05/2038
D07 # 86579

MACMAHON

Project Environmental Management Plan

for

Main Roads Western Australia

Eyre Highway – Balladonia & Caiguna East (Stage 3) Sections Including Separable Portion 2 Balladonia East and Heartbreak Ridge Contract 363/03

Macmahon Ref: C202

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Revision History

Rev	Date	Description	Originator	Reviewer	Approver	Client Approval
0	12-Sep-05	Issued for Review	M Fairlie	C Bray		
1	13-Sep-05	Issued for Use	C Bray	M Fairlie	L Collins	
2	10-Oct-05	Review following meeting with Main Roads	J Ward	R Hamilton M Fairlie	L Collins	
3	28-Aug-06	Reviewed	Z Ede	M Fairlie	R Krakiewicz	
4	12/03/07	Reviewed to include Balladonia East and Heartbreak Ridge	J Kiddie	M Fairlie	R Krakiewicz	

Contents

List of Tables

Appendices

1. INTRODUCTION

1.1 Project Environmental Management Plan (PEMP)

1.1.1 Purpose

The primary purpose of this PEMP is to provide documentation in a suitable framework to minimise environmental impacts associated with project activities in accordance with contract requirements, relevant legislation and project objectives for the Eyre Highway – Balladonia, Caiguna East (Stage 3), Balladonia East and Heartbreak Ridge Sections Project.

To achieve this purpose, the PEMP will cover the following:

- Establish the specific procedures required for the environmental management system;
- Provide a consistent and uniform approach that assures the required standards and environmental protection are attained and maintained for the operation project works;
- Outline the actions to be carried out during the works, while ensuring acceptable environmental protection standards are maintained; and
- Provide Main Roads with verification that the required environmental protection standards have been achieved.

1.1.2 Structure & Scope

Sections 1 to 9 - outlines the project, the legislative requirements, structure and scope of the PEMP, relationship between the PEMP and the Macmahon Environmental Management System (EMS), training requirements, monitoring and reporting requirements, and continual improvement mechanisms.

Appendices

- Appendix 1: Environmental Risk Register detailing the strategies for managing the environmental aspects and impacts associated with the project. The relevant environmental factors/issues to be managed for the project are shown in Table 2. Each environmental aspect/issue is cross-referenced in the table with the associated section within the risk register in which they will be addressed.
- Appendices 2 to 4: Environmental Contingency Plans
- Appendix 5: Project Borrow Pit Management Plan

Macmahon will undertake the works in an environmentally responsible manner in accordance with contract, legislative and statutory requirements.

1.2 Background

Main Roads propose to carry out improvements (overlay or reconstruction) to four existing sections of the Eyre Highway:

a) a 56.65 km length west of Balladonia between 139.35 and 196.02 SLK, and

b) a 16.82 km length east of Caiguna between 384.24 and 401.06 SLK, and

c) a 46.00 km length East of Balladonia (variation) from 196.10 to 242.10 SLK, and

d) a 44.57 km length east of Frasers Range at Heartbreak Ridge (variation) from 45.65 to 90.22 SLK

2. PROJECT DETAILS

2.1 Customer

Main Roads Western Australia

2.2 Main Roads Representative

Upali Wijesiri

2.3 Location & Scope of Work

The works will be undertaken along sections of the Eyre Highway near Balladonia and Caiguna, Western Australia. The Project involves:

i) Highway: design and overlay or reconstruction of the highway to provide the specified cross-section, alignment and pavement performance;

ii) Connecting roads and access roads: design and construction of all connections, modifications and improvements necessary to connecting roads, intersections and access roads to properties;

iii) Accommodation works: to properties affected by the Project Works including accesses;

iv) Parking bays: provision of parking bays off the highway;

v) Drainage: design and construction and modification of all associated drainage;

vi) Signing and pavement marking: removal of signing and pavement markings no longer required, provision of new signing and pavement markings and modifications to existing signing and pavement markings which are required as a consequence of the Project Works;

vii) Services: relocation or modification of all services which are affected by work carried out, in order to complete the Project Works;

viii) Rehabilitation: of sections of existing roads which are no longer required following completion of the Project Works and other specified areas including borrow pits and drains; and

ix) Design: design verification and preparation of all documentation including detailed construction drawings and specifications in accordance with the design for the Project Works

2.4 Key Milestones & Dates

Commencement (design):	August 2005
Commencement (site):	October 2005
Practical Completion:	December 2006
Practical Completion of Variations:	May 2008

2.5 Key Performance Indicators (KPI's)

In addition to the objectives and targets for each environmental aspect, which are detailed within the Environmental Risk Register (refer Appendix 1) the following Key Performance Indicators for Environment are set for the project:

Environment

- No unauthorised land disturbance;
- 100% investigation and reporting to the satisfaction of the Main Roads Representative of any environmental incident or accident at the Site, irrespective of its source;
- Completion of monthly environmental inspection and any other environmental monitoring as detailed in Section 6.6 of the PEMP; and
- Internal audit score of 80% or above for compliance to PEMP.

Heritage

- No alteration, disturbance or interference with Aboriginal sites and/or artefacts; and
- 100% reporting of discovery of Aboriginal Sites.

3. EXISTING ENVIRONMENT

The following information has been extracted from:

- Main Roads Western Australia Eyre Highway Contract 363/03 'Scope of Works and Technical Criteria', and
- Eyre Highway Outline Environmental Assessment, prepared by Kellogg, Brown & Root Pty Ltd.
- Report for Eyre Higway Upgrade – Balladonia East and Heartbreak Ridge Sections – Flora and Fauna Assessment prepared by GHD

3.1 Surrounding Land Use

- Pastoral
- Nature Reserve

3.2 Closest Residents

Proprietors of the Balladonia and Caiguna Roadhouses

Proprietor of the Fraser Range Station

3.3 Existing Environment

3.3.1 Landform & Soils

The Project is located within the Eucla Basin of Western Australia. Soils are comprised of pinkish-brown silt with a floury texture with calcrete skeletal material.

3.3.2 *Flora & Vegetation*

Flora

A flora survey was conducted by Bennett Environmental Consulting (BEC) during April 2004. A follow-up survey was carried out by ATA Environmental in August 2004.

Four vegetation units have been identified within the original Project boundary:

i) Sclerophyll Woodland of *Eucalyptus flocktoniae* and *E. oleosa*;
ii) Mallee Shrubland of *Eucalyptus eremophila*;
iii) Eucalyptus Woodland with patches of *Myoporum* and saltbush; and
iv) Open saltbush/bluebush plains

Vegetation units i, ii and iii exist on sections of the road surveyed to the west and east of Balladonia, whilst units i and iv exist on the section of road due east of Caiguna. The proposed borrow pits near Balladonia occur within vegetation unit 'i'. These units consist of at least 60% of the original vegetation.

Three additional units have been identified for the Balladonia East Section:

i) Low Open Mallee Woodland;

ii) Chenopod Shrubland;

iii) Mosaic Chenopod Shrubland and Grassland

And three units have been identified for the Heartbreak Ridge Section:

i) Open Eucalypt Woodland;

ii) Mixed Open Woodland over Chenopod Shrubland;

iii) Samphire Flat

The abovementioned units for the Balladonia East and Heartbreak Ridge Sections constitute at least 93% of the original vegetation.

A desktop search of the Department of Conservation and Land Management (CALM) rare flora database was conducted resulting in the identification of two Priority 2, five Priority 3, and Four Priority 4 flora species:

- *Chthonocephalus multiceps* (P2)
- *Hydrocotyle coriginaensis* (P2)
- *Acacia eremophila* (numerous-nerved variant) (P3)
- *Acacia eremophila* var. *variabilis* (P3)
- *Eucalyptus histophylla* (P3)
- *Eucalyptus ovularis* (P3)
- *Microseris scapigera* (P3)
- *Eremophila parviflora* subsp. *parviflora* (P4)
- *Myriophyllum balladoniense* (P4)
- *Wurmbea murchisoniana* (P4)

Eremophila parviflora subsp. *parviflora* (Fig 2) was recorded within several proposed borrow pit sites. *Microseris scapigera* could be present in the area, but a search could only be undertaken after sufficient rainfall. *Eucalyptus histophylla* and *E. ovularis* were not found during the survey, although could be present along the road reserves. *Grevillea phillipsiana* (P1) (Fig 1) was recorded from several borrow pit sites (SLK 140.3, 166.45, 146.7 and 155.3) and accounted for less than one percent of the total vegetation cover of each quadrat it was recorded from.

Discovery of a potentially new taxa was made in the Heartbreak Ridge Section. This taxon is currently listed as Acacia sp. NOV (JF1025). Once given a phase name this new species would likely be given a Priority 1 status. A separate report is being prepared documenting location distribution and status of this new taxa.

Weeds

Twenty-one weed species were identified during the aforementioned survey, and are categorised by CALM as follows:

- HIGH: 3 species
- MODERATE: 5 species
- MILD: 2 species
- LOW: 9 species
- DECLARED:
    - *Carthamnus lanatus* (Saffron Thistle)
    - Echium plantigenem (Pattersons Curse)
    - Emex australis (Doublegee)

Weed species identified during the survey conducted by Bennett Consulting Services include:

- *Cenchrus ciliaris* - WA Buffel Grass
- *Chloris gayana* - Rhodes Grass
- *Eragrostis curvula* - African Love Grass
- *Panicum capillare* - Witchgrass
- *Carthamnus lanatus* - Saffron Thistle
- *Helianthus debilis* – Sunflower
- *Carrichtera annula* – Ward's Weed

Ward's weed (*Carrichtera annua*) must be targeted for removal/control, as recommended by ATA Environmental.

GHD identified a further 14 weed/introduced species in the Heartbreak Ridge Section and 26 within the Balladonia East Section. Weed species were mainly grasses (Poaceae) and daisies (Asteraceae). Weed species in those areas were mainly confined to road edges, around disturbance areas such

as tracks, wells, abandoned houses and roadside rest areas.

Two declared plant species identified within the Balladonia East Section, Echium Plantigenem (Paterson's Curse) and Emex Australis (Doublegee).

No declared plant species were identified within the Heartbreak Ridge Section.

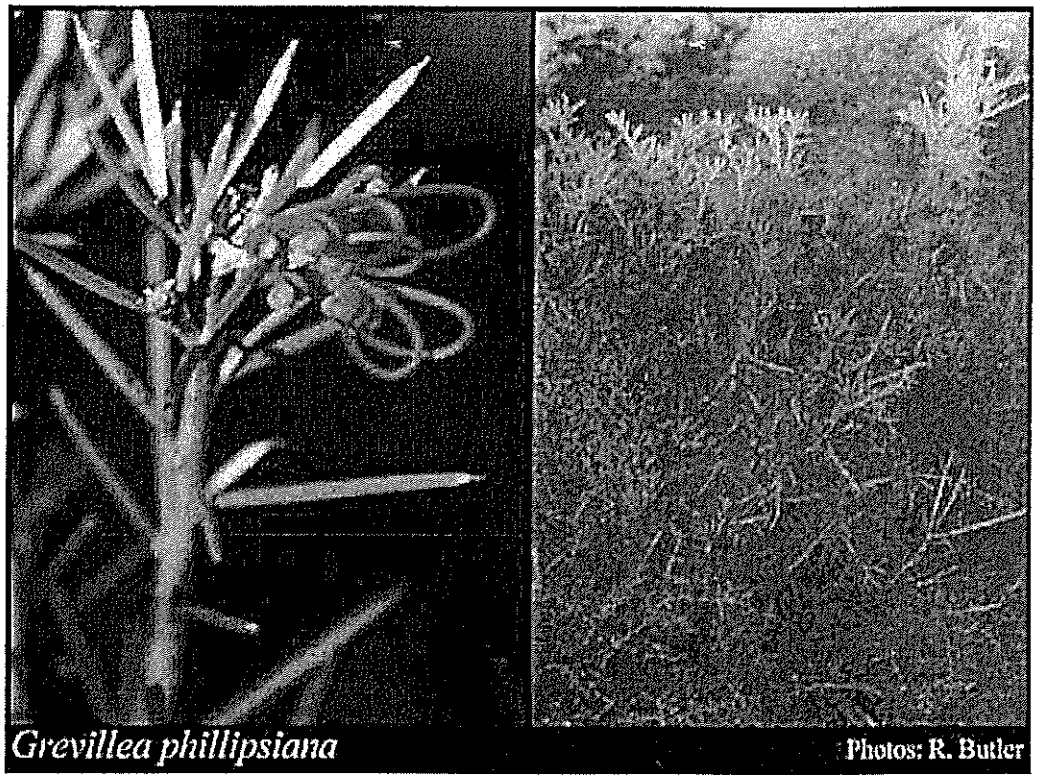


Figure 1

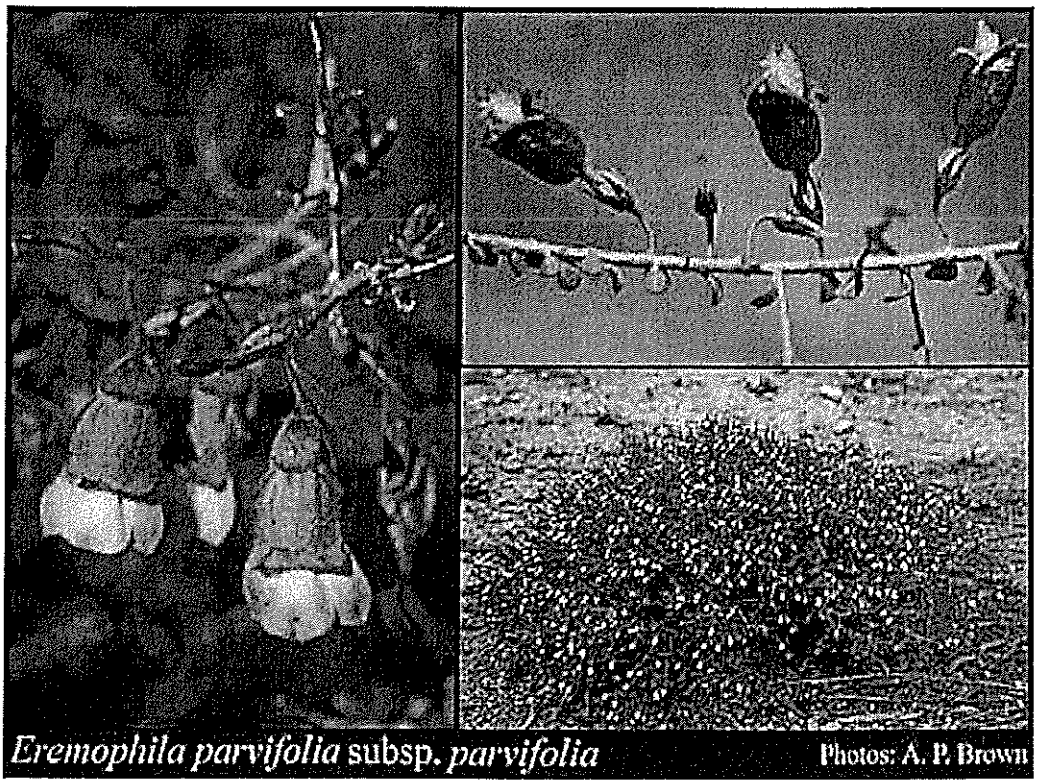


Figure 2

3.3.3 Fauna

A desktop search of the Department of Conservation and Land Management (CALM) Threatened Fauna database was commissioned by Kellogg, Brown & Root. ENV Australia Pty Ltd also conducted a field assessment of fauna occurring within the Project boundary.

Threatened and priority species that are likely to occur include:

- *Acanthiza iredalei iredalei* - Slender-billed Thornbill
- *Leipoa ocellata* - Mallee Fowl
- *Falco peregrinus* - Peregrine Falcon
- *Nyctophilus timoriensis* - Central Long-eared Bat
- *Branchinella basispina* – Fairy Shrimp
- *Falcunculus frontatus leucogaster (Crested Shrike-tit (southwestern subsp.)*

3.3.4 Heritage & Culture

In respect of Separable Portion 1 Main Roads is not aware of any Aboriginal 'sites' within the Project boundaries. In Respect to the Heartbreak Ridge Section, Main Roads are aware of the following Aboriginal Sites and impose the following constraints on the contractor in carrying out the Project:

- Bedonia Rocks at 50.2 to 50.6 SLK (north) – roadworks must not extend more than 10m north of existing seal
- Bedonia Rocks at 50.2 to 51.5 SLK (south) – roadworks must not extend more than 10m south of the existing seal – see appendix 5 for procedure if human burial material found
- Dundas Claypan at 78.1 to 78.5 SLK (south) – roadworks must not extend more than 30m south of the existing seal
- Site no W01737 at 79.5 to 80.0 SLK – roadworks must not extend more than 50m north of the existing seal
- Two Sisters at 79.0 to 83.0 SLK – roadoworks must avoid having any impact on the lakes or lakes margins
- Quartz Quarry at CH 81230 – 5m exclusion zone around the site (approx 20m from existing seal

3.3.5 Environmentally Significant Site

A 'blow hole' exists 60 metres from the eastern boundary of 388.5 SLK materials pit, which is to be marked and preserved within a 50 metre exclusion zone.

4. LEGAL & OTHER REQUIREMENTS

The procedure ***SSFM116a 'Legal and Other Requirements'*** describes how relevant legislation is identified, accessed and controlled.

Table 1: Legal and other requirements, their associated application and responsible administrator relevant to the project.

Legislation	Application	Responsible Department/ Administrator
Acts & Regulations		
Aboriginal Heritage Act 1972	Protects Aboriginal sites from disturbance	Department of Indigenous Affairs
Agriculture and Related Resources Protection Act 1976	Management of weeds and pests	Agriculture Western Australia
Bush Fires Act 1954	Manages fire safety	Bush Fires Board
Clean Air Regulations 1967	Regulates air borne emissions	Department of Environment, (DoE)
Explosive and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992	Regulations for the management and handling of dangerous goods	Department of Industry and Resources (DoIR)
Environment Protection Act 1986	Provides a framework for environmental protection in WA	DoE
Environment Protection (Noise) Regulations 1997	Noise limits, methods for noise assessment and control	DoE
Environment Protection (Controlled Waste) Regulations 2001	Control and abatement of waste	DoE
Explosives and Dangerous Goods Act 1961	Regulates the use and storage of explosives and dangerous goods	DoIR
Health Act 1911	Provides regulation for the protection of public health e.g. sewage disposal	Department of Health
Heritage of Western Australia Act 1990	Identify, conserve and where appropriate enhance those places within Western Australia which are of significance to the culture	Heritage Council of WA
Wildlife Conservation Act 1950	Protection of rare and endangered flora and fauna	Department of Conservation
Other Requirements (Australian Standards (AS), Codes of Practice, Licences, Approvals)		
AS/NZS ISO 14001:2004	Environmental Management Systems framework	Standards Australia/Standards New Zealand
AS 1940 – 2004 – Storage and Handling of Flammable and Combustible Liquids	Sets out requirements for design, construction and operations of installations for the storage and handling of flammable and combustible liquids.	Standards Australia

Table 2: List of key environmental approval documentation and associated milestone dates

Document Type	File/Permit Number	Submission for Review	Revision & Submission to Government	Expected Date of Approval	Expiry Date
Clearing Permit (DoE) (Caiguna Section)	18920 – 104/1	N/A	N/A	N/A	24 December 06
Clearing Permit (DoE) (Balladonia Section)	18921 – 105/1	N/A	N/A	N/A	24 December 06
Clearing Permit (DoE) (Balladonia East/Heart Break Ridge Section)	CPS 818/3	N/A	N/A	N/A	12 December 2010

In addition to the abovementioned requirements, the clearance of any areas not covered under the Main Roads' environmental flora and fauna assessments will require a separate environmental assessment to be undertaken.

A summary of the environmental assessment (flora & fauna) is included in section 3 of this plan.

Should additional assessments be required, the assessments shall be undertaken in accordance with the format set out in Reference Information Document No. 24 and to a level of detail deemed satisfactory by the Principal.

5. ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

The integrated Macmahon Business System (MBS) is an essential element of our business and serves to meet customer requirements, reduce business risk, improve profitability and demonstrate responsible management to our stakeholders.

The environmental, quality and safety management systems have been certified by NATA Certification Services International (third party certification body) as meeting the requirements of the following management system standards:

- AS/NZS ISO 9001:2000 - Quality systems
- AS/NZS ISO 14001:2004 - Environmental management systems
- AS/NZS 4801:2001 - Occupational health and safety management systems

The ultimate objective of the environmental management system (EMS) is to provide a consistent approach to the environmental management of operations, whilst ensuring the required corporate, contractual and legislative standards are met and environmental disturbance minimized.

This Plan incorporates contract and statutory requirements as well as applicable elements of AS/NZS ISO 14001:2004.

An overview of the Environmental Management System to be implemented for the works is illustrated in the flowchart overleaf.

Support Services

Environmental Management System Flowchart – SSFC06b

PROCESS OWNER: *Quality and Environmental Manager Ross Hamilton ph: (08) 9365 1109 email: RHamilton@macmahon.com.au*

Responsibilities
CEO – Chief Executive Officer
QEM/QEC/QEO – Quality & Environmental Manager/Coordinator/Officer
PM – Project Manager
PEMR – Project Environmental Management Representative
LA – Lead Auditor

Objective		Activities
"To demonstrate management commitment and communicate policy and objectives to stakeholders."	CEO – Policy	Environmental Policy, CPPS06
"To identify, assess and document the methodology to control risks and ensure legal requirements are understood and communicated."	QEM/QEC/QEO/PM – Planning	Project launch, PPPC02 Correspondence & Filing, PPPC04 Project Planning, PPPC03 Risk Management, PPPC05 Evaluation of Subcontractors, PPPC06 Legal & Other Requirements, SSPC38 & Project Plan
"To execute planned arrangements and strive to achieve the highest levels of quality and environmental service performance to meet or exceed customer requirements."	PEMR/PM – Implementation	Toolbox Meetings, PEPC19 Document Control, PEPC03 Electronic Data Back-up, SSPC37 Emergency Preparedness & Response, PEPC22 Evaluation of Subcontractors, PPPC06 Hazardous Substances, PEPC28 Hydrocarbon Management, PEPC35 Plant Washdown, PEGL04 Induction, SSPC02 Purchasing, SSPC33 Responsibilities & Authorities SDPC01 Monitoring and Measurement, PEPC38 Waste Management, PEPC34
"To determine the measure of compliance with planned arrangements; evaluate the effectiveness of systems implemented; and to identify opportunities for improvement."	PEMR/PM/LA – Measurement and Evaluation	Accident Reporting, SSPC34 Auditing, SSPC35 Monitoring & Measurement, PEPC38 Nonconformance, Corrective & Preventative Action, PEPC39 Project Reporting, PEPC37 Archiving of Records, COPC02
"To review the Management System to determine its continuing suitability, adequacy and effectiveness; and to identify opportunities for improvement."	QEM/QEC/QEO – Review and Improve	Customer Satisfaction, PEPC40 Toolbox Meetings, PEPC19 Continual Improvement, SSPC36

Continual Improvement

Rev 1

6. ENVIRONMENTAL POLICY

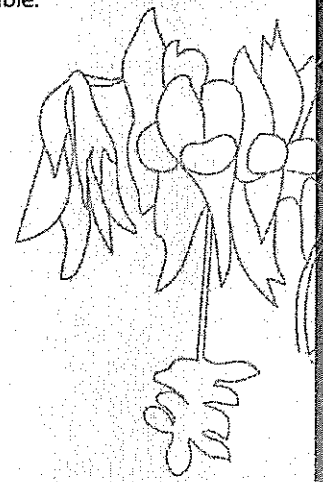
MACMAHON
WHEN EXPERIENCE COUNTS

ENVIRONMENTAL POLICY

To work effectively in a diverse range of environments and social settings, Macmahon recognises the importance of integrating environmental management into how we do business. Our environmental policy objective is to minimise the adverse impact on the environment as a result of our business activities.

To achieve this objective we will:

- Establish and maintain an Environmental Management System in accordance with AS/NZS ISO 14001.
- Comply with contract conditions, relevant legislation and other criteria to which the company subscribes.
- Regularly review business operations, identify and implement opportunities for improvement.
- Educate our workforce of key environmental issues, management controls and associated responsibilities.
- Establish defined environmental objectives and targets to measure our performance and identify opportunities for improvement.
- Strive to prevent pollution, reduce waste and commit to recovery and recycling where feasible.



Nick Bowen
Chief Executive Officer
September 2005

7. IMPLEMENTATION OF THE PEMP

7.1 *Structure & Responsibility*

Corporate Support

Macmahon has centralised its corporate activities and operates from its head office located in Perth. The General Managers (Civil, Surface and Underground Mining) report to the Chief Executive Officer of Macmahon Holdings Limited.

At Group level, the QA and Environmental Manager (QEM) has overall responsibility for Quality and Environment functions, is independent of the projects and reports to the General Manager – Strategic Development.

Project

At operational level, the assigned Project Quality & Environmental Management Representative (PQEMR) has a line responsibility to the Project Manager and a reporting function to the Group QA & Environmental Manager.

7.2 *Project Team*

Resources for this project have been identified by the Project Manager and detailed in the Project Organisation Chart, refer to Project Quality Plan.

7.3 *Responsibilities & Authorities*

The responsibilities and authorities of Macmahon personnel are defined in position descriptions. The specific responsibilities of staff in relation to Environmental matters are detailed below:

Project Manager

The Project Manager has overall authority in the determination of all matters affecting the implementation and operation of environmental practices on the project. The Project Manager reports to the Construction Manager – Civil Operations and is responsible for:

- Identifying resources and equipment for environmental purposes;
- Ensuring training is provided to improve awareness of environmental issues and responsibilities;
- Incorporating environmental management aspects in project planning;
- Ensuring project operations are performed in accordance with legal and other requirements; and
- Reviewing the effectiveness of the system for continuous improvement.

Group QA & Environmental Manager / Coordinator

- Development of the Project QA and/or Environmental Management Plans;
- Auditing the Quality and Environment Systems; and
- Providing support to the PQEMR for the duration of the project.

Project Quality & Environmental Management Representative (PQEMR):

The PQEMR has a functional reporting link to the QA and Environmental Manager and is responsible for the following:

- Monitoring and reporting on environmental system performance;
- Consulting with the Project Manager on environmental matters;
- Assisting with site inspections and audits;
- Liaising with employees on environmental matters;
- Ensuring the PEMP and associated plans are implemented to meet the requirements for the project;
- Assigning project staff to perform verification duties;
- Ensuring non conformances and environmental incidents are identified, reported and suitable corrective actions are determined and completed;
- Reviewing inspection reports and ensuring any actions required are executed;
- Ensuring subcontractors fulfil their quality and environmental obligations;
- Attending meetings to discuss environmental issues;
- Assisting with the updating of Project Plans; and
- Liaising with environmental representatives from client, government authorities & community groups.

Supervisors:

Fundamental checking by site supervisory staff and subcontractors will also be a feature of the management system. Placing responsibility for the achievement of company objectives at the workface will lead to greater accountability at this level.

7.4 *Environmental and Aboriginal Heritage Inductions*

It is the policy of Macmahon to ensure adequate training and instruction is provided to personnel to allow them to perform their duties whilst ensuring the environmental impacts associated with the Project are minimal and there is nil impact at Aboriginal Heritage sites.

The Project Manager is to ensure all Macmahon and Subcontractor personnel attend a Macmahon induction, prior to commencement of work, in accordance with Procedure ***SSPC02 'Induction'*** which includes but will not be limited to the following environmental topics:

- Overview of key environmental issues and personnel responsibilities
- Promoting awareness of significant environmental issues and personnel responsibilities (as outlined in Appendix 2)
- Reporting of environmental incidents – which will include the type of events to be reported, how an event is reported and to whom the event is reported.
- Emergency procedures – which will cover the procedure for an emergency and for evacuation of the site in the event of a catastrophic situation arising
- Contingency Plans – e.g. for Hydrocarbon/Chemical Spills ;the Discovery of Previously Unidentified Aboriginal Heritage Sites and discovery of human burial material

7.5 *Environmental Awareness Training*

A set of toolbox topics has been devised as training tool for presentation at toolbox meetings to raise awareness of environmental aspects and issues associated with the project. Topics covered will include (but will not limited to) dust, waste management, hydrocarbons, flora/fauna, weeds, 'Environmental Golden Rules', vehicle wash-down and cigarette butts.

The PQEMR and other key personnel (e.g. Supervisors) also undergo training in the Macmahon Project Environmental Management Representative Training Package.

7.6 *Consultation, Communication & Interface*

Environmental issues specific to this project will be communicated as follows:

Method	Frequency	Participants (as minimum)	Reference	Record
Project site				
Toolbox Meeting	Weekly for the first month and minimum of monthly	Project personnel	PEPC19	Minutes of Meeting and Attendance record
Project Site Meeting	Weekly, or as required	PM / Construction Manager (SPE) / Main Roads Representative	Contract 363/03 Section 3.4	Minutes of Meeting (draft of minutes to be forwarded to Main Roads Represent-ative within 48 hrs)

Design Review Meeting	As required	PM / Design Consultant / Design Manager / Design Verifier / Main Roads Representative	Contract 363/03 Section 7.2	Minutes of Meeting (draft of minutes to be forwarded to Main Roads Represent-ative within 48 hrs)
Project Review Group Meeting	Monthly, or as required	Main Roads Representative / PM / Construction Manager (SPE) / Construction Manager – Civil Operations	Contract 363/03 Sections 3.5, 3.6, and 3.7	Minutes of Meeting (draft of minutes to be forwarded to Main Roads Representative within 48 hrs)
Project Management Board Meeting	3-monthly, or as required (at least 5 days notice to be given)	Main Roads Director of Major Projects / Main Roads Representative / Macmahon Construction Manager – Civil Operations / PM	Contract 363/03 Section 3.11	Meeting Agenda, Minutes of Meeting
Authority Consultation				
Regulatory Body eg DoE, DOIR, WRC	As required	PM / PQEMR (note: permission from Client may be first required)	-	Minutes of Meeting or equivalent record
Community Consultation				
Other interested parties	As required	Main Roads Representative, PM, PEMR (note: permission from Client required)	-	Minutes of Meeting or equivalent record

7.7 Operational Controls

7.7.1 Risk Register (Environment)

The Environmental Risk Register (Appendix 1) outlines minimum environmental operational controls to be implemented for each environmental aspect.

Environmental Risk Register Structure

For each environmental aspect, there is a stated

- Legal or other obligation – including legislation, standards and contractual requirements;
- Environmental impact ;
- Risk analysis (inherent risk) – the likelihood and consequence of an environmental hazard/impact occurring in the absence of any control measures;
- Objective and targets to be achieved;
- Control measures *(with assigned responsibility)*- to be implemented to meet management objectives;
- Monitoring (with assigned responsibility) – includes relevant equipment, location of monitors, parameters, baseline monitoring, frequency of monitoring/inspections, recording of complaints and reporting of results (format/frequency); and
- Level of residual risk – the likelihood and consequence of an environmental hazard occurring following the implementation of control measures.

The level of risk associated with each environmental factor is determined using procedure ***PPPC05 'Risk Management Procedure'***.

For any subcontracted works, the nominated Subcontractor is expected to implement the stated environmental controls and undertake monitoring in accordance with contract requirements.

Table 3: Scope of the Environmental Risk Register (Appendix 1)

Environmental Hazard/Aspect	Risk Register Reference – Item № (Appendix 1)	Page №
Spillage or Leakage of Hazardous Substances	4	5
Spillage or Leakage of Hydrocarbons	5	6
Waste Generation and Disposal	6	8
Air Quality (Dust Generation)	7	9
Misuse of Topsoil (Stripping, Stockpiling, & Respreading)	8	11
Herbicide Overspray	9	12

Environmental Hazard/Aspect	Risk Register Reference – Item № (Appendix 1)	Page №
Unauthorised Ignition of Fire	10	12
Introduction of Noxious Weeds	11	13
Over-clearing or Unauthorised Clearing / Land Disturbance	12	14
Failure to Comply with Aboriginal Heritage Legislation / Contract Requirements	13	15
Failure to Comply with Borrow Pit Management Plan	14	16
Disturbance to Flora and Fauna due to Failure To Comply With Relevant Legislation / Contract Conditions	15	18
Erosion and Sedimentations	16	19
Pollution of Water	17	19
Poorly Planned and/or Conducted Rehabilitation of Borrow Pits	18	21

7.7.2 *Correspondence & Filing*

A filing index and correspondence register system is to be set up at the commencement of a project, which is appropriate to control all correspondence and project records in accordance with procedure ***PPPC04 'Project Correspondence & Filing'.***

The Document Controller, in liaison with the Project Manager, establishes a hardcopy project filing index to ensure that records are indexed and filed in a manner to facilitate easy retrieval of information.

Project Manager informs the Client, suppliers, subcontractors, etc., of where project related correspondence is to be addressed.

All inward correspondence is to be stamped with a 'Received' stamp showing the receipt date, registered and then distributed to relevant staff as directed by the Project Manager. Correspondence is to be filed in chronological order.

7.7.3 Controlled Documents

The following documents, as a minimum, shall be subject to control as detailed in procedure ***PEPC03 'Document Control'.***

- Group Procedures & Forms
- Standards/Codes/Acts/Regulations
- Project Plans
- Project Procedures and Forms
- Drawings

Where changes are required to project documentation, the Project Manager or delegate shall coordinate all amendments/revisions to the documents and implement the necessary changes required.

Unless otherwise specified by the Project Manager, drawings are to be transmitted to external parties using a Document Transmittal form. All other documents may be transmitted using suitable correspondence. Transmittal records shall be maintained.

7.7.4 Superseded Documents

Where superseded versions of controlled documents are retained for any purposes, such documents are to be identified 'Superseded' to prevent the unintended use of obsolete information.

7.7.5 Purchasing

All purchasing is to be completed in accordance with procedure ***SSPC33 'Purchasing'.*** For Purchasing by Macmahon, Purchase Requisitions are to be approved by staff with sufficient expenditure authority prior to release. Employees responsible for purchasing items for use on site are to ensure that quality, environmental and safety requirements (as applicable) are stated in the Purchase Requisition prior to issue. 'Purchase Authority Approval Limits' forms detail staff purchasing authority limit.

7.7.6 Management of Subcontractors

Suppliers/Subcontractors will be evaluated in accordance with procedure ***PPPC06 'Evaluation of Subcontractors'***. Only Subcontractors who have been evaluated by Macmahon will be engaged to perform subcontract works.

Where a subcontractor is unable to provide Macmahon with an acceptable environmental management system, the Project Manager or nominated representative will ensure that the Subcontractor undertakes the works in accordance with the Macmahon environmental management system requirements and the PEMP.

A Subcontracts Database will be maintained to record details of subcontractors evaluated.

Prior to commencement of works, Subcontractors will be required to submit details of their proposed system e.g. Project plans, inspection and test plans and/or process procedures, to Macmahon for review and acceptance.

For completed works, Subcontractors shall submit conformance documentation, in accordance with contract specifications, to Macmahon for review and acceptance.

7.7.7 Process Procedures

Corporate environmental procedures that have been developed as part of the Macmahon Environmental Management System and are relevant to the project include:

- Hydrocarbon Management (PEPC35)
- Control of Hazardous Substances (PEPC28)
- Hydrocarbon/Chemical Spill Response (PEFC13)
- Weed/Dieback Management (PEFC12)
- Management of Unrecorded Aboriginal Heritage Sites (SSFC06c)

These guidelines and procedures have been developed to cover and/or align with relevant requirements, standards, legislation and/or best practice.

Project specific environmental procedures and guidelines are developed for each project where required.

The following project specific procedures are to be developed and implemented for this project:

- Waste Management (based on PEPC34)

Macmahon personnel or Subcontractors may generate project specific procedures. Project specific procedures generated by project staff are to be reviewed by the PQEMR for inclusion of project title/description, procedure title and procedure reference. The procedure reference is to include the procedure number and revision status e.g. C202/PP/01 r0 (C202 = project reference) for Eg.

- Management of Human Burial Material Found within Limits of Works

Where procedures are developed, these should not dilute requirements outlined in Macmahon management system procedures. Upon completion of the review and resolution of any discrepancies with the originator, the PQEMR or Project Manager signs for approval.

Subcontractor generated procedures, addressing performance of a specific work process/system, are to be reviewed by the Project Manager / PQEMR for suitability and adequacy of meeting specified contract requirements. Where changes are required, the comments are to be communicated to the subcontractor. The Project Manger / PQEMR ensure that suitable amendment action is performed by the subcontractor prior to commencement of work.

Approved Process Procedures are to be recorded in the Document Control Register.

7.7.8 *Hydrocarbon Management*

For all Macmahon projects, hydrocarbons (i.e. diesel, oils, hydraulic fluids, lubricants and solvent degreasers) will be stored within impervious or lined bunded enclosures in accordance with *Australian Standard (AS) 1940-1993 The storage and handling of flammable and combustible liquids* and procedure ***PEPC35 'Hydrocarbon Management'.***

Containment vessels for waste hydrocarbons, coolants and the like will be located in separate impervious or lined bunded compartments than that of diesel storage tanks to prevent potential cross contamination of materials. New and in-use products will be stored separately from waste vessels. All vessels containing waste materials will be appropriately labelled (with contents and dates) and correctly stored.

Prior to the commissioning of Hydrocarbon Storage Facilities, the ***Fuel and Oil Storage Checklist (PECL03)*** will be completed by the Maintenance Supervisor or Project Engineer to ensure all of the general requirements of AS 1940 have been satisfactorily addressed.

In the event of a hydrocarbon or chemical spill/leak the Macmahon spill response process is to be adhered to (PEFC13). All project personnel will be trained in the spill response process and the spill response flowchart prominently displayed in key areas such as workshops and spill response equipment stations.

7.7.9 Hazardous Substances

All substances/chemicals to be utilised on the works shall be checked using the Chemwatch system and Material Safety Data Sheet obtained prior to use on the project. The Project Safety Advisor shall ensure that a register and file of MSDS records are maintained for all hazardous products used.

All other aspects of hazardous substance management shall be in accordance with procedure ***PEPC28 'Control of Hazardous Substances'*** and State Legislation.

7.7.10 Plant and Equipment

A planned program/schedule for the maintenance of Macmahon plant and equipment shall be established. Plant and equipment shall be maintained in accordance with procedure ***PEPC08 'Plant Servicing'.*** The program facilitates the efficient operation of plant/equipment and hence ensures exhaust emissions are minimised.

All plant and equipment (including site vehicles) are to undergo daily pre-start inspections in accordance with procedure **PEPC07** ***'Pre-Start Checks'*** and records of inspections maintained.

7.8 Emergency Preparedness & Response

The Site Safety Advisor is to establish suitable emergency procedures to ensure effective response in the event of an emergency (including environmental emergencies such as fire and large fuel spills) in accordance with procedure ***PEPC22 'Emergency Preparedness and Response'***.

An Emergency Procedure (flip-chart) is to be completed and posted at specific work areas, specifying the steps to be taken and the parties/persons to contact in the event of an emergency.

The Emergency Procedure shall be tested on a six (6) monthly basis. Records shall be maintained for all site emergencies and any emergency practice drills conducted.

8. CHECKING & CORRECTIVE ACTION

8.1 Monitoring

Monitoring of each key environmental factor is as described in the Environmental Risk Register (Appendix 1).

Further, a Project Environmental Inspection Checklist (PECL02) will be completed by the PQEMR on a monthly basis (as a minimum).

8.2 Measurement

Any inspection, measuring and testing equipment (including newly acquired test equipment) used for measuring purposes, whether owned by Macmahon or Subcontractor, shall be controlled and calibrated. For Macmahon equipment a register is to be maintained in accordance with procedure ***PEPC38 'Monitoring and Measurement.***

All testing undertaken shall be performed in accordance with contract requirements and the equipment used for calibration and test results must be traceable to national standards. Calibration and test records shall be reviewed and initialed by a Macmahon representative to signify review and acceptance.

8.3 Nonconformance, Corrective & Preventative Action

Any environmental nonconformance (e.g. breach of legal or contract requirements or audit-related nonconformance) is to be reported in accordance with procedure ***PEPC39 'Nonconformance and Corrective Action'***.

Concessions or waivers shall be sought from Main Roads for the proposed corrective action for any nonconformance which varies the requirements of the Specification or Contract. The action taken shall be to a degree appropriate to mitigate any impacts caused and risks encountered.

A Nonconformance Register (PEFM43) shall be maintained to monitor the status of the Nonconformance raised.

8.3.1 Complaints

Complaints from any source (e.g. Main Roads, public, DoE) shall be registered using the project Enquiry Register, the complaint investigated by the Community Relations Representative or PQEMR in consultation with the Project Manager and action taken to enable satisfactory closeout.

8.3.2 Environmental Incident Reporting

All project and subcontractor personnel shall report all actual environmental incidents immediately to the PQEMR.

It is the responsibility of the PQEMR or nominated person(s) to fully investigate the occurrence with personnel involved in accordance with procedure ***SSPC34 'Accident Investigation and Reporting'.*** In the event of an environmental incident on site, the Project Manager shall complete and then send by fax the following documentation to the Safety Training Manager within 24 hours:

- Accident/Incident Report (SSFM01)
- Accident Statement Report (SSFM02)

8.4 Control of Records

Project records, including pertinent subcontractor project records, shall be maintained to provide evidence of conformity to customer requirements and of the effective operation of the environmental management system. Such records include, but are not limited to:

- Correspondence to /from client and interested parties
- Permits, Licenses and Approvals
- Induction Training Records
- Inspection and test documentation, including calibration
- Nonconformance & Corrective Action / Complaints
- Environmental Incidents
- Audits and Inspections

8.5 Progress Reporting

PQEMR is to complete a Project Quality & Environmental Monthly Report (PEFM58) and forward it to the QA & Environmental Manager, reporting on the preceding month's performance covering the following:

- External audits completed
- Nonconformances raised
- Complaints reported
- Environmental incidents reported
- Waste Minimisation statistics
- Improvement/initiatives implemented at site

Submission of environmental documentation to Main Roads is as specified in the contract.

8.6 *Internal Audits*

Internal audits aimed at evaluating the conformance of the system, process or product, as appropriate, shall be carried out as detailed in procedure ***SSPC35 `Auditing'*** by the QA & Environmental Manager or Coordinator, who is independent of the project.

The Group QA & Environmental Manager will establish an Internal Audit Plan. An internal audit will be completed within the first four weeks of start-up and thereafter every 3 months (minimum).

An audit report will be issued to the site and Main Roads' Representative within five days of completion of the audit.

Any nonconformance identified during the audit shall be actioned in accordance with procedure ***PEPC39 'Nonconformance and Corrective Action'.*** Management personnel responsible for the area shall take timely corrective action on the deficiencies found.

8.7 *External Audits*

Results from second party (client) and third party audits (i.e. DEP, NCSI) are to be reviewed by the Project Manager and any necessary corrective actions assigned to ensure proper and timely closeout.

8.8 *Archiving of Records*

Project environmental records shall be archived for a minimum period of 5 years after the last defects correction period has expired, in accordance with procedure ***COPC02 'Archiving of Records'.***

The Originator is to complete an Archive Record Form identifying contents of records in each box. A destroy by date is to be included on the form taking account of the minimum retention periods stated in Contract 363/03.

9. REVIEW & IMPROVEMENT

The following mechanisms will be implemented to review performance and identify opportunities for improvement.

9.1 Toolbox Meetings

Toolbox meetings will include 'Environment' as an agenda item. Issues raised are to be recorded, and responsibilities assigned to ensure satisfactory close-out of issues raised.

9.2 Customer Satisfaction

In accordance with procedure ***PEPC40 'Customer Satisfaction'***, QA and Environmental Manager /Coordinator arranges to contact the Customer Representative during the project to gather formal feedback on Macmahon's project performance, using the 'Customer Feedback Questionnaire' form. Following receipt of completed feedback, any category that is rated 'average' or below will be treated as an opportunity for improvement and necessary corrective action taken.

9.3 Group Management System Review

In accordance with procedure ***SSPC36 'Continual Improvement',*** the QA & Environmental Manager organises a meeting with General Managers and other key personnel on a 12 monthly basis to review the management system to determine its continuing suitability, adequacy and effectiveness and to assess and identify opportunities for improvement.

Group Management System Review Reports and meeting minutes are accessible to Macmahon employees via the document library on the Macmahon intranet.

APPENDIX 1

Project Environmental Risk Register

Form Ref:	PPFM03
Revision:	1
Date:	21-Dec-05

Risk Register – Environmental

MACMAHON

LIKELIHOOD *'Likelihood that the stated consequence will occur'*

Almost Certain	Almost inevitable outcome, the event is expected to occur in most circumstances.
Likely	Not a certainty but such an event is known to have occurred and represents a creditable scenario. There is a good chance the event will occur.
Possible	Could happen, easy to imagine a feasible scenario where the situation could exist but it would be unusual for the event to occur.
Unlikely	Conceivable, occurrence would require multiple failures of systems and controls, but it would be remotely possible for the event to occur.
Very Unlikely	Little or no chance of occurrence. Would require a combination of factors for the situation to result. The event has not known to have happened, but it is possible given the wrong circumstances.

CONSEQUENCE *'Consideration of the degree of possible severity of the event outcome consequences'*

	People/IR/Society	*EBIT / Contribution*	*Plant*	*Environmental Harm*	*Tendering / Contractual*	*Reputation*
Critical	• Single or multiple fatalities • IR dispute targeting multiple sites	• EBIT impact greater than $10M	• Unavailability of key resources (assets, people or consumables) for an extended period of time	• Irreparable/long term damage to a large or critical aspect of the natural environment	• Serious non-performance on contract • Major client insolvency	• Negative national media event • Intervention by government agency and licence to operate is revoked
Major	• Life threatening incident resulting in serious LTI or ongoing illness/health effects • Loss of key individual or group of individuals • Inability to attract/retain key staff to meet contract • Protracted IR dispute at one site	• EBIT impact of between $2M and $10M	• Unavailability of key resources (assets, people or consumables)	• Major damage with medium term impact on the natural environment, remediation with six to twelve months	• Non-performance against contract schedule • Critical sub-contractor non-performance	• Employee's actions impact reputation on a specific site • Investigation by government agency
Moderate	• Incident that requires medical treatment by a qualified medical practitioner • Loss of key individuals • A single IR event at a single site	• EBIT impact of between $0.5M and $2M	• Equipment performance below contract tender rates for less than 3 months	• Localised short-term controllable impact on the natural environment, remediation expected within one month	• Rework requiring additional resources • Moderate sub-contractor non-performance	• Employee's actions impact on a specific site • Investigation by government agency
Minor	• Injury requiring first aid treatment only • Delays in filling vacancies • Trouble filling day to day positions • Isolated IR issue handled at the project site	• EBIT impact of between $50K and $0.5M	• Equipment performance below contract tender rates for less than 1 month	• Localised impact on the natural environment, remediation expected within one day.	• Rework using existing resources	
Insignificant	• No injuries	• EBIT impact less than $50K	• Equipment performance below contract tender rates for less than 1 week	• Negligible impact on the environment which is difficult to notice and does not require remedial action.	• Insignificant rework using existing resources	

EXPOSURE *'Consider the exposure (frequency) factor when determining the likelihood of the risk/hazard event occurring.'*	
Hazard event occurs:	**Exposure factor:**
• Continuously	• Many times daily
• Frequently	• Approximately once daily
• Occasionally	• Once a week to once a month
• Infrequent (combine with rarely as they mean much the same thing)	• Once a month to once a year

SUMMARY OF RISK MANAGEMENT PROCESS	
Step 1	**Identify the hazard:** Does the work activity contain potential hazards?
Step 2	Put immediate, temporary controls in place
Step 3	Conduct a risk assessment
	Likelihood X Consequence X Exposure
Step 4	Put permanent controls in place to reduce the risk to as low as reasonably practicable (ALARP)

QUALITATIVE RISK ANALYSIS MATRIX

		CONSEQUENCE				
		Insignificant	**Minor**	**Moderate**	**Major**	**Critical**
LIKELIHOOD	**Almost Certain**	**M**	**H**	**H**	**VH**	**VH**
	Likely	**M**	**M**	**H**	**H**	**VH**
	Possible	**L**	**M**	**H**	**H**	**H**
	Unlikely	**L**	**L**	**M**	**M**	**H**
	Very Unlikely	**L**	**L**	**M**	**M**	**H**

Note: Risks assessed as either Very High or High are considered 'significant' and therefore require either treatment measures to be implemented or are unacceptable.

RISK ACTION MATRIX

Control Action Rating:	***Qualitative Risk Action Description:***
Very high	*Extreme risk, immediate action required*
High	*High risk, senior management attention needed*
Moderate	*Moderate risk, management responsibility must be specified*
Low	*Low risk, manage by routine procedures*

Customer: Main Roads Western Australia (Main Roads) **Contract Ref:** 363/03

Project Title: Eyre Highway – Balladonia & Caiguna East (Stage 3) Sections **Project Ref:** C202

Prepared by: Zeb Ede, Mark Fairlie, Sean Wenden, Mitchell Pearce **Date:** 28-Aug-06

Approved by: **Date:**

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
1. Failure to Obtain Required Licences *Licenses consists of obtaining necessary licences/ permits and compliance with relevant license conditions e.g. for groundwater extraction, well construction, septic tank installation, storage of dangerous goods.*	Explosives and Dangerous Goods Act 1961 Environmental Protection Act 1986 Contract 363/03 Section 5.2 and SWTC Section 9.1(c) SWTC Appendix 32: Environmental Conditions № 7	Potential non-compliance with licence conditions resulting in unauthorised adverse environmental effects (environmental harm) and significant cost penalties.	Unlikely	Moderate	Moderate	Comply with legal and statutory requirements for licensing Comply with licence conditions	**Project Manager:** • Obtain and maintain approval/licences as legally required • Ensure compliance with licence conditions (as applicable to Macmahon scope of services):	**QA & Env Manager / Coordinator** to • Complete an internal audit to assess compliance	Moderate L = Very unlikely C = Moderate
2. Risk Register *No Customer input or feedback to planned environmental management* *Register may not address all environmental aspects, and/or assess the risk appropriately*	AS/NZS ISO 14001:2004	Insufficient environmental control measures established for the Project resulting in varying degrees of environmental harm	Possible	Moderate	High	Customer input and acceptance of Risk Register (Environmental)	**Project Manager:** • Issue Risk Register (Environmental) for Main Roads approval	**Project Manager:** • Liaise with Main Roads to obtain approval	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
3. Failure to Promote Awareness of Main Roads & Macmahon Environment Requirement	AS/NZS ISO 14001:2004 SWTC Section 9.4(a) SWTC Appendix 32: Environmental Conditions № 8	Personnel unaware of key environ-mental site issues hence increased risk of incident/ breach of license resulting in environmental harm	Possible	Moderate	High	Access to Project Plan & Procedures and display Environmental. Policy Induction of all Macmahon and Subcontractor personnel	**QA & Environmental Mngr / Coordinator** to issue Project Environmental Management Plan & Environmental Policy to site **Project Manager** (or delegate) to prepare generic site environmental induction (to meet Main Roads requirements) covering key Environ-mental issues such as: • Environmental Policy • Environmental Plan and Risk Register • Dust control • Hydrocarbon Management • Clearing • Flora & fauna • Weed hygiene • Fuel & oil leaks/ spillages • Aboriginal Heritage • Environmentally significant site (blow hole) No person allowed to work/travel unsuper-vised on site without first completing an induction.	**Project Manager** (or delegate) • To promote awareness and education of Licence /environmental issues at Toolbox meetings **QA & Environmental Manager / Coordinator** • To review induction material and training records during audits and report findings	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
4. Spillage Or Leakage Of Hazardous Substances	AS 1940:2004 – Storage and Handling of Flammable and Combustible Liquids SWTC Section 9.14 SWTC App.41 clause 1.14d	Ground and/or water contamination and may pose a threat to human health	Unlikely	Moderate	Moderate	Use only substances found on Chemwatch system All hazardous substances to be stored and used in an appropriate manner	**Safety Advisor (or delegate):** • Review substances received against Chemwatch system: if substance(s) are not included, return to supplier, other-wise print MSDS record, update register and file • Ensure that any supplier of substances provides adequate toxicolo-gical information to allow the safe use of that substance. Where that subst-ance is required for ongoing maintenance or has been used as part of the project, copies of MSDS shall be provided to Main Roads Represent-ative by the date of practical completion. • Store substances in a secure and appropriate manner as per Australian Standards • Maintain spill equipment material	**Site Safety Advisor (or delegate) to:** • Maintain register of Material Safety Data Sheets (MSDS) and copies of MSDS records PQEMR (or delegate) to : • Conduct monthly inspection, using Environmental Checklist, to assess compliance of the storage area	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
5. Spillage or Leakage of Hydrocarbons *Light vehicles and earth moving equipment will be used on site. Spillage and/or leakage of hydrocarbons or oils may occur during:* **Storage** Commonly found hydro carbon contamination problem areas in the industry include: • Inadequate bunding of temporary hydrocarbon storage and handling facilities • Inadequate bund capacity, accumulation of stormwater in bunds • Unacceptable method of waste oil and oily water disposal • Incompatible methods used in separation system – e.g. the use of solvent based degreasers with a gravity based separation system	Environmental Protection Act 1986 AS 1940:2004 – Storage and Handling of Flammable and Combustible Liquids SWTC Section 9.14	Hydrocarbon Contamination of: • Ground • Surface Water • Groundwater Cause flammable and explosive hazards Create acute and/or chronic toxic hazards	Likely	Minor	Moderate	All hydrocarbons to be stored and handled in a manner that minimises spills/leaks No uncontained spillage of fuels and oils Bulk fuels storage to comply with AS 1940	**Maintenance Supervisor to:** • Establish bulk fuel/oil/waste oil storage facility • Complete checklist PECL03 to verify facility complies with AS 1940 • Maintain lowest practical level of hydrocarbons in temporary storage facilities • All waste oil is collected and stored in labelled collection drums/pods and stored in a bunded area • Maintain spill equipment material • Engage licensed waste contractor to remove/ dispose of waste oil • Ensure instruction signage is erected at all temporary hydrocarbon transfer locations • Manage spills in accordance with Macmahon spill response flowchart PEFC13	**Maintenance Supervisor (or delegate) to conduct:** • Daily visual inspections for evidence of spills at all sites where there is the potential for hydrocarbon spills (eg petrol bowsers, oil drum storage areas, waste oil storage areas). • Minimum monthly inspection, using Macmahon Environmental Checklist, to assess compliance.	Low L = Unlikely C = Minor
Dispensing	Environmental Protection Act 1986 AS 1940:2004 – Storage and	Hydrocarbon Contamination of: • Ground	Likely	Minor	Moderate	All hydrocarbons to be stored and handled in a manner which	**Workshop Personnel:** • Utilise drip trays and oil trolleys as	**Workshop Leading Hand (or delegate):** • Conduct visual daily inspections for	Low L = Unlikely C = Minor

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
	Handling of Flammable and Combustible Liquids SWTC Section 9.14	• Surface Water • Groundwater				minimises spillage and leakage No uncontained spillage of fuels and oils No unapproved / undocumented disposal of waste oil	necessary • Hoses stored off the ground to prevent them from being damaged • Spills to be managed in accordance with Macmahon spill response flowchart PECF13	evidence of spills at all sites where there is the potential for hydrocarbon spills (eg petrol bowsers, oil drum storage areas, waste oil storage areas) **Plant Operator:** • to advise Foreman of any defects in dispensing items /equipment	
Servicing	Environmental Protection Act 1986 SWTC Section 9.14	Hydrocarbon contamination of: • Ground • Surface Water • Groundwater	Likely	Minor	Moderate	All hydrocarbons to be stored and handled in a manner which minimises spillage and leakage No uncontained spillage of fuels and oils	**Service (field) Operator:** • Maintain secure hose connection • Servicing to be conducted in approved areas • Servicing/lubricating /mechanical repairing of vehicles/machinery that cannot be moved to approved servicing areas will only be carried out when approved by Supervisor	**Plant Operator:** • To record any defects such as leaking hoses using Daily Pre-start inspection card **Workshop Supervisor:** • To take appropriate action as necessary	Low L = Unlikely C = Minor

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
6. Waste Generation and Disposal Construction activities will generate solid wastes such as: **Solid** • *Used batteries* • *Used tyres* • *General waste* • *Contaminated soils* • *Oily rags* • *Scrap steel* • *Lubricants* • *Used oil filters* • *Used air filters*	Environmental Protection Act 1986 Environmental Protection (Controlled Waste) Regulations 2001	• Ground Contamination • Groundwater Contamination • Waste of energy and/or resources • Attraction of pest species • Reduced visual amenity • Unpleasant odour • Risk to human health • Creation of fire hazards	Possible	Minor	Moderate	Aim to avoid waste Maximise recovery and minimise volume of waste to landfill All waste materials to be disposed of in an approved and environmentally responsible manner and dockets for disposal maintained Reuse materials on site where possible No complaints regarding waste	**Maintenance Supervisor or delegate:** **Solid Wastes** • Complete site specific waste management procedure (PEPC34) • Ensure that all waste is disposed of in a manner that is in accordance with applicable laws and regulations • Engage licensed waste disposal contractors are engaged for removal of waste as required • Discourage littering • Ensure materials or storage containers containing waste materials are appropriately covered to minimise risk of being blown away On completion of the Works the site shall be left in a clean and tidy condition and all workshops, facilities and temporary works will be removed (unless alternative arrangements with Main Roads are made).	**PQEMR/ Supervisors:** • Conduct daily visual inspections for litter and general waste around the site • Conduct monthly inspection, using Macmahon Environmental Checklist (PECL02) • Record monthly waste statistics using Macmahon Project Quality & Environmental Monthly Report Form (PEFM58) and submit to the QA & Environment Manager	Low L = Unlikely C = Minor

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives / Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
Liquid • *Sewerage* • *Used oil* • *Used radiator coolant* • *Used grease* • *Chemicals* • *Lubricants* • *Washdown wastewater*	Environmental Protection (Controlled Waste) Regulations 2001	Contamination of: • Ground • Surface Water • Groundwater Attraction of pest species	Possible	Minor	Moderate	Safe and appropriate storage and disposal of liquid waste No unapproved / undocumented disposal of liquid waste No spillages of liquid waste	• No hazardous liquid waste to be disposed of on site • All liquid waste to be stored in areas that prevent spillages entering exposed areas of the environment • Engage licensed contractors for removal /disposal liquid wastes • All ablution and toilet waste shall be managed (where required) in accordance with local council and state health regulations • Unless client owned facility, or otherwise directed by client, washdown to be conducted over hardstand.	**Project Manager or delegate:** • Conduct monthly inspection, using Macmahon Environmental Checklist • Record monthly waste disposal /recycle statistics using Macmahon Project Quality & Environmental Monthly Report Form and submit to the Group QA & Environmental Manager	Low L = Unlikely C = Minor
7. Dust Generation During works, significant dust sources may originate from: • *Traffic movements over open, exposed ground areas* • *Wind movement over exposed stockpiles and land areas* • *Excavation works* • *Earthworks* • *Topsoil stripping*	Environmental Protection Act 1986. Occupational Health and Safety Act 1984 DoE Guidelines for Land Development Sites and Impacts on Air Quality 1996 AS2436 (1981) – Guide to Noise Control on Construction, Maintenance and Demolition Sites	Dust can result in a serious nuisance and loss of amenity for populations living in the vicinity of the site. Examples of 'nuisances' include: • Soiling of surfaces (laundry, houses, etc) • Penetration of finer dust indoors • Noticeable dust deposition on horizontal	Possible	Insignificant	Low	Minimise the generation of dust from earthworks, traffic and unsealed areas No public complaints relating to dust generation No externally initiated work stoppages based on ambient dust levels	**Project Manager (or delegate)** to ensure the following (where relevant): • Regular watering of works using water carts • Watering of live stockpiles to limit airborne dust (dependent on weather conditions). • Control of vehicular speed (speed is a significant contributor	**Site personnel** to visibly monitor dust generation activities daily during works and report dust issues to supervisor	Low L = Unlikely C = Insignificant

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
• *Borrow pit development and operation* • *Load and hauling* • *Topsoil stripping, stockpiling & respreading*	SWTC Section 9.10	surfaces over longer periods • Noticeable health effects (re inspirable & respirable dust) over longer periods • Changes in character of the area Potential loss of condition of adjacent (downwind) vegetation due to blanketing dust Risk to human health Adverse impact and disturbance to fauna				Minimise environmental harm caused by dust generation To ensure that nuisance dust levels and potential health hazards are not experienced by other land users	to dust) by conducting driver education and erecting speed signs where appropriate • Minimise vehicle movements wherever practicable • Where possible, topsoil shall not be handled when it is excessively wet, dry or windy • Respond to Main Roads request to dust issues as and when required • Where possible, conduct clearing activities in stages to reduce the area exposed • Dust suppression measures carried out simultaneously (where required) whilst handling topsoil • Retain as much existing vegetation as possible to act as wind breaks • Where possible, topsoil will be stripped and placed directly onto areas already prepared for rehabilitation rather than stockpiled		

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
8. Misuse of Topsoil (Stripping, Stockpiling & Re-spreading)	SWTC Appendix 32: Environmental Conditions № 5	Misuse of topsoil may impact on landscape rehabilitation programs due to unsuitable topsoil and/or lack of topsoil. It may also lead to the generation of dust and sedimentation/erosion	Likely	Minor	Moderate	Recover topsoil from all areas to be disturbed unless advised otherwise by Main Roads	**Supervisor to ensure:** • Topsoil is removed from all areas that will or may be disturbed by the operations • Identification and recovery of topsoil as per contractual requirements • Where possible topsoil shall be stripped and placed directly on to areas already prepared for rehabilitation as opposed to stockpiling • If topsoil storage is required, stockpiles shall not exceed 1 metre or two dump loads in height unless directed otherwise by Main Roads • Topsoil stockpiles shall be located in areas approved by Main Roads • Topsoil stockpiles to be profiled to minimise the potential for erosion • Diversion drains constructed around topsoil stockpiles (where required) • Where vegetation consists mainly of	**PQEMR (or delegate)** • To conduct monthly inspection, using the Macmahon Environmental Checklist, and assess compliance with contract obligations regarding topsoil management. **Supervisors and Operators:** • to ensure topsoil is appropriately managed during daily activities.	Low L = Unlikely C = Minor

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
							grasses, such vegetation should be removed together with the topsoil and later respread as a mixture		
9. Herbicide Overspray	Agriculture and Related Resources Protection Act 1976	Drift of herbicide outside of designated area may kill non-target species (native flora and fauna)	Possible	Insignificant	Low	No spraying during windy weather conditions	**Project Manager (or delegate)** to: Engage licensed company/person to undertake spraying Ensure no boom or side spraying occurs in environmentally sensitive areas. **PQEMR:** • Ensure environmental and heritage approvals have been gained for the area to be treated	**PQEMR/ Foreman:** • Complete visual inspections • Complete surveillance audits as required.	Low L = Unlikely C = Insignificant
10. Unauthorised Ignition of Fire *Fire in the construction site may result from the following activities:* • *Lighting of fires on site* • *Use of machinery eg graders, loaders etc with inadequate shielding in the vicinity of flammable materials (e.g. during*	Bushfires Act 1954 Environmental Protection Act 1986 SWTC Section 9.7	Injury or damage to property, people, flora and fauna.	Possible	Major	High	No unauthorised fires	**Project Manager (or delegate)** to ensure: • Employees advised that no unauthorised fires to be lit on site • Adequate fire protection equipment is available and maintained	**Project Manager (or delegate)** to: • Conduct visual inspection of work areas • Arrange for 12 monthly external inspections of fire extinguishers	Moderate L = Unlikely C = Major

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
clearing of vegetation)									
11. Introduction of Noxious Weeds *Mobilisation phase, and between the two sites (i.e. Balladonia and Caiguna)*	Agriculture and Related Resources Protection Act 1976 Environmental Protection Act 1986 Conservation and Land Management Act 1984 Macmahon Weed Hygiene Process (PEFC12) SWTC Section 9.5(c) SWTC Appendix 32: Environmental Conditions № 6	Noxious weeds are undesirable as they compete with native plants and may replace the habitats and food resources of native animals. Weeds may also inhibit regeneration of native species, change the fire characteristics of an area and affect nutrient recycling resulting in degradation and simplification of the natural ecosystem Cost impact to Macmahon associated with remedial works and non-compliance with contract conditions	Possible	Moderate	High	All plant mobilised to site is free from soil and vegetation matter No new weed species to be introduced to the project area No weeds spread within the project area (i.e. between Balladonia and Caiguna)	**Project Manager (or delegate)** to: • Abide by Macmahon Weed Hygiene Flowchart (PEFC12) • Ensure plant to be used in performance of the works has been inspected/ washed prior to dispatch to site • Ensure machinery involved in topsoil removal moving between the Balladonia and Caiguna East sections have been inspected /washed • Ensure personnel (including subcontractors) are aware of weed hygiene requirements • Check plant supplied to site to ensure free from soil and vegetation matter before offloading • Provide a Weed Hygiene certificate (if requested) for each piece of plant verifying each has been properly washed, 24 hours	*PQEMR:* • Monitoring of site for spread of weeds • Maintain weed hygiene certificates and register	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
							prior to off-loading and when moving plant between Balladonia and Caiguna		
12. Over-clearing or Unauthorised Clearing / Land Disturbance *Clearing consists of all trees standing or fallen, brush, shrubs and other vegetation. Land disturbance may be associated with activities such as off-road driving.*	Environmental Protection Act 1986 Wildlife Conservation Act 1950 SWTC Section 9.5(b)	• Destruction of declared rare and priority flora • Destruction of native fauna habitat • Displacement and/or destruction of (threatened) native fauna • Disturbance or destruction of heritage sites • Dust generation • Spread of noxious weeds • Erosion problems	Possible	Moderate	High	<u>Objectives:</u> Protection of Declared Rare and Priority Flora Minimising the environmental effects of land disturbance Ensuring the conservation status of all fauna species is not threatened <u>Targets:</u> No unauthorised clearing Avoid the introduction and spread of weeds within the project area	**Project Personnel:** • Shall not knowingly damage or remove vegetation without the consent of Main Roads • If any clearing is required, clear large woody vegetation and stockpile separately to facilitate seed collection and spreading on rehabilitated areas • Clearing/grubbing activities only allowed during daylight hours **Project Supervisor/ Foreman** to ensure: • Written approval has been obtained from Main Roads prior to any clearing outside of the designated areas • Clearing complies with contract specifications (i.e. only the minimum area required for construction is cleared) • Areas earmarked for clearing to be clearly demarcated prior to	**PQEMR** to: • Confirm Main Roads has signed necessary documentation prior to clearing. • Raise Nonconformance Report and investigate cause for any breaches reported	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
							clearing taking place • No vehicular traffic allowed over unmarked land outside of the designated work area		
13. Failure to Comply with Aboriginal Heritage Legislation / Contract Requirements	Aboriginal Heritage Act 1972 Aboriginal Heritage Regulations 1974 Macmahon Aboriginal Heritage Management flowchart (CSCF06c) Contract № 363/03 Sections 4.5 and 5.3 SWTC Section 9.17	Earthworks have the potential to impact on ethnographic sites, sub-surface artefacts and/or skeletal material. Heritage sites are protected by legislature and require permission to be disturbed. Failure to comply with legislation may result in the following: • Regulatory fines • Loss of heritage • Stakeholder issues	Possible	Major	High	Objectives: No unauthorised alteration, disturbance or interference with known heritage sites and/or areas of cultural significance 100% reporting of discovery of heritage sites Respecting the rights of traditional landowners Targets: Comply with the provisions of the Aboriginal Heritage Act 1972-1980 Comply with Project specific Aboriginal Heritage Management Plan (where implemented)	**PQEMR** to ensure: • Flowchart CSCF06c applies • All significant finds, such as a burial, will result in operational activities being suspended until the finds can be managed in a sensitive and appropriate manner according to the nature and type of material discovered. Notification will be given to Main Roads immediately after the discovery of any material/site • No known Aboriginal sites or artefacts are to be disturbed unless prior clearance has been obtained from the Archaeologist and Main Roads **Project Manager** to: • Ensure all personnel are inducted (where required) regarding their responsibilities under the relevant heritage legislation	**Project personnel:** • If any person identifies any material or ethnographic site suspected to be of heritage significance, works that could impact on the material/site will be suspended immediately, and the Project Manager, Main Roads and Archaeologist informed. • Any Aboriginal cultural material uncovered will be dealt with by a qualified Archaeologist.	Moderate L = Very Unlikely C = Major

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
14. Failure to Comply with Borrow Pit Management Plan	Project Borrow Pit Management Plan SWTC Section 9.5(f) SWTC Section 6.13 SWTC Appendix 32: Environmental Conditions № 1,2,3 and 4	• Unauthorised clearing • Destruction of declared rare and priority flora • Destruction of native fauna habitat • Displacement and/or destruction of (threatened) native fauna • Damage or destruction of heritage sites and/or areas of cultural significance • Dust generation • Spread of noxious weeds • Changes to the landform • Modified surface drainage resulting in further land disturbance	Possible	Moderate	Moderate	Avoid unauthorised clearing Minimise environmental harm Rehabilitate borrow pits (where practicable) so as they free-drain or in accordance with contract requirements	**PQEMR** (or delegate) to: • Borrow/material pits containing Priority 4 species *Eremophila parvifolia* var *parvifolia* and Priority 1 listed *Grevillea phillipsiana* are only to be used when all other borrow/material sources have been exhausted • Seed used in rehabilitation of borrow pits will be sourced from local provenance. • Ensure planned borrow/material pits are not in known ecologically significant areas, heritage areas or known noxious weed infestation areas where possible • Wherever possible, plan and excavate borrow pits so that they free-drain on completion of rehabilitation earthworks • Locate pits (where possible) to minimise clearing of vegetation • Submit	**PQEMR** (or delegate) to: • Visually inspect the planned borrow pit area to ensure no noxious weed contamination • Monitor regrowth in rehabilitated areas for the duration of the project, and defects correction period, which will involve visual inspections and photographic monitoring by a consultant	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
							documentation to Main Roads for approval prior to the development of pits. (the documentation should include information such as pit location, pit size and pit design) • Implement Project Borrow Pit Management Plan • Ensure all pits used for the Project are rehabilitated (progressively, where possible) prior to leaving site • Flora/fauna surveys to be commissioned by Macmahon if further borrow pits are required (other than those borrow pits mentioned in the Contract)		

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
15. Disturbance to Flora and Fauna due to Failure To Comply With Relevant Legislation / Contract Conditions *Disturbance caused by personnel movement within the site, clearing or excavation works*	Environmental Protection Act 1986 Wildlife Conservation Act 1950 Wildlife Protection Regulations 1970 SWTC Sections 9.5 and 9.6	<u>Flora</u> Failure to comply could result in disturbance to established/rare native flora and fauna Introduction or spread of weeds <u>Fauna</u> All native fauna is protected Removal of breeding, nesting and foraging habitats by clearing Potential loss of protected fauna Introduction of feral animals resulting in increased pressure on native species Failure to comply could result in clean-up and/or rehabilitation undertaken at cost to Macmahon	Possible	Moderate	High	No complaints No damage or unauthorised removal of vegetation.	**Project personnel:** • To ensure threatened and endangered species of flora and fauna shall not be disturbed except as part of an approved land disturbance **Project Manager** or delegate to communicate during site induction and toolbox meetings and site communications: • Identification, location and marking out of Priority flora • Restrict activities to designated areas • Obey speed limits • Firearms and pets are not allowed on site Borrow/material pits containing Priority 4 species *Eremophila parvifolia* var *parvifolia* and Priority 1 listed *Grevillea phillipsiana* are only to be used when all other borrow/material sources have been exhausted	**PQEMR** to • Monitor following site establishment and record any breaches • Conduct monthly inspection, using Macmahon's Environmental Checklist, to assess compliance • Demarcate/flag Priority flora (i.e. Priority 4 species *Eremophila parvifolia* var *parvifolia* and Priority 1 listed *Grevillea phillipsiana*) individuals when encountered.	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
16. Erosion and Sedimentation	Environmental Protection Act 1986	Pollution of Water Resources Death of flora/fauna directly or indirectly utilising water sources contaminated by sediment/liquid waste	Unlikely	Moderate	Moderate	All vehicle / equipment wash-down and dewatering effluent will be discharged in an approved and environmentally acceptable manner All construction activities will be carried out in a manner so as to minimise transport of sediment from work areas	**Project Manager** (or delegate) to ensure: • All runoff emanating from the site must be effectively filtered or otherwise treated so that water quality meets wastewater discharge limits specified in licence conditions and relevant State legislation • Open excavations will be bunded and/or provided with effective cut-off or diversion drains on their perimeter (where required) to divert overland stormwater runoff away from the excavation • Exposed soil, batters and other erosion sensitive areas will be adequately protected through velocity reduction, covering, grassing or water diversion	Daily visual inspection of project area to identify sediment/potential sediment issues	Moderate L = Unlikely C = Moderate
17. Pollution of Water	Environmental Protection Act 1986	Contamination of: • Ground • Surface Water Groundwater	Unlikely	Moderate	Moderate	Minimise ground contamination Maximise re-use of water	**Project Manager** (or delegate): • Ensure washdown constructed in an area where pollutants are not likely to enter surface or ground water. • Use biodegradable solvents	**Maintenance Supervisor (or delegate):** • Conduct regular visual inspection of washdown area	

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives & Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
							• Ensure all interception drains and diversion drains are maintained free of accumulated sediments and obstructions • Ensure washdown area drains free of rubbish/silt • Ensure that Macmahon design, construct, maintain, remove and where appropriate , reinstate all necessary temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt from project works • Ensure spills/leaks of hazardous substances etc are cleaned up as quickly as practicable • Ensure hydrocarbon storage (including waste hydrocarbons) is per AS1940 (2004) • Immediately remove any spoil, debris or silt that may be deposited on adjacent land and in the process restore the affected land to its original state.	• Conduct monthly inspection, using Macmahon Environmental Checklist, to assess compliance • Regularly monitor the water quality at washdown area discharge point for clarity and odour	Moderate L = Unlikely C = Moderate

Environmental Hazard/Aspect	Legal or Other Requirement	Risk/Impact	Impact Analysis Likelihood (L) & Consequence (C)		Inherent Risk Level	Objectives Targets	Treatment Option/ Additional Controls (including responsibility)		Level of Residual Risk
			L	C			Control Measures	Monitoring	
18. Poorly Planned and/or Conducted Rehabilitation of Borrow Pits	Project Borrow Pit Management Plan SWTC Section 9.5(f) SWTC Section 6.13 SWTC Appendix 32: Environmental Conditions № 1,2,3 and 4	Poorly managed rehabilitation programs are likely to delay and/or prevent return of native flora and fauna (where relevant).	Likely	Moderate	High	To plan and perform rehabilitation activities progressively (where practical) in a manner that promotes the restoration of the natural landscape and return of native flora/fauna as soon as possible	**Nominated Subcontractor:** • All seed on the project should be locally sourced where possible **Construction Supervisor to ensure:** • Following borrow pit use, exposed surfaces shall undergo rehabilitation (including existing borrow pits) • All native vegetation cleared must be stockpiled on site for use in rehabilitation • Topsoil to a depth of 100mm must be stripped and stockpiled for rehabilitation • Topsoil spreading, seeding and planting program must be implemented to complement road-works • Herbicide should be sprayed over rehabilitation areas to minimise weed growth.	**PQEMR and/ or nominated subcontractor** • Monitor compliance with planned arrangements • Conduct photo monitoring of rehabilitation areas	Low L = Unlikely C = Minor

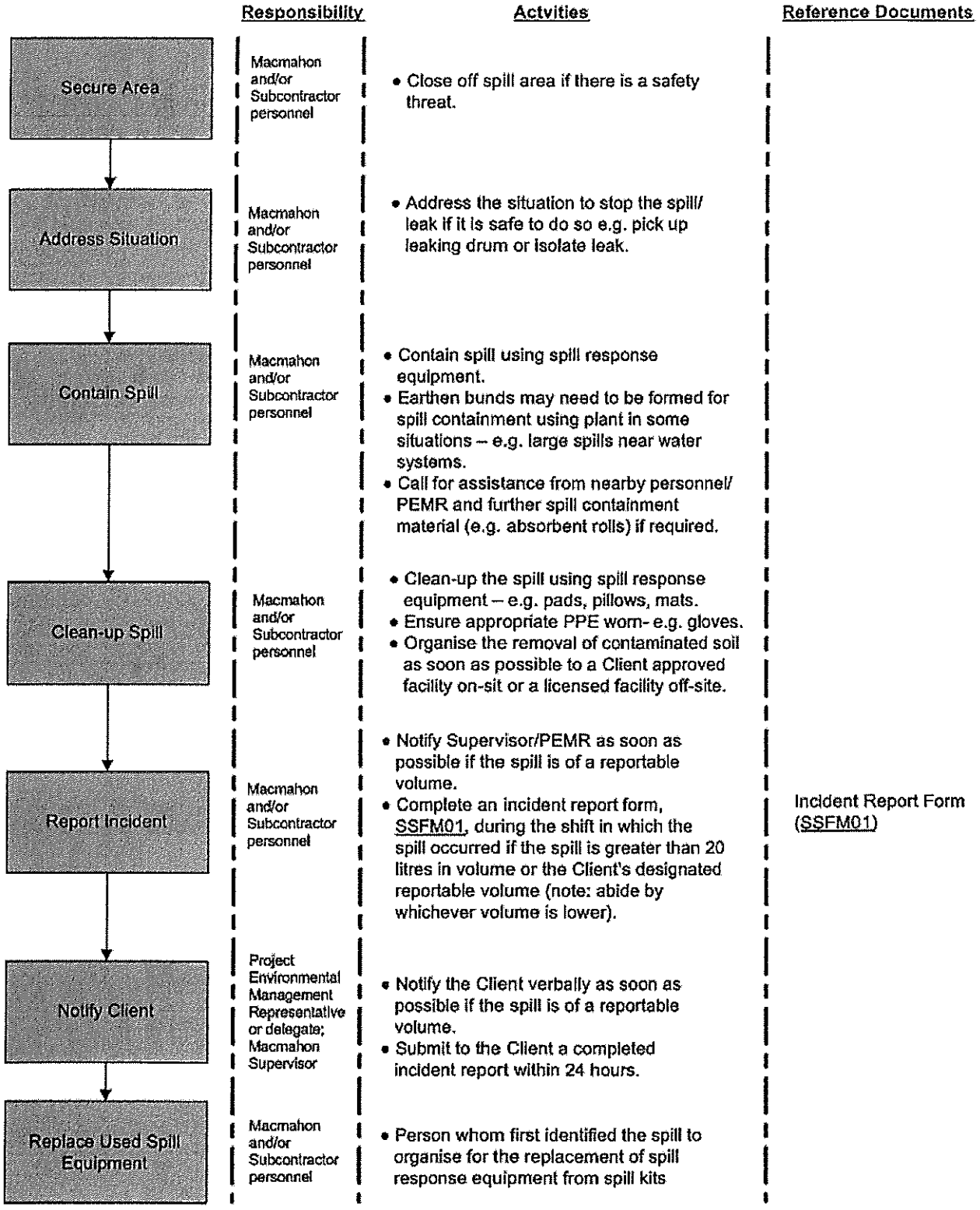
APPENDIX 2

Hydrocarbon/Chemical Spill Response Process (PEFC13)

Project Execution Phase

Hydrocarbon / Chemical Spill Response Flowchart – PEFC13

PROCESS OWNER: *Quality & Environmental Manager Ross Hamilton ph: (08) 9365 1109 email: RHamilton@macmahon.com.au*



APPENDIX 3

Weed Management Process (PEFC12)

Project Execution Phase

Weed/Dieback Hygiene Process Flowchart – PEFC12

PROCESS OWNER: *Quality & Environmental Manager Ross Hamilton ph: (08) 9365 1109 email: RHamilton@macmahon.com.au*

Background

Weeds are plants growing where they are not wanted and do not normally occur. Often weeds are able to spread rapidly. Weeds are undesirable as they compete with native plants and may replace the habitats and food resources of native animals. Weeds may also inhibit regeneration of native species, change the fire characteristics of an area and affect nutrient recycling, resulting in the degredation and simplification of the natural ecosystem.

Dieback – a root disease that kills native plants. Dieback is spread via plant roots and by animals / humans / machinery / equipment / vehicles that come into contact with infected plants.

	Responsibility	Activities	Reference Documents
Clean Plant & Equipment prior to dispatch to site	Macmahon and/or Subcontractor personnel	• Ensure that all plant and equipment is washed down and cleaned of all soil and vegetation prior to dispatch to site. In Queensland, a Weed Hygiene Declaration Form from the Department of Natural Resources and Water should be completed for the supply or transport of 'things'.	Queensland Weed Hygiene Declaration
Complete weed/dieback certificate & notify site	Macmahon and/or Subcontractor personnel	• A responsible person (e.g. workshop supervisor where the plant has been cleaned) to inspect the plant and sign the weed /dieback hygiene certificate(s) (PEFM47) once satisfied each piece of plant has been cleaned to the required standard. • Completed certificates to be faxed to the site at least 24 hours prior to the plant arriving on site. Macmahon to provide a copy of the certificate (where required) to the Client. A copy of the certificate should also travel to site with the plant equipment. Note: Completed Qld Weed Hygiene Declarations - White Copy to Receiver, Yellow Copy for site records, Pink Copy to Macmahon Transport Manager	Weed /Dieback Hygiene Certificate PEFM47 Note: In Queensland the Weed Hygiene Declaration should be used in place of PEFM47 Memo - Queensland Weed Hygiene
Inspect Plant prior to entry on site	Project Environmental Management Representative or delegate	• The PEMR or delegate is to inspect plant equipment prior to off-loading on site and verify whether the assurances provided by the signed weed/dieback hygiene certificate are correct. • If satisfied the plant is allowed entry to site. • If plant not cleaned to the required standard it must not be allowed to be off loaded onto the site. The plant is to be cleaned at a location off-site deemed to be suitable by both the PEMR and the Client Representative prior to again seeking approval for entry.	
Maintain weed/dieback hygiene certificates and register	Project Environmental Management Representative or delegate	• Record plant/equipment movements on the weed/dieback hygiene register (PEFM10) every time plant/equipment.	Weed /Dieback Hygiene Register PEFM10
Repeat weed/dieback hygiene process on departure	Macmahon and/or Subcontractor personnel	• The weed/dieback hygiene process is to be followed for all Macmahon plant on its departure from site.	

Rev 3

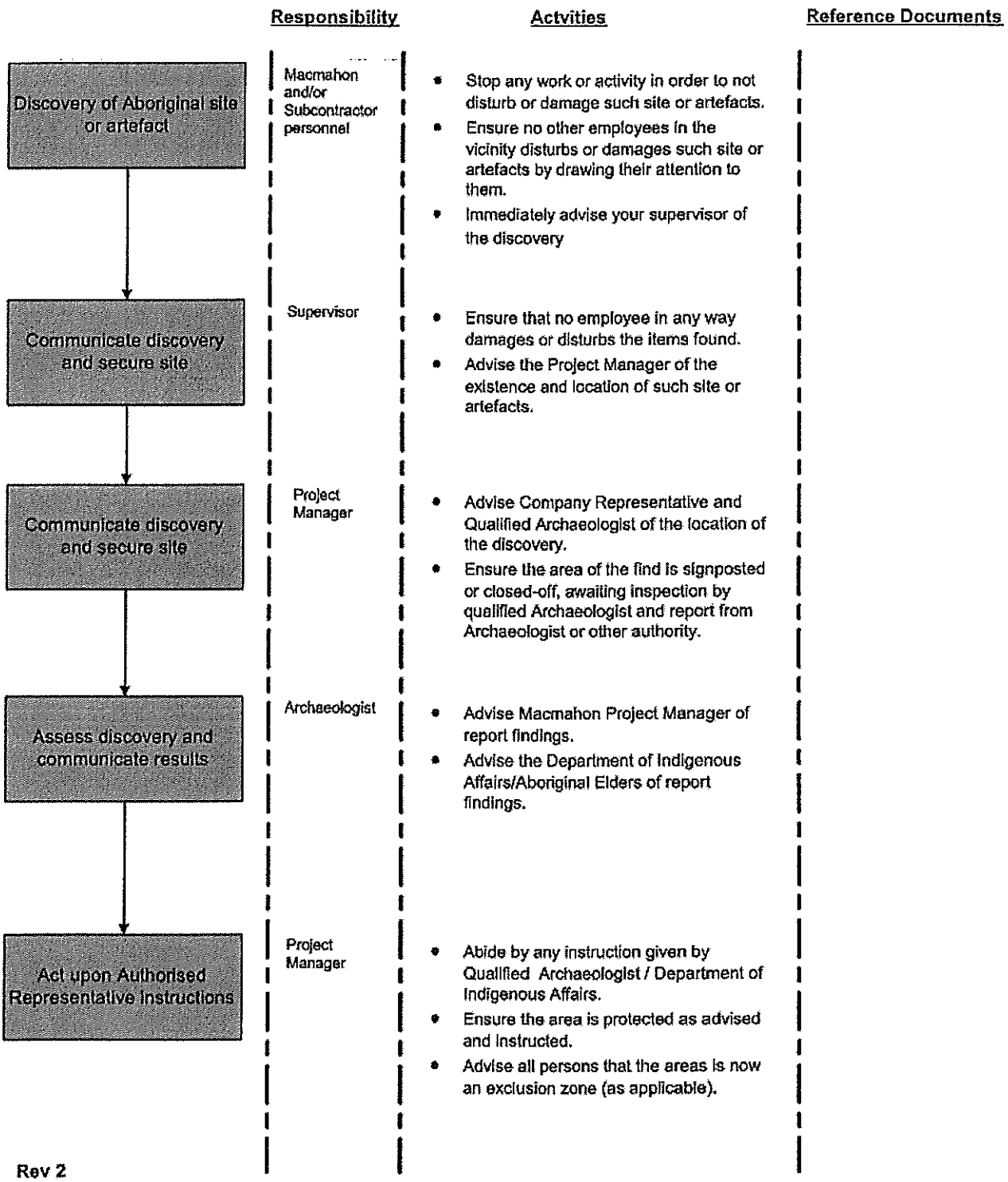
APPENDIX 4

Management of Unrecorded Aboriginal Heritage Sites (SSFC06c)

Project Execution Phase

Management of Unrecorded Aboriginal Sites or Artefacts Flowchart – SSFC06c

PROCESS OWNER: Quality and Environmental Manager Ross Hamilton ph: (08) 9365 1109 email: RHamilton@macmahon.com.au

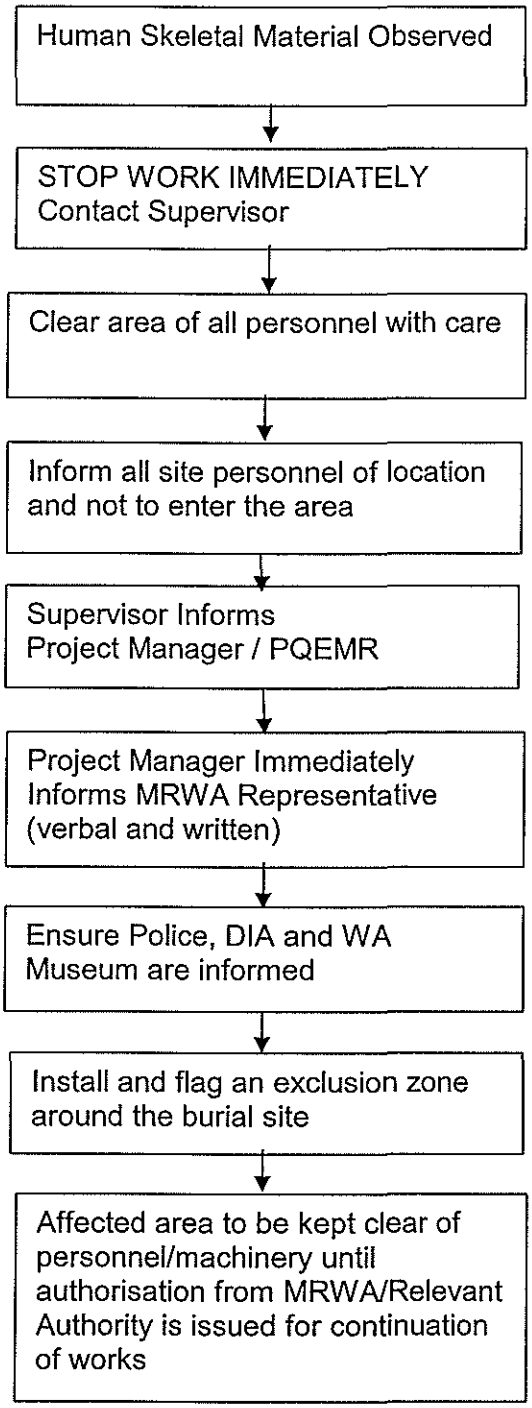


Rev 2

APPENDIX 5

Management of Discovery of Human Burial Material within Clearing Limits – (C202-045)

Form Ref	C202-045	**Procedure For Human Burial Material Found Within Clearing Limits of Heartbreak Ridge**	MACMAHON
Rev	0		
Date	20-Feb-07		



Refer to Eyre Highway D&C Project Deed, clause 4.5 and 5 along with the SWTC Clause 9.17
Refer to Macmahon flowchart SSFC06c - Management of Unrecorded Aboriginal Sites or Artefacts

APPENDIX 6

Project Borrow Pit Management Plan

Proc No:	C202-047	BORROW PIT MANAGEMENT PLAN FOR EYRE HIGHWAY C202	MACMAHON
Revision:	3		
Date:	13/05/07		
Authorised by:			

Objective: *To plan, excavate and rehabilitate borrow pits in manner that promotes the restoration of the natural landscape and return of native flora and fauna as soon as possible.*

Phase/Aspect	Description
PLANNING	Main Roads have identified potential sources of pavement material and borrow material both within and outside the Site. Prior to the selection of pavement and borrow material, the volume of material (compacted) required for the Works shall be calculated from designs/plans and other reference material. The volume of material located within pits shall then be calculated to ensure sufficient material for the works. Where there is insufficient material for construction, further investigation of potential pits will be necessary, subject to the conditions as set out in Contract 363/03. Any information regarding volumes, pit locations and investigations shall be made available to the Main Roads Representative on request. A desktop study and visual inspections of the work area shall be conducted to locate better material sources. The suitability and extent of the borrow material in these areas may need to be confirmed through test pitting. Test pits must be backfilled if they are not to become part of the borrow pit development. Any test pits that are to be left open shall be left in a safe condition to prevent people and animals from becoming injured or trapped. Test pits should preferably be located in open areas and away from large stands of trees and areas of environmental or heritage significance. Test pitting is not expected on this project due to the number of prior investigations conducted previously.
Pit location	Materials pits should be located as close as possible to where the material is required. Pits located in very hill areas may not be economical to use as machinery cannot operate efficiently. Consideration should also be given to the cost of constructing and maintaining haul roads. Materials pits are to be located and operated to maximise regeneration of vegetation and minimise long term damage to the surrounding environment. Borrow pits should be placed so as to avoid: • large trees and heavily timbered areas; • Aboriginal heritage sites; • watercourses by a minimum of 50m; and • significant flora/fauna species/habitat, in particular pits containing Grevillea phillipsiana and Eremophila parvifolia shall be avoided where possible

Visual considerations	To reduce the visual impact of borrow pits the points listed below must be followed, except for materials already in stockpile: • a minimum 150m wide buffer zone of undisturbed vegetation remains between the pit and the nearest limit of clearing for roadworks; • the shape of the pit should be rectangular and run parallel to any roads; • vehicular movement will be confined to either existing roads or a single access road; • the pit shall be positioned behind screens of vegetation or terrain, wherever possible; • the single access road to the borrow pit should be dog legged prevent a direct line of sight into the pit from the adjoining road; • pits should be placed so as to not be visible from public roads and any significant observation areas (distance no less than 150m); • a minimum clearance of 500m is to be maintained from any building; and • a minimum clearance of 200m is to be maintained form any stat improvement such as windmills, tanks, bores and soaks.
Pit dimensions	Borrow pits should consist of a rectangular design. Pit dimensions should maximise the amount of material extracted whilst minimising the impact to the environment. The total cleared area for any one pit may not exceed ten hectares, as stated in the clearing permits for Contract 363/03. Prior to opening a pit, a meeting should be conducted on site with the Main Roads Representative or Main Roads Surveillance Officer and machine operator or supervisor to discuss pit marker pegs, the size and shape of the pit, the material being sought and the depth of the deposit. Accurate recording of test depths from pit investigations will determine the optimal depth for the excavation. The efficient use of depth control will ensure a greater recovery of material, a minimisation of unwanted material and make the task of rehabilitation easier. The depth of the borrow pit should be as deep as possible for mate extraction however it should be noted that shallower pits are easier to rehabilitate. As a guide, pits should be approximately 1.5 m deep once topsoil has been removed. Under this contract, pits may exceed 1.5m in depth. Where possible, material should be excavated from a series of smaller pits, which are operated sequentially rather than as a single large pit. Individual borrow pits should be separated by no less than a 20 metre buffer zone of undisturbed vegetation.
APPROVAL TO OPEN A BORROW PIT	Under contract 363/03, clearing hold-points must be released from the Main Roads Representative prior to any clearing. As a minimum, the following information will be recorded and made available to the Main Roads Representative on request: • a map showing the borrow pit location (with chainage references and/or GPS coordinates); • intended dimensions and depth;

	• volume of material to be extracted; and • what the material is to be used for. The limits of the borrow pit (together with the proposed entry road) shall be pegged before the Main Roads Representative undertakes a site visit for approval. A borrow pit may only be opened once the clearing hold point has been released.
CLEARING OF BORROW PITS	As of July 8 2004, clearing of native vegetation is prohibited. Prior to any clearing works, permits must be granted from the Department of Environment. Clearing Permits have been obtained for this project. In regards to the Caiguna East and Balladonia areas, the permits allow for up to 33 hectares to be cleared between 384 and 401 SLK and up to 94 hectares from 139.4 to 198 SLK for the purposes of borrow pits. . The permits detail the location of the pits and state that the permit holder shall not clear more than 10 hectares at each site for the purpose of borrow pits. The permit numbers are 104/1 and 105/1 and the expiry date is December 24 2006. In regards to the Balladonia East and Heartbreak Ridge areas, the clearing permit is CPS 818/3 and expires in December 12 2010. Clearing Permit CPS818/3 allows a maximum annual limit of clearing in the Goldfields-Esperance area of 200ha. The initial clearing stage involves stripping the existing vegetation and natural debris and pushing it into windrows at the sides of the borrow pits. It is recommended that at least 6m clearance be made between the excavation limits and the edge of clearing to allow for storage of the vegetation and topsoil stockpiles. The second stage involves stripping and pushing it to form a second windrow parallel to the stockpiled vegetation. An adequate thickness of topsoil must be removed for later respreading on cut batters. Topsoil windrows should be sufficiently far away to allow room for battering of the sides without disturbing the topsoil windrows during the rehabilitation phase. Typically, topsoil windrows should not be closer than 2m from the edge of excavation and, under Contract 363/03 topsoil windrows shall be no higher than 1m. Vegetation and topsoil should also be cleared and stockpiled to one side of access tracks using similar methods as described above.
EXCAVATION OF BORROW PITS	Excavation profiles should be pre-planned and discussed with the Main Roads Representative to ensure that where possible, borrow pit floor levels are as close as possible to the lowest natural level within the borrow pit margin. This pre-planning may enable pit floor levels to be elevated during rehabilitation earthworks so that the pit is free draining. Pit floors should also be as level as possible to facilitate loading.
REHABILITATION OF BORROW PITS	The rehabilitation of borrow pits should be undertaken in consultation with Main Roads. Existing pits must be rehabilitated in a manner which minimises the disturbance of existing vegetation. If a pit has been operated sequentially from a series of adjacent smaller

	pit areas, each separate pit shall be rehabilitated prior to the extraction of material from a subsequent pit. This shall be done using the topsoil and cleared vegetation from the subsequent area. Any unused pavement material is to be placed in a single uniform stockpile and the remainder of the pit rehabilitated. All industrial rubbish is to be removed to an approved rubbish disposal tip. Any oversize rock, weed infected surplus topsoil, rubbish and debris must be buried. Existing overburden material shall be uniformly spread over the pit area, followed by clean topsoil. In addition to any pits opened under Contract 363/03, existing pits located within 100m of the new Highway and at 382.02, 382.25 and 392.23 SLK shall be rehabilitated in accordance with this plan and Contract 363/03.
Landscaping	The borrow pit floor shall be left neat with any stockpiles of material being spread over the borrow pit floor. Borrow pit walls should then be battered to a slope no steeper than 3 horizontal to 1 vertical. It is recommended that the battered slope be 6 horizontal to 1 vertical. Material moved during the battering of walls shall be spread over the borrow pit floor with the intention of creating a landform that reflects the natural gradient of the surrounding landscape as much as possible. Consideration should be given to the flow of water into and out of the pit and landscaping should take this into account.
Spreading Topsoil	The stockpiled topsoil is to be spread over the borrow pit floor and walls as evenly as possible.
Ripping	Once the topsoil has been spread, deep ripping along the contours of the borrow pit is required to relieve soil compaction caused by the operation of heavy equipment within the pit. Ripping facilitates water infiltration, seed lodgement and plant root penetration. Ripped areas should not be driven over (except to spread the stockpiled vegetation) and should be left as rough as possible. A windrow should be placed across the beginning of the borrow pit to prevent vehicular entry and water flow from the track into the pit. The track should be s-ripped to slow down water flow. The pit should be ripped to a depth of 500mm at no more than 1m spacings. The final phase of the rehabilitation is to spread the stockpiled vegetation evenly over the surface of the disturbed area.
Seeding	Under Contract 363/03, a seeding program shall be undertaken for all rehabilitated pits, using personnel experienced in seed collection in the Goldfields area. Seed collection shall be undertaken at the optimal time to suit the species of seed being collected. At the completion of rehabilitation works, each pit shall be seeded at a rate of 1.5kg per hectare. The quantity of seed collected must be sufficient to satisfy this requirement. Seeding will be done using a suitably qualified consultant.

MONITORING	Monitoring of rehabilitated materials pits shall be undertaken during the defects correction period. Monitoring and reporting on rehabilitation works shall be conducted on an annual basis. An initial report shall be submitted on completion of rehabilitation works, prior to Practical Completion. A final report will be issued no later than one month prior to the end of the Defects Correction Period. Monitoring and reporting will be carried out by a suitably qualified environmental consultant. The report issued by the consultant shall include sufficient detail to determine whether acceptable standards have been achieved for each pit. Where necessary, the report shall include proposed remedial actions for pits which are not expected to achieve an acceptable standard. An acceptable level of rehabilitation is one in which the density and species composition of vegetation within the pit is similar to or better than the surrounding undisturbed area.
ADDITIONAL READING	Main Roads Pavement Engineering Report No. 2001-6M 'Gravel Search Manual' Main Roads Tender Document Specification 303 – Borrow Pits.