Main Roads Western Australia

Mitchell Freeway Extension - Burns Beach Road to Romeo Road

Construction Environment Management Plan

May 2014

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Appendices

Abbreviations & acronyms

Abbreviation/ acronym	Definition
AS/NZS	Australian Standards and New Zealand Standards
BTEX	Benzene, toluene, ethylbenzene and xylenes. These compounds are some of the Volatile Organic Compounds (VOCs) found in petroleum derivatives such as petrol
CEMP	Construction Environmental Management Plan
CWG	Mitchell Freeway Extension Community Working Group
DEC	Department of Environment and Conservation
DAA	Department of Aboriginal Affairs (formerly Department of Indigenous Affairs)
DotE	Department of the Environment (formerly Department of Sustainability, Environment, Water, Population and Communities)
DPaW	The Department of Parks and Wildlife (formerly Department of Environment and Conservation)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EAR	Environmental Assessment Report
EIA	Environmental Impact Assessment
EMR	Environmental Management Register
EMS	Environmental Management Systems
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FFMP	Flora and Fauna Management Plan
ICAM	Incident Cause Analysis Method
MNES	Matters of National Environmental Significance
MRS	Metropolitan Region Scheme
MRWA	Main Roads Western Australia
MSDS	Material Safety Data Sheet
PSDMP	Project Specific Dieback Management Plan
PSERP	Project Specific Emergency Response Plan
SBMP	Site Based Management Plan
TPH	Total Petroleum Hydrocarbons
WAPC	Western Australian Planning Commission
WC Act	*Wildlife Conservation Act 1950*

1. Introduction

1.1 Background

The Mitchell Freeway provides the primary road access route from the Perth north-west corridor towards the city of Perth. The freeway currently terminates at Burns Beach Road. The freeway has been constructed in several stages since the 1960s, with further extensions and widening works planned.

The Mitchell Freeway Extension has been the subject of a planning process undertaken by Main Roads Western Australia (Main Roads). The Mitchell Freeway Extension Community Working Group (CWG) was formed in March 2012 with the aim of working with the community and assisted by Main Roads to develop the "right transport" solution for the community in the northern corridor.

The Mitchell Freeway Extension CWG prepared a Business Case which detailed the six options examined, associated costs and a recommended option. The scope of works for the recommended Value Engineered Option F (staged construction) is detailed below.

The Western Australian Planning Commission (WAPC) has initiated Major Metropolitan Region Scheme (MRS) Amendment 992/33 Clarkson-Butler, Wanneroo, which contains 11 amendments for rezoning and reservation in the north-west corridor of the metropolitan region. Of the 11 amendments, six were considered by the Environmental Protection Authority (EPA) to have the potential to significantly impact on the environment and therefore should be assessed pursuant to Section 48A of the *Environmental Protection Act 1986* (EP Act). The EPA has developed a set of conditions which the EPA recommends be imposed if the proposed scheme amendment is approved; this document is discussed in more detail in section 1.2.

The project is being referred to the federal Department of the Environment (DotE) (formerly the commonwealth Department of Sustainability, Environment, Water, Population and Communities DSEWPaC) for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as the project was deemed to potentially impact significantly on Matters of National Environmental Significance (MNES).

1.1.1 Proposed development

The Mitchell Freeway Extension (the Project) will be developed as a staged construction as summarised below and shown on Figure 1, Appendix A. The proposed Project Area for the Mitchell Freeway Extension includes the three stages of construction, located within the City of Wanneroo and City of Joondalup. This includes works on Wanneroo Road, Joondalup Drive and Burns Beach Road.

The three stages of construction are detailed as follows:

- Stage 1 (approximately 151.0 hectares (ha)) – Freeway extension from Burns Beach Road to Hester Avenue and the connecting roads (Neerabup Road and Hester Avenue) (Planned for 2015–2017).
- Stage 2 (approximately 158.0 ha) – Freeway extension from Hester Avenue to Romeo Road and connecting road (Romeo Road) (Planned for 2017–2021).
- Stage 3 (approximately 95.2 ha) – Wanneroo Road duplication from Joondalup Drive to Hall Road (Planned for 2027–2029).

This CEMP has been developed for Stage 1 of the Project only.

The total Project Area is 404.2 ha. The entire Project Area has been the subject of several studies (as detailed in Section 1.3.3) and the key environmental values of the site are summarised in Section 2.

1.2 Ministerial conditions

This Construction Environmental Management Plan (CEMP) has been developed in accordance with Main Roads standard practices and the EPA's ministerial statement 629.

Ministerial Statement Number 629 (pursuant to the Provisions of Division 3 of Part IV of the Environmental Protection Act 1986), for the amendment of the Metropolitan Region Scheme to accommodate modifications to the zones and reserves in the Clarkson-Butler District, dictates that a Construction Management Plan is a condition of implementation. The specifications of the Construction Management Plan for the alignment for Mitchell Freeway and Part of the Northern Suburbs Rail System (Section 4.2) dictate:

"*Prior to the finalisation of detailed design plans for the proposed freeway, and railway north of Hester Avenue, Butler, a Construction Management Plan shall be prepared in consultation with conservation groups (including Quinn's Rocks Environmental Group [and Board Riders Gone Green]) to ensure the protection and management of biodiversity in Neerabup National Park, to the requirements of the Responsible Authority with the concurrence of the Environmental Protection Authority. This Plan shall include:*

1. *Management of drainage incorporating best practice Water-Sensitive Design principles, in consultation with the Water and Rivers Commission [now Department of Water], which considers the implications to existing vegetation and groundwater quality from both sumps and altered surface hydrology to minimise potential for waterlogging and infiltration of pollutants to groundwater;*
2. *Investigation for the presence of caves before and during clearing for construction, and management of discovery;*
3. *Investigation for the presence of subterranean fauna within any cave or karst system encountered in areas cleared or cut during construction, and designation of appropriate management measures on advice of the Department of Environmental Protection [now Department of Environment Regulation];*
4. *The erection of exclusion fencing of the alignment area as designated by the 'extent of works' prior to any clearing for construction, paying particular attention to retaining as many mature trees as possible;*
5. *Control the use of lighting along the alignment to assist in the reduction of deaths of nocturnal terrestrial fauna species;*
6. *Compliance with appropriate dust, noise, vibration, and lighting standards and guidelines during construction; and*
7. *Allocation of responsibilities and timing for implementation*."

1.3 CEMP purpose and objectives

1.3.1 Purpose

This CEMP has been prepared to apply only to Stage 1 of the project. The purpose of this CEMP is to:

- Summarise the current status of the Project Area
- Summarise the potential environmental impacts of construction activities
- Define environmental management objectives
- Detail management actions or measures to achieve the environmental objectives
- Detail monitoring and reporting requirements
- Define environmental management responsibilities

This CEMP addresses the following environmental issues:

- Vegetation, flora and fauna
- Dieback
- Fire management
- Topsoil and weed management
- Surface water and groundwater management
- Acid Sulfate Soils management
- Contaminated sites management
- Construction noise, dust and vibration management
- Construction waste management
- Aboriginal Heritage management
- European Heritage management

This document is designed to assist all parties involved in the Mitchell Freeway Extension project to manage the identified potential environmental impacts that may result from construction activities. It will be used as a benchmark for contractors, who will be expected to prepare and submit their own CEMP(s) consistent with this document. This CEMP has been prepared based on a desktop assessment and existing reports provided by other parties, which GHD has not independently verified or checked.

1.3.2 Objectives

The objectives of this CEMP are:

- To identify key construction environmental issues that may require management in order to achieve the construction outcomes at the site.
- Provide environmental management actions in accordance with the EPA's Ministerial Statement Number 629 requirements and the Ministerial Conditions detailed in Section 1.2.
- To allocate responsibility for management actions to appropriate personnel.
- Identify the potential for monitoring, maintenance or auditing programmes to assess management measures.

- To comply with all relevant Local and State government legislation.

1.3.3 Relevant documents

This management plan draws information from various sources including relevant documents relating to legislation, publically available databases and previous studies by GHD and other consultants relevant to the Project. The documents listed in Table 1 are the relevant documents pertaining to this CEMP and are recommended for reference, where required. These documents are available from MRWA upon request.

Table 1 Relevant documents

Document	Reference	Aspect
Metropolitan Region Scheme Amendment No. 992/33 Clarkson-Butler, Wanneroo	EPA Bulletin 971 (2000)	Report and recommendations of the Environmental Protection Authority.
Level 2 Flora and Level 1 Fauna Assessment	GHD (2013a)	Terrestrial vegetation, flora and fauna
Black Cockatoo Assessment	GHD (2013b)	Targeted survey for Black Cockatoos and their habitat
Level 2 Fauna Survey Neerabup Road Extension	GHD (2013c)	Detailed fauna survey of the Neerabup Road Extension
Fauna Movement Study	GHD (2013d)	Targeted study of fauna movement and levels of fauna activity along the Neerabup Road Extension
Flora and Fauna Management Plan (FFMP)	GHD (2014a)	Identification, management and monitoring measures for flora and fauna impacts
Environmental Impact Assessment (EIA)	GHD (2014b)	Environmental impacts and identification of management measures
Dieback survey	Glevan Consulting (2013)	Assessment of vegetation for presence of *Phytophthora* Dieback
Preliminary site investigation	GHD (2013e)	Assessment of potentially contaminated sites
European Heritage Desktop Assessment	Nayton (2013a)	Desktop assessment of European Heritage values
European Heritage Field Assessment	Nayton (2013b)	Archaeological survey of Stage 1 construction area
Aboriginal Heritage Analysis	R & E O'Connor Pty Ltd (2013)	Desktop assessment of Aboriginal Heritage values
Ethnographic Aboriginal heritage field survey	Goode B (2013)..	

1.4 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 Main Roads as set out in Section 1.3.1 of this Report, as provided in the project brief.

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.

Site conditions (including the presence of species and communities of conservation significance) 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.

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 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, in part, 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.

2. Key Environmental Values

2.1 Existing environment

The key ecological, social and economic values of the Project Area are summarized below. The existing environment is described in more detail in the documents listed in Section 1.3.3.

2.1.1 Key ecological values

Conservation significant flora and ecological communities

A key consideration in this CEMP is the management of impacts to conservation significant flora species and ecological communities.

No conservation significant flora species listed under the EPBC Act or *Wildlife Conservation Act 1950* (WC Act) were recorded during the Level 2 flora and vegetation survey (GHD 2013a).

One DPaW Priority species was recorded within the Stage 1 Project Area; *Jacksonia sericea* (Priority 4); Approximately 6,000 individuals of this species were observed during the field studies within the broader Project Area (approximately 706 individuals of this species were recorded within Stage 1).

Additionally, there are two species listed under both the EPBC Act and WC Act and 12 DPaW Priority-listed species that are considered likely to be in the Project Area (but have not been recorded during targeted surveys) that may be impacted as a result of this project:

- — *Eucalyptus caesia* (Priority 4);
- — *Stylidium maritimum* (Priority 3);
- — *Pimelea calcicola* (Priority 3
- — *Acacia benthamii* (Priority 2)
- — *Caladenia huegelii* (Grand Spider Orchid) (State Threatened, Federal Endangered)
- — *Drakaea micrantha* (Dwarf hammer-orchid) (State Threatened, Federal Vulnerable)
- — *Austrostipa mundula* (Priority 2)
- — *Conostylis bracteata* (Priority 3)
- — *Conostylis pauciflora* subsp. *euryrhipis* (Priority 4)
- — *Conostylis pauciflora* subsp. *pauciflora* (Priority 4)
- — *Lecania turicensis* var. *turicensis* (a lichen) (Priority 2)
- — *Sarcozona bicarinata* (Priority 3)
- — *Schoenus griffinianus* (Priority 3)
- — *Thelymitra variegata* (Priority 3)

No Federally-listed Threatened Ecological Communities (TEC) were recorded in the Project Area by GHD (2013a). A Priority 3 Priority Ecological Community (PEC) (Northern Spearwood Shrublands and Woodlands) was recorded by GHD (2013a) as occurring on Vegetation Types 3, 4 and 6. Approximately 40.3 ha of these vegetation types is present within Stage 1 of the Project Area. Subsequent to these surveys, a new PEC has been listed by DPaW '*Banksia* dominated woodlands on the Swan Coastal Plain IBRA region' (Priority 3) which is equivalent to vegetation

type 1 '*Banksia* woodland'. A total of 35.9 ha of Vegetation Type 1 is present within Stage 1 of the Project Area.

Remnant vegetation and habitat

It is proposed 86.6 ha of remnant native vegetation will be cleared for Stage 1 of the project. The remnant vegetation is dominated by woodlands including a mosaic of *Eucalyptus* and *Banksia* species; seven remnant vegetation types have been identified in the Project Area (six of these occur within Stage 1 of the Project Area). The condition of the vegetation ranges from *Excellent* to *Completely Degraded*. The majority of the Neerabup Road portion (within Neerabup National Park) is in *Excellent* condition. The remnant vegetation provides a diverse range of habitat resources for fauna that reside in the area (including native taxa and introduced (pest) species).

A total of 64.5 ha within Stage 1 of the Project Area is degraded, rehabilitated or planted, occurring alongside established residential areas, roads, tracks and the Clarkson line railway. As such, much of the 64.5 has been highly disturbed and is cleared

Conservation significant fauna

A key consideration in this CEMP is the management of impacts to conservation significant fauna species and their habitat.

Seven species of conservation significance (that afford some level of protection under the WC Act, Priority-listed by DPaW or listed under the Federal EPBC Act) are known to occur in the Project Area. These species are:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*),
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) – Vulnerable (EPBC Act), Threatened (Schedule 1 WC Act)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii* subsp. *naso*) – Vulnerable (EPBC Act), Vulnerable (WC Act
- Rainbow Bee Eater (*Merops ornatus*),
- Carpet Python (*Morelia spilota imbricata*),
- Southern Brown Bandicoot (*Isoodon obesulus fusciventer*) and
- Western Brush Wallaby (*Macropus irma*).

A further five conservation significant species are considered likely or possible to occur in the Project Area including;

- Peregrine Falcon (*Falco peregrinus*) - Schedule 4 (WC Act).
- Fork-tailed Swift (*Apus pacificus*) - Schedule 3 (WC Act), Migratory/Marine (EPBC Act)
- Jewelled Ctenotus (*Ctenotus gemmula*) (Swan Coastal Plain pop.) - Priority 3 (DPaW).
- Black-striped Snake (*Neelaps calonotos*) - Priority 3 (DPaW)
- Chuditch (*Dasyurus geoffroii* or Western Quoll) Schedule 1 under the WC Act and Vulnerable under the EPBC Act

2.1.2 Key ecological issues

The key ecological issues that are likely to result from the Project are:

- The loss of 86.6 ha of native remnant vegetation.

- Loss of individuals of a DPaW Priority species plant and potential impacts to 14 other flora species of conservation significance.
- Loss of habitat for seven different WC Act, DPaW or EPBC Act list
- ed fauna species and potential impacts to five other fauna species of conservation significance.
- Loss of 40.3 ha of the Priority 3 PEC 'Northern Spearwood Shrublands and Woodlands' and 35.9 ha of the Priority 3 PEC 'Banksia dominated woodlands on the Swan Coastal Plain IBRA region'.

2.2 Existing social and economic environment

The Mitchell Freeway provides the primary road access route from the Perth north-west corridor towards the City of Perth. The Project aims to construct further extensions and widening works for the road network in this area including the suburbs of Joondalup, Currambine, Kinross, Clarkson, Merriwa, Ridgewood, Butler and Alkimos. Further development of the freeway is now required to provide a more direct route for traffic in the far northern suburbs, take pressure off smaller local roads and facilitate residential and business development in the area.

2.2.1 Key social and economic attributes

The key social and economic attributes and values in the local area around the Project include:

- The Yaberoo Budjara Heritage Trail of Aboriginal heritage value passes through the Project Area (crosses Neerabup Road within Stage 1 of the Project Area)
- Industrial and commercial areas to the east and south of the Project Area
- The residential areas to the west of the Project Area
- The Project Area is located on the Gnangara Mound which is a P3 Public Drinking Water Source Area (PDWSA); P3 areas are declared over land where water supply sources need to coexist with other land uses such as residential, commercial and light industrial developments

The Project has been developed principally to address the need for more connectivity and transport options around these key social and economic attributes and to allow for projected increases in traffic.

2.2.2 Key social and economic issues

A key consideration in this CEMP is the management of social and economic values in the area. The Mitchell Freeway Extension Community Working Group (CWG) was formed by the State Government in March 2012 with the aim of working with the community and assisted by Main Roads to develop the "right transport" solution for the community in the northern corridor. The CWG has identified several key social and economic attributes in the area and has been consulted with regard to the development of the Project. Key considerations for the construction phase of the Project include environmental concerns (as detailed in Section 2.1.1), noise wall location and design, impacts on local traffic and the development of a Principal Shared Path.

3. Governance and Policies

3.1 Implementation

The implementation of this CEMP will allocate responsibility for the management measures documented in Section 4

The management measures presented in this CEMP form the basis for control of construction activities. Where reference is made to procedures, guidelines or government documents the latest approved versions should be used. This CEMP identifies the person/s responsible for undertaking and implementing all management strategies during the construction phase of the Project with regard to actions both within the Project Area and offsite as required. The responsibility of particular management procedures and actions can be delegated, though overall responsibility will remain with the listed person.

All contractors will be required to prepare and submit their own CEMPs, consistent with this document. These documents will require approval by Main Roads prior to the commencement of works at the site. Breaches of the CEMP may incur personal or company penalties as legislated by State and Commonwealth laws. Environmental management systems (EMS) are to be put in place to ensure the effective and compliant implementation of this CEMP at the site.

3.1.1 Review and updates

Any relevant changes or updates to knowledge, standards, policies and procedures should be incorporated wherever possible during the construction of each stage of the Project. This CEMP has been developed to apply to Stage 1 of the Project only.

Given the entire project (three Stages) is proposed to have construction until 2027–2029 this CEMP will require formal review and update prior to being applied to additional stages of the Project. Consideration of the environmental values associated with the other project stages will also be required.

3.2 Legislative requirements

Existing State and Commonwealth legislation which the project is required to adhere to in relation to environmental management are listed in Table 2 below. Legislation changes should be reviewed regularly with updates regularly received by the Environmental Coordinator through a subscription to Environmental Law. If required, this plan will be updated to include the necessary legislative changes.

Table 2 Commonwealth & State Legislation relating to environmental management

Legislation	Relevance	Specific trigger	Regulatory authority
Commonwealth Legislation			
Environment Protection and Biodiversity Conservation Act 1999	Protection of environmental matters of national significance.	Black Cockatoo breeding and feeding habitat	Department of the Environment (DotE)

Legislation	Relevance	Specific trigger	Regulatory authority
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Preserve and protect places, areas and objects of particular significance to Aboriginals, and for related purposes.	Not specifically triggered by this project. However, if an Aboriginal site (or a site that is potentially an Aboriginal heritage site) is found, it must be reported and not disturbed unless approval to disturb has already been obtained.	DotE
State Legislation			
Aboriginal Heritage Act 1972	Protection of sites of Aboriginal Heritage significance, both known and as yet unknown.	Not specifically triggered by this project. Any newly discovered areas unearthed during construction.	Department of Aboriginal Affairs
Biosecurity and Agriculture Management Act 2007	Obligations for control, destruction and notification of gazetted noxious plants and animals.	Presence and/or introduction of declared plants within the road reserve.	Department of Agriculture and Food Western Australia (DAFWA)
Contaminated Sites Act 2003 and Contaminated Sites Regulations 2006	Regulates matters relating to the identification, assessment, recording, management and clean-up of contaminated sites.	Excavation and disturbance of areas containing contaminated material.	Department of Environment Regulation (DER) (formerly Department of Environment and Conservation ; DEC)
Environmental Protection Act 1986	Prevention, control and abatement or pollution and conservation protection and enhancement of environment.	Entire Project Area.	DER/EPA
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Manages the clearing of native vegetation within the state to ensure it is managed appropriately and is not excessive.	All areas of native vegetation.	DER
Environmental Protection (Controlled Wastes) Regulations 2004	Manages the transportation and disposal of controlled wastes.	Entire Project Area.	DER
Environmental Protection (Noise) Regulations 1997	Regulates noise emissions within the state to prevent significant impact upon neighbouring communities.	All areas.	DER
Environmental Protection (Unauthorised Discharge) Regulations 2004	Prevention of the releasing of contaminants into the environment.	All areas.	DER

Legislation	Relevance	Specific trigger	Regulatory authority
Heritage of Western Australia Act 1990	Provides for and encourages the conservation of places (natural or constructed) which have significance to the cultural heritage of the State.	Entire Project Area.	Heritage Council of WA
Soil and Land Conservation Act 1988 (WA) and Clearing Control Regulations 1991	Deals with the conservation of soil and land resources and the mitigation of the effects of erosion.	Entire Project Area.	Commissioner for Soil and Land Conservation
Metropolitan Water Supply, Sewerage and Drainage Act 1909	Provides for the establishment and management of water supply, sewerage and drainage infrastructure and protection of water supply.	Works on water and sewage systems.	Water Corporation Department of Water (DoW)
Rights in Water and Irrigation Act 1914	Governs water resource management and allocation in Western Australia ensuring water resources are comprehensively and appropriately managed.	Any dewatering and abstraction during construction phase.	DoW
Waterways Conservation Act 1976	Management and conservation of water and the related land and environment.	Indirect drainage into surrounding surface water areas.	DoW
Wildlife Conservation Act 1950 (WA)	Provides for the conservation and protection of wildlife (flora and fauna). Special provisions and schedules cover protection and management of gazetted rare flora and fauna.	All areas of native vegetation.	Department of Parks and Wildlife (DPaW) (formerly Department of Environment and Conservation; DEC)

3.3 Environmental policy

Main Roads operates under its Environmental Policy and Sustainability Policy and also has an ISO 14001 accredited Environmental Management System. This CEMP has been developed in line with this policy:

"Main Roads Western Australia manages the State's road network to provide safe and efficient road access that will enhance community lifestyles and support economic prosperity. We seek to achieve balanced and sustainable outcomes for the community. Responsible environmental stewardship in developing and maintaining the road network is critical to our success. Main Roads is committed to the following principals:

- *Protecting and enhancing the environmental values of road reserves;*
- *Minimising the impact on the natural environment of roads and road use; and*
- *Conserving natural resources and minimising energy consumption and waste.*

The objectives of this policy are:

- *Fully satisfy all environmental legislation, Government Policy and, where specific legislation is lacking, uphold the spirit of the law;*
- *Implement, maintain and continually improve an effective environmental management system across Main Roads planning, business, project and management processes*
- *Apply an approach of "avoid, minimise and mitigate", in order of preference, to the management of environmental impacts associated with road construction projects*
- *Develop awareness of environmental management processes, standards and responsibilities among Main Roads' employees and contractor partners*
- *Listen and be responsive to community and stakeholder views on environmental issues; and*
- *Set specific environmental objectives and targets relating to the key environmental aspects of Main Roads' activities, and measure and report progress in achieving these targets".*

4. Construction Environmental Management Plan

The aim of this CEMP is to ensure that the environment is not adversely impacted on, directly or indirectly, by development of the Mitchell Freeway Extension Stage 1 (the Project). The potential impacts of constructing these roads and associated facilities are briefly described for each key environmental issue, followed by management measures to be implemented during construction.

In order to comply with relevant environmental legislation and manage impacts to the local environment, Main Roads has defined a series of objectives, targets and Key Performance Indicators (KPIs) for each environmental issue/aspect.

To ensure the objectives and targets are achieved, the management actions to be followed during the construction of the project are listed within each section. Monitoring requirements are also included to assess compliance with the management actions, as are contingency actions which are to be implemented where monitoring indicates that the objectives and targets are not/will not be achieved and/or to address any non-compliances of management measures.

Some potential impacts may be relevant to several of the environmental issues/aspects detailed in the following sections. Where possible the relevant management actions and monitoring is detailed in one section to prevent unnecessary repetition.

The development of management plans for each specific aspect and implementation of strategies and actions will be the responsibility of the project's construction contractors including Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM) and Design Manager (DM). The implementation of the actions and monitoring of the key performance indicators (KPIs) will also be the responsibility of the project's construction group.

4.1 Vegetation, flora and fauna

The relevant documents outlining the vegetation, flora and fauna values of the Project Area include:

- Level 2 Flora and Level 1 Fauna Assessment (GHD 2013a)
- Black Cockatoo Assessment (GHD (2013b)
- Level 2 Fauna Survey Neerabup Road Extension (GHD (2013c)
- Fauna Movement Study (GHD 2013d)
- Flora and Fauna Management Plan (GHD 2014a)
- Environmental Impact Assessment (GHD 2014b)
- Dieback survey (Glevan Consulting 2013)

4.1.1 Introduction

As detailed in Section 1.1.1 and the documents listed in Section 1.3.3, the total area of Stage 1 of the Project Area is 151.0 ha including 86.6 ha of remnant native vegetation. This vegetation will be cleared during the construction phase of the project.

The remnant vegetation contains habitat for flora, fauna and ecological communities that are of conservation significance (as summarised in Section 2.1.2)

4.1.2 Potential impacts

The potential impacts during the construction phase of the project may be interrelated and include:

- Reduction of vegetation association extents
- Clearing of DPaW Priority-listed flora species and their habitat identified in the Project Area (and loss of habitat for conservation significant flora species that may possibly occur in Stage 1 of the Project Area)
- Loss of fauna habitat including habitat for conservation significant fauna species
- Fragmentation of remnant vegetation patches and habitat
- Disruptions to breeding cycles and movement of fauna
- Direct mortality to fauna from construction activities (vehicle strike)
- Disturbance to vegetation adjacent to clearing areas due to edge effects, changes in hydrology and potential fragmentation
- Increased erosion and runoff and changes to existing drainage and hydrology
- Risk to subterranean fauna from changes in hydrology and groundwater regimes
- Introduction and/or spread of dieback and weeds
- Increased risk of fire

Cumulatively these impacts may also reduce the resilience of the existing environment and result in a reduction in biodiversity.

4.1.3 Objectives & Key Performance Indicators

Management measures aim to minimise the impacts to native flora, fauna and ecological communities and manage the risks of loss of biodiversity.

A series of objectives are detailed in Table 3, outlining the targets and the KPIs to assess achievement of these targets.

One of the key strategies to avoid impacts to vegetation, fauna and habitat during the construction phase of the project is to strictly adhere to clearing and disturbance boundaries.

Table 3 Objectives & Key Performance Indicators for vegetation, flora & fauna

Objective	Target	Key Performance Indicator
Vegetation		
Minimise vegetation clearing.	No clearing or disturbance during construction outside of pre-defined clearing lines, as outlined in detailed design plans, EPBC approved area and State Clearing Permits.	Occurrences of clearing or disturbance exceeding design plans in Incident Report Register Ongoing construction area inspections and reports to assess clearing operations.
Ensure impacts on Threatened and Priority Flora and communities are adequately identified and minimised during construction.	Occurrences of Threatened and Priority Flora species and communities to be clearly identified on detailed design plans and in the field for the duration of the construction works in that area.	Clear indication of recorded Threatened and Priority Flora and communities' locations included on detailed design plans. Clear indication of recorded Threatened and Priority Flora and community locations included in Clearing Permits.

Objective	Target	Key Performance Indicator
	Areas containing Threatened and Priority Flora species and communities not to be disturbed are clearly delineated in the field for the duration of the construction works in that area.	Presence of delineating fencing or tape around Threatened and Priority Flora and communities in non-disturbance areas. Number of reported incidents/non-conformance reports of delineating fencing or tape missing or not installed around Threatened and Priority Flora and communities in areas of non-disturbance.
	No known Threatened species, populations or communities outside the approved clearing areas to be disturbed.	Number of reported incidents of disturbance to Threatened and Priority Flora outside of the construction zone.
Fauna		
Ensure impacts on protected fauna (in particular Black Cockatoo and Quenda habitat) are adequately identified and minimised during construction.	Impact to protected fauna habitat is minimised. Protected fauna habitat is marked on design drawings and flagged or fenced off during the duration of construction.	Presence of delineating fencing or tape around areas of protected fauna habitat in non-disturbance areas. Number of reported incidents/ non-conformance reports of delineating fencing or tape missing or not installed around protected fauna habitat in areas of non-disturbance.
	No damage has occurred to key protected fauna habitat outside of approved clearing areas during construction.	The area of habitat or feeding area damaged, or number of potential nesting trees lost or damaged during construction as recorded in Environmental Incident Reports and Inspections.
	No threatened fauna has been injured or killed.	Fauna encounter records – number of injured or killed as a result of construction activities.
Minimise impact to terrestrial fauna.	No injuries and deaths of fauna outside of approved clearing areas during construction.	Number of injuries and deaths of fauna and number of rescued fauna (excepting planned relocation).
	No clearing or disturbance to fauna habitat outside of approved clearing areas during construction.	Presence of delineating fencing or tape around areas of fauna habitat outside the approved clearance area. Number of reported incidents/non-conformance reports of delineating fencing or tape missing or not installed around fauna habitat outside the approved clearance area.
Minimise impact to subterranean fauna.	Groundwater levels shall not be significantly altered during construction, or subsequently due to construction activities.	Groundwater levels remain largely unchanged during construction activities.
	Groundwater contamination risk shall be minimised during construction.	No chemical or hydrocarbon spills greater than 50 L are recorded in the environmental register.

4.1.4 Management measures

To avoid and minimise impacts on vegetation, flora and fauna as a result of this project the clearing management and mitigation actions summarised in Table 4 will be followed. Where appropriate, these actions will be included in the internal clearing permit approvals to ensure implementation. The development of management plans for each specific aspect and implementation of strategies and actions will be the responsibility of the Project's construction contractors.

Table 4 Vegetation, flora & fauna management actions

Management action	Timing	Responsibility
The design, including that for drainage, noise walls and fences, will be modified where possible to minimise the number of trees and extent of vegetation required to be cleared.	Pre-construction	DM
A pre-clearing flora survey will be undertaken to verify the vegetation type and species.	Pre-construction	EC
Using the information from previous studies (GHD 2013b) all trees that have been identified as having hollows suitable for Black Cockatoo breeding will be checked to remove any birds in the hollows prior to clearing.	Pre-construction	EC
Clearing will be limited to the area required for the safe construction and operation of the road, in line with Main Roads' standards.	Construction	CM
For five consecutive days immediately prior to logging or vegetation clearing activities the areas should be trapped and surveyed by an appropriately licenced (under WC Act) and experienced ecologist to remove and relocate any fauna that may be directly impacted by logging and clearing activities. The relocation program will require approval by DPaW under the WC Act.	Immediately prior to Clearing	EC CM
The induction program will include relevant vegetation, flora and fauna information.	Construction	EC
The clearing line will be clearly marked onsite by a surveyor in accordance with the design. This line will be checked by a member of the Environment Team (with appropriate experience) prior to the commencement of clearing works to ensure it is correct.	Prior to Clearing	AM EC
The clearing line will be walked by a member of the Environment Team (with appropriate experience) and community representatives. Trees of significance, and Priority flora species will be retained where possible and clearly marked on site.	Construction	EC AM
Prior to clearing commencement, an internal clearing permit will be approved by the Environmental Coordinator to ensure the applicable environmental of the clearing are considered and managed.	Construction	AM
Prior to the commencement of clearing, the area will be searched for fauna and any fauna relocated into the neighbouring vegetation. This will include: • Ground searches for fauna. • Tree hollow inspections, including the use of a cherry picker if required, with the purpose to remove any possums or birds (including eggs) from the trees prior to clearing if clearing occurs during breeding season.	Prior to clearing	CM EC

Management action	Timing	Responsibility
Clearing shall be undertaken in stages along one front to give fauna the opportunity to escape.	Construction	AM
As far as practical clearing should be timed to prevent coinciding with the main nesting/breeding seasons of fauna species which occur within the Project Area (particularly Black Cockatoos)	Construction	AM
Fauna encountered in the construction area shall be given the chance to move on if there is no threat to the person's safety in doing so. The Environmental Coordinator will be suitably experienced and licensed and will be available at all times during the construction phase to interact with fauna that cannot move away freely.	Construction	AM
If injured/sick animals are encountered, or eggs are removed from trees prior to clearing, a nominated fauna carer listed under the Wildlife Hotline (08 9474 9055) shall be called to care for the animal. The carer may only enter site if escorted by the site manager or foreman. This action is restricted to larger mammal and avian species.	Construction	EC
Native fauna encounters will be recorded and reported to DPaW.	Construction	EC
Existing cleared areas shall be utilised for temporary construction purposes, such as access tracks, offices and laydown areas wherever practicable.	Construction	CM
Vehicles and equipment shall not be driven over, or parked on, vegetation and/or tree roots as far as is practicable.	Construction	AM
Construction works will be undertaken congruent with the detailed design plans.	Construction	CM
Mature trees in particular will be retained as far as practicable and shall not be removed for temporary construction works.	Construction	AM
Temporary fencing shall be placed around significant mature trees and vegetation which are to remain uncleared immediately adjacent to the clearing area, in order to prevent unnecessary damage where appropriate.	Construction	EC AM
Vegetation will be pruned with a chainsaw in preference to clearing where possible.	Construction	AM
Cleared vegetation will not be burned on site.	Construction	AM CM
Cleared vegetation suitable for reuse will generally be reduced in size (chipping) and reused within the soft landscaping works where possible.	Construction	CM AM
Cleared vegetation not suitable for re-use will be disposed of at an appropriate landfill facility, or buried at least 1 m beneath the eventual surface of the road (in accordance with Main Roads' specifications).	Construction	AM
All rubbish (including cigarette butts) will be disposed of in appropriate bins and disposed of off-site as appropriate.	Construction	AM
If any caves or karst voids (areas where limestone has been dissolved) are identified during the construction phase, work will be suspended and CM should be consulted. All works will cease until appropriately experienced people have assessed the cave or karst feature for significance and impacts to subterranean fauna.	Construction	EC AM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.1.5 Monitoring program

To ensure and record compliance with the Vegetation, Flora and Fauna objectives and associated management actions, the following monitoring measures will be conducted. Frequency, responsibility and parameters are detailed in Table 5 below.

Table 5 Vegetation, flora & fauna monitoring requirements

Parameter	Frequency	Location	Responsibility
Flagging/temporary fencing surrounding significant trees	Weekly during construction	Construction area	EC
Placement of compounds, stockpiles and laydown areas are in suitable locations	Weekly during construction	Construction area	EC
Clearing lines and temporary fences will be utilised	Weekly during construction	Construction area, particularly where clearing is required and areas have been fenced	EC
Minimise clearing footprint where possible	Prior to clearing (through the Clearing Permit process)	All areas prior to clearing	EC

4.1.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated.

Table 6 Vegetation, flora & fauna contingency actions

Trigger	Action
New DRF/listed threatened flora species found during the construction phase	Notify DER/DotE
Non-compliance with management measures detailed in Table 4.	Investigate cause. Implement contingency actions which may include: • Review management measure's practicality or relevance. • Improve training and education for all personnel. • Improve and implement increased protective measures as necessary. • Improve methods for marking clearing lines. • Install additional temporary fencing or signs. • Monitor the success of these actions.

4.2 Dieback

The relevant documents relating to Dieback (*Phytophthora cinnamomi*) include:

- Environmental Impact Assessment (GHD 2014b)
- Dieback survey (Glevan Consulting 2013)

4.2.1 Introduction

The potential impacts and management implications resulting from Dieback (*Phytophthora cinnamomi*) are a key consideration for the CEMP for the Project.

Glevan Consulting undertook an assessment of the vegetation within the Project Area in July 2013 for the presence of Dieback (*Phytophthora cinnamomi*) (Glevan Consulting 2013). The Project Area was determined to be a mosaic of Infested, Un-infested, and Un-mappable vegetation. The key results from this survey were:

- The Project Area lies predominantly within the Spearwood and Quindalup dune systems which is a landform where the effect of *P. cinnamomi* on the vegetation would be minimal.
- Areas that were considered to be infested with *P. cinnamomi* were demarcated on site.
- There were several sections of the Project Area that were considered Un-mappable and/ or Un-protectable.
- There were also Un-infested and Protectable areas within the Project Area and these should be managed as such.

4.2.2 Potential impacts

Dieback is a soil-borne pathogen recognised as a major threat to Australian vegetation, and in particular, the vegetation and dependent biota within the south west botanical province. Dieback is known to reduce the health and species diversity of native vegetation and the disease is listed as a key threatening process under the EPBC Act.

The key potential impact from the project in relation to Dieback is that the construction phase of the project has the potential to spread the disease into areas that are currently unaffected. This is primarily because uncontrolled movements across the site by construction vehicles, construction personnel or vegetation relocation (such as mulch) may lead to the proliferation and spread of Dieback

4.2.3 Objectives & Key Performance Indicators

Management measures have been developed and are focused to avoid the spread of Dieback into Un-infested areas

A series of objectives are detailed in Table 7, outlining the targets and the KPIs to assess achievement of these targets.

Table 7 Objectives & Key Performance Indicators for dieback

Objective	Target	Key Performance Indicator
Construction contractor to develop and implement Project Specific Dieback Management Plan (PSDMP) consistent with Main Roads' current operating standards and approved by Main Roads	PSDMP developed and approved prior to construction and implemented in the first instance of construction.	All project staff and contractors aware of PSDMP and their specific obligations as detailed in the plan.
Avoid the spread of dieback from known areas, and its introduction to Un-infested areas, as a result of construction works.	No new dieback infestations identified immediately adjacent to the construction area in areas of significance such as conservation zones or TECs	Baseline and post-construction dieback surveys.

4.2.4 Management measures

The Project Specific Dieback Management Plan (PSDMP) as developed and implemented by the Construction contractor will detail actions to manage the risks associated with dieback including those actions listed in Table 8

Table 8 Dieback management actions

Management action	Timing	Responsibility
All plant is inspected immediately prior to entering site to ensure it is free of weeds and soil	Construction	Plant Manager/CM
Strictly avoid the movement of soils and plant material into the uninfected and un-mappable areas within the Project Area	Construction	EC CM AM
Reduce vehicle and plant movement into and within the site as much as possible - particularly during wet conditions.	Construction	EC CM AM All project personnel
Restrict access to public into the Project Area.	Construction	CM AM
Clearly demarcate the areas of the site that are Infested and Un-infested. The boundaries between the management zones will be clearly marked in the field prior to earthworks commencing.	Construction	EC CM AM
All site personnel and contractors should be educated with regard to Dieback and their obligations to follow this CEMP and the Dieback management plan.	Construction	EC CM AM
Dieback hygiene procedure to be prepared for use by contractors including the provision of training to all vehicle operators on site in the effective use of clean down stations and the environmental implications of the spread of the pathogen.	Construction	EC CM AM
Ensure the effluent from the clean down stations, leachate from contaminated soil stockpiles and drainage lines from contaminated areas are contained and not able to drain into adjacent dieback free or uninterpretable areas or Neerabup National Park.	Construction	EC CM AM
As far as practical, time the clearing phase of the operation to occur during the dry months to reduce the risk of spreading the disease.	Construction	EC CM AM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.2.5 Monitoring program

To ensure and record compliance with the Dieback objectives and associated management actions, the following monitoring measures, and their associated frequency, responsibility and parameters, will be conducted (Table 9).

Table 9 Dieback monitoring requirements

Parameter	Frequency	Location	Responsibility
Access to public	Ongoing	Whole Project Area	CM AM
Use of hygiene/wash down standards on vehicles and machinery	Ongoing – at least weekly	Use of hygiene/wash down standards on vehicles and machinery	EC All project personnel
Signs of significant erosion and water potentially leaving the site into sensitive bushland areas	During peak flow times and as required	Whole Project Area	EC CM AM
Photo monitoring	Quarterly	Adjacent sensitive bushland	EC

4.2.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, Table 10 lists contingency actions to be initiated.

Table 10 Dieback contingency actions

Trigger	Action
Non-compliance with management measures detailed in PSDMP	• Investigate cause. • Implement contingency actions which may include: – Review management measures' practicality or relevance. – Improve training and education for all personnel. – Improve and implement increased protective measures as necessary. – Monitor the success of these actions.

4.3 Fire

The relevant documents relating to fire include:

- Environmental Impact Assessment (GHD 2014b)
- Level 2 Flora and Level 1 Fauna Assessment (GHD 2013a)

4.3.1 Introduction

The impacts from fire on environmental, social and commercial assets can be complex and dynamic. As such, the construction contractor will need to develop an emergency response plan that includes fire management to be implemented during the construction phase of the project.

4.3.2 Potential impacts

The Project Area will have some fire hazard risks particularly given the proximity of the Project Area to the extensive areas of native bushland; the level of risk is a result of the type of activity being undertaken, weather conditions, and the proximity of the activity to fuel (and characteristics of the fuel). Fire hazard risks will be spatially and temporally dynamic and will require specific management planning in conjunction with DPaW and Department of Fire and Emergency Services (DFES).

4.3.3 Objectives & Key Performance Indicators

The primary objective for the Fire management measures should be to avoid all fires that result from construction activities. Other objectives and KPI should include those listed in Table 11.

Table 11 Objectives & Key Performance Indicators for fire

Objective	Target	Key Performance Indicator
Construction contractor to develop and implement Project Specific Emergency Response Plan (PSERP) which addresses fire consistent with Main Roads' current operating standards and approved by Main Roads in consultation with DPaW and DFES.	PSFMP developed and approved prior to construction and implemented in the first instance of construction.	All project staff and contractors aware of PSFMP and their specific obligations as detailed in the plan.
Avoid all instances of fire as a result of construction works.	No fires resulting from construction activities	Number of fires resulting from construction activities
Do not undertake hot works on Total Fire Ban Days without exemption from DFES	No fires resulting from construction activities	Number of fires resulting from construction activities

4.3.4 Management measures

The Project Specific Emergency Response Plan (PSERP) as developed and implemented by the Construction contractor will detail actions to manage the risks associated with fire including those actions listed in Table 12. The management strategies should be consistent with Main Roads' operating standards for fire management.

Table 12 Fire management actions

Management action	Timing	Responsibility
Maintain all vehicles, plant and equipment in good working order free of build-up of debris and oil.	Ongoing	All personnel
Eliminate all unnecessary ignition sources (including cigarettes) from site.	Ongoing	All personnel
Maintain a neat and tidy work area with no stock piles of rubbish.	Ongoing	AM All personnel
Reduce the amount of flammable substances stored on site (such as fuel) to the minimum required. Where possible all flammable substances should be kept off site. Where that is not practical, flammable substances should be kept in an area that is free for ignition sources and clearly identified and registered.	Ongoing	AM All personnel
Develop and maintain a risk assessment of all construction activities.	Project conception and ongoing	EC with consultation with applicable staff

Management action	Timing	Responsibility
When construction activities are deemed to be a moderate or high fire risk, specific fire management actions should take place such as wetting down the work area and having a dedicated spotter to watch work for fire ignition.	Ongoing	All personnel
All shire restrictions on fire and machinery movement should be strictly adhered to.	Ongoing	EC
The Neerabup National Park Rangers, regional DPaW staff and DFES staff should be aware of the construction activities of moderate and high risk and when these activities are planned.	Ongoing	EC
Development of emergency response and evacuation plans for fire started as a result of construction activities.	Project conception and ongoing	CM AM EC
Development of emergency response and evacuation plans for fires not started as a result of construction activities that threaten the lives of Project personnel.	Project conception and ongoing	CM AM EC
Maintain adequate access provisions in the form of cross-overs, access tracks and gates are provided at the interface between the Park and Neerabup Road for use by DPaW or other emergency services.	Project conception and ongoing	CM DM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.3.5 Monitoring program

To ensure and record compliance with the fire management objectives and associated management actions, the following monitoring measures will be conducted in accordance with Main Roads' Standards (Table 13). Frequency, responsibility and parameters are also detailed.

Table 13 Fire monitoring requirements

Parameter	Frequency	Location	Responsibility
All fires are to be reported to EC	Ongoing	Whole site	All personnel
Fire awareness and knowledge of obligations	Ongoing	Whole site	EC AM
Awareness of daily fire risk ratings, Shire warnings and restrictions and subsequent communication to staff	Daily checks Communicate in pre-start meetings	Whole site	EC AM
Implementation of PSFMP such as vehicle checks and rubbish removal	Ongoing	Whole site	CM EC AM

4.3.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, Table 10 lists contingency actions to be initiated.

Table 14 Fire contingency actions

Trigger	Action
Fire event as a result of construction activities	Implementation of emergency evacuation and response plans
Fire event as a result of construction activities	Review of PSFMP and implementation of appropriate changes

4.4 Topsoil and weed management

The relevant documents relating to top soil and weed management include:

- Environmental Impact Assessment (GHD 2014b)
- Level 2 Flora and Level 1 Fauna Assessment (GHD 2013a)

4.4.1 Introduction

The existing roads and access tracks in the Project Area traverse some locations which have undergone significant modification as a consequence of human development including roads, residential and industrial infrastructure.

The Project Area is affected by introduced weed species, particularly in areas that are adjacent to existing infrastructure. With the movement of soil through various mechanisms, weed seeds can be spread easily throughout the Project Area, or even introduced from other areas if transported to site. Hence, weed control is necessary to prevent the introduction of new species, and the spread of those existing within the Project Area.

4.4.2 Current status

The GHD (2013a) vegetation and flora survey identified a total of 146 introduced (exotic) and planted species within the Project Area including two species which have legislated management requirements:

- *Asparagus asparagoides* (Bridal creeper)
- *Solanum linnaeanum* (Apple of sodum)
- *Zantedeschia aethiopica* (Arum lily). This species was not recorded in Stage 1 of the Project Area, however, it was recorded within the neighbouring Stage 2 and Stage 3 areas.

Bridal creeper and Apple of sodum are declared category P1 plants under the *Biosecurity and Agriculture Management Act* 2007 (BAM Act). As a result their management during construction work is required. Bridal creeper is also listed as a Weed of National Significance (WoNS) (Australian Weeds Committee 2010).

Weeds can be unsightly and have a detrimental impact on the environment, including impeding purposely planted vegetation success. However, declared weeds are of particular concern, as they spread easily and are difficult to control. Control of weeds will be undertaken as per the BAM Act.

Weed control is particularly important in areas of the road alignment which are adjacent to vegetation, including the section adjacent to the Neerabup National Park. Weed and topsoil management within this area will be a high priority.

Revegetation will be part of the final stages of the construction phase of the Project. The key mechanism and strategies to manage the risks associated with weeds and topsoil will be associated with the planning of revegetation. Revegetation will take place in any areas that:

- Are not required to remain cleared for safety reasons
- Have been cleared or disturbed during the construction phase
- Have been cleared or disturbed prior to the Project and are immediately adjacent to the Project Area.

4.4.3 Potential impacts

There are several risks with regard to weeds and this project:

- There is a risk that the project will increase the spread of weeds through the Project Area and surrounds. This includes the risk of spreading declared weeds (Bridal creeper and Apple of sodum) throughout the Project Area.
- There is a risk that the project will introduce additional/different weed species into the area.
- There is a risk that declared weeds may be spread to areas containing conservation significant flora and may compete with conservation significant flora for habitat.

Broadly, the potential environmental impacts weeds may have in the Project Area include:

- Competition for resources
- Changes to soil nutrient composition
- Modification of the hydrological cycle
- Impediment to native seedling recruitment

Weeds are able to invade the road reserve and adjoining vegetation in several ways, including:

- Wind and water
- Pedestrians, vehicles and machinery
- Infestations on land adjacent to the Project Area
- Spread from existing weed infestations within the road reserve

4.4.4 Objectives & Key Performance Indicators

Management measures have been developed and are focused to:

- Avoid the introduction and spread of weeds.
- Use indigenous native vegetation species consistent with adjacent communities in revegetation works.
- Reduce the potential for soil erosion in areas of vegetation within the final landscape design.

A series of objectives is detailed in the table below, outlining the target and the KPI to assess achievement of these targets.

Table 15 Objectives & Key Performance Indicators for topsoil & weed management

Objective	Target	Key Performance Indicator
Avoid the introduction and spread of weeds	No declared weeds found within construction area at final construction area inspection.	Weed control records Results from final construction area inspection
	No complaints from adjacent stakeholders regarding weed introduction and spread.	Number of complaints
Avoid soil erosion in Project Area	No sign of significant soil erosion within the construction area at final construction area inspection.	Results from final construction area inspection

Objective	Target	Key Performance Indicator
	Presence of vegetation or other soil stabilisers in bare soil areas.	
Avoid the introduction and spread of weeds as a result of construction works.	No new declared weeds identified within construction areas and immediate adjacent areas of Neerabup National Park within 1 year following construction.	Baseline and post-construction weed surveys.
	Less than 10 complaints annually from the public during construction of weed introduction and spread along the road reserve during construction.	Complaints records.
Incorporate topsoil and weed management strategies in the Revegetation plan	Prior to clearing, a qualified and experienced environmental scientist/landscaper or ecologist will undertake a topsoil and vegetation assessment to determine areas of topsoil and mulch suitable for reuse, focussing on using topsoil and mulch that has minimal weed and more native species.	
	Ensure revegetation is maintained for the first three years and includes active weed control within the revegetated areas and in the areas immediately adjacent to revegetation if required.	

4.4.5 Management measures

To avoid impacts from the introduction and spread as a result of this project, appropriate management and mitigation actions summarised in the following table will be implemented by the construction contractor. Where appropriate, these actions will be included within the internal Clearing Permits to ensure implementation.

Table 16 Topsoil & weed management actions

Management action	Timing	Responsibility
The site induction program will include hygiene training to ensure all staff and sub-contractors are aware of the requirements to avoid the spread and introduction of weeds.	Induction	CM
Plant, machinery, equipment, tools and footwear will be cleaned down prior to arrival and prior to departure from the site. Clean down will consist of brushing, gouging, scraping and/or water blasting to remove any compacted soil or plant matter.	Prior to entry to site	CM AM
All declared category P1 plants under the BAM Act will be managed in accordance with legislated requirements.	Construction	CM AM
Weedy topsoil and mulch will either be treated prior to reuse, buried at least 1.5 m under fill or disposed of appropriately offsite at a licensed landfill facility.	Construction	CM AM
Imported fill contain minimal weeds or be treated prior to use.	Construction	CM AM
A weed control program will be implemented by the Rehabilitation Manager. This will involve spraying weeds appropriately to maximise the success of revegetation works and reduce the spread of weeds.	Construction/post-construction	CM
Any revegetation works alongside and within the Neerabup National Park will only include plant species which are indigenous to the local area.	Construction/post-construction	CM
Revegetation species, in areas other than that within the Neerabup National Park, shall be as agreed with Main	Construction/post-construction	PD CM

Management action	Timing	Responsibility
Roads representative.		
Acquire mulch from site works and approved commercial suppliers.	Construction/post-construction	CM
Obtain source plant material and topsoil from certified suppliers with appropriate *Phytophthora cinnamomi* and weed control measures.	Construction/post-construction	CM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.4.6 Monitoring program

To ensure and record compliance with the Topsoil and Weed management objectives and associated management actions, the following monitoring measures will be conducted. Frequency, responsibility and parameter are detailed in the table below.

The monitoring program for weeds and topsoil is focused on:

- Monitoring construction activities to ensure they are consistent with the management measures detailed in the previous section.
- Monitoring the road reserve and surrounding areas for significant weed infestations post construction.

Table 17 Topsoil & weed monitoring requirements

Parameter	Frequency	Location	Responsibility
Presence of declared weeds	Opportunistically, during construction	Construction area	EC
	Once, during the final inspection of the project	Construction area	EC
Public complaints relating to weeds along the road, made via the Main Roads enquiries line	As recorded during construction	Construction area	Stakeholder Relationships Manager

4.4.7 Contingencies

Should the above management actions be unsuccessful, or not implemented, the contingency actions will be initiated as listed in Table 18.

Table 18 Topsoil & weed contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 17.	• Investigate cause. • Implement contingency actions which may include: – Review management measures' practicality or relevance. – Improve training and education for all personnel. – Improve and implement increased protective measures as necessary. – Monitor the success of these actions.
Declared plant identified	• Review treatment program and ensure plant is eradicated during any following weed control event.

Trigger	Action
	• Continue monitoring.
Recurrence of weed complaints	• From complaints, identify areas of significant weeds and possible source of infestation. • Review and revise weed controls. • Implement new controls and monitor area for further weed infestations.

4.5 Surface water and groundwater

The relevant documents relating to surface water and groundwater include:

- Environmental Impact Assessment (GHD 2014b)
- Preliminary Site Investigation (GHD 2013e)

4.5.1 Introduction

The construction works for this project involve the establishment of drainage sumps and culverts to convey stormwater away from the road in a manner which is acceptable to the broader community in terms of nuisance, protection of assets and safety.

Poorly managed construction operations have the potential to generate impacts on the surface and groundwater at both the local and regional scale. The objectives of water management are to minimise the potential impacts of the road construction on the existing hydrology, drainage, vegetation and subterranean ecosystem in the local area.

Impacts of the construction works on the hydrology of the area are predicted to be limited given that no dewatering or recharge will be occurring as a component of the works. It is noted that the groundwater flow direction is towards the coast and away from Neerabup National Park.

4.5.2 Current status

The Project Area is located on the Gnangara Mound which is identified as P3 Public Drinking Water Source Area (PDWSA) which is an important source of fresh ground water in the Perth region, derived from the unconfined superficial aquifer. P3 areas are declared over land where water supply sources need to coexist with other land uses such as residential, commercial and light industrial developments.

The Project Area is situated on aeolian deposits of the Swan Coastal Plain (Spearwood Dunes and Quindalup Dunes). The geology of the area consists of Tamala Limestone, sands derived from Tamala Limestone, Safety Bay Sands and Holocene swamp deposits (Department of Mines 1978; cited in Government of Western Australia 2000). Water will infiltrate readily into the soil profile through the sandy substrates of the Project Area.

4.5.3 Potential impacts

Potential impacts of the Project on surface water include:

- Alteration of natural hydrological regimes (changes to groundwater hydrology could also impact surface water expression)
- Changes to water quality (e.g. through chemical spills, erosion causing turbidity, disturbance of ASS, deposition of sediments, gross pollutants, heavy metals, hydrocarbons and solvents)
- Flooding of receiving water bodies

Changes in natural hydrological regimes and water quality may lead to the following impacts:

- Alteration of surface water systems
- Alteration or loss of recreational facilities
- Alteration or loss of flora and fauna communities

4.5.4 Objectives & Key Performance Indicators

The objective of this section is to minimise and mitigate impacts on the environment to:

- Prevent deleterious impacts on surface and groundwater quality
- Minimise erosion
- Where required, provide water quality improvement devices to treat surface water runoff from the Project Area before discharging to the environment
- Prevent direct discharge of surface water runoff from the Project Area to the environment during construction
- Prevent the spillage of hazardous goods to the adjacent environment, particularly watercourses and wetlands

A set of targets is detailed in the table below, outlining the relevant KPIs to assess achievement of these targets.

Table 19 Objectives & Key Performance Indicators for surface water & groundwater

Objective	Target	Key Performance Indicator
Prevent deleterious impacts on surface and groundwater quality.	No new exceedences of groundwater quality levels attributed to the construction of the roads.	Prepare and implement an ASS Management Plan if required.
Prevent deleterious impacts on surface and ground water.	No significant change in groundwater levels at production and monitoring bore locations.	Results from dewatering monitoring (as part of the ASS Management Plan).
Avoid erosion.	No erosion alongside the road during construction after revegetation works are complete. Or No significant erosion alongside the road during construction.	Weekly site inspections
Where required, provide water quality improvement devices to treat off road drainage prior to discharge to the environment.	Installation of stormwater treatment devices upstream or basins as appropriate.	Design and installation of water quality treatment devices or basins
Avoid hazardous materials spills as a result of construction activities.	No Level 1 or 2 spills during construction.	Incident Reports of occurrence of spills. Weekly site inspections.

4.5.5 Management measures

The management of drainage will incorporate best practice Water-Sensitive Design principles in consultation with the Waters and Rivers Commission. The management strategies will be employed with consideration to impacts on existing vegetation, nearby wetlands, karst areas and groundwater quality from both sumps and altered surface hydrology to minimise potential for waterlogging and infiltration of pollutants to surface water and groundwater. To avoid impacts on the surface and groundwater as a result of this project, appropriate management and mitigation actions summarised in the following table will be implemented.

It should be noted that Main Roads have commissioned an investigation into the occurrence of caves and karst areas associated with the Project area and no caves or voids have been positively identified, although the northern Swan Coastal Plain is broadly recognised as containing karst.

Table 20 Surface water & groundwater management actions

Management action	Timing	Responsibility
Final drainage designs will be provided to the DoW for their information. Drainage structures will be constructed in accordance with design drawings and specifications, conducted by suitably qualified personnel and subsequently approved by DOW	Design	DM
Erosion control measures will be designed and constructed at discharge points.	Design/Construction	DM CM
Water diversion bunds or levees shall be established around potentially contaminated areas to prevent the cross-contamination of clean water.	Construction	CM
Any evidence of erosion, disturbance to natural drainage flow or impact on vegetation is required to be reported to the Site Supervisor and be remediated as required.	Construction	CM
The workforce induction shall include information on surface water and groundwater protection during construction.	Construction	CM
Effective erosion and sediment control measures shall be implemented during construction to mitigate runoff from site. Controls may include one or more of the following: • Mulch sausages • Sand bags • Silt fences • Hay bails • Geotextile placement.	Construction	CM
Construction material shall not obstruct drainage lines (flow pathways).	Construction	CM
Drainage pathways should be vegetated to reduce scour and slow flows.	Construction	CM
Sumps will be revegetated where possible to improve aesthetics	Construction	CM EC
Hygiene management measures will be adhered to during the basin constructions, with particular attention to those basins located within Dieback uninterpretable areas and Dieback protectable.	Construction	CM
A Spill Response Procedure shall be prepared and	Pre-construction	CM

Management action	Timing	Responsibility
implemented for an oil, chemical or hazardous material spill event to ensure the spill is contained effectively and cleaned up appropriately and efficiently with approved materials.		
All fuel storage shall comply with the relevant regulations and legislation.	Construction	CM
All chemicals on site will be stored in purpose built containers/tanks in accordance with the MSDS.	Construction	CM
Re-fuelling on site shall be undertaken on a sealed/bunded surface or using a catch tray.	Construction	CM
No re-fuelling of equipment (with the exception of stationary plant) shall be conducted within 50 m of a watercourse.	Construction	CM
Vehicles shall not be left unattended when re-fuelling.	Construction	CM
All hydrocarbon spills shall be cleaned up immediately and recorded using the internal project incident reporting tool.	Construction	CM/AM/EC
Appropriate permits/approvals will be acquired for the taking or discharging of surface and groundwater, and any approval conditions will be implemented.	Construction	CM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.5.6 Monitoring program

To ensure and record compliance with the Surface and Groundwater objectives and associated management actions, the following monitoring items will be completed (Table 21). Frequency, responsibility and parameter are also detailed below.

Table 21 Surface water & groundwater monitoring requirements

Parameter	Frequency	Location	Responsibility
Effectiveness of erosion controls	Opportunistic Weekly	Entire construction site	Site Supervisor EC
Significant run off from construction areas	Opportunistic and weekly site inspections during construction	Entire construction site	EC
Monitoring as per individual groundwater abstraction and dewatering licences (if required).	As per permit conditions	Groundwater bore and dewatering sites	EC

4.5.7 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated.

Table 22 Surface water & groundwater contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 20.	Investigate cause. Implement contingency actions which may include: • Review management measure's practicality or relevance. • Improve training and education for all

Trigger	Action
	personnel. • Improve and implement increased protective measures as necessary. • Improve methods for marking clearing lines. • Install additional temporary fencing or signs. • Monitor the success of these actions.
Spill or leak of hazardous materials during construction.	The cause of level 1 or 2 spills shall be investigated. An appropriate remedy shall be implemented, possibly including: • Repairing defective equipment • Upgrading fuel storage and handling procedures. The effectiveness of remedy shall be monitored.

4.6 Acid Sulfate Soils

The relevant documents relating to Acid Sulfate Soils include:

- Preliminary Site Investigation (GHD 2013e)
- Environmental Impact Assessment (GHD 2014b)

4.6.1 Introduction

Acid Sulfate Soils (ASS) are naturally occurring soils, sediments and peats mainly in the form of iron sulphides, predominantly pyrite (FeS_2). ASS generally form in protected low energy environments such as estuaries and coastal lakes. ASS are benign in their natural state, generally an anaerobic, reducing condition. However, when these soils are exposed to air through the lowering of the water table or by excavation, oxygen reacts with the iron sulphides in the soil. The subsequent oxidation results in the production of sulphuric acid which can cause a breakdown of soil structure, a release of metals, metalloids and nutrients. The release of these reaction products can be detrimental to biota, human health and built infrastructure.

4.6.2 Current status

The DER Acid Sulphate Soil risk mapping indicates that the majority of the Project Area has '*No known risk of ASS occurring within 3 m of the natural soil surface'* .However, it is noted that areas particularly to the south within the vicinity of Burns Beach Road and to the east of Wanneroo are considered to be '*High to moderate risk of ASS occurring within 3 m of the natural soil surface'*. An ASS risk map is provided in GHD (2013c, e).

The ASS risk mapping is considered consistent with geological mapping and the assumed presence of lacustrine sediments due to the occurrence of historical geomorphic wetlands and Holocene swamp deposits associated with the chain of north-south trending wetlands in the region.

Although not presented on the ASS Risk Map, ASS may be present within the lower topographical regions. The lower lying areas are generally reflective of the north-south trending wetlands, but also in the intervening areas towards the coast, the lower lying areas may comprise coastal back swamp deposits (e.g. Connolly Drive) (GHD 2013c and 2013e).

4.6.3 Potential impacts

If ASS are present this has the potential to cause significant environmental and economic impacts including fish kills and loss of biodiversity in wetlands and waterways, effects on estuarine fisheries and aquaculture projects, contamination of groundwater resources by acid, arsenic, heavy metals and other contaminants, damage to infrastructure through the corrosion of concrete and steel pipes, bridges and other subsurface assets.

4.6.4 Objectives & Key Performance Indicators

There will be the need to excavate and fill areas during the construction phase of the project, which presents a risk of exposing ASS. Whilst it is unlikely that these earth works will expose ASS, the Construction Manager (CM) and Environmental Coordinator (EC) will ensure that the objectives in Table 23 are met.

Table 23 Objectives & Key Performance Indicators for ASS

Objective	Target	Key Performance Indicator
Comply with the *Draft Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (DEC 2009)	Compliance with the *Draft Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (DEC 2009)	No non-compliance with the *Draft Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (DEC 2009)
Minimise impacts on the environment, community, personnel and infrastructure as a result of ASS.	No unplanned/ unintentional exposure of ASS	No incidents of environmental damage or personnel harm as a result of ASS

4.6.5 Management measures

A preliminary ASS investigation will be conducted to identify the presence of potential ASS within the Project Area and an ASS Management Plan congruent with the *Draft Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (DEC 2009) will be developed as required.

This plan will include defined location/s of ASS within the Project Area based on expected excavation requirements, and relevant management measures.

The Construction Manager (CM) and Environmental Coordinator (EC) will be responsible for the management of ASS during the construction phase of the project.

4.6.6 Monitoring program

To ensure and record compliance with the ASS objectives and associated management actions within the ASS management plan, the following monitoring items will be completed (Table 21). Frequency, responsibility and parameter are also detailed in below.

Table 24 ASS monitoring requirements

Parameter	Frequency	Location	Responsibility
Groundwater effluent – pH and total acidity	As required by the ASS Management Plan	Dewatering event location	EC/Dewatering Contractor
Groundwater quality	As required by the ASS Management Plan	Dewatering event location	EC

4.6.7 Contingencies

If ASS are identified during the monitoring program, the Environmental Coordinator (EC) should be notified and will be responsible for implementing the ASS Management Plan. The

management measures outlined within the ASS Management Plan will need to be reviewed for practicality or relevance.

4.7 Contaminated sites

The relevant documents relating to Contaminated Sites include:

- Preliminary Site Investigation (GHD 2013e)
- Environmental Impact Assessment (GHD 2014b)

4.7.1 Introduction

The DER (formerly DEC) has published a contaminated sites database (DER, 2013). A search of this database established that there are no known contaminated sites within the Project Area. The potential for contaminated sites to be encountered during construction is therefore limited.

4.7.2 Potential impacts

The disturbance of contaminated land during construction can pose environmental and human health risks if not managed correctly. Although there is limited risk of contaminated sites being encountered, potential impacts will be managed to reduce the human and environmental impact of the project.

4.7.3 Objectives & Key Performance Indicators

The objective of this section is to outline the management and mitigation measures to:

- Comply with the *Contaminated Site Act 2003*.
- Minimise impacts on the environment, community and personnel upon discovery and remediation of contaminated land.
- To ensure the site is acceptable and safe for the beneficial use of the land and groundwater for future or existing land use.

A set of targets is detailed in Table 25 below, outlining the objectives and the KPIs which assists in the assessing of these targets.

Table 25 Objectives & Key Performance Indicators for contaminated sites

Objective	Target	Key Performance Indicator
Comply with the *Contaminated Site Act 2003*	Compliance with the *Contaminated Site Act 2003*	No non-compliance with the *Contaminated Site Act 2003*
Minimise impacts on the environment, community and personnel upon discovery and remediation of contaminated land	Early identification of unknown contaminated land. Correct removal and disposal of contaminated soils and groundwater.	No incidents of environmental damage or personnel harm as a result of existing contaminated land

4.7.4 Management measures

Although it is unlikely contaminated sites will be encountered during construction, to avoid impacts from the disturbance of existing contaminated sites as part of the construction works for the project, appropriate management and mitigation actions summarised in Table 26 will be implemented.

Table 26 Contaminated sites management actions

Management action	Timing	Responsibility
Desktop and site investigations will be undertaken prior to construction commencement to determine any potential and actual contaminated sites within the project boundaries.	Prior to construction	CM EC
The induction program shall include training to make sure all personnel are aware of visual and olfactory observations which suggest potential contamination.	Induction	CM
During intrusive works such as excavations, if visual and or olfactory evidence suggests potential for contamination (e.g. fill material, building rubble, odours, soil staining), works will cease, the site supervisor will be notified, and the material sampled and analysed. Works will commence once the status of the material has been confirmed and corrective actions implemented (if required).	Construction	CM AM
Determination of contamination and requirements for remediation will be undertaken on advice from the Environmental Coordinator. The site of potential contamination will be contained (i.e. bunded) to prevent any spread of contaminates, and will be fenced to prevent any unauthorised access.	Construction	CM EC

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.7.5 Monitoring program

Specific contaminated land monitoring in the form of daily and weekly technical assessments is not expected to be required during the construction phase. Contamination monitoring may be required following identification of previously unknown contaminated sites following reporting to the DPaW and subsequent advice from the DPaW.

4.7.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated (Table 27).

Table 27 Contaminated sites contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 26.	• Immediately investigate the cause of the non-compliance and take preventative actions to avoid further occurrences. • Review management measure's practicality or relevance. • Consider further education of staff/sub-contractors to ensure understanding and prevent any reoccurrence.

4.8 Construction noise, vibration and dust

The Environmental Impact Assessment (GHD 2014b) contains detailed information relating to construction noise, vibration and dust, and was used to inform this management plan.

4.8.1 Introduction

The management of noise, dust and vibration during construction is an integral piece of the overall environmental management. Management of these factors is required for the duration of

the construction program to minimise disturbance to neighbouring stakeholders who are present along the boundary of the alignment.

The Project Area may experience significant noise, dust and vibration during the construction phase of the project. The noise, dust and vibration aspects caused during the construction phase may impact adjacent residents, flora, fauna and nearby infrastructure. The management of these factors is necessary to reduce the social and environmental impact upon these nearby amenities and areas. However, the temporary construction phase of this project should pose no significant long-term effects to the surrounding land users.

This CEMP does not take into account noise impacts as a result of the operation of the upgraded highway.

4.8.2 Potential impacts

The project traverses residential, commercial and recreational land uses. As a result, the project influences both social and environmental activities surrounding the construction area.

Noise, dust and vibration factors are potentially an annoyance to local residents with the level of disturbance dependent upon the duration, intensity and timing of the construction activities.

Noise

Noise transmits from various construction equipment such as rollers, trucks and excavators into the surrounding environment through the ground, water or air. Construction noise is primarily a nuisance for nearby residents surrounding the construction area.

Noise emissions from the construction of the highway may cause localised temporary disturbance to local fauna, however, it is unlikely that the behaviour of the fauna will be impacted in the long-term.

The extent of noise emissions will vary depending upon the construction activity being undertaken at the time, and local features such as topography and buildings. Noise emissions will vary along the construction corridor depending on the works being undertaken. Noise emissions may also have varying tones, with particular continuous tones considered less intrusive than others.

Vibration

Similar to noise, vibration from construction activities and plant can also be transmitted into the surrounding environment through the ground, water or air.

Vibration impacts may impact on nearby infrastructure such as buildings. Vibration impacts will vary depending on construction aspects similar to noise, such as duration, intensity and timing.

Dust

The primary air quality concern during construction is the potential level of dust generated during the road construction, particularly in very dry conditions. Dust is a nuisance to the environment and has the potential to decrease amenity values. Dust can impact the health of nearby flora, by blocking and damaging stomata therefore rendering the plant unable to perform photosynthesis. Dust can also be a health hazard, causing respiratory problems and dangerously reducing visibility for nearby traffic.

The long-term effects from dust are expected to be insignificant, due to the temporary nature of the construction program.

4.8.3 Objectives & Key Performance Indicators

The objective of this section is to outline the management and mitigation measures to:

- Minimise construction noise and comply with noise and buffer standards.
- Ensure adjacent buildings are not structurally impacted from construction vibrations.
- Minimise dust generation along the entire Project Area during the construction phases.

A set of targets is detailed in Table 28 below, outlining the objective and the KPI which will assist in the assessment of these targets.

Table 28 Objectives & Key Performance Indicators for noise, vibration & dust

Objective	Target	Key Performance Indicator
Comply with the *Environmental Protection (Noise) Regulations 1997*	Compliance with the *Environmental Protection (Noise) Regulations 1997*	No non-compliance with the *Environmental Protection (Noise) Regulations 1997*
Manage vibration so that it complies with industry best practice	Adjacent buildings are not significantly affected by vibration from construction works	No evidence of significant vibration impact on buildings and structures as assessed pre-construction and post-construction property condition reports
Manage dust so that it does not create adverse social impacts	No excessive number of complaints received for excessive dust during construction	No evidence of significant dust impact on adjacent vegetation, residents, buildings and structures as assessed by opportunistic observations.

4.8.4 Management measures

Actions to be undertaken to manage noise, vibration and dust during construction along the Project Area are summarised below, with the appropriate management and mitigation measures to be enforced. Included in the management measures and actions are the timing requirements and the nomination of personnel with responsibility for each action.

Noise & vibration management measures & actions

Construction activities will generate noise and vibration which may impact adjacent residences, buildings and potentially disrupt local fauna. These potential impacts will be minimised through a combination of strategies such as limiting construction activities to specific hours of the day, effective site management and a responsive approach to potential arising issues. To avoid impacts from noise during construction the management and mitigation measures will include, but are not limited to those outlined in Table 29.

Table 29 Noise & vibration management actions

Management action	Timing	Responsibility
Workforce inductions will include education in relation to the minimisation of noise and vibration.	Workforce induction	CM
Selecting machinery and adopting operational practices that will produce the lowest practical level of noise and vibration.	Pre-Construction	CM AM
Construction activities (including materials transport) shall be limited between 0700 and 1900 Monday to Saturday, excluding public holidays (standard work hours) unless an out of hours Noise Management Plan is obtained.	Construction	CM AM
Where construction activities are required outside of approved operating hours: • Prepare a Noise Management Plan (NMP) • Obtain approval for the NMP from the City of Wanneroo.	Construction	CM AM

Management action	Timing	Responsibility
• Ensure all nearby residents are notified prior to works, with details of time period of activity and summary of why the activity is required outside of usual hours. • Reduce noise emissions as much as practicable, e.g. croakers in place of reverse beepers.		
Property condition surveys will be conducted and reports prepared for all properties within 50 m of works and with owner consent.	Pre-construction	CM
A complaints register shall be established and maintained.	Pre-construction and construction	SRM
Appropriate access routes, staff parking and work area conditions will be determined prior to activity commencing which will minimise noise and vibration impacts on the neighbouring community. These will be specified within Access Permits.	Construction	CM
Conventional radios are to be kept at a reasonable volume and will need to be turned off immediately if nearby stakeholders complain.	Construction	AM
Residents in proximity to the Project Area will be advised of the proposed construction work schedule.	Construction	CM SRM
Barriers (e.g. fences, site offices) shall be used for equipment that may run on a 24 hour basis near sensitive areas.	Construction	AM
Generators, compressors and other semi-fixed equipment that generates noise shall be located as far as practicable from nearby residences.	Construction	AM
Maintenance schedules shall be followed to ensure that all equipment is in good condition.	Construction	AM
Where practicable, rollers shall be selected which are able to operate in oscillation mode. Oscillation mode will be used when in close proximity to adjacent structures	Construction	CM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

Dust management measures & actions

Dust management is primarily focused on reducing dust generation and avoiding potential impacts in nearby areas. The following actions will comply with the guidelines for the Prevention of Dust and Smoke Pollution from Land Development Site in Western Australia (Department of Environmental Protection 1996). To avoid impacts from dust during construction the management and mitigation measures will include, but are not limited to those outlined in Table 30.

Table 30 Dust management actions

Management action	Timing	Responsibility
Workforce inductions will include education in relation to the minimisation of dust.	Workforce induction	CM
The Guidelines for the Prevention of Dust and Smoke Pollution from Land Development Sites in Western Australia 1996 will be complied with during construction.	Construction	CM

Management action	Timing	Responsibility
Dust generation shall be controlled/mitigated through appropriate measures where practicable including hydro mulch, water application through water carts and chemical dust suppressants. This applies to the entire construction site and includes, but is not limited to haul roads, cleared areas, batters and stockpiles.	Construction	CM
Appropriate licences from the Department of Water will be obtained if required to supply water for dust suppression and other construction purposes.	Construction	CM
A complaints register for any issues of concern shall be established.	Pre-construction	SRM
The extent of cleared and other disturbed areas will be minimised as far as is practicable for construction requirements.	Construction	CM
When within 5 m of residential boundary, stockpiles shall be kept to below fence height.	Construction	CM
All vehicles carrying dusty loads will be covered through the use of tarpaulins etc. if travelling outside of the Project Area, where practicable.	Construction	CM AM
The construction site will be kept clean to minimise dust accumulation within and surrounding the site.	Construction	CM AM
Soil surfaces will be rehabilitated and/or stabilised to minimise dust lift.	Construction	CM
Regular maintenance of all heavy vehicles. Those owned by a sub-contractor will be inspected prior to entering the site to ensure vehicles are operating effectively, and documented in a maintenance register.	Construction	AM
If required and practicable, construction material shall be dampened by sprinkling water prior to transportation, especially during dry and windy weather conditions.	Construction	AM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.8.5 Monitoring program

To ensure and record compliance with the noise, vibration and dust objectives and associated management actions, the following monitoring items will be completed (Table 31) Frequency, responsibility and parameter are also detailed below.

Table 31 Noise, vibration & dust monitoring requirements

Parameter	Frequency	Location	Responsibility
Integrity of machinery and vehicles during Pre-starts	Weekly/Daily	Entire Project Area	AM
Vibration levels at surrounding infrastructure	As required based on construction schedule	Selected properties adjacent to construction works.	CM EC
Evidence of excessive dust lift	Opportunistically	Entire Project Area	AM All personnel
Dust on vegetation	Weekly, Opportunistically	Entire Project Area with particular emphasis on areas of neighbouring vegetation	EC

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.8.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated (Table 32).

Table 32 Noise, vibration & dust contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 29 and Table 30.	• Immediately investigate the cause of the non-compliance and take preventative actions to prevent further occurrences. • Review management measure's practicality or relevance. • Consider further education of staff/sub-contractors to ensure understanding and prevent any reoccurrence.
Complaints received concerning noise or vibration.	Manage complaints and ensure a rapid response occurs.
Complaints received concerning dust.	Manage complaints and ensure a rapid response occurs.

4.9 Construction waste

The Environmental Impact Assessment (GHD 2014b) contains detailed information relating to construction waste, and was used to inform this management plan.

4.9.1 Introduction & status

The construction of the Mitchell Freeway Extension will inevitably produce waste products including domestic wastes and materials from demolition. Appropriate disposal of these products will be undertaken to minimise the impact on the environment.

Furthermore, the Project Area is currently used for illegal dumping of rubbish and there is a considerable amount of domestic and commercial waste scattered through the site.

4.9.2 Potential impacts

Potential impacts as a consequence of unmanaged construction waste disposal include:

- Impacts on vegetation and fauna
- Visual and aesthetic impacts
- Contamination of sites outside the Project Area
- Possible impacts on human health
- Direct or indirect loss of remnant vegetation, and consequential loss of conservation value and negative impacts on fauna habitat.

4.9.3 Objectives & Key Performance Indicators

A series of objectives is detailed in Table 33 below, outlining the target and the KPI to assess achievement of these targets.

Table 33 Objectives & Key Performance Indicators for construction waste

Objective	Target	Key Performance Indicator
All construction activities are to be	As far as is practical,	Waste management

Objective	Target	Key Performance Indicator
carried out with the principles of cleaner production and waste minimisation.	construction waste will be separated into reusable, recyclable and refuse.	records detailing the supply of recycling bins on site
	As far as is practical, selection of construction materials will consider sustainable sources	Records of material purchases.
	Construction waste will be disposed of at appropriate facilities	Asbestos and hazardous waste disposal records

4.9.4 Management measures

To avoid impacts as a result of waste disposal the management and mitigation actions summarised in Table 34 will be followed. Where appropriate, these actions will be included within the internal clearing permits to reinforce such requirements.

Table 34 Construction waste management actions

Management action	Timing	Responsibility
The workforce induction shall outline the requirements for waste minimisation and management practices. All workers will be encouraged to minimise waste production and to make sure that any wastes produced are disposed of appropriately.	Induction	CM
The Project Area will be kept clean and tidy with litter and waste placed in appropriate disposal/recycle bins	Construction	CM AM
The Project Area will be secured to reduce the frequency of illegal dumping of rubbish.	Construction	CM AM
Litter and recycle bins shall be placed (and regularly emptied) in appropriate areas.	Construction	AM
Waste chemicals shall be disposed of as per the corresponding MSDS sheet.	Construction	AM EC
Any asbestos waste from existing structures shall be removed and disposed of by a suitably qualified asbestos removalist	Construction	CM
Littered asbestos waste will be removed according to Main Roads and the construction contractor's internal Occupational Health and Safety Procedure	Construction	AM
All waste will be disposed of at an appropriate licenced facility.	Construction	CM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.9.5 Monitoring program

To ensure and record compliance with the Construction Waste objectives and management actions, the following monitoring will be completed (Table 35). Frequency, responsibility and parameter are also detailed below.

Table 35 Construction waste monitoring requirements

Parameter	Frequency	Location	Responsibility
Presence of litter within and adjacent to the Project Area which is attributed to construction activities	Opportunistically and reported weekly	Construction area	Environmental Coordinator
Correct usage of recycle and refusal bins	Opportunistically and reported weekly	Construction area	Environmental Coordinator

4.9.6 Contingencies

Should the above management actions be unsuccessful, or not put into place, the following contingency actions will be initiated.

Table 36 Construction waste contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 34.	• Immediately investigate the cause of the non-compliance and take preventative actions to avoid further occurrences. • Review management measure's practicality or relevance. • Consider further education of staff/sub-contractors to ensure understanding and prevent any reoccurrence. • Monitor effectiveness of preventative actions.

4.10 Aboriginal Heritage

The relevant documents relating to Aboriginal Heritage include:

- Aboriginal Heritage Analysis (R & E O'Connor Pty Ltd 2013)
- Aboriginal Ethnographic Consultation (Goode 2013)
- Environmental Impact Assessment (GHD 2014b)

4.10.1 Introduction

In May 2013 Main Roads commissioned GHD/R & E O'Connor to undertake desktop assessments of Aboriginal heritage values of the Project Area (R & E O'Connor Pty Ltd 2013). In December 2013 Main Roads commissioned Brad Goode to undertake an ethnographic consultation for the entire Project Area from Burns Beach Road to Romeo Road (Goode 2013). This survey further elucidated the position of sites Joondalup Waugal Egg (Site ID 3504) and Butler-FS03 (Place ID 20598). Details of this report and the findings are included in the Environmental Impact Assessment (EIA) completed by GHD (2014a). The results of relevance to this CEMP include:

- The majority of the survey corridor had been adequately surveyed and the corridor would not require further assessment.
- Neither heritage sites, Joondalup Waugal Egg Site ID 3504 and Place ID 20598 Butler-FS03, are within the Project Area and will not be affected by works to adjoining roads
- No further sites or places of significance as defined by Section 5 of the *Aboriginal Heritage Act 1972* were identified within the Project Area.

It was recommended that:

- The Project Area is monitored during the construction phase for archaeological material.
- An underpass is constructed along the Yaberoo Budjara Heritage Trail which later became a stock route; whist this recommendation is addressed separately in the design phase of the project, the area should be given due consideration during the construction phase of the project (and as such is listed here).

4.10.2 Potential impacts

The key potential risk for the project to Aboriginal values is the potential for the project to uncover and disturb previously undiscovered Aboriginal artefacts and items of cultural significance.

4.10.3 Objectives & Key Performance Indicators

The objectives, targets and key performance indicators for the project are listed in Table 37.

Table 37 Objectives & Key Performance Indicators for Aboriginal Heritage

Objective	Target	Key Performance Indicator
Comply with the requirements of the *Aboriginal Heritage Act 1972* including obtaining a Section 18 approval, if required.	Protection of all known and unknown Aboriginal Heritage sites	Records of site inspections/monitoring
Minimise impacts on Aboriginal Heritage, both known and unknown	As above	As above
Consult with the local Aboriginal community regarding the project.	Maintain communication between Main Roads and Aboriginal community representatives.	Consultation meeting records

4.10.4 Management measures

The management measures to be implemented during the construction phase of the project are described in Table 38. To complement this CEMP, during the design phase of the project, Main Roads will identify any local redesign opportunities to avoid or minimise impacts on any known sites of Aboriginal Heritage significance.

Table 38 Aboriginal Heritage management actions

Management action	Timing	Responsibility
Undertake consultation with the local Aboriginal community and archaeologists outlining the intended design, construction methods, timing and operation of the road. Due consideration will be given to requests made by the Aboriginal people regarding the protection of Aboriginal Heritage and the recognition of Aboriginal culture and history.	Pre-construction	SRM PD SRM
Known Aboriginal Heritage sites situated outside or partly outside of the construction footprint shall be clearly identified on clearing permits as 'no-go' areas.	Construction	EC
Compound, stockpiles and other project infrastructure will not be located within known Aboriginal Heritage sites.	Construction	CM AM
Aboriginal Heritage site boundaries adjacent to the works shall be protected by fencing if they occur within the construction works to prevent any unauthorised access.	Construction	AM EC
The induction shall address Aboriginal Heritage issues, including location of known sites and staff obligations with	Workforce induction	CM

Management action	Timing	Responsibility
regards to the protection of known and unknown Aboriginal Heritage sites and values pursuant to the Aboriginal Heritage Act 1972.		
A suitably qualified archaeologist shall be engaged to assist with advice, consultation and investigations of Aboriginal Heritage matters as required.	As required	CM
If objects of significance to the Aboriginal community are found during construction those works shall cease immediately within 20 m of the objects.	Construction	CM AM
Should any Aboriginal Heritage objects be identified they shall be salvaged and managed according to advice from the archaeologist and Aboriginal community representatives.	Construction	CM AM
If suspected skeletal remains are found, works shall cease and the incident reported immediately to the WA Police Service and DAA. Works will not resume until the Police, DAA and archaeologists are satisfied with the management of the remains.	Construction	All Employees
The location and details of any newly discovered objects or remains will be reported to DAA.	Construction	AHC CM

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.10.5 Monitoring program

To ensure and record compliance with the Aboriginal Heritage objectives and associated management actions, the following monitoring items will be completed (Table 39). Frequency, parameter and responsibility are also detailed below.

Table 39 Aboriginal Heritage monitoring requirements

Parameter	Frequency	Location	Responsibility
Locations of compounds, stockpiles and associated construction materials are outside of known Aboriginal Heritage sites	Weekly	Construction area	EC
Temporary fencing is erect and in place at nearby Aboriginal Heritage Sites.	Weekly	Construction area	EC
Monitor any disturbance on known sites	Weekly	Swan River	EC
Check disturbance is within allowed limits at any new sites found during construction	As required – dependent upon timing of discovering and agreed management	Dependent upon discovery	EC

4.10.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated.

Table 40 Aboriginal Heritage contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 37 as a direct result of construction staff/sub-contractors not understanding the outlined requirements.	• Immediately investigate the cause of the non-compliance and take preventative actions to prevent further occurrences. • Review management measure's practicality or relevance. • Consider further education of staff/sub-contractors to ensure understanding and prevent any reoccurrence. • Consult with Aboriginal community representatives where required (e.g. unauthorised disturbance of known site).
Unauthorised disturbance to known Aboriginal Heritage sites during construction.	• Investigate cause. • Implement contingency actions which may include: – Review management measure's practicality or relevance. – Improve training and education for all personnel. – Improve and implement increased protective measures as necessary. – Consult with the Aboriginal community regarding the disturbance. – Monitor the success of these actions and continue to monitor sites of Aboriginal Heritage significance.

4.11 European Heritage

The relevant documents relating to European Heritage include:

- European Heritage Desktop Assessment (Nayton 2013a)
- European Heritage Field Assessment (Nayton 2013b)
- Environmental Impact Assessment (GHD 2014b)

4.11.1 Introduction

In May 2013, Main Roads commissioned GHD/Dr Gaye Nayton to undertake a preliminary desktop assessment of the Project Area to assess the site for European Heritage values. Details of this report and the findings are included in the EIA (GHD 2014a).

4.11.2 Potential impacts

The potential impacts of the project on the identified European Heritage sites within the Project Area are detailed in the EIA (GHD 2014a). Most of the identified heritage places are located within Neerabup National Park which is crown land. Places 70 and 74 are also on crown land. A Government Heritage Property Disposal (GHPD) referral form will need to be completed for those heritage places on crown land.

In many cases the exact location and extent of heritage places could not be determined from the available information. It is therefore recommended that physical inspections and surveys be undertaken to determine where features are within heritage places and identify what will be impacted by the road works to assist the GHPD process and where necessary compile archival records for the City of Wanneroo planning approvals process.

4.11.3 Project performance

The objective of this section is to outline the management and mitigation measures to:

- Comply with the requirements of the Heritage of Western Australia Act 1972
- Minimise impacts on European Heritage sites

A series of objectives is detailed in Table 41, outlining the target and the KPI to assess achievement of these targets.

Table 41 Objectives, targets & Key Performance Indicators for European Heritage

Objective	Target	Key Performance Indicator
Comply with the requirements of the *Heritage of Western Australia Act 1972* and the Government Heritage Property Disposal Process.	No disturbance to State registered European Heritage sites. Comply with any heritage approval requirements.	Records of site inspections/monitoring.
Minimise impacts on European Heritage sites.	As above Obtain planning approval from the City of Wanneroo to impact sites listed on the Municipal Register of Heritage Places	As above Obtain planning/demolition approval from the City of Wanneroo

4.11.4 Management measures

To avoid impacts to European Heritage during the construction phase, appropriate management and mitigation actions summarised in the following table will be followed. Where appropriate, these actions will be included within the internal clearing permits to ensure they occur.

Table 42 European Heritage management actions

Management action	Timing	Responsibility
Heritage management will include compliance with any recommendations issued by the State Heritage Office.	Construction	CM
All project excavation activity will be restricted to the confines of the Project Area to avoid any disturbance of unknown European Heritage sites.	Construction	All personnel
If potential European Heritage objects are found during construction works, they shall be salvaged and managed according to advice from a suitably qualified archaeologist and Environmental Coordinator.	Construction	Archaeologists EC

Responsibilities are abbreviated as follows: Construction Manager (CM), Environmental Coordinator (EC), Area Manager (AM), Design Manager (DM).

4.11.5 Monitoring program

To ensure and record compliance with the European Heritage objectives and associated management actions, the following monitoring will be conducted (Table 43). Frequency, responsibility and parameter are also detailed below.

Table 43 European Heritage monitoring requirements

Parameter	Frequency	Location	Responsibility
Locations of compounds, stockpiles and laydown areas are located outside of known European Heritage sites.	Weekly	Construction area	Environmental Coordinator
Monitor any disturbance on known sites outside of Project Area	Weekly	Areas adjacent to construction area	Environmental Coordinator

4.11.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated.

Table 44 European Heritage contingency actions

Trigger	Action
Non-compliance with management measures detailed in Table 42 as a direct result of construction staff/sub-contractors not understanding the outlined requirements.	• Immediately investigate the cause of the non-compliance and take preventative actions to prevent further occurrences. • Review management measure's practicality or relevance. • Consider further education of staff/sub-contractors to ensure understanding and prevent any reoccurrence.

5. Consultation, communication & training

5.1 Environmental stakeholders

During construction, stakeholders who have a particular interest in the environment surrounding the Project Area will be consulted as required. Consultation will be undertaken individually unless requested otherwise. The following stakeholders will be consulted during this time:

- City of Wanneroo
- Department of Water
- Conservation Groups including Quinn's Rocks Environmental Group

5.2 Aboriginal community

The Project Area is covered by two applications for determination of native title; the Swan River People #2 (Number WC2011/002) and the Whadjuk People (Number WC2011/009). There are no determined native title holders, but the Whadjuk group has a registered native title claim which covers the Project Area. A review by R & E O'Connor (2013) indicated that the Ballaruk group, which incorporates the extended Bodney family and the Bibulmun group as demonstrating cultural knowledge of the Project Area in the past.

These groups will be consulted regarding the surveys to be undertaken in the areas of the proposed Neerabup Road and proposed realignment of Romeo Road from Marmion Avenue, through the Mitchell Freeway Reserve to Wanneroo Road. If these surveys find Aboriginal Heritage sites within the Project Area, these groups will continue to be consulted and engaged throughout the Project.

5.3 External communications

Communications with external parties may include the following where appropriate:

- Correspondence and meetings with applicable regulatory authorities
- Consultation with adjacent landowners and stakeholders
- Management of and responding to complaints or requests

Significant environmental aspects will be communicated externally if deemed necessary during stakeholder engagement.

5.4 Internal communications

All on-site personnel will be kept informed of any updates or reminded of key points of this management plan via the following communications where appropriate:

- Toolbox meetings
- Project reports
- Performance assessment reports
- Notice boards
- Inductions
- Sub-contractor co-ordination meetings

- Clearing permit conditions

5.5 Induction and training

Site employees and contractors shall receive appropriate training to ensure they understand their responsibilities and are competent to undertake their work in an acceptable manner. Environmental requirements shall be explained to site personnel during this induction.

On-going training will be provided through toolbox meetings or similar forums. Induction and toolbox attendance shall be recorded.

All site personnel shall receive an environmental induction that addresses the following areas:

- Environmental policies
- Environmental Management Plans and related documents
- Legal responsibilities for all personnel
- Emergency procedures and responses
- Regulatory requirements relevant to the project and their obligations as a member of the team
- Potential consequences if procedures are not followed.

Personnel performing tasks that may cause significant environmental impacts must have been inducted, as well as completed necessary training processes and/or have appropriate experience, before undertaking such tasks.

5.6 Internal clearing permits

An internal clearing permit system will be established to manage the clearing works on the project. Personnel will be required to apply for a clearing permit from the Environmental Team, with the Environmental Coordinator to authorise the permit. The internal clearing permit will include the area of vegetation to be cleared, and any environmental, heritage or community requirements. The requirements of the clearing permit will be communicated with site personnel prior to the works being undertaken.

5.7 Construction site monitoring

Daily and weekly observations of the construction site will be conducted to ensure the objectives of this management plan are implemented and that the required management actions are in place. The Site Supervisor will undertake daily checks of the site where required, while opportunistic monitoring and weekly recording will be conducted by the Environmental Coordinator. Inspection checklists will include only key actions to be monitored during construction of the road and rail as per the associated management plans.

6. Reporting requirements

6.1 Performance reporting

The environmental performance of the construction activities and the identification of auditing requirements will be assessed by Main Roads prior to and throughout the construction period. Monitoring and reporting objectives are to demonstrate legal compliance. Typical contractor reporting requirements include:

- List of licences obtained prior to and during construction (each time a licence is obtained or renewed)
- Monthly CEMP exceptions report – documents any breaches of the CEMP and highlights the corrective action that has been, or is to be, taken
- Complaints Register – documents any community complaints from the construction works

All documents pertaining to environmental management are required to be maintained though a system of document control, including the storage of hardcopy documents at site and archiving for handover to Main Roads upon contract completion. Environmental documents are intended to be of a live nature for reference by key personnel and will be continuously updated by designated personnel. Environmental documents may include:

- CEMP (this document)
- Incident reports and the corrective action register
- Audit Schedule

Performance reporting will be applied to produce systematic, comprehensive and informative reports on the results of environmental monitoring and the construction activities of the project as a whole.

Regular reports will be provided to the Project manager and Environmental Coordinator in relation to compliance with this CEMP. The following reports will be issued by the Construction Manager for the project:

- Internal environmental audits and six-monthly Environmental Management Systems (EMS) audits, including any environmental management compliance and monitoring results.
- Monthly Environmental Compliance Reports summarising any incidents occurring within the period, including comments on response procedures and preventative actions.

6.2 Regulatory requirements

Reporting to the appropriate regulatory authorities will be undertaken as required according to the various environmental approvals and permit conditions.

6.3 Environmental incidents

6.3.1 Reporting and document control

To ensure that all environmental incidents are identified, reported and thoroughly investigated and the following procedure has been developed for the management and notification of such incidents.

All documents pertaining to environmental management are required to be maintained though a system of document control; including the storage of hardcopy documents at site and archiving

for handover to Main Roads upon contract completion. Environmental documents are intended to be of a live nature for reference by key personnel and will be continuously updated by designated personnel to allow incident actions to be monitored and an effective method of follow up occurs on the path to an eventual closing of the action. Environmental documents may include:

- CEMP (this document)
- Incident reports and the corrective action register
- Audit Schedule

6.3.2 Incident definition

An Environmental incident is any event resulting from activities (including Main Roads', Main Roads' contractors' or third party activities) which has the potential to, or has caused environmental impact or results in a non-conformance of legislation, an approval, permit, or condition or an external complaint relating to an environmental incident or environmental issue.

A 'Main Roads Environmental Incident Notification and Initial Investigation report' should be completed for all environmental incidents:

- Which occur due to MRWA activities, activities of 3rd parties or incidents on MRWA vested land.
- For reporting of potential environmental incidents (near misses) and stakeholder complaints.

Incident Categories are detailed below in Table 45.

Table 45 Incident Category Classification Table

Category Type	Definition
Insignificant	Where the environmental impact is: • Localised (confined within the work site) • Negligible and on site impacts only • Has no residual or lasting effect and • No or single treatment required to remediate
Minor	Where the environmental impact is: • Localised • On site impacts only • Limited or short term residual effect and • Readily addressed through standard clean up
Moderate	Where environmental impact is: • Localised significant and/or moderate offsite impact • Medium term residual effects and • Manageable and reversible through significant clean-up efforts and changes to work practices
Major	Where environmental impact is:

	• Major localised and / or major offsite impact • Significant long term residual effects • Impacts are likely to be irreversible without significant long term commitment to remediation actions and • Requires significant resources to address and remediate
Catastrophic	Where environmental impact is: • Widespread severe impacts on and offsite • Major long term commitment to remediation actions • Requires significant resources to address and remediate and • Significant irreversible effects, even after remediation actions

All incidents, no matter how insignificant, must be reported and investigated to prevent further incidents from occurring. All incidents should be reported by the Environmental incident observer to the Site Supervisor immediately or as soon as practical. In addition to reporting the incident to the Site Supervisor, the incident will need to be reported to other roles. The specific details of the roles and reporting timeframes are outlined in Appendix B of the Main Roads Environmental Incident Notification and Initial Investigation report.

For all Environmental Incidents there needs to be an investigation, except for minor (less than 50 L fuel or oil spills). The investigation level requirements and investigation completion timeframe are detailed below in Table 46

On completion of the investigation, the findings and recommendations shall be distributed to the relevant site crews for discussion at a toolbox meeting.

All incidents and the results of the subsequent investigation are to be tabled and reviewed at the next Safety, Health and Environment (SHE) committee meetings.

Table 46 Incident investigation requirements

Incident Category	Investigation level requirements			Investigation completion timeframe		
	Initial investigation	Detailed investigation	Independent investigation	Initial investigation	Detailed investigation	Independent investigation
Catastrophic	Yes	Yes	Yes	Within 1 working days of incident occurrence awareness.	Within 30 working days from reporting of initial investigation.	Within 30 working days from ME assigning investigation leader.
Major	Yes	Yes	Yes	Within 2 working days of incident occurrence awareness.	Within 20 working days from reporting of initial investigation.	Within 20 working days from ME assigning investigation leader.
Moderate	Yes	Yes	Optional (Manager Environment to decide)	Within 5 working days of incident occurrence awareness.	Within 15 working days from reporting of initial investigation.	Within 15 working days from ME assigning investigation leader.
Minor	Yes	No	No	Within 10	N/A	N/A

				working days of incident occurrence awareness.		
Insignificant	Yes	No	No	Within 10 working days of incident occurrence awareness.	N/A	N/A

Depending on the location of an incident the Environmental Coordinator will also notify the appropriate authorities, who may include:

- Department of Aboriginal Affairs
- Aboriginal community representatives
- Department of Parks and Wildlife
- Department of Fire and Emergency Services
- City of Joondalup
- Department of Water

6.4 Non-conformance reports

Non-conformance reports are kept by the construction contractors to detail deviations from the established processes, such as those listed in this CEMP. These reports are generated when a deviation has occurred, but has not necessarily resulted in an environmental impact.

6.5 Complaints

A Project Complaint and Response system should be implemented by the Contract Manager and be implemented during the construction phase to establish and maintain a system of records, documenting all information of complaint handling. The Contract Manager will operate a telephone contact line for the purpose of receiving any complaints and comments from members of the community relating to construction activities. For each complaint received, the following information will be recorded:

- Date and time of complaint
- Name of staff member who received the complaint
- Method by which the complaint was made
- Nature of complaint
- Action to be undertaken by the Contract Manager in relation to the complaint, including staff responsible in taking that action
- Potential for environmental incident

Following investigation of the complaint, the complaints register will be updated to include:

- A summary of the investigation undertaken
- The action undertaken by the Contract Manager relevant to the complaint
- Weather conditions at the time and place of the event, if relevant to the complaint, and any construction related activities
- If no action was undertaken by the Contract Manager the reasons for this decision

- Time and date of follow-up contact and resolution with the complainant
- Nature of and outcomes from follow-up contact with the complainant
- Environmental incident report number if relevant

If the complaint investigation determines that the nature of the complaint justifies its inclusion as an Environmental Incident, it will be acted on without delay in line with the procedure detailed in the section above.

6.6 Auditing

To ensure the management measures outlined in this construction phase environmental management plan are being adequately implemented and comply with relevant design and environmental standards, regular environmental audits will be undertaken throughout the construction period. Auditing of the commitments outlined in this CEMP shall be undertaken as follows:

- Regular system audits of the EMS and compliance procedures
- Regular site CEMP compliance inspections
- Audits of key Contractors' environmental management
- Daily and weekly work area inspections.

Persons responsible for environmental auditing will be suitably qualified.

A progress and compliance report will be prepared following the completion of each audit to document the effectiveness of the environmental management measures that have been implemented. Any non-compliance will be highlighted and addressed by the contractor to the satisfaction of Main Roads. Where audit finds show environmental management actions are not effective, the audit may recommend changes to procedures.

6.7 Management Plan review & revision

This management plan shall be reviewed by the Construction Manager upon advice of the Environmental Coordinator at such time if the project scope changes significantly. Upon review, the document shall be revised and re-issued where appropriate. In addition, continued improvement of the plan will occur in response to environmental incident resolutions and audit findings during the construction of the Project.

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Appendices

Appendix A – Figures

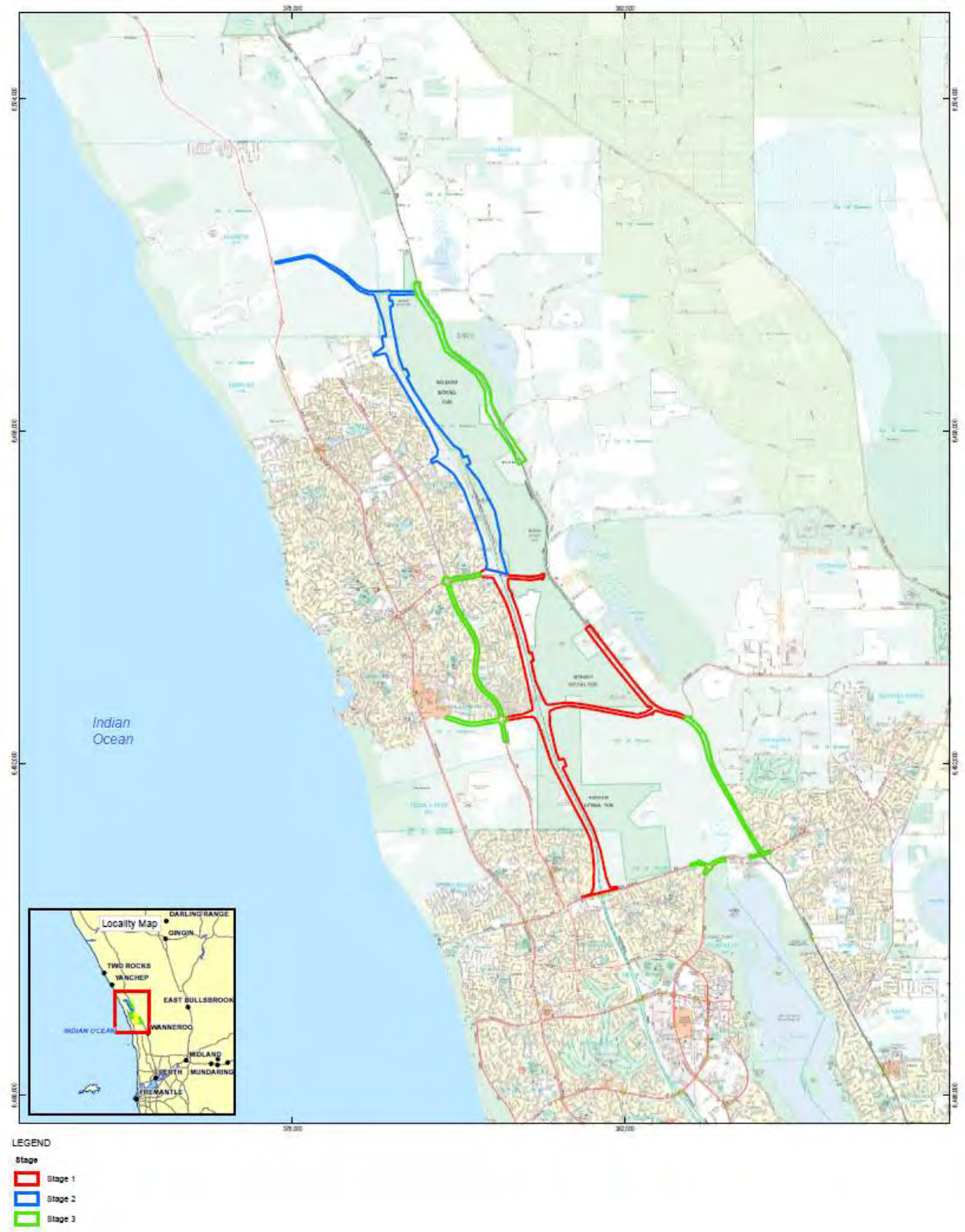

Figure 1 Project locality plan

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