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Main Roads Western Australia

Bunbury Port Access Project Stage 2

Environmental Management Plan

December 2011

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Acronyms

ACMC	Aboriginal Cultural Materials Committee
ASS	Acid Sulphate Soil
BORR	Bunbury Outer Ring Road
CHMCE	Cultural Heritage Monitors Conditions of Engagement
CCW	Conservation Category Wetland
DAFWA	Department of Agriculture and Food Western Australia
dbh	diameter at breast height
DEC	Department of Environment and Conservation
DoSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DIA	Department of Indigenous Affairs
DoW	Department of Water
DRF	Declared Rare Flora
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation
EPP	Environmental Protection Policy
ESA	Environmentally Sensitive Area
GBRS	Greater Bunbury Regional Scheme
IBRA	Interim Biogeographic Regionalisation of Australia
LRP	Landscape and Rehabilitation Plan
IUCN	International Union for Conservation of Nature MRWA
MRWA	Main Roads Western Australia
NEPM	National Environmental Protection Measure
NES	National Environmental Significance
NRM	Natural Resource Management
PAR	Port Access Road
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Community
PF	Priority Flora
RIWI	Rights in Water and Irrigation Act

RFP	Request for Proposal
TEC	Threatened Ecological Community
TFD	Threatened Flora Database
SWTC	Scope of Works and Technical Criteria
TMP	Topsoil Management Plan
WAHERB	Herbarium of Western Australia
WAPC	Western Australian Planning Commission.

1. Introduction

1.1 Background

Main Roads proposes to construct the Bunbury Access Project Stage 2 (the Project) to provide improved access to the Bunbury Port. The Project comprises Stage 2 of the Bunbury Port Access Road (PAR) and Stage 1 of the Bunbury Outer Ring Road (BORR) as shown at Figure 1. The Project will provide a high standard route for traffic to access Bunbury Port and the developing Preston industrial areas east of Bunbury, without having to travel through developed areas of Bunbury. Construction is planned to commence in early 2012 and be delivered as a Design and Construct Contract by the Contractor.

The Project was referred to the Environmental Protection Authority (EPA) for a determination under Section 38 of the *Environmental Protection Act 1986* on the requirement for formal assessment. In February 2010 the EPA has determined that the Project does not require formal environmental assessment. Consequently Main Roads will conduct the Project clearing under its Statewide Purpose Clearing Permit (CPS 818/5).

In late 2010, Main Roads referred the Project to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DoSEWPC) under the provision of the *Environment Protection and Biodiversity Conservation Act 1999*. DoSEWPC has determined that the proposed action is a "Controlled Action" as a consequence of impacts on threatened species – Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis)* and White Tailed Black Cockatoo species (*Calyptorhynchus latirostris, and C. baudinii*). DoSEWPC has since determined that the action will be assessed through Preliminary Information. The public comment period is completed and DoSEWPC is currently working through the assessment process.

1.2 Purpose and Scope

This Environmental Management Plan (EMP) has been prepared to define environmental responsibilities through the final planning, design and construction of the Project. The EMP addresses the following environmental and social issues:

- Aboriginal heritage;
- Vegetation;
- Fauna;
- Topsoil;
- Dieback and weeds;
- Construction – noise, dust and vibration;
- Surface and groundwater; and
- River foreshores including acid sulphate soils.

For each of the environmental issues listed above the following sections of this EMP:

- Detail the current status of the Project site;
- Briefly describe the potential impacts of the Project;
- Define environmental management objectives for project construction;
- Detail management actions to achieve the environmental objectives;
- Detail monitoring requirements; and
- Detail reporting requirements.

1.3 Related Documents

This EMP has been prepared based on the results of previous documents and reports prepared for the Project. These include the following:

Bennett Environmental Consulting. (2003). Vegetation and Flora of Selected Areas – Bunbury Outer Ring Road and Port Access Road. Unpublished Report prepared for Main Roads Bunbury.

Bennett Environmental Consulting Pty Ltd (2008). Significant Flora along Proposed Bunbury Outer Ring Road. Perth, WA.

Brad Goode and Associates (2009). Desktop Aboriginal Heritage Survey of the Proposed Bunbury Outer Ring Road, Western Australia. A report prepared for GHD Pty Ltd on behalf of Main Roads Western Australia.

Brad Goode and Associates (2010). Aboriginal Heritage Survey of the Proposed Bunbury Outer Ring Road, Western Australia. A report prepared for GHD Pty Ltd on behalf of Main Roads Western Australia.

GHD (2002). Bunbury Outer Ring Road and Port Access Road – Wetlands and Threatened Community Survey. Unpublished Report prepared for Main Roads WA.

GHD (2009). Report for Bunbury Outer Ring Road (Stage 1) and Port Access Road (Stage 2) – Flora and Vegetation Spring Survey. Unpublished report prepared for Main Roads WA.

GHD (2009). Bunbury Outer Ring Road (Stage 1) and Port Access Road (Stage 2) - Significant Fauna Survey Report. Unpublished report prepared for Main Roads WA.

GHD (2011). Bunbury Port Access Project (Stage 2) – Environmental Impact Assessment. Unpublished report prepared for Main Roads WA.

GHD (2011). Bunbury Port Access Project (Stage 2) – Supplementary Environmental Information. Unpublished report prepared for Main Roads WA.

Glevan (2010). Bunbury Port Access Stage 2 - Phytophthora cinnamomi Management Plan. Unpublished Report prepared for Main Roads WA.

HGM Maunsell (2002). Bunbury Outer Ring Road – Environmental Assessment and Management Plan. Unpublished report prepared for Main Roads Western Australia. TH00570112.

2. Legislative Requirements

Existing state and federal environmental and heritage legislation relevant to the Project is listed in Table 1.

Table 1 Relevant Commonwealth and State Environmental Legislation

Legislation	Relevance	Specific trigger	Regulatory authority
Commonwealth Legislation			
Environment Protection and Biodiversity Conservation Act 1999	Protection of environmental matters of national significance.	Potential impact on protected fauna species.	Department of Sustainability, Environment, Water, Population and Communities (DoSEWPC)
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.	Entire Project Site.	DoSEWPC
State Legislation			
Aboriginal Heritage Act 1972	Protection of sites of Aboriginal Heritage significance, both known and as yet unknown.	Identified Aboriginal heritage sites. Any newly discovered areas unearthed during construction.	Department of Indigenous Affairs
Agriculture and Related Resources Protection Act 1976	Obligations for control, destruction and notification of gazetted noxious plants and animals.	Presence and/or introduction of declared plants within the Project Site.	Department of Agriculture and Food Western Australia (DAFWA)
Biosecurity and Agriculture Management Act 2007	Provides biosecurity and agriculture management for the state.	Biosecurity risks.	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. Not expected to be triggered by this Project.	Department of Environment and Conservation (DEC)
Country Areas Water Supply Act 1947	Management of rural water supplies.	Not expected to be triggered by this Project.	Department of Water (DoW)

Legislation	Relevance	Specific trigger	Regulatory authority
Environmental Protection Act 1986	Prevention, control and abatement of pollution and conservation protection and enhancement of environment.	Entire Project Site	DEC
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	DEC
Environmental Protection (Controlled Wastes) Regulations 2004	Manages the transportation and disposal of controlled wastes.	Entire Project Site	DEC
Environmental Protection (Noise) Regulations 1997	Regulates noise emissions within the state to prevent significant impact upon neighbouring communities.	Entire Project Site	DEC
Environmental Protection (Unauthorised Discharge) Regulations 2004	Prevention of the releasing of contaminants into the environment.	Entire Project Site	DEC
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 Site	Heritage Council of WA
Soil and Land Conservation Act 1988	Deals with the conservation of soil and land resources and the mitigation of the effects of erosion.	Not expected to be triggered by this Project	DAFWA
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 groundwater abstraction during construction	DoW

Legislation	Relevance	Specific trigger	Regulatory authority
Waterways Conservation Act 1976	Management and conservation of water and the related land and environment.	Indirect drainage to 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 fauna habitat	DEC

3. Environmental Management

To assist in the final planning, design and construction stage of the Project a set of objectives, targets and key performance indicators have been developed to direct:

- Compliance with the relevant Project approvals;
- The fulfilling of agreements with stakeholders;
- Compliance with environmental legislation; and
- Avoidance of unmanaged impacts to the local environment.

To achieve these objectives and targets, management actions and responsibilities are listed for each environmental issue. Monitoring is proposed to assess that objectives are met and contingency actions are defined to address any unpredicted impacts and non-compliances.

Although some potential impacts may be relevant to several environmental issues in the following sections, the relevant management actions and associated monitoring is generally only detailed in one section to prevent unnecessary repetition.

3.1 Aboriginal Heritage

3.1.1 Background

Aboriginal heritage investigations of the Site have included both archaeological survey and ethnographic consultation with local Aboriginal community and Native Title representatives.

These surveys have identified three registered Aboriginal heritage sites that will be impacted by the Project. These sites and other sections of the Site with a greater potential for sub-surface artefacts to be present are detailed in Table 2.

Table 2 Aboriginal Heritage Sites Impacted by the Project

Site ID	Name	Site Type	Comment
4880	Bunbury 20	Artefact scatter	Close proximity to works on Boyanup - Picton Road (Ch. 0 – 1800).
19 795	Preston River	Mythological	30 m either side of the high water mark ie 60m wide, and two ephemeral drainage lines that flow to the Preston River.
17976	Ferguson River	Mythological	30 m either side of the high water.
-	-	Artefact scatters	Moore Rd section (BORR Ch. 6 500 – 8 500).

3.1.2 Conditional Approvals

Main Roads has been given conditional environmental approval by the Minister for Indigenous Affairs issued under Section 18 of the *Aboriginal Heritage Act 1972* to use those sections of the above Aboriginal sites that intersect with the Project. Both Main Roads and the Contractor are required to comply with the conditions of the Ministerial approval. This section of the EMP has been prepared to comply with the conditions prescribed by the Minister including the condition which prescribes that Main Roads:

> "Prior to beginning works develop and implement a comprehensive Aboriginal Heritage Management Plan (AHMP) with the Aboriginal people identified in the Notice ("the Consultants") to the satisfaction of the Registrar. This may include, but not be limited to the following:
>
> a. A commitment to engage at least two appropriately qualified Aboriginal people at any one time (on a rotational basis) to monitor all initial ground disturbing works."

3.1.3 Potential Impacts

The Project footprint impacts two of the three registered Aboriginal heritage sites listed in Table 2. Roadworks and bridge construction will impact the Preston and Ferguson Rivers. Site Bunbury 20 (Lot 500), occurs in close proximity to the planned works and may be inadvertently impacted by off alignment activities such as stockpiles or laydown areas.

Due to Aboriginal historical land use, buried archaeological material may occur within the Site, particularly in the Moore Rd section of BORR (Ch. 6 500 - 8 500). When conducting ground disturbing activities for roadworks there is the potential to disturb such material.

3.1.4 Management Objectives

Table 3 Aboriginal Heritage Objectives, Targets and Key Performance Indicators

Objective	Target	Key Performance Indicator
Comply with the requirements of the *Aboriginal Heritage Act 1972*	Protection of all known and unknown Aboriginal Heritage sites.	Records of site inspections/monitoring.
	Compliance with Project approval conditions.	Reporting to the Department of Indigenous Affairs (DIA).
Minimise impact on Aboriginal Heritage, both known and unknown	Protection of all known and unknown Aboriginal heritage sites.	Records of site inspections/monitoring.
	Ongoing consultation with the local Aboriginal community.	Engagement of monitors.
		Records of meetings.

3.1.5 Management Actions

To meet the management objectives detailed in Section 3.1.4 the actions detailed in Table 4 will be followed.

Table 4 Aboriginal Heritage Management Actions

Item	Management Action	Timing	Responsibility
1	Develop an Aboriginal Heritage Management Plan (AHMP) as required under the Section 18 approval and have it approved by the Registrar of the DIA.	Pre-construction	Main Roads Project Manager
2	Consider recognition of the cultural significance of sites to Noongar people through the naming of bridges and roads with Noongar names is considered.	Prior to road opening	Main Roads Project Manager
3	Provide for Noongar representatives to be given equal participation in the ground breaking and road opening ceremonies, and recognition that the land the road and bridges were built on was Noongar land.	Ground breaking and road opening ceremony	Main Roads Project Manager
4	Advise Consultant Anthropologist B Goode (9755 3716, 0432267443) of the requirement to conduct the proprietary rituals at least 14 days prior to the commencement of construction activities at: ◗ Ferguson River (PAR Ch. 2 650-2 720) ◗ Preston River (BORR Ch. 9 520-9 680)	Pre-construction	Contractor
5	Provide for Noongar representatives to conduct proprietary rituals 3-4 days prior to the start of construction activities at: ◗ Ferguson River (PAR Ch. 2 650-2 720) ◗ Preston River (BORR Ch. 9 520-9 680)	Pre-construction	Contractor
6	Encourage the Noongar community to be involved in the rehabilitation of the river embankments following the completion of works.	Post-construction	Main Roads Project Manager
7	Identify a site in consultation with the local Aboriginal community for the relocation of any artefacts salvaged during construction of the Project.	Pre-construction	Main Roads Project Manager
8	Undertake any local redesign opportunities to avoid or minimise impact on any known sites of Aboriginal Heritage significance.	Design	Contractor
9	The site induction shall address Aboriginal heritage issues, including location of known sites and staff obligations with regards to the protection of known and unknown Aboriginal Heritage sites and values pursuant to the *Aboriginal Heritage Act 1972.*	Workforce induction	Contractor

Item	Management Action	Timing	Responsibility
10	Prior to the commencement of ground disturbing activities conduct a site induction with the Noongar Cultural Heritage Monitors, and prepare a schedule / roster for site monitoring.	Pre-construction	Contractor
11	Provide the necessary training (eg White Card) for Cultural Heritage Monitors to access the site.	Pre-construction	Contractor
12	Two (2) Noongar Cultural Heritage Monitors(CHM) shall be engaged to monitor ground disturbing works at the following sites as per the Cultural Heritage Monitors Conditions of Engagement (CHMCE) detailed at Appendix A: ◗ Ferguson River (PAR Ch. 2 650-2 720); ◗ Preston River drainage line (PAR Ch. 1900-2100); ◗ Preston River (BORR Ch. 9 520-9 680); ◗ Moore Rd section (BORR Ch. 6 500 – 8 500); ◗ Preston River drainage line (SW Hwy Ch. 300-400); and ◗ Boyanup Picton Road Rd section (Ch. 0-1800).	Construction	Contractor
13	Compounds, stockpiles and other temporary Project infrastructure shall not be located within known Aboriginal heritage sites.	Construction	Contractor
14	Aboriginal heritage site boundaries adjacent to the works shall be protected by fencing to prevent any unauthorised access.	Construction	Contractor
15	Engage a suitably qualified archaeologist, who is endorsed by the Cultural Heritage Monitors, to assist with advice, consultation and investigations of Aboriginal heritage matters.	Construction	Contractor
16	The Contractor is to cease work immediately should material associated with the traditional life of Aboriginal people be discovered. Following cessation of work an exclusion zone should be flagged around the area where no work can take place or unauthorised personal can enter. This exclusion zone may vary in size depending on the nature of the Site, but generally a 20 m radius is reasonable. The Contractor should arrange for an archaeologist to inspect the material before work can re-commence within the exclusion zone. The Contractor's works can continue in other sections of the Works Site while appropriate management procedures are implemented to address the newly discovered Aboriginal Site.	Construction	Contractor

Item	Management Action	Timing	Responsibility
17	Should any Aboriginal heritage objects be identified: ◗ They shall be reported to the Registrar of the Department of Indigenous Affairs (Ph: 9235-8000); and ◗ They shall be salvaged and managed according to advice from the Department of Indigenous Affairs, the archaeologist and Aboriginal community representatives. The archaeologist shall obtain a S16 permit as required under the *Aboriginal Heritage Act 1972* for any excavation of Aboriginal heritage sites.	Construction	Contractor
18	Should skeletal remains be discovered the Contractor must stop work immediately, set up an exclusion zone, call the Police (as required under the WA *Coroners Act 1996*) and the Department of Indigenous Affairs (Ph: 9235-8000). No disturbance to the remains is to be permitted until assessed by the Police. No unauthorised personnel can enter this exclusion zone until the Police have handed jurisdiction of the matter over to the Department for Indigenous Affairs and the consultant.	Construction	Contractor
19	If skeletal remains are an Aboriginal Heritage matter and not a police matter, they will be managed with advice from the archaeologist and the wishes of the local indigenous community.	Construction	Contractor
20	The Contractor will provide reasonable time and privacy to conduct any necessary proprietary rituals required under Aboriginal law and custom should a new site be identified.	Construction	Contractor
21	The location and details of any newly discovered objects will be reported immediately to Main Roads Representative and the Registrar of the Department of Indigenous Affairs.	Construction	Contractor
22	The Contract shall provide Main Roads with a monthly report detailing Aboriginal Heritage issues including: • Any impacts on Listed Aboriginal sites; • Any newly identified Aboriginal sites; and • The names and dates that Cultural Heritage Monitors were engaged to monitor the works.	Construction	Contractor

3.1.6 Monitoring Program

To encourage and record compliance with the Aboriginal Heritage objectives and associated management actions, the following monitoring actions detailed in Table 5 will be undertaken.

Table 5 Aboriginal Heritage Monitoring Requirements

Parameter	Frequency	Location	Responsibility
Locations of compounds, stockpiles and temporary infrastructure.	Weekly	Entire site	Contractor
Temporary fencing is erect and in place at nearby Aboriginal Heritage Sites.	Weekly	Entire site	Contractor
Monitor disturbance is within approved limits at any new sites found during construction.	As required – dependent upon timing of discovering and agreed management.	Dependent on discovery	Contractor
Two Aboriginal community representatives are to be engaged to monitor initial ground disturbing works.	Daily during initial ground disturbing works at sites impacted.	Moore Rd section, Ferguson and Preston Rivers, and Boyanup Picton Road Rd section (Ch. 0-1800)	Contractor

3.1.7 Contingencies

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

Table 6 Aboriginal Heritage Contingency Actions

Trigger	Action
Non-compliance with management measures detailed in Table 4.	1. Immediately investigate the cause of the non-compliance and take preventative actions to prevent further occurrences. 2. Review management measures practicality or relevance. 3. Consider further education of staff /sub-contractors to ensure understanding and prevent any reoccurrence. 4. Consult with Aboriginal community representatives where required (e.g. unauthorised disturbance of known site).

Trigger	Action
Unauthorised disturbance to known Aboriginal Heritage sites during construction.	1. Investigate cause. 2. Implement contingency actions which may include: ◗ Review management measures practicality or relevance; ◗ Improve training and education for all personnel; and ◗ Improve and implement increased protective measures as necessary. 3. Consult with the Aboriginal community regarding the disturbance. 4. Monitor the success of these actions and continue to monitor sites of Aboriginal Heritage significance.

3.1.8 Reporting Requirements

Table 7 Aboriginal Heritage Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Aboriginal Heritage issues including: ◗ Any impacts on Listed Aboriginal sites; ◗ Any newly identified Aboriginal sites; and ◗ The names and dates that CHM were engaged to monitor the works.	Monthly	Contractor	Main Roads Representative
1. Contingency actions including the implementation of any contingency actions. 2. Any new contingencies recommended.	Monthly	Contractor	Main Roads Representative
Provide a written report annually, or at the completion of construction if construction is completed within one year, as required under the Section 18 approval.	Annually or completion of construction	Main Roads	DIA

3.2 Vegetation

3.2.1 Background

Much of the Project Site comprises cleared land, parkland cleared or Blue Gum plantation. The native vegetation within the Project Site was classified by the site assessment into three vegetation types:

- *Corymbia calophylla*, *Agonis flexuosa (*Peppermint) open woodland;
- *Melaleuca rhaphiophylla* over mixed pasture grasses; and
- *Eucalyptus rudis* woodland over mixed pasture grasses.

The vegetation complexes of the Project Site comprise Swan, Guildford and Southern River. The

Swan Complex is considered Endangered' with only 5% of its pre-European extent remaining and the Southern River and Guildford are considered 'Vulnerable' with less than 20 % pre-European extent remaining. Clearing required for the Project will impact these vegetation types.

The site vegetation is considered to have moderate species diversity with a total of 128 plant taxa from 34 families recorded during the site flora surveys. Of these 31 species are introduced or not endemic to the area – one of which is considered as a Declared Plant - Arum Lily (*Zantedeschia aethiopica*) under the Agriculture and Related Resources Protection Act 1976.

The vegetation condition within the Project Site varied from very good - good to completely degraded.

The majority of the Project Site has been cleared for agriculture or supports 'parkland cleared' vegetation. Stands of remnant native vegetation are located at:

1. Bunbury Outer Ring Road (Stage 1) between Picton Boyanup Rd and Lot 1 (Ch. 6 430–8200);
2. BORR Stage 1 Melaleuca stand Lot 1 (Ch. 8 320 – 8 400);
3. BORR Stage 1 Preston River crossing (Ch. 9 520- 9 680);
4. Bunbury Outer Ring Road (Stage 1) Peppermint woodland between South Western Highway and Preston River (Ch 10 270 – 10 635);
5. PAR Stage 2 – Ferguson River Crossing (Ch. 2 650 – 2 720);
6. PAR Stage 2 remnant Peppermint stand Lot 5 (Ch. 1 475 – 1 680);
7. Boyanup Picton roadside vegetation and remnant tree stands Lot 103 (Ch. 110 - 1880); and
8. South Western Highway roadside vegetation (Ch. 0 – 900).

The expected Project clearing is approximately 17 ha of native vegetation in addition to areas of Blue Gum and farmland as shown in Table 8. This estimate is based on clearing 3 m from the edge of the earthworks and a 5 m clearing corridor for new fencing based on the March 2011 Concept Design and Project scope. Although it is not expected that there will be a significant change during final design, clearing areas may differ slightly due to currently unforeseen circumstances.

Table 8 Bunbury Port Access Road Clearing Impact

	Vegetation Type	Clearing Area (ha)
1	*Corymbia calophylla / Agonis flexuosa* woodland	13.7
2	*Eucalyptus rudis* woodland	1.5
3	*Melaleuca rhaphiophylla* wetland	1.6
Total Clearing		**16.8 ha**

Construction of the Project will not impact on any Declared Rare Flora, priority flora, Threatened Ecological Communities or priority Ecological Communities.

3.2.2 Potential Impacts

Native vegetation clearing for roadworks is unavoidable due to the nature of the site. Potential impacts include:

- The direct loss of flora and vegetation;
- Impacts on fauna through loss of habitat;
- Changes in surface hydrology altering soil moisture;
- Introduction and spread of weeds and alteration of vegetation composition and structure; and
- Change in fire regimes which may alter vegetation composition and structure.

Any loss of remnant vegetation has the potential to reduce biodiversity, contribute to habitat fragmentation, and habitat loss.

3.2.3 Management Objectives

Table 9 Vegetation Objectives, Targets and Key performance Indictors

Objective	Target	Key Performance Indicator
Minimise the area of native vegetation (and fauna habitat) cleared during construction to the minimum required for road construction and congruent with Austroads standards.	Clearing of native vegetation for the Project not to exceed 16.8 ha. No clearing or disturbance of native vegetation during construction outside of pre-defined clearing lines as outlined in detailed design plans.	Survey of native vegetation clearing area at the completion of clearing. Occurrences and area of clearing or disturbance exceeding design plans in Incident Report Register. Ongoing construction area inspections and monitoring reports.

3.2.4 Management Actions

To meet the vegetation management objectives above the actions detailed in Table 10 should be followed in addition to the fauna management measures detailed at Section 3.3.

Table 10 Vegetation Management Actions

Item	Management Action	Timing	Responsibility
1	The clearing footprint will be reduced to the minimum necessary for the safe construction, operation and maintenance of the Project including earthworks, bridge construction, drainage structures, service re-locations and fencing. During the detailed design phase, reduce as far as practicable the clearing impact on all fauna habitat, with a particular focus on: ◗ Actual and potential habitat for conservation significant species (Western Ringtail Possum, White-tailed Black Cockatoo); ◗ The Peppermint trees between Boyanup Picton Road and the Ferguson River; ◗ EPP lakes; and ◗ Watercourses.	Design	Contractor and Main Roads Project Manager
2	Where possible drainage structures and parking bays shall be located in existing cleared areas.	Design	Contractor
3	Conduct a pre-clearing tree survey to identify and locate any trees with a trunk diameter (dbh) greater than 500mm at breast height within the road reservation.	Pre-construction	Contractor
4	Implement design modifications to avoid clearing trees with a trunk diameter (dbh) greater than 500 mm at breast height where possible.	Design	Contractor
5	Monitor and record the number of mature trees (>500mm dbh) removed and those retained through alternative design options.	Construction	Contractor
6	Monitor and record the Project clearing area and areas where clearing has been reduced as a consequence of design changes (compared to the current preliminary design).	Construction	Contractor
7	The induction program will include discussion of vegetation clearing management.	Pre-construction	Contractor
8	Project clearing will be limited to a maximum area for each vegetation type as detailed below: *Corymbia calophylla / Agonis flexuosa* woodland 13.7 ha *Eucalyptus rudis* woodland 1.5 ha *Melaleuca rhaphiophylla* wetland 1.6 ha	Construction	Contractor
9	Implement an internal clearing permit system.	Construction	Contractor
10	Clearing works will be undertaken congruent with the detailed design plans.	Construction	Contractor

Item	Management Action	Timing	Responsibility
11	Clearing for roadworks will be limited to a maximum of 3 m from the edge of earthworks except where additional clearing is required for safety reasons.	Construction	Contractor
12	Clearing for bridge works will be limited to the minimum necessary for the safe construction and operation of the bridge.	Construction	Contractor
13	Clearing for fence lines will be limited to a maximum 5 m wide strip unless otherwise required for safety reasons or no other practical means of access to the site is available.	Construction	Contractor
14	Clearing for service relocations shall be kept to the minimum necessary for the safe construction and operation of other utility services.	Construction	Contractor
15	The clearing line shall be set out and approval received from Main Roads Representative, or his delegate, prior to the commencement of clearing works.	Construction	Contractor
16	Clearing shall not extend beyond the approved clearing footprint without the written approval of Main Roads Representative.	Construction	Contractor
17	Fauna management measures as detailed at Section 3.3 shall be conducted as part of the clearing works.	Construction	Contractor
18	Install temporary fencing at the edge of the clearing line at the following locations: Moore Road wetland (Ch. 6 680 – 6800); Ferguson River crossing (PAR Ch. 2 650 – 2 720); and Preston River crossing (BORR Ch. 9 520 - 9 680).	Construction	Contractor
19	All cleared vegetation suitable for re-use, apart from stumps and roots, shall be reduced in size by chipping, splitting, cutting, mowing, slashing, grinding etc.	Construction	Contractor
20	Cleared vegetation unsuitable for re-use will be disposed of at an appropriate landfill facility.	Construction	Contractor
21	Burning off will not be permitted under any circumstances in any part of the site or other land used for the purpose of the Works.	Construction	Contractor
22	No native vegetation will be cleared for temporary site infrastructure.	Construction	Contractor
23	Temporary site infrastructure will be fenced where adjacent to native vegetation.	Construction	Contractor
24	Any damage caused by works to vegetation, landforms or fauna habitat outside the works area will be rehabilitated.	Construction	Contractor
25	Vehicles and equipment shall not be driven over or parked on tree roots.	Construction	Contractor

Item	Management Action	Timing	Responsibility
26	Temporary fencing shall be placed around significant mature trees that are to remain uncleared immediately adjacent to the clearing area.	Construction	Contractor
27	Vegetation to be trimmed will be pruned with a chainsaw in preference to breaking off of limbs where possible.	Construction	Contractor
28	Cigarette butts will be disposed of in appropriate bins. Butts should not be disposed of on the ground.	Construction	Contractor

3.2.5 Monitoring Program

To ensure and record compliance with the Vegetation management objectives and associated management actions the monitoring measures detailed in Table 11 will be conducted.

Table 11 Vegetation Monitoring Requirements

Parameter	Frequency	Location	Responsibility
No damage to vegetation outside of the clearing line.	Weekly during construction	Entire site	Contractor
Temporary fencing surrounding significant trees.	Weekly during construction	Entire site	Contractor
Placement of compounds, stockpiles and laydown areas outside of areas of native vegetation.	Weekly during construction	Entire site	Contractor
Clearing lines delineated and temporary fences erected and in place.	Weekly during construction	Entire site	Contractor
Road design will be assessed against the proposed clearing area to ensure the required clearing area is less than 16.8 ha of native vegetation.	Prior to clearing (through the internal Clearing Permit process)	Entire site	Contractor
The total clearing area shall be measured and recorded.	At the completion of all clearing activities	Entire site	Contractor
Record the number of mature trees with a diameter of greater than 500 mm that have been cleared, and those retained through design changes	At the completion of all clearing activities	Entire site	Contractor

3.2.6 Contingencies

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

Table 12 Vegetation Contingency Actions

Trigger	Action
Non-compliance with management measures detailed in Table 10	1 Investigate cause. 2 Advise Main Roads, Department of Environment and Conservation and the Department of Environment Sustainability, Water Population and communities. 3 Implement mitigation measures which may include: • Implement additional revegetation works; • Define additional offset areas; • Review management measures practicality or relevance; • Improve training and education for all personnel; • Improve and implement increased protective measures as necessary; • Improve methods for marking clearing lines; and • Install additional temporary fencing or signs. 4 Monitor the success of these actions.
Area of native vegetation clearing exceeds 16.8 ha	1 Investigate cause. 2 Quantify location and area of over clearing. 3 Implement contingency actions which may include: • Review management measures practicality and/or relevance; • Improve training and education for all personnel; • Improve methods for marking clearing lines; and • Install additional temporary fencing or signs. 4 Conduct additional revegetation works. 5 Monitor the success of these actions.

3.2.7 Reporting Requirements

Table 13 Vegetation Management Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Damage to vegetation outside of the clearing line	Monthly	Contractor	Main Roads Representative
Measurement of the total project clearing area and a GIS shapefile of the clearing footprint.	At the completion of all clearing activities	Contractor	Main Roads Representative
The number of mature trees with a dbh of greater than 500 mm that have: ◗ Been cleared; and ◗ Retained through design changes.	At the completion of all clearing activities	Contractor	Main Roads Representative
Contingency actions including the implementation of any contingency actions and any new contingencies recommended.	Monthly	Contractor	Main Roads Representative

3.3 Fauna

3.3.1 Background

Fauna surveys recorded a total of eight reptiles, four native mammals, seven non-native mammals, and 32 birds as occurring at the Project Site. Of these animals five conservation significant fauna species were identified:

- Western Ring-tailed Possum (*Pseudocheirus occidentalis*);
- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*);
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii);*
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso)*; and
- Rainbow Bee-eater (*Merops ornatus).*

Domestic and pest species were also identified in the Project Site including European Cow (*Bos Taurus*), Horse (*Equus caballus*), Wild Pig (*Sus scrofa*), Cat (*Felis catus*), Domestic Dog (*Canis domesticus*), Rabbit (*Oryctolagus cuniculus*) and Fox (*Vulpes vulpes*).

The occurrence and potential impact of the Project on conservation significant species is discussed below.

Western Ringtail Possum

Western Ring-tail Possums (WRP) occur only in the south west region of Western Australia where they feed upon Peppermint and Eucalypt trees. The Project Site, and its surrounds, contains

significant habitat and evidence (dreys, scats and/or animal) of WRP recorded at a number of locations within and adjacent to the Project Site. The species was observed in a range of vegetation that supported Peppermint (*Agonis flexusoa*), *Banksia spp*, *Melaleuca spp*, Marri (*Corymbia calophylla*) and/or Jarrah (*Eucalyptus marginata*) in most native woodland areas along the alignment.

The Project is likely to impact local populations mainly by habitat loss, population fragmentation and increased mortality caused by highway traffic.

Carnaby's Black Cockatoo

There are three species of Black cockatoo that are known to occur in the Project Site and its surrounds. These species are highly mobile and are known to utilise similar habitats, consequently overlap of foraging habitat is expected.

Carnaby's Black Cockatoo was not heard or observed over the assessment but foraging areas were found in Banksia woodland suggesting usage by this species. At one site, feathers of a *Calyptorhynchus* species, suspected to be Carnaby's Cockatoo, were recorded.

Evidence of feeding areas were also found particularly in Marri / Peppermint woodland. Observations of cockatoo foraging were concentrated in the vegetation in the vicinity of Walrodt, Moore and Boyanup Picton Roads. No confirmed cockatoo nest trees will be impacted by clearing for roadworks.

Clearing for roadworks will impact on up to 5.5 ha of cockatoo foraging habitat. Potential impact on this species has prompted the requirement for Main Roads to implement an environmental offset proposal to be developed and approved with the Commonwealth DoSEWPC.

Baudin's Black Cockatoo

Baudin's Black Cockatoo was reported once during the assessment via calls and possible feathers although these can be easily confused with Carnaby's Black Cockatoo. Several feeding areas were found particularly where Marri or Banksia is present.

As noted above, clearing for roadworks will impact on up to 5.5 ha of cockatoo foraging habitat although no nest trees are expected to be cleared. Potential impact on this species has prompted the requirement for Main Roads to implement an environmental offset proposal to be developed and approved with the Commonwealth DoSEWPC.

Forest Red-tailed Black Cockatoo

Forrest Red-tailed Black Cockatoo's were observed along the alignment by either sightings or call identification. Several feeding habitats were found particularly in Marri and Banksia woodland.

Rainbow Bee-eater

Rainbow bee-eaters were recorded at one site within the Project Site. Birds were observed on a sand ridge on Lot 5 north of Walrodt Road, where three pairs of birds were observed nesting at the site. This site is approximately 700 m north of the PAR Stage 2. Construction of the PAR is unlikely to impact on this species.

Habitat Value and Linkages

The habitat between Walrodt Road and Boyanup-Picton Road provides confirmed habitat for WRP and foraging habitat for Black Cockatoo species. No confirmed cockatoo nesting trees were observed within the Project Site but significant large trees are present and suitable for breeding. The vegetation between Walrodt Road and Boyanup-Picton Road provides a significant habitat linkage to the large area of native vegetation in Lot 5 to the north, and the smaller remnants to the south and east.

A number of other significant species were not identified but may be present between Walrodt Road and Boyanup-Picton Road. These include the Lined Skink, South West Carpet Python, Brush-tailed Phascogale, Greater Long-eared Bat, Western False Pipistrelle, Western Brush Wallaby and Southern Brown Bandicoot.

The vegetation along both the Ferguson and Preston Rivers, although of poorer condition also provides a regional linkage along the watercourses.

3.3.2 Potential Impacts

Potential impacts on fauna as a result of the Project are summarised below.

Clearing

Clearing will lead to loss of habitat available for fauna within the Project Site including the conservation significant species detailed above. Other impacts may include the severance of existing fauna movement corridors severed by the Project. Consequently, management of kangaroos and other terrestrial fauna and maintenance of their existing or alternative movement corridors is considered essential.

The loss or fragmentation of habitat may impact on fauna by reducing feeding and/or breeding areas. In some cases the conservation significant fauna species require specific native vegetation to survive. Vegetation clearing and vehicle movements are likely to result in an increased incidence of animal death or injury. Terrestrial animals (including mammals, reptiles and amphibians) are most at risk, as they are often unable to vacate disturbed areas of vegetation quickly enough to avoid harm. Animals may also become disorientated following destruction of their current habitat.

Traffic

Movement of vehicles along the Project during construction and once opened to traffic represents a long term threat to animals attempting to follow normal movement corridors across the road. Collisions between animals and vehicles are likely to result in serious traffic crashes and injury or death to animals.

Road Construction

Road construction activities also have the potential to affect fauna through:

- Collisions with construction vehicles which may result in injury or death to fauna;
- Terrestrial fauna may fall or enter into constructed trenches or other sub-surface earthworks and be unable to escape; and

- Noise from construction machinery or plant may temporarily disrupt nearby fauna and prevent normal faunal activities.

3.3.3 Management Objectives

The objectives of fauna management are detailed in Table 14. This table also outlines the target and the KPI to assess achievement of these objectives. Specific management measures are detailed in Table 15.

Table 14 Fauna Management Objectives, Targets and Key Performance Indicators

Management objectives	Target	Performance indicator
Ensure impacts on fauna including protected fauna (as listed at the time of construction) are adequately identified and minimised during construction.	The entire Project Site has been surveyed for threatened fauna prior to construction.	Documentation of PAR threatened fauna survey.
	No damage to key fauna habitat outside of approved clearing area.	The area of habitat or feeding area damaged, and number of nesting trees damaged during construction as recorded in Environmental Incident Reports and Construction Area Inspections.
	No threatened fauna is injured or killed during construction of the Project.	Number of threatened fauna injured or killed as result of construction activities as recorded in Environmental Incident Reports and Inspections.
Minimise impact to terrestrial fauna.	Implement fauna management measures including fencing and underpasses.	Fauna exclusion fencing and underpasses incorporated into Project design and implemented during construction works.
	No damage has occurred to known terrestrial fauna habitat outside of approved clearing area.	Area of habitat damaged outside of approved disturbance boundary as recorded in Environmental Incident Reports and Construction Area Inspections.
	Monitor clearing area and impact on potential cockatoo nest trees.	Calculate (survey) clearing area and nest trees cleared.
	Reduce risk of vehicle fauna collisions	Main Roads records
Provide fauna migration pathways where required.	Fauna underpasses utilised by fauna within 12 months following construction.	Sightings, tracks, scats or other signs fauna have utilised underpasses in monitoring.

3.3.4 Management Actions

Management of fauna impacts will be required across the entire Project Site with particular focus on:

- Bunbury Outer Ring Road (Stage 1) between Picton Boyanup Rd and Ch. 8200;
- Picton Boyanup Road widening and realignment;
- Preston and Ferguson bridge crossings; and
- Peppermint woodland between South Western Highway and Preston River (Ch 10 200 – 10 635).

Table 15 Fauna Management Actions

Item	Management Action	Timing	Responsibility
1	Discuss with DEC and identify location for the installation of a possum rope bridge overpass over the BORR in the vicinity of Moore Road.	Planning	Main Roads Project Manager
2	Design and install possum rope bridge at agreed location.	Construction	Contractor
3	Prepare fencing strategy to minimise fauna crossing the road.	Planning	Main Roads Project Manager
4	Maintain access for fauna movement at the Preston and Ferguson River bridges by incorporating adequate setbacks from the watercourse.	Design Construction Operation	Contractor
5	Construct fauna underpasses on BORR in the vicinity of Ch. 8000 on Lot 1 Moore Road – large underpass (1500 mm diameter pipe minimum).	Design and Construction	Contractor
6	Facilitate fauna movement through culvert at BORR Ch. 9 230 by the design of fencing.	Design and Construction	Contractor
7	Workforce inductions, pre-start and/or toolbox meeting will include education in relation to fauna management.	Construction	Contractor
8	No domestic animals or pets are permitted on any part of the Site including site offices and compounds.	Construction	Contractor
9	Project compounds and stockpiles, and route related infrastructure (e.g. drainage facilities, parking bays) shall be placed outside of priority fauna habitat, including potential cockatoo feeding areas.	Construction	Contractor
10	Install fauna exclusion fencing as shown on the Fencing Strategy Plans.	Construction	Contractor
11	Pre-clearing fauna inspections and hollow searches shall be conducted within two (2) days prior to conducting clearing operations. These shall be conducted by the University of Western Australia (UWA). A minimum of three weeks notice of the commencement of clearing must be provided to UWA and to the Main Roads Representative.	Construction	Contractor

Item	Management Action	Timing	Responsibility
12	Care shall be taken not to injure fauna during clearing operations. A trapping and/or relocation program shall be implemented for protected fauna where the fauna are in danger of being injured. Clearing of nesting trees should be avoided during the black cockatoo nesting period between August and March.	Construction	Contractor
13	Trapping and handling of fauna shall be conducted by UWA.	Construction	Contractor
14	Clearing shall be undertaken in stages and along one front to allow fauna to move from the clearing area into adjacent habitats. Trees containing mammals shall be pushed over slowly to minimise risk of injury to the animals and time allowed for the animals to leave the area before the tree is removed and mulched.	Construction	Contractor
15	Trapped or discovered protected fauna (e.g. Quenda, Western Ringtail Possum) will be held-and-released or, if required, relocated as agreed with the DEC.	Construction	Contractor
16	Any reported injured fauna shall be taken to an approved wildlife carer identified through the Wildcare Helpline on 9474 9055.	Construction	Contractor
17	Post construction monitoring of fauna roadkills as per Main Roads operating procedures, will be conducted to assess the effectiveness of the fauna exclusion fencing.	Construction	Main Roads Project Manager
18	The site landscaping and revegetation plan shall include plant species suitable for foraging food sources and long term nest hollows for Carnaby's and Red-tailed Black Cockatoos. Species shall also include those suitable as foraging and habitat trees for Western Ringtail Possums.	Construction and post-construction	Main Roads Project Manager

3.3.5 Monitoring Program

To encourage and record compliance with the fauna management objectives and associated management actions, the following monitoring measures will be conducted. Frequency, responsibility and parameter are detailed in the Table 16.

Table 16 Fauna Monitoring Requirements

Parameter	Frequency	Location	Responsibility
Presence of trapped fauna in pits, trenches, compound or any other work area which has real potential to entrap fauna, and ensure all are checked and cleared.	Daily	Entire site	Contractor
Contact with injured or dead protected fauna species are recorded and records made available to DEC.	As required	Entire site	Contractor

Parameter	Frequency	Location	Responsibility
Use of fauna underpasses.	One year post construction	Fauna underpasses	Main Roads Project Manager
Fauna roadkill during operation.	One year post construction	Entire site	Main Roads Project Manager
Use of possum rope bridge.	Two years post construction	Possum rope bridge	Main Roads Project Manager

3.3.6 Contingencies

Contingency actions for the fauna management are outlined in Table 17.

Table 17 Contingency Actions for the Fauna Management

Trigger	Action
Non-compliance with fauna management measures in Table 15.	1. The likely cause of the non-compliance shall be immediately investigated. 2. Remedial action shall be undertaken immediately to repair damage (e.g. to barriers and underpasses) if required. 3. Preventative actions shall be taken to prevent further non-compliance. 4. A review shall be conducted of fauna management measures and/or further education of staff/contractors to ensure that all possible steps are taken to prevent any reoccurrence.
Previously undetected cockatoo nesting trees discovered.	1. Personnel shall cease work near nesting trees and report to Main Roads Representative. 2. Main Roads in consultation with DEC shall investigate and review potential remedies to avoid damaging nesting trees where practicable. Implement management measures which may include: ◗ relocation of nesting hollows; ◗ installation of two artificial cockatoo hollows per hollow felled; ◗ incorporation of nesting trees in road reserve or median; and ◗ protective tree barriers. 3. Monitor success of management.
New fauna movement corridors identified by site observations.	1. Location of fauna underpasses and fauna exclusion fences shall be reviewed. 2. Kangaroo warning signs shall be installed as required.

Trigger	Action
Fauna roadkill is excessive compared to similar nearby roads.	Review fauna movement corridors and fencing and amend if possible.

3.3.7 Reporting Requirements

Table 18 Fauna Management Reporting Requirements

Parameter	Frequency	Responsibility	Report to
The number and species of fauna killed or injured during construction including date and time.	Monthly	Contractor	Main Roads Representative
The number and species of fauna relocated during construction including date and time.	Monthly	Contractor	Main Roads Representative
The number, time and date of any encounters with injured or dead protected fauna during construction.	Monthly	Contractor	Main Roads Representative DEC
Contingency actions including the implementation of any contingency actions and any new contingencies recommended.	Monthly	Contractor	Main Roads Representative
Use of fauna underpass and overpass.	One year post construction	Main Roads Project Manager	Main Roads Manager Environment
Fauna roadkill data.	One year post construction	Main Roads Project Manager	Main Roads Manager Environment

3.4 Topsoil Management

3.4.1 Background

The quality of topsoil within the Project Site varies from good to completely degraded. Large sections of the site are completely degraded with no native vegetation present. Where native vegetation remains it has been degraded to some extent by weed encroachment and grazing.

The management of topsoil during roadworks is important to optimise the use of the resource by its regeneration potential, and to minimise the risk of transporting weeds within the site. Appropriate topsoil management is also critical in the success and maintenance of new revegetation sites.

The topsoil over the length of the Project was assessed for its suitability for re-use in the site landscaping. Topsoil on the site is to be managed as detailed in the Topsoil Management Plan detailed at Appendix B.

3.4.2 Potential Impacts

The most significant environmental impact from poor topsoil management is the spread of weeds. The movement of topsoil and weed seed can result in new weed populations and increased weed density at existing weedy sites. The additional impact that weeds may have include the following:

- Competition for resources with native vegetation;
- Changes to soil nutrient composition;
- Modification of the hydrological cycle; and
- Impediment of 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; and
- Spread from existing weed infestations within the road reserve.

3.4.3 Management Objectives

A series of topsoil management objectives are detailed in Table 19 below, outlining the target and the KPI to assess achievement of these targets. These objectives supplement the Dieback and Weed management objectives detailed in Section 3.5. Topsoil management actions are listed in Table 20 to achieve these objectives.

Table 19 Topsoil Objectives, Targets and Key Performance Indicators

Objective	Target	Key Performance Indicator
Reduce the potential for wind and water erosion.	No significant signs of erosion within the construction area at final certificate.	Results from final inspection.
	Presence of vegetation or other soil stabilisers in uncovered areas.	Results from final construction area inspection.
Manage topsoil resources to maximise rehabilitation success.	Achieve revegetation criteria.	Achieve revegetation completion criteria.
Provide a roadside that can be efficiently maintained.	Respread topsoil in appropriate areas.	As construction records.

3.4.4 Management Actions

To appropriately manage topsoil during the project management measures will include, but not limited to those identified in Table 20.

Table 20 Topsoil Management Actions

	Management Action	Timing	Responsibility
1	Site topsoil shall be managed in line with the Topsoil Management Plan with the final boundaries to be agreed on-site with Main Roads Representative.	Construction	Contractor
2	A system must be developed and implemented to allow for the traceability of disposed weed infested topsoil.	Construction	Contractor
3	Prior to the start of works topsoil shall be stripped to a nominal depth of 150 mm.	Construction	Contractor
4	Acquire mulch and/or compost from site works and approved commercial suppliers.	Construction	Contractor
5	Manufacture topsoil / mulch for sites to be rehabilitated with native vegetation. All mulch produced from the Project clearing works is to be stockpiled at a stockpile site approved by Main Roads Representative. Mulch shall be mixed at the following ratio - 10% imported compost, 25% clean weed free soil and 65% site mulch. The topsoil / mulch mixture shall be allowed to naturally compost.	Construction	Contractor
6	Compost manufactured on-site shall be spread on earthwork cut and fill batters as detailed in the Topsoil Management Plan.	Construction	Contractor

3.4.5 Monitoring Program

To ensure and record compliance with topsoil management objectives and associated management actions, the following monitoring measures will be conducted.

Table 21 Topsoil Monitoring Requirements

Parameter	Frequency	Location	Responsibility
Evidence of erosion on embankments	Opportunistic and weekly site inspections during construction. Annually for two (2) years after Practical Completion and after winter, or flood events	Entire site	Contractor
Topsoil respread as per SWTC	At Practical Completion	Entire site	Contractor

3.4.6 Contingencies

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

Table 22 Topsoil Contingency Actions

Trigger	Action
Non-compliance with topsoil management measures detailed in table 20.	1. Investigate cause. 2. Implement contingency actions which may include: ◗ Review management measures practicality or relevance; ◗ Improve training and education for all personnel; and ◗ Improve and implement increased protective measures as necessary. 3. Monitor the success of the contingency actions.

3.4.7 Reporting Requirements

Table 23 Topsoil Management Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Details of the location of weed infested topsoil disposed off-site.	At the completion of clearing	Contractor	Main Roads Representative
As constructed drawings of topsoil respread areas.	Practical Completion	Contractor	Main Roads Representative
Outcome of erosion inspections	Annually	Contractor	Main Roads Representative

3.5 Dieback and Weeds

3.5.1 Background

A site dieback assessment of the Project Site was conducted by Gleven Consulting on behalf of Main Roads in September 2010. This survey noted that:

> "Phytophthora occurrence information found no vegetation communities that were mappable for Phytophthora within the proposed construction area and easement. All seasonally inundated areas and water drainage systems within the development area have a high probability of previous epidemic disease activity."

For the purposes of road construction the Project Site is considered to be dieback infested and unprotectable. Dieback management is focused on minimising the risk of transporting dieback from the Site to other sites.

The flora and vegetation surveys of the Project Site conducted in 2008/2009 identified 128 flora species within the Project Site of which 31 are introduced species or species not endemic to the area.

One weed species - Arum Lily is listed as a Declared Weed Species prescribed as priority 1 and 4 under the *Agriculture and Related Resources Protection Act, 1976*. Consequently management of this plant is defined under the Act as:

P1 Introduction of the plant into, or movement of the plant within an area, is prohibited; and

P4 Spread of the plant beyond where it currently occurs to be prevented.

3.5.2 Potential impacts

Road and bridge construction will require the stripping and/or movement of existing soil and the importation of soil material to the site. Soil movement has the potential to spread dieback and weeds within the site and / or transport them to other sites.

The potential environmental impacts of weeds on ecosystem function include:

- resource competition with native vegetation;
- prevention of native seedling recruitment;
- alteration of hydrological cycle;
- changes to soil nutrient status;
- alteration of fire regime;
- changes to the abundance of indigenous fauna; and
- limit the success of site revegetation.

The occurrence of weed and pasture species adjacent to much of the Project Site has limitations on the potential for site rehabilitation, as weed invasion within the road reserve will occur in the long term. Main Roads will implement revegetation works of the Project Site once works are completed.

3.5.3 Management Objectives

Table 24 Dieback and Weed Objectives, Targets and Key performance Indicators

Objective	Target	Key Performance Indicator
Comply with the *Agriculture and Related Resources Protection Act 1976*	Compliance with the *Agriculture and Related Resources Protection Act 1976*	No non-compliance with the *Agriculture and Related Resources Protection Act 1976*

Objective	Target	Key Performance Indicator
Prevent the introduction and spread of additional weeds, and manage existing infestations at bridge crossings and BORR Ch. 6800-8100.	Decline in % weed cover detected in road reserve rehabilitation by the third year following construction. No declared weeds detected in final construction area inspection.	Weed species presence/absence from rehabilitation monitoring. No declared weeds detected in rehabilitation monitoring between Year 1 and Year 3. Weed control records. Presence of weeds from final construction area inspections.

3.5.4 Management Actions

Management and mitigation measures to meet objectives listed in table 24 during construction are summarised below.

Table 25 Dieback and Weed Management Actions

	Management Action	Timing	Responsibility
1	Declared weed infestations should be removed or treated with herbicide prior to the commencement of roadworks.	Pre-construction	Main Roads Project Manager
2	Workforce inductions, pre-start and/or toolbox meeting will include education in relation to topsoil movement, weeds and dieback.	Pre-construction	Contractor
3	The specification for imported material shall include the requirement that all material (sand, gravel and limestone) be free of topsoil.	Pre-construction	Main Roads Project Manager
4	Clearing and topsoil movement during wet soil conditions should be avoided where possible.	Construction	Contractor
5	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.	Construction	Contractor
6	Construction plant and light vehicle movements will be restricted to the limits of the areas to be cleared.	Construction	Contractor
7	Once the natural soil surface has been covered by imported material, or in the case of sections of cut or the in-situ subgrade has been covered, clean down is not required as long as vehicles and machinery do not travel beyond the works area.	Construction	Contractor
8	Entry points into the Project site to be minimised.	Construction	Contractor
9	Prior to any new seeding or planting, weed control measures shall be implemented.	Construction	Main Roads Project Manager

	Management Action	Timing	Responsibility
10	Acquire mulch and compost from site works and approved commercial suppliers.	Construction	Contractor
11	Obtain seed and/or seedling plant material from certified suppliers with appropriate *Phytophthora cinnamomi* and weed control measures.	Post-construction	Main Roads

3.5.5 Monitoring Program

To encourage and record compliance with the topsoil and weed management objectives and associated management actions, the following monitoring measures will be conducted. Frequency, responsibility and parameters are detailed in Table 26.

The monitoring program for weeds and topsoil is focused on:

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

Table 26 Weed Monitoring Requirements

Parameter	Frequency	Location	Responsibility
Declared plants – construction site.	Opportunistically, during construction.	Entire site	Contractor
	Once, during the final inspection of the Project	Entire site	Contractor
	Annually for 2 years after Practical Completion	Entire site	Contractor
	Ongoing as part of network management	Entire site	Main Roads

3.5.6 Contingencies

Should the above management actions be unsuccessful, or not implemented, the contingency actions listed in Table 27 will be initiated.

Table 27 Dieback and Weed Contingency Actions

Trigger	Action
Non-compliance with the management measures listed in Table 25.	1. Investigate cause. 2. Implement contingency actions which may include: • Review management measures practicality or relevance; • Improve training and education for all personnel; and • Improve and implement increased protective measures as necessary.
Declared plant identified	1. Review treatment program and ensure plant is eradicated during any following weed control event. 2. Continue monitoring.
Recurrence of weed complaints	1 From complaints, identify area of significant weeds and identify possible source of infestation. 2 Review and revise weed controls. 3 Implement new controls and monitor area for further weed infestations.

3.5.7 Reporting Requirements

Table 28 Dieback and Weed Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Occurrence and location of any new populations of Declared plants	From start of construction to two (2) years after Practical Completion	Contractor	Main Roads Representative
Contingency actions including the implementation of any contingency actions and any new contingencies recommended.	Monthly	Contractor	Main Roads Representative

3.6 Construction Management

3.6.1 Potential impacts

The Project traverses a sparsely populated rural and industrial area. Several industrial buildings/offices occur with 50 m of the Project on the Boyanup Picton Road (PAR Stage 2 and BORR Stage 1) and on the existing Moore Road section. There are no private residences within 100 m of the Project Site and as such the potential impacts from noise, dust and vibration on residents and existing land use is expected to be minimal.

Noise

Noise transmits from various construction equipment such as rollers, trucks and excavators into the surrounding environment through the ground, water or air. Noise emissions from the construction of the road 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 alignment depending on the works being undertaken, and may 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. Potential vibration impacts will vary depending on construction aspects similar to noise, such as duration, intensity and timing. As noted above there are a number of industrial buildings within 50m of the Project Site.

Dust

The primary air quality issue during construction is the potential for dust generation, particularly in dry and/or windy conditions. These conditions can decrease community amenity values, reduce traffic safety and impact the health of nearby flora by blocking and damaging their stomata and therefore ability to photosynthesise. Dust can also be a health hazard causing respiratory problems and reducing visibility for nearby traffic.

Impacts from dust are expected to be minimal and short term.

3.6.2 Management Objectives

The impact management and mitigation measures in Table 30 are focused to achieve the objectives detailed in Table 29, which outlines the target and the KPI to assess achievement of the objectives.

Table 29 Noise, Vibration and Dust Objectives, Targets and Key Performance Indicators

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*
	No complaints received as a consequence of noise issues during construction	Complaints Register

Ensure that vibration complies with industry best practice.	No incidents complaints received for excessive vibration during construction.	Complaints Register
	Adjacent buildings are not significantly impacted 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.
Ensure that dust generated by the Project does not create adverse social impacts.	No complaints as a result of dust generation during construction.	Complaints Register

3.6.3 Management Actions

Management and mitigation measures to be undertaken to manage noise, vibration and dust impacts during construction are summarised in Table 30.

Table 30 Noise, Vibration and Dust Management Actions

	Management Action	Timing	Responsibility
1	Workforce inductions will include education in relation to and the minimisation of noise, dust and vibration.	Workforce induction	Contractor
2	Selecting machinery and adopting operational practices that will produce the lowest practical level of noise and vibration.	Pre-Construction	Contractor
3	Prior to the start of any construction activity in a particular area of the Site, the Contractor must conduct and report on property inspections to establish the condition of all properties and structures that may be affected by the activity. Such inspection must be conducted with the agreement of the owner and occupier.	Pre-construction	Contractor
4	The property condition survey must be carried out within the extent of the area that may be affected by the activity. As a minimum the extent of the property condition survey must include all properties within 150 m of any construction activities	Pre-construction	Contractor
5	All properties requiring preconstruction inspections and reports must be resurveyed within one month after the end of the construction period.	Post-construction	Contractor
6	The property condition survey must be carried out by an independent, qualified assessor agreed to by a Main Roads' Representative. The same assessor must be involved throughout the process including any subsequent investigations and recommendations resulting from complaints of damage.	Pre-construction	Contractor

	Management Action	Timing	Responsibility
	Property condition survey reports must include relevant photographs. A copy of the survey report must be provided to the owner of the building/structure and signed off by the owner as a correct record. A full set of survey reports must be provided to a Main Roads' Representative.	Pre-construction	Contractor
	Copies of post-construction survey reports must be provided to the owner of the building/structure and a Main Roads' Representative.	Pre-construction	Contractor
	A complaints register shall be established and maintained including the implementation of a complaints management and close out procedure.	Pre-construction	Contractor
	To manage construction noise the Contractor must: • minimise the effects of noise on the occupants of adjacent properties by the use of silenced plant or by operating plant as far away as practicable from those properties; • limit working hours on those construction activities which generate significant noise; and • design and construct noise mitigation structures to satisfy the requirements of the deed.	Construction	Contractor
	Construction activities (including haul routes) shall be limited between 0700 and 1900 Monday to Saturday, excluding public holidays, unless approval is gained from the City of Bunbury or Shire of Dardanup. An out of hours Noise Management Plan approved by the local authority will be necessary prior to commencing construction works.	Construction	Contractor
	Appropriate access routes, staff parking and work area conditions will be determined prior to the activity commencing which will minimise noise, dust and vibration impacts.	Construction	Contractor
7	Conventional radios are to be kept at a reasonable volume and will need to be turned off immediately if nearby stakeholders complain.	Construction	Contractor
8	Residents in proximity to the upgrade alignment shall be advised of the proposed works schedule in advance of the works occurring.	Construction	Contractor
9	Noise barriers (e.g. fences, site offices) shall be used for equipment that may run on a 24 hour basis near sensitive areas.	Construction	Contractor
10	Generators, compressors and other semi-fixed equipment that generates noise shall be located as far as practicable from surrounding premises.	Construction	Contractor
11	Maintenance schedules shall be followed to ensure that all equipment is in good working order.	Construction	Contractor

	Management Action	Timing	Responsibility
12	Regular maintenance of all heavy vehicles shall be undertaken and documented within a register. Those owned by a sub-contractor will be inspected prior to entering site to ensure vehicles are operating effectively and documented in a maintenance register.	Construction	Contractor
13	Construction methods which will keep dust to a minimum particularly near residences, and which comply with the relevant Department of Environment and Conservation guidelines and the Occupational Safety and Health Act 1984 (WA).	Construction	Contractor
14	Dust generation shall be controlled / mitigated through appropriate measures including mulching watering and chemical dust suppressants. This applies to the entire construction site and includes, but is not limited to haul roads, stockpiles, cleared areas, batters and stockpiles.	Construction	Contractor
15	Undertake dust monitoring to confirm compliance with DEC Guidelines if complaints are received from residents.	Construction	Contractor
16	Dust generating activities shall be minimised during unfavourable weather conditions as far as practicable.	Construction	Contractor
17	The extent of cleared and other disturbed areas will be minimised as far as is practicable for construction requirements.	Construction	Contractor
18	All vehicles carrying dusty loads will be covered through the use of tarpaulins or covers if travelling outside of the Project Site.	Construction	Contractor
19	Promptly remove any mud, debris, epoxy, concrete, slurry or other deleterious matter deposited on trafficked roadways, paths or verges as a result of the Contractor's operations. If, within three hours of a request to do so from a Main Roads' Representative, the Contractor fails to remove the material, the Main Roads' Representative may arrange removal of the material at the Contractor's expense.	Construction	Contractor
20	The construction site will be kept clean to minimise dust and rubbish accumulation within and adjacent to the site.	Construction	Contractor
21	If required and practicable, construction material shall be dampened by sprinkling water prior to transportation especially during dry and windy weather conditions.	Construction	Contractor
22	Haul routes will either be sealed or compacted to reduce the potential of dust emissions. Dust suppressants will be used on unsealed routes to minimise dust lift.	Construction	Contractor
23	All works must comply with the local government authority, DEC and Fire and Emergency Services Authority of WA requirements for fire prevention.	Construction	Contractor

	Management Action	Timing	Responsibility
24	Plant and vehicles operating over or through uncleared vegetation must be fitted with appropriate exhaust systems positioned or covered so that the vegetation cannot come into contact with the exhaust system.	Construction	Contractor
25	Water tankers, equipment and trained personnel must be provided to fight any fires that may be caused by construction activity.	Construction	Contractor
26	Ground vibrations in adjoining properties must be limited by ensuring that the ground particle velocities from any necessary operation of vibratory compaction or percussion equipment cause minimum nuisance and do not exceed any such limit that could result in damage to property.	Construction	Contractor
27	A baseline vibration measurement must be taken at two locations and at the time nominated by a Main Roads' Representative. The measurements must be taken at the commencement of construction activities involving the operation of vibratory compaction or percussion equipment.	Construction	Contractor
28	If complaints of nuisance levels of vibration from residents occur, the Contractor must advise Main Roads' Representative and respond to any complaint at the earliest opportunity but no later than 24 hours after the complaint is received. In addition, the Contractor must take vibration measurements at the affected residence.	Construction	Contractor
29	The Contractor must prepare and implement a hazardous material management/response plan which includes procedures for containing and recovering chemical or fuel spillages.	Construction	Contractor
30	The Contractor must liaise with, obtain approvals from and keep all relevant Authorities fully informed of any hazardous materials stored on the Site and of the contingency plans to be adopted for any spills.	Construction	Contractor
31	Arrangements must be made by the Contractor with the relevant Authorities or with a licensed specialist contractor for the disposal of all sewage, garbage refuse, waste fuels and lubricants.	Construction	Contractor
32	All reasonable actions necessary must be taken to prevent, or otherwise minimise, nuisance to others generated by construction activities including: • glare to nearby traffic and adjacent residences where work is permitted to occur outside the normal daylight hours; • exhaust emissions from poorly maintained vehicles and machinery; and • any activity that may directly or indirectly create a nuisance to the public at large.	Construction	Contractor

3.6.4 Monitoring Program

To encourage and record compliance with the management objectives and associated management actions, the following monitoring actions will be undertaken.

Table 31 Noise, Vibration and Dust Monitoring Requirements

Parameter	Frequency	Location	Responsibility
Integrity of machinery and vehicles during pre-starts.	Weekly/Daily	Entire site	Contractor
Observable impacts due to excessive vibration on surrounding infrastructure.	Weekly	Entire site	Contractor
Baseline vibration monitoring.	Project commencement	Properties within 150 m of the Project Site	Contractor
Vibration monitoring results.	As required	Effected properties	Contractor
Dust monitoring as outlined above.	Daily Opportunistic	Entire site	Contractor
Dust on vegetation.	Weekly Opportunistic	Entire site with particular emphasis on areas traversing vegetation	Contractor

3.6.5 Contingencies

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

Table 32 Noise, Vibration and Dust Contingency Actions

Trigger	Action
Non-compliance with management measures in Table 30.	1. Immediately investigate the cause of the non-compliance and take preventative actions to prevent further occurrences. 2. Review management measures practicality or relevance. 3. Consider further education of staff/sub-contractors to ensure understanding and prevent any reoccurrence.

Construction activities required outside of approved operating hours	1. Preparation of a Noise or Vibration Management Plan approved by the City of Bunbury of Shire of Dardanup. 2. As appropriate, ensure all nearby residents are notified prior, with details of time period of activity and summary of why the activity is required outside of usual hours. 3. Limit activities to those absolutely necessary. 4. Reduce noise emissions as practicable, e.g. croakers in place of reverse beepers.
Complaints received concerning dust, noise or vibration.	1. Manage complaints and ensure a rapid response occurs.

3.6.6 Reporting Requirements

Table 33 Noise, Vibration and Dust Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Property condition survey reports	Pre-construction	Contractor	Main Roads
Property condition survey reports	Post construction	Contractor	Main Roads
Out of hours Noise Management Plan and local authority approvals	Prior to out of hours works	Contractor	Main Roads
Baseline vibration results and reports	Pre-construction	Contractor	Main Roads
All complaints received and close out action.	Earliest opportunity but no later than 24 hours after the complaint Monthly	Contractor	Main Roads
Contingency actions including the implementation of any contingency actions and any new contingencies recommended.	Monthly	Contractor	Main Roads Representative

3.7 Surface and Groundwater

3.7.1 Background

Most of the Project Site occurs on low lying alluvial plains (palusplain) with several small seasonal damplands and sumplands. The majority of the Project traverses 'Multiple Use' wetland apart from where it crosses the Preston River which is a 'Conservation' category wetland.

The Preston River is also recognised as an Environmentally Sensitive Area (ESA) under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. The river foreshore and its surrounds has been grazed for many years and essentially comprises an overstorey of native trees with a weed and pasture understorey. The watercourse will be impacted by the construction of two bridges at the highway crossing.

A 'Multiple Use' wetland also protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* occurs immediately adjacent to the road reserve south west of the proposed Boyanup Picton Road intersection. This wetland is also defined as an ESA. The wetland has been grazed for a number of years. The roadworks embankment is expected to impact on the immediate fringe of this wetland.

Impact on these wetlands should be minimised as part of the final design process and appropriate construction management.

3.7.2 Groundwater

The Project lies within the Dardanup sub-area of the Bunbury Groundwater Area, proclaimed under the *Rights in Irrigation and Water Act 1914.* Any groundwater bores required for construction water will require approval from the Department of Water (DoW). Main Roads has been issued with conditional approval from the DoW under the *Rights in Water and Irrigation Act 1914* for the construction of groundwater bores for construction purposes only.

3.7.3 Public Drinking Water Source Protection Areas

The Project Site is not located within any gazetted Public Drinking Water Source Areas (PDWSA) protected under the *Country Areas Water Supply Act 1947*.

The Bunbury Water Reserve is approximately 3.3 km west from the Project Site and will not be impacted by construction activities.

3.7.4 Potential Impacts

Potential impacts of the Project on ground and 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); and
- Flooding of receiving water bodies.

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

- Alteration of surface water systems; and
- Alteration or loss of flora and fauna species and / or communities.

The installation of retention basins as part of the drainage network will provide some filtration to water prior to entry to the groundwater aquifer. These basins will also provide additional water

quality protection to the rivers by reducing sediment loads, pollutants and the risk of a major chemical spill entering them.

3.7.5 Management Objectives

Table 34 Surface Water Objectives, Targets and Key Performance Indicators

Management Objective	Target	Key Performance Indicator
Maintaining existing surface water hydrology.	Maintain existing surface hydrology through drainage design and construction.	Drainage design Site inspection
Prevent deleterious impacts on surface and groundwater quality.	No significant decrease in groundwater quality levels attributable to the construction of the Project.	Groundwater monitoring results
	No spillage of hazardous goods to wetlands and watercourses.	Incident Reports of occurrence of spills.
Prevent deleterious impacts on surface and ground water during construction and operation.	No disturbance to the Ferguson and/or Preston Rivers beyond the road reserve.	Weekly site inspection. Results from dewatering monitoring (as part of the ASS Management Plan).
	No significant change in groundwater levels at production and monitoring bore locations.	Results from groundwater monitoring.
	Design and installation of water quality improvement devices (drainage system and basins) as part of the Project drainage.	Project design
Avoid soil erosion.	No soil erosion alongside the road and at bridge sites during construction.	Weekly site inspections
Avoid impacts on major watercourses and adjacent wetlands.	No clearing beyond that essential for road construction and operation.	Clearing area survey Weekly site inspections
	No direct discharge of surface water runoff from the Project Site to wetlands and/or watercourses.	Weekly site inspections.

3.7.6 Management Actions

To avoid significant impacts on surface water and groundwater during construction the management and mitigation measures will include, but not limited to, those identified in Table 35.

Table 35 Surface Water and Ground Water Management Actions

	Management Action	Timing	Responsibility
1	Prepare a Spill Response Procedure for oil, chemical or hazardous material spill events to ensure any spill is contained effectively and cleaned up appropriately and efficiently with approved materials.	Pre-construction	Contractor
2	Prepare and implement a monitoring program to assess the impacts of roadworks on local groundwater quality.	Pre-construction	Main Roads Project Manager
3	Design highway drainage to maintain existing surface water capacity and movement.	Design	Contractor
4	The design approach to infiltrate run-off at source where possible.	Design	Contractor
5	Assess ASS site investigations and prepare an ASS Management Plan to be approved by the DEC.	Design	Contractor
6	Design the bridge and highway drainage to ensure there is no direct discharge of road run-off to the Ferguson River, Preston Rivers or adjacent wetlands.	Design	Contractor
7	Design a minimum 20,000 litre capacity detention/infiltration basin to be part of the drainage design where there is the potential for discharge of hazardous spills into the Preston and Ferguson Rivers and other major waterways.	Design	Contractor
8	The design shall be adjusted within the road reserve to minimise impacts on the wetland south of Moore Road (BORR Stage 1 Ch 6 680 – 6 800).	Design	Contractor
9	Design drainage and watercourse crossings to include erosion control and scour protection measures.	Design	Contractor
10	Prepare the Rehabilitation and Landscape Plan so that roadsides and medians will be vegetated with pasture grasses or local native species, capable of acting as a biological filter for run-off.	Design	Main Roads Project Manager
11	Erosion control will be applied at drainage discharge points.	Design	Contractor
12	The workforce induction shall include information on surface water and groundwater protection during construction.	Workforce induction	Contractor
13	Construct the road drainage as designed.	Construction	Contractor
14	Comply with the approved ASS Management Plan.	Construction	Contractor
15	No runoff from construction areas shall be directed into adjacent wetlands or watercourses.	Construction	Contractor
16	Install temporary erosion and sediment control measures at major watercourses and wetlands.	Construction	Contractor
17	Revegetate disturbed areas of the site with local endemic plant species or pasture grasses as per the Rehabilitation and Landscape Plan.	Construction & post construction	Main Roads Project Manager

	Management Action	Timing	Responsibility
18	Hydrocarbon storage shall not be permitted within 200 m of a watercourse or wetland. Storage of hydrocarbons on-site shall be within suitably designed containers within a bunded area.	Construction	Contractor
19	No re-fuelling of equipment (with the exception of stationary plant) shall be conducted within 50 m of a watercourse or wetland.	Construction	Contractor
20	All chemicals on site will be stored in purpose built containers/tanks in accordance with their MSDS.	Construction	Contractor
21	Refuelling on site shall be undertaken on a sealed/bunded surface or using a catch tray.	Construction	Contractor
22	Vehicles shall not be left unattended when filling.	Construction	Contractor
23	The transfer of chemicals (e.g. pouring from one container to another) on site to be undertaken on a sealed/bunded surface or using a catch tray.	Construction	Contractor
24	All hydrocarbon spills shall be recorded as environmental incidents.	Construction	Contractor
25	Appropriate permits/approvals will be acquired for the taking of surface and/or groundwater.	Construction	Contractor
26	Comply with conditions detailed on any ground or surface water use licenses.	Construction	Contractor

3.7.7 Monitoring Program

To encourage and record compliance with the management objectives and associated management actions, the following monitoring actions will be undertaken as outlined in Table 36.

Table 36 Surface Water and Groundwater Monitoring Requirements

Parameter	Frequency	Location	Responsibility
Evidence of physical disturbance to watercourses or wetlands beyond the approved clearing area.	Weekly during construction.	Wetlands and watercourses crossings	Contractor
Evidence of erosion on embankments.	Opportunistic and weekly site inspections during construction.	Entire site	Contractor
Run off from construction areas into wetlands and watercourses.	Opportunistic and weekly site inspections during construction.	Entire site	Contractor

No significant reduction in groundwater quality as a consequence of road construction identified through groundwater monitoring.	Quarterly	Monitoring bores	Main Roads Project Manager
Monitoring as per individual ground and/or surface water abstraction and dewatering licence conditions (if required).	As per permit conditions.	Groundwater bores, surface water abstraction and dewatering sites	Contractor
Monitor any increase in localised surface flooding as a consequence of road construction.	Opportunistically during construction and 2 year defects period Opportunistic for 2 years post construction	Entire site Entire Site	Contractor Main Roads Project Manager

3.7.8 Contingencies

Should the above management actions be unsuccessful, or not implemented, the following contingency actions will be initiated as outlined in Table 37.

Table 37 Surface and Groundwater Contingency Actions

Trigger	Action
Non-compliance of management measures in Table 35.	1. The likely cause of the non-compliance shall be immediately investigated. 2. Remedial action shall be undertaken immediately to repair damage if required. 3. Preventative actions shall be taken to prevent further non-compliance. 4. A review shall be conducted of management measures and/or further education of staff/contractors to ensure that all possible steps are taken to prevent any reoccurrence.
Occurrence of erosion	1. Investigate the cause 2. If the occurrence is a result of the construction of the road preventative actions shall be undertaken to prevent further erosion. These may include: ◗ Application of fill/mulch; ◗ Installation of gabion cages; and ◗ Installation of jute matting to secure bank. 3. Monitor the effectiveness of the remedy.

Trigger	Action
Significant change in groundwater water quality that may be attributed to the Project.	1. Investigate the cause 2. If the occurrence is a result of the construction of the road preventative actions shall be undertaken. These may include: ◗ review of drainage design; and ◗ additional site works. 3. Monitor the effectiveness of the remedy.
Spill or leak of hazardous materials during construction.	1. The cause of level 1 or 2 spills shall be investigated. 2. An appropriate remedy shall be implemented, possibly including: ◗ repairing defective equipment; and ◗ upgrading fuel storage and revise handling procedures. 3. The effectiveness of the remedy shall be monitored.
Localised surface flooding	1. Investigate the cause 2. If the occurrence is a result of the construction of the road preventative actions shall be undertaken to prevent further ponding. These may include: ◗ review of drainage design; and ◗ additional site works. 3. Monitor the effectiveness of the remedy.

3.7.9 Reporting Requirements

Table 38 Surface and Groundwater Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Occurrences of erosion on the site and runoff into wetlands/watercourses and contingency actions implemented	Monthly	Contractor	Main Roads
Contingency actions including the implementation of any contingency actions and any new contingencies recommended.	Monthly	Contractor	Main Roads Representative
Changes to groundwater quality.	As required	Main Roads Project Manager	DoW

3.8 River Foreshores

3.8.1 Background

The Project traverses two existing major watercourses – the Preston River to be crossed by two bridges and the Ferguson River by a single bridge. The crossing sites are vegetated with remnant

native overstorey species and a weed / pasture grass understorey.

The watercourses are protected under the *Rights in Water and Irrigation Act 1914.* Main Roads has been issued with conditional approval to construct the bridges by the DoW.

DoW has approved the proposed bridge designs in respect to the waterways capacity at the Preston and Ferguson Rivers.

Furthermore, a condition imposed on PAR through the EPA assessment of the Greater Bunbury Region Scheme by the Minister for the Environment includes a requirement that a Foreshore Management Plan (FMP) be prepared for the Ferguson River in the vicinity of the Port Access Road. This section of the EMP addresses the EPA requirement and applies to both the Ferguson and Preston Rivers.

3.8.2 Potential impacts

Potential impacts to the foreshores of the Ferguson and Preston Rivers include:

- Direct or indirect loss of remnant vegetation, and consequential loss of conservation value and negative impacts on fauna habitat;
- Impacts on water quality through increased turbidity (from erosion/scouring) or contamination (from road runoff) which could affect aquatic flora and fauna; and
- Pollution of existing foreshores and waterways through inappropriate management of acid sulphate soils, hydrocarbons and waste.

3.8.3 Management Objectives

Management objectives, targets and KPIs are detailed in Table 39 to assess the achievement of the above objectives, while Table 40 details relevant management and mitigation measures to achieve these objectives.

Table 39 Foreshore Objectives, Targets and Key Performance indicators

Management objective	Target	Key Performance Indicator
Minimise the impacts on the existing foreshore landform and native vegetation, during and after construction.	No clearing or disturbance of vegetation during construction outside of pre-defined clearing boundaries approved by a Main Roads Representative.	Incident Report Register (for clearing exceeding design plans) Construction area inspections
	Conduct rehabilitation and revegetation works in all disturbed foreshore areas as soon as possible after works are completed.	Site inspections
	Achieve rehabilitation completion criteria in foreshore areas within three years of construction.	Rehabilitation monitoring (see Landscaping Plan)

Management objective	Target	Key Performance Indicator
Comply with legislative requirements	Comply with the conditions of the approved Bed and Banks Permit.	Compliance reporting and site audits
	Seek appropriate approvals from DoW for any temporary crossings of the Ferguson or Preston Rivers ie temporary crossings.	DoW licenses and approvals
Minimise impacts and/or alterations to the existing foreshore landform, condition and shape including that due to erosion.	No new bank erosion attributable to construction works 20 m upstream or 20 m downstream of foreshore works area during final construction area inspection.	Results from final construction inspection.
	No new bank erosion attributable to construction works 20 m upstream or 20 m downstream of foreshore works area two (2) years after the completion of construction.	Annual monitoring inspections
Minimise impacts on the hydrology and water quality of the Preston or Ferguson Rivers at drainage outlet upgrade sites.	No foreshore clearing beyond that approved by a Main Roads Representative.	Incident Report Register Construction area inspections
	No evidence of runoff from construction areas directed into the adjacent river/drains during construction.	Site inspections Complaints Register
	No direct discharge from road or bridges to rivers.	Design audits Site inspections
Prevent the spillage of hazardous goods to the adjacent environment, particularly watercourses and wetlands.	No Level 1 or 2 spills of hazardous goods during construction.	Incident Report Register
Minimise the risk of spillage of hazardous goods to watercourses.	Implement drainage basins at watercourse crossings to avoid direct discharge to the watercourse.	Design audit Site inspection
Manage any ASS that will be disturbed or impacted by bridge construction works	Investigate ASS. Prepare and implement DEC approved management plan if required.	ASS Management Plan (if required) DEC compliance reporting and site audits

3.8.4 Management Actions

To avoid significant impacts on the Ferguson and Preston Rivers foreshore areas as a result of this Project, the management and mitigation measures will include, but not limited to the following actions outlined in Table 40.

Table 40 Foreshore Management Actions

	Management Action	Timing	Responsibility
1	Design bridges to maintain hydrologic capacity of the watercourse with DoW approved increases in upstream backwater.	Design	Main Roads Project Manager
2	Design bridges to avoid disturbance of the primary watercourse channel.	Design	Main Roads Project Manager and Contractor
3	Prepare and implement environmental offset plan for riverine vegetation/habitat approved by the Department of Environment and Conservation.	Design	Main Roads Project Manager
4	Design bridges so that no runoff will be directly discharged into the rivers. Bridges shall not incorporate scuppers and runoff shall be directed to capture areas on either side of the crossing.	Design	Contractor
5	Design watercourse crossings to include erosion control and scour protection measures.	Design	Contractor
6	Approvals from DoW shall be obtained prior to any temporary crossings being constructed at the bridge crossings.	Design	Contractor
7	Conduct appropriate site investigations and determine the risk of acid sulphate soils (ASS) being disturbed by the works. If ASS may be disturbed, prepare an ASS Management Plan to be approved by the DEC.	Design	Contractor
8	The induction program shall include training to make sure all personnel are aware of the requirements to protect river foreshores.	Pre-construction	Contractor
9	Bridges shall be constructed as designed.	Construction	Contractor
10	Implement the ASS management plan as approved by the DEC.	Construction	Contractor
11	Maintain river water flows during construction works as approved by the DoW.	Construction	Contractor
12	Where clearing at water course crossings is required trees shall be cut off at ground level leaving the root system in-situ to maintain bank stability.	Construction	Contractor
13	Any overhanging vegetation on the clearing boundary shall be pruned with a chainsaw.	Construction	Contractor
14	Where practicable silt curtains shall be in place during all construction activities at waterways.	Construction	Contractor

	Management Action	Timing	Responsibility
15	Install temporary erosion and sediment control measures to prevent unmanaged drainage from the work site entering the watercourses.	Construction	Contractor
16	At the crossing sites install temporary fencing along the edge of the clearing line (perpendicular to the river) to avoid disturbance beyond the works area.	Construction	Contractor
17	All temporary works and structures erected in waterways or on foreshores shall be removed post construction, and the landform restored.	Construction	Contractor
18	Respread topsoil at foreshore areas as per the Topsoil Management Plan.	Construction	Contractor
19	Revegetate disturbed areas of the site with local endemic plant species as per the Revegetation and Landscape Plan.	Construction	Main Roads Project Manager
20	Hydrocarbon storage shall not be permitted within 200 m of a watercourse or wetland.	Construction	Contractor
21	No re-fuelling of equipment (with the exception of stationary plant) shall be conducted within 50 m of a watercourse.	Construction	Contractor

3.8.5 Monitoring Program

To ensure and record compliance with the foreshore management objectives and associated management actions, the following monitoring items will be completed. Frequency, responsibility and parameters are detailed in Table 41.

Table 41 Foreshore Monitoring Requirements

Parameter	Frequency/Duration	Location	Responsibility
Evidence of bank erosion 20 m upstream and 20 m downstream of foreshore works sites.	Weekly during bridge construction works. Monthly during construction once foreshore works conclude. Annually for two (2) years post construction after winter, or flood events	River foreshore sites.	Contractor
Evidence of physical disturbance of banks beyond clearing lines.	Weekly during foreshore construction works.	River foreshore sites.	Contractor

Parameter	Frequency/Duration	Location	Responsibility
Evidence of direct runoff into watercourses from construction areas.	Weekly inspections throughout construction phase as required after rainfall events	River foreshore sites.	Contractor
Integrity of silt curtains.	Daily during use.	River foreshore sites.	Contractor
Fencing of foreshore areas.	Daily during construction	River foreshore sites.	Contractor
Revegetation of foreshore areas.	Annually for three (3) years post construction	River foreshore sites.	Main Roads Project Manager

3.8.6 Contingencies

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

Table 42 Foreshore Management Contingency Actions

Trigger	Action
Non-compliance with management measures in Table 40.	1. The likely cause of the non-compliance shall be immediately investigated. 2. Remedial action shall be undertaken immediately to repair damage to riverine and foreshore areas if required. 3. Preventative actions shall be taken to prevent further non-compliance. 4. A review shall be conducted of management measures and/or further education of staff/contractors to ensure that all possible steps are taken to prevent any reoccurrence.
Disturbance to the Preston or Ferguson Rivers by visual observations, other than that expected in the short term.	1. Investigate the cause of the significant increase, including potential for the change to be attributed to adjacent land uses/activities. 2. If the change is attributed to the presence of the road and/or construction activities undertaken in the vicinity, an appropriate remedy and/or preventative action shall be identified and implemented. 3. Monitor the effectiveness of the remedy.

Trigger	Action
Direct discharge of surface water runoff from construction areas into wetlands or watercourses.	1. Investigate the cause. 2. Identify and implement preventative action to prevent the re-occurrence, possibly including: ◗ Realigning diversion bunds; and ◗ Extending diversion bunds. 3. Monitor effectiveness of preventative action
Spill or leak of hazardous goods during construction.	1. Immediately investigate the cause (Class 1, 2 or 3) 2. Implement remedy, possibly including: ◗ Repairing faulty equipment; and ◗ Improving fuel storage and handling procedures. 3. Monitor effectiveness of remedy
Direct discharge of surface water runoff from the road into wetlands or watercourses during operation of the road.	1. Investigate the cause. 2. Identify and implement preventative action to prevent the re-occurrence, possibly including: ◗ Revised drainage design; and ◗ Site works. 3. Monitor effectiveness of preventative action.

3.8.7 Foreshore Reporting Requirements

Parameter	Frequency	Responsibility	Report to
Occurrences of erosion on the site and contingency actions implemented.	Monthly	Contractor	Main Roads Representative
Evidence of disturbance to river banks beyond the clearing line	Monthly	Contractor	Main Roads Representative
Evidence of direct runoff into watercourses from construction areas	Monthly	Contractor	Main Roads Representative
Contingency actions including the implementation of any contingency actions and any new contingencies recommended.	Monthly	Contractor	Main Roads Representative
Occurrences of erosion of foreshore following completion of construction.	As required if eroded	Main Roads Project Manager	DoW
Revegetation of foreshore area	Annually for three years	Main Roads Project Manager	DoW

4. Environmental Auditing

To monitor the success or otherwise in achieving the environmental objectives and targets detailed in the preceding sections of this EMP, the following auditing requirements are considered to be a minimum recommendation.

Table 43 Environmental Auditing Requirements

Parameter	Frequency	Responsibility	Report to
Audit compliance with the EMP during the construction period.	Every six (6) months and at completion.	Contractor	Main Roads Representative
Undertake third party audits of compliance with this EMP during the construction and two year defects period.	Annually	Main Roads Project Manager	Main Roads Representative

5. Environmental Incidents

Environmental incidents are defined as events that cause or potentially cause harm to the environment, with the level of significance assigned according to the definitions provided in the Table 45.

The appropriate management of environmental incidents that may occur during construction is important in mitigating environmental impacts of the project and achieving the environmental objectives and targets. To ensure that all environmental incidents are identified, reported and thoroughly investigated, and that where appropriate, corrective action aimed at preventing recurrences of the incident takes place the Contractual requirements are detailed in the Scope of Works and Technical Criteria. These requirements are summarised in Table 44.

Table 44 Environmental Incident Management Measures

Environmental Incidents	Contractor
Develop a procedure for the management and notification of environmental incidents that ensures incidents are: ◗ Identified; ◗ Reported; ◗ Investigated, and ◗ Where appropriate, corrective action aimed at preventing recurrences of the incident takes place.	Contractor
Define the significance of environmental incidents as per Table 45.	Contractor
Report environmental incidents as per the notification requirements.	Contractor
Maintain an environmental incidents report register.	Contractor

Environmental incidents are defined as events that cause or potentially cause harm to the environment, with the level of significance assigned according to the definitions provided in Table 45.

Table 45 Environmental Incident Classification

Significance (Class)	Nature of incident	Example
Minor (3)	Where the environmental impact is limited and is confined within the work site. Environmental impacts are readily addressed through clean up or changes to work practise. Breach of contract EMP.	Uncontained hydrocarbon spill less than 200 L. Dust suppression failure without causing off-site impact.

Significance (Class)	Nature of incident	Example
Significant (2)	Incident involving off -site environmental impacts that requires significant resources to address. Non-compliance with statutory requirements or environmental criteria requiring reporting to authorities. Non-conformance with Contractors EMP occurring within the work site where the environmental impact is significant and has the potential for an off-site environmental impact.	Clearing outside approved area (less than 100m^2). Over spray of herbicides damaging nearby crops or native vegetation. Uncontained hydrocarbon spillage greater than 200L. Dust suppression failure causing off-site impact.
Major (1)	Any on-site or off-site environmental incident resulting in significant long term environmental harm. An incident resulting in prosecution under environmental laws.	Unauthorised clearing of a large area (greater than 100m^2). Actual pollution of waterways (eg by on-site or off-site fuel spills). Land disturbance resulting in damage to public infrastructure which impacts on a group of people.

All incidents, no matter how insignificant must be reported as per the notification process detailed below:

Table 46 Environmental Incident Notification Process

Incident Category	Personnel to be Notified	Timing of Notification
Minor (3)	Observer(s) notifies Supervisor	By the end of the working day
Significant (2)	Observer(s) notifies Supervisor	Upon completion of remedial action
	Contractor's Supervisor notifies the Contractor's Representative and Contract Manager	Upon completion of initial incident assessment
	Contract Manager / Main Roads Supervisor notifies Main Roads Manager Environment and DEC if the incident is a non-compliance with statutory requirements or has resulted in pollution or environmental harm.	Upon completion of initial incident assessment
Major (1)	Observer(s) notifies Supervisor	Immediately
	Contractor's Supervisor notifies the Contractor's Representative and Contract Manager	Immediately
	Contract Manager / Main Roads Supervisor notifies DEC Manager Environment and relevant Executive Directors.	Upon completion of initial incident assessment and/or site emergency response procedure

6. Reporting

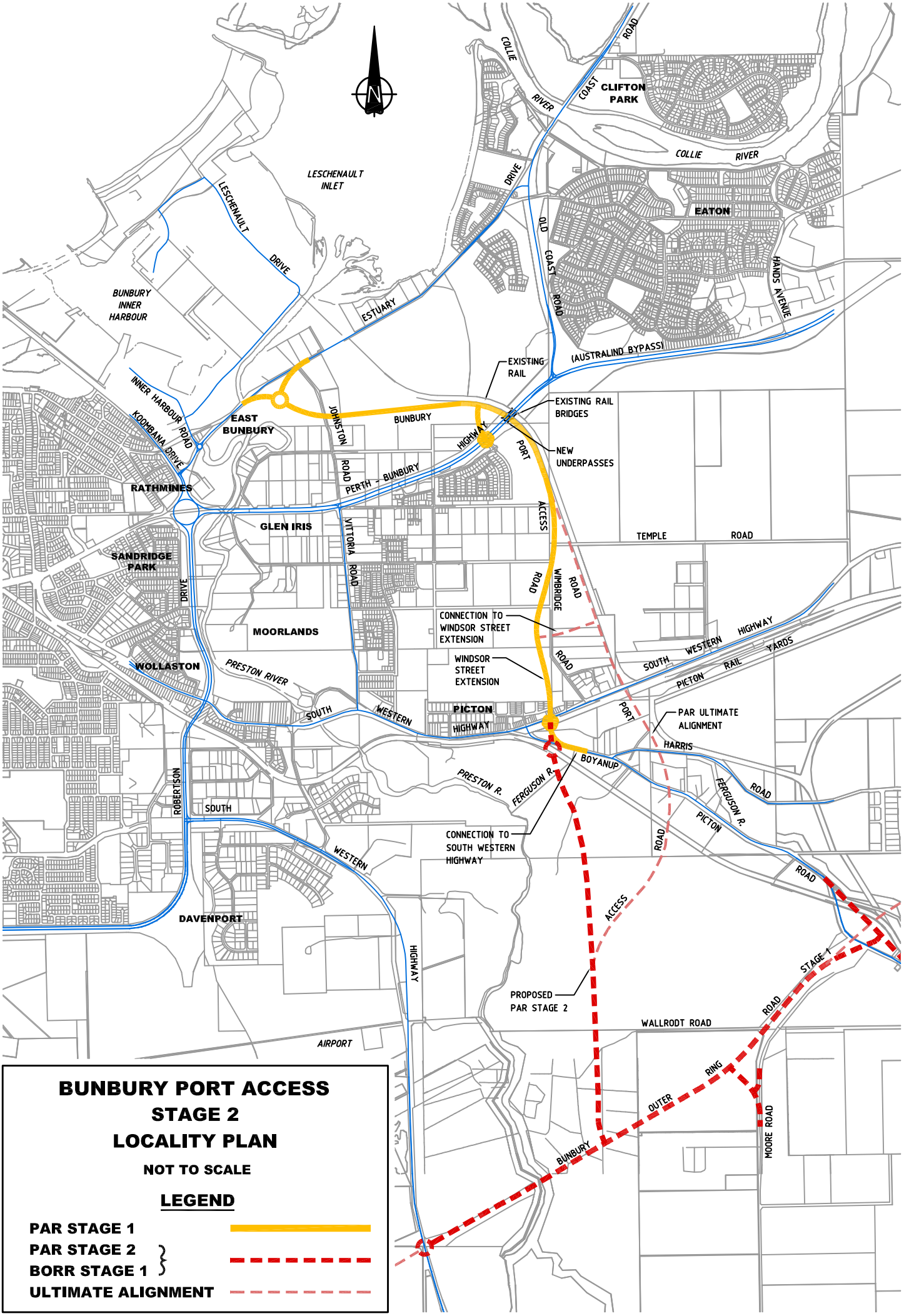
The following section provides a summary of the environmental reporting requirements throughout the implementation of the Project. Detailed reporting requirements are included in the preceding sections of this EMP and the Contract documentation.

Table 47 Summary of Environmental Reporting

Parameter	Frequency	Responsibility	Report to
Construction Phase			
Environmental Incidents	Monthly	Contractor	Main Roads
Non-conformances and corrective actions	Monthly	Contractor	Main Roads
Complaints received	Monthly	Contractor	Main Roads
Monthly environmental performance reports.	Monthly	Contractor	Main Roads
Specific EMP reporting requirements	As noted in EMP	Contractor	Main Roads
Prepare any compliance reports required by any regulatory Authority and submit them to a Main Roads' Representative for comment before submission to the relevant regulatory Authority.	As required	Contractor	Permit / license issuing authority
Construction materials usage – fill materials, pavement materials, surface materials – aggregate, sand ,asphalt, kerbing, barrier, bridges and culverts	Annually	Contractor	Main Roads
Project environmental performance report.	Completion of construction	Contractor	Main Roads
Annual Public Environmental Reporting data – environmental and materials usage	Annually	Main Roads Project Manager	Main Roads Manager Environment
Post Construction			
Specific EMP reporting requirements including clearing area, erosion, declared plants, drainage structures, flooding / inundation	As noted in EMP	Contractor	Main Roads
Specific EMP reporting requirements including erosion, declared plants, drainage structures, flooding / inundation	As noted in EMP	Main Roads Project Manager	Main Roads Manager Environment

Parameter	Frequency	Responsibility	Report to
End of Defects Correction Period			
Specific EMP reporting requirements including erosion, Declared plants, drainage structures, flooding / inundation	As noted in EMP	Contractor	Main Roads
Specific EMP reporting requirements including erosion, declared plants, drainage structures, flooding / inundation	As noted in EMP	Main Roads Project Manager	Main Roads Manager Environment

Figures



BUNBURY PORT ACCESS
STAGE 2
LOCALITY PLAN

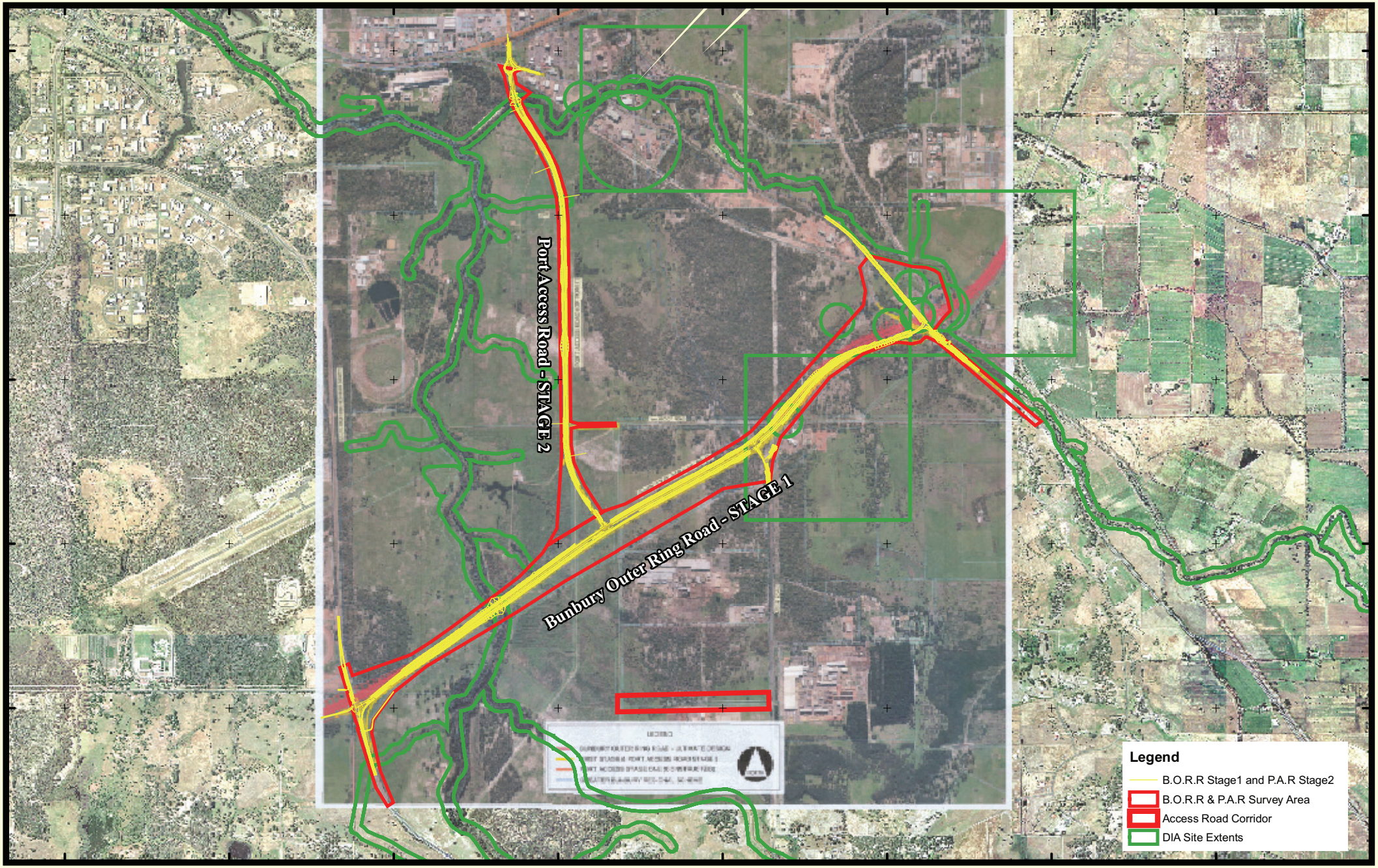
NOT TO SCALE

LEGEND

- PAR STAGE 1
- PAR STAGE 2
- BORR STAGE 1
- ULTIMATE ALIGNMENT

Last Updated: 1 June 2011

PAR-Locality-Plan-04.dwg



Port Access Road - STAGE 2
and Bunbury Outer Ring Road - STAGE 1

DATE
3rd Sept 2010

SCALE - at A4
1:30,000

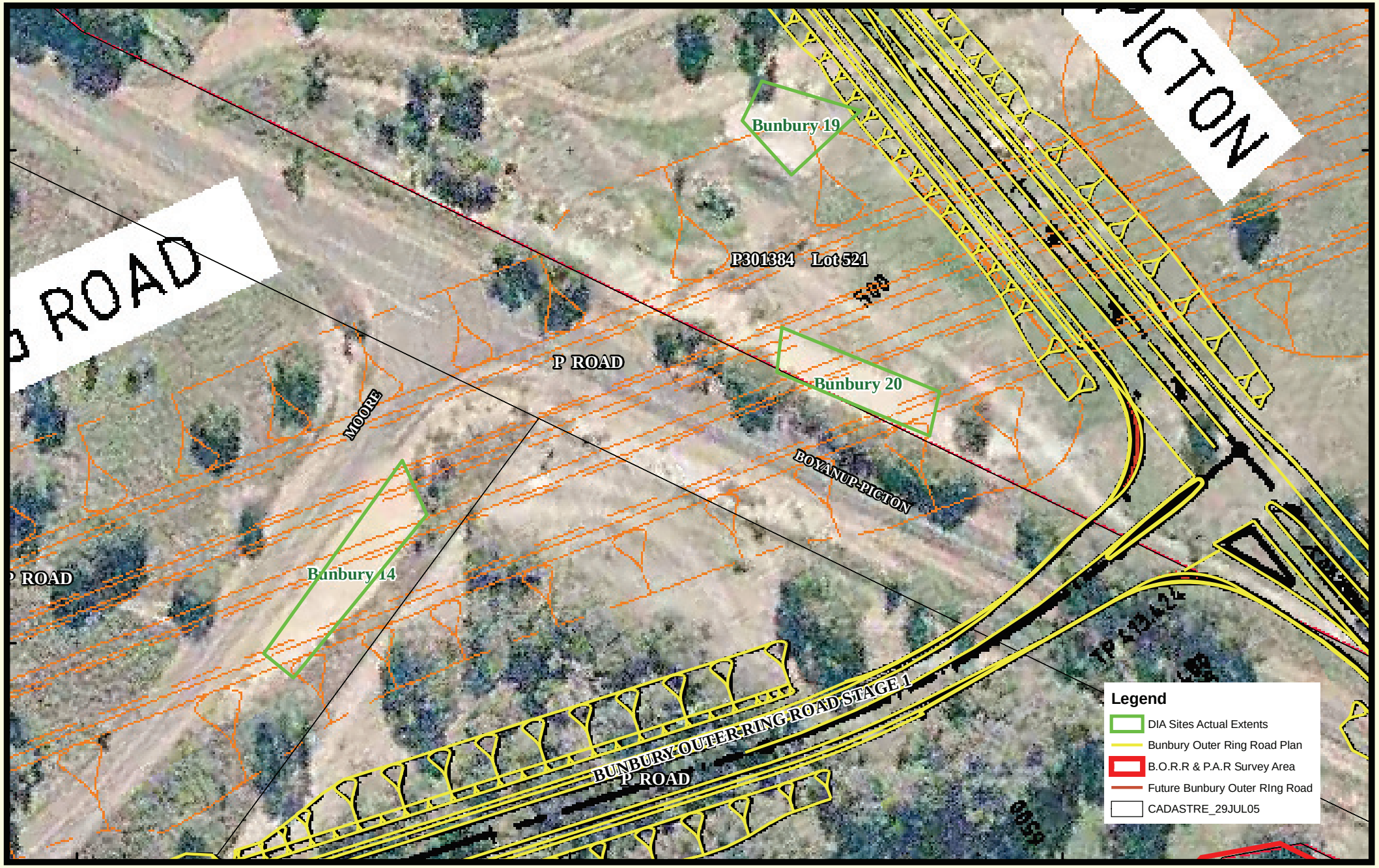
0 105 210 420 630 840 1,050 1,260
Meters

N

GDA 1994 MGA Zone 50

Survey conducted by
BRAD GOODE & ASS - 79 Naturaliste Terrace, DUNSBOROUGH WA 6281

Mapping provided by
WARPSPEED GIS - P.O. BOX 147, VASSE WA 6280



Bunbury Outer Ring Road - STAGE 1
in relation to Actual Site Extent of SiteID 4875 - Bunbury 14, SiteID 4870 Bunbury 19 and SiteID 4880 Bunbury 20

DATE
12th Oct 2010

SCALE - at A4
1:1,000

0 3.75 7.5 15 22.5 30 37.5 45
Meters

N

GDA 1994 MGA Zone 50

Survey conducted by
BRAD GOODE & ASS - 79 Naturaliste Terrace, DUNSBOROUGH WA 6281

Mapping provided by
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Port Access Road - STAGE 2
in relation to Ferguson River Crossing

DATE
11th Oct 2010

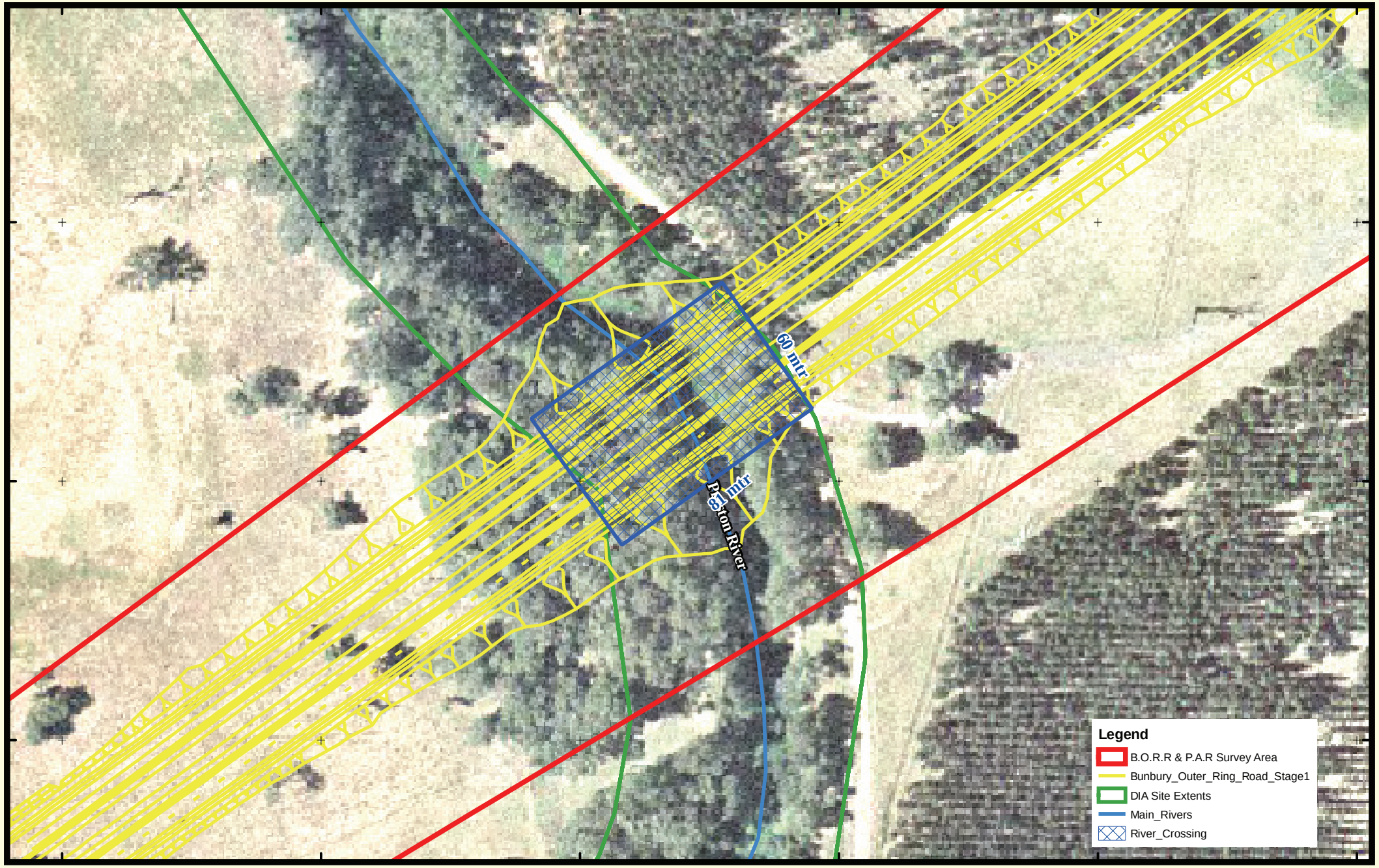
SCALE - at A4
0 3.5 7 14 21 28 35 42
Meters

N

GDA 1994 MGA Zone 50

Survey conducted by
BRAD GOODE & ASS - 79 Naturaliste Terrace, DUNSBOROUGH WA 6281

Mapping provided by
WARPSPEED GIS - P.O. BOX 147, VASSE WA 6280



Bunbury Outer Ring Road - STAGE 1
in relation to Preston River Crossing

DATE
11th Oct 2010

SCALE - at A4

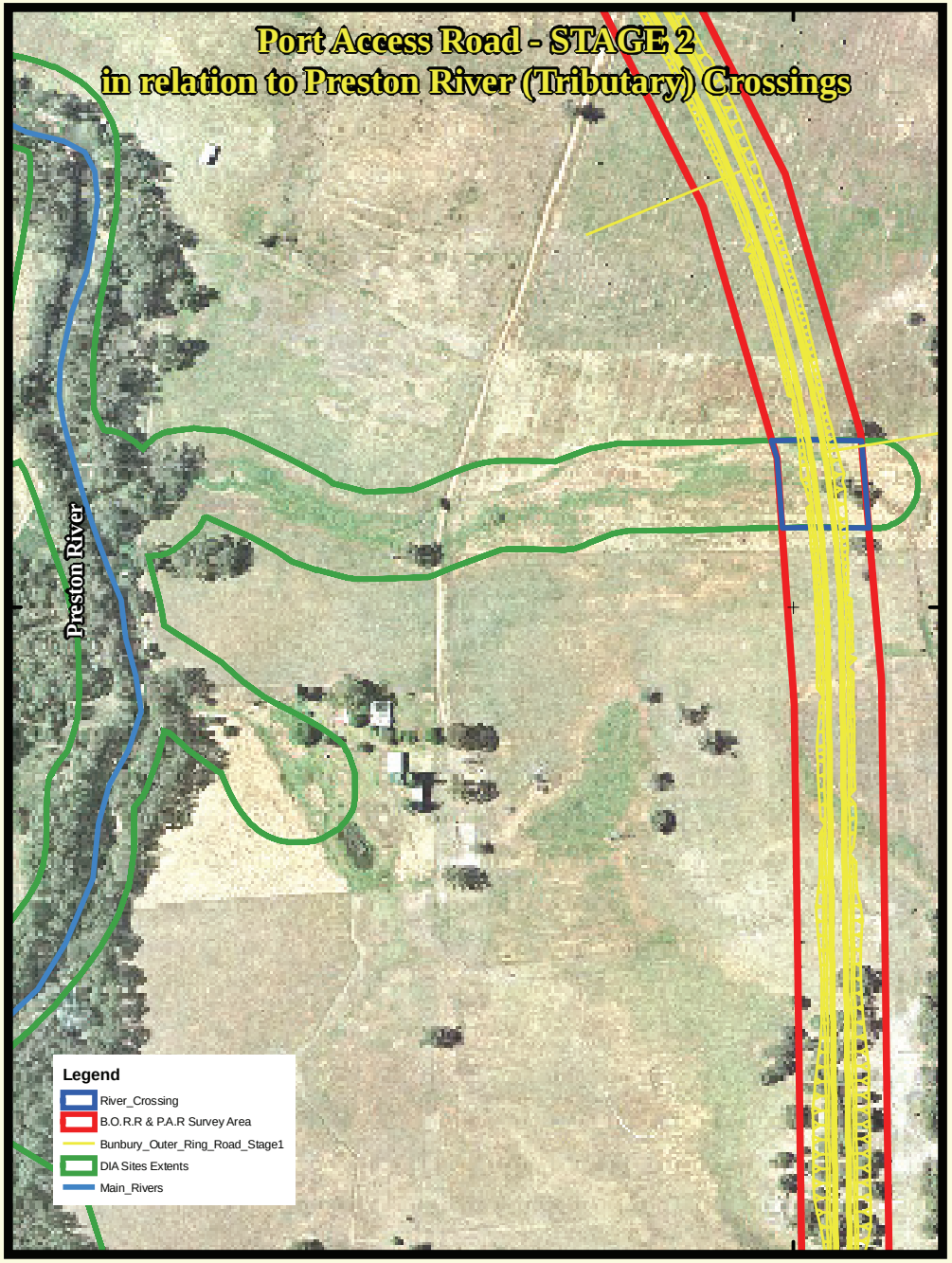
0 5 10 20 30 40 50 60
Meters

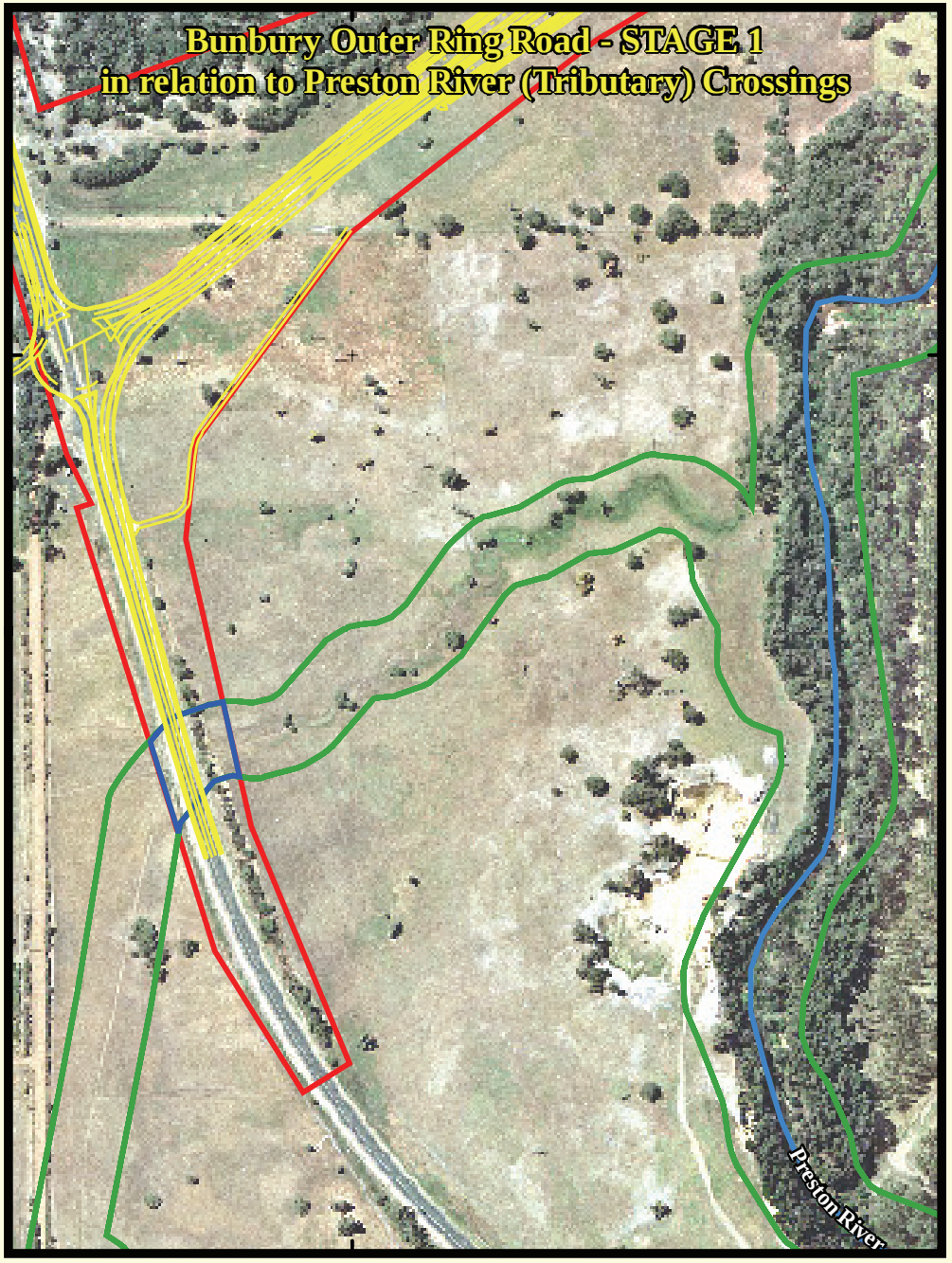
N

GDA 1994 MGA Zone 50

Survey conducted by
BRAD GOODE & ASS - 79 Naturaliste Terrace, DUNSBOROUGH WA 6281

Mapping provided by
WARPSPEED GIS - P.O. BOX 147, VASSE WA 6280





Port Access Road - STAGE 2
and Bunbury Outer Ring Road - STAGE 1
in relation to Preston Tributary Crossings

DATE

11th Oct 2010

SCALE - at A4

0 12.5 25 50 75 100 125 150
Meters

N

GDA 1994 MGA Zone 50

Survey conducted by
BRAD GOODE & ASS - 79 Naturaliste Terrace, DUNSBOROUGH WA 6281

Mapping provided by
WARPSPEED GIS - P.O. BOX 147, VASSE WA 6280

Appendix A

Cultural Heritage Monitors Conditions of Engagement

Bunbury Port Access Project Stage 2

Aboriginal Heritage Monitors Conditions of Engagement

Background

Two Noongar Cultural Heritage Monitors (CHM) shall be engaged to monitor ground disturbing works at the:

- Ferguson River (PAR Ch. 2 650-2 720)
- Preston River drainage line (PAR Ch. 1900-2100)
- Preston River (BORR Ch. 9 520-9 680)
- Moore Rd section (BORR Ch. 6 500 – 8 500)
- Preston River drainage line (SW Hwy Ch. 300-400)
- Boyanup Picton Road Rd section (Ch. 0-1800)

One young observer may accompany the Cultural Heritage Monitors and this person will need to be nominated to the Contractor. The young observers will not be employed or paid by the Contractor.

Definition of Terms

For the purposes of these Conditions of Engagement, the following definitions apply:

1. Main Roads includes employees, consultants and contractors engaged by Main Roads Western Australia.
2. Contractor is the organisation bound to execute work on behalf of Main Roads as defined by the Contract Deed.
3. Cultural heritage monitor (CHM) is a person nominated to Main Roads or Contractor to represent the claimant group in observing the Contractor's activities and to protect Aboriginal heritage.
4. Ground Disturbing Activity means activities that disturb the earth and activities involving the use of machinery, and include, but are not limited to; clearing, topsoil stripping and excavation.
5. Native Title Applicants means the registered applicants listed on the Native Title Claim and all people on whose behalf the Native Title Claim was lodged.
6. Land means the area of land comprising the Site.
7. Site means an Aboriginal Site as defined in Section 5 of the *Aboriginal Heritage Act 1972.*
8. Works Site means Bunbury Port Access Project Stage 2 road reservation on which Main Roads infrastructure will be constructed as shown at Figure 1.

Conditions and Responsibilities

The following table defines the conditions and responsibilities in conducting monitoring of the Project.

Item	Management Action	Timing	Responsibility
1	Prior to the commencement of ground disturbing activities conduct a site induction with the Noongar Cultural Heritage Monitors (CHM), and prepare a schedule / roster for site monitoring.	Pre-construction	Contractor / Cultural Heritage Monitors
2	Payments to CHM will be $400.00 cash per day. Alternatively CHM can be employed by the Contractor to conduct heritage monitoring and other suitable tasks.	Construction	Contractor
3	Payment for the monitoring services will be made by the Contractor with time sheets to be processed for payment every second day.	Construction	Contractor
4	Insurance (worker's compensation, public liability, etc) requirements for CHM and observers shall be covered by the Contractors insurance.	Construction	Contractor
5	Timesheets shall be completed by the CHM in full and will be signed by the Contractor's nominated representative and the monitors.	Construction	Cultural Heritage Monitors
6	Construction hours will generally be 7 am to 7 pm Monday to Saturday excluding public holidays. CHM are expected to be available during these times.	Construction	Cultural Heritage Monitors
7	Notification to the CHM of the works commencing will be by mail and phone approximately one week prior to the commencement of the activities.	Construction	Contractor
8	The failure of the CHM to attend the Works Site after being given at least three working days' notice of their need to attend will not inhibit the construction works to proceed.	Construction	Cultural Heritage Monitors
9	If more than two CHM are nominated then the first two on the supplied list will be contacted initially.	Construction	Contractor
10	CHM must be suitable to attend the Works Site in terms of their physical ability to walk and inspect the work site in safe and capable manner.	Construction	Cultural Heritage Monitors
11	The CHM must comply with the Contractors' Occupational Safety and Health Policy & Alcohol and Other Drugs Policy.	Construction	Cultural Heritage Monitors
12	On days when the monitoring of ground disturbing activities is to occur the CHM should attend the Works Site office 30 minutes prior to the Contractor's start time. This will enable any pre-start briefings for the day to be arranged and safety equipment to be issued.	Construction	Cultural Heritage Monitors
13	If the CHM do not arrive on the Works Site by the Contractor's nominated start time, or if they decide to depart the site prior to the end of the working day, this will not prevent the Contractor from undertaking ground disturbing activities on that day.	Construction	Contractor

Item	Management Action	Timing	Responsibility
14	A Work Site-specific induction may need to be attended by the CHM, depending on the Contractor's specific Works Site requirements.	Construction	Contractor / Cultural Heritage Monitors
15	The CHM and any observers must attend the Works Site wearing sturdy and enclosed shoes, long trousers and a long-sleeved shirt.	Construction	Cultural Heritage Monitors
16	CHM will be supplied with the necessary Personal Protective Equipment (PPE) (e.g. hard hats, high visibility vests) to enter the Works Site by the Contractor.	Construction	Contractor
17	CHM will return PPE to the Contractor at the end of each working day.	Construction	Cultural Heritage Monitors
18	The Contractor may at any time at its absolute discretion exclude the CHM or the young observers from being present at the Work Site for non-compliance with safety requirements. This exclusion will not prevent the Contractor from undertaking ground disturbing activities on that day.	Construction	Contractor / Cultural Heritage Monitors
19	CHM may advise the Contractor on ways to minimise disturbance within the affected site.	Construction	Contractor / Cultural Heritage Monitors
20	Should the CHM choose not to be present for the entire day (Contractor's normal working hours), then for safety reasons they must advise the Contractor s Representative on arrival and prior to leaving the Works Site so that the Contractor is aware of who is on the Works Site and that ground disturbing activities can take place without the presence of CHM.	Construction	Contractor / Cultural Heritage Monitors
21	The Contractor will provide vehicle transport for CHM to travel around the Site, or elect to provide an escort for the CHM.	Construction	Contractor

Appendix B

Topsoil Management Plan

Bunbury Port Access Road Project (Stage 2)
Topsoil Management Plan

The management of topsoil during roadworks is important to optimise the use of the resource by its regeneration potential, and to minimise the risk of transporting weeds within the site. Appropriate topsoil management is also critical in the success and maintenance of new revegetation sites.

All mulch produced from the project clearing works is to be used to manufacture 'clean' topsoil for use in the project revegetation works.

The scope, procedures and processes for revegetation works were developed in accordance with and with reference to Main Roads Specifications:

- Main Roads Specification 204 – Environment
- Main Roads Specification 302 – Earthworks
- Main Roads Specification 304 – Revegetation and Landscaping

Topsoil Management

Prior to the start of earthworks topsoil shall be stripped to a depth of 150 mm and windrowed to the edge of earthworks, or removed from the section for disposal as detailed in Table 1 and Figure 1 below.

Topsoil Manufacture

Mulch from cleared site vegetation is to be stockpiled and mixed with imported compost, clean weed free soil at the percentages of:

- 65% mulched cleared vegetation
- 10% imported compost
- 25% weed free soil

This is then to be allowed to naturally compost as detailed at Figure 2 below.

The manufactured material is then to be respread on all earthwork cut and fill batters at a nominal thickness cover of 80 mm at the completion of earthworks as detailed on the shown at Figures 3 and 4.

TOPSOIL MANAGEMENT STRATEGY

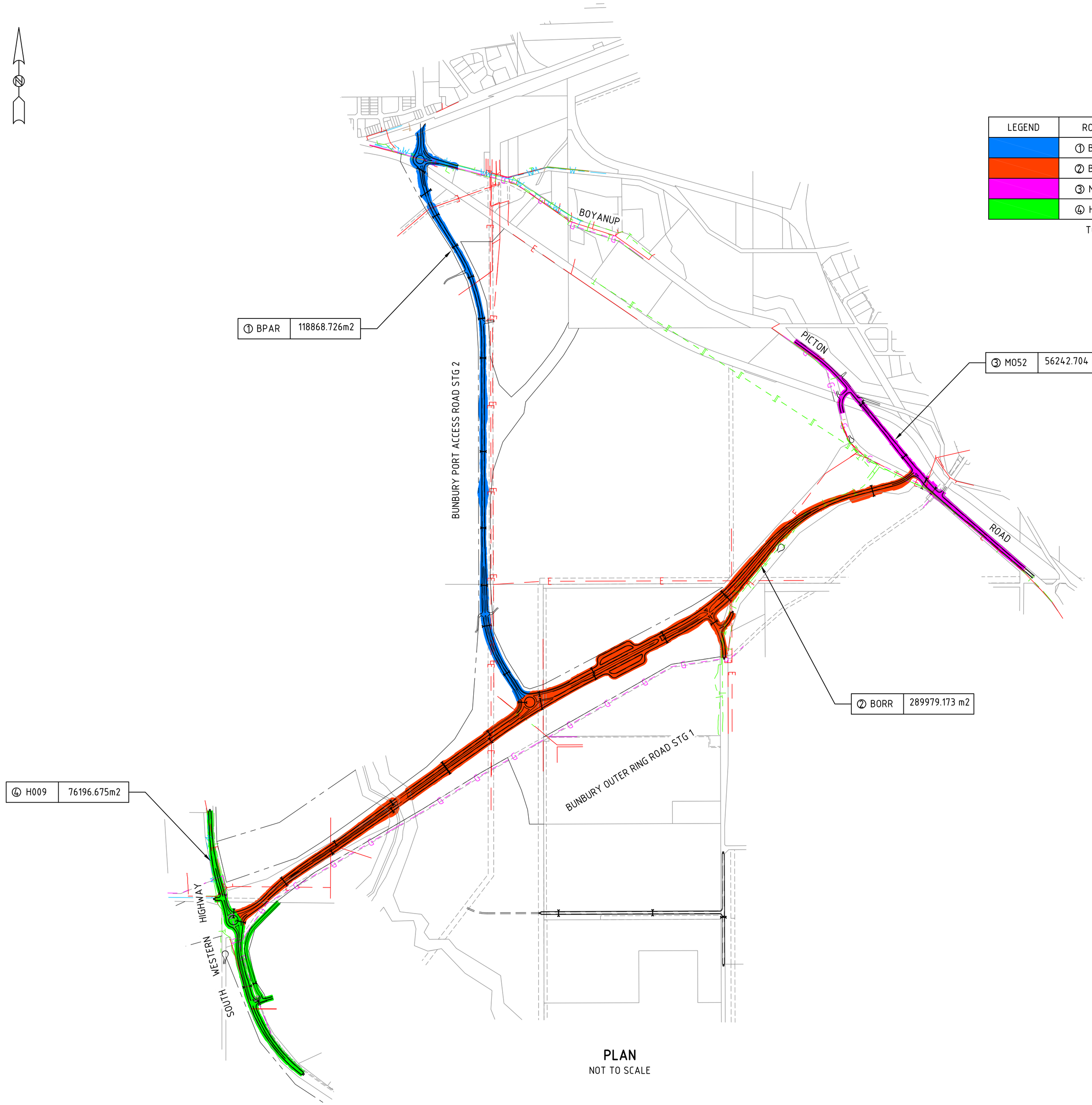
Bunbury Outer Ring Road (BORR) and Bunbury Port Access Stage 2 (BPAR)

Classification key	1 = Well Conserved	2 = Conserved	3 = Partially Conserved	4 = Degraded (To be spoiled off site or buried under 500mm class 1, 2 or 3 topsoil)	5 = Unsuitable (Dispose off site to spoil)	Other - See comment

Item #	Chainage Start	Chainage Finish	Distance	LHS Classification	LHS Management Actions Proposed	Adjacent Landuse or Feature	RHS Classification	RHS Management Actions Proposed	Adjacent Landuse or Feature	Topsoil Treatment and General Comments
BPAR Stage 2										Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	0.000	0.980	0.980	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Industrial	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	0.980	1.250	0.270	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Industrial	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	1.250	1.500	0.250	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Industrial	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	1.500	1.700	0.200	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Industrial	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	1.700	2.600	0.900	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Industrial	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	2.600	2.950	0.350	3	Degraded but can be reused within site outside this chainage	Ferguson River - Verge has upper storey present	3	Degraded but can be reused within site outside this chainage	Ferguson River - Verge has upper storey present	Topsoil to be stripped 150mm deep, removed from this section for disposal with other degraded topsoil. Mulch compost product to be imported and respread nominally 80mm thick on all cut batters
										Total Distance
BORR - M052										**H052 Boyanup Picton Road**
	0.200	0.800	0.600	4	Degraded but can be reused within site	Farmland	4	Degraded, Topsoil to be carted to spoil	Remant Roadside Vegetation	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	0.800	1.600	0.800	4	Degraded but can be reused within site	Farmland	4	Degraded but can be reused within site	Piggery	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	1.600	1.800	0.200	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Farmland	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
BORR - H009										**H009 South Western Hwy**
	0.000	0.400	0.400	3	Degraded but can be reused within site	Verge has upperstory present	4	Degraded but can be reused within site	Speedway Car Park	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	0.400	0.900	0.500	4	Degraded but can be reused within site	Narrow verge adjacent to farmland	4	Degraded but can be reused within site	Narrow verge adjacent to farmland	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
BORR - New Alignment										**BORR - New Alignment starting at M052 Boyanup - Picton Road Intersection**

TOPSOIL MANAGEMENT STRATEGY										
Bunbury Outer Ring Road (BORR) and Bunbury Port Access Stage 2 (BPAR)										
Classification key		1 = Well Conserved		2 = Conserved	3 = Partially Conserved	4 = Degraded (To be spoiled off site or buried under 500mm class 1, 2 or 3 topsoil)	5 = Unsuitable (Dispose off site to spoil)	Other - See comment		
	6.427	8.450	2.023	3	Degraded but can be reused within site outside this chainage	Verge has upper storey present	3	Degraded but can be reused within site outside this chainage	Verge has upper storey present	Topsoil to be stripped 150mm deep, removed from this section for disposal with other degraded topsoil. Mulch compost product to be imported and respread nominally 80mm thick on all cut batters
	8.450	9.500	1.050	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Industrial	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
	9.500	9.900	0.400	3	Degraded but can be reused within site outside this chainage	Preston River - Verge has upper storey present	3	Degraded but can be reused within site outside this chainage	Preston River - Verge has upper storey present	Topsoil to be stripped 150mm deep, removed from this section for disposal with other degraded topsoil. Mulch compost product to be imported and respread nominally 80mm thick on all cut batters
	9.900	10.600	0.700	4	Degraded but can be reused within site	Industrial	4	Degraded but can be reused within site	Verge to be rehabilitated	Topsoil to be stripped 150mm deep, windrowed to the edge of earthworks and then respread on fill batters
										Total Distance

LEGEND	ROAD	AREA (m2)
	① BPAR	118868.726
	② BORR	289979.173
	③ M052	56242.704
	④ H009	76196.675
	TOTAL	541287.278



PLAN
NOT TO SCALE

AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR INFORMATION ONLY	08/06/2011

NOTES

NOTE:
1. ENGINEERING AND DRAINAGE DESIGN SUPPLIED BY AECOM.
2. FOR TOPSOIL RESPREAD AREAS, PLEASE SEE DWG. SK02-RESPREAD AND SK03-RESPREAD.

ISSUED
FOR INFORMATION ONLY

METADATA

GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	01/11/2010
MAPPING SURVEY STANDARD:	
DATE OF CAPTURE:	
MAIN ROADS PROJECT ZONE:	PCG94
HEIGHT DATUM:	AHD

Government of Western Australia
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ROBERTSON DRIVE BUNBURY 6230
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huntsman.

DRAWING NUMBER/DOCUMENT ID
DESIGNED / DRAWN AC
VERIFIED
DIRECTOR

SCALES A 1

MRWA FILE NUMBER
APPROVED (MRWA)

BUNBURY PORT ACCESS PROJECT
STAGE 2

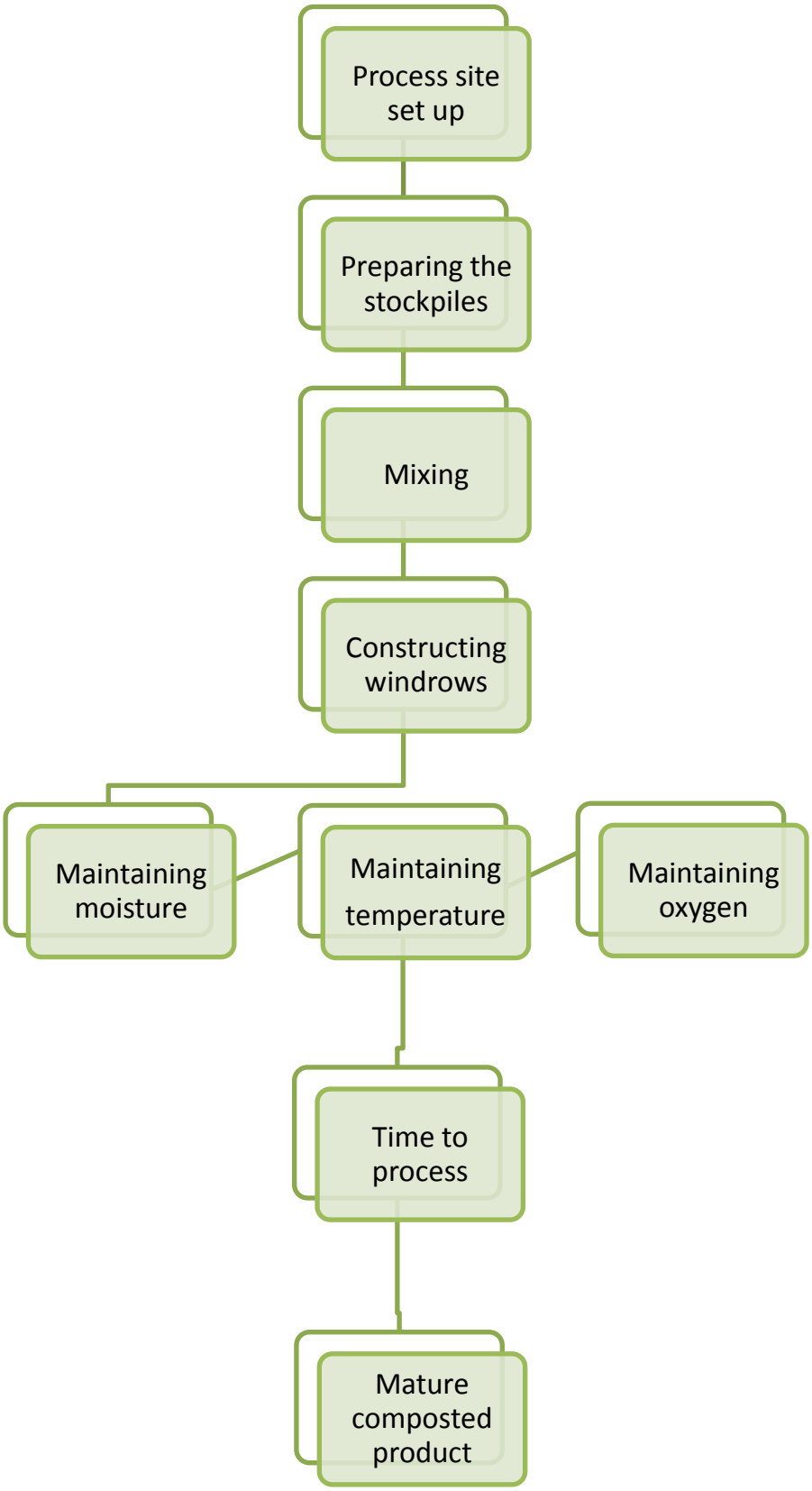
TOPSOIL STRIP PLAN

LOCAL AUTHORITY CITY OF BUNBURY (204)
MRWA DRAWING NUMBER
SK01-STRIP A

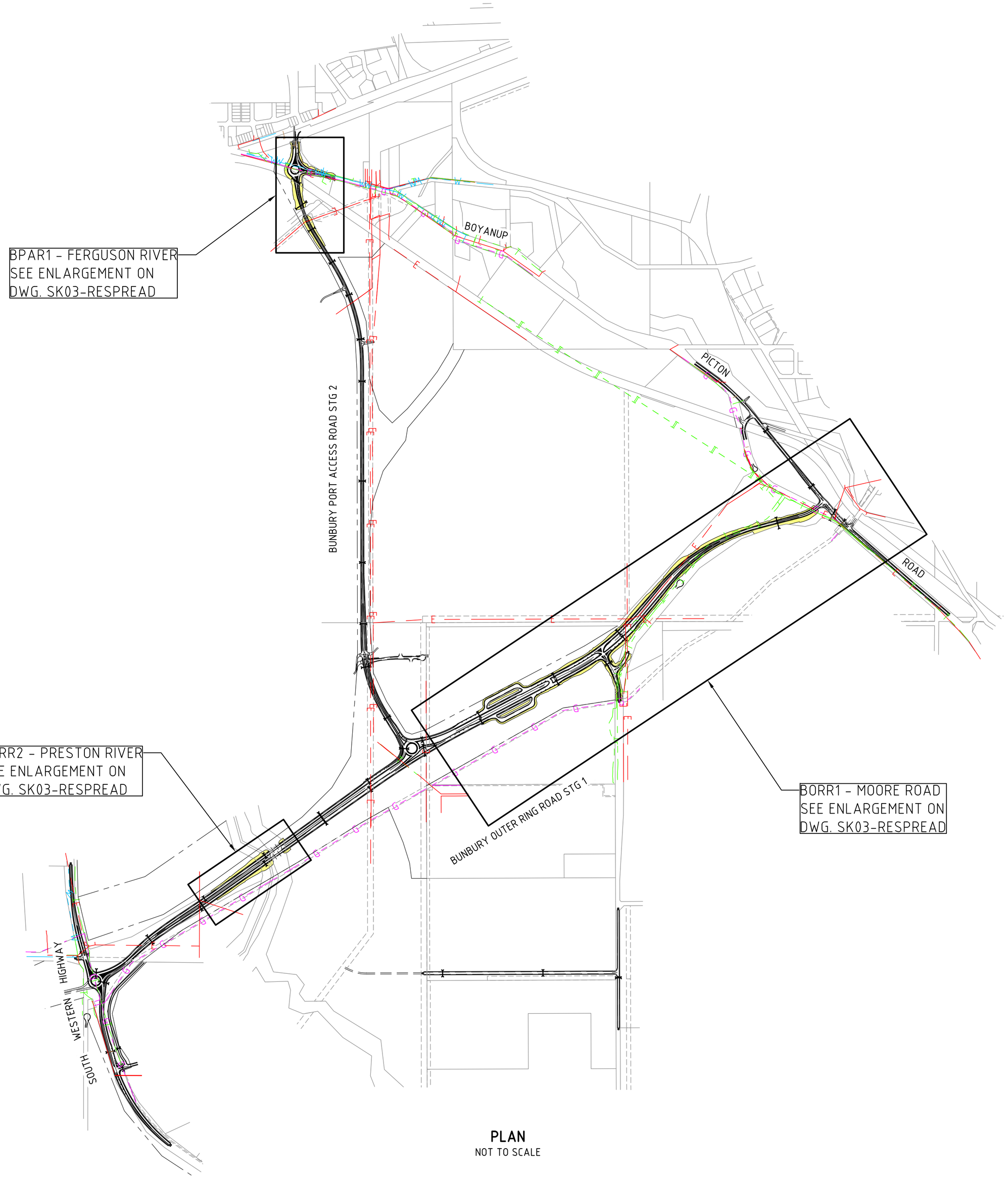
Z:\HUNTSMAN\H10.002-BORR\7 - DOCUMENTATION\7.02-CAD\H10-002-SK01-Strip.dwg

Soil manufacture – the composting process

Steps involved in manufacturing soil – the composting process



(Encycle Consulting Pty Ltd, 2011)



PLAN
NOT TO SCALE

AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR INFORMATION ONLY	08/06/2011

NOTES

NOTE:
1. ENGINEERING AND DRAINAGE DESIGN SUPPLIED BY AECOM.
2. MULCH/COMPOST RESPREAD NOMINALLY 80mm THICK.
3. FOR BREAKDOWN OF RESPREAD AREAS AND ENLARGEMENTS, PLEASE SEE DWG. SK03-RESPREAD.

LEGEND

MANUFACTURED TOPSOIL RESPREAD

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METADATA

GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	01/11/2010
MAPPING SURVEY STANDARD:	
DATE OF CAPTURE:	
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huntsman.

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VERIFIED	
DIRECTOR	

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MRWA FILE NUMBER

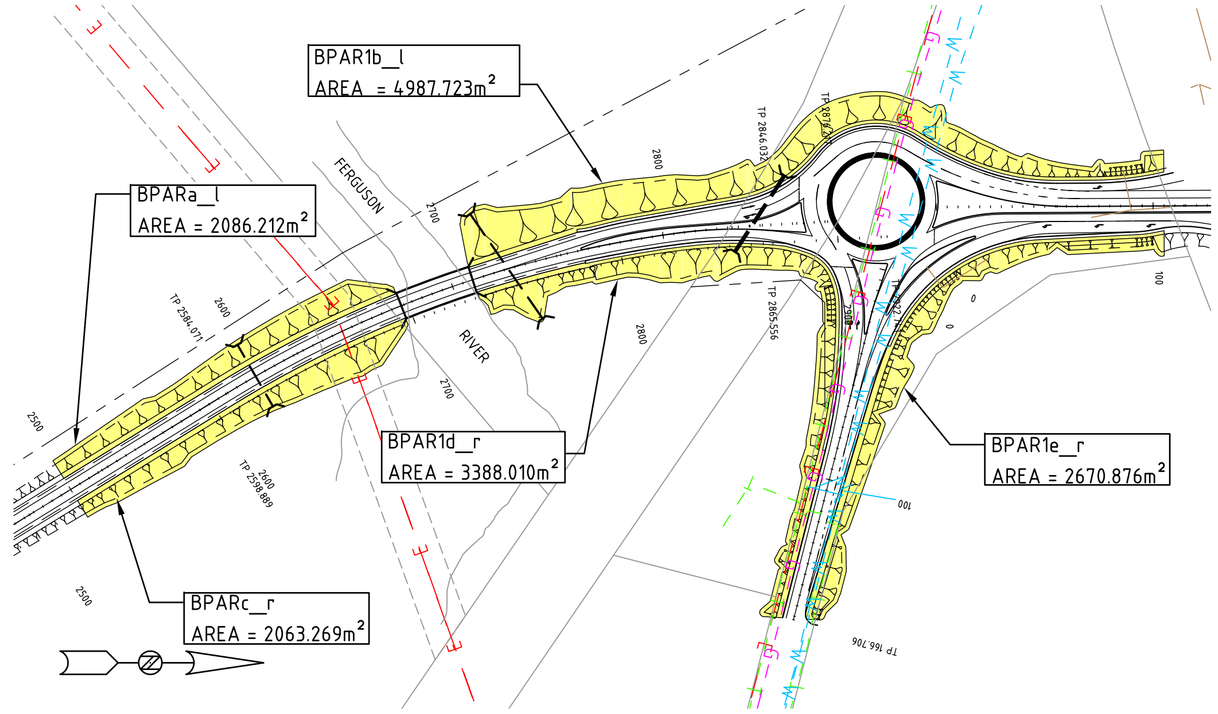
APPROVED (MRWA)

BUNBURY PORT ACCESS PROJECT
STAGE 2

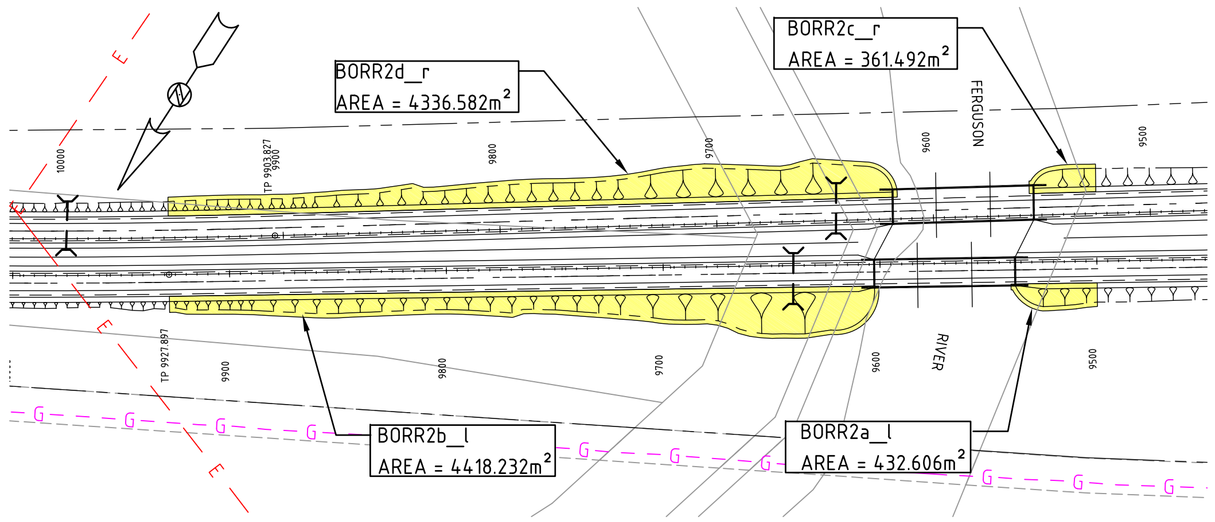
TOPSOIL RESPREAD PLAN
PAGE 1 OF 2

LOCAL AUTHORITY CITY OF BUNBURY (204)

MRWA DRAWING NUMBER
SK02-RESPREAD A



BPAR1 - FERGUSON RIVER
NOT TO SCALE



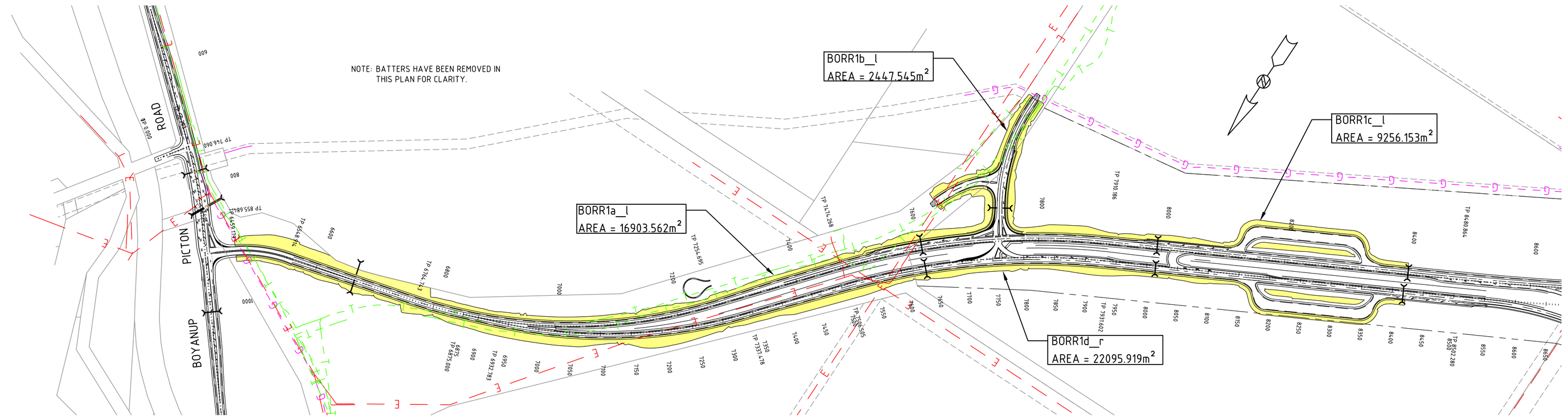
BORR2 - PRESTON RIVER
NOT TO SCALE

BREAKDOWN OF RESPREAD AREAS

RESPREAD ID	AREA (m^2)	DESCRIPTION
BPAR1a_l	2086.212	CH2500 TO CH2670 - LEFT OF BPAR STG 2 - WEST OF FERGUSON RIVER
BPAR1b_l	4988.877	CH2710 TO BPAR STG 1 - LEFT OF BPAR STG 2 - EAST OF FERGUSON RIVER
BPAR1c_r	2063.269	CH2500 TO CH2670 - LEFT OF BPAR STG 2 - WEST OF FERGUSON RIVER
BPAR1d_r	3389.408	CH2710 TO BOYANUP PICTON ROAD - RIGHT OF BPAR STG 2 - EAST OF FERGUSON RIVER
BPAR1e_r	2670.876	BOYANUP PICTON ROAD TO BPAR STG 2 - RIGHT OF BPAR STG 1
BORR1a_l	16903.562	CH6515.629 TO MOORE RD - LEFT OF BORR
BORR1b_l	2447.545	MOORE RD - LEFT OF BORR
BORR1c_l	9256.153	MOORE RD TO CH8400 - WEST OF BORR
BORR1d_r	22095.919	CH6515.629 TO 8400 - RIGHT OF BORR
BORR1e_lm	1393.773	MEDIAN AT CH8150 TO CH8350 - LEFT OF BORR
BORR1f_rm	1369.680	CH8150 TO CH8350 - MEDIAN ON RIGHT OF BORR
BORR2a_l	432.606	CH9500 TO TP CH9927.897 - LEFT OF BORR - EAST OF PRESTON RIVER
BORR2b_l	4418.232	CH9500 TO TP CH9927.897 - RIGHT OF BORR - WEST OF PRESTON RIVER
BORR2c_r	361.492	CH9500 TO TP CH9927.897 - LEFT OF BORR - EAST OF PRESTON RIVER
BORR2d_r	4336.582	CH9500 TO TP CH9927.897 - RIGHT OF BORR - WEST OF PRESTON RIVER
TOTAL AREA	78214.188	

SUMMARY OF STRIP AND RESPREAD AREAS

TOTAL STRIP AREA	541287.280m^2
TOTAL RESPREAD AREA	78214.188m^2
TOTAL RESPREAD VOLUME NOTE: MULCH/COMPOST RESPREAD NOMINALLY 80mm THICK.	6257.135m^3



BORR1 - MOORE ROAD
NOT TO SCALE

AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR INFORMATION ONLY	08/06/2011

NOTES

NOTE:
1. ENGINEERING AND DRAINAGE DESIGN SUPPLIED BY AECOM.
2. MULCH/COMPOST RESPREAD NOMINALLY 80mm THICK.
3. FOR OVERALL PLAN VIEW, PLEASE SEE DWG. SK02-RESPREAD.

LEGEND

MANUFACTURED TOPSOIL RESPREAD

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FOR INFORMATION ONLY

METADATA

GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	01/11/2010
MAPPING SURVEY STANDARD:	
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