# 21 DRAFT ENVIRONMENTAL MANAGEMENT PLAN

A number of recommendations have been made in relation to the management and mitigation of the identified environmental impacts from the Glebe Option within this environmental assessment (EIS Volume 4).

Each of these recommendations will require action to be undertaken during the design, construction and / or operation of the Glebe Option. A Draft Environmental Management Plan (EMP) has been developed to ensure that these recommendations are implemented at the appropriate time.

The purpose of the EMP is to provide development control strategies in accordance with agreed performance criteria for acceptable levels of environmental protection. The EMP defines policies for implementation, monitoring and reporting, specifies responsibilities and the nominated corrective actions in case a performance requirement is not reached.

The EMP for the Glebe Option will be prepared and implemented by SunWater as the owner and operator of the Glebe Weir infrastructure.

## 21.1 Objectives

SunWater is committed to the protection of the environment and minimising impacts during all phases of the project. This has / will be achieved through the thorough assessment of environmental impacts and the development and implementation of processes to minimise and manage those impacts and to enhance values in the natural, social and economic environments wherever possible.

The EMP targets the needs of SunWater personnel and its contractors involved with overall management of the Glebe Option and other organisations, government bodies or individuals who may be involved directly or indirectly with construction and operation. Management procedures have been developed to achieve the following objectives to:

- provide guidance for future detailed design;
- ensure approval and compliance of all activities;
- manage and minimise the environmental impacts of construction and associated works;
- manage and minimise the environmental impacts of the weir and pipeline operation; and
- ensure long-term environmental and operational sustainability of the weir and pipeline by adopting best practice environmental management.

The EMP has been prepared to ensure that persons undertaking activities for the Glebe Option are aware of their environmental protection obligations and to provide a framework for implementing environmental management requirements. This will ensure compliance with all relevant legislation.

## 21.2 Glebe Option EMP Outline

This EMP is a tool that provides a set of practical and achievable plans for the environmental management of all phases of the Glebe Option. It is a dynamic document that will be used by SunWater until a contractor is in place, at which point it will be further reviewed and updated to incorporate actual construction methodologies and negotiated EPA licence agreements. The EMP requires regular updating to remain relevant to construction activities and incorporate changes in environmental management procedures. These may result from incorporation of the lead contractors work procedures and processes, continual monitoring, availability of new techniques, legislation, and revised environmental policies of SunWater in consultation with the relevant authorities.

The Glebe Option EMP addresses activities that have the potential to cause environmental harm or nuisance. The environmental management issues to be addressed during the design and construction phases include:

- contamination of soils and waters;
- surface and groundwater quality;
- aquatic flora and fauna;
- terrestrial flora and fauna;
- air quality;
- noise;
- waste;
- storage and handling of hazardous goods;
- visual amenity;
- traffic;
- cultural heritage;
- hazard and risk; and
- social and economic issues.

The Glebe Option EMP also provides criteria for ongoing environmental performance review and compliance monitoring. The Emergency Management Plan is presented under Chapter 19 Hazard and Risk.

## 21.3 Key roles and responsibilities

Key responsibilities relate to the person or company representative responsible for managing actions, or a specified component of the actions, in the Glebe Option EMP and ensuring they are correctly undertaken. Responsibility for implementing these actions will be determined by the Project Manager when construction and operational roles for staff and workers are defined.

The key roles and responsibilities that should be assigned to individuals for the successful implementation of this EMP are outlined in Table 21-1.

Table 21-1. Project roles and responsibilities

| Role | Responsibilities | Activities |
|---|---|---|
| Project Manager (PM) | SunWater | ▪ Responsible for the design phase, appointment of contractor and contract supervision.<br>▪ Responsible for overall planning of the project to ensure operations are conducted safely and in accordance with statutory requirements.<br>▪ Reports on performance of the system and certifies that the work is continuing in accordance with the EMP. |
| Construction Manager (CM) | Contractor | ▪ Responsible for overall construction work to ensure construction is conducted safely and in accordance with statutory requirements.<br>▪ Directs construction activities according to the EMP.<br>▪ Reports to Project Manager.<br>▪ Instructs subcontractors to comply with specified control measures.<br>▪ Directs site activities according to the EMP.<br>▪ Ensures all site personnel are aware of any changes to the EMP and any revised procedures. |
| Site Supervisor (SS) | Contractor | ▪ Responsible to Contractor for project construction and ancillary works.<br>▪ Attends site induction and ensures that adequate environmental procedures are followed.<br>▪ Reports to the EC or PM on any breaches of plans or statements, sightings of rare plants or animals, fauna, archaeological or heritage items, or environmental incidents (e.g. spills). |
| Environmental Coordinator (EC-C) | Contractor | ▪ Monitors operations of the EMP and recommends any necessary changes to the SS and EC-S.<br>▪ Provides advice, assistance and direction to the SS and EC-S to ensure operations are conducted in a safe and environmentally sound manner.<br>▪ Maintains regular contact with personnel to ensure a safe working environment.<br>▪ Notifies the SS and EC-S of environmental incidents or contravention of environmental requirements (e.g. development conditions), once identified, records, investigates the cause and ensures measures are adopted to promptly secure compliance.<br>▪ Ensures that the work crew is inducted with regard to environmental procedures. |
| Environmental Coordinator (EC-S) | SunWater | ▪ Ensures that the system for the environmental management is planned, documented, implemented and maintained in accordance with contract/tender documents<br>▪ Monitors operations of the EMP and recommends any necessary changes to the EC-C and PM.<br>▪ Audits the works for compliance and reports to PM |

## 21.4 EMP Monitoring and Review

The Glebe Option EMP has been developed during the design phase and prior to the construction phase, with the intention of addressing all possible scenarios. Issues may arise that have not been considered prior to the commencement of project activities. The EMP will be reviewed regularly, as outlined below, to ensure that the individual objectives, responsibilities, performance criteria and recommended corrective actions are revised to remain achievable, appropriate, effective and practical. Since it is not possible to identify and specify every detail necessary for the final Glebe Option EMP, SunWater will ensure that the document is refined throughout the life of the Project as required.

Throughout the construction and operation of the project, the EC-S will review environmental issues, complaints and incidents to identify trends in environmental incidents should they occur, and make any changes to environmental management measures and this EMP wherever necessary.

## 21.5 Performance Criteria

Performance criteria for the Glebe Option EMP are realistic, achievable and practical. It is considered that only by setting realistic and measurable criteria will the principles of *ecologically sustainable development,* as defined by the *Environmental Protection Act 1994* ('EP Act'), be achieved, i.e.:

- 'Development that improves the total quality of life, both now and in the future, in a way which maintains the ecological process on which life depends.'

Performance criteria are expressed in simple terms that can be readily understood, measured and provide a sound basis for corrective action. Where possible, air emissions, water quality, noise and similar issues are set against established environmental protection policies; EPA environmental criteria (e.g. Queensland Water Quality Guidelines (EPA, 2006a), applicable Environmental Values and Water Quality Objectives), quantitative standards of the *Australian and New Zealand Environment and Conservation Council* (ANZECC), and Australian Standards (AS).

## 21.6 Reporting

Should an environmental incident (such as one causing or threatening environmental harm as defined in the EP Act) occur during the construction phase, the EC-C will immediately take appropriate action to minimise any adverse environmental impact and promptly report details of the incident to the EC-S and relevant agencies (e.g. EPA). The EC-C will carry out any instruction received from SunWater and/or authorised representatives of relevant agencies.

The reporting structure for environmental incident and relevant contact numbers for relevant project personnel and regulatory agencies will be made available to all relevant staff during site environmental inductions and displayed at all site offices and crib rooms. Contact names and numbers will be updated wherever appropriate.

## 21.7 Complaints and Incidents Procedure

All potentially affected stakeholders (in particular neighbouring landholders) will be consulted to ensure that disruptions to their daily activities as a result of construction works are kept to a minimum. Every endeavour will be made to notify stakeholders at least 24 hours in advance of any planned disruption.

The EC-C will record all complaints received during the construction phase (e.g. by telephone and in writing) The EC-C will establish a *Complaints and Incidents Register* and all legitimate and verifiable complaints received will be investigated and logged into the Register, recording:

- time, date, name and contact details of the complainant;
- reason(s) for the complaint;
- any investigations undertaken;
- conclusions formed; and
- any actions taken.

Complaints will be resolved as quickly as possible, in a consultative manner. The EC-C will respond to the complainant in writing and/or by telephone within 24 hours of receipt of the complaint to inform them of the status of the investigation and the timeframe for resolution. Upon their receipt, all complaints will also be forwarded to the EC-S.

## 21.8 Environmental Monitoring

The EC-C will conduct informal inspections of construction activities daily with formal inspections of the construction site and activities to be carried out at the specified frequencies for particular Elements as provided in the following sections. The EC-C will record details of inspections on checklists, which will be kept for review by the relevant SunWater personnel and regulatory agencies.

If any non-conformance(s) with the provisions of this EMP are detected, SunWater together with the Contractor (if applicable) will issue a non-conformance notice to the offending entity and ensure that all necessary measures are promptly taken to rectify the non-conformance.

Where monitoring or auditing indicates that performance criteria have not been achieved, corrective action is to be implemented as soon as practicable, as directed by SunWater or the contractor as appropriate.

## 21.9 Auditing

The Project will be subject to internal and external auditing. The objectives of these audits are to ensure:

- compliance with all applicable Local, State and Federal government environmental permits, approvals and regulations; and
- compliance with the performance criteria specified in the Glebe Option EMP.

Random audits will be undertaken by the EC-S, who will inspect various aspects of the site to ensure conformance with the Glebe Option EMP. Full EMP compliance audits will be undertaken by an independent/ external (accredited auditor) auditor on a regular basis, a minimum of every two months. Audit reports will be prepared at the completion of each audit detailing the outcomes, including outstanding issues and / or non conformance with the EMP management actions. Following the identification of non-compliances, corrective actions will be implemented and, if deemed necessary, an action plan developed. Copies of the audit reports and details of the corrective actions will be made available for regulatory inspection, upon request.

## 21.10 Training

### 21.10.1 Staff Inductions

Staff inductions will ensure that all staff with responsibilities under the EMP have received environmental awareness training and are alerted to their responsibilities under the EP Act. All staff will be inducted and made aware of environmental issues associated with the project prior to commencement.

The induction will cover:

- the general ‘duty of care’ and ‘duty to notify’ obligations under the EP Act;
- the environmental risks associated with the project;
- an outline of the content of this EMP; and
- emergency contact details and any other information relevant to this EMP.

### 21.10.2 Work Improvement Notices

Work Improvement Notices (WINs) will be issued for the alteration of any construction or other site activities that will result in improved environmental outcomes, if an alteration is possible and practicable. The Work Improvement Register will be used to record all WINs.

### 21.10.3 Toolbox Talks

Regular toolbox talks, which are to be presented to all levels of employees, are to be given for each work section or group as required before work commences and during the performance of work. The topics will be taken from the various toolbox talk information sheets, generated from work method statements and EPA fact sheets that relate to tasks or activities being undertaken in the relevant works area. Each toolbox talk subject will be recorded.

Toolbox talks will cover all of the environmental elements listed in the EMP and include the management of any project environmental issues. They shall also be held for the preparation of Environmental Risk Analysis and Work Method Statements.

### 21.10.4 Pre-start Work Meetings

These meetings are similar to toolbox talks, but are only attended by the senior members of staff, including relevant Supervisors, Site Engineers, the EC (both EC-S and EC-C) and the Safety Representative shall conduct pre-start work meetings. During the pre-start meeting, site personnel will be reminded of imminent environmental issues and risks in the vicinity of the work and the EC-C will ensure all personnel are aware of the required instructions to be followed to avoid an incident.

## 21.11 Construction Phase Demobilisation

The overall objectives are to return the area to as close as possible to the pre-construction state following completion of the construction activities. For this purpose, the Contractor should take detailed reference photographs of the construction site prior to commencing construction and these will also serve during the operational phase to compare recovery and make necessary corrective measures. Site restoration is the responsibility of the Contractor and all works required should be substantially completed by handover time. It will be the responsibility of the Contractor to prepare site plans showing detailed planned restoration measures as part of the preparation and implementation of a final EMP, as per the contractual agreement.

Any disturbed areas at the weir and pipeline construction sites that are not occupied by a permanent building or structure may require restoration by the Contractor. Topsoil removed during construction and other earthworks may be stockpiled and reserved for site rehabilitation.

## 21.12 Summary of other relevant legislation, standards and guidelines

The full list of all legislation, standards and guidelines that the project will need to consider is provided in Table 21-2.

### 21.12.1 Relevant Legislation and Environmental Reference Standards

Legislation and reference standards should be used as the basis of decision making and complaints resolution in respect of the EMP. In addition to these, it is important to consider any local government by-laws and regulations that may also apply to the particular environmental management issues. Details of legislation, guidelines, and reference standards that may apply to the project are given in Table 21-2.

Table 21-2. List of legislative requirements, standards and guidelines

| Issue | Legislation, Standards and Guidelines |
|---|---|
| **Construction** | • *Workplace Health and Safety Act 1995 (Qld)*<br>• *Fire and Rescue Service Act 1990 (Qld)* |
| **Air Quality** | • *Environmental Protection Act 1994 (Qld)*<br>• *Environmental Protection (Air) Policy 1997 (Qld)* (EPA, 1997a)<br>• *AS 3580 – Methods of sampling and analysis of ambient air* |
| **Noise and Vibration** | • *Environmental Protection Act 1994*<br>• *Environmental Protection (Noise) Policy 1997(Qld)* (EPA,1997b)<br>• *AS 1055 – Acoustics – description and management of environmental noise*<br>• *AS 2436 – Guide to noise control on construction, maintenance and demolition-sites*<br>• *AS 1259 – Sound level meters*<br>• *AS 2187 – Explosives storage, transportation and use* |
| **Water Quality, Erosion, Sediment Control and Water Resources** | • *Water Act 2000 (Qld)*<br>• *Environmental Protection Act 1994 (Qld)*<br>• *Environmental Protection (Water) Policy 1997(Qld)* (EPA, 1997c)<br>• *Water Quality Sampling Manual – Department of Environment and Heritage 1995*<br>• *Soil Erosion and Sediment Control – Engineering Guidelines for Qld Construction sites – IE Aust 1996*<br>• *Nature Conservation Act 1992 (Qld)*<br>• *Nature Conservation (Wildlife Management) Regulation 2006 (Qld)* |
| **Waste Management and Contaminated Land** | • *Environmental Protection Act 1994 (Qld)*<br>• *Environmental Protection (Waste) Policy 2000 (Qld)* (EPA, 2000a)<br>• *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland 1998 - EPA*<br>• *Environment Protection Regulation 1998*<br>• *National Environmental Protection (Assessment of Site Contamination) Measure 1999, National Environmental Protection Council* |
| **Storage and Handling of Dangerous Goods and Risk Management** | • *Dangerous Goods Safety Management Act 2001 (Qld)*<br>• *Dangerous Goods Safety Management Regulation 2001 (Qld)*<br>• *Workplace Health and Safety Regulation 2008 (Qld)*<br>• *Hazardous Substances Code of Practice 2003*<br>• *Workplace Health and Safety Act 1995 (Qld)*<br>• *AS1940 – Storage and Handling of Flammable and Combustible Liquids*<br>• *Petroleum Act 1923 (Qld)*<br>• *Explosives Act 1999 (Qld)*<br>• *AS 2931 – Selection and use of emergency procedure guides for the transport of dangerous goods*<br>• *Transport Operations (Road Use Management – Dangerous Goods) Regulation 1998 (Qld)*<br>• *Transport Operations (Road Use Management) Act 1995 (Qld)*<br>• *Queensland Transport "Transporting Dangerous Goods Guide and New Requirements" September 1998* |

| Issue | Legislation, Standards and Guidelines |
|---|---|
| | • *Australian Dangerous Good Code Sixth Edition*<br>• *Electricity Act 1994 (Qld)*<br>• *Electrical Safety Act 2002 (Qld)*<br>• *Fire and Rescue Service Act 1990 (Qld)*<br>• *Fire and Rescue Service Regulation 2001 (Qld)*<br>• *AS 2187 - Explosive storage transport and use*<br>• *AS 4360 - Risk management*<br>• *AS 3780 - Storage and handling of corrosive substances* |
| **Flora and Fauna** | • *EPBC Act 1999 (Cth)*<br>• *Vegetation Management Act 1999 (Qld)*<br>• *Nature Conservation Act 1992 (Qld)*<br>• *The Nature Conservation (Koala) Conservation Plan 2006 (Qld)*<br>• *Fisheries Act 1994 (Qld)* |
| **Cultural Heritage** | • *Australian Heritage Council Act 2003 (Cth)*<br>• *Native Title (Queensland)Act 1993 (Qld)*<br>• *Native Title Act 1993 (Cth)*<br>• *Queensland Heritage Act 1992*<br>• *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)*<br>• *Aboriginal Cultural Heritage Act 2003 (Qld)* |
| **Land Use Control** | • *Integrated Planning Act 1997 (Qld)*<br>• *Transport Infrastructure Act 1994 (Qld)*<br>• *Banana Shire Council (Gates and Grids) Local Law No.3*<br>• *Banana Shire Council (Roads) Local Law No.17*<br>• *Banana Shire Council (Control of Nuisance) Local Law No.19*<br>• *Local Law No.18 (Control of Nuisance). Dalby Regional Council*<br>• *Local Law No.21 (Roads) Dalby Regional Council*<br>• *Forestry Act 1959 (Qld)*<br>• *State Development and Public Works Organisation Act 1971 (Qld)*<br>• *Land Act 1994 (Qld)*<br>• *Land Protection (Pest and Stock Route Management) Act 2002 (Qld)* |

Separate construction and operational implementation plans for the Glebe weir and the pipeline are detailed in Table 21-3 to Table 21-36 for the following elements:

- soils, geology and geomorphology;
- land contamination;
- visual amenity;
- hydrology;
- air, noise and vibration;
- aquatic flora and fauna;
- terrestrial flora and fauna;
- cultural heritage;
- waste management;
- hazard and risk;
- social and economic; and
- traffic and safety.

## 21.13 Construction Implementation Plans – Glebe Weir

Table 21-3. Soils, Geology and Geomorphology

| Element – Soils, Geology and Geomorphology<br>Environmental Objective<br>Minimise environmental impact by preventing soil loss and erosion. | |
|---|---|
| Performance Criteria | • Manage and mitigate the impacts of spoil removal, haulage and placement in spoil stockpile areas<br>• Manage and mitigate the risks of soil erosion impacts from all work areas where vegetation is removed or the soil disturbed during construction works<br>• Compliance with existing water quality within Glebe Weir, i.e. discharges originating from the construction site are not to impact (as per EPA licence conditions that will be negotiated prior to the commencement of construction) on the water quality of the Glebe Weir impoundment to downstream Dawson River<br>• Compliance with Environmental Protection Policy (EPP) (Water) (EPA, 1997c), Section 32, Prohibition on build-up of sediment |
| Implementation Strategy | • Diverting overland or channelled flows away from disturbed areas<br>• Installing flow and sediment control structures on and below disturbed areas<br>• Constructing and maintaining sedimentation ponds<br>• Designing the disturbed surfaces to promote spreading flows, not concentrating flows<br>• During site stripping or excavation, topsoil should be stockpiled where appropriate for later rehabilitation or landscaping works.<br>• Constructing stockpiles, so the surface is level with sufficient roughness to trap water and aid infiltration rather than large conical or elongated crested stockpiles where runoff would be rapid<br>• Stockpiles to have silt fences or established bunds installed on the downstream side, and diversion bunds on the upstream side<br>• Site vehicles and plant to be restricted to the defined roadways to prevent the unnecessary destabilisation of surfaces<br>• Ensure sufficient materials to appropriately implement erosion and sediment strategies on site at all times. These materials may include but are not limited to: rip rap, geotextiles, silt sausages, silt fences, sand/gravel filter checks, sand bag check dams and coir logs. Hay bales should not be used due to the risk of weed introduction<br>• Planning of construction works to provide for the progressive and timely stabilisation and rehabilitation of disturbed areas |

| | |
|---|---|
| | • Undertaking of erosion risk assessment to identify flow paths, suitable stockpile locations, soil cover type, and soil stability<br>• Undertaking of finishing and landscaping requirements for on-going sediment and erosion control around the worksites following construction |
| Monitoring | • Regular inspection of sediment traps to ensure sediments do not leave the site. In wet weather or when using large quantities of water in construction works more frequent monitoring may be necessary.<br>• Implement detailed monitoring programs to assess the impacts on the immediate construction site and sensitive receiving environments (i.e. waterways and aquatic ecosystems)<br>• Daily monitoring of turbidity, pH, DO and EC, up and downstream of construction site<br>• Regular auditing of EMP conducted both internally (EC-C and EC-S) and externally (independent auditor)<br>• Regular monitoring of rehabilitation work and taking correct actions immediately any problems occur |
| Reporting | • Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to regulatory body/ies |
| Corrective Action | • Regular clean out accumulated sediments from applied measures to reinstate performance capacity. Return material to stockpile and do not dispose of adjacent to sediment trap.<br>• Appropriate control measures implemented where unacceptable sediment or erosion is identified or may occur.<br>• The erosion and sediment control plans should be amended to account for changes in site conditions or treatment methods in the case of the failure of a device.<br>• Necessary corrective action implemented following incident or complaint.<br>• The Contractor will ensure that all appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding soil management and erosion control.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

Table 21-4. Land Contamination

| Environmental Objective – Land Contamination (spills and clean up)<br>Prevention of spills from occurring on the project site<br>Contain, clean-up and remediation (where necessary) of spills. | |
|---|---|
| Performance Criteria | • All fill used on site is 'inert' and must be free from contaminants.<br>• Containment of all spills involving materials that may cause environmental and effective cleaned up.<br>• Measures taken to prevent the incident from recurring. |
| Implementation Strategy | <u>Contaminated Soil</u><br>• Confirm the presence of contaminated sites prior to construction<br><u>Prevention of Contamination</u><br>• Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements as a minimal standard. MSDS for products kept on-site will be readily available to employees and contractors.<br>• Smaller quantities of chemicals, fuels and oils will be stored in self bunded pallets, within a bunded area in the workshop, or in a bunded container on the site. Bulk quantities of fuel should be stored in double-skinned tanks (self bunding).<br>• Waste products (e.g. oil/water separator waste, sludges and residues), should be contained within weatherproofed, sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater. Regular inspections will be carried out of the tanks, bunds and storage areas to ensure integrity.<br><u>Treatment of Contamination</u><br>• Contaminated sites within the study area could be managed by:<br>– Option 1 - Do nothing (contaminated site left unmanaged);<br>– Option 2 - Decommissioning of Underground Storage Tanks (*in situ* abandonment of USTs);<br>– Option 3 - Removal of Underground Storage Tanks (USTs);<br>– Option 4 - Capping of contaminated sites (*in situ* management of contamination);<br>– Option 5 - Excavation and off-site disposal to contaminated soil management facility;<br>– Option 6 - Excavation and on-site entombment to a suitable location, and management within the study area.<br>• Obtain an approval and a disposal permit from the EPA (Contaminated Land Unit) for the removal of contaminated soil, in accordance with the *Environmental Protection Act 1994* (EP Act).<br>• Remove contaminated soils in accordance with an EPA approved Remediation Action Plan (RAP). |

| | |
|---|---|
| | • Prepare and implement procedures for the remediation of contaminated soil spills that may occur during transport.<br>• Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials should be described in an Emergency Management Plan.<br>• In the event of a large spill, sites will be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act 1994 and the QLD EPA Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998) |
| Monitoring | • Recording of any spills that occur as an incident, as well as the follow up actions, any results and reporting to authorities.<br>• Auditing of this EMP conducted weekly (internally) and quarterly (externally). |
| Reporting | • Any environmental incidents involving spills are to be recorded. Information required in this report includes; time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Immediate reporting to the SS of any significant spills or potential risk of spills.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to PM and regulatory body/ies. |
| Corrective Action | • Ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding waste management, spill procedures and the storage and handling of hazardous substances and materials with the potential to cause environmental harm.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.<br>• Remediate and rehabilitate all spills and areas of contamination. |
| Environmental Objective – Land Contamination (imported Fill)<br>Ensure all imported fill to the Glebe Weir site is clean and free of contaminants | |
| Performance Criteria | • All fill used on site is 'inert' and must be free from contaminants. |
| Implementation Strategy | • Ensure that all fill material brought on to the site meets the requirements of:<br>– National Environmental Protection (Assessment of Site Contamination) Measure (National Environmental Protection Council (NEPC) 1999); and<br>– Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (EPA, 1998a).<br>• Conduct visual inspections of the imported fill material to ensure that it contains no waste material. |

| | |
|---|---|
| | • Obtain documentation from the fill provider, which must be provided when requested and contain the following:<br>– Date of arrival on site;<br>– Volume/ quantity of fill material;<br>– Provider;<br>– Source of fill material; and<br>– Documentation that the site of the fill material is not listed on the EMR/ CLR. |
| Monitoring | • Regular auditing of this EMP conducted weekly (internally) and quarterly (externally). |
| Reporting | • Report all non-compliance to the Site Supervisor.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding the sourcing, tracking and transportation of fill material.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

Table 21-5. Hydrology

| Environmental Objective – Surface Water<br>Minimise the impact of increased sediment loads into the Dawson River and Tributaries. | |
|---|---|
| Performance Criteria | • As per the requirements of the site discharge licence conditions (negotiated with the EPA prior to construction works commencing), runoff to waterways not to exceed agreed limits at the point of discharge<br>• The design for sediment devices is to allow for the capture of the 'first flush' of 25 mm for a rain event. When possible, cleaner water will be pumped from the surface layer of the devices to reduce overflow potential in the next rain event<br>• Compliance with the EPP Water (EPA, 1997c), Section 32, *Prohibition on build-up of sediment* |
| Implementation Strategy | • Managing potential run-on so that flows are dispersed over the site<br>• Develop a site based ESC and Stormwater Management Plan<br>• Collection and treatment of sediment laden stormwater<br>• Avoiding flow concentration within the site<br>• Installing silt fences on the upstream side of works to prevent water flowing into the work area<br>• Shaping landforms to provide slopes similar to or lower than those of the surrounding landscape and establishing grass where it will be the primary vegetation cover for erosion protection<br>• Placing anchored biodegradable erosion protection and establishing trees and shrubs where they, and their leaf litter, will provide the primary ground cover for erosion protection<br>• Ensuring adequate soil material to support plant growth by placing a layer of material with appreciable water holding capacity to increase profile water storage and covering this with topsoil stockpiled during excavation<br>• Utilising rock check dams to reduce erosive velocities in drainage lines<br>• Collection and treatment of concrete wastes. |
| Monitoring | • Monitoring of sediment and erosion control devices should occur weekly (at a minimum) to ensure they remain undamaged from construction activity, and immediately following each rainfall event<br>• Water quality monitoring (turbidity, either as NTU or TDS) in the Dawson River upstream of the weir pool, at locations downstream used in baseline monitoring and in potentially affected flowing watercourses (e.g. Cockatoo Ck), monthly and immediately following significant rainfall events<br>• Weir pool water quality monitoring over the full depth at locations upstream of works, and near the offtake.<br>• Training and education of workforce |

| Environmental Objective – Surface Water<br>Minimise the impact of increased sediment loads into the Dawson River and Tributaries. | |
|---|---|
| Reporting | • The results of the water quality monitoring, records of staff training and any minor site incidents should be included in a monthly report to SunWater<br>• Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Maintain, repair and replace sediment and erosion control devices whenever required<br>• Wherever possible, exposed areas experiencing excessive erosion to be vegetated / rehabilitated<br>• If water quality monitoring indicates significant sediment losses from the site, additional control devices are required in the corresponding runoff flow paths.<br>• The ESC requires continual review and revision to ensure it provides the site with adequate environmental protection.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Surface Water<br>Prevent contamination of the Dawson River and Tributaries. | |
|---|---|
| Performance Criteria | • Minimising spillage on the construction site<br>• Diverting upstream surface waters away from project site<br>• Preventing soil and water contamination from oil, fuel or chemicals |
| Implementation Strategy | • All spillage of fuels and chemicals in the works area will be contained and cleaned up immediately using appropriate equipment<br>• Hazardous chemicals will be stored in designated storage areas and appropriately bunded / contained in accordance with AS 1940 |
| Monitoring | • Weekly inspection of work sites to detect any chemical/oil spills<br>• Runoff water quality will be visually monitored during operations and especially following wet weather events<br>• Sampling and analysis of stormwater and receiving waters should a significant spill occur to determine the level and extent of contamination |
| Reporting | • All water quality data are to be recorded and made available upon request of an auditor or regulatory authority<br>• Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Clean up soil and water contamination or spillage as soon as practicable.<br>• Where contaminated runoff is detected, determine the source, then contain and recover the contaminants<br>• Should a significant spill occur which potentially causes or threatens environmental harm, notify the EPA.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Groundwater<br>Prevent groundwater contamination from construction activities. | |
|---|---|
| Performance Criteria | • No contamination of groundwater as a result of on-site activities |
| Implementation Strategy | • Implement best-practice measures to manage contaminants with potential to release to land and subsequently groundwater<br>• All chemicals on-site are to be stored as per AS 1940 and the MSDS. |
| Monitoring | • Weekly visual inspection of work sites to identify contaminant spills<br>• Should a contaminant release incident occur with potential to impact on groundwaters, undertake monitoring for relevant indicator parameters |
| Reporting | • Reports should be prepared after each monitoring period (monthly) that include details of monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Should groundwater contamination be established, consult with relevant regulatory bodies (NRW and EPA) and promptly facilitate groundwater remediation<br>• Groundwater Quality Monitoring Programme introduced in the event that any significant spill may affect the groundwater<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

Table 21-6. Air, Noise and Vibration

| Environmental Objective – Air Quality<br>Minimise vehicle emissions | |
|---|---|
| Performance Criteria | • No complaints from the community or on-site workforce |
| Implementation Strategy | • Ensure vehicle engines are turned off when vehicles are stationary.<br>• Ensure regular maintenance of engines to reduce vehicle emissions in order to comply with National Environment Protection (Ambient Air Quality) Measure (NEPC, 2003)<br>• Ensure a community liaison/complaints process is in place and complaints are addressed in a timely manner |
| Monitoring | • Via complaints register and observations by ECs.<br>• Undertake air quality monitoring if warranted by complaints<br>• Weather station to be established on site to monitor seasonal weather (particularly wind speed and direction) as a means to verify Project-related complaints |
| Reporting | • Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Maintain offending vehicles or remove from site.<br>• Where unacceptable levels measured, review on-site activities with additional control measures and/or varied site operations.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Air Quality<br>Minimise dust disturbance from vehicle operation | |
|---|---|
| Performance Criteria | • No damage to surrounding vegetation from dust deposition or impacts on crops and introduced pastures.<br>• No complaints from the community or on-site workforce |
| Implementation Strategy | • Reducing entrainment of dust particles through watering haul roads, on-site vehicle tracks, and stockpiles as necessary<br>• Minimising vehicle speeds around work areas<br>• Substituting tasks where possible with alternative methods that produce less dust<br>• Using dust/wind fencing around stockpiles and minimising drop distances onto stockpiles<br>• Upgrading and maintaining unsealed roads as required<br>• Avoid dust generating activities on very windy days<br>• Clearing progressively to avoid large areas of bare earth |
| Monitoring | • Undertake air quality monitoring if warranted by complaints<br>• Monthly inspection of surrounding vegetation to identify any areas of dust deposition/ vegetation damage |
| Reporting | • Immediate reporting to Construction Manager of significant dust event that will require mitigation measures to be implemented.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Increase watering frequency<br>• Reduce speed limits<br>• Minimise dust generating activity during high wind periods. |

| Environmental Objective – Air Quality<br>Minimise greenhouse gas emissions | |
|---|---|
| Performance Criteria | • No complaints from community or on-site workforce regarding vehicle emissions<br>• All bulbs, air conditioners and office equipment are certified as power use efficient<br>• No cleared vegetation is removed from site as waste<br>• Bus in use and all vehicles carry passenger numbers near the carrying capacity<br>• Recycling program in place and functioning<br>• Minimising burning of excess vegetation that cannot be recycled |
| Implementation Strategy | • Ensure vehicle engines are turned off when vehicles are stationary.<br>• Ensure regular maintenance of engines to reduce vehicle emissions in order to comply with National Environment Protection (Ambient Air Quality) Measure (NEPC, 2003)<br>• Designing a construction works program to source most construction materials from within or close to the project area to reduce fuel use and energy consumption associated with transport of materials.<br>• Maintaining construction equipment and haul trucks in good working order so fuel efficiency of equipment is maximised.<br>• Using appropriately sized equipment for construction activities.<br>• Investing in accredited renewable energy providers to reduce greenhouse gas emissions associated with electricity production and using solar power on site, where possible. |
| Monitoring | • Complaints register<br>• Purchase orders include this criteria and EC-C inspect all equipment for energy efficiency labels |
| Reporting | • Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to regulatory body/ies. |
| Corrective Action | • Consider the offset of greenhouse gas emissions through suitable practices (tree planting)<br>• Service vehicles regularly to ensure excessive greenhouse gases are not emitted |

| Environmental Objective – Noise and Vibration<br>Minimal impact of construction noise on surrounding environments | |
|---|---|
| Performance Criteria | • No noise complaints resulting from construction |
| Implementation Strategy | • Unless landholders and the EPA otherwise notified, noise-emitting works to be limited to between 6:00 am and 6:00 pm Mon. to Sat.<br>• Machinery and equipment to be regularly serviced and maintained<br>• All plant and machinery will be fitted with appropriate noise attenuation equipment, as per manufacturer's specifications<br>• Placing temporary noise barriers and enclosures around noisy activities or along the noise transmission path adjacent to the receiving site if residents request it and tests show it to be a potential nuisance<br>• Being alert to the native fauna species in and around work sites and seeking professional advice on minimising noise impacts<br>• Arranging for the camping and recreational areas at Glebe Weir to be closed during construction |
| Monitoring | • Complaints register to be implemented and maintained as required<br>• Noise monitoring to be undertaken on receipt of a noise complaint which is not considered to be vexatious/ unjustified or if instructed by the EPA |
| Reporting | • In the event of noise complaints a report outlining the climatic conditions at the time, likely activities that were responsible for the complaint and the investigations in response of the community complaint. |
| Corrective Action | • Review construction practices<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Noise and Vibration<br>Minimal impact of increased traffic noise | |
|---|---|
| Performance Criteria | • No complaints arising from traffic noise |
| Implementation Strategy | • Design transport routes to avoid/ minimise residential impacts<br>• Implement speed limits in sensitive zones<br>• Encourage the limited use of heavy vehicle exhaust brakes within residential areas<br>• All vehicles will be fitted with appropriate noise attenuation equipment, as per manufacturer's specifications<br>• Restrict delivery of heavy vehicles, equipment and oversized loads to daylight hours where practical<br>• Maintain the road surface at a suitable standard |
| Monitoring | • Complaints register to be implemented and maintained as required<br>• Noise monitoring to be undertaken on receipt of a noise complaint which is not considered to be vexatious / unjustified |
| Reporting | • In the event of noise complaints a report outlining the climatic conditions at the time, likely activities that were responsible for the complaint and the appropriate proposed investigations in response of the community complaint. |
| Corrective Action | • Review practices and implement noise controls<br>• Identify alternate transport routes, where practical |

Table 21-7. Aquatic Flora and Fauna

| Environmental Objective – Aquatic Flora and Fauna<br>Avoid adverse impacts on aquatic fauna and flora, during construction of the project.<br>Minimise the opportunity for aquatic weed growth and increases in abundance or diversity of other pest species. | |
|---|---|
| Performance Criteria | • Waters leaving the site are to comply with the quality levels negotiated with the EPA (discharge quality to be agreed with the EPA prior to construction commencing)<br>• No waste material (general and construction rubbish) entering waterways from the construction areas<br>• No significant uncontrolled or untreated release of water or sediment from site<br>• When flow is occurring; there should be no additional blockages to those that currently exist. The sizing of temporary bridges or culverts should be such as to not hinder passage.<br>• No fish or turtle kills occur related to construction works |
| Implementation Strategy | • Implementation of all related EMP elements<br>• All creek/ river crossings to be constructed during periods of low or minimal flow where possible<br>• If aquatic habitat is isolated by works, any fish or larger aquatic fauna should be removed humanely and transferred to the nearest unimpacted riverine area |
| Monitoring | • Implement monitoring including **in Tables 21-3** to **21-5** inclusive<br>• Incidental observations for fish or turtle kills |
| Reporting | • Incidents, complaints and any significant environmental harm to aquatic environment reported to regulatory body/ies.<br>• Assessment of performance against the identified indicators will be determined by auditing and reporting on a monthly (internally) and three monthly (externally) basis during construction.<br>• Kills of fish or turtles reported through SunWater's standard procedure and EPA notified in accordance with that procedure. |
| Corrective Action | • Ensure sediment and erosion controls are working adequately<br>• Remove flow restrictions and accumulated debris<br>• Immediate reporting to Supervisor and EC-C of any incident which contravenes the objectives of the EMP.<br>• The Construction Manager can request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Aquatic Flora and Fauna<br>Minimise the breeding of mosquitoes and bitting midges | |
|---|---|
| Performance Criteria | • No complaints from workforce or surrounding residence |
| Implementation Strategy | • Minimise the breeding opportunities of mosquitoes and biting midges onsite through appropriate workforce education, control through application of larvicides (where necessary), site maintenance and building design.<br>• Minimise the retention time of standing water onsite |
| Monitoring | • Construction site to be inspected post rainfall events to ensure undesired pooling is not occurring for extended periods on site (e.g. most species take at least six days to develop, thus retention time of undesired on-site surface water should be less than this)<br>• If complaints are received, breeding habitats should be determined by conducting site survey, by dipping for larvae along the banks of the waterway and around the site. |
| Reporting | • All corrective, treatment measures and complaints (workforce and community) to be reported to the PM and EC-C |
| Corrective Action | • Where a high abundance of mosquito larvae are found (>10 per dip), treatment with a commercial target specific larvicide, such as 'Altosid 30 day briquettes', maybe required.<br>• Bitting midges cannot be treated by chemical means within the breeding areas due to the toxicity of midge adulticide to other organisms. Where the sources of midges are identified, control measures such as barriers (which maybe treated with 'bistar', a midge adulticide) can be implemented. |

Table 21-8. Terrestrial Flora and Fauna

| Environmental Objective – Terrestrial Flora and Fauna<br>Minimise and mitigate, as far as is practicable, the adverse impacts of vegetation clearance. | |
|---|---|
| Performance Criteria | • No impact on the Boggomoss Snail populations or known habitats<br>• Minimal risk of injury or death to resident wildlife<br>• All injured animals to be treated humanely<br>• Patches of habitat are not to be cleared in a haphazard fashion that limits fauna movement<br>• Clearing each day is to be undertaken in accordance with the Management Plan for Clearing which should set out clearing order.<br>• No vegetation to be disturbed outside of areas designated for clearing**.** Where clearing activities are scheduled adjacent to remnant vegetation, the edge of the clearing zone must be clearly marked. All clearing to be undertaken with appropriate VMA clearance permits. |
| Implementation Strategy | • A Management Plan for clearing will be prepared in accordance with the State Policy for Vegetation Management (NRW 2006c)<br>• All cleared areas to be managed under a site specific ESC<br>• A fauna spotter/catcher will be present preceding and during all clearing activities to actively search all habitat for wildlife and to ensure that clearing methods are appropriate<br>• Clearing of vegetation to be undertaken so that any more mobile, non-volant fauna are able to move to other areas of suitable habitat<br>• Nest boxes will be placed in the surrounding habitat to replace natural hollows lost as a result of inundation and clearing<br>• Protection from heavy machinery and other disturbances of vegetation outside of the areas designated for clearing<br>• Avoid clearing in areas of known usage during breeding and nesting periods, where practical |
| Monitoring | • Record spotter/catcher activities in relation to clearing activities.<br>• Record any wildlife injuries or deaths directly associated with clearing activities<br>• Record animal injuries and follow up with information from receiving veterinary surgeon<br>• Map clearing on an aerial photograph and plan each period of clearing on this basis<br>• Instances of disturbance outside of temporary fencing to be recorded |
| Reporting | • Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |

| | |
|---|---|
| Corrective Action | • Clearing not to commence without fauna spotter/catcher present<br>• Clearing practices to be undertaken accordingly to the advice provided by the fauna spotter/catcher<br>• Injured animal handling procedures to be advised by a veterinary surgeon<br>• Rehabilitate disturbed areas in accordance with the Habitat Rehabilitation Management Plan |
| Environmental Objective – Terrestrial Flora and Fauna<br>Minimise and mitigate the introduction of weed species. | |
| Performance Criteria | • No new weed introductions or spread of existing weeds as a result of the project |
| Implementation Strategy | • A detailed Weed Management Plan will be prepared<br>• Ensure vehicles are certified as 'clean' of soil or vegetation from other sites before entering the Project Area<br>• Machinery to be cleaned before commencing work in a different area |
| Monitoring | • Regular (monthly) inspections of works areas and adjoining areas are to be undertaken, and the occurrence of new weeds or spread of existing weeds to be recorded.<br>• The success of control programs should be visually monitored and follow up measures taken as appropriate |
| Reporting | • Monthly report including monitoring results, audits, corrective actions taken, training and incidents. |
| Corrective Action | • Treatment of weeds identified on-site during inspection, or otherwise, will be undertaken in accordance with NRW guidelines for each species |

| Environmental Objective – Terrestrial Flora and Fauna<br>Minimise and mitigate the impact of general construction activities upon vegetation. | |
|---|---|
| Performance Criteria | • Health of adjacent ecosystems not affected by construction activities.<br>• No direct or indirect impact occur to boggomoss snail habitat<br>• No fauna will be killed or injured by falling into the pipeline trench<br>• No unnecessary clearing of vegetation |
| Implementation Strategy | • A Construction Habitat Management Plan is to be prepared and incorporated into the overall Construction Management Plan<br>• wash dust off adjoining habitat as needed<br>• Limit ancillary works to already cleared areas or areas planned for clearing<br>• Speed limits of 60 km/hr or less to apply to areas of construction immediately adjacent to roads, with signage alerting drivers to the potential presence of fauna must be erected in areas where the roads intersect vegetation.<br>• Siting of stockpile areas, camps, offices, spoil dumps, refuse areas and vehicle parking areas, must, where possible, be within areas that are already cleared, or are proposed to be cleared<br>• Advise workforce of travel during sunrise and dusk hours to be aware of native fauna grazing by the roadside. |
| Monitoring | • Monitor health of adjacent vegetation (monthly) for the visual signs of stress<br>• Record results of inspections and any treatments for dust removal<br>• Record any native fauna road kill<br>• Open areas of pipeline trench are inspected each morning for fauna and that fauna is humanely and safely removed. |
| Reporting | • Monthly report including monitoring results, audits, corrective actions taken, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |

| | |
|---|---|
| Corrective Action | • Increase regularity of dust removal<br>• Revise speed zones and signage<br>• Increase warning message through staff training<br>• Increase the frequency of fauna escape ramps within trenches, or close trench at the conclusion of the day (where applicable) |
| Environmental Objective – Terrestrial Flora and Fauna<br>Site rehabilitation (major rehabilitation works are only to be undertaken if the Proposed Nathan Dam is not approved prior to 2013) | |
| Performance Criteria | • Restoration of disturbed areas to pre-construction conditions, or better |
| Implementation Strategy | • A Habitat Rehabilitation Management Plan will be prepared, including requirements for revegetation<br>• Re-establishment of wildlife corridors<br>• Salvaged vegetation will be used where appropriate as habitat<br>• Revegetate areas with a variety of local endemic species |
| Monitoring | • Bi-annual inspection of rehabilitated areas to be undertaken for the first 6 years of establishment to monitor weed intrusion and flora/ fauna health. |
| Reporting | • Survey/ inspection results to be prepared after each monitoring period, outlining climatic conditions, survey methodology, results and any recommendations/ actions required. |
| Corrective Action | • Review and revise Habitat Rehabilitation Management Pan<br>• Review, revise and apply the Weed Management Plan, where appropriate. |

Table 21-9. Cultural Heritage

| Environmental Objective – Cultural Heritage<br>Appropriate handling of Aboriginal artefacts and heritage during excavation and construction activities | |
|---|---|
| Performance Criteria | • No damage to Aboriginal cultural heritage items during construction activities and to preserve the heritage values of the area |
| Implementation Strategy | • Operation of the project under Cultural Heritage Management Plans as agreed between SunWater and the Aboriginal Parties<br>• Cease construction activities immediately and inform SunWater directly if artefacts or archaeological remains are discovered |
| Monitoring | • Cultural heritage induction to be provided by relevant Traditional Owners prior to ground-breaking activities associated with construction taking place<br>• If agreed, members of the relevant Aboriginal Party to oversee excavation activities for near surface material in hardrock areas and to depth in alluvium. |
| Reporting | • Evidence of a suspected Aboriginal artefact or heritage item to be reported immediately to the site supervisor and construction manager.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • SunWater and Traditional Owners to liaise as part of ongoing Cultural Heritage Management Plans |

Table 21-10. Waste Management

| Environmental Objective – Waste Management<br>Management of waste associated with general construction | |
|---|---|
| Performance Criteria | • No cleared vegetation suitable for milling or mulching to be burned or dumped<br>• Non-millable vegetation to be used in rehabilitation or soil stabilisation works or mulched provided that it is weed free<br>• Material not suitable for artisans to be reserved if local interest in use |
| Implementation Strategy | Cleared Vegetation<br>• Cleared vegetation will be used where possible in habitat rehabilitation<br>• Mulch suitable other vegetation for rehabilitation and stabilisation<br>• Millable timber occurring within areas to be cleared will be harvested and used for commercial purposes<br>Construction waste (e.g. steel, tyres, ceramics, packaging material, excess spoil)<br>• Construction wastes from the site area should be minimised<br>• Reuse in rehabilitation or store temporarily in bunded stockpiles<br>• Segregate and provide receptacles for cardboard, recyclable plastics, scrap metal, waste oils and concrete<br>• Suppliers of construction materials to be encouraged to reuse or collect packaging (e.g. plastic wrapping or cardboard boxes) for recycling or reuse<br>• Recycle drums to merchants and return plastic containers to manufacturers<br>• Excess spoil to be reused onsite for rehabilitation and or levee bank construction, where applicable<br>Domestic Wastes<br>• Collection bins for designated recyclable and putrescible wastes to be installed at amenity rooms for collection<br>Liquid wastes and sewage<br>• Any liquid wastes to be disposed of by an approved contractor or taken to the local council for disposal at an appropriate facility<br>• Provision of package sewage treatment plants as required<br>• Provision of portable toilet facilities and pump out of wastes<br>Wastewater<br>• Direct runoff from roads to sediment ponds<br>• Direct wastewater from vehicle washdown areas into dams and recycle<br>• Ablution water to be treated and recycled for reuse on-site<br>Hazardous waste (e.g. batteries, contaminated soil, paints, asbestos) |

| Environmental Objective – Waste Management<br>Management of waste associated with general construction | |
|---|---|
| | • All hazardous wastes will be transported from site via an approved contractor<br>• Designated areas for empty drums and containers should be established in an adequately bunded and sheltered area<br>• Appropriate spill kits (hazardous chemical or general) will be provided near the storage area |
| Monitoring | • Record treatment of cleared vegetation<br>• Inspections to ensure waste segregation is occurring<br>• Undertaking monthly waste audits<br>• Maintain waste disposal records |
| Reporting | • Records to be keep of all waste movement from the site, including date, material removed, contractor and treatment/ disposal destination.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents. |
| Corrective Action | • Review waste management processes<br>• Revise waste management resource plan |

Table 21-11. Hazard and Risk

| Environmental Objective – Hazard and Risk<br>Minimise the risks associated with flooding<br>Minimise the risks associated with fire | |
|---|---|
| Performance Criteria | • No loss of personnel or equipment<br>• No damage to neighbouring landholdings from fire |
| Implementation Strategy | Flooding<br>• Weir upgrade construction site to be closed during flood events.<br>• All plant and machinery to be relocated to areas of greatest immunity to high water levels during weir overtopping<br>• Restrict public (camping and boating) access to weir during construction<br>Fire<br>• No uncontrolled burning of vegetation or other activities likely to increase risk of uncontrolled fires.<br>• Establish and maintain contact with local emergency services.<br>• Obtain approval from local fire warden for any burnoffs prior to starting fires<br>• Maintain work areas and temporary accommodation clear of fire risk areas |
| Monitoring | Flooding<br>• Monitor weather and flood conditions, providing adequate time for any issued warnings if upstream flooding is likely<br>Fire<br>• Monitor weather patterns throughout fire event<br>• Ensure fire safety equipment is regularly maintained. |
| Reporting | • A report, post event, is to be prepared which outlines the damage/ losses to the site and surrounding environment. |
| Corrective Action | • Schedule construction to avoid periods with highest risk from heavy rain events<br>• Advise local Fire Warden if fire occurs or prior to any scheduled burn-offs to obtain permits<br>• Notify nearest landholders if any risk of fire escaping<br>• Reinstate any damages to fences or property |

| Environmental Objective – Hazard and Risk<br>Minimise the risks associated with hazardous materials (spills and leaks of chemicals) | |
|---|---|
| Performance Criteria | • No land or surface / groundwater contamination |
| Implementation Strategy | • Compliance with relevant standards<br>• Secondary containment/bunding<br>• Spill containment equipment to be serviceable at all times<br>• Immediate cleanup of leaks and spills<br>• Locate chemicals away from flow paths<br>• Installation of an oil containment boom across the downstream section of the Dawson River if large-scale stream contamination occurs |
| Monitoring | • Weekly inspections of chemical use areas<br>• Weekly inspections of storage areas for any defects with bunding or floor structures<br>• Visual inspection of equipment and components |
| Reporting | • Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Review construction practices and mitigation techniques to ensure all protocols are being followed |

| Environmental Objective – Hazard and Risk<br>No unmanaged public access to the project site | |
|---|---|
| Performance Criteria | • No access to construction site |
| Implementation Strategy | • Ensure adequate work site security of compounds, weir area, pipeline stockpiles and pipeline work areas |
| Monitoring | • Daily monitoring of evidence of access |
| Reporting | • Any incidents must be immediately reported to regulatory body/ies, where applicable. |
| Corrective Action | • Review security protocols |

Table 21-12. Social and Economic

| Environmental Objective – Social and Economic<br>Avoid and minimise any adverse social impacts associated with the increase in local construction workforce<br>Enhance the work opportunities for the local industry | |
|---|---|
| Performance Criteria | • No reduction in access to services for community<br>• Maximises business development opportunities for the neighbouring communities<br>• Maximise the workforce to be sourced from the local area |
| Implementation Strategy | • Establish expression of interest process for local contractors and service providers<br>• Ensure construction contractor maximises use of local workforce and subcontractors in conformance with Queensland government policy<br>• Continue consultation program with local community and stakeholders for early identification of any adverse issues<br>• Monitor Glebe Option complaints phone line and establish consultation and complaints register<br>• Consult with Council and government regarding detailed planning for construction camps. SunWater and the Contractor will participate in joint management group meetings (Wandoan Joint Venture, Surat Basin Rail, other infrastructure or service providers, local government, government agencies) if this strategy is chosen. |
| Monitoring | • Ongoing consultation with relevant Local Authorities and government departments<br>• Registers maintained and actions / responses checked within 24 hours. |
| Reporting | • Communications register to include communication activities, residents' complaints and resolution of complaints. Regular reviews required.<br>• The results of annual monitoring of community satisfaction with environmental and complaints management collated into report for submission to SunWater.<br>• Significant complaints and community issues reported to the PM where required. |
| Corrective Action | • SunWater to liaise with Councils and relevant government contractor |

Table 21-13. Traffic and Safety

| Environmental Objective – Traffic and safety<br>Effectively manage the increases in traffic movement along regional roads during construction | |
|---|---|
| Performance Criteria | • No road accidents related to the Glebe Option<br>• No justified complaints regarding construction traffic |
| Implementation Strategy | • Liaise with Department of Main Roads and Local Government re Traffic Management Plan<br>• Facilitate safe entry and exit points for the construction areas<br>• Restrict construction traffic to selected locations that are clearly signed<br>• Reduce speed limits near the vicinity of construction activities<br>• Ensure traffic control points are manned during construction times<br>• Avoid heavy vehicle movements during school set down and drop-off times<br>• Sufficient notification to local residents and stakeholders of any road closures or change in traffic conditions<br>• Providing buses for personnel transport to and from site, arranging pooling where small numbers work outside regular shifts<br>• Maintaining awareness of safe driving techniques |
| Monitoring | • Undertake traffic surveys where required<br>• Undertake tie-ins under the supervision of traffic control |
| Reporting | • Monthly Report prepared and submitted to SunWater to include details of local traffic conditions, including any accidents involving construction traffic, any monitoring results, audits, training and incidents.<br>• Immediate reporting to Supervisor and EC-C of any incident which contravenes the objectives of the EMP.<br>• Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required. |
| Corrective Action | • Address all requests from the Department of Main Roads<br>• Review and amend Traffic Management Plan if a significant number of complaints is received |

## 21.14 Construction Implementation Plans – Glebe Weir to Wandoan Pipeline

Table 21-14. Soils, Geology and Geomorphology

| Environmental Objective – Soils, Geology and Geomorphology<br>Minimise environmental impact by preventing soil loss and erosion. | |
|---|---|
| Performance Criteria | • Manage and mitigate the impacts of spoil removal, haulage and placement in spoil stockpile areas.<br>• Manage and mitigate the risks of soil erosion impacts from all work areas where vegetation is removed or the soil disturbed during construction works.<br>• Compliance with EPP Water (EPA,1997c), Section 32, Prohibition on build-up of sediment. |
| Implementation Strategy | • Works that will require high levels of soil disturbance (creek crossings) or traffic movement should be scheduled for the April to September period (dry season)<br>• Diverting overland or channelled flows away from disturbed areas<br>• Installing flow and sediment control structures on and below disturbed areas<br>• Constructing and maintaining sedimentation ponds if required<br>• Designing the disturbed surfaces to promote spreading flows, not concentrating flows<br>• During site stripping or excavation, topsoil should be stockpiled where appropriate for later rehabilitation.<br>• Constructing stockpiles, so the surface is level with sufficient roughness to trap water and aid infiltration rather than large conical or elongated crested stockpiles where runoff would be rapid<br>• Stockpiles and laydown areas to have silt fences or established bunds installed on the downstream side, and diversion bunds on the upstream side<br>• Site vehicles and plant to be restricted to the defined roadways to prevent the unnecessary destabilisation of surfaces<br>• Ensure sufficient materials to appropriately implement erosion and sediment strategies on site at all times. These materials may include but are not limited to: rip rap, geotextiles, silt sausages, silt fences, sand/gravel filter checks, bag check dams and coir logs. Hay bales should not be used due to the risk of weed introductions.<br>• Planning of construction works to provide for the progressive and timely stabilisation and rehabilitation of disturbed areas.<br>• Undertaking of erosion risk assessment to identify flow paths, suitable stockpile/ laydown locations, soil cover type, and soil stability.<br>• Undertaking of finishing and landscaping requirements for on-going sediment and erosion control around the worksites following construction/ installation. |

| Environmental Objective – Soils, Geology and Geomorphology<br>Minimise environmental impact by preventing soil loss and erosion. | |
|---|---|
| | • Dispose of excess spoil in appropriate areas to avoid construction a levy mound, with the potential to seriously affect overland flows and lead to erosion. |
| Monitoring | • Regulate inspection of sediment traps to ensure sediments do not leave the site. In wet weather or when using large quantities of water in construction works more frequent monitoring may be necessary.<br>• Implement detailed monitoring programs to assess the impacts on the immediate construction site and sensitive receiving environments (i.e. waterways and aquatic ecosystems)<br>• Regular auditing of EMP conducted both internally (EC-C and EC-S) and externally (independent auditor). Audits to continue for a month post reinstatement and/ or after significant rainfall event. |
| Reporting | • Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Regularly cleanout accumulated sediment from applied measures to reinstate performance capacity. Return material to stockpile and do not dispose of adjacent to sediment trap.<br>• Appropriate control measures implemented where unacceptable sediment or erosion is identified or may occur.<br>• The ESC plans should be amended to account for changes in site conditions or treatment methods in the case of the failure of a device.<br>• Necessary corrective action implemented following incident or complaint.<br>• The Contractor will ensure that all appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding soil management and erosion control.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

Table 21-15. Land Contamination

| Environmental Objective – Land Contamination (spills and clean up)<br>Prevention of spills from occurring on the project site<br>Containment, clean-up and remediation (where necessary) of spills. | |
|---|---|
| Performance Criteria | • Containment of all spills involving materials that may cause environmental damage is effectively cleaned up.<br>• Measures taken to prevent the incident from recurring. |
| Implementation Strategy | <u>Prevention of Contamination</u><br>• Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements as a minimal standard. MSDS for products kept on-site will be readily available to employees and contractors.<br>• Smaller quantities of chemicals, fuels and oils will be stored in self bunded pallets, within a bunded area in the workshop, or in a bunded container on the site. Bulk quantities of fuel should be stored in double-skinned tanks (self bunding).<br>• Refuelling of machinery and vehicles to be undertaken in a bunded area, with the capacity to contain spilt material, with all appropriate spill containment and/ or treatment equipment readily accessible<br>• Waste products (e.g. oil/water separator waste, sludges and residues), should be contained within weatherproofed, sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater. Regular inspections will be carried out of the tanks, bunds and storage areas to ensure integrity.<br><u>Treatment of Contamination</u><br>• Contaminated sites within the study area could be managed by:<br>– Option 1 - Do nothing (contaminated site left unmanaged);<br>– Option 2 - Decommissioning of Underground Storage Tanks (*in–situ* abandonment of USTs);<br>– Option 3 - Removal of Underground Storage Tanks (USTs);<br>– Option 4 - Capping of contaminated sites (*in–situ* management of contamination);<br>– Option 5 - Excavation and off-site disposal to contaminated soil management facility;<br>– Option 6 - Excavation and on-site entombment to a suitable location, and management within the study area.<br>• Obtain an approval and a disposal permit from the EPA (Contaminated Land Unit) for the removal of contaminated soil, in accordance with the *Environmental Protection Act 1994*.<br>• Remove contaminated soils in accordance with an EPA approved Remediation Action Plan (RAP).<br>• Prepare and implement procedures for the remediation of contaminated soil spills that may occur during transport. |

| Environmental Objective – Land Contamination (spills and clean up)<br>Prevention of spills from occurring on the project site<br>Containment, clean-up and remediation (where necessary) of spills. | |
|---|---|
| | • Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials should be described in an Emergency Management Plan.<br>• In the event of a large spill, sites will be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act and the QLD EPA Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (EPA 1998a) |
| Monitoring | • Recording of any spills that occur as an incident, as well as the follow up actions, any results and reporting to authorities.<br>• Auditing of this EMP conducted weekly (internally) and quarterly (externally). |
| Reporting | • Any environmental incidents involving spills are to be recorded. Information required in this report includes; time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Immediate reporting to the SS and EC-C of any significant spills or potential risk of spills.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to regulatory body/ies. |
| Corrective Action | • Ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding waste management, spill procedures and the storage and handling of hazardous substances and materials with the potential to cause environmental harm.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.<br>• Remediate and rehabilitate all spills and areas of contamination. |

| Environmental Objective – Land Contamination (imported Fill)<br>Ensure all imported fill to the site is clean and free of contaminants | |
|---|---|
| Performance Criteria | • All fill used on site is 'inert' and must be free from contaminants. |
| Implementation Strategy | • Ensure that all fill material brought on to the site meets the requirements of:<br>– National Environmental Protection (Assessment and Site Contamination) Measure (NEPC, 1999); and<br>– Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (EPA, 1998a).<br>• Conduct visual inspections of the imported fill material to ensure that it contains no waste material.<br>• Obtain documentation from the fill provider, which must be provided when requested and contain the following:<br>– Date of arrival on site;<br>– Volume/ quantity of fill material;<br>– Provider;<br>– Source of fill material; and<br>– Documentation that the site of the fill material is not listed on the EMR/ CLR. |
| Monitoring | • Regular auditing of this EMP conducted weekly (internally) and quarterly (externally). |
| Reporting | • Report all non-compliance to the Site Supervisor.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding the sourcing, tracking and transportation of fill material.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

Table 21-16. Visual Amenity

| Environmental Objective – Visual Amenity<br>Minimise the impacts on visual amenity associated with the pipeline construction. | |
|---|---|
| Performance Criteria | • No community complaints relating to pipeline constructions impact on visual amenity |
| Implementation Strategy | • Development of landscape and revegetation concept plan for the pipeline route.<br>• Stockpiles and laydown areas to be sufficiently screened<br>• Reinstatement of pipeline route to be undertaken immediately after the pipe has been installed<br>• Construction rubbish and waste to be appropriately stored and regularly removed from site<br>• Operational buildings (auxiliary pump stations and balancing tanks) are to be designed to blend in with the surrounding environment, and where required, revegetate to surrounding areas to establish a visual screen. |
| Monitoring | • Monitor the site conditions for opportunities to improve visual amenity<br>• Monitor community reaction and feedback |
| Reporting | • All complaints, and associated details (when, where, etc) is to be reported to SunWater. |
| Corrective Action | • Tree planting on SunWater property and private property by agreement, where applicable.<br>• Improve temporary screening, where appropriate. |

Table 21-17. Hydrology

| Environmental Objective – Surface Water<br>Minimise the impact of increase sediment loads into watercourses. | |
|---|---|
| Performance Criteria | • The design for sediment devices is to allow for the capture of the 'first flush' of 25 mm for a rain event. When possible, cleaner water will be pumped from the surface layer of the devices to reduce overflow potential in the next rain event<br>• Compliance with the EPP Water (EPA, 1997c), Section 32, *Prohibition on build-up of sediment* |
| Implementation Strategy | • Managing potential run-on so that flows are dispersed over the site<br>• Develop a site based ESC<br>• Collection and treatment of sediment laden stormwater<br>• Avoiding flow concentration within the site<br>• Installing silt fences on the upstream side of works to prevent water flowing into the work area<br>• Shaping landforms to provide slopes similar to or lower than those of the surrounding landscape and establishing grass where it will be the primary vegetation cover for erosion protection<br>• Placing anchored biodegradable erosion protection and establishing trees and shrubs where they, and their leaf litter, will provide the primary ground cover for erosion protection<br>• Ensuring adequate soil material to support plant growth by placing a layer of material with appreciable water holding capacity to increase profile water storage and covering this with topsoil stockpiled during excavation<br>• Utilising rock check dams to reduce erosive velocities in drainage lines<br>• Collection and treatment of concrete wastes.<br>• Undertake creek crossings during dry conditions (April to September)<br>• EC's to be present during watercourse crossings |
| Monitoring | • Monitoring of sediment and erosion control devices should occur weekly (at a minimum) to ensure they remain undamaged from construction activity, and immediately following each rainfall event<br>• Water quality monitoring (turbidity, either TDS or NTU) in potentially affected flowing watercourses, monthly, during creek crossings and immediately following significant rainfall events<br>• Training and education of workforce |

| | |
|---|---|
| Reporting | • The results of the water quality monitoring, records of staff training and any minor site incidents should be included in a monthly report to SunWater<br>• Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Maintain, repair and replace sediment and erosion control devices whenever required<br>• Wherever possible, exposed areas experiencing excessive erosion to be vegetated / rehabilitated<br>• If water quality monitoring indicates sediment losses from the site, additional control devices are required in the corresponding runoff flow paths.<br>• The ESC requires continual review and revision to ensure it provides the site with adequate environmental protection.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |
| Environmental Objective – Surface Water<br>Prevent contamination of watercourse and creek beds. | |
| Performance Criteria | • Minimising spillage on the construction site<br>• Diverting upstream surface waters away for from project site<br>• Preventing soil and water contamination from oil, fuel or chemicals |
| Implementation Strategy | • All spillage of fuels and chemicals in the works area will be contained and cleaned up immediately using appropriate equipment<br>• Hazardous chemicals will be stored in designated storage areas and appropriately bunded / contained in accordance with AS 1940<br>• Refuelling of machinery and vehicles to be undertaken away from drainage channels, in a bunded area capable of containing spilt material. Spill containment and treatment materials to be readily accessible. |
| Monitoring | • Weekly inspection of work sites to detect any chemical/oil spills<br>• Runoff water quality will be visually monitored during operations and especially following wet weather events<br>• Sampling and analysis of stormwater and receiving waters should a significant spill occur to determine the level and extent of contamination |
| Reporting | • All water quality data is to be recorded and made available upon request of an auditor or regulatory authority<br>• Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to regulatory body/ies. |
| Corrective Action | • Clean up soil and water contamination or spillage as soon as practicable.<br>• Where contaminated run off is detected, determine the source, then contain and recover the contaminants |

| | |
|---|---|
| | • Should a significant spill occur which potentially causes or threatens environmental harm, notify the EPA.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

Table 21-18. Air, Noise and Vibration

| Environmental Objective – Air Quality<br>Minimise vehicle emissions | |
|---|---|
| Performance Criteria | • No complaints from the community or on-site workforce |
| Implementation Strategy | • Ensure vehicle engines are turned off when vehicles are stationary.<br>• Ensure regular maintenance of engines to reduce vehicle emissions in order to comply with National Environment Protection (Ambient Air Quality) Measure (NEPC, 2003) |
| Monitoring | • Via complaints register and observations by ECs.<br>• Undertake air quality monitoring if warranted by complaints<br>• Weather station to be established on site to monitor seasonal weather (particularly wind speed and direction) as a means to verify Project-related complaints |
| Reporting | • Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Maintain offending vehicles or remove from site.<br>• Where unacceptable levels measured, review on-site activities with additional control measures and/or varied site operations.<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Air Quality<br>Minimise dust disturbance from vehicle operation and construction activities | |
|---|---|
| Performance Criteria | • No damage to surrounding vegetation from dust deposition or impacts on crops and introduced pastures<br>• No complaints from the community or on-site workforce |
| Implementation Strategy | • Reducing entrainment of dust particles through watering haul roads, on-site vehicle tracks, and stockpiles as necessary<br>• Minimising vehicle speeds around work areas<br>• Substituting tasks where possible with alternative methods that produce less dust<br>• Using dust/wind fencing around stockpiles and minimising drop distances onto stockpiles<br>• Upgrading and maintaining unsealed roads as required<br>• Where possible, suspend dust generating activity during strong wind conditions |
| Monitoring | • Undertake air quality monitoring if warranted by complaints<br>• Monthly inspection of surrounding vegetation to identify any areas of dust deposition/ vegetation damage |
| Reporting | • Immediate reporting to Construction Manager of significant dust event that will require mitigation measures to be implemented.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Increase watering frequency<br>• Reduce speed limits<br>• Minimise dust generating activity during high wind periods. |

| Environmental Objective – Air Quality<br>Minimise greenhouse gas emissions | |
|---|---|
| Performance Criteria | • No complaints from community or on-site workforce regarding vehicle emissions<br>• No cleared vegetation is removed from site as waste |
| Implementation Strategy | • Operate buses from workforce accommodation areas to site and ensure all vehicles carry passenger numbers near the carrying capacity<br>• Recycling program in place and functioning<br>• Minimise the burning off of cleared vegetation<br>• Ensure vehicle engines are turned off when vehicles are stationary.<br>• Ensure regular maintenance of engines to reduce vehicle emissions in order to comply with National Environment Protection (Ambient Air Quality) Measure (NEPC, 2003)<br>• Designing a construction works program to source most construction materials from within or close to the project area to reduce fuel use and energy consumption associated with transport of materials.<br>• Regularly spaced laydown areas of construction materials to minimise handling and travel distances<br>• Maintaining construction equipment and haul trucks in good working order so fuel efficiency of equipment is maximised.<br>• Using appropriately sized equipment for construction activities.<br>• Minimise burning of excess vegetation that cannot be recycled. |
| Monitoring | • Complaints register |
| Reporting | • Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Service vehicles regularly to ensure excessive greenhouse gases are not emitted |

| Environmental Objective – Noise and Vibration<br>Minimal impact of construction noise on surrounding environments | |
|---|---|
| Performance Criteria | • No noise complaints resulting from construction |
| Implementation Strategy | • Unless landholders and the EPA otherwise notified, noise-emitting works to be limited to between 6:00 am and 6:00 pm Mon. to Sat.<br>• Machinery and equipment to be regularly serviced and maintained<br>• All plant and machinery will be fitted with appropriate noise attenuation equipment, as per manufacturer's specifications<br>• Placing temporary noise barriers and enclosures around noisy activities or along the noise transmission path adjacent to the receiving site if residents request it<br>• Being alert to the native fauna species in and around work sites and seeking professional advice on minimising noise impacts |
| Monitoring | • Complaints register to be implemented and maintained as required<br>• Noise monitoring to be undertaken on receipt of a noise complaint which is not considered to be vexatious/ unjustified or if instructed by the EPA |
| Reporting | • In the event of noise complaints a report outlining the climatic conditions at the time, likely activities that were responsible for the complaint and the investigations in response of the community complaint. |
| Corrective Action | • Review construction practices<br>• The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Noise and Vibration<br>Minimal impact of increased traffic noise | |
|---|---|
| Performance Criteria | • No complaints arising from traffic noise |
| Implementation Strategy | • Design transport routes to avoid/ minimise residential impacts<br>• Implement speed limits in sensitive zones<br>• Encourage the limited use of heavy vehicle exhaust brakes within residential areas<br>• All vehicles will be fitted with appropriate noise attenuation equipment, as per manufacturer's specifications<br>• Use 'white noise' generators on reversing equipment in preference to beepers<br>• Restrict delivery of heavy vehicles, equipment and oversized loads to daylight hours, where practical |
| Monitoring | • Complaints register to be implemented and maintained as required<br>• Noise monitoring to be undertaken on receipt of a noise complaint which is not considered to be vexatious / unjustified |
| Reporting | • In the event of noise complaints a report outlining the climatic conditions at the time, likely activities that were responsible for the complaint and the appropriate proposed investigations in response of the community complaint. |
| Corrective Action | • Review practices and implement noise controls<br>• Identify alternate transport routes, where practical |

Table 21-19. Aquatic Flora and Fauna

| Environmental Objective – Aquatic Flora and Fauna<br>Minimise and mitigate, as far as is practicable, the adverse impacts on aquatic fauna and flora, during construction of the project. | |
|---|---|
| Performance Criteria | • Waters leaving the site do not cause significant detriment to receiving watercourses<br>• No waste material (general and construction rubbish) entering waterways from the construction and operational areas<br>• No uncontrolled or untreated release of water or sediment from site<br>• All works to be undertaken in accordance with the Erosion and Sediment Control (ESC) Plan<br>• Implementation of a program to monitor and treat aquatic weeds and other pest species that may have been introduced from construction activities.<br>• When flow is occurring; there should be no additional blockages to those that currently exist. The sizing of temporary bridges or culverts should be such as to not hinder passage. Possible adequate flows to be maintained to allow aquatic fauna migration |
| Implementation Strategy | <u>Erosion and Sediment Control</u><br>• Minimise the amounts of sediments entering the watercourses through effective implementation of ESC<br><u>Chemical, fuels and oils</u><br>• Implementation and maintenance of the Water Quality and Hazards/Risks EMPs with particular reference to the appropriate storage measures of hazardous materials.<br><u>Waste Management</u><br>• Implementation of a waste management plan<br><u>Obstruction of fish and turtle passage</u><br>• Ensure the opportunity for fish and turtles to migrate is maintained<br>• All creek/ river crossings to be constructed during periods of low or minimal flow<br><u>Weed management</u><br>• Site to be reinstated immediate after pipe installation, to minimise the length of disturbance and prevent further weed establishment. |
| Monitoring | • Weekly visual inspection of erosion and sediment control devices and receiving waters. This inspection is required during, or immediately following rainfall events.<br>• Regular audits of the EMP<br>• Implement and maintain the Weed Management EMP, to determine the distribution of known declared weeds and, where practicable, control these infestations, in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002*. |

| Environmental Objective – Aquatic Flora and Fauna<br>Minimise and mitigate, as far as is practicable, the adverse impacts on aquatic fauna and flora, during construction of the project. | |
|---|---|
| Reporting | • Incidents, complaints and any significant environmental harm to aquatic environment reported to regulatory body/ies.<br>• Assessment of performance against the identified indicators will be determined by auditing and reporting on a monthly (internally) and three monthly (externally) basis during construction. |
| Corrective Action | • Ensure sediment and erosion controls are working adequately<br>• Review construction practices/ methodologies<br>• Remove flow restrictions and accumulated debris<br>• Immediate reporting to SS and EC-C of any incident which contravenes the objectives of the EMP.<br>• The Construction Manager can request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. |

| Environmental Objective – Aquatic Flora and Fauna<br>Minimise the breeding of mosquitoes and bitting midge | |
|---|---|
| Performance Criteria | • No complaints from workforce or surrounding residence |
| Implementation Strategy | • Minimise the breeding opportunities of mosquitoes and biting midges onsite through appropriate workforce education, control through application of larvicides (where necessary), site maintenance and building design.<br>• Minimise the retention time of standing water onsite |
| Monitoring | • Pipeline construction site to be inspected post rainfall events to ensure undesired poolings, is not occurring for extended periods on site (e.g. most species take at least six days to develop, thus retention time of undesired on-site surface water should be less than this)<br>• Pipeline reinstatement should be inspected post rainfall events to ensure that 'settling' of excavation areas has not created sink holes and potential breeding pools<br>• If complaints are received, breeding habitats should be determined by conducting site survey, by dipping for larvae along the banks of the waterway and around the site. |
| Reporting | • All corrective, treatment measures and complaints (workforce and community) to be reported to the PM and EC-C |
| Corrective Action | • Where a high abundance of mosquito larvae are found (>10 per dip), treatment with a commercial target specific larvicide, such as 'Altosid 30 day briquettes', maybe required.<br>• Bitting midges cannot be treated by chemical means within the breeding areas due to the toxicity of midge adulticide to other organisms. Where the sources of midges are identified, control measures such as barriers (which maybe treated with 'bistar', a midge adulticide) can be implemented.<br>• All observed 'sink holes' along the reinstatement route are to be repaired. |

Table 21-20. Terrestrial Flora and Fauna

| Environmental Objective – Terrestrial Flora and Fauna<br>Minimise and mitigate the impact of general construction activities upon flora and fauna. | |
|---|---|
| Performance Criteria | • Minimal risk of injury or death to resident wildlife<br>• All injured animals to be treated humanely<br>• Health of adjacent ecosystems not affected by construction activities.<br>• No fauna will be killed or injured by falling into the pipeline trench<br>• Clearing each day is to be undertaken in accordance with the Management Plan for clearing which should set out clearing order.<br>• No vegetation to be disturbed outside of areas designated for clearing**.** Where clearing activities are scheduled adjacent to remnant vegetation, the edge of the clearing zone must be clearly marked. All clearing to be undertaken with appropriate VMA clearance permits. |
| Implementation Strategy | • A Management Plan for clearing will be prepared in accordance with the State Policy for Vegetation Management (NRW, 2006c)<br>• A fauna spotter/catcher will be present preceding and during all clearing activities to actively search all habitat for wildlife and to ensure that clearing methods are appropriate<br>• Clearing of vegetation to be undertaken so that any more mobile, non-volant fauna are able to move to other areas of suitable habitat<br>• Protection from heavy machinery and other disturbances of vegetation outside of the areas designated for clearing<br>• Minimise dust impacts on adjoining habitat<br>• Limit ancillary works to already cleared areas or areas planned for clearing<br>• No unnecessary clearing of vegetation<br>• Avoid clearing in areas of known usage during breeding and nesting periods, where practical<br>• Siting of stockpile areas, camps, spoil dumps, refuse areas and vehicle parking areas, must, where possible, be within areas that are already cleared, or are proposed to be cleared<br>• Where practical trenches should not be left open at night, to prevent capture/ injury of native fauna<br>• Advise workforce of travel during sunrise and dusk hours to be aware of native fauna grazing by the roadside |
| Monitoring | • Record spotter/catcher activities in relation to clearing activities.<br>• Record any wildlife injuries or deaths directly associated with clearing activities<br>• Record animal injuries and follow up with information from receiving veterinary surgeon<br>• Open areas of pipeline trench are inspected each morning for fauna and that fauna is humanely and safely removed. |

| Environmental Objective – Terrestrial Flora and Fauna<br>Minimise and mitigate the impact of general construction activities upon flora and fauna. | |
|---|---|
| Reporting | • Instances of disturbance outside of temporary fencing to be recorded<br>• Record any native fauna road kill<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM regulatory body/ies. |
| Corrective Action | • Clearing not to commence without fauna spotter/catcher present<br>• Clearing practices to be undertaken accordingly to the advice provided by the fauna spotter/catcher<br>• Injured animal handling procedures to be advised by a veterinary surgeon<br>• Increase warning message through staff training<br>• Increase the frequency of fauna escape ramps within trenches, or close trench at the conclusion of the day (where applicable)<br>• Rehabilitate disturbed areas in accordance with the Habitat Rehabilitation Management Plan |

| Environmental Objective – Terrestrial Flora and Fauna<br>Minimise and mitigate the introduction of weed species. | |
|---|---|
| Performance Criteria | • No new weed introductions or spread of existing weeds as a result of the project |
| Implementation Strategy | • A detailed Weed Management Plan will be prepared<br>• Implement and maintain the EMP for Weed Management. This plan will include protocols for management of vehicle and machinery movement to reduce the likelihood that weeds are spread as a consequence of this project. This will comply with existing guidelines, particularly with respect to *Parthenium*, as the work site is in a *Parthenium* free zone. Washdown facilities are available in Taroom. Material and equipment sourced from an area of outside of the 'free zone' must be accompanied by appropriate certification of cleanliness. |
| Monitoring | • Regular (monthly) inspections of works areas and adjoining areas are to be undertaken, and the occurrence of new weeds or spread of existing weeds to be recorded.<br>• The success of control programs should be visually monitored and follow up measures taken as appropriate |
| Reporting | • Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Treatment of weeds identified on-site during inspection, or otherwise, will be undertaken in accordance with NRW guidelines for each species |

| Environmental Objective – Terrestrial Flora and Fauna<br>Site rehabilitation (major rehabilitation works are only to be undertaken if the Proposed Nathan Dam is not approved prior to 2013) | |
|---|---|
| Performance Criteria | • Restoration of disturbed areas to pre-construction conditions, or better |
| Implementation Strategy | • A Habitat Rehabilitation Management Plan will be prepared, including requirements for revegetation<br>• Re-establishment of wildlife corridors (this constitutes major rehabilitation)<br>• Salvaged vegetation will be used where appropriate as habitat<br>• Revegetate areas with a verity of local endemic species or native grasses, where applicable |
| Monitoring | • Bi-annual inspection of rehabilitated areas to be undertaken for the first 6 years of establishment to monitor weed intrusion and flora/ fauna health. |
| Reporting | • Survey/ inspection results to be prepared after each monitoring period, outlining climatic conditions, survey methodology, results and any recommendations/ actions required. |
| Corrective Action | • Review and revise Habitat Rehabilitation Management Plan<br>• Review, revise and apply the Weed Management Plan, where appropriate. |

Table 21-21. Cultural Heritage

| Environmental Objective – Cultural Heritage<br>Appropriate handling of Aboriginal artefacts and heritage during excavation and construction activities | |
|---|---|
| Performance Criteria | • No damage to Aboriginal cultural heritage items during construction activities and to preserve the heritage values of the area |
| Implementation Strategy | • Operation of the project under Cultural Heritage Management Plans as agreed between SunWater and the Aboriginal Parties<br>• Cease construction activities immediately and inform SunWater directly if artefacts or archaeological remains are discovered |
| Monitoring | • Cultural heritage induction to be provided by relevant Traditional Owners prior to ground-breaking activities associated with construction taking place<br>• If agreed, members of the relevant Aboriginal Party to oversee excavation activities for near surface material in hard rock areas and to depth in alluvium |
| Reporting | • Evidence of a suspected Aboriginal artefact or heritage item to be reported immediately to the site supervisor and construction manager.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • SunWater to liaise with Traditional Owners |

Table 21-22. Water Management

| Environmental Objective – Waste Management<br>Management of waste associated with general construction | |
|---|---|
| Performance Criteria | • Cleared vegetation to be used in rehabilitation or soil stabilisation works or mulched provided that it is weed free<br>• Material suitable for artisans to be reserved if local interest in use |
| Implementation Strategy | <u>Cleared Vegetation</u><br>• Cleared vegetation will be used where possible in habitat rehabilitation<br>• Mulch suitable other vegetation for rehabilitation and stabilisation<br>• Millable timber occurring within areas to be cleared will be harvested and used for commercial purposes<br><u>Construction waste (e.g. steel, tyres, ceramics, packaging material, excess spoil)</u><br>• Construction wastes from the site area should be minimised<br>• Segregate and provide receptacles for cardboard, recyclable plastics, scrap metal, waste oils and concrete<br>• Suppliers of construction materials to be encouraged to reuse or collect packaging (e.g. plastic wrapping or cardboard boxes) for recycling or reuse<br>• Recycle drums to merchants and return plastic containers to manufacturers<br>• Excess spoil to be reused onsite, where applicable such as to repair gully erosion and to produce a slight mound over the pipeline<br><u>Domestic Wastes</u><br>• Collection bins for designated recyclable and putrescible wastes to be on-site<br><u>Liquid wastes and sewage</u><br>• Any liquid wastes to be disposed of by an approved contractor or taken to the local council for disposal at an approved facility<br>• Provision of portable toilet facilities and pump-out wastes<br><u>Hazardous waste (e.g. batteries, contaminated soil, paints, asbestos)</u><br>• All hazardous wastes will be transported from site via an approved contractor<br>• Designated areas for empty drums and containers should be established in an adequately bunded and sheltered area<br>• Appropriate spill kits (hazardous chemical or general) will be provided near the storage area |
| Monitoring | • Record treatment of cleared vegetation<br>• Inspections to ensure waste segregation is occurring<br>• Undertaking monthly waste audits |

| | |
|---|---|
| | • Maintain waste disposal records |
| Reporting | • Records to be keep of all waste movement from the site, including date, material removed, contractor and treatment/ disposal destination.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents. |
| Corrective Action | • Review waste management processes<br>• Revise waste management resource plan |

Table 21-23. Hazard and Risk

| Environmental Objective – Hazard and Risk<br>Minimise the risks associated with flooding<br>Minimise the risks associated with fire | |
|---|---|
| Performance Criteria | • No loss of personnel or equipment<br>• No damage to neighbouring landholders from fire |
| Implementation Strategy | <u>Flooding</u><br>• Pipeline construction not to occur near areas of potential inundation during flood events.<br>• All plant and machinery to be relocated to areas of greatest immunity to high water levels<br><u>Fire</u><br>• No uncontrolled burning of vegetation or other activities likely to increase risk of uncontrolled fires.<br>• Establish and maintain contact with local emergency services.<br>• Maintain work areas clear of fire risk areas |
| Monitoring | <u>Flooding</u><br>• Monitor weather and flood conditions, providing adequate time for any issued warnings if upstream flooding is likely<br><u>Fire</u><br>• Monitor weather patterns throughout fire event<br>• Ensure fire safety equipment is regularly maintained. |

| | |
|---|---|
| Reporting | • A report, post event, is to be prepared which outlines the damage/ losses to the site and surrounding environment. |
| Corrective Action | • Schedule construction to avoid periods with highest risk from heavy rain events<br>• Advise local Fire Warden if fire occurs, or prior to any scheduled burnoffs to obtain permits<br>• Notify nearest landholders if any risk of fire escaping<br>• Reinstate any damages to fences or property |
| Environmental Objective – Hazard and Risk<br>Minimise the risks associated with hazardous materials (spills and leaks of chemicals) | |
| Performance Criteria | • No land or surface water contamination |
| Implementation Strategy | • Compliance with relevant standards<br>• Secondary containment/bunding<br>• Spill containment equipment to be serviceable at all times<br>• Immediate cleanup of leaks and spills<br>• Locate chemicals away from flow paths<br>• Installation of an oil containment boom across the downstream section of the watercourse, if large-scale stream contamination occurs |
| Monitoring | • Weekly inspections of chemical use areas<br>• Weekly inspections of storage areas for any defects with bunding or floor structures<br>• Visual inspection of equipment and components |
| Reporting | • Immediate reporting to SS and the EC-C of any incident, spill or release of materials to the environment.<br>• Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.<br>• Any incidents that have the potential to cause significant environmental harm must be immediately reported to the PM and regulatory body/ies. |
| Corrective Action | • Review construction practices and mitigation techniques to ensure all protocols are being followed |

| Environmental Objective – Hazard and Risk<br>No unmanaged public access to the project site | |
|---|---|
| Performance Criteria | • No access to construction site |
| Implementation Strategy | • Ensure adequate work site security |
| Monitoring | • Daily monitoring of security and access |
| Reporting | • Any incidents must be immediately reported to the PM and regulatory body/ies, where applicable. |
| Corrective Action | • Review security protocols |

Table 21-24. Social and Economic

| Environmental Objective – Social and Economic<br>Minimal impact associated with the increase in local construction workforce<br>Enhance the work opportunities for the local industry | |
|---|---|
| Performance Criteria | • No reduction in access to services for residents<br>• Maximises business development opportunities for the neighbouring communities<br>• A percentage of the workforce to be sourced from the local area |
| Implementation Strategy | • Establish expression of interest process for local contractors and service providers<br>• Ensure construction contractor maximises use of local workforce and subcontractors in conformance with Queensland government policy<br>• Continue consultation program with local community and stakeholders for early identification of any adverse issues<br>• Monitor Glebe Option complaints phone line and establish consultation and complaints register<br>• Consult with Council and government regarding detailed planning for construction camps. SunWater and the Contractor will participate in joint management group meetings (Wandoan Joint Venture, Surat Basin Rail, other infrastructure or service providers, local government, government agencies) if this strategy is chosen. |
| Monitoring | • Ongoing consultation with relevant Local Authorities and government departments<br>• Registers maintained and actions / responses checked within 24 hours. |
| Reporting | • Communications register to include communication activities, residents' complaints and resolution of complaints. Regular reviews required.<br>• The results of annual monitoring of community satisfaction with environmental and complaints management collated into report for submission to SunWater.<br>• Significant complaints and community issues reported to the PM, where required. |
| Corrective Action | • SunWater to liaise with Councils and relevant government contractor |

Table 21-25. Traffic and Safety

| Environmental Objective – Traffic and safety<br>Effectively manage the increases in traffic movement along regional roads during construction | |
|---|---|
| Performance Criteria | • No road accidents related to the Glebe Option<br>• No justified complaints regarding construction traffic |
| Implementation Strategy | • Liaise with Department of Main Roads and Local Government re Traffic Management Plan<br>• Facilitate safe entry and exit points for the construction areas<br>• Restrict construction traffic to selected locations that are clearly signed<br>• Reduce speed limits near the vicinity of construction activities<br>• Ensure traffic control points are manned during construction times<br>• Avoid heavy vehicle movements during school set down and drop-off times<br>• Sufficient notification to local residents and stakeholders of any road closures or change in traffic conditions<br>• Providing buses for personnel transport to and from site, arranging pooling where small numbers work outside regular shifts<br>• Maintaining awareness of safe driving techniques |
| Monitoring | • Undertake traffic surveys where required<br>• Undertake tie-ins under the supervision of traffic control |
| Reporting | • Monthly Report prepared and submitted to SunWater to include details of local traffic conditions, including any accidents involving construction traffic, any monitoring results, audits, training and incidents.<br>• Immediate reporting to SS and EC-C of any incident which contravenes the objectives of the EMP.<br>• Incidents, complaints and any significant environmental harm reported to the PM and regulatory body/ies where required. |
| Corrective Action | • Address all requests from the Department of Main Roads<br>• Review and amend Traffic Management Plan if a significant number of complaints are received |

## 21.15 Operational Implementation Plans – Glebe Weir

Table 21-26. Soils, Geology and Geomorphology

| Environmental Objective – Soils, Geology and Geomorphology<br>Minimise erosion and deposition in the storage area. | |
|---|---|
| Performance Criteria | • Limit the extent of sediment deposition within the weir |
| Implementation Strategy | • Work with landowners and leaseholders to Manage grazing and fire to maintain ground cover vegetation in and around the storage and aid re-establishment when water levels are low<br>• Maintaining riparian vegetation within the buffer zone of the storage along all streams entering it to minimise bank instability and thus sediments entering the storage<br>• Allowing natural regeneration of trees and shrubs in the riparian zone of streams entering the storage<br>• Establishing trees tolerant of both wet and dry conditions such as forest red gum (*Eucalyptus tereticornis*) and tea tree (*Melaleuca spp*.), and river oak (*Casuarina cunninghamiana*) in the buffer zone and encouraging natural establishment<br>• Placing partly buried logs and tree stumps just below FSL to break up wind generated wave action – these would provide habitat for aquatic species as well. |
| Monitoring | • Monitor sedimentation levels at the weirs upstream extremities |
| Reporting | • Operator to report on weir operations as per the Resource Operations Plan |
| Corrective Action | • Remove coarse sediments when economic volumes accumulate (if appropriate) |

| Environmental Objective – Soils, Geology and Geomorphology<br>Minimise the impact of changed flow patterns and entrapment of bedload sediments on the Dawson River and associated downstream alluvium downstream. | |
|---|---|
| Performance Criteria | • Streambed conditions maintained downstream of the weir<br>• Levees and terraces downstream of the weir remain stable |
| Implementation Strategy | • Protecting and encouraging riparian vegetation, particularly that immediately adjacent to the stream channel<br>• Establishing trees tolerant of both wet and dry conditions such as forest red gum (*Eucalyptus tereticornis*) and tea tree (*Melaleuca spp*.) in the buffer zone |
| Monitoring | • Visual inspection of streambed, levees and terraces downstream |
| Reporting | • Operator to report on weir operations as per the Resource Operations Plan |
| Corrective Action | • Maintain riparian vegetation<br>• Design and install appropriate erosion protection devices |

Table 21-27. Water Resources

| Environmental Objective – Surface Water Quality<br>Maintain surface water quality<br>Minimise the contamination of waterways from spills<br>Minimise growth of harmful algae<br>Ensure downstream water quality is at least equal to the present | |
|---|---|
| Performance Criteria | • Long-term water quality within the storage to meet locally relevant water quality objectives<br>• Long-term water quality downstream of the storage to meet water quality objectives<br>• No spills or contaminated runoff immediate adjacent to the storage |
| Implementation Strategy | • Develop locally relevant water quality objectives in conjunction with EPA<br>• All activities to comply with EMP<br>• Develop a Algae Management Plan,<br>• Remediate all known contaminated sites and remove all significant sources of contamination from the impoundment area and nearby catchment<br>• If Nathan Dam is not approved by 2013, install a multi-level offtake with appropriate release mechanism |
| Monitoring | • Minimum monthly monitoring by depth profile (DO, pH, temp, EC, algal cell counts and speciation) near the offtake and at upstream and downstream riverine sites<br>• Monitoring during critical periods, such as during spring and early summer, during potential ‘ turnover ‘ periods, during nil and low flow periods and after small runoff events<br>• Sampling of receiving waters should a spill occur to assess the level and extent of contamination<br>• Monitoring in accordance with ROL |
| Reporting | • Operator to report on weir operations as per the ROL<br>• Incidents, complaints and any significant environmental harm reported to regulatory body/ies |
| Corrective Action | • Soil and water contamination or spillage to be cleaned up immediately<br>• Select optimum off-take level to minimise impacts when the multi-level offtake is in place |

| Environmental Objective – Groundwater<br>Minimise the waterlogging of agricultural lands in areas downstream of the levees | |
|---|---|
| Performance Criteria | • No change in groundwater levels beyond the buffer zone |
| Implementation Strategy | • Construct the levees and plant the riparian buffer as designed<br>• Cease irrigation at the two centre pivots nearest Boggomoss Ck.<br>• Install groundwater monitoring bores between the levee near Boggomoss Ck and Boggomoss No.8 |
| Monitoring | • Visual monitoring of area near levees for evidence of waterlogging<br>• monitor groundwater levels in the installed bores |
| Reporting | • Record results of water table depth at monthly intervals. |
| Corrective Action | • Review operating strategy and consider further engineering options (subsurface drainage) |

Table 21-28. Air Quality, Noise and Vibration

| Environmental Objective – Air Quality<br>Reduce the discharge of noxious gases, if turnover of water storage occurs<br>Reduce greenhouse gas emissions | |
|---|---|
| Performance Criteria | • Limit air quality impact on sensitive receptors (particularly the neighbouring camping ground)<br>• Minimum net greenhouse gas emissions from the operation of the storage |
| Implementation Strategy | • Minimise discharge of noxious gases by removing readily decomposable organic matter from the storage area<br>• Revegetate cleared lands |
| Monitoring | • Undertake sensory monitoring of odours from discharge water and surface of storage if complaints received |
| Reporting | • Operator to report on weir operations as per the Resource Operations Plan<br>• Incidents, complaints and any significant environmental harm to be reported to regulatory body/ies |
| Corrective Action | • As per surface water quality management,<br>• Review operating system |

| Environmental Objective –Noise and Vibration<br>Minimise the operational noise from pumps | |
|---|---|
| Performance Criteria | • No justified noise and vibration complaints from sensitive receptors (camping ground) |
| Implementation Strategy | • Ensure equipment of appropriate design is installed and maintained, including sound enclosures over equipment |
| Monitoring | • Via response to complaints. Will include noise monitoring where necessary |
| Reporting | • Operator to report on weir operations as per the ROL<br>• Incidents, complaints and any significant environmental harm to be reported to regulatory body/ies |
| Corrective Action | • Review of pump usage<br>• Assess effective uses of noise mitigation measures and rectify if appropriate |

Table 21-29. Aquatic Flora and Fauna

| Environmental Objective – Aquatic Flora and Fauna<br>No serious blue-green algal blooms | |
|---|---|
| Performance Criteria | • Adherence to locally relevant Water Quality guidelines<br>• Utility of water for designated purposes not compromised |
| Implementation Strategy | • Avoid disturbance of sediments that might liberate nutrients from reservoir bottom<br>• Completion of an Algae Management Plan |
| Monitoring | • Monthly monitoring of water quality and algal levels |
| Reporting | • Operator to report on weir operations as per the ROL<br>• Incidents, complaints and any significant environmental harm reported to regulatory body/ies |
| Corrective Action | • If algal densities exceed trigger thresholds, implement Algal Management Plan<br>• Signage to warn public of weir pool's suitability for primary and secondary recreation |

| Environmental Objective – Aquatic Flora and Fauna<br>Maintain downstream aquatic habitats<br>Reduce physical impacts on fauna. particularly at weir offtake | |
|---|---|
| Performance Criteria | • Condition of downstream habitats does not deteriorate as a result of the weir operation<br>• Reduction in turtle fatalities as a consequence of weir operation activities |
| Implementation Strategy | • Maintain downstream flow to meet EFOs.<br>• Improve offtake structure and screening, and assess spillway design based on advice from turtle specialists in EPA |
| Monitoring | • Seasonal monitoring of condition of downstream areas likely to be affected by flow regime change<br>• Screens and discharge area to be checked seasonally and when weir is at low water levels for evidence of damage to turtles and other fauna |
| Reporting | • Operator to report on weir operations as per the ROL |
| Corrective Action | • Review designs, compliance with EFO's or EFO's themselves as appropriate |
| Environmental Objective – Aquatic Flora and Fauna<br>Prevent the introduction of exotic species | |
| Performance Criteria | • No additional exotic species present in weir pool water |
| Implementation Strategy | • Negotiate with DPI to ensure non-endemic fish species are not permitted to be introduced to the storage<br>• Include signage in accessible areas around the weir |

| | |
|---|---|
| Monitoring | • Annual monitoring of fish species composition and incidental monitoring of recreational catches during the year |
| Reporting | • Report to SunWater summarising the result of the annual monitoring program<br>• The presence of a new listed pest species to be reported to the appropriate regulatory body/ies |
| Corrective Action | • Assess potential impact of specific exotic species. Control exotic species (if necessary and if possible) under guidance from NRW and EPA |
| Environmental Objective – Aquatic Flora and Fauna<br>Minimise the breeding of mosquitoes and biting midges | |
| Performance Criteria | • No complaints from workforce or surrounding residence/sensitive receptors |
| Implementation Strategy | • Minimise the breeding opportunities of mosquitoes and bitting midges onsite through appropriate workforce education, control through adulticides where necessary, site maintenance and building design. |
| Monitoring | • If complaints are received, breeding habitats should be determined by conducting site survey of the immediate area, by dipping for larvae along the banks of the waterway. |
| Reporting | • All corrective, treatment measures and complaints (workforce and community) to be reported to the PM and EC-C |
| Corrective Action | • Where a high abundance of mosquito larvae are found (>10 per dip), such as 'Altosid 30 day briquettes', maybe required.<br>• Bitting midges cannot be treated by chemical means within the breeding areas due to the toxicity of midge adulticide to other organisms. Where the sources of midges are identified, control measures such as barriers (which maybe treated with 'bistar', a midge adulticide) can be implemented. |

Table 21-30. Terrestrial flora and fauna

| Environmental Objective – Terrestrial Flora<br>Minimise impact on the adjacent groundwater-dependent ecosystems<br>Minimise impacts on downstream ecosystems<br>Minimise impacts of weed intrusion | |
|---|---|
| Performance Criteria | • No long term impact on Boggomoss ecosystems<br>• Maintain EFO's<br>• No new weed infestations associated with the operation of the weir and pipeline<br>• Avoid the creation of edge effects along the borders of all new access roads and the inundation area. |
| Implementation Strategy | • Existing hydrological regimes are to be maintained for adjacent boggomoss communities<br>• Effected ecosystems and species will be offset through habitat restoration and enhancement of comparable ecosystems in the local area<br>• Seedlings and seeds of significant local provenance species to be used in habitat restoration<br>• Development of a Weed Management Plan<br>• Educate operations staff on weed identification to ensure early detection of possible infestations |
| Monitoring | • Regular (monthly) inspection around the perimeter of the weir, weir wall and adjacent pipeline route to determine the distribution of declared and environmental weeds<br>• Regular (6 monthly) inspection to identify the progress of the habitat rehabilitation/ restoration<br>• Regular (annual) inspections of the Boggomoss communities<br>• Flora surveys to be replicated in the area every five years for the initial 15 years, with 10-yearly surveys following that if it is deemed necessary.<br>• Refer to Groundwater section for monitoring to protect Boggomoss snail |
| Reporting | • Operator to report on weir operations as per the ROL and Weed Management Plan |
| Corrective Action | • Review control/eradication plans for problem species<br>• Determine altered habitat components and implement remedial actions to restore habitat for affected species |

| Environmental Objective – Terrestrial Fauna<br>Maintain local wildlife corridors<br>Appropriate rehabilitation/restoration of habitats<br>Replacement of hollows with nest boxes in habitats adjacent to the weir pool<br>Minimise the introduction/impact of pest species | |
|---|---|
| Performance Criteria | • Boggomoss Snail populations are not impacted by weir operations<br>• Nest boxes used by target species<br>• No detriment to fauna movement (wildlife corridors) as a result of weir operation<br>• Cleared areas restored to original condition, or locally offset with similar habitat configuration. |
| Implementation Strategy | • Development of a Habitat Rehabilitation Management Plan<br>• Development of a Animal Pest Species Management Plan<br>• Revegetate weir pool edges and fence to exclude livestock<br>• Where possible, retain large, dead trees in the inundations area |
| Monitoring | • Annual monitoring of nest box use for first three years of operation.<br>• Regular (6 monthly) inspection of restoration/rehabilitation area<br>• Fauna surveys to be replicated in the area every five years for the initial 25 years, with 10-yearly surveys following that if it is deemed necessary. |
| Reporting | • Operator to report on weir operations as per the Resource Operations Plan |
| Corrective Action | • Determine altered habitat components and implement remedial actions to restore habitat for affected species |

Table 21-31. Waste Management

| Environmental Objective – Waste Management<br>No waste from maintenance activities will remain on site | |
|---|---|
| Performance Criteria | • All waste disposed of lawfully.<br>• Storage areas kept clean and tidy |
| Implementation Strategy | **Hazardous waste (e.g. batteries, contaminated soil, paints, asbestos)**<br>• All hazardous wastes will be transported from site via an approved contractor<br>• Appropriate spill kits (hazardous chemical or general) will be provided near the storage area<br>**General waste**<br>• Will be removed from site as it is produced by the maintenance staff and deposited at an appropriate facility |
| Monitoring | • Undertake regular auditing to ensure compliance with the EMP objectives |
| Reporting | • Records to be keep of any hazardous waste movement from the site, including date, material removed, contractor and treatment/ disposal destination. |
| Corrective Action | • Review waste management processes |

Table 21-32. Hazard and Risk

| Environmental Objective – Hazard and Risk<br>Reduce the possibility of sunny-day weir failure | |
|---|---|
| Performance Criteria | • No injury or loss of life<br>• No loss of storage capacity<br>• Specification as per ANCOLD and Queensland guidelines<br>• No loss of significant species or habitat |
| Implementation Strategy | • Maintain security and control system for offtakes, pumps and bags<br>• Restrict public access to unsafe areas during operation |
| Monitoring | • Regular inspection of fences, gates, locks and buildings for signs of access<br>• Regular inspection of all components and facilities during operation |
| Reporting | • Operator to report internally in accordance with emergency management plan and in accordance with dam safety guidelines if applicable |
| Corrective Action | • Review safety procedures, emergency management plan and design and operation guidelines as applicable |

## 21.16 Operational Implementation Plans – Glebe Weir to Wandoan Pipeline

Table 21-33. Noise and Vibration

| Environmental Objective – Noise and Vibration<br>Minimal impact of pump station operation on surrounding environments | |
|---|---|
| Performance Criteria | • No noise complaints resulting from pump station operation |
| Implementation Strategy | • Pump station equipment to be regularly serviced and maintained<br>• All machinery will be fitted with appropriate noise attenuation equipment, as per manufacturer's specifications |
| Monitoring | • Complaints register to be implemented and maintained as required<br>• Noise monitoring to be undertaken on receipt of a noise complaint which is not considered to be vexatious/ unjustified |
| Reporting | • In the event of noise complaints a report outlining the climatic conditions at the time, likely activities that were responsible for the complaint and the investigations in response of the community complaint. |
| Corrective Action | • If noise is a continual problem for the pump station, appropriate noise attenuation barriers should be installed. |

Table 21-34. Aquatic flora and fauna

| Environmental Objective – Aquatic Flora and Fauna<br>Minimise trapping aquatic flora and fauna in the pipeline | |
|---|---|
| Performance Criteria | • Minimise likelihood of fauna and flora being drawn into the pipeline |
| Implementation Strategy | • Ensure intake pipe is adequately screened to minimise flora and fauna being drawn into the pipeline.<br>• Minimise pipeline suction<br>• Clear area around intakes of macrophytes and other potential fauna habitat |
| Monitoring | • Regular inspection of intake screens<br>• Inspection of WJV ponds to determine if flora or fauna have been transferred |
| Reporting | • Operator to report on pipeline and weir operations as per the ROL |
| Corrective Action | • Replacement of screen<br>• Review of pumping regime<br>• Clear area around intake |

Table 21-35. Terrestrial flora and fauna

| | |
|---|---|
| **Environmental Objective – Terrestrial Flora**<br>**Minimise weed intrusion** | |
| Performance Criteria | • No new weed species introduced to the area<br>• Minimise the spread of weeds along maintenance easements |
| Implementation Strategy | • Develop a Weed Management Plan<br>• Vehicles and machinery to be washed down post working in a weed infested area<br>• Operations staff to be educated in weed identification |
| Monitoring | • Periodic inspection of easements |
| Reporting | • Operator to report on pipeline as per the Resource Operations Plan |
| Corrective Action | • Treatment and eradication of listed pest species<br>• Review management plan and wash-down procedures |
| **Environmental Objective – Terrestrial Fauna**<br>**Minimise the impact on existing wildlife corridors**<br>**Minimise the presence of feral species** | |
| Performance Criteria | • Minimal impact of easement corridors on wildlife movement<br>• No increase in pest species as a result of pipeline operations |
| Implementation Strategy | • Where possible, maintenance easements should be rehabilitated (excluding vehicle access) with fallen timber, rocks, leaf litter and low growing vegetation.<br>• Develop a Animal Pest Species Management Plan<br>• Offset clearance through habitat restoration and enhancement of comparable ecosystems in the local area |
| Monitoring | • Periodic inspection of habitat rehabilitation progress.<br>• Periodic monitoring of fauna use (both native and introduced) of the easement and adjacent vegetation |

| | |
|---|---|
| Reporting | • Operator to report on pipeline as per the Resource Operations Plan |
| Corrective Action | • Review relevant management plan |

Table 21-36. Hazard and Risk

| Environmental Objective – Hazard and Risk<br>Minimise the risks of pipeline failure, due to human or accidental factors<br>Minimise deliberate vandalism | |
|---|---|
| Performance Criteria | • Reduce the risk of physical damage to the pipeline due to deliberate or accidental factors |
| Implementation Strategy | • Adequate signage along pipeline<br>• Appropriate system design (emergency cut-off) and management<br>• Registration with 'Dial Before You Dig (DBYD) system<br>• Adequate security |
| Monitoring | • Periodic pipeline inspection and maintenance |
| Reporting | • All incidents to be reported to the appropriate Authorities |
| Corrective Action | • Revise management and/or security plan |

## 21.17 Environmental Monitoring

Environmental monitoring will be undertaken during the construction and operational phases for both components of the project.

### 21.17.1 Construction

The results of environmental monitoring during the construction phase will be used to assess the impact the dam is having on the surrounding environment and to demonstrate compliance with regulatory requirements. The recorded construction phase data will be compared to the baseline data.

#### *21.17.1.1 Management Principles*

- Develop monitoring procedures in accordance with standard 'best practice' protocols and the requirements of the EPA, DPI&F, NRW and other relevant agencies;
- Undertake environmental monitoring during the construction phase as shown in Table 21-37;
- Calibrate and maintain all equipment used for environmental monitoring;
- Record and maintain details of calibration and maintenance for each piece of monitoring equipment used;
- Send all samples to a NATA registered laboratory for analysis; and
- Record and maintain details of laboratory results and quality assurance measures.

Table 21-37. Environmental monitoring required during the construction phase for Glebe Weir and the Glebe Weir to Wandoan pipeline

| Element | Environmental Parameter | Schedule (Glebe Weir) | Schedule (Glebe Weir to Wandoan pipeline) |
|---|---|---|---|
| Surface Water Quality | • Turbidity, dissolved oxygen, pH, total suspended solids, chemicals (fuels, oils etc) | • Monthly<br>• During and post discharge events | • During and post discharge events at creek crossings |
| Groundwater | • Water level in piezometers installed around Glebe Weir., particularly for boggomoss habitat monitoring<br>• Visual assessment of adjacent land for water logging | • Monthly<br>• | • N/A |
| Air Quality | • Particulates | • Following complaints | • Following complaints |
| Noise | • Construction Noise | • Following complaints | • Following complaints |
| Vibration | • Vibration | • Following complaints | • N/A |
| Aquatic Flora and Fauna | • Marcoinvertebrates, macrophytes,turtles, fish | • Every 6 Months | • N/A |

### 21.17.2 Operation

A monitoring program will be designed and implemented to record changes in the environmental conditions in response to construction activities and in accordance with the ROL. The monitoring program will assist in the early detection and identification of potential issues. A list of potential areas where monitoring may be required is given in Table 21-38.

#### *21.17.2.1 Management Principles*

- To conduct an operational monitoring program that will be used to collect data to compare against baseline monitoring results;
- Monitoring procedures will be developed in accordance with standard best practice protocols;
- Undertake baseline environmental monitoring and data collection as shown in Table 21-38;
- Calibrate and maintain all equipment used for environmental monitoring;
- Record and maintain details of calibration and maintenance for each piece of monitoring equipment used;
- Send all samples to a NATA registered laboratory for analysis; and
- Record and maintain details of laboratory results and quality assurance measures.

Table 21-38. Proposed environmental monitoring during the operational phase for Glebe Weir and the Glebe Weir to Wandoan pipeline

| Element | Environmental Parameter | Schedule (Glebe Weir) | Schedule (Glebe Weir to Wandoan pipeline) |
|---|---|---|---|
| Surface Water Quality | • Release temperature, turbidity, pH, conductivity and dissolved oxygen<br>• Vertical stratification<br>• Blue green algae (speciation, cell counts) | • Monthly<br>• Monthly (all year but especially October to May)<br>• Weekly during blooms | • N/A |
| Groundwater | • Water level in piezometers around Glebe Weir, particularly for boggomoss habitat monitoring<br>• Visual assessment of adjacent land for waterlogging | • Quarterly until trends stabilise<br>• Monthly | • N/A |
| Terrestrial Flora and Fauna | • Bank stability,<br>• replanting, rehabilitation monitoring | • Every 6 months<br>• As per EMP element | • During routine maintenance inspections |
| Noise | • Operational noise | • Following complaints | • Following complaints |
| Aquatic Flora and Fauna | • Pump inlet screen<br>• Base of spillway | • Every 6 months | • Every 6 months at creek crossings |