20. Environmental Management Plans

20.1 Environmental Management

A number of recommendations have been made in this Environmental Impact Statement (EIS) in relation to the management of environmental impacts during the construction and operation of Emu Swamp Dam including the Urban and Irrigation Pipeline. These recommendations will require actions to be taken during the design, construction and operational life of the Project and associated infrastructure.

In order to ensure that these recommendations are implemented, a Draft Environmental Management Plan (EMP) has been developed for the project.

An outline of the Draft EMP is provided in this EIS to demonstrate the commitment of Stanthorpe Shire Council (SSC) to ensure that the recommendations of this EIS are implemented. Environmental management practices and strategies for individual project elements are described in **Section 20.3**.

20.2 Purpose

An EMP is a management tool used to assist in minimising impact to the environment. The EMP is a dynamic document. It will be regularly updated to incorporate changes in environmental management procedures and practices in light of ongoing monitoring results, new techniques, legislation and environmental policies of the proponent in consultation with the relevant authorities.

The implementation of the EMP will ensure that concepts and commitments given in the EIS are applied so that the potential impacts of the construction and operation of the proposed infrastructure on the environment are minimised.

The EMP provides for ongoing environmental performance review and compliance monitoring.

20.2.1 Environmental Requirements and Obligations

The EMP is devised to ensure that identified environmental impacts relating to the Project construction and operation are avoided or minimised. In this regard, the EMP may refer to environmental legislation, controls, standards and guidelines relevant to impact mitigation and avoidance. The EMPs also requires that, wherever possible, works related to site development meet environmental expectations of the broader and local community.

A list of applicable legislation is identified in this section. The Project environmental management representative will hold copies of relevant legislation, guidelines and standards on site during construction.

Commonwealth Legislation

Commonwealth legislation relevant to the Project and the Draft EMP includes:

- *Environment Protection and Biodiversity Conservation Act 1999.*

Queensland Legislation

Queensland legislation relevant to the Project and the Draft EMP includes:

- *Environmental Protection Act 1994 (EP Act)*

The EP Act is the umbrella legislation for the regulatory management of the environment in Queensland. The EP Act is based on self-regulation and duty of care that places the responsibility for protection of the environment on all persons during the conduct of all activities.

The EP Act provides for the licensing of Environmentally Relevant Activities (ERAs) and the granting of development approvals and registration certificates for the operation of regulated activities. The EP Act also

provides the power to administering authorities to order actions be taken to improve environmental management performance, conduct audits and environmental evaluations of activities, approval of environmental management programs and impose penalties or prosecute persons for non-compliance within the requirements of the EP Act.

The EP Act is the primary legislative environmental tool in Queensland. The EP Act also allows for the preparation of Environmental Protection Policies (EPPs). The following EPPs have been proclaimed:

- *Environmental Protection (Water) Policy 1997;*
- *Environmental Protection (Noise) Policy 1997;*
- *Environmental Protection (Air) Policy 1997; and*
- *Environmental Protection (Waste Management) Policy 2000.*

Other State Legislation

The EIS has been prepared under the provisions of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). Relevant information in the EIS is then used to support applications for permits, licenses and approvals as outlined in **Appendix B** of the EIS. In addition to the EP Act other major legislation relevant to the Emu Swamp Dam Project includes:

- *Aboriginal Cultural Heritage Act 2003;*
- *Dangerous Goods Safety Management Act 2001;*
- *Fisheries Act 1994;*
- *Health Regulations under the Health Act;*
- *Integrated Planning Act 1997;*
- *Land Act 1994;*
- *Nature Conservation Act 1994;*
- *Nature Conservation (Wildlife) Regulation 1994;*
- *Queensland Heritage Act 1992*
- *Soil Conservation Act 1986;*
- *Transport Infrastructure Act 1994;*
- *Vegetation Management Act 1999;*
- *Water Act 2000; and*
- *Workplace Health and Safety Act 1995.*

20.2.2 Objectives and Principles

The objectives of the EMP are those embodied in the Intergovernmental Agreement on the Environment (IGAE) and the Principals of Ecologically Sustainable Development (ESD).

The Core Objectives are:

- to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- to provide for equity within and between generations; and
- to protect biological diversity and maintain essential ecological processes and life support systems.

The Guiding Principles are:

- where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- the global dimensions of environmental impacts should be recognised and considered; and
- decisions and actions should provide for community involvement regarding issues that affect them.

No objective or principle should dominate others. A balanced approach which takes into account all of these objectives and principles is required to pursue the goal of ESD.

20.2.3 Environmental Responsibilities

Management Structure

To achieve the over-arching objective of sound environmental management and deliver the Project with the least possible impact on the local community, a clear implementation and management structure is required.

The proposed structure, regardless of the contractual delivery mechanism adopted for the Project, includes the following roles.

The Proponent - Stanthorpe Shire Council (SSC):

- owner of the land required for the inundation area;
- administrator of the head agreement or contract to ensure that the contract conditions are met;
- liaise with and coordinate relevant agencies within the Queensland Government to provide timely advice to the Contractor for the smooth and efficient delivery of the project;
- ensure that prior to commencement of any work the Contractor/s have obtained all necessary approvals, established and properly briefed community consultative committees and agreed to a schedule of regular meetings with each committee; and
- ensure that the Contractor is operating in accordance with the Construction Environmental Management Plans (CEMPs) and in compliance with all applicable approvals and requirements for licensing.

Contractor:

- prepares detailed engineering designs and CEMP;
- obtains all necessary approvals, including development approvals, environmental licenses, workplace health and safety and all other construction-related approvals;
- ensures all designs and construction works are prepared and conducted in accordance with approvals, with the contract, with relevant legislation and regulations, and with local laws; and
- maintains for the duration of the construction phase, open and effective communications with the communities in the vicinity of the works areas about the construction program, scale, duration and nature of the proposed work, and details of proposed impact mitigation measures.

Overall Responsibilities

The following tables provide a summary of the likely responsibilities and accountabilities of various parties who have active roles in the environmental management of the project. The responsibilities have been divided into the construction (**Table 20.1**) and operation (**Table 20.2**) stages.

- **Table 20.1 Project Responsibilities - Construction**

Project Responsibilities – Construction	
The Proponent (SSC)	Manage the construction process as the Project proponent. Provide readily available expertise for the construction project as required. Receive progress reports on performance by the Contractor for the purpose of acknowledging compliance with contract conditions. Review the CEMP submitted by the Contractor. Ensure that the requirements of the Conditions of Contract (Environmental Management) and approved CEMP are included in the contract documentation are implemented. Review any revisions to the CEMP as required. Maintain a current copy of the contract and the CEMP containing a record of the completion of planned actions, monitoring records and reports, supplied by the Contractor. Undertake audits of environmental performance.
Contractor	Develop CEMP in accordance with the approved EMP submitted with the EIS. Maintain a master copy of the CEMP containing a record of the completion of planned actions, monitoring records, and reports which are made available during audits.

Project Responsibilities – Construction	
	Appoint independent facilitators to convene the community consultative committees, establish the committee terms of reference, facilitate meetings and pro-actively work to ensure efficient but comprehensive communication between the committee and other parties takes place. Obtain all necessary statutory approvals and licences and ensure that conditions of licences/approvals/permits are met. Provide copies of the CEMP to the relevant project staff having responsibilities defined in the CEMP. Provide training to all relevant project personnel. Maintain a record of all training undertaken by all project staff, detailing the type and purpose of the training. Undertake regular monitoring in relation to environmental management issues and ensure that monitoring results are made available to the Proponent and the community consultative committees. Ensure corrective actions arising from self-assessments and external audits are completed, and in accordance with the CEMP. Notify the Proponent and any relevant State agency of any environmental incidents and maintain a record of events relating to the environmental incidents including any remedial action taken. Ensure there is adequate and accurate identification and reporting of any non-conformances and any other environmental issues that may arise during construction. Provide relevant and timely information about construction activities that may impact on the relevant stakeholders and consult with individuals that may be directly impacted by construction activities, as required, to ensure direct project impacts are being managed. Ensure that environmental protection measures are implemented in accordance with CEMP. Undertake regular management reviews of the CEMP, either at scheduled intervals, or on the identification of a system failure.

- **Table 20.2 Project Responsibilities - Operation**

Project Responsibilities – Operation	
Operator (SSC)	Prepare an OEMP for the project consistent with the conditions of any applicable approvals and requirements. Continuously monitor the environmental performance of the Project during operation and provide regular reports on performance to the Proponent. Report to the Proponent on incidents of non-compliance. Ensure the Project is operated safely and with good environmental management practices at all times.

20.2.4 Competence, Training and Awareness

The EMP will only be successful where all those responsible for its implementation and review are thoroughly conversant with its content, interpretation and performance measurement. SSC is committed to providing training for its site workforce and ensuring that the contractual arrangements with the contractor specify the need for adequate training to be provided to all contracted members of the dam workforce.

Staff involved in environmental monitoring will be trained and competent in the operation, calibration and maintenance of the equipment. Sampling staff will also be trained and competent in sample collection, handling, storage and transport methodologies and techniques.

Records of staff training will be auditable and available for inspection, on request.

20.2.5 Documentation, Communication & Complaints

Documentation and Environmental Records

Adequate records must be maintained to demonstrate compliance with the both the CEMP and OEMP. These records will be available at all times and readily accessible for independent inspection and audit. This includes:

- contract documents;
- statutory permits and licences;
- reports;
- monitoring data results;
- environmental audits and reviews;
- environmental training records;
- details of non-conformance reports;
- complaints register;
- inspection, calibration and maintenance activity; and
- corrective action reports.

The following documents must be readily accessible for personnel to carry out the activities associated with the project:

- a copy of the CEMP;
- copies of environmental checklists and forms required by the CEMP;
- copies of relevant work instructions and procedures;
- Material Safety Data Sheets (MSDS) for any chemicals stored or used on the site; and
- copies of permits, approvals and attached conditions.

Modifications to the records keeping system shall be done to ensure it is effective and efficient for all levels of employees involved to ensure compliance with the requirements of the CEMP.

Internal Communication

Environmental protection will be achieved through clear and concise internal communications, which will be subject to periodic audits to ensure that the communication structure is performing adequately and all actions are performed and recorded. The audits will also provide for follow-up on specific or corrective actions raised during previous audits to ensure responses are complete.

The CEMP will be held in a prominent location and will include at the start of the document a list of the names, affiliations, phone numbers and fax numbers (including after hours numbers where necessary) of the people within the designated environmental management reporting structure.

The Contractor will submit the following as part of their Monthly Report to SSC containing a summary of:

- works undertaken;
- monitoring results;
- compliance with approvals, licences and the CEMP;
- complaints; and
- corrective actions and contingency, and success of implemented measures.

Significant communications, including all reports, incident forms and complaints will be documented and kept up to date.

External Communication

To ensure external communication is timely and transparent, only nominated personnel will be involved in consultation with external bodies on environmental issues. The Contractor's Project Manager is responsible for nominating all staff members responsible for external communication. The Contractor's Project Manager may also invite personnel to attend meetings with agencies and the community consultative committees.

Any incidents and environmental harm during construction works or operation of the Dam will be reported to the Environmental Protection Agency (EPA) as soon as possible (as per Section 320 of the EP Act).

Complaints and Responses

The environmental management process managed by the Contractor is to include a procedure for receiving and acting upon complaints. Attention to complaints will be carefully managed, prompt and effective, and will form a key part of the environmental reporting mechanism. Responsibility for maintaining the complaints procedure will rest with the Contractor.

While the CEMP and OEMP will establish the procedure for complaints, basic requirements will include:

- a procedure for receiving and responding to complaints which is acceptable to SSC, the Coordinator-General and the EPA;
- the Contractor maintaining, during the construction phase, a complaints telephone service
- a process for registering and handling all complaints received in terms of:
  - time and date of complaint;
  - the identity of the complainant and the recorder of the complaint;
  - the specific action or activity causing the complaint;
  - whether environmental compliance requirements are being met;
  - the action taken to address the complaint if necessary;
  - a database for tracking of complaints and actions taken in response;
  - immediate communication of the complaint to the contractor;
  - details on how the action taken is to be communicated to the complainant and the Proponent and the Contractor;
  - feedback to the complainant and the Proponent, the Coordinator-General as required and the EPA within a specified time period;
  - any subsequent remedial action required to avoid cause for future complaints if relevant;
  - regular reporting to the Coordinator-General, the EPA and SSC on complaints and corrective actions; and
  - monitoring and auditing of the complaint handling system.

Other informative resources are also to be accessible by external stakeholders via the SSC website that will also offer feedback forms for complaints and grievances.

20.2.6 Monitoring

Measuring, monitoring and evaluating will be key activities of each element within the EMP. Monitoring shall mean the setting in place and operation of various procedures to monitor, measure and record the level of impact on the environment during the execution of the project.

The monitoring of environmental impacts shall be carried out in accordance with the monitoring requirements for each element throughout the EMP, relevant legislation and the conditions of any permit, where relevant.

Monitoring procedures will be developed in accordance with standard protocols and the requirements of the EPA, Department of Primary Industries & Fisheries (DPIF), Department of Natural Resources & Water (DNRW), and other relevant agencies as appropriate. All equipment used for environmental monitoring will be calibrated and

maintained to the standards recommended by the supplier/manufacturer. Records of calibration and maintenance for each piece of monitoring equipment will be held on site.

Environmental monitoring samples, if taken, will be sent for analysis to a National Association of Testing Authorities (NATA) registered laboratory where applicable. All records of laboratory analysis results and quality assurance will auditable and available for inspection, on request, by regulatory agency officials or their representatives.

Environmental monitoring requirements for each phase of the development are detailed within **Section 20.3**.

20.2.7 Auditing

Aspects of the Project with a potential for environmental impact will be subject to periodic environmental audits. The audit objectives will be to verify compliance with applicable Commonwealth, State and Local government environmental permits, approvals and regulations issued for the Project.

The audit will also seek to verify the suitability of the EMPs outlined in this CEMP (**Section 20.3**).

Each audit will be internally reviewed by the Contractor and/or SSC and all recommendations / actions raised will be addressed. Copies of audit reports and details of corrective actions will be made available for regulatory inspection, on request.

20.2.8 Reporting

Monthly environmental summary reports will be produced for the duration of the works. Copies of the reports shall be held on site and will be available for regulatory agency inspection, on request. The report shall include, but is not limited to the following:

- record of inspections;
- a list of any performance criteria that have not been met, the corrective action taken and a description of the magnitude of any possible environmental impact;
- a register of complaints detailing:
  - origin of the complaint;
  - complaint investigation (personnel, date and summary of action/s taken); and
  - response to actions and suggested changes to practices or procedures.
- results of any surveys carried out;
- an annual Environmental Summary Report will be prepared each calendar year by the Operator (for the first three years of operation), containing, in part, the following information:
  - summary of the monthly Environmental reports;
  - fluctuations in water storage levels;
  - releases; and
  - water quality monitoring.

20.2.9 Non-compliance and Corrective Actions

The monitoring and reporting will incorporate continual improvement in requirements identified through a non-compliance and corrective action procedure. These will be nominated in the Project's quality procedures and EMPs, and will specify methods for recording and reporting non-conformances and ensuring that corrective actions are implemented to rectify the problem.

20.3 Construction Environmental Management Plans

There are a number of activities taking place during the construction phase of the Emu Swamp Dam which have the potential to impact on environmental values in the area. These are:

- vegetation clearing within the full supply level;
- construction of RCC dam wall and spillway;
- operation of workshop (fixed and mobile);
- operation of site project / administration office;
- use of vehicles and equipment on site;
- operation of concrete batching and RCC plant;
- construction and use of haulage roads; and
- upgrade of roads, telecommunication, power transmission and associated infrastructure.

The environmental elements addressed in this CEMP are:

- Geology and Soils
- Land Contamination
- Hydrology
- Water Quality
- Ground Water
- Terrestrial Flora
- Terrestrial Fauna
- Aquatic Flora & Fauna
- Weed Management
- Pest Management
- Air Quality
- Noise and Vibration
- Waste
- Hazard and Risk
- Transport and Roads
- Cultural Heritage

The CEMP is to incorporate sub-plans that comply with the relevant industry standards for environmental management and must include at least:

- a soil and water management plan;
- a construction stormwater management plan;
- a construction air quality management plan;
- a construction noise and vibration management plan;
- a construction traffic management plan;
- a construction emergency action plan;
- a construction fire management plan;
- a construction land contamination remediation plan;
- a vegetation clearance management plan; and
- other management plans necessary to achieve the environmental objectives and performance criteria.

20.3.1 Draft Environmental Management Plan Outline

Overview

The EMP is presented within the EIS, on the understanding that detailed EMPs for construction and operation, as well as relevant environmental plans are to be prepared by the Contractor and reviewed by SSC and either the EPA or State agency exercising its powers under legislation. The detailed EMPs for construction and operation will need to include, but not be limited to, mitigation measures that address the Environmental Objectives and Performance Criteria of this Draft CEMP and any conditions imposed either by the Coordinator-General evaluation report or other agencies under other approvals. They will also need to refer to expressed community needs and issues as identified in the Draft EIS and any Supplementary Report.

The purpose of the EMPs is to set out the project commitments to avoid or minimise potential environmental impacts of the Project as identified in the EIS, including identification of environmental aspects to be managed and how environmental values may be protected and enhanced.

The Draft CEMP and OEMP respectively, are dynamic documents as they incorporate continuous improvement. Each plan will be updated to incorporate further information, approval conditions, and changes in environmental management procedures in the light of ongoing monitoring results, new techniques, and relevant legislative requirements.

Implementation

The CEMP and OEMP demonstrate how potential impacts may be addressed during the construction and operational phases of the Project. The preparation of specified actions, strategies and recommendations implemented through each EMP includes:

- recommendations made in the EIS to minimise identified environmental impacts;
- good practice environmental management;
- general content requirements of international standard ISO 14001; and
- management and responsibility for performance.

20.3.2 Geology & Soils

Environmental Objective – Geology & Soils ▪ **Minimise environmental impact by preventing soil loss and erosion.**	
Performance Criteria	▪ Manage and mitigate the impacts of spoil removal, haulage and placement in spoil retainment areas. ▪ Manage and mitigate the risks of soil erosion impacts from all work areas where vegetation is removed or the soil disturbed during construction works. ▪ in accordance with the Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites (The Institution of Engineers, Australia (Qld), 1996
Mitigation Measures	**General Works** ▪ Before commencing earthworks on any part of the Project, sufficient materials to protect against erosion will be available on Site ▪ Work will be scheduled to ensure that temporary erosion control works are in place by the end of work each day, especially before weekends, if rain is imminent or when permanent erosion control works are not in place. ▪ Construction activity will be scheduled so that work in sensitive areas can be completed and rehabilitated as quickly as feasible. ▪ Sedimentation traps and detention basins will be designed for a 24 hour storm event of a return period of 10 years and cleaned out regularly and managed to ensure the required retention capacity is maintained. ▪ If detention basins are incapable of removing suspended matter effectively and standards for suspended solids contents are being exceeded in the river, environmentally benign chemicals will be added to aid settling subject to approval from the Environmental Protection Agency (EPA) ▪ Exposed areas shall be protected as soon as possible after finishing by hydroseeding or other appropriate processes to provide a protective cover **Clearing of vegetation** ▪ Consider options to maximise vegetation preservation. ▪ Develop a clearing plan which clearly designates areas to be disturbed and removal of such vegetation. ▪ Requirements for environmental controls to be included in all works procedures involving disturbance of land. ▪ Responsible persons to be nominated to ensure that environmental controls are maintained. **Construction of Access Roads** ▪ Construction of site access roads for heavy vehicles will need to be suitably scour protected and drained. ▪ Care will be taken to minimise exposure of subsoils particularly where contaminated runoff may exit the area. ▪ Measures outlined below for Soil dispersion and salinity to be followed ▪ Wherever practicable, the order of construction of surface protection works including grassing shall be such that they provide erosion and sediment control to the parts of the works that they are designed to protect as those parts of the works are constructed. **Soil erosion** ▪ Prior to commencement of clearing, topsoil removal and other construction activity, an operational plan be developed which seeks to stage operations to reduce environmental risk as far as possible. ▪ This may involve prior construction of temporary waterways, containment basins, contour diversion banks, reduction of overland flow velocity (hay bales, hession weirs etc), delaying vegetation removal along key natural waterways and considered locations of stockpiles. Specific controls to be implemented will vary with tasks to be performed. ▪ Monitoring of major downstream waterways, including the Severn River, during flow events for turbidity, total suspended solids and pH are not occurring. **Soil dispersion and salinity (on pipeline route)** ▪ All operational personnel will be made aware of the possible existence of these soils. ▪ Care will be taken to minimise exposure of subsoils particularly where contaminated

Environmental Objective – Geology & Soils	
▪ **Minimise environmental impact by preventing soil loss and erosion.**	
	runoff may exit the area. ▪ Should clayey subsoil be exposed then the following additional requirements are needed; ▪ This material will not be stockpiled for reuse in revegetation, ▪ Minimise exposure time, ▪ Extra care in excluding surface wash where this material is exposed, ▪ Replace this material back into excavation holes first with the sandy material above it.
Monitoring	▪ Regular inspection of sediment and erosion control structures and measures. In wet weather or when using large quantities of water in construction works more frequent monitoring may be necessary. ▪ Implement detailed monitoring programs to assess the impacts on the immediate construction site and sensitive receiving environments (i.e. water ways and aquatic ecosystems).
Reporting	▪ Monthly Report prepared and submitted to the proponent to include details of monitoring results, audits, training and incidents. ▪ Immediate reporting to Project Supervisor and the Contractor Environmental Adviser of any incident, spill or release of materials to the environment. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Action	▪ Appropriate control measures implemented where sedimentation or erosion is identified or may occur. ▪ Necessary corrective action implemented following incident or complaint. ▪ 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. ▪ 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.

20.3.3 Land Contamination

Environmental Objective – Land Contamination (Spills & Clean Up)	
▪ **Prevention of spills from occurring at the Project site.** ▪ **Contain, clean up and, if necessary, remediation of any spills that do occur.**	
Performance Criteria	▪ All fill used on site is 'inert' and must be free from contaminants. ▪ Containment of all spills involving materials that may cause environmental and effective cleaned up and measures taken to prevent the incident from recurring.
Mitigation Measures	**Contaminated Soil** ▪ Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements. MSDS for products kept on site will be readily available to employees and contractors. ▪ 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 will be stored in double skinned tanks (self bunding). ▪ Waste products (e.g. oil/water separator waste, sludges and residues), will 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. ▪ Obtain an approval and a disposal permit by the EPA (Contaminated Land Unit) for the removal of contaminated soil, in accordance with the Environmental Protection Act 1994. ▪ 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.

Environmental Objective – Land Contamination (Spills & Clean Up) ■ **Prevention of spills from occurring at the Project site.** ■ **Contain, clean up and, if necessary, remediation of any spills that do occur.**	
	■ Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will be described in an Emergency Management Plan. ■ 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 Draft EPA Guidelines
Monitoring	■ Recording of any spills that occur as an incident, as well as the follow up actions, any results and reporting to authorities. ■ Auditing of this EMP conducted weekly (internally) and monthly (externally).
Reporting	■ Any environmental incidents involving spills recorded including time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Immediate reporting to the Alliance Environmental Adviser of any significant spills or potential risk of spills. ■ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	■ Contractor
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. ■ 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.

20.3.4 Hydrology

Environmental Objective - Hydrology ■ **Maintain environmental flows within the Severn River and tributaries throughout construction.**	
Performance Criteria	■ Envrionmental Flow Objectives (EFOs) and Water Allocation Security Objectives (WASOs) as set out in the Border Rivers Resource Operations Plan ■ No existing water users are to be affected throughout construction.
Mitigation Measures	■ Throughout construction period environmental flows are to be maintained via the scheduling of works outside of the bed and banks of the Severn River. ■ All construction water will be contained in ponds and treated before release downstream. ■ All construction activities will be scheduled in such a way that the impacts of flooding on the construction of the dam will be minimised. ■ Once the temporary water storages are installed, in preparation of building the final section of Roller Compacted Concrete, environmental flows will be maintained via syphoning or pumping water around the works and releasing the water down stream. ■ Prepare flood management plans.
Monitoring	■ Upstream flow gauging weir to monitor daily flows to determine environmental pass flows.
Reporting	■ In the event that flows are impeded by construction works DNRW will be notified immediately.
Responsibility	■ Site Supervisor / Contractor
Corrective Action	■ Adverse impacts to environmental flows within Severn River be reported to the DNRW. ■ Rehabilitation will be conducted on areas where unacceptable flow conditions have occurred. ■ The Contractor will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding environmental flow requirements. ■ 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.

20.3.5 Water Quality

Environmental Objective – Water Quality ■ **Maintain water quality within the Severn River and tributaries throughout construction of the Project and associated activities.**	
Performance Criteria	■ Drinking water quality objectives as per the Environmental Protection (water) Policy 1997, Environmental Values and Water Quality Objectives. ■ Aquatic ecosystem environmental values as per the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Queensland Water Quality Guidelines ■ The overarching performance criterion is to maintain existing ecosystem attributes and water quality within Severn River throughout construction period.
Mitigation Measures	**Suspended solids and turbidity** Development of soil and water management plan which complies with *Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites* (The Institution of Engineers, Australia (Qld), 1996 (or later version). ■ stormwater diverted around the construction sites, will need to be treated prior to discharge downstream into the Severn River in order to control the amount of suspended solids, organic matter and contaminants present in the water from construction runoff. Treatment will primarily involve the use of sediment ponds and flocculants if the suspended solid do not settle out of the water in the ponds; ■ stormwater and flows from the Severn River collected within the construction site in the temporary water storage will be treated and reused for construction water. Treatment will be primarily aimed at removing the suspended solids via settlement ponds; ■ exposed soils will be stabilised by using materials such as mulch, biodegradable matting, and geotextile fabrics; ■ revegetation of areas impacted by all Project construction activities outside of the inundation area, which includes areas disturbed by pipe laying, as soon as it is available; ■ rate of stormwater flow within the construction area will be reduced by using energy dissipation techniques; ■ measures will be implemented to minimise sediment taken offsite and to other areas of the Dam construction site by construction vehicles, via the use of wash down bays; ■ filtering runoff from the site, using geotextile fabrics, and silt curtains where practicable; ■ Key phase of the construction sequence will be timed to coincide with low rainfall periods as much as is practical. ■ Stormwater collected within the construction areas, and where applicable, diverted into holding/settlement ponds (e.g. in the former quarry site) for treatment and reuse; ■ The water detained in sediment ponds is to be reused on the construction site. **Chemicals** ■ Fuel, oil and chemicals will be stored in accordance with Australian Standard 1940, *the Storage and Handling of Flammable and Combustible Liquids*, and the *Dangerous Goods Act 1975* and the *Pesticides Act 1999*. ■ Bunding and appropriate storage of fuels and other hazardous/ flammable materials. Spill containment kits available on site. ■ Oil containment booms and oil spill recovery equipment available when working on water. ■ Emergency response procedures will be developed, with chemical spill response kits available at all construction sites and staff trained in their use.
Monitoring	■ In the event that an unplanned spill or incident occurs within the construction area or as part of associated activities of the Emu Swamp Dam project, targeted water quality monitoring will be carried out up and down stream to determine potential impacts from the event. ■ Routine water quality program (every second month program with four (4) event

Environmental Objective – Water Quality ■ **Maintain water quality within the Severn River and tributaries throughout construction of the Project and associated activities.**	
	based occasions per year when inflows exceed 30 ML/day) upstream and downstream of the construction works for the following parameters: - Temperature, pH, and turbidity; - Nuisance algae and chlorophyll-a; and - DO, Total Phosphorous, and Total Nitrogen.
Reporting	■ Develop site specific water quality guidelines for nutrients, temperature, pH, conductivity, zinc and copper for areas upstream of the dam ■ Develop site specific water quality guidelines temperature, zinc and copper for areas downstream of the dam ■ During and after rainfall, a visual inspection of the construction site undertaken during and after rainfall to ensure that mitigation measures are in place and no major erosion is occurring. Additional monitoring may be required to determine the extent of stormwater runoff after pulse events. ■ Immediate reporting to Supervisor of any incident, spill or release of materials to the environment. ■ Incidents, complaints and any environmental harm reported to regulatory body/ies, as required under the *Environmental Protection Act 1994*.
Responsibility	■ Contractor
Corrective Action	■ Contaminated waters (elevated turbidity, suspended solids etc) observed flowing from the construction site into Severn River catchment, will be identified and the appropriate action taken by the Environmental Adviser to ensure that any contamination is minimised and rehabilitated. ■ Impacts to downstream water quality shall be reported to the EPA. ■ Rehabilitation will be conducted on areas where sedimentation/erosion has occurred. ■ The Contractor will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding water quality management, sediment and erosion control and spill management procedures. ■ 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.

20.3.6 Groundwater

Environmental Objective – Groundwater ■ **Ensure preservation of groundwater quality and quantity during construction.**	
Performance Criteria	■ Minimisation of impacts on groundwater quality by ensuring all practical measures have been taken to prevent contamination as a result of construction activities. ■ Adequate monitoring and management of groundwater levels throughout the dewatering program.
Mitigation Measures	■ Ensure groundwater monitoring program is developed prior to construction to monitor groundwater levels as part of geotechnical program. ■ Bore drilling, construction and development methods will be in accordance with the Minimum Construction Requirements for Water Bores in Australia (Land and Water Committee, 2003). The final bore construction details will be designed by a hydrogeologist as each borehole is drilled, to ensure target yields are obtained for the localised ground conditions encountered.
Monitoring	■ Groundwater monitoring program carried out during construction and operation of the Project to assess any changes in groundwater levels and in accordance with approval conditions.
Reporting	■ Monthly Report prepared and submitted to Proponent to include details of monitoring results, audits, training and incidents. ■ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.

Environmental Objective – Groundwater	
▪ **Ensure preservation of groundwater quality and quantity during construction.**	
Responsibility	▪ Contractor
Corrective Action	▪ Significant changes to groundwater levels outside of the zone of influence investigated and the appropriate action taken by the Construction Manager. ▪ A more detailed and targeted Groundwater Quality Monitoring Program will be introduced in the event that any significant spill may affect the groundwater. ▪ The Contractor will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding groundwater monitoring and storage and handling of hazardous substances. ▪ The Construction Manager can request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or at risk of occurring.

20.3.7 Terrestrial Flora

Environmental Objective – Terrestrial Flora	
▪ **Implementation of vegetation clearance, stockpiling, recycling or disposal practices that maximise the re-use of native vegetation and minimise environmental harm.**	
Performance Criteria	▪ Felled vegetation will be re-used on site wherever possible. ▪ Retained vegetation is not compromised by site clearing works, gross mechanical disturbance or impacts associated with sedimentation and/or pollutant export from the development area. ▪ Weed invasion is prevented both within the construction site and in surrounding areas. ▪ Harm to fauna is avoided where practicable.
Mitigation Measures	**Supply of Relevant Site Plans** ▪ Relevant plans detailing the staging of works, areas to be retained, significant areas of exclusion and other relevant issues shall be provided to the Construction Manager, Environmental Advisor and clearing contractor prior to any site preparation activities within the proposed construction area. ▪ Prior to the commencement of any vegetation clearance, the clearing contractor, in consultation with the Construction Manager and Environmental Advisor, to discuss all areas to be cleared on construction plans and in the field. ▪ All areas to be cleared shall be clearly identified on the ground by the Environmental Advisor prior to the commencement of any site preparation activities. Areas to be retained will therefore be clearly identified and no unauthorised access permitted. ▪ Prior to clearing in remnant vegetation, a qualified botanist will inspect the site for EVR flora. ▪ Implementation of an on-site Vegetation Clearance Management / permitting system. **Identification of Exclusion Zones** ▪ A Vegetation Clearance Management Plan will be developed for the Project to prevent excessive clearing and impact to vegetation. Strategies include: – limit the clearing of riparian zones to within 2 m (vertical) of the FSL; – identify areas within the inundation area that are to be cleared and/or retained on Construction Drawings; – boundaries of areas to be retained to be clearly marked by tape and/or pegs and conform to limits on drawings; – avoid impact on vegetation outside the inundation area by clearly identifying the FSL boundary, and directing contractors to avoid these areas; – minimise clearing of vegetation within the road corridors; and – contractor to monitor vegetation clearing to ensure only approved areas are cleared. ▪ Trees considered suitable for retention must be identified.

Environmental Objective – Terrestrial Flora ▪ **Implementation of vegetation clearance, stockpiling, recycling or disposal practices that maximise the re-use of native vegetation and minimise environmental harm.**	
	Minimising Damage to Retained Vegetation ▪ All activities in areas adjacent to any vegetation to be retained are to be carried out in such a manner as to minimise damage to the vegetation (i.e. delineated limit of disturbance boundary). ▪ Vegetation to be retained is to be clearly identified. Each tree or groups of trees to be retained and investigated at the appropriate time by an Ecologist / Arborist. **Sediment and Erosion Control** ▪ As construction activities may impact on retained vegetation it is important to ensure sediment fencing is in place before site preparation and other earthworks commence. Prior to any site preparation operations, the Environmental Advisor (or other suitably qualified personnel) is to undertake an inspection of all sediment fencing. **Protection of Trees within Construction Zones** ▪ Contractor to provide fences and/or trunk girdles to prevent unintended physical damage to the root system, trunk or canopy of native vegetation identified for retention, which may be impacted upon by clearing works. ▪ All works carried out on either foliage or root systems of trees in consultation with a qualified arborist or horticulturist. ▪ Develop translocation plans for suitable EVR species in consultation with a qualified arborist or horticulturist
Monitoring	▪ Monitoring by Contractor of vegetation clearance, earthworks components and the above Performance Objectives of the proposed works on a continual basis to confirm that specific controls have been implemented and appropriate work practices are being adopted to achieve the specified performance objectives. ▪ Monitoring of downstream of the proposed dam and at suitable reference sites (yet to be identified) to detect any residual impacts that changes in hydrological regime may have on significant species. Particularly relevant are the impacts that any changes to hydrological regime may have on populations of *Melaleuca williamsii, M. flavovirens,* and the regionally significant *M.* sp. (Severn River) downstream from the dam wall. ▪ Periodic condition monitoring by Contractor of all retained vegetation, with a maximum interval between inspections of 3 months. ▪ Disturbed areas are inspected monthly for weed growth, with appropriate weed control measures implemented when warranted. ▪ Regular inspection of cleared areas and contractor's methods during clearing to ensure compliance with EMP.
Reporting	▪ Monthly Report prepared and submitted to Proponent to include details of monitoring results, audits, training and incidents. ▪ Immediate reporting to Supervisor and Environmental Advisor of any incident which contravenes the objectives of the EMP. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Action	▪ Appropriate control measures implemented where unacceptable sediment or erosion is occurring or may occur. ▪ The Contractor will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding vegetation clearing and weed management. ▪ The Construction Manager can request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or at risk of occurring. ▪ If monitoring downstream shows that the Project is having an impact, SSC will investigate the feasibility of the following proposed mitigation measures: ▪ changing the flow regime of the environmental flows; or ▪ installation of dissipaters downstream of the dam to minimise the effects of erosion.

20.3.8 Terrestrial Fauna

Environmental Objective – Terrestrial Fauna	
▪ **Ensure that tree clearing operations are completed in a manner that provides maximum protection of the health and livelihood of native fauna.**	
Performance Criteria	▪ The risk (of injury and death) to fauna is managed and minimised during site clearing operations. ▪ Retained habitat is not compromised by site clearing works, gross mechanical disturbance or impacts associated with sedimentation and/or pollutant export from the construction area. ▪ Fauna species continue to utilise the retained habitat area post-development.
Mitigation Measures	**Compliance with the Code of Practice** ▪ The program will be undertaken in compliance with the Draft Queensland Code of Practice for the Welfare of Animals (Wildlife), including the presence of a wildlife spotter and catchers/carers during all clearing activities. **Identification of Habitat Trees** ▪ Habitat trees must be identified prior to the selective clearing operations. Larger, old growth trees are also considered to be habitat trees as they are likely to provide greater amounts of foraging resources, cover, and a high number of potential hollows. Dead (stag) trees are also regarded as important habitat trees as they provide roosting and nesting resources.) ▪ Clearing must be conducted using a staged approach where the smaller non-habitat trees are removed with the larger remaining habitat trees removed three to five days after the initial clearing. (This staged method provides a disturbance stimulus and provides fauna with time to leave the site thus maximizing the chances of fauna survival while reducing the need for human intervention for translocation or rescue purposes). **Tree Removal** ▪ Where possible, the actual felling of the habitat trees conducted in a manner that will maximise the chances of survival for any fauna remaining within the tree hollows. This involves pushing rather than cutting, and cushioning the tree fall with other felled timber and foliage. **Care of Injured Fauna** ▪ All injured animals immediately removed and taken to an appropriately qualified veterinary surgeon. Any orphaned or injured native fauna discovered at a later stage during operational works immediately reported to the QPWS. **Retention and Re-use of Hollow Logs** ▪ Hollow logs not mulched until inspected by a qualified Ecologist. ▪ As many hollow logs as possible relocated to areas within an approved Conservation Open Space Area as habitat features. **Vegetation Offset Strategy** ▪ Restore vegetation connectivity for existing remnant vegetation wherever possible to improve the general connectivity of vegetation and habitat throughout the landscape. ▪ A plan is to be developed prior to the commencement of Project construction activities detailing the habitat loss created by the Project and likely compensatory habitat available to offset this loss. ▪ A deed of agreement will be entered into with the DNRW to provide a Vegetation Offset Strategy within 12 months of lodging the vegetation clearing application. The Vegetation Offset Strategy will seek to comply with the performance criteria set out DNRW *Policy for Vegetation Management Offsets 2007*.
Monitoring	▪ Monitoring of vegetation clearance, earthwork components and requirements of this EMP on a continual basis to confirm that specific controls have been implemented

Environmental Objective – Terrestrial Fauna ▪ **Ensure that tree clearing operations are completed in a manner that provides maximum protection of the health and livelihood of native fauna.**	
	and appropriate work practices are being adopted to achieve the specified Environmental Objectives. ▪ Monitor impacts on the riparian habitat downstream of the dam wall and take remedial action as appropriate to maintain ecological function; ▪ Monitor translocation sites to determine the success of the translocation and management actions.
Reporting	▪ Monthly report prepared and submitted to SSC to include details of monitoring results, audits, training and occurrence of any incidents. ▪ Immediate reporting to Supervisor and Environmental Adviser of any incident, spill or release of materials to the environment ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Action	▪ Ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding fauna management. ▪ The Construction Manager can request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or at risk of occurring. ▪ If monitoring downstream shows that the Project is having an impact, SSC will investigate the feasibility of the following proposed mitigation measures: ▪ changing the flow regime of the environmental flows; or ▪ installation of dissipaters downstream of the dam to minimise the effects of erosion.

20.3.9 Aquatic Flora & Fauna

Environmental Objective – Aquatic Flora & Fauna ▪ **Minimise and mitigate, as far as is practicable, the adverse impacts on aquatic fauna and flora during construction of the project.**	
Performance Criteria	▪ No discharge of materials through stormwater runoff from construction and operational areas, with particular regard to suspended sediments, fuels, chemicals, and oils. ▪ No waste materials (general and construction rubbish etc) entering waterways from construction and operational areas. ▪ A program must be implemented to monitor and treat aquatic weeds and other pest species that may enter the dam from a work site. ▪ No uncontrolled or untreated release of water or sediment from a work site.
Mitigation Measures	**Sediment and Erosion Control** ▪ Implementation and maintenance of the Water Quality EMP, with particular reference to the management of stormwater, stockpiles and exposed soils. ▪ Potentially restrict cattle access based on a case by case basis. **Chemicals, Fuels, and Oils** ▪ Implementation and maintenance of the Water Quality and Hazards/Risks EMPs with particular reference to the appropriate storage measures of hazardous materials. **Movement of Vehicles/Plant from Weed Infested Areas** ▪ Implement and maintain the EMP for Weed Management. This plan will include protocols for management of vehicle and machinery movement protocol to reduce the likelihood that weeds are spread as a consequence of this project. **Loss of Habitat** ▪ Selective retention of vegetation and re-vegetating selected areas of the fringe of the dam with native species tolerant of periodic inundation, which are known as good sources of large woody debris, and will provide food for aquatic species;

Environmental Objective – Aquatic Flora & Fauna ▪ **Minimise and mitigate, as far as is practicable, the adverse impacts on aquatic fauna and flora during construction of the project.**	
	▪ Maintenance of downstream riffles through flow regime management; ▪ Riparian zone restoration in certain areas above FSL
Monitoring	▪ Implement and maintain a program to monitor and control pest species in waterways (both flora and fauna).
Reporting	▪ Monthly report prepared and submitted to Proponent to include details of monitoring results, audits, training and the occurrence of any incidents. ▪ Incidents, complaints and any significant environmental harm to aquatic environment reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Action	▪ Measures undertaken to protect the aquatic environment where unacceptable impacts or risk of environmental harm becomes apparent. ▪ Immediate reporting to Supervisor and Environmental Adviser of any incident which contravenes the objectives of the EMP. ▪ 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.

20.3.10 Weed Management

Environmental Objective – Weed Management ▪ **Declared weeds and introduced flora not present in study area are not introduced.** ▪ **Declared weeds already present in the study area are not spread as a result of project activities.**	
Performance Criteria	▪ Obligations under the *Land Protection (Pest and Stock Route Management) Act 2002* are met. ▪ All vehicles working off road have "clean" certificates. ▪ Documentation available showing quarry sites inspected for weeds prior to extraction. ▪ Infestation of weed and pest species reduced. ▪ No additional weed and pest infestations or increase in distribution as a consequence of the construction activities. ▪ All employees working on site attend induction training sessions to identify weeds.
Mitigation Measures	**Weed Management** ▪ All mulch produced on site from cleared vegetation and trees specifically exclude material from weed species. Vegetation mulching suitably controlled to avoid contamination. Mulch containing weed species material shall be treated separately and not used on site for regeneration/ revegetation works. ▪ Soil disturbance within retained vegetation must be kept to a minimum to avoid weed recruitment. Areas to be regenerated (weed control) or revegetated completed under strict supervision to avoid unnecessary soil disturbance. ▪ Avoid the removal of vegetation, which is not salvaged for timber resource, from the vegetation clearance areas. ▪ Weeds not to be used as mulch for landscape, disposed of to SSC's landfill and burnt to prevent reseeding. ▪ Management methods for declared weeds must be consistent with recommendations in DNRW Pest Fact sheets. **Weed Removal** ▪ Priorities given to species of greatest environmental threat. Generally these species are prioritised by the classification allocated by the *Rural Lands Protection Act 1985*; the higher the category the greater the concern, however, in some cases, locally threatening species must have higher priorities. **Wash-down Facilities and "Clean" Plant.** ▪ Use of wash-down facilities for vehicles and equipment entering and leaving the construction site and those areas proposed for vegetation clearance.

Environmental Objective – Weed Management ■ **Declared weeds and introduced flora not present in study area are not introduced.** ■ **Declared weeds already present in the study area are not spread as a result of project activities.**	
	■ All machinery, equipment and vehicles shall be certified as "clean" prior to entering the construction site by trained personnel in accordance with DNRW practices. ■ Movement of Vehicles/Plant from Weed Infested Areas. ■ Movement protocol developed and implemented for vehicles and plant to ensure declared weeds are not spread. This protocol will trigger the need for a "washdown".
Monitoring	■ The distribution known declared weeds monitored and, where feasible, made to eradicate or contain these infestations in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002*. ■ Employees/contractors working on site to report presence of declared weeds to the supervisor by the end of the working day. ■ Areas downstream from the Dam will be inspected regularly and particularly after rain/flow events. Any new germination or infestations of declared weed species reported and where feasible, destroyed.
Reporting	■ Notification to the Environmental Advisor by personnel of weed outbreaks or potential contamination. ■ Monthly Report prepared and submitted to Proponent to include details of monitoring results, audits, training and incidents. ■ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	■ Contractor
Corrective Action	■ The Contractor will ensure that the appropriate personnel undertake adequate environmental awareness training covering the requirements of the EMP regarding vegetation clearing and weed management. ■ 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.

20.3.11 Pest Management

Environmental Objective – Pest Management ■ **Pest infestations do not increase as a consequence of the project and existing populations of introduced fauna are controlled.**	
Performance Criteria	■ No additional, or increase in distribution of pest infestations as a consequence of the construction activities at, or within the project area.
Mitigation Measures	**Site Management** Ensure construction personnel do not create environments favourable to pest species, including: ■ ensure waste is managed appropriately; ■ where practicable, ensure water is not left to lie on sites for longer than 7 days (i.e. avoid ponds of standing water; and ■ ensure stormwater treatment and sediment control devices are designed and managed as to not create breeding habitat for mosquitoes **Active Pest Control** ■ Pest animal control measures, where necessary, completed using suitable and appropriate strategies as employed elsewhere within the area. **Waste Disposal** ■ All food scraps and other waste materials covered and removed off site regularly to reduce attraction to feral animals.
Monitoring	■ Presence of pests monitored as part of weekly site inspections. ■ All monitoring of waste will be carried out in accordance with the waste EMP. ■ Employees / contractors working on site to report presence of feral animals to the Environmental Advisor. ■ Auditing of the EMP conducted quarterly (internally) and annually (externally).

Environmental Objective – Pest Management	
▪ **Pest infestations do not increase as a consequence of the project and existing populations of introduced fauna are controlled.**	
Reporting	▪ Monthly Report prepared and submitted to Proponent to include details of monitoring results, audits, training and incidents. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Actions	▪ Appropriate control measures implemented where infestations occurring. ▪ The Contractor will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding pest management. ▪ 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.

20.3.12 Air Quality

Environmental Objective – Air Quality	
▪ **To minimise the potential to generate air quality impacts at residences near the Dam construction area.**	
Performance Criteria	**Aim to achieve:** ▪ PM_{10} (24 hr average) - 50 µg/m^3 NEPM (Ambient Air Quality) **Not to be exceeded:** ▪ PM_{10} (24 hr average) - 150 µg/m^3 EPP(Air) ▪ PM_{10} (annual average) - 50 µg/m^3 EPP(Air) ▪ Dust Deposition - 120 mg/m^2/day EPP(Air)
Mitigation Measures	▪ Haul roads will be watered regularly using truck water carts as required to reduce emissions of wheel generated dust. Recycled water will be used preferentially for dust suppression purposes (refer to Section 7 of the EIS); ▪ The size of cleared areas will be minimised to limit exposed areas available for dust emissions by wind erosion; ▪ Surface excavation works and blasting activities will incorporate consideration of prevailing meteorological conditions wind speed and direction, with works ceasing if high winds are blowing in the direction towards sensitive receivers. This is particularly important when dust emissions are close to sensitive receivers; ▪ Limit speeds of haul trucks to 40 km/hr on-site to reduce wheel-generated dust from haul roads located near sensitive receivers; ▪ Retention of existing vegetation, where practical, between construction activities and sensitive receivers will reduce particulate concentrations and dust deposition rates at receivers; ▪ Construction of an enclosure around the crushing area will be considered if dust impacts from crushing operations become problematic; ▪ The prevailing meteorological conditions will be considered before undertaking any burn event to minimise potential air quality impacts from this activity. These events will be undertaken in consultation with the Queensland Rural Fire Service, and the Queensland Parks and Wildlife Service; and ▪ Sealed access roads to the worksite sheds will be kept relatively dust free by regular sweeping and washing if needed. At certain times of the year, natural rainfall should keep this surface washed.
Monitoring	▪ Dust deposition monitoring at the nearest sensitive receiver in the event of a complaint. ▪ In order to assist with the investigation of complaints (as above) and the management of air emissions during construction a meteorological monitoring station may be established at the site. ▪ If installed, the meteorological monitoring station will continuously monitor wind speed, wind direction, temperature and rainfall as a minimum and will continue throughout the duration of construction.
Reporting	▪ Monthly Report prepared and submitted to Stanthorpe Shire Council to include details of air quality monitoring results, audits, training and the occurrence of any

Environmental Objective – Air Quality ▪ **To minimise the potential to generate air quality impacts at residences near the Dam construction area.**		
		complaints. ▪ Immediate reporting to Manager of significant dust event that will require mitigation measures to be implemented. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
	Responsibility	▪ Contractor
	Corrective Action	▪ Investigation into air quality mitigation measures (improved measures) must be undertaken immediately, or as soon as practicable, upon receipt of valid complaints relating to nuisance dust, where air quality objectives are not being met or where there is a significant change in activity being undertaken on site. Where investigations show unacceptable project dust levels, revision to management plans will be undertaken and further controls implemented, as necessary. ▪ Ensure that the appropriate personnel undertake adequate environmental awareness training regarding air quality management and the environmental management commitments relating to dust generation. ▪ The Contractor 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.

20.3.13 Noise & Vibration

Environmental Objective – Noise & Vibration ▪ **To minimise noise and vibration impacts from construction activities at residential locations near the Dam construction area.**		
	Performance Criteria	**Aim to achieve** ▪ Noise from construction activities will aim to achieve a level of 55 dB(A) $L_{Aeq\ 11\ Hr}$ during the day and evening (derived from EPP (Noise)) and L_{Amax} 52 dB(A) during the night. (EPA 2004, *Guideline - Planning for Noise Control*) **Must be achieved** ▪ Ground vibration from blasting must not exceed (EP Regulation s.6I): – peak particle velocity of 5 mm per second for nine out of any ten consecutive blasts initiated, regardless of the interval between blasts; and – peak particle velocity of 10 mm per second for any blast. ▪ Air blast overpressure levels from blasting must not exceed: – 115 dB(linear) peak for nine out of any ten consecutive blasts, regardless of the interval between blasts; and – 120 dB(linear) peak for any blast.
	Mitigation Measures	**Construction hours** ▪ As far as practicable, general construction activities (excluding Roller Compacted Concrete operations) will be in accordance with the EPP (Noise) and *Environmental Protection Regulation 1998*. ▪ Due to the nature of using Roller Compacted Concrete, these operations will occur on a continuous 24 hour basis. During this time communication with potentially affected residents and business will be carried out. **General Noise Management Practices and scheduling of activities** ▪ In general, construction works and consideration of quiet work practices will be carried out in accordance with Australian Standard 2436-1981, Guide to noise control on construction, maintenance and demolition sites (Standards Australia, 1981). ▪ Prior to the commencement of site works, the community will be informed of the upcoming activities and likely duration. ▪ The construction programme will continue to be developed in consultation with the local community to schedule noisier activities (such as blasting) during least sensitive times of the day (refer *Consultation* below). ▪ Rock breaking, rock hammering, blasting and any other activities which result in impulsive or tonal noise generation will only to be conducted during normal

Environmental Objective – Noise & Vibration

- **To minimise noise and vibration impacts from construction activities at residential locations near the Dam construction area.**

operational hours.

- Appropriate selection of construction processes / methodologies and equipment which minimise the generation of noise will be further considered during the development of the project schedule.
- Employ respite periods for particularly noisy activities where possible.
- Maintain a site activity log, recording the type of activities occurring during various times of the day to assist with the retrospective investigation of community complaints relating to noise (or dust) complaints

Maximise Shielding and Distance to Receivers

Maximise the offset distance between noisy plant and continuous operations (generators, compressors, crushers etc) and nearby noise sensitive receivers or ensure plant are screened utilising:

- Purpose built barriers;
- Materials stockpiles;
- Site sheds, buildings or other structures; or
- Natural topographical barriers.

Where possible, carry out loading and unloading of materials and equipment in areas as far away from noise sensitive areas as possible.

Plant and Equipment

- Equipment having directional noise characteristics (emits noise strongly in a particular direction) will be oriented such that noise is directed away from sensitive areas;
- Avoid the coincidence of noisy plant working at the same time close together adjacent to sensitive receivers;
- Acoustic enclosures or localised noise screens could be incorporated around fixed plant or over individual pieces of equipment as appropriate based on acoustic assessment for:
  - Crusher and screening plant;
  - Concrete batch plant;
  - Maintenance area/shed.
- All mechanical plant will be silenced by best practice means using current control technology and in accordance with manufacturers specifications;
- Plant with the lowest noise rating which meets the requirement of the task will be selected;
- Where possible for works in close proximity to sensitive receivers, use electric motors in preference to diesel motors;
- Where enclosures are fitted to equipment, ensure doors and seals are in good working order and that doors can be closed properly against the seals;
- If piling is required, use bored piles which are cast in-situ or screened drop hammers rather than untreated drop-hammer driven piles;
- Ensure that internal combustion engines (all mobile and stationary equipment) are fitted with a suitable muffler in good repair;
- Where reversing alarms are to be used for mobile equipment such as dozers, scrapers, cranes, graders, excavators, trucks, loaders etc, their acoustic range will be limited to the immediate danger area. Alternatives to traditional reverse beepers could include the use of:
  - "Smart Alarms" which adjust their volume depending on the ambient level of noise,
  - low frequency "quacker" alarms
  - spotters, CCTV camera and audio notification; and
  - In all cases, the requirements of Occupational Health and Safety Regulations must be addressed.
- Where practicable, metal surfaces subject to impacts from heavy objects (such as rock dropping into empty truck trays, or metal grates on road ramps etc) will be lined with rubber impact protection to minimise impact noise;
- Ensure that tailgates on trucks are securely fitted to avoid unnecessary "clanging"

Environmental Objective – Noise & Vibration ▪ **To minimise noise and vibration impacts from construction activities at residential locations near the Dam construction area.**	
	noise, particularly during movement of empty trucks; ▪ Where using pneumatic equipment, select silenced compressors or use quieter hydraulic equipment ; ▪ Conduct regular inspections and effective maintenance of both stationary and mobile plant and equipment (including mufflers, enclosures etc); and ▪ Equipment not being utilised as part of the work will not be left standing with engines running for extended periods. **Traffic Noise Management** ▪ Establish designated access route/s to the site and inform drivers of these routes, parking lots and acceptable delivery times. ▪ Undertake regular site road maintenance (and inspections) to minimise impact noises from trucks travelling over irregularities in the road surface (such as pot-holes, washouts or ruts). ▪ Limit vehicle speeds in critical areas both on and off site. ▪ Allow for one-way traffic flow through the site to minimise the use of reversing alarms as much as possible and minimise traffic delays. ▪ The use of 'smart', reversing alarms (as below). ▪ Limiting excessive acceleration from site exits. ▪ Ensure that vehicles required within compounds do not "queue" outside the worksite close to residential areas. This particularly applies in the commencement of shift during morning hours, where sleep disturbance issues may arise. ▪ Entry and departure of heavy vehicles to and from the site are restricted to the standard daytime construction times. **Blasting overpressure and vibration** ▪ Blasting will be restricted to one blast per day at a single regular time of day during afternoon hours (the time will be determined based on outcomes of consultation with the community). ▪ Blasting will be designed and managed by a blasting contractor, who will control blast overpressure and vibration in accordance with the project limits, through a detailed management plan. The plan must address Australian Standard 2187–2006 *Explosives—Storage and Use Part 2: Use of explosives*, and will include the following types of measures to minimise impacts: – Reducing maximum instantaneous charge of each blast; – Changing drilling patterns, burden, blast hole diameter, deck loading, location, spacing and orientation of blast holes or using a combination of appropriate delays; and – Where possible orienting faces so that they do not face directly towards residences and keeping face heights to a minimum; – Consider weather forecasts in the ongoing management of blast impacts (allowing for the effects of adverse wind on the propagation of air blast to surrounding areas).
Monitoring	**Environmental Noise Monitoring** Due to the varying nature of the construction activities to be undertaken throughout the project the effectiveness of the construction noise mitigation measures and management procedures will be reviewed regularly. Ongoing monitoring and review of the site noise management practices will be undertaken: ▪ at the commencement of construction activities; ▪ in response to a validated community complaint regarding construction noise; or ▪ where review of upcoming construction schedule indicates a high likelihood for impact at nearest sensitive receiver locations. The purpose of monitoring is as a proactive management tool to assist with: ▪ investigating the likely sources of construction noise impact; ▪ quantifying the extent of likely impact (through comparison with the project noise level goals); ▪ identifying the need for further controls or modified site noise management practices; and ▪ establishing the effectiveness of noise mitigation implemented.

Environmental Objective – Noise & Vibration ■ To minimise noise and vibration impacts from construction activities at residential locations near the Dam construction area.		
		Blast Overpressure Monitoring ■ Blast overpressure and vibration monitoring is initially to be undertaken for trial blasts at several key residential locations to identify site specific details and make adjustments to the blasting parameters and programme. ■ This monitoring will also be undertaken on a monthly basis under changing temperature and meteorological conditions to ensure blasting levels remain within the criteria.
	Reporting	■ General monitoring information is for the use of the Environmental Advisor, however, the results of noise level measurements and investigations undertaken in response to community complaints will be summarised and included with other environmental reporting documentation (as required) and provided to the EPA on request. Reporting will note: – The time of monitoring; – The type and location of activities occurring on site at the time of monitoring; – The location of monitoring positions with respect to site noise sources (also marked on a plan); – Noise generating activities audible at the monitoring location; – Other extraneous noise sources which could influence the noise level measurements; and – Weather conditions prior to and during the monitoring (or complaint). ■ Where site activities are identified as the probable cause of concern or complaint, action will be taken to minimise future events by revising noise management procedures (involving modification to work practices or further controls at source or at receiver) for the activities identified as contributing to the nuisance or high noise event. ■ Management measures outlined above will be revised and the updated commitments implemented to reduce potential for future impacts as a result of similar activities
	Responsibility	■ Environmental advisor will be responsible for compliance monitoring and complaint investigation.
	Corrective Action	■ If complaints are received in relation to a short-term unavoidable event/s or emergency the community engagement and awareness of the possibility of such future activities will be improved. ■ Where construction noise level investigations in response to community complaints show unacceptable project noise levels, revision to the noise mitigation measures and management commitments will be undertaken to further control noise impacts. ■ The project noise level goals will be used to assist with determining the need for further corrective actions. ■ Where further source noise controls or mitigation in the sound transmission path are not possible or ineffective in further controlling noise levels, controls at the receiver will be investigated. Detailed investigation of façade attenuation will be required as part of these investigations.

20.3.14 Waste

Environmental Objective – Waste Management ■ To prevent or minimise the generation of wastes, where practicable and to appropriately contain, control and dispose of all waste generated.

Environmental Objective – Waste Management ▪ **To prevent or minimise the generation of wastes, where practicable and to appropriately contain, control and dispose of all waste generated.**	
Performance Criteria	▪ Implementation of waste management principles (Reduce, Re-use, Recycle) and effective and sustainable disposal strategies on site. ▪ Reasonable and practicable steps to minimise the impacts of handling and disposal of construction waste will carried out; such as: – Minimisation of the production of waste and amount of waste requiring disposal; – Minimisation of the impact to the environment from waste; – Maximisation of the opportunities to reuse waste on-site; – Correct disposal of all wastes produced; and – Reduction of waste generated on site through re-use and recycling. ▪ All waste must be disposed of lawfully. ▪ Construction and storage areas clean and tidy.
Mitigation Measures	▪ Prepare and implement waste management procedures to deal with all construction waste streams. ▪ Develop waste management plans to deal with any potential incident in which waste material with the potential to cause environmental harm, is released to the environment will be prepared. ▪ In the event of an environmental incident, take such corrective or remedial action as is required to render the area safe and avoid or minimise environmental harm. ▪ Identify and implement measures for avoiding waste generation and, if avoidance is not reasonable or practicable, reducing waste generation on site. **Reuse** ▪ Identify and implement strategies for the re-use of waste products during construction. ▪ Spoil will be generated from excavations for dam and road foundations. Where possible, this material will be incorporated into the dam embankments or road design with waste material placed and compacted in designated disposal areas. The surfaces of the waste areas will be suitably sloped and revegetated to prevent erosion of the cover material. ▪ All commercially millable timber and other useable material will be offered for sale to local timber millers who will undertake logging operations under the supervision of the construction contractor. Vegetation unsuitable for timber will be chipped on site to provide mulch for landscaping, or made available to local revegetation projects. ▪ Building materials, timber and metal off cuts and plastics from construction and demolition will be reused on site where practicable. **Recycle** ▪ Identify and implement recycling strategies for construction waste material; and ▪ Implement training for employees in the waste management plan and recycling opportunities. **Regulated Waste** ▪ The regulated wastes generated during the construction of the dam include waste oils, fuels, lubricants, tyres, batteries, oily air filters, paints, resins, solvents, sewage sludges and residues, spill clean up materials and water, soiled rags, drums and soils containing regulated wastes. These wastes will be reduced and/or recycled where possible. ▪ The management of regulated wastes (collection, transport, tracking, treatment and disposal) will be in accordance with the EPA Guidelines, including appropriate licensing of the contractor, transport vehicles and facilities. **Disposal** ▪ Disposal of all waste material that is unable to be reused or recycled onsite, within an approved land fill; ▪ No vegetation waste is to be burnt on site without a 'Permit to Burn' issued by the Rural Fire Brigade; and **Waste Transport** ▪ Restriction of site works and surface truck movements for transport of waste

Environmental Objective – Waste Management ▪ **To prevent or minimise the generation of wastes, where practicable and to appropriately contain, control and dispose of all waste generated.**	
	material to designated hours; and ▪ Ensure the movement of hazardous materials and regulated wastes occurs at non-peak times to minimise the possibility of traffic conflicts and associated risks. ▪ Transport of wastes will be carried out by a licensed carrier, and in accordance with the EPA tracking system as defined in *Environment Protection (Waste Management) Regulation 2000.*
Monitoring	▪ Regular inspection of on-site facilities to ensure waste is being generated, stored, handled, disposed and transported in accordance with this EMP. ▪ Registers and manifests maintained to track waste material. This documentation subject to internal or external audit, especially for any regulated waste material. ▪ Any discharges from site that could impact on the environment monitored in accordance with EPA's requirements. ▪ Records kept of any regulated waste removed from the site, including name and licence number of waste transporters, volume and description of waste transported, destination of waste and licence number of the waste treatment operator. ▪ Waste contractors to provide certification (licence) records verifying their registrations and points of discharge of waste. ▪ Assessment of actual waste results and comparison with predicted impacts and mitigation measures. Provide baseline data to enable continuous improvement of waste avoidance, reduction and management measures throughout the project. ▪ Monitoring for potential environmental impacts.
Reporting	▪ Monthly Report prepared and submitted to Proponent to include details of monitoring results, audits, training and incidents. ▪ Any environmental incidents involving spills recorded including time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Immediate reporting to Alliance Environmental Advisor of any large spills or potential risk of spills. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	Contractor
Corrective Action	▪ Ensure that the appropriate personnel undertake adequate environmental awareness training covering the requirements of the EMP regarding waste management. ▪ 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.

20.3.15 Hazard & Risk

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ **Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.**	
Performance Criteria	▪ Compliance with relevant Standards, guidelines and legislation. ▪ Number of Incidents.
Mitigation Measures	▪ AS4801 and AS4804 will be complied with in developing and operating the safety management system **Hazardous Materials or Dangerous Goods** ▪ Undertake storage and transport of materials according to relevant Australian standards, guidelines and legislation, including: – AS4452 The Storage and Handling of Toxic Substances; – AS1940 The Storage and Handling of Flammable and Combustible Liquids; – AS3780 The Storage and handling of Corrosive Substances;

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ **Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.**	
	– Dangerous Goods Safety Management Act 2001; and – Local council requirements. ▪ Undertake refuelling and maintenance activities in designated bunded areas to minimise the potential for soil and water contamination to result from these activities. Prepare and implement spill response measures. ▪ Spill kits for contaminated material and protective clothing will be provided at each transfer and storage location for use in the event of any spillages or leaks. ▪ Copy of up to date MSDS for each chemical / product used on site, will be available on site and readily available to all site personnel. ▪ Appropriate signage provided using HAZCHEM coders which are to be visible at all times. Signage also listing contact details for the Alliance Environmental Advisor and Safety Officer in case of an emergency. ▪ Fire fighting equipment must be checked and maintained at all times. ▪ Records will be kept on the existing inventory, storage location, personnel training and disposal of waste for all chemicals, fuel and dangerous goods used on site. ▪ All relevant staff must be trained in appropriate handling, storage and containment practices for chemicals, fuel and dangerous goods. ▪ Liquid chemicals and fuels storage in above ground tanks and chemicals and fuels stored in drums will be bunded in accordance with relevant Australian Standards. ▪ In the event that Asbestos is located on site, develop an Asbestos management plan. **Emergency Response** ▪ Develop an Emergency Action Plan or Dam Safety Emergency Plan which will include the following: – identification of emergency conditions which could endanger the integrity of the dam; – dam operation procedures to follow in the event that such emergency conditions are identified; – warning systems for downstream communities; – notification listing or flowchart – identifying responsibility for notification, the order of notification and who is to be notified; – roles and responsibilities – of the dam owner, operator and dam personnel; – area map – showing the access routes to the storage during fair and adverse weather conditions, including distance and travel times; – a drawing of the storage catchment area; – emergency events and actions list; – description of typical problems, problem characteristics and when / what to check for during inspections; – a dam failure inundation map – this will identify downstream inhabited areas subject to danger, inundated areas, and a narrative description of areas affected by dam break; and – any other charts or rating tables, considered by the dam owners as necessary. – Contingency plans to account for natural disasters such as storms, floods and fires will be developed for the construction, operation and maintenance phases. ▪ Designated first aid and emergency rescue facilities and equipment will be available. ▪ Stores, workshops and offices will be fitted with approved and certified fire detection (smoke detectors) and sprinkler systems. ▪ First aid and fire fighting equipment (hand held extinguishers and fire hoses) will be installed at strategic points within each building. ▪ Develop a fire management plan for the site for construction and operation phases. ▪ Fire fighting equipment and exit locations will be suitably signed and all work areas will be within the required distance to reach emergency exits. ▪ Appropriately trained personnel will be available throughout the life of the Project to provide first aid and emergency response to on site emergencies. **Vehicle Collision and Driving Conditions**

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ **Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.**		
		▪ Construction workers operating vehicles on-site will be trained and licensed, so that these vehicles are driven in a safe and appropriate manner. ▪ Speed control (signage), driving to conditions, and prescribed driving etiquette on the site will be used to control the risk. ▪ All vehicles will be fitted with radios for two-way communication. ▪ Watering of roads and access areas will be undertaken regularly to suppress dust and improve visibility. ▪ Adequate night lighting through the provision of lighting towers and vehicle headlights will be provided to ensure night operating and driving conditions are safe. **Explosives and Blasting** ▪ A specialist explosives company will provide the ammonium nitrate, emulsion, detonators and boosters to be used during blasting operations. The Contractor's personnel will be licensed and trained in the transport, handling, mixing and use of explosive materials. ▪ Blasting operations will comply with the *Explosive Act 1999*. ▪ Note that the location of the explosives will take into consideration: **Public Risk** ▪ enhancing physical protection to the public by the use of natural ground features. ▪ vehicular access routes and junctions with public roads. **Security** ▪ other activities within the proximity of the site and ▪ protection from flood, fire, landslide, lightning or other natural incidents. ▪ Personnel in the vicinity of a blast will continue to wear Personal Protective Equipment (PPE) and all personnel will observe safe distances during blasting activities. ▪ Working at height and falling objects ▪ Mandatory PPE on a construction site that protects against objects falling from height includes steel capped boots and hard hats (both are worn at all times). ▪ Fall of persons will be controlled through appropriate elevated work platforms and the proper use of harnesses. ▪ Fencing will protect selected areas with high risk of a security breach or unauthorised public access. ▪ Prior to being given access to the Project site, visitors will complete mandatory registration and an environmental, health and safety induction. The scope of induction will reflect those areas of the Project site that the visitor will be permitted access. **Flooding** ▪ Construction activities phased to minimise potential ' wash out ' impacts. ▪ Cease in-stream works and remove all construction personnel and equipment to higher ground in the likelihood of a flood event. ▪ Cease RCC works well before flood event to minimise impact on RCC. ▪ Constructing coffer dam and diversion conduit of capacity sufficient to pass a flood event with an AEP that will adequately limit the commercial risk of damage to the partly completed dam.

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ **Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.**	
Monitoring	▪ Monitoring will be undertaken to assess whether Project health and safety measures are being implemented and effective. Monitoring will involve the compilation and assessment of data relating to health and safety issues, such as reported near misses, accident reports and any health surveillance data (sickness data). Outcomes from this monitoring may trigger the need for additional safety and health risk control actions. ▪ Accident and near hit data will be monitored to identify where: – common themes occur – PPE is being incorrectly used/abused – corrective actions have not been strictly implemented – corrective actions are ineffective – procedures/practices need to be reviewed – retraining may be required – health surveillance data will be monitored to identify common themes
Reporting	▪ Any environmental incidents involving spills recorded including time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Immediate reporting to the Alliance Environmental Advisor of any large spills or potential risk of spills. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Action	▪ In the event of a spill of hazardous substances, necessary work procedures and operation controls will be reviewed to ensure they are fit for purpose and revised where necessary. ▪ Ensure that the appropriate personnel undertake adequate environmental awareness training covering the requirements of the EMP regarding the management of hazardous substances. ▪ 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. ▪ Schedule construction to avoid periods with highest risk from heavy rain events.

20.3.16 Transport & Roads

Environmental Objective – Transport & Roads	
▪ **Manage construction traffic and transport issues to minimise potential impact on the community and the operation of the road network.**	
Performance Criteria	▪ Avoidance, mitigation and management of the potential construction traffic impacts on communities near the industrial area and worksites within the inundation area. ▪ Minimisation, as much as possible, of potential traffic disruptions to the operation of the road network due to construction works. ▪ Maintenance of safe access near all project work areas for road users. In particular, development of local access strategies in consultation with stakeholders groups (DMR and/or SSC) to maintain safe, convenient and efficient access throughout the area. ▪ Implementation of traffic management measures near each worksite to avoid conflicts between construction traffic and local traffic. ▪ Local and broader communities kept informed about the time and scale of changes in the traffic conditions on roads in the vicinity. ▪ Traffic flows near construction works monitored, as required. ▪ Corrective measures implemented in response to traffic impacts subsequent to construction works.
Mitigation Measures	▪ A Construction Environmental Plan will be developed for each component of the road works in accordance with DMRs Environmental management Policy and Strategy 2002 – 2007, as required. ▪ Transport of hazardous and dangerous materials during the construction phase will be undertaken in accordance with the EPA tracking system as defined in *Environment Protection (Waste Management) Regulation 2000.* ▪ Prepare a Traffic Management Plan in consultation with DMR and SSC (as required) for all elements of the works to included measures to minimise the adverse effects on the road network. The plan will address the safety and convenience for all road users and consider the following: – keep one lane open at all times; – installation of proper signage to make drivers aware about road works and guide them through the work area; – measures to help ensure safety and manage the changes in traffic conditions (e.g. traffic controllers/and/or variable message signage wet weather specific operational requirements including any management measures necessary to address any potential environmental impacts of wet weather operations); and – truck routes and construction site access. ▪ Consideration will be given during construction of any specific safety or amenity issues on particular routes should this be identified during the detailed design stage of the Project. ▪ Intersection configurations will be confirmed for all new intersections and any revised existing intersections in the Preliminary Design phase of the Project to ensure they are adequate to safely cater for construction traffic volumes. ▪ Model the exit sign and construction traffic (on the major roads and intersections in the vicinity of the site) in order to predict the effect of temporary traffic arrangements. ▪ Prepare dilapidation surveys prior to haulage operations to identify any pore start improvement. A maintenance plan will be prepared to manage any impacts during construction and a post construction survey undertaken to confirm the need or otherwise for restoration following completion. ▪ Use of the established truck routes and arterial roads for the haulage of construction materials and spoil in order to minimise truck traffic on local roads; ▪ Minimising congestion effects by properly staging the construction work to even distribute traffic and avoiding the haulage of construction materials and equipment during peak hours. ▪ Each haulage contractor will be required to prepare a Road Use management Plan (RUMP) which addresses the following key items associated with the haulage of materials: – Haulage routes; – Safety management;

Environmental Objective – Transport & Roads ▪ **Manage construction traffic and transport issues to minimise potential impact on the community and the operation of the road network.**	
	– Traffic management; – Operations; – Environmental controls; and – Emergency plans. ▪ In terms of safety, the contractor will be required to identify controls as a means of mitigating or eliminating the hazards and risks identified above. ▪ Intersection configurations will be confirmed for all new intersections and any revised existing intersections in the preliminary Design Phase of the project to ensure they are adequate to safely cater for the future traffic volumes and that the intersection performance criteria are met **Local Traffic** ▪ Notification to the local communities and local authorities where practicable about proposed changes to local traffic access and possible delays due to construction activities and provision of clear signage of changed traffic conditions and alternative routes. **Workforce Transportation and Parking** ▪ Provision of sufficient parking to accommodate employees' vehicles and instructions given to commuting employees to use the providing parking facilities in order to avoid traffic disruption due to road side parking. ▪ Provision of buses and encouraging car pooling for transportation of construction workforce. **Emergency vehicles** ▪ Ensure at least one lane will be kept open on all roads during the construction period. ▪ Establish a project reference group to advise community needs including emergency services needs throughout the construction period
Monitoring	▪ Monitoring of traffic flows and road network performance on a continual basis to confirm that specific controls have been implemented and appropriate work practices are being adopted to achieve the specified performance objectives.
Reporting	▪ Monthly report on local traffic conditions, including any accidents involving construction traffic. ▪ Monthly Report prepared and submitted to the proponent to include details of local traffic conditions, including any accidents involving construction traffic, any monitoring results, audits, training and incidents. ▪ Immediate reporting to Supervisor and Environmental Advisor of any incident which contravenes the objectives of the EMP. ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibility	▪ Contractor
Corrective Action	▪ Investigation and implementation of additional traffic management and transport options where required. ▪ Ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding traffic management. ▪ The Construction Manager can request the cessation of works at any time should they feel that the performance criteria of the EMP have been breached.

20.3.17 Cultural Heritage

Environmental Objective – Cultural Heritage	
■ **To manage the known and unknown components of indigenous archaeological records and areas.**	
Performance Criteria	■ All known indigenous archaeological records, as identified within the CHMP, are preserved and not impacted upon by the project. ■ All unknown indigenous archaeological records found during the course of the Project are reported to the DNRW and the proponent.
Mitigation Measures	■ Cultural Heritage Maganement Plan (CHMP) to oversee all management of Aboriginal cultural heritage associated with the Project ■ Prior to construction a Heritage Management Plan (HMP) will be prepared for the entire Project area outlining a suitable strategy to protect sites of European cultural heritage significance ■ Conduct cultural heritage awareness training for all on-site personnel identifying areas and items of cultural heritage significance. ■ In the event that any indigenous items are uncovered during the course of the construction, work in the immediate area will cease and the finds immediately be reported to the Cultural Heritage Coordination Unit and Proponent.
Monitoring	■ As required by CHMP and HMP
Reporting	■ Report any findings of any indigenous archaeological items to the Site Supervisor immediately. ■ Report any findings of any indigenous archaeological items to Cultural Heritage Coordination Unit, DNRW and Proponent. ■ Report any findings of any European archaeological items to EPA and Proponent.
Responsibility	■ All site personnel
Corrective Action	■ Non-compliances to be followed to completion.

20.3.18 Visual Amenity

Environmental Objective – Visual Amenity	
■ **Minimise the potential impacts on the visual environment during construction**	
Performance Criteria	■ Disturbed areas are rehabilitated with native endemic vegetation. ■ Recreation facilities are established and completed prior to opening of the site for public access and use. ■ Areas cleared around the full supply level of the dam are maintained clear of dying vegetation.
Mitigation Measures	■ Management of night lighting to ensure lights are focussed on the affected construction areas and to limit extraneous light where necessary; and ■ Protection and management of native vegetation within the construction area with particular emphasis on ?? ■ conserving vegetation downstream of the dam wall to act as a visual screen.
Monitoring	■ Inspections carried out to assess the health of the seedlings (growth rates, foliage
Reporting	■
Responsibility	■ Contractor
Corrective Action	■ Complaint to followed to completion.

20.4 Draft Operational Management Plans

Environmental Management Plan Element Strategies describes proposed objectives, performance criteria and identified mitigation measures for the operational phase of Emu Swamp Dam. Some of the environmental elements suggest specific monitoring requirements and / or statutory requirements.

20.4.1 Management of Water Storage

Environmental Objective	
■ **Conform to flow requirements of the Resource Operations Plan.** ■ **Maintain downstream Envrionmental Flow Objectives and Water Allocation Security Objectives.**	
Performance Criteria	■ Compliance with Envrionmental Flow Objectives (EFOs) and Water Allocation Security Objectives (WASOs) as set out in the Border Rivers Resource Operations Plan ■ No existing water users are to be effected throughout construction. ■ Flood levels upstream of the dam which are consistent with estimates made during project design. ■ Absence of excessive accumulation of deposited sediment in the upper reaches of the dam. ■ Staff trained in procedures associated with monitoring required by the EMP. ■ All mandatory objectives under the Water Resource (Border Rivers) Plan 2003 that apply to the Emu Swamp Dam are met.
Mitigation Measures	■ Implement operating procedures as stated in a Border Rivers Resource Operations Plan once the Dam is commissioned.
Monitoring	■ Dam levels near the spillway to be observed on a daily basis. ■ Review precipitation data from BoM sites on a monthly basis. ■ Inflows to the dam will be measured at the upstream gauging weir. ■ Water quality monitoring within the impoundment in accordance with the Water Quality EMP.
Reporting	■ Operator to report on dam operations as per the Resource Operations Plan.
Responsibility	■ Dam Operator
Corrective Action	■ Adverse impacts to environmental flows within Severn River be reported to the DNRW. ■ SSC will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding environmental flow requirements.

20.4.2 Water Quality

Environmental Objective – Water Quality	
■ **To preserve water quality within incoming and the Severn River Catchment and maintain the Environmental Values (EVs), including compliance with local Water Quality Objectives (WQOs), in particular the drinking water guidelines.**	
Performance Criteria	■ Drinking water quality objectives as per the *Environmental Protection (water) Policy 1997*, Environmental Values and Water Quality Objectives. ■ Aquatic ecosystem environmental values as per the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* and *Queensland Water Quality Guidelines* ■ The overarching performance criterion is to maintain existing ecosystem attributes and water quality within Severn River throughout operation.
Mitigation Measures	■ Management measures to be identified and implemented to limit sediment and contaminants within surface runoff. ■ Management measures to be identified and implemented to ensure accidental spills (particularly hydrocarbon and chemical spills) are isolated, cleaned and remediated to minimise groundwater contamination. **Stratification** ■ Selectively extract water during stratification events

Environmental Objective – Water Quality ▪ **To preserve water quality within incoming and the Severn River Catchment and maintain the Environmental Values (EVs), including compliance with local Water Quality Objectives (WQOs), in particular the drinking water guidelines.**	
	Turbidity ▪ Exposed soils will be stabilised as quickly as possible; ▪ Revegatation of areas impacts outside the inundation area; ▪ Where possible, revegetate agricultural land to minimise potential erosion and turbid runoff; ▪ Maintain shoreline water levels so that fringing wetlands and macrophyte beds can persist; and ▪ Manage upstream inputs where possible. For example, rehabilitation of riparian vegetation and restricted access by cattle (subject to negotiation) to the riparian zone may decrease bank erosion and turbid inputs into the river. **Nutrients** ▪ Ensure buffer area is well vegetated, to retard surface runoff and to act as a sink for nutrients; ▪ Re-vegetate cleared land within the buffer area to minimise potential nutrient runoff ; ▪ Maintain shoreline water levels in a manner that allows fringing macrophyte beds to persist; ▪ Management of upstream nutrient sources, such as those that come from cattle and human sewerage. ▪ Undertake additional slashing and removal of vegetation ahead of reservoir filling in order to reduce the amount of organic matter **Blue Green Algae Blooms** ▪ Management of nutrient concentrations within the dam and catchment as outlined above.
Monitoring	**Suggested routine water quality monitoring program** ▪ Undertaking a routine (quarterly) water quality monitoring program in the dam for the first 3 years of operation for the following parameters: - temperature, pH, turbidity, colour, organic carbon;; - nuisance algae, chlorophyll-a; - herbicides (namely diuron); and - DO, algal composition, Total Phosphorous, Total Nitrogen, Aluminium, Iron and Manganese ▪ Fixed site water quality meter with data logger is recommended for installation at the outlet pipe, which is connected to the Urban Pipeline. ▪ Implementation of baseline monitoring programs for pesticide and herbicide use in drinking water catchments **Event base monitoring** ▪ Event-based monitoring may also be carried out in order to understand the inflow of contaminants into the proposed dam site and to monitor the success of catchment management practices.
Reporting	▪ Monitoring results will be compared to the WQOs that support the EVs of the impoundment area and downstream of impoundment area, ▪ During and after rainfall, a visual inspection of rehabilitated areas undertaken to ensure no major erosion is occurring. Additional monitoring may be required to determine the extent of stormwater runoff after pulse events. ▪ Quarterly water quality reports prepared by operational personnel which report on water quality conditions within the Emu Swamp Dam and Severn River catchment. ▪ Operator to report on dam operations as per Resource Operations Plan.
Responsibility	▪ Dam Operator
Corrective Actions	▪ Where WQOs and EVs are not met management action will be taken to ensure objectives are met. ▪ Any elevated physico-chemical parameters, or nutrient or metal concentrations, observed within the upper catchment, Emu Swamp Dam or in the Severn River, will be identified and the appropriate action taken by the Dam Operator.

20.4.3 Aquatic Ecology

Environmental Objective – Aquatic Ecology ▪ **Minimise and mitigate as far as is practicable the adverse impacts on aquatic flora and fauna during operation of the Project.**	
Performance Criteria	▪ No discharge of materials, including sediment, within stormwater from operational areas. ▪ A program in place to monitor and control aquatic weeds and other pest species on the recreational values and water quality of the dam.
Mitigation Measures	**Aquatic Biota** ▪ Controlled gradual inundation, where practical, toward the proposed FSL to ease the transition from a lotic to a bentic habitat; ▪ A program to identify operational activities that could aid in the management of habitat diversity.
Monitoring	**Aquatic Fauna** ▪ Monitoring of recreational fish catches to ensure appropriate stocking rates. **Aquatic Flora** ▪ Develop a programme to assess and control the spread and distribution of aquatic weed growth within the impoundment area will be completed on a quarterly basis for a minimum two years following operation. ▪ Restriction of cattle access (subject to negotiation with leaseholders of QWI owned land) to the dam may benefit the growth and condition of emergent / fringing and submerged species growing in the shallow margins, but might also result in the proliferation of the exotic para grass. Cattle access will be managed on a case by case basis. **Auditing** ▪ Regular auditing undertaken to ensure compliance with objectives of the EMP.
Reporting	▪ Operator to report on dam operations as per Resource Operations Plan. ▪ A report describing performance against the described measures and including results of monitoring will be submitted on an annual basis.
Responsibility	▪ Dam Operator
Corrective Actions	▪ Additional investigations or monitoring where necessary after fish kills, aquatic vegetation die off, uncontrolled releases or spills to waterways to assess health of aquatic biota. ▪ Implementation of measures to protect aquatic biota if impacts from operation are affecting the viability of the ecosystem.

20.4.4 Noise & Vibration

Environmental Objective – Noise & Vibration ▪ **To minimise noise and vibration impacts from construction activities at residential locations near the Dam construction area.**	
Performance Criteria	▪ 50 dB(A) from 7am - 7pm, Monday to Saturday ▪ Greater of 40 dB(A) or background + 5 dB from 8am to 7pm, Sunday & Public Holidays
Mitigation Measures	**Dam Facilities** Motors associated with the pump station and fish transfer station will be designed with consideration to noise emissions. Mitigation options may include: ▪ enclosures; ▪ acoustically line plant rooms; ▪ barriers; ▪ locating plant in sites which maximise shielding provided by topography, buildings or structures associated with the Project **Pump Station** ▪ Perform further investigation into the potential for noise impact (including sleep disturbance) during detailed design and incorporate acoustic treatment as required to maintain appropriate noise levels at nearest sensitive receivers.

Environmental Objective – Noise & Vibration ▪ **To minimise noise and vibration impacts from construction activities at residential locations near the Dam construction area.**	
	Maintenance ▪ Restrict use of regulated devices (grass cutting, electrical power tools etc)
Monitoring	▪ Monitoring required on a receipt of a formal noise complaint
Reporting	▪ Formal complaints will be provided to the EPA on request
Responsibility	▪ Dam Operator
Corrective Actions	▪ If complaints are received in relation to a short-term unavoidable event/s or emergency the community engagement and awareness of the possibility of such future activities will be improved. ▪ Where further source noise controls or mitigation in the sound transmission path are not possible or ineffective in further controlling noise levels, controls at the receiver will be investigated. Detailed investigation of façade attenuation will be required as part of these investigations.