OAKAJEE PORT & RAIL

Rail Development
Environmental Management Plan
Surface Water Management

Document No	:	301012-01054-2000-EN-PLN-003
Revision	:	0
Date of Issue	:	19-Nov-10

SYNOPSIS

This report has been prepared on behalf of and for the exclusive use of Oakajee Port & Rail Pty Ltd and their contractors.

PROJECT 301012-01054-2000-EN-PLN-003

REV	DESCRIPTION	ORIG	REVIEW	REVIEW OWNER	DATE	APPROVED	DATE
0	Issued for Approval	T Carpenter	A Garnaut	G Edwards	19-Nov-10	D McAlinden	19-Nov-10
C	Issued for Final Review	T Carpenter	A Garnaut	G Edwards	30-Jun-10	D McAlinden	30-Jun-10
B	Issued for OPR Review	T Carpenter	A Garnaut	G Edwards	10-Jun-10	D McAlinden	10-Jun-10
A	Issued for Internal Review	T Carpenter	A Garnaut	G Edwards	27-May-10	D McAlinden	27-May-10
CEMP-Rail-002	Issued for Internal Review	T Carpenter	S Pickard	G Edwards	23 Mar 10	P Scott	
CEMP-Rail-002	Issued for Internal Review	*ecologia*	T Carpenter	P Holmes	20 Jan 10	C Miller	

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LIST OF ACRONYMS & ABBREVIATIONS

ANZECC	Australian New Zealand Environment Conservation Council Australian New Zealand
ARI	Average Recurrence Interval
AS/NZS	Australian Standard/New Zealand Standard
DEC	Department of Environment and Conservation
DoW	Department of Water
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Authority
ISO	International Organisation for Standardisation
NWCH	North West Coastal Highway
OPR	Oakajee Port and Rail Pty Ltd
PER	Public Environmental Review
RIWI Act	*Rights in Water and Irrigation Act 1914*
SWMP	Surface Water Management Plan
TDS	Total Dissolves Solids
TSS	Total Suspended Solids
VFMP	Vegetation and Flora Management Plan

1. INTRODUCTION

1.1 Scope & Objective

This document details the management strategies to be implemented by Oakajee Port and Rail Pty Ltd (OPR) to ensure that management of surface water during the construction and operation of the OPR Rail Development (the Project) is conducted in an appropriate manner and in accordance with relevant statutory requirements.

The objectives of the Surface Water Management Plan (SWMP) are:

1. To provide guidance to minimise impacts on surface water flows in accordance with management strategies set out in this SWMP;
2. To outline monitoring programs and reporting that will be implemented for surface water management throughout construction and operation activities;
3. To ensure OPR complies with regulatory requirements with respect to surface water management; and
4. To enable optimisation of construction and operation works taking cognisance of item 1 to 3 above.

The SWMP will be managed via the OPR Environmental Management System (EMS) ensuring all commitments are effectively disseminated across the project team and construction and operation supervisors. The structure of the EMS is detailed in Appendix A. The policies, monitoring, review and auditing of the SWMP are elements of the broader EMS framework under which the construction and operation of the Project will be managed. The EMS enables the SWMP commitments to be cross referenced with other management plans and regulatory approval documents via a series of databases and registers.

Commitments detailed in the Project Public Environmental Review (PER) have been incorporated into Section 6 of the SWMP. The PER and SWMP will be reviewed in consultation with the Department of Environment and Conservation (DEC) and other Decision Making Authorities. Following final approval of the PER, conditions regarding surface water management may be placed on the Project. This SWMP incorporates relevant requirements to comply with those potential conditions, and will be updated as necessary to ensure continued compliance.

1.2 Background/Project Description

OPR is seeking to develop and operate a new deepwater port at Oakajee, 24 kilometres north of Geraldton on Western Australia's (WA's) mid west coastline. The port will be supported by a new 570 km rail network linking the port to iron ore mines to the east. The port will comprise a large breakwater sheltering two Cape size berths, a third berth for Panamax or Cape size vessels, a tug and work boat harbour and associated land based facilities including ship loaders, conveyors, stockpile yard, stackers and reclaimers.

Construction of the Project is scheduled to commence in 2011 with current forecasts having the Project operational by 2014. Iron ore exports from Oakajee Port are expected to be nominally 45 million tonnes per annum.

The broader Oakajee Development has three key project areas:

- Oakajee Deepwater Port;
- Port Terrestrial; and
- Rail Development.

This EMP relates to the Rail Development which extends in a north-easterly direction from the North West Coastal Highway (NWCH) at Oakajee to the Jack Hills mining operations. There will be two spur lines; to Westnet (Mullewa) line and Weld Range (Figure 1-1). The Project comprises the following features:

- Approximately 570 km of rail formation and track (including two spur lines), with a typical final disturbance width of 50 m to 80 m.
- Watercourse/drainage channel crossings including an estimated nine bridges, multi-barrel culverts for major drainage channels and additional culverts for environmental flows.
- NWCH and Chapman Valley Rd bridges providing grade separation of train and vehicular traffic.
- Supporting infrastructure including:
    - up to three large quarries and numerous borrow pits during construction and for ongoing maintenance requirements during operations
    - approximately 200 groundwater production bores and a number of these will be retained for maintenance requirements during operations
    - power via generators for construction camps, bores, etc and maintenance of these during operations
    - up to six construction camps for approximately 3,000 personnel in total at peak occupancy, some portions of some camps being retained to accommodate maintenance personnel and one permanent accommodation camp during operations
    - vehicle access tracks
    - laydown areas during construction
    - mine loops at Jack Hills and Weld Range
    - temporary rail welding depot, sleeper plant and ballast stockpiles at a Construction Depot, part of which will be retained as a permanent track maintenance depot
- Up to 18 train movements a day (highest movements in the western portion of the rail from Oakajee to the potential Mullewa spur).

1.3 Description of Key Works

Construction Phase

The Project will require the disturbance of approximately 7,000 ha of land, (of which approximately 6,000 ha of native vegetation), to construct the rail corridor, source construction materials and locate the necessary support infrastructure.

Works during construction will involve land clearing, excavating construction material, cut and fill for the rail corridor, laying rail tracks and development of supporting infrastructure. Infrastructure will include accommodation camps, water and power supply, access tracks, workshops and rail servicing yards.

Operation Phase

The Project entails the use of trains of up to 2.2 km in length, comprising up to 200 wagons with two standard gauge locomotives. The locomotives will be diesel electric units.

It is anticipated that approximately 20,000 tonnes will be carried per fully-laden train.

The rail line will operate 24 hours a day, 7 days a week.

Maintenance activities will include:

- Maintenance or repairs to tracks, rail embankments or bridges
- Maintenance or upgrading of access roads
- Unblocking or repairing drainage culverts.

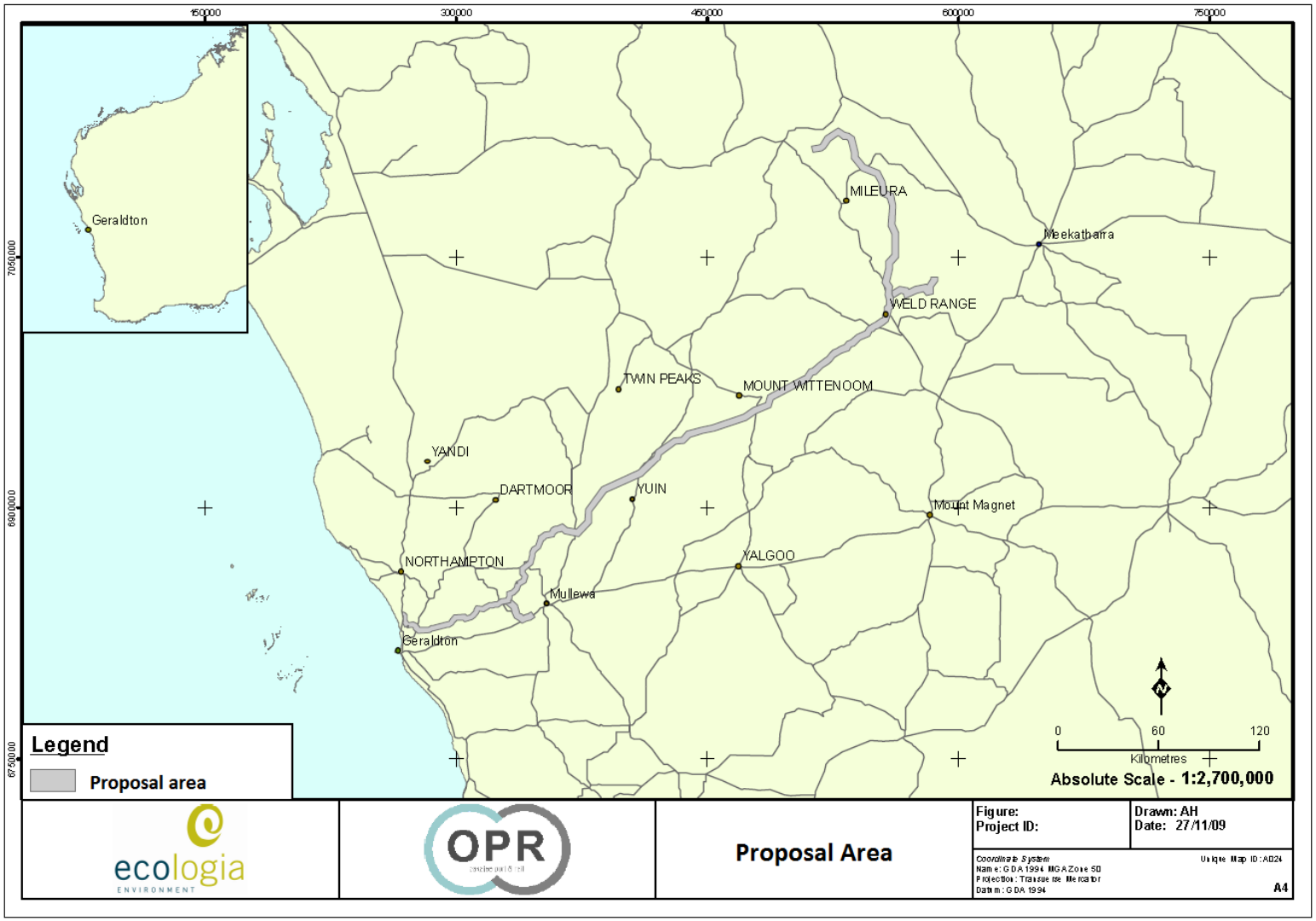

Figure 1-1: OPR Rail Alignment from Great Eastern Highway to Jack Hills

1.4 Key Environmental Legislation/Standards

Table 1-1 identifies the key legislation and standards relevant to surface water management.

Table 1-1: Key Legislation and Standards Relevant to the Management Aspect

Legislation/Standards	Responsible Government Authority / Organisation	Aspect
Commonwealth Legislation		
Nil		
State Government Legislation		
Environmental Protection Act 1986 Part V	Department of Environment and Conservation (DEC)	The Act establishes a licensing and approval system for 'prescribed premises' which include premises which uncontrolled may have impact on surface waters.
Rights in Water and Irrigation Act 1914	Department of Water (DoW)	The Project area is located within the Gascoyne Groundwater Management Area. Bed and Banks Permits and Licenses to Take Water (if required) may be required to be approved under this Act Prior to constructing infrastructure such as bridges or environmental culverts within named waterways a 21A permit must be sought from DoW, issued under the *Rights in Water and Irrigation Act 1914* (RIWI Act)
Soil and Land Conservation Act 1945	Department of Food and Agriculture	Provides for the protection of the Project area from soil contamination.
Waterways Conservation Act 1976	DoW	The Buller and Oakajee rivers bisect the Project area. Potential pollution of these waterways may result in the pollution of the surrounding area, including downstream and terrestrial ecosystems.
Guidelines and Regulations		
Environmental Protection (Unauthorised Discharges) Regulations 2004	DEC	Prevention of direct discharge of sediment or pollutants to the surrounding surface waters
Stormwater Management Manual for Western Australia (DoW 2004-2007)	DoW	Stormwater Management Manual provides guidance for best practice management of stormwater in WA at industrial and commercial sites. The objectives of the Manual are: • Water Quality: To maintain

Legislation/Standards	Responsible Government Authority / Organisation	Aspect
		or improve the surface and groundwater quality within the development areas relative to pre development conditions. • Development: To ensure the delivery of best practice stormwater management through planning and development of high quality developed areas in accordance with sustainability and precautionary principles.
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000)	ANZECC	The ANZECC Guidelines for Fresh and Marine Water Quality outlines the management framework for the management and monitoring of marine and freshwater quality. It provides a guide to government and industry to ensure protection of water sources in Australia and New Zealand.
National Water Quality Management Strategy, No 7: Australian Guidelines for Water Quality Monitoring and Reporting, 2000		This will be used for monitoring and reporting for this SWMP.
Australian Standards		
Nil		
OPR		
OPR EMS	OPR	Provides the framework for environmental management in compliance with *Australian Standard/New Zealand Standard (AS/NZS) International Standards Organisation (ISO) 14001:2004 Environmental Management Systems – Requirements with Guidance for Use*. This EMP is managed under the auspices of the OPR EMS.

2. EXISTING ENVIRONMENT

The Project will run in a north easterly direction from the NWCH near Oakajee to the Jack Hills mining operation for approximately 530 km and will traverse across various creeks, rivers and other surface water areas.

Surface drainage features of the Project area can be divided into two broad groups: the external drainage provided by the

catchment areas of rivers that flow into the sea, and the internal drainage of water courses that drain into a number of salt lakes.

To the east, running generally north-south, between Meekatharra and Wiluna, lies the area of the internal drainage. Here, creeks and internal rivers drain surface water into numerous salt lakes (Aquaterra, 2009).

The northern portion of the Project area is characterised by an ephemeral drainage pattern within the Murchison River catchment, which is made up of an extensive drainage network covering an area of about 82,000km^2. The river discharges into the ocean at Kalbarri, 110km north of Oakajee. Water quality during flooding is fresh, but turbid, while low flows are brackish and saline (Aquaterra, 2009).

The Project crosses a number of episodic rivers and creeks including the Chapman River, Greenough River, Bangemall Creek, Sanford River, and Ilkabiddy Creek. As with most of WA, the rivers and creeks within the Project area are intermittent, with predominately summer flows (ANRA, 2009a).

The greatest rainfalls and flooding events within the project area result from tropical cyclones. Several significant flood events have occurred in recent years; including Cyclone Clare and Cyclone Dominic in January 2009. Widespread storms and flooding were experienced in the region resulting in the closure of several roads, regional airstrips and the flooding of Yuin Station and some houses in Meekatharra. The rainfall intensities from these two events are estimated to have had an ARI in excess of 1000 years (Aquaterra, 2009). As such, flooding of this magnitude is an extremely rare event.

With increasing distance from the coast the rainfall tends to be more unreliable and erratic and the route crosses broad flat plains which drain large catchment areas and are subject to sheetflow (Aquaterra, 2009). Sheetflow occurs when floodwater spreads out over a large area at uniform depth. Sheetflow zones occur across the project area with some vegetation communities, particularly mulga (*Acacia aneura*) woodland, which are dependant on seepage from these surface water flows (ANRA, 2009b).

Historical land use within the catchments of the project area ranges from broad acre intensive cropping near the coast, to extensive grazing and pastoral lands and more recently iron ore mining. Impacts to surface water from these industries is predominately from the damming of run-off for stock and irrigation purposes, run-off of nutrients from fertilizers into waterways and increased salinity due to clearing (ANRA, 2009c).

3. POTENTIAL IMPACTS

3.1 Methodology

The basis of this SWMP is the risk register that was developed using the IMS-SF-1 Environmental Risk Register Template and in accordance with the IMS-SP-1 Environmental Risk Management Procedure. The risk evaluation is based on the overall project risk management principles based on AS/NZS 4360: Risk Management. The content of the risk register was developed in a workshop where potential disturbance to surface water were identified and assessed from an understanding of site construction and operation plans.

3.2 Issues & Threats

The Project crosses a number of episodic rivers and creeks including the Greenough, Sanford and Chapman Rivers. Stream flow is directly in response to rain and flows last for a short period of time (Aquaterra 2009).

The Project requires an estimated nine bridges and the location of these have been chosen where the hydraulic impact of the bridge and the associated earthworks required is minimised to prevent increased erosion and scour.

Vegetation clearing is required for constructing the rail corridor and supporting infrastructure such as quarries, borrow pits, construction camps access tracks, laydown areas and administration buildings. Clearing of large areas of vegetation can potentially reduce the infiltration of rainfall into the soil, which may cause increased overland flow and erosion issues. If this is not managed appropriately, it in turn may reduce water quality with increased sedimentation in local rivers and creeks, impacting on riparian vegetation and aquatic fauna.

The construction of linear infrastructure such as the Project may alter natural flow of surface water and cause surface water to flow parallel to the rail corridor if engineering controls are insufficient. Therefore, over 1,000 culverts for major drainage channels and sheetflow will be installed along the route.

During Project construction and operation, the improper management of chemicals, hydrocarbons, sewage and on-site stormwater may also contribute to the contamination of surface water resources.

3.3 Impacts

Potential surface water impacts that may occur due to the construction and operation of the Project include:

- Alteration of the existing surface water flow patterns;
- Reduction in surface water runoff volume to downstream vegetation communities that may be dependent on upstream drainage;
- Reduction in surface water runoff quality due to hazardous material contamination particularly from hydrocarbons;
- Pooling along the rail corridor edge, which may lead to the growth of invasive vegetation; and
- Sedimentation in downstream areas due to erosion of disturbed areas such as laydown yards, borrow pits, access roads and other cleared areas.

Installing bridges and culverts may also alter the stream's natural flow pattern, erode and destabilise banks, reduce the hydraulic capacity of the stream and increase the extent of flooding upstream (afflux). Riparian and in-stream vegetation may also need to be removed leading to a reduction in aquatic fauna and flora habitat (Aquaterra 2009).

4. ROLES & RESPONSIBILITIES

This section outlines who is responsible for the surface water management aspects of this SWMP. Overall responsibility for the implementation of this SWMP rests with the OPR Project Director and Environment Manager. All employees and contractors shall meet the requirements of this SWMP and associated procedures. Responsibility for some management actions stated in this SWMP may be delegated to specific contractors if appropriate.

Key Project personnel including the Construction/Operation Manager, Superintendents and Supervisors shall ensure that all management actions are undertaken to satisfactory standard and that all personnel are aware of their responsibilities.

There shall be dedicated staff to manage health, safety and environment during construction and operation and a general outline of responsibilities in relation to surface water management are provided below. The responsibility for more detailed control measures are presented in Section 6.

Project Engineers

- Accountable for the design or Project infrastructure to ensure maintenance of surface water flows within the scope of their respective projects.

- Ensure the requirements of this SWMP is implemented in relation to their work packages.
- Ensure the design of major drainage crossings do not impede or redirect the natural flow of surface water.
- Ensure the design of culverts and access road crossings do not significantly impede the flow of surface water in areas of sheet flow.
- Limit the area of impact in sheet flow areas to that approved by the PER.
- Ensure that design will allow compliance with the Control Measures listed in Section 6.

Construction/Operation Manager

- Overall accountability to ensure this SWMP is implemented, complied with, reported and maintained on Site.
- Ensure appropriate resources and personnel are made available to meet the requirements of this SWMP to ensure the maintenance of surface water flows.
- To ensure construction and operation activities comply with the overall EMS and construction/operation phase EMPs (including this SWMP).
- To investigate and subsequently rectify issues that may arise as a result of non-conformance.
- Ensure all personnel attend inductions and are aware of the requirements of this SWMP and related procedures.
- Review reports provided by the Site Environmental Coordinator.
- Ensure the drainage facilities are constructed according to design parameters.
- Ensure stormwater drainage during construction and operation does not significantly alter flow regimes.

Environment Manager

- Overall accountability for the auditing and assessment of compliance with this SWMP and ensure it is maintained on site.
- Provide support to all Project personnel as required ensuring this SWMP is implemented and complied with.
- Provide advice to all key parties to ensure compliance with the legal requirements, achievement of environmental objectives and improving environmental performance.
- Obtain relevant approvals for alteration of watercourses as required.
- Ensure drainage designs proposed are suitable for the maintenance of surface water flow, and obtain external advice if necessary.
- Confirming estimated area of impact in sheetflow areas.
- Review the effectiveness and implementation of this SWMP.
- Review and closing out any corrective actions listed in the Incident Register.
- Participate in hazard studies, risk workshops and design reviews to ensure surface water risks and opportunities are identified and managed.
- Report as required to regulating authorities.

Supervisors and Superintendents:

- Ensure the requirements of this SWMP are implemented within their area of responsibility as delegated by the Construction/Operation Manager.
- Have a working knowledge of surface water flow and management applicable to their area of responsibility.
- Include surface water issues when applicable in prestart (toolbox) meetings.
- Conduct audits, inspections and raising corrective actions as required.
- Provide leadership, training and recognition in managing surface water within their area of responsibility.

Site Environmental Coordinator

- Provide training and induction on surface water management as outlined in this SWMP.
- Liaise with supervisors to identify surface water issues associated with day-to-day construction and pre commissioning activities and operation activities.
- Undertake inspections in liaison with Supervisors.
- Prepare reports on surface water management and identify areas of improvement and corrective action.
- Assist with investigating surface water incidents and co-ordinating corrective actions, if required.
- Provide timely and accurate advice to the Construction/Operation Manager on surface water management and corrective actions in relation to surface water incidents.
- Report any non-compliance in the EMS Incident and Non-conformance Report Form.
- Collate surface water quality results after rain events.
- Maintain all documents (hard copy files, electronic files and emails) for inspection during internal and external audits.
- Maintain a Incident Register and provide the register to the Environmental Manager.
- Maintain the risk register that informs this SWMP.

Contractors

- Support OPR surface water management initiatives and culture.
- Comply with all legal requirements and the requirements specified in this SWMP.
- Ensure all personnel are adequately trained in surface water management.
- Seek advice from OPR when in doubt of their requirements.

All Personnel

- Comply with all legal requirements and the requirements of this SWMP.
- Report surface water incidents to their Supervisor or Site Environmental Coordinator.
- Attend environmental inductions or any other training on surface water management.
- Participate in HSE meetings and suggest improvements to surface water management.

Also refer to EMS for further details on general OPR personnel responsibilities.

5. MITIGATION

Impacts on surface water will be minimised by appropriate design and avoidance where possible. To prevent or minimise the impacts, controls are placed in the order of hierarchy of control principles listed below:

- Elimination of the activity;
- Substitution with a lower risk activity or product;
- Engineering solutions to reduce the impact of the event;
- Implementation of administrative procedures to control the activity; and
- Clean up or remediation measures to mitigate impacts after an event.

The management strategy structure and content follows WA Environmental Protection Authority (EPA) and DEC guidance.

Management strategies have been developed to meet the following EPA objectives:

- To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected; and
- To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

The intended mitigation of impacts, determined in accordance with the EPA recommended mitigation hierarchy, is outlined below (Table 5-1). The objectives, targets and performance indicators related to surface water have been developed based upon the management strategies outlined within the Project PER.

Table 5-1: Performance Management targets and indicators for surface water

Potential Impacts	OPR Management Objective	OPR Management Strategy	Target	Performance Indicators
• Alteration of the existing surface water flow patterns; • Reduction in surface water runoff volume to downstream vegetation communities that may be dependent on upstream drainage; • Pooling along the rail corridor edge, which may lead to the growth of invasive vegetation; and • Sedimentation in downstream areas due to erosion of disturbed areas such as laydown yards, borrow pits, access roads and other cleared areas. • Installing bridges and culverts may alter the stream's natural flow pattern, erode and destabilise banks, reduce the hydraulic capacity of the stream and increase the extent of flooding upstream (afflux). • Riparian and in-stream vegetation may also need to be removed leading to a reduction in aquatic fauna and flora habitat (Aquaterra 2009).	• To avoid any significant disturbance to surface water hydrology regimes. • Ensure the protection of sheetflow dependent vegetation. • Ensure the protection of riparian vegetation	• Ensure the design and installation of Project bridges, culverts and other surface water flow mechanisms do not significantly impact natural surface water hydrology regimes. • Ensure drainage of construction and operation areas do not significantly impact natural surface water hydrology regimes.	• All permits obtained for named streams, water courses and embankments requiring disturbance • No visible pooling upstream of Project infrastructure • No visible diversion or restriction of flow downstream of Project infrastructure • No vegetation loss outside of approved disturbance footprint through alteration to surface water hydrology. • No significant scouring or erosion on downstream waterways.	• Compliance with Bed and Banks Permits. • Visual surface water hydrology observations during flow events • Mulga vegetation monitoring in sheetflow areas • Incident reporting

Potential Impacts	OPR Management Objective	OPR Management Strategy	Target	Performance Indicators
Reduction in surface water runoff quality due to hazardous material contamination particularly from hydrocarbons.	To maintain the quality of surface water and minimise the potential for erosion and sedimentation.	Ensure potentially contaminated surface water is not released to the environment.	• No significant increase in sedimentation downstream of Project infrastructure. • No significant decline in water quality downstream of Project infrastructure.	• Water quality monitoring data. • Incident reporting • Compliance with Hazardous Materials and Contamination Management Plan

6. KEY CONTROL MEASURES

A series of control measures have been established to address the potential impacts related to surface water that could arise during the construction and operation of the Project. The control measures directly address the EPA objectives and OPR management strategies set out in the PER. The control measures for surface water are detailed in Table 6-1 below.

As part of the implementation of control measures as detailed in this plan, a number of procedures and systems will be employed in order to govern and manage the requirements during construction and operation. In particular, the following key systems will be utilised for managing on site compliance and monitoring:

- Ground Disturbance System (during construction only);
- Clearing Control System (during construction only); and
- Surface Water Monitoring Program;

The Ground Disturbance and Clearing Control Systems will work in coordination to control all Project construction activities in order to ensure construction activities only occur within designated areas.

Details of the structure and relationship of these systems is provided in Appendix B.

Table 6-1: Control measures for surface water

OPR Management Objective	Control Measure ID	Control Measures	Responsibility	Timing	Monitoring
Construction Phase					
• To avoid any significant disturbance to surface water hydrology regimes. • Ensure the protection of sheetflow dependent vegetation. • Ensure the protection of riparian vegetation	RCS1	Bed and Banks permits required under the RIWI Act will be obtained for activities which have the potential to interfere with named streams, water courses and embankments.	Environmental Manager	Prior to construction	Compliance with Bed and Banks Permit conditions
	RCS2	Bridges will be designed to withstand 1 in 100 year average recurrence interval (ARI) flooding without damage and 1 in 2,000 year ARI flooding without structural damage.	Project Engineer	Prior to construction	Approved design
	RCS3	Design drainage infrastructure to minimise pooling alongside the rail corridor.	Project Engineer	Prior to construction	Visual observations and inspections of pooling during flow events
	RCS4	Where infrastructure may cause drainage to flow parallel to the rail formation, place culverts at regular intervals together with interceptor banks to direct runoff and reduce pooling.	Project Engineer, Construction Manager	Prior to and during construction	Visual observations and inspections during flow events
	RCS5	Where practical, construct bridges and major crossings at right angles to major drainage channels.	Project Engineer, Construction Manager	Prior to and during construction	Assessment of final design
	RCS6	A risk audit will be completed to ensure these designs are appropriate to meet environmental and safety objectives.	Project Engineer, Construction Manager and Environmental Manager	Prior to and during construction	Completed Risk Audit
	RCS7	OPR will perform investigations to determine areas of sheetflow dependant vegetation that may be impacted by the Proposal. A hydrology assessment will be performed for these areas to	Environmental Manager	Prior to and during construction	Visual observations and inspections, vegetation health monitoring.

OPR Management Objective	Control Measure ID	Control Measures	Responsibility	Timing	Monitoring
Construction Phase					
		determine the suitable drainage measures required to maintain sheetflow and restrict drainage shadows to within the area originally disturbed by the construction footprint.			
	RCS8	Suitable drainage mechanisms (such as culverts) will be installed in areas of sheetflow dependant vegetation at intervals that will ensure the drainage shadow does not extend beyond the approved disturbance area.	Construction Manager	During construction	Visual observations and inspections, vegetation health monitoring
	RCS9	Construct borrow pits such that they are not an impediment to downstream flow. Borrow pits are to be self draining, where possible, and will contain erosion protection as required.	Construction Manager	During construction	Visual inspections
	RCS10	Conduct induction and training sessions on surface water management. Surface water issues to be discussed at toolbox meetings. Also applies to surface water quality management.	Environmental Manager, Supervisors and Superintendents	Prior to site access	Induction records
	RCS11	Maintain all stormwater infrastructure to their designed capacity or function.	Construction Manager	During construction	Maintenance reports
To maintain the quality of surface water and minimise the potential for erosion and sedimentation.	RCS12	Identify relevant surface water monitoring points, schedules and frequencies, together with trigger levels and responses for implementation of investigations and corrective actions where appropriate.	Construction Manager	During construction	Monitoring program
	RCS13	Camps and other supporting rail infrastructure will be located away from creeks and waterways at least 0.5m above the 100 yr ARI flood level for the	Project Engineer	Prior to construction	Approved design

OPR Management Objective	Control Measure ID	Control Measures	Responsibility	Timing	Monitoring
Construction Phase					
		area.			
	RCS14	Construction of Project infrastructure will include appropriate erosion protection e.g. rip rap rock protection and reno mattresses.	Project Engineer, Construction Manager	Prior to and during construction	Visual observations and inspections
	RCS15	Land clearing will be kept to a minimum and managed under the Rail Vegetation and Flora Management Plan.	Construction Manager	During construction	Ground disturbance procedure
	RCS16	Contain, monitor and appropriately treat (if required) any potentially contaminated stormwater prior to reuse or release to the environment.	Construction Manager	During construction	Water quality monitoring prior to release
	RCS17	Water from wash down bays will be collected, treated and released or recycled where practicable.	Construction Manager	During construction	Water quality monitoring prior to release
	RCS18	Potential contamination impacts to surface water will be managed under the Hazardous Materials and Contamination Management Plan.	Construction Manager	During construction	Refer to Hazardous Materials and Contamination Management Plan
Operation Phase					
• To avoid any significant disturbance to surface water hydrology regimes. • Ensure the protection of sheetflow dependent vegetation. • Ensure the protection	ROS1	Monitor and maintain drainage mechanisms (such as culverts) installed in areas of sheetflow dependant vegetation to ensure the drainage shadow does not extend beyond the approved disturbance area.	Operation Manager	During Operation	Visual observations and inspections, vegetation health monitoring
	ROS2	Conduct induction and training sessions on surface water management. Surface water issues to be discussed at toolbox meetings. Also applies to surface water quality management.	Environmental Manager, Supervisors and Superintendents	Prior to site access	Induction records

OPR Management Objective	Control Measure ID	Control Measures	Responsibility	Timing	Monitoring
Construction Phase					
of riparian vegetation	ROS3	Maintain all stormwater infrastructure to their designed capacity or function.	Operation Manager	During operation	Maintenance reports
To maintain the quality of surface water and minimise the potential for erosion and sedimentation.	ROS4	Implement the surface water monitoring program at identified relevant surface water monitoring points.	Operation Manager	During operation	Monitoring program
	ROS5	Contain, monitor and appropriately treat (if required) any potentially contaminated stormwater prior to reuse or release to the environment.	Operation Manager	During operation	Water quality monitoring prior to release
	ROS6	Water from wash down bays will be collected, treated and released or recycled where practicable.	Operation Manager	During operation	Water quality monitoring prior to release
	ROS7	Potential contamination impacts to surface water will be managed under the Hazardous Materials and Contamination Management Plan.	Operation Manager	During operation	Refer to Hazardous Materials and Contamination Management Plan

7. MONITORING

Monitoring and reporting of performance indicators will be undertaken to determine the impact of the Project on surface water hydrology.

Any incident or public complaint will be managed through OPR Safety and Environmental Management System incident reporting and investigation protocols. The monitoring associated with the SWMP will be continuous throughout the construction/operation phase of the Project, with the registers and systems developed and implemented prior to the start of construction. All new contractor packages will need to address the registers and systems detailed within this plan prior to mobilisation with monitoring undertaken continuously in coordination with Site Supervisors and the Construction/Operation Manager.

Monitoring requirements are summarised below in Table 7-1.

Table 7-1 Summary of Monitoring

Management Objective	Monitoring Requirement	Responsibility
To avoid any significant disturbance to surface water hydrology regimes.	Visual observations and inspections during flow events for: • Pooling upstream/upslope of Project infrastructure • Diversions of natural drainage lines as a result of the Project • Restriction in flow downstream of Project infrastructure Inspection of drainage facilities after significant rainfall or at least twice annually, to determine whether blockage, siltation, erosion, structural instability or damage has occurred.	Site Environmental Coordinator , Supervisors and Superintendents
Ensure the protection of sheetflow dependent vegetation	Monitoring of sheetflow dependant vegetation health downslope of Project infrastructure in accordance with OPR's Vegetation and Flora Management Plan (VFMP).	Site Environmental Coordinator
Ensure the protection of vegetation located along drainage lines	Monitoring of vegetation health downstream of Project infrastructure in accordance with OPR's VFMP	Site Environmental Coordinator
To maintain the quality of surface water and minimise the potential for erosion and sedimentation.	Monthly onsite water quality sampling upstream and downstream of major drainage line crossings (when stream flows are present) • Total Suspended Solids (TSS) • Total Dissolved Solids (TDS) • pH Monthly visual monitoring for hydrocarbon sheen downstream of Project infrastructure, or immediately if hydrocarbon spill incident occurs within close proximity to drainage lines. Monitoring will occur until construction of the crossing is completed and the construction areas are stabilised. Sampling of surface water captured on site in accordance with OPR's Hazardous Materials and	Site Environmental Coordinator

Management Objective	Monitoring Requirement	Responsibility
	Contamination Management Plan prior to treatment or release. Potential erosion issues associated with cleared areas will be monitored and managed under OPRs VFMP.	

8. CONTINGENCIES

Through the monitoring requirements and associated systems and registered as defined in Section 7, any actual or potential non-conformance will be detected via regular reviews and inspections. In the event the proposed management controls do not meet the set targets, the following will occur:

- OPR will consult with DEC and field specialists regarding refinements to the SWMP;
- The SWMP will be revised as needed and its effectiveness monitored.

Contingency actions will be initiated where performance indicators have not been met.

Incidents will be reported and recorded using the EMS Incident and Non-conformance Report Form by the Site Environmental Coordinator. An incident will be raised if the following occurs:

- Water quality sampling show a significant increase in TDS or TSS, or a significant variation in pH when comparing upstream and downstream results.
- Visual monitoring identifies that there is significant pooling, flow diversions or restrictions as a result of the Project.
- A complaint is received from the public regarding surface water flow or quality.
- A visible hydrocarbon sheen is recorded downstream of Project infrastructure
- An unauthorised release of potentially contaminated on-site stormwater occurs
- A hazardous material spill occurs that could potentially impact on surface waters
- The health of sheetflow dependant or riparian vegetation is impacted as a result of the Project
- Significant erosion of cleared areas has occurred.

Where surface water management data indicates non-compliance with the performance indicators, contingency actions will be implemented (Table 8-1). This will include informing all relevant parties and personnel.

Contingency actions may involve supplementary monitoring or predictive modelling to identify the source of the non-compliance, and may involve revising existing construction/operation practices to prevent future occurrences.

Table 8-1: Contingency management actions for surface water management

Performance Indicator	Contingency actions	Responsibility
Water quality sampling show a significant increase in TDS or TSS, or a significant variation in pH when comparing upstream and downstream results	Increase in TDS or TSS: • Identify Project areas that may have caused the increase in TDS or TSS • Inspect onsite drainage containment measures. Repair, redesign or replace onsite drainage containment facilities if required • Stabilise any areas that are susceptible to	Environmental Manager

Performance Indicator	Contingency actions	Responsibility
	erosion • Resample to confirm success of contingency measures Variation in pH: • Identify potential sources of contaminants • Inspect onsite hazardous material containment measures. Repair, redesign or replace onsite containment facilities if required • Resample to confirm success of contingency measures	
Significant pooling, flow diversions or restrictions as a result of the Project.	• Identify potential cause of impact • Repair, unblock, redesign or replace drainage facilities if required • Review success of contingency actions during next flow event	
Visible hydrocarbon sheen is recorded downstream of Project infrastructure	• Identify potential sources of hydrocarbons • Inspect onsite hydrocarbon containment measures. Repair, redesign or replace onsite containment facilities if required • Perform visual inspection to confirm success of contingency measures	
Unauthorised release of potentially contaminated on-site stormwater occurs	• Repair, unblock, redesign or replace onsite stormwater containment facilities if required • Review success of containment facilities during next flow event	
Hazardous material spill occurs that could potentially impact on surface waters	• Respond to the spill in accordance with OPR's Hazardous Materials and Contamination Management Plan	
Reduction in the health of sheetflow dependant or riparian vegetation	• Respond in accordance with OPR's VFMP	
Significant erosion of cleared areas	• Respond in accordance with OPR's VFMP	

For all non-conformances a report will be provided to the Site Supervisor, contractor and Contracts Manager detailing the reason for the non-conformance and resolutions adopted.

9. REPORTING

OPR may be required to report on the results of the SWMP as part of the overall Ministerial approval conditions reporting requirements.

The EMS Incident and Non-conformance Report Form will be documented in the Incident Register and will be reported to the relevant authorities in OPR's Annual Environmental Report. In the case where an incident can be considered a breach of the Environmental Protection (Unauthorised Discharges) Regulations 2004, the Site Environmental Manager will contact DEC within 24 hours and information concerning the incident will be provided.

A summary of reporting is listed in Table 9-1 below.

Table 9-1: Summary of Reporting

Report	Details	Reporting Frequency	Responsibility
Incident Report	Summary of incidents from water quality sampling, visual monitoring and complaints.	Immediately following incident	Site Environment Coordinator
Annual Report	• Details of incidents • Water quality results • Complaints received and resolved	Annually	Site Environment Coordinator and Environment Manager

10. AUDITING & REVIEW

10.1 Auditing

This SWMP will be audited (both internally and externally) in accordance with OPR overall EMS auditing regime. The auditing will ensure compliance with SWMP commitments, the OPR EMS and procedures. Internal auditing will focus on reviewing non-conformance reports, systems and registers and the control measures register (via the EMS). An Audit report will be produced every 6 months detailing the outcomes of the audit including:

- completeness of implementation of systems, databases and registers;
- integration of approvals systems with Procurement, Contracting and Construction;
- compliance with commitments and control measures; and
- recommendations of changed and follow up actions.

10.2 Review & Revision

Any non-conformances identified through the monitoring or auditing procedures will be assessed to determine if changes to the SWMP will be required. The review will follow on from an audit and audit report to determine if any non-conformances are the result of inadequacy of the management plans and EMS systems and processes. Details of the review program for all EMPs are detailed in the OPR EMS with regular 6 monthly reviews scheduled to align to the audit schedule.

11. RELATED PLANS

This SWMP summarises potential impacts that are more closely managed by the following related management plans. Specific details of potential impacts and control measures are outlined in the associated EMPs (Table 11-1).

Table 11-1: Related Management Plans

Related Management Plan	Relevant Impacts
Vegetation and Flora Management Plan	• Impacts to sheetflow dependant and riparian vegetation • Erosion of cleared areas
Hazardous Materials and Contamination Management Plan	• Reduction in surface water quality

12. REFERENCES

Environmental Protection Authority 2006, *Environmental Offsets*, Position Statement No. 9, Western Australia.

Aquaterra (2009) *OPR Rail Development: Surface Water Management*. Unpublished report for Oakajee Port and Rail Ltd. October 2009.

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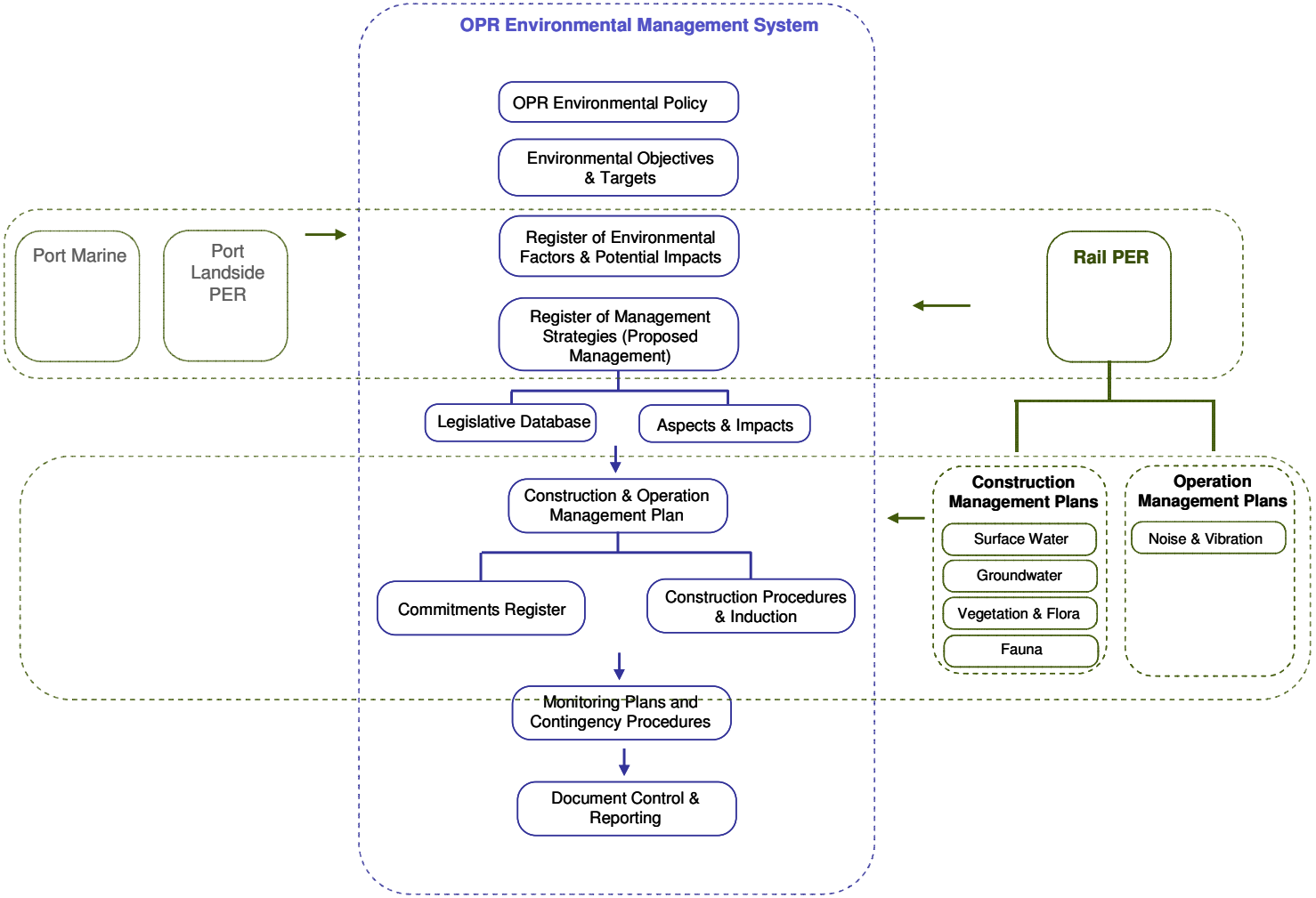
OPR, *ecologia* Environment (2009) *Oakajee Port and Rail Development Environmental Management System Documentation*. Perth, WA

APPENDIX A: EMS STRUCTURE



APPENDIX B: OPR EMS SYSTEMS AND REGISTERS