and identified as no-go areas, demarcated on relevant drawings and provided to the Construction Contractor Representative	Drawings showing environmental no-go areas provided to the Construction Contractor Representative	Contract award and prior to commencement of clearing.	Record of provision of drawings showing environmental no-go areas	• Clearing more than 50.07 ha BWSCP TEC • Clearing more than 95.61 ha of high quality foraging habitat, 8.56 ha of medium quality foraging habitat or 27.90 ha of low quality foraging habitat for Carnaby's Cockatoo • Clearing more than 6.29 ha of high quality foraging habitat, 70.06 ha of medium quality foraging habitat or 27.90 ha of low quality foraging habitat for FRTBC • Clearing of BWSCP TEC or Black Cockatoo habitat outside the approved area.	• Incorrectly cleared areas will be included in the Landscape and Revegetation Plan for the project within 6 months of completion of clearing for revegetation with BWSCP TEC and Black Cockatoo foraging habitat species • Clearing in the direct vicinity will cease immediately if trigger is met. Clearing will not recommence until no-go areas have been reviewed and confirmed to be in place correctly, and Main Roads Superintendent provides approval to recommence.	• Construction Contractor Environmental Management Representative • Main Roads Superintendent.
		All environmental no-go areas clearly marked with flagging on site	Prior to commencement of clearing	• Incident reporting (EQSafe) • Monthly site inspections • Site inspection by Construction Contractor Environmental Management Representative prior to and following clearing to confirm no-go areas are appropriately flagged / fenced, and that clearing remains within limits.			
	Vegetation to be retained will be clearly marked with flagging on site	All vegetation to be retained will be marked with flagging on site					
	All clearing areas will be marked with flagging and approved by the Main Roads Superintendent prior to clearing commencing	All areas to be cleared will be marked with flagging on site					

Management Objective / Desired Outcome	Management Measures	Performance Target/Completion Criteria	Timing	Monitoring/Reporting Activity	Corrective Action Trigger(s)	Corrective Action	Corrective Action Responsibility
	• Additional areas required for construction such as laydown areas, stockpile areas and vehicle turn around, will be located in areas cleared for permanent works or areas that do not contain BWSCP TEC or Black Cockatoo habitat • Clearing will be avoided for any temporary construction activities.	Areas for ancillary services located in cleared areas or areas that do not contain BWSCP TEC or Black Cockatoo habitat	During construction	• Construction site plan and photos showing all ancillary areas not located on land containing BWSCP TEC or Black Cockatoo habitat • Monthly site inspections.	Areas required for construction such as laydown areas etc are proposed to be located within areas of native vegetation	• Main Roads Superintendent is required to provide approval for clearing of native vegetation for construction laydown etc. and approval must only be given if there are no other practicable options • Incorrectly cleared areas will be included in the Landscape and Revegetation Plan for the project within 6 months of completion of clearing for revegetation with BWSCP TEC and Black Cockatoo foraging habitat species.	Main Roads Superintendent
To avoid edge impacts into adjacent areas of BWSCP TEC and habitat for Carnaby's Cockatoo and FRTBC outside the Development Envelope	Declared Plants within the construction site boundary will be treated according to their Control Codes and advice from Department of Primary Industries and Regional Development (DPIRD), with the aim of eradication where possible but as a minimum prevent off site movement (refer to Appendix A)	No new occurrence or spread of Declared Plants within the construction site boundary or immediately adjacent areas during construction activities	All construction activities	• Monthly site inspections • Annual revegetation Representative monitoring.	New occurrence or spread of a Declared Plant identified	• Application of weed eradication techniques for the weed species (refer to Appendix A) • Review CoE process.	Construction Contractor Environmental Management Representative
	WoNS and environmental weeds within the construction site boundary will be treated according to the weed control management outlined by Weeds Australia (http://weeds.ala.org.au/) with the aim of controlling off-site movement (refer to Appendix A)	No new occurrence or spread of WoNS or environmental weeds through construction activities			New occurrence or spread of a WoNS or environmental weed identified	• Application of weed eradication techniques for the weed species (refer to Appendix A) until completion criteria of weed cover at less than 30% is met • Review CoE process.	
	Topsoil containing Declared Pests or WoNS shall not be reused in landscaping or revegetation.	All topsoil from Declared Pest or WoNS infested areas to be buried at a depth of at least 300 mm or disposed off-site at a landfill.	During construction	Records of topsoil segregation and burial or licensed waste facilities	Topsoil from infested areas used in landscaping or revegetation	• Topsoil removed from landscaping/revegetation areas and replaced with clean topsoil. Infested topsoil buried at depth or disposed at a licensed waste facility.	
	All heavy plant and machinery will be inspected by the contractor prior to entry at the work site and be confirmed to be clean and free of vegetation and soil material	All plant and machinery will be verified clean on arrival at site	All construction activities	Records verifying plant and machinery arriving on site is clean	Plant and machinery arriving on site without verification that it is clean of soil and vegetative matter	Refresher training will be conducted	
	Topsoil from infected or potentially infected *Phytophthora* dieback areas (including within 20 m of mapped P. multivora and P.	All topsoil from infested and potentially infected dieback areas used in	During construction	Records of topsoil segregation and reuse from infected areas or licensed waste facilities	Topsoil from infected or potentially infected dieback	• Topsoil sampled for *Phytophthora* at sampling density according to WA contaminated site guidelines	

Management Objective / Desired Outcome	Management Measures	Performance Target/Completion Criteria	Timing	Monitoring/Reporting Activity	Corrective Action Trigger(s)	Corrective Action	Corrective Action Responsibility
	nicotianae infected sites) shall be segregated and not used in non-infected areas	infected areas or disposed of at a licensed facility			areas used in non-infected areas	• If topsoil found to contain *Phytophthora*, the topsoil will be removed and placed on an infected area or a licensed waste facility • Phosphite will be applied to dieback susceptible species within 30 m of placed topsoil that tested positive for *Phytophthora*, in accordance with DBCA guidance.	
	CoE procedures will be implemented on site, and entry and exit records kept for CoE points	No breach of CoE protocols	For the duration of the approval	• Entry and/or exit records for CoE points • Monthly site inspections.	Breach of CoC protocol	Refresher training will be conducted	
	Water carts and/or surface stabilization measures (e.g. hydro mulch) will be used to minimise dust generated from cleared areas Dust generating activities will be suspended at the direction of the Construction Contractors Environmental Representative if deemed too dusty and will not recommence without approval of same	• No dust complaints from community or other stakeholders • No visual dust plumes generated by construction activities.	During construction	• Visual dust observations by all project personnel • Monthly site inspections.	• Reports of visible dust plumes by project personnel • Complaints from community or other stakeholders.	Increased application rate/frequency for dust suppression methods (e.g water carts) will be implemented effective immediately of trigger being realised	Construction Contractor Environmental Management Representative
	Vehicle speeds will be limited to between 40-80km/hr on site for safety purposes and this will consequently reduce dust generated	No incidents of speeding within the construction site boundary	During construction	• Visual monitoring by all construction personnel • Incident reporting (EQSafe).	Reported exceedance of site speed limits	• Refresher training will be conducted within 1 week • Instances of speeding are identified and offenders will be asked to immediately reduce speed • Repeat offenders (ie. Caught speeding more than 2 times) will undergo further refresher training.	
	All hot work will be undertaken in accordance with Contractor's hot work procedure. This will be reviewed and approved by the Main Roads Superintendent prior to work commencing	No fires started as a result of hot works	During hot works such as welding	• Monthly site inspections to confirm required controls are in place • Incident reports related to fires.	Ignition / fire started as a result of hot works	• Incident investigation shall be initiated within 1 day and a report completed within 1 week • Fire impacted areas will be included in the Landscape and Revegetation Plan for the project for revegetation with	Construction Contractor Environmental Management Representative
	All vehicles, plant and equipment to be fitted with fire extinguishers and restricted to designated cleared areas unless involved in clearing operations	No fires started as a result of construction vehicles or equipment	During construction		Ignition / fire started as a result of construction vehicles or equipment		

Management Objective / Desired Outcome	Management Measures	Performance Target/Completion Criteria	Timing	Monitoring/Reporting Activity	Corrective Action Trigger(s)	Corrective Action	Corrective Action Responsibility
	Fire danger ratings and Shire vehicle movement bans to be observed and the requirements of these implemented	No fires started as a result of construction vehicles or equipment	During construction		Ignition / fire started as a result of construction vehicles or equipment	BWSCP TEC and Black Cockatoo foraging habitat species • Refresher training will be conducted within 1 week.	
	Temporary drainage structures within or adjacent to BWSCP TEC or Black Cockatoo habitat will be designed and constructed such that scouring or erosion within adjacent vegetated areas does not occur	No evidence of erosion from construction activities within no-go areas or BWSCP TEC or Black Cockatoo habitat to be retained.	Prior to and during construction	Monthly site inspections	Erosion identified in BWSCP TEC or Black Cockatoo habitat to be retained	Review drainage to identify whether there are any failure points, and repair/address any failure points identified within 2 weeks	Construction Contractor Environmental Management Representative
	Topsoil within the DE will be harvested, stockpiled and reused in accordance with Main Roads Environmental Guideline Topsoil Management	Topsoil is managed in accordance with Main Roads Guideline	Prior to and during construction and landscaping	Monthly site inspections	Topsoil is not managed in accordance with Main Roads Guideline	Topsoil management amended to ensure compliance with Main Roads Guideline	Construction Contractor Environmental Management Representative
	Landscaping within the road reserve will use local native species in accordance with Main Roads Specification 304 (Revegetation and Landscaping) and Main Roads Environmental Guideline Revegetation Planning and Techniques	Landscaping is compliant with Main Roads Specification 304 and Guideline	Prior to and during landscaping	• Review of landscaping plans and species list • Inspection of landscaping areas.	• Landscaping plans and species lists are not compliant • Landscaping works do not comply with approved plans and species list.	• Landscaping plans and species list amended to ensure compliance • Landscaping works are re-planted to comply with approved plans and species list.	Construction Contractor Environmental Management Representative Main Roads Superintendent
To avoid injury or mortality to Carnaby's Cockatoo and FRTBC during vegetation clearing and construction.	Where trees that are known to be Black Cockatoo habitat are retained but are located within 10 m of the edge of the road seal the risk of fauna strike will be assessed to determine if wildlife hazard signage is required.	Black Cockatoo habitat retained within 10 m of the edge of the seal of the road will be risk assessed and wildlife hazard signage installed as required.	During construction	Risk assessment	Black Cockatoo habitat is retained within 10m of the edge of the road seal and is not risk assessed to determine whether wildlife hazard signage is required.	Risk assess retained Black Cockatoo habitat within 10 m of the edge of the road seal and install wildlife hazard signage if required.	Construction Contractor Environmental Management Representative
	Speed limits between 40-80km p/hr will be applied throughout the construction site for safety purposes which will consequently reduce the risk of fauna strikes during construction.	No incidents of speeding within the construction site boundary		• Visual monitoring by all construction personnel • Incident reporting (EQSafe).	Reported exceedance of site speed limits	• Refresher training will be conducted within 1 week • Instances of speeding are identified and offenders will be asked to immediately reduce speed • Repeat offenders (ie. Caught speeding more than 2 times) will undergo further refresher training.	

Management Objective / Desired Outcome	Management Measures	Performance Target/Completion Criteria	Timing	Monitoring/Reporting Activity	Corrective Action Trigger(s)	Corrective Action	Corrective Action Responsibility
	A list of local wildlife rescue organisations and carers will be maintained on site to contact in the event of fauna injury.	A list of local wildlife rescue organisations and carers is on site at all times.		Monthly inspection	• A list of local wildlife rescue organizations and carers is not on site • Wildlife rescue specialists not contacted immediately on discovery of an injured Black Cockatoo.	• A list of local wildlife rescue organizations and carers is obtained by site immediately • Refresher training will be conducted within 1 week.	
	Revegetation designs shall not include foraging or breeding plant species within 10 m of the road.	Revegetation designs exclude foraging or breeding plant species within 10 m of the road	Prior to commencement of revegetation.	Record of revegetation drawings showing species mix	• Revegetation designs include foraging or breeding plant species within 10 m of the road • Foraging or breeding plant species planted within 10 m of the road.	• Design drawings amended to exclude revegetation with foraging or breeding plant species within 10 m of the road • Foraging or breeding plant species removed from within 10 of the road and replaced with non-habitat species.	• Construction Contractor Environmental Management Representative • Main Roads Superintendent.
	Within 7 days prior to clearing, trees with hollows used by or suitable for use by Carnaby's Cockatoo will be inspected by a suitably qualified person to confirm that there are no hollows being used by Carnaby's Cockatoo within the area to be cleared	Survey of trees with hollows used by or suitable for use by Black Cockatoo undertaken within 7 days prior to clearing events	Within 7 days prior to clearing events	Survey for hollows that are being used, or are capable of being used, by Black Cockatoos Maintain a register of nesting trees	Clearing event undertaken without pre-clearing survey	• Contractor to provide evidence that a suitably qualified person is engaged to conduct surveys prior to subsequent clearing events • Contractor to provide evidence that surveys are scheduled within 7 days prior to subsequent clearing events.	Construction Contractor Environmental Management Representative
					Survey undertaken more than 7 days prior to clearing	• Unanticipated clearing event delays will be risk assessed against survey findings • Clearing in the direct vicinity will cease immediately if trigger is met • Clearing will not recommence until nogo areas have been reviewed and confirmed to be in place correctly, and Main Roads Superintendent provides approval to recommence.	

Management Objective / Desired Outcome	Management Measures	Performance Target/Completion Criteria	Timing	Monitoring/Reporting Activity	Corrective Action Trigger(s)	Corrective Action	Corrective Action Responsibility
	Any tree and vegetation within 10m of the tree identified as being used by Black Cockatoos for nesting must not be cleared until a suitably qualified person has verified that the tree is not in use.	• No clearing of trees used by Black Cockatoo • All trees currently being used by Black Cockatoos are marked with flagging as no-go areas with flagging with a 10 m exclusion zone • All hollows being utilised by the species are detected during surveys • No Black Cockatoo mortality or injury during clearing.	Carnaby's Cockatoo breeding season and following survey of area to be cleared	• Surveys undertaken by suitably qualified person to confirm hollow is no longer being used by Black Cockatoo • Maintain a register of nesting trees.	• Clearing of a tree with a hollow currently used by Black Cockatoo • Suitably qualified person has not confirmed the tree is no longer being utilised by Black Cockatoos before it is cleared.	• Immediate inspection of felled tree (eg with hollow currently in use) to determine survivability of Black Cockatoo (if present) • A list of local wildlife rescue organisations and carers will be maintained on site. This will allow efficient identification of an appropriate destination to which to transfer injured cockatoo • Incorrectly cleared areas will be included in the Landscape and Revegetation Plan for the project for revegetation with Black Cockatoo foraging habitat species • Clearing activities are immediately ceased in the vicinity of the unmarked trees and relevant trees are correctly flagged before clearing activities recommence • If a tree currently utilised by the species is felled, clearing in the direct vicinity will cease immediately if trigger is met • Clearing will not recommence until nogo areas have been reviewed and confirmed to be in place correctly, and Main Roads Superintendent provides approval to recommence.	• Construction Contractor Environmental Management Representative • Main Roads Superintendent.

Table 9 Monitoring schedule

Monitoring Activity	Parameter Measures	Items Addressed	Applicable Method / Guideline	Responsibility
Pre-clearing surveys for hollows being used by Black Cockatoos	Presence of hollows being used by Black Cockatoo	• Confirm all potential breeding trees with suitable hollows for nesting that are being used by Black Cockatoo before clearing begins • Confirm that Black Cockatoo are no longer using suitable hollows before clearing begins • Maintain a register of nesting trees • Record the location of any known nesting hollow or suitable nesting hollow that are additional to the nesting hollows already marked as no-go areas.	• Suitably qualified person with experience in hollow identification to visually inspect all potential nesting trees within the clearing area and record spatial co-ordinates for any trees identified with hollows that are being utilised, or are capable of being utilised, by Black Cockatoos • Monitoring will be conducted in line with best practice and monitoring methods used will be consistent advice contained within the Black Cockatoo Recovery Plan (DPAW, 2013) • Note: no-go areas are areas of vegetation that are not approved to be cleared, these include trees with hollows that are being used by or are suitable for Black Cockatoos, conservation significant flora and all areas outside of the approval boundary. These areas are identified on the engineering drawings issued for construction.	• Suitably qualified person • Construction Contractor Environmental Management Representative.
Monthly site inspection	Compliance with CEMP requirements	• Confirm all vegetation to be retained is clearly marked with flagging on site • Confirm environmental no-go areas are clearly marked on site • Confirm that clearing outside of approved area or in excess of approved limits has not or will not occur • Confirm areas required for temporary construction activities, such as laydown, are only located on previously cleared areas • Confirm all plant and machinery are verified clean on arrival at site • Confirm no new occurrences of declared plants within the construction site boundary • Confirm no new occurrences of WoNS or Environmental Weeds within the construction site boundary • Confirm no breach of CoE procedures • Confirm soil from known or potential dieback infested areas has been reused in infested areas or disposed off-site at a licensed waste facility • Confirm list of wildlife rescue organization contact details is on site • Confirm no visual dust plumes • Confirm hot works procedures are in place and correctly implemented • Confirm no erosion or scouring within vegetation that is to be retained, within no-go areas or outside the approval boundary • Confirm topsoil is harvested, stockpiled and reused in accordance with Main Roads Environmental Guideline Topsoil Management • Confirm landscaping within the road reserve is compliant with approved landscaping plans and species mix • Confirm previous weed control measures been effective and is follow-up treatment required to eliminate the weeds • Confirm weed control measures been implemented as per this CEMP and in line with Weeds Australia Guidance (http://weeds.ala.org.au/WoNS/).	Visual inspection to confirm that management measures in the CEMP are being implemented correctly	Construction Contractor Environmental Management Representative

Monitoring Activity	Parameter Measures	Items Addressed	Applicable Method / Guideline	Responsibility
Weekly site inspection during seeding/planting	Landscaping progress	• Landscaping must begin within one year of commencement of the action within all areas identified for landscaping, within one year of the completion of construction • Confirm all landscaping is occurring within winter • Confirm topsoil is reused in accordance with Main Roads Environmental Guideline Topsoil Management • Confirm landscaping within the road reserve is compliant with approved landscaping plans and species mix • Confirm no foraging, nesting or roosting plant species for Black Cockatoo are planted within 10 m of the edge of the pavement.	Visual inspection by a suitable qualified person to confirm that landscaping is occurring/has occurred in accordance with approved plans and species mix	Construction Contractor Environmental Management Representative.

Table 10 Managing uncertainty

Data	Limitations / Uncertainty	Risk presented by Limitations / Uncertainty	Risk Management Measures
Road Alignment Design	High level of certainty of maximum impact within Development Envelope	Low risk	n/a
Biological survey (GHD 2019b)	Biological survey reported nil to minor limitations in desktop or field components	Low risk	n/a
Black Cockatoo hollow monitoring (GHD 2019b)	One year of monitoring hollows suitable for Black Cockatoo nesting	Potential for Black Cockatoos to nest in hollows not previously observed	Pre-clearing survey of all suitable hollows for nesting
Dieback Survey (Glevan 2019)	Lack of dieback expression in calcareous soils	Unrecorded / un-expressed *Phytophthora* infestations may be present	Dieback hygiene management adopted as a precautionary measure

5. CEMP Implementation and Review

5.1 Roles and responsibilities

All project personnel, including sub-contractors/sub-consultants, are responsible for complying with applicable Commonwealth and State legislation, local government requirements and the conditions of all licences, permits and approvals. Specific responsibilities in relation to this CEMP are provided in Table 11.

Table 11 CEMP roles and responsibilities

Role	CEMP Responsibilities
Main Roads Project Director	• The overall management and control of the CEMP • Reviewing and approving the CEMP • Assisting with implementation of the CEMP • Providing the necessary resources to ensure the CEMP is properly implemented • Ensuring all personnel are inducted into the project's environmental requirements prior to commencement of works on-site • Ensuring suppliers are made aware of the environmental objectives pertaining to them through conditions of contract • Taking strategic actions to continuously improve the CEMP • Participating in incident investigations • Management, implementation, monitoring and compliance of the CEMP and any approval conditions, including construction supervision and performance of all staff, contractors and subcontractors • Reviewing CEMP performance and implementation of correction actions, or stop work procedures, in the event of breaches of CEMP conditions, that may lead to serious impacts on local communities, or affect the reputation of the project • Representing the project at community meetings.
Main Roads Superintendent	• Confirming all environmental requirements are implemented as outlined in the CEMP as required to avoid and minimise actual or potential environmental harm on-site • Assisting the Environmental Management Representative to develop and maintain the various registers and checklists • Supporting the Environmental Management Representative to plan and implement environmental requirements • Reporting activity that has resulted, or has the potential to result, in an environmental incident immediately to the Environmental Management Representative • Participating in incident investigations • Monitoring construction activities to ensure that identified and appropriate control measures are effective and in compliance with the CEMP • Managing CEMP performance and implementation of correction actions, or stop work procedures, in the event of breaches of CEMP

Role	CEMP Responsibilities
	conditions, that may lead to serious impacts on local communities, or affect the reputation of the project • Ensuring that all construction personnel and subcontractors are informed of the intent of the CEMP and are made aware of the required measures for environmental a compliance and performance • Ensuring effective communication and dissemination of the content and requirements of the CEMP to contractors and subcontractors • During construction, maintain traffic safety along access roads, with special emphasis on high trafficked areas.
Main Roads Environmental Representative	• Reviewing the CEMP • Developing monitoring programs required under this CEMP • Being the primary contact point in relation to the environmental performance of the construction phase • Managing procedures and practices for receiving and responding to complaints and inquiries in relation to the environmental performance • Reporting any activity that has resulted in, or has the potential to result in an environmental incident immediately to the Project Manager, Construction Manager and other relevant personnel • Considering and advising on matters specified in the conditions of licences and approvals relating to the environmental performance and impacts of the proposal • Requiring reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment is likely to occur • Identifying environmental competence requirements for all staff and ensure delivery of environmental training to personnel within the team. • Acting as main point of contact between the regulatory authorities and the proposal on environmental issues • Providing advice and liaison with the construction teams to ensure that environmental risks are identified and appropriate controls are developed and included within method statements • Assisting in the development and delivery of environmental training for site personnel and subcontractors • Environmental auditing of subcontractors and suppliers.
Construction Contractor Representative	• Assisting with implementation of the CEMP for construction related activities • Providing the necessary resources to ensure the CEMP is properly implemented • Making sure all personnel are inducted into the proposal's environmental requirements prior to commencement of works on-site • Participating in incident investigations

Role	CEMP Responsibilities
	• Management, implementation, monitoring and compliance of the CEMP and any approval conditions.
Construction Contractor Environmental Management Representative	• Implementation of the CEMP on-site • Coordinating and managing all the environmental activities during the construction phase • Being the primary contact point in relation to the environmental performance of the construction phase • Managing procedures and practices for receiving and responding to complaints and inquiries in relation to the environmental performance • Reporting any activity that has resulted in, or has the potential to result in an environmental incident immediately to the Main Roads Superintendent and other relevant personnel • Requiring reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment is likely to occur • Identify environmental competence requirements for all staff and ensure delivery of environmental training to personnel within the team • Assistance in the development and delivery of environmental training for site personnel and subcontractors • Management of the construction contractor's environmental monitoring, inspection and audit program in so far as it relates to construction activities.

5.2 Inspections, audits and reporting

5.2.1 Contractor inspections and audits

The Construction Contractor will undertake monthly inspection of the entire worksite against this CEMP for the duration of construction works. Where any High or Severe risks are identified, inspections in the areas to which these apply will be undertaken on a weekly basis.

An audit of this CEMP will be undertaken by the Construction Contractor within five weeks of the commencement of work and every three months thereafter.

Main Roads will conduct environment and heritage audits of the construction contract area on a six monthly basis during the construction phase.

5.2.2 Incident reporting

Environmental incident categories and reporting timeframes are outlined in the Main Roads Environmental Incident Reporting, Investigation and Management Procedure. This procedure provides a process for the reporting, investigation and management of environment or heritage incidents.

Where an environmental incident occurs, the following will be actioned:

- Immediate remedial action: where safe to do so the observer of an incident should undertake any immediate actions to stop, control or contain the incident to prevent further damage
- Determine the environmental incident category (i.e. minor, significant or major): environmental incidents are to be categorised as per the Main Roads Environmental Incident Reporting, Investigation and Management Procedure
- Notify management: Notification requirements for environmental incidents are outlined on the Main Roads Environmental Incident Reporting, Investigation and Management Procedure
- Assessment and investigation
- Incident report: EQSafe is Main Roads electronic system for the recording and management of all incidents. Where EQSafe cannot be accessed the Main Roads Corporate Environmental Incident Report Form will be used to record environmental incidents associated with the Project
- Corrective and preventative actions – the Contractor will track the progress of agreed corrective and preventative actions
- All environmental incidents are to be reported to the Superintendent and filed by the Contractor.

Corrective actions may also arise from audits, inspections and management reviews. Corrective actions are to be reviewed and endorsed by Main Roads before the action is implemented. Audits will follow to confirm satisfactory completion.

All environmental incidents that result in an off-site impact to the Neerabup National Park or Neearbup Nature Reserve will be reported by Main Roads to Department of Biodiversity, Conservation and Attractions.

5.3 Environmental training

An environment induction will be carried out for all visitors, personnel, contractors and sub consultants who are required to work on the Project. This induction details the responsibilities of all project personnel, contractors and sub consultants under this CEMP and outlines environment requirements that personnel need to be aware of when undertaking work activities in accordance with this CEMP.

All personnel will be required to sign an attendance form on completion of the induction. Attendance at these inductions is recorded in the training register for the Project.

Daily pre-start meetings will be conducted to inform project personnel of specific environmental issues related to the day's work. These meetings are to also include visitors and sub-consultants who are on site. In addition, toolbox meetings will be held with all project personnel to provide environmental awareness training, disseminate any relevant outcomes of environmental inspection and audits, including areas for improvement or positive achievements.

Specialised training will be provided to relevant personnel and will include spill prevention, control and containment/clean up, erosion and sediment control, and environmental emergency response.

5.4 Review

5.4.1 Risk review

The risk assessment will be reviewed periodically to confirm it remains relevant and captures all risks to MNES. Review triggers are:

- Changes to project/CEMP scope
- Following significant environmental incidents
- Where corrective actions or contingency management measures are implemented
- When new information regarding MNES becomes available.

5.4.2 CEMP review

Throughout the life of the EPBC Act approval the CEMP will be reviewed and updated as required. The review will include an evaluation of the effectiveness of the plan and incorporate new data or information pertinent to the management of the BWSCP TEC and Black Cockatoos. Review triggers are as follows:

- Annually on the anniversary of the approval of the CEMP
- Following significant incidents
- Anticipated changes to scope
- Following community or stakeholder complaints
- Identification of non-compliance with environmental approval conditions
- Monitoring results, inspections or audits indicate performance targets or completion criteria may not be achieved or maintained
- Monitoring results, inspections or audits indicate completion criteria have been achieved.

The CEMP will be updated by the Main Roads Environmental Management Representative or suitably qualified delegate and approved by the Main Roads Project Director.

Changes to the CEMP will be communicated to all project personnel, contractors and sub consultants via the regular pre-start and toolbox meetings.

Main Roads will inform DEE of any changes to the CEMP.

6. Data management

Records will be kept to demonstrate compliance with this CEMP. These records include, but are not limited to:

- Risk assessments
- Audit results and reports, including the timing, location and spatial delineation of clearing, and periodic reconciliation against approved disturbance limits
- Black Cockatoo hollow pre-clearing inspections
- Monthly and weekly inspection results
- Environmental incident reports
- Monitoring data, results and reports
- Landscaping design and species mix approved for use
- Topsoil harvesting, storage and reuse from known/potential dieback infected areas
- Records of landscaping activities including dates, location and area of landscaping, species mixes used and quantities
- Induction records
- Pre-start and Toolbox meeting minutes
- Correspondence in relation to the requirements of this CEMP between Main Roads, construction contractors and/or regulators.

The Main Roads Site Superintendent and the Construction Contractor Representative are responsible for establishing and maintaining electronic and hardcopy filing systems for the above information. Once construction is completed, all documents that were kept on site during construction will be transferred to Main Roads head office as part of site demobilisation.

7. References

Department of Conservation and Land Management (CALM) 2003, *Phytophthora cinnamomi and disease caused by it, Volume I – Management Guidelines*, Government of Western Australia.

Department of the Environment (DotE) 2014a, *Environmental Management Plan Guidelines*, Commonwealth of Australia 2014.

Department of the Environment (DotE) 2014b, *Background: Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi*, Commonwealth of Australia January 2014.

GHD 2019a, *Mitchell Freeway Extension Hester Avenue to Romeo Road EPBC 2018/8367 Preliminary Documentation*, report prepared for Main Roads Western Australia, July 2019.

GHD 2019b, *Mitchell Freeway Extension Hester Avenue to Romeo Road, Biological Survey*, report prepared for Main Roads Western Australia, July 2019.

Appendices

Appendix A Summary of weed controls for Declared Pests and WoNS

**Moraea flaccida* (One-leaf Cape Tulip) – Declared Pest

**Gomphocarpus fruticosus* (Narrowleaf Cottonbush) – Declared Pest

**Echium plantagineum* (Paterson's Curse) – Declared Pest

**Solanum linnaeanum* (Apple of Sodom) – Declared Pest

**Opuntia stricta* (Common Prickly Pear) - Declared Pest and WoNS

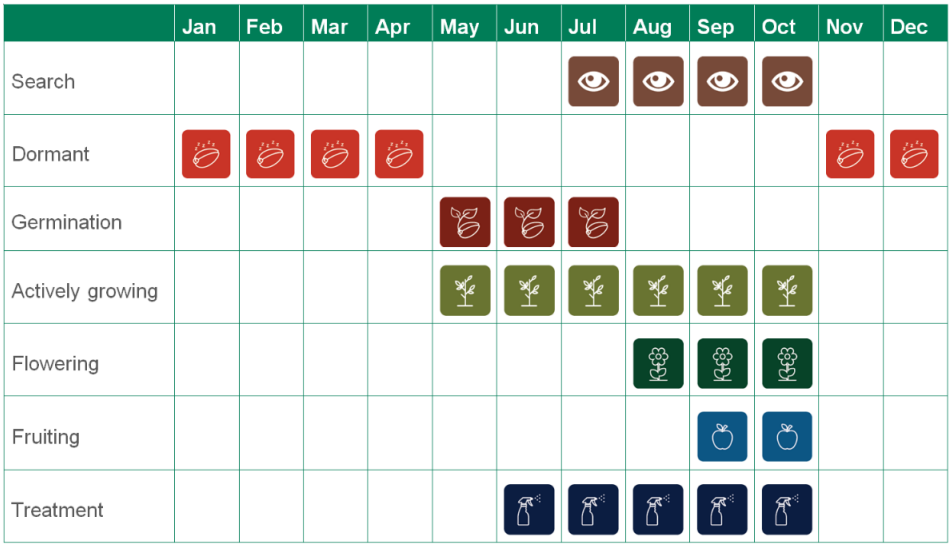
**Lantana camara* (Common Lantana) - Declared Pest and WoNS

**Asparagus asparagoides* (Bridal Creeper) – Declared Pest and WoNS

**Zantedeschia aethiopica* (Arum Lily) – Declared Pest

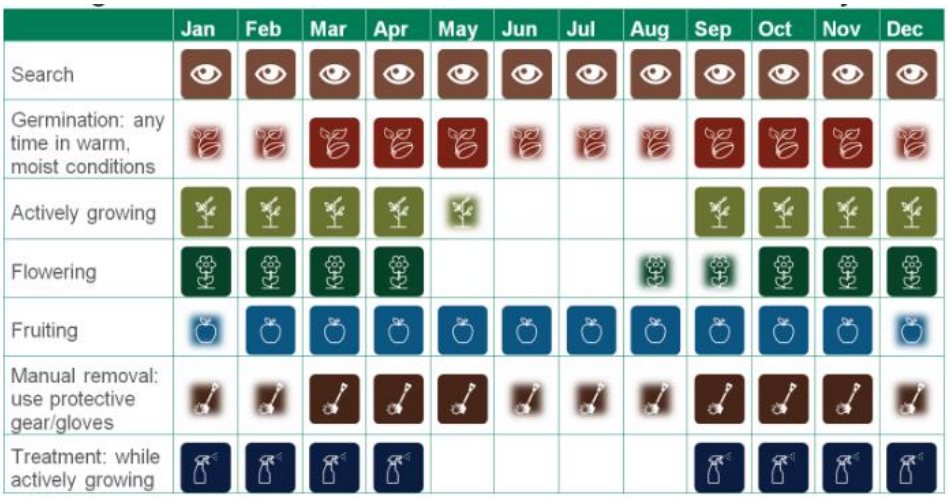
Weed Control Summary Sheet

One-leaf Cape Tulip

Species	*Moraea flaccida*
Status	Declared Pest
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary	Refer to https://www.agric.wa.gov.au/declared-plants/one-leaf-cape-tulip-declared-pest for management details. 
Control Methods Recommended herbicides (Department of Primary Industries and Regional Development)	**Chemical control** Recommended herbicides (One-leaf) August-September, (two-leaf) July-end August: • 2,4-D LV ester (cereals and pasture) • 2,4-D amine (cereals and pasture) • 2,4-DB (cereals and pasture) • Paraquat (blanket wiper) Full emergence to early August: • 2,2-DPA
Further Information	For other methods of control refer to declared plant control handbook available at: https://www.agric.wa.gov.au/herbicides/declared-plant-control-handbook

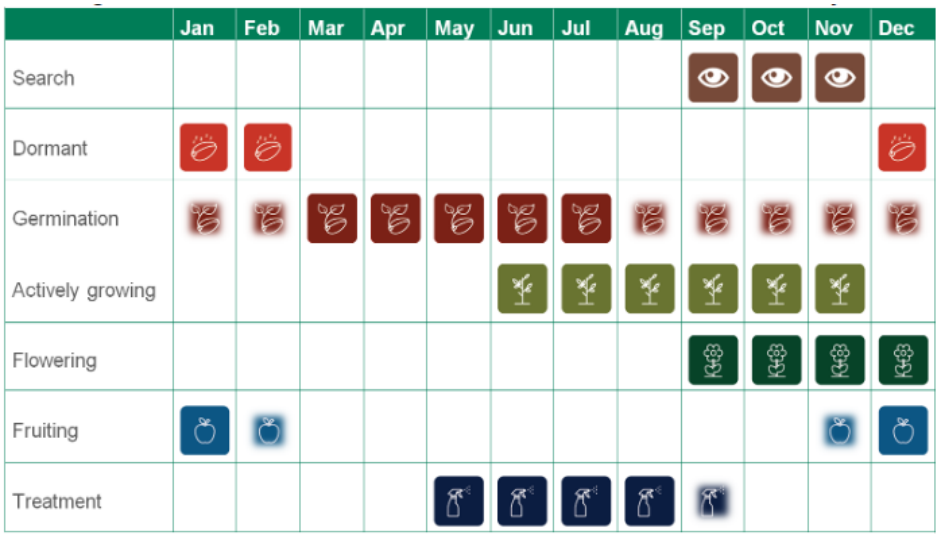
Weed Control Summary Sheet

Narrowleaf Cottonbush

Species	*Gomphocarpus fruticosus*
Status	Declared Pest
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary	Refer to https://www.agric.wa.gov.au/declared-plants/narrow-leaf-cotton-bush-declared-pest for management details. 
Control Methods Recommended herbicides (Department of Primary Industries and Regional Development)	**Chemical control** Recommended herbicides Active growing, July to December: • Glyphosate • Triclopyr
Further Information	For other methods of control refer to declared plant control handbook available at: https://www.agric.wa.gov.au/herbicides/declared-plant-control-handbook

Weed Control Summary Sheet

Paterson's Curse

Species	*Echium plantagineum*
Status	**Declared Pest**
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary	Refer to https://www.agric.wa.gov.au/declared-plants/paterson%E2%80%99s-curse-declared-pest for management details. 
Control Methods	**Chemical control** Recommended herbicides In cereals • Chlorsulfuron; Metsulfuron methyl; Triasulfuron; Tigrex; Broadstrike; Jaguar; Bromoxynil + MCPA In pasture, up to four leaf stage • Jaguar®; Tigrex®; Broadstrike®; Bromoxynil + MCPA At early flowering, seed set control • Chlorsulfuron; Metsulfuron methyl; Triasulfuron; Glyphosate + 2,4-D LV ester
Further Information	For other methods of control refer to declared plant control handbook available at: https://www.agric.wa.gov.au/herbicides/declared-plant-control-handbook

Weed Control Summary Sheet

Apple of Sodom

Species	*Solanum linnaeanum*
Status	Declared Pest
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary	Refer to https://www.agric.wa.gov.au/declared-plants/apple-sodom-declared-pest for management details. 
Control Methods	**Chemical control** Recommended herbicides • Amitrole T® • Triclopyr • Glyphosate • Picloram + 2,4-D amine
Further Information	For other methods of control refer to declared plant control handbook available at: https://www.agric.wa.gov.au/herbicides/declared-plant-control-handbook

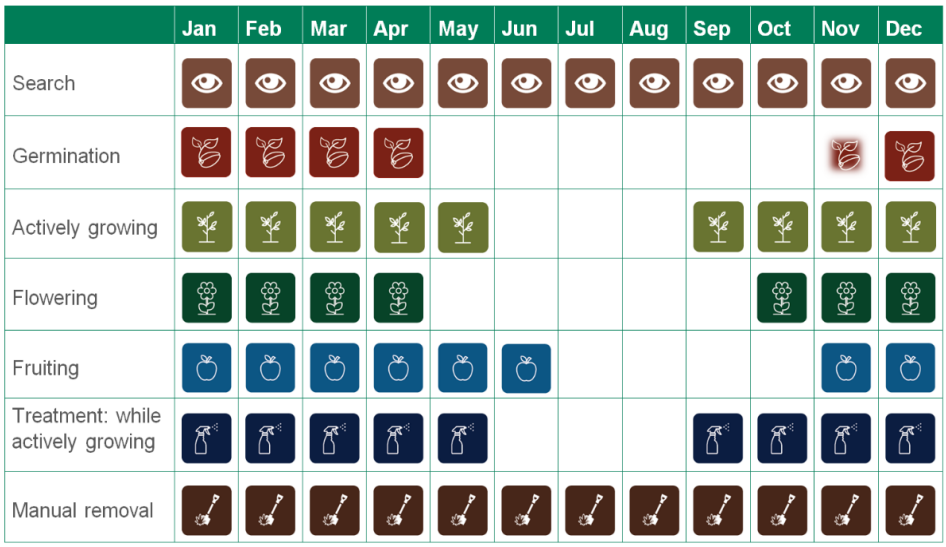
Weed Control Summary Sheet

Common Prickly Pear

Species	*Opuntia stricta*
Status	Declared Pest Weed of National Significance
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary	Refer to https://www.agric.wa.gov.au/declared-plants/opuntioid-cacti-declared-pests for management details. 
Control Methods	Report the presence of this organism if its legal status is prohibited before undertaking a control measure. Foliar spraying of herbicide must not be undertaken where plant is under stress or during hot, dry conditions, apart from MSMA **Manual removal** • Hand pulling • Mechanical **Chemical control** Recommended herbicides When Actively growing • Triclopyr • Triclopyr + Picloram
Further Information	For other methods of control refer to the Best Practice Control manual available on the DPIRD website here.

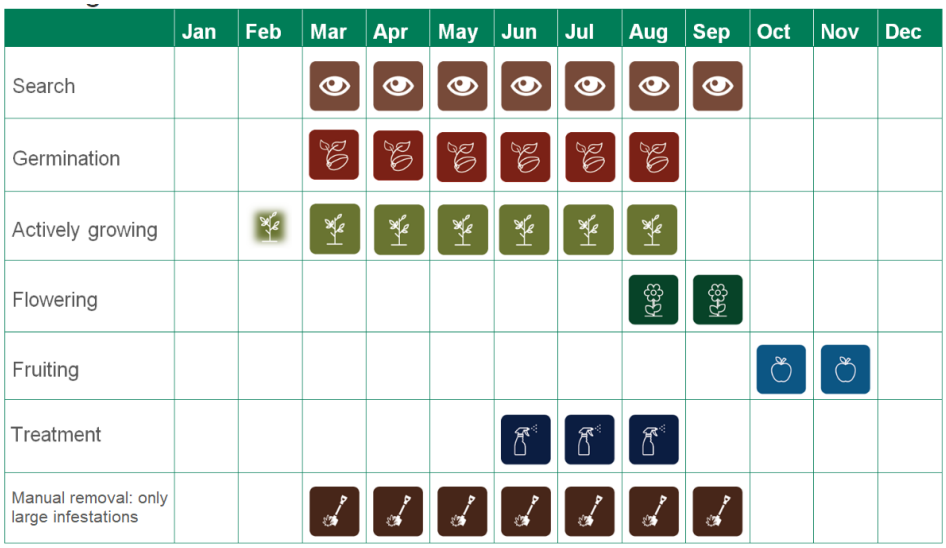
Weed Control Summary Sheet

Common Lantana

Species	*Lantana camara*
Status	Declared Pest Weed of National Significance
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary Faded icons indicates occasionally	Refer to https://www.agric.wa.gov.au/declared-plants/lantana-declared-pest for management details. 
Control Methods	**Chemical Control** Recommended herbicides: • Hot Shot™ • Triclopyr + picloram • 2,4-D + picloram • Metsulfuron methyl
Further Information	For other methods of control for the Common Lantana refer to the Weed Management Guide available here.

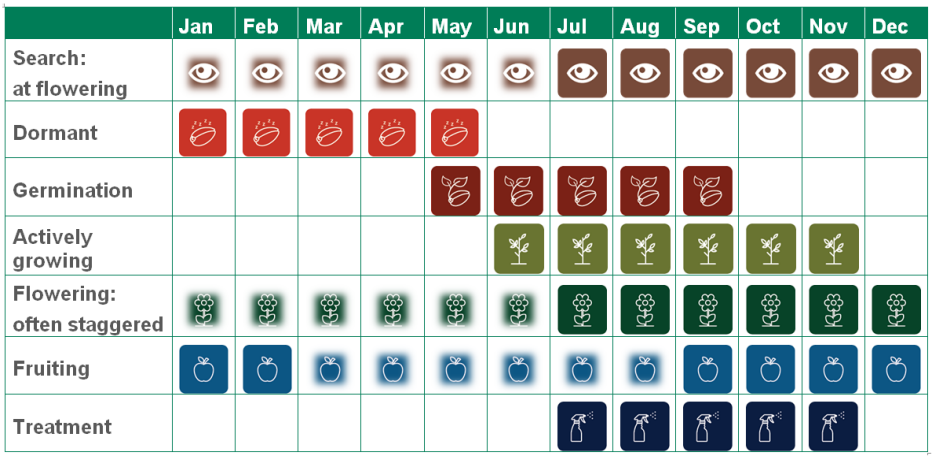
Weed Control Summary Sheet

Bridal Creeper

Species	*Asparagus asparagoides*
Status	Declared Pest Weed of National Significance
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary Faded icons indicates occasionally	Refer to https://www.agric.wa.gov.au/declared-plants/bridal-creeper-declared-pest for management details. 
Control Methods	**Chemical control** Recommended herbicides • Metsulfuron • Glyphosate
Further Information	For other methods of control for the Bridal Creeper, refer to the Weed Management Guide available here.

Weed Control Summary Sheet

Arum Lily

Species	*Zantedeschia aethiopica*
Status	Declared Pest
Objective	Aim to eradicate where possible, as a minimum prevent off-site movement
Management Summary Faded icons indicates occasionally	Refer to https://www.agric.wa.gov.au/declared-plants/arum-lily-declared-pest for management details. 
Control Methods	**Chemical control** Recommended herbicides June to October • Chlorsulfuron • Metsulfuron • 2,4-D amine • Paraquat
Further Information	For other methods of control refer to declared plant control handbook available at: https://www.agric.wa.gov.au/herbicides/declared-plant-control-handbook

GHD

Level 10
999 Hay Street
T: 61 8 6222 8222 F: 61 8 6222 8555 E: permail@ghd.com

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Revision	Author	Reviewer		Approved for Issue		
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