ENVIRONMENTAL MANAGEMENT PLAN

1. INTRODUCTION

1.1. Introduction

The proposed Emu Swamp Dam project (the 'Project') is located on the Severn River, 15km south-west of Stanthorpe and 5km north of Ballandean, in south-east Queensland. An environmental impact statement was prepared for the Project in 2007 and released for public comment in 2008.

The EIS presented two options for the Project: an urban supply dam, and an urban supply and irrigation dam. The Southern Downs Regional Council, as the Project proponent, has opted to pursue the latter option that will result in the dam having a storage capacity of 10,500ML with a full supply level of 738m AHD and an associated inundation area of 196 ha.

A number of submissions were made by stakeholders and interested persons in relation to the EIS.

1.2. Purpose of this document

The Environmental Impact Statement (EIS) prepared for Emu Swamp Dam included a number of environmental management recommendations for the construction and operational phases of the Project. The purpose of this Environmental Management Plan (EMP) is to integrate those recommendations – and any further recommendations arising from studies conducted after the public release of the EIS – into a single document that presents the control measures required to be implemented throughout the construction and operational phases.

The environmental aspects of the Project and the recommended control measures are presented at Section 1.5 and 1.6. These control measures have been designed based on the Project being at a conceptual stage. It will be the responsibility of the Contractor to develop and implement effective control measures once construction is underway. This may be achieved through the Contractor developing a detailed Construction Environmental Management Plan (CEMP) and Operation Environment Management Plan (OEMP) for review by the Proponent. The EMPs will provide a basis for implementing control measures that can mitigate environmental impacts as the Project progresses. The EMPs will need to be reviewed and updated periodically to take into account the changing nature of the project and the regulatory environment.

2. LEGISLATIVE REQUIREMENTS AND OBLIGATIONS

This EMP has been designed to ensure that identified environmental impacts relating to the construction and operational stages are avoided or minimised where practicable. In this regard, the EMP may refer to environmental legislation, controls, standards and guidelines relevant to impact mitigation and avoidance. The EMP also requires that, wherever possible, works related to site development meet the expectations of stakeholders and interested persons within the community.

The Contractor will hold copies of relevant legislation, guidelines and standards on site during construction. The following sets of legislation are relevant to the Project:

2.1. Commonwealth legislation

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) regulates activities that impact on matters of national environmental significance (MNES), including listed threatened species and ecological communities.

2.2. Queensland legislation

The *Environmental Protection Act 1994* (EP Act) is the overarching legislation for the regulatory management of Queensland's environment. The EP Act binds all persons as having a duty of care to protect the environment during the course of all activities. The object of the EP Act is to 'protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends' (ecologically sustainable development).

The EP Act enables subordinate legislation which defines environmental objectives and sets targets for achieving these objectives. The following subordinate legislation is applicable to the Project:

- *Environmental Protection (Air) Policy 2008*; and
- *Environmental Protection (Noise) Policy 2008*;
- *Environmental Protection (Waste Management) Regulation 2000*; and
- *Environmental Protection (Water) Policy 2009*.

The EP Act includes a list of activities deemed to be Environmentally Relevant Activities (ERAs) for which approval is required. The Project is expected to involve the following ERAs:

- ERA 8 – Chemical storage;
- ERA 16 – Extractive and screening activities;
- ERA 41 – Cement manufacturing; and
- ERA 56 – Regulated waste storage.

2.3. Other State legislation

The EIS was prepared under the provisions of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The information contained within the EIS provides a basis for understanding the environmental approvals that may be required for the construction and operation of the Project. Appendix C of the Supplementary Report contains an outline of the environmental approvals, permits and licences likely to be required for the Project.

The following sets of legislation are also applicable to the Project:

- *Aboriginal Cultural Heritage Act 2003*;
- *Fisheries Act 1994*;
- *Forestry Act 1994*
- *Land Act 1994*;
- *Nature Conservation Act 1992*;
- *Nature Conservation (Wildlife) Regulation 1994*;
- *Queensland Heritage Act 1992*;
- *Soil Conservation Act 1986*;
- *Strategic Cropping Land Act 2011*;
- *Sustainable Planning Act 2009*;
- *Transport Infrastructure Act 1994*;
- *Vegetation Management Act 1999*;
- *Water Act 2000*; and
- *Work Health and Safety Act 2011*.

2.4. Objectives and principles

The Intergovernmental Agreement on the Environment (IGAE) and the Principals of Ecologically Sustainable Development (ESD) provide a background to the objectives of this EMP. A balanced approach that takes into account all of these objectives and principles is required to pursue the goal of 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 bio-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.

3. KEY ROLES AND RESPONSIBILITIES

3.1. Management structure

To achieve the overarching 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.

3.1.1. The Proponent - Southern Downs Regional Council (SDRC)

- future owner of the land required for the inundation area and buffer;
- administrator of the head agreement or contract to ensure that the contract conditions are met;
- responsible for driving levels of environmental performance within Council and contractor organisations;
- 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;
- 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;
- communicate with stakeholders and interested persons throughout the construction and operation of the project; and
- preparation of annual reports on environmental performance.

3.1.2. Contractor (to be awarded):

- prepares and implements detailed engineering designs;
- prepares and updates the CEMP;
- obtains all necessary environmental and work health and safety approvals, including development approvals, licences, other construction related permits;
- ensures the design and construction phases are conducted in accordance with approvals, the contract, relevant legislation and regulations, and local laws;
- maintains open and effective communication with all stakeholders and interested persons for the duration of the construction phase, on matters including the construction program, scale, duration and nature of the proposed work, and details of proposed impact mitigation measures; and
- preparation of monthly and annual reports on environmental management and compliance.

3.1.3. Overall Responsibilities

The following tables provide a summary of the likely responsibilities and accountabilities of various parties that will have active environmental management roles. The responsibilities have been divided into the construction and operation stages.

Table 3-1 Project responsibilities for the construction stage

Project Responsibilities – Construction	
The Proponent (SDRC)	Appoint a suitable Construction Contractor; Review the CEMP submitted by the Contractor, and any revisions made to the CEMP; Ensure that suitable environmental management requirements are included in the Contract documentation; Oversee the construction and operation of the Project; Provide readily available expertise for the construction project as required; Receive progress reports from the Construction Contractor on environmental performance for the purpose of verifying compliance with the contract and general environmental obligations; 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 the Contractor's environmental performance; Report environmental performance to the administering authority (if required), and participate in regulatory audits that may be conducted by the administering authority from time to time; Report environmental emergencies and incidents to the administering authority and relevant response agencies as soon as practicable after becoming aware of the events; Maintain effective communication with all Project stakeholders and interested persons; and Oversee the operational phase of the dam by developing or reviewing an OEMP.
Contractor	Develop a CEMP for review by the Proponent; Develop sub-plans for specific areas/aspects of environmental concern; Implement the CEMP and sub-plans and review the documents on a periodic basis to ensure the effectiveness of the control measures; Provide training and awareness sessions on environmental management to all site personnel and sub-contractors; Obtain all necessary statutory approvals and licences and ensure that conditions of licences/approvals/permits are met; Undertake regular environmental monitoring and complete inspection checklists as provided for in the CEMP and sub-plans; Participate in environmental audits that may be undertaken by the Proponent or the administering authority from time to time; Compile monthly and annual reports on environmental performance for submission to the Proponent; Maintain records of all environmental documentation including the Contract, CEMP, sub-plans, training and awareness sessions, environmental inspection checklists, complaint management, emergencies and incidents, corrective actions taken, waste tracking receipts, audit reports etc; Notify the Proponent of any environmental emergencies or incidents that occur. If the proponent cannot be contacted, notify the administering authority and relevant response agencies; and 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. This includes notifying stakeholders and interested persons about the construction phases and likely impacts.

Table 3-2 Project responsibilities for the operational stage

Project Responsibilities – Operation	
Operator (SDRC)	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; and Ensure the Project is operated safely and with good environmental management practices at all times.

3.2. Competence, training and awareness

All site personnel including visitors will receive environmental induction training prior to engaging in construction activities. The training will outline the environmental values of the project area and surrounds, and the potential impacts and control measures associated with the construction phase. The training will also provide site personnel with instructions to be followed in the event of an emergency or incident, including the duty to notify the administering authority in cases where environmental harm may be caused or threatened. Training records for site personnel and visitors will be maintained accordingly, and access to the site should not be granted to any individual without evidence of environmental training being successfully completed. It may also be necessary to conduct refresher training at specified intervals to ensure that awareness levels are maintained.

In addition to the environmental induction training, specialist training will be conducted for site personnel that have specific duties such as environmental monitoring including the collection and analysis of samples, vegetation clearing, major earthworks, landform reinstatement and rehabilitation – as these activities have the potential to directly impact on environmental and cultural heritage values.

3.3. Records, communication and reporting

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 audits. This includes:

- contract documents;
- statutory approvals;
- environmental reports;
- monitoring data results;
- environmental inspection checklists;
- environmental audits and reviews;
- environmental training records;
- details of emergencies and incidents and corrective actions taken;
- complaints register;
- liaison with community groups and consultative committees; and
- inspection, calibration and maintenance activities.

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

- a copy of the CEMP and relevant sub-plans for specific environmental issues;
- copies of all relevant documents required under the CEMP;
- copies of relevant work instructions and procedures;
- Safety Data Sheets (SDS) for any chemicals stored or used on the site; and
- copies of permits, approvals and attached conditions.

3.3.1. 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 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.

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

3.3.2. 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.

If an event occurs that causes or threatens material or serious environmental harm, an employee has a duty to notify their employer under section 320B of the EP Act (Duty of employee to notify employer) no later than 24 hours after becoming aware of the event. If the employer cannot be contacted, the employee must give written notice of the event to the administering authority. All other persons have a duty to give written notice to the administering authority within 24 hours of becoming aware of the event, unless the person has a reasonable excuse.

3.4. Complaint handling

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 complaint handling, basic requirements will include:

- a procedure for receiving and responding to complaints that is acceptable to SDRC, the Coordinator-General and the EHP;
- the Contractor maintaining, during the construction phase, a telephone service to receive complaints;
- 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 administering authority 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 administering authority and SDRC 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 SDRC website that will also offer feedback forms for complaints and grievances.

3.5. 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 Department of Environment and Heritage Protection (DEHP), the Department of Primary Industries (DPI), the Department of Natural Resources & Mines (DNRM), 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 4.

3.6. Auditing

Certain aspects of the project will be subjected to periodic independent audits to measure conformance against identified environmental requirements. This may include determining conformance with State and Federal

approvals, and verifying the suitability of the CEMP. Copies of audit reports including recommendations for improved performance will be made available to the administering authority and the contractors upon request.

3.7. 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 to the administering authority and auditors upon request. The reports shall include the following at a minimum:

- summary of works undertaken and control measures implemented;
- records of environmental inspections including the following elements:
  - the date and time;
  - person conducting the inspection;
  - list of environmental issues identified and the actual or potential impacts;
  - recommended corrective actions and responsible persons;
- monitoring results (incl. samples & analysis, inspection checklists);
- compliance with approvals, licences and the CEMP;
- complaints received, environmental incidents and emergencies;
- meeting minutes from community consultative activities; and
- work expected to be completed in the next monthly period.

An annual environmental report will be prepared each calendar year by the Construction Contractor and the Operator. The annual report will provide a summary of environmental performance over the year and can be based around the contents of the monthly reports (in the case of the Contractor). The annual report prepared by the Operator should also include the following elements:

- fluctuations in water storage levels;
- water releases; and
- water quality monitoring results.

3.8. Non-compliance and corrective actions

The purpose of the environmental monitoring and reporting is to ensure that environmental harm and/or nuisance is detected and addressed promptly through corrective actions. The specific requirements in relation to monitoring and reporting will be nominated in the CEMP and OEMP to be prepared by the Construction Contractor and Proponent respectively.

4. CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

During the construction phase of the project, there will be a number of activities that have the potential to impact on identified environmental values in the area and surrounds. A full description of construction activities is provided in Section 3.2.1.1 – *Emu Swamp Dam* within the EIS. A summary of the activities is shown below:

- Land clearing and blasting;
- Access road construction;
- Quarrying and sand extraction;
- Concrete manufacture;
- Operation of crushing and screening plants;
- Dam foundation preparation;
- RCC wall construction;
- Materials haulage;
- Intake tower and outlet;
- Recreational facilities;
- Site rehabilitation; and
- Fish transfer (if required).

The construction activities have the potential to impact on the environmental values of the area and its surrounds. The environmental aspects that will need to be addressed in the CEMP must include:

- 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 management;
- Hazard and risk;
- Transport and roads;
- Cultural heritage; and
- Visual amenity.

It may be necessary for the CEMP to include management sub-plans for certain environmental aspects that will require continual revision to be effective. For example, erosion and sediment control measures need to be continually tailored to the land disturbances that occur at the site. The sub-plans must comply with relevant industry standards for environmental management, and are useful documents to provide to sub-contractors where guidance is needed. The Contractor has the responsibility of identifying and revising the sub-plans that will need to be in place as construction progresses. Examples of sub-plans that may be required are:

- erosion and sediment control plan;
- air quality management plan;
- noise and vibration management plan;

- traffic management plan;
- emergency response plan (including fires);
- land contamination remediation plan;
- vegetation clearance management plan; and
- other management plans necessary to achieve the desired environmental objectives.

The CEMP and OEMP demonstrate how potential impacts may be addressed during the construction and operational phases of the Project. The following tables have been prepared for each of the identified environmental aspects that will need to be managed throughout the construction and operation of the project, according to the following framework:

- Performance criteria: these are statements of the environmental objectives to be achieved;
- Mitigation measures: the anticipated control measures necessary to mitigate environmental impacts;
- Monitoring: a description of the recommended monitoring events and frequencies;
- Reporting: a description of the recommended reporting mechanisms;
- Responsibilities: a list of persons/contractors responsible for implementing the control measures; and
- Corrective actions: a description of the response measures required to respond to incidents.

4.1. Geology & soils

Environmental Objective – Geology & Soils ▪ Minimise environmental impact by managing the soil resource and preventing soil loss and erosion.	
Performance Criteria	▪ Manage and mitigate the impacts of soil disturbance (removal, haulage, stockpiling and emplacement) in all work areas. ▪ Manage and mitigate the risks of soil erosion from all work areas where vegetation clearing and soil disturbances occur ▪ Restore areas disturbed by construction works.
Mitigation Measures	Soil Management Plan ▪ Prepare a Soil Management Plan (SMP) prior to construction. The SMP must be prepared by a Certified Practicing Soil Scientist (CPSS); ▪ The purpose of the SMP will be to outline requirements for the construction methodology, including excavation, soil management and rehabilitation along the pipeline route and areas to be disturbed for construction of the project; ▪ Undertake additional soil surveys where required, to determine the extent of soil boundaries of sodic texture-contrast soils along the pipeline route. The following sections outline the mitigation measures that will be further defined in the SMP and the Erosion and Sediment Control Plan (ESCP): General works ▪ Before commencing earthworks on any part of the Project, sufficient materials must be available to protect the site from erosion; ▪ 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 environmentally sensitive areas can be completed and the area stabilised and rehabilitated as quickly as possible. Vegetation and clearing and grading ▪ Develop a Clearing Plan which clearly designates areas to be disturbed and removal of the vegetation; ▪ Clearing must be restricted to designated areas; ▪ Requirements for environmental controls must be included in all work procedures involving land disturbance;

Environmental Objective – Geology & Soils ▪ Minimise environmental impact by managing the soil resource and preventing soil loss and erosion.	
	▪ Responsible persons must be nominated to ensure that environmental controls are maintained. Topsoil stripping and management ▪ Topsoil thickness must be determined before stripping occurs; ▪ Topsoil will be stripped using a grader to the prescribed depth; ▪ Topsoil will not be mixed or stockpiled with subsoil or vegetation; ▪ Saline and/or sodic soil materials will be appropriately ameliorated to avoid erosion; ▪ Stockpiles must be located away from drainage lines, and must be stabilised and/or have erosion control measures in place (e.g. appropriate batters, binding agents, seeded, mulched, sediment fences) in accordance with the ESCP; ▪ Adequate gaps will be maintained between stockpiles for the movement of workers and fauna; ▪ Where there is an abrupt change in soil material (e.g. occurrence of rock , saline/ sodic soil materials, cracking clays), these materials will be stripped and stockpiled separately for accurate reinstatement; ▪ The topsoil will be reinstated in the minimum time practicable ; ▪ The topsoil will be backfilled and compacted to a similar bulk density to the undisturbed soils in the area; ▪ In areas subject to cropping, advice will be sought from suitably qualified professionals (CPSS and an agronomist) for specific soil management strategies to comply with the landholder's farming practices. Subsoil excavation and management ▪ Minimise the length of time that subsoils are exposed; ▪ Subsoil must be stockpiled separately from topsoil; ▪ Sodic subsoils must be promptly identified and managed to avoid erosion. This may include the addition of ameliorants such as gypsum, iron sulphate and/or lime; ▪ Stockpiles must be located away from drainage lines, and must be stabilised and/or have erosion control measures in place (e.g. appropriate batters, binding agents, seeded, mulched, sediment fences) in accordance with the ESCP; ▪ Backfilling of dispersive soils must occur within three days of excavation to avoid prolonged exposure; ▪ Dispersive soil materials should be buried at depth (allowing for future ripping and cultivation without disturbance of the sodic soil materials below) and beneath a layer of competent and stable (non-sodic) soil materials. Erosion and sediment control ▪ Develop an ESCP prior to commencement of construction. The ESCP will be prepared by a Certified Practitioner in Erosion and Sediment Control (CPESC) with reference to the guidelines *Best Practice Erosion and Sediment Control* (IECA 2008) and will include the following details: ▪ Construction access points ▪ Proposed construction activities and limits of disturbance ▪ Retained vegetation ▪ Soils information ▪ Environmental features e.g. watercourses ▪ Existing topography ▪ General layout of proposed works ▪ Location of vegetation, topsoil and subsoil stockpiles and the effect on drainage patterns ▪ Location of all drainage, erosion and sediment control devices ▪ Construction specifications for adopted erosion and sediment control measures ▪ Site revegetation requirements ▪ Site monitoring and maintenance program.

Environmental Objective – Geology & Soils ▪ Minimise environmental impact by managing the soil resource and preventing soil loss and erosion.		
		▪ Install suitable drainage, erosion and sediment control measures in accordance with the ESCP, to prevent erosion of soil materials. Stockpiles ▪ Stockpiles will be included in monthly inspections (with disturbed areas) for identification of weeds; Longer term stockpiles may be shaped and fertilised and seeded immediately with pastures and annual cover crop. Combined with limiting stockpiles to <3 m these measures are considered adequate measure for the management of stockpiled materials that are not at a high risk of erosion. 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 in the SMP and ESCP for potentially sodic soils are to be followed; ▪ Wherever practicable, the order of construction of surface protection works including establishing grass cover shall be such that adequate erosion and sediment controls are in place as construction progresses. Watercourse protection ▪ Reinstate surface contours to stable/original profiles to ensure the risks to overland flow regimes are temporary and minor in magnitude; ▪ Watercourse crossings are to be scheduled when rainfall and waterway levels are low; ▪ A range of measures may be implemented to mitigate risk to waterways and these will be documented in the Erosion and Sediment Control Plan. These may include a combination of drainage, erosion and sediment controls such as diversion drains, rock dissipaters, sediment basins etc; ▪ Monitoring of major downstream waterways, including the Severn River, during flow events for turbidity, total suspended solids, pH, electrical conductivity and dissolved oxygen. Cropping soils ▪ Cropping soils in areas of potential strategic cropping land and/or cropping are to be sequentially stripped (in a maximum of three stages) and stockpiled separately; ▪ Depth of cover above the pipeline will be a minimum of 1.2 m; ▪ Soils will be backfilled sequentially in the reverse order of excavation; ▪ Subsoils will be compacted to a similar bulk density to pre-disturbance; ▪ Adequate signage and landholder education will be undertaken to minimise risk of damaging the pipeline during ripping; ▪ In areas subject to cropping, advice will be sought from suitably qualified professionals (CPSS and an agronomist) for specific soil stripping and reinstatement requirements in line with farming practices employed by the land holder. Restoration ▪ Management strategies must be in place to minimise the likelihood of compaction (minimise traffic, monitor the workability of the soils materials, review soil moisture content; ▪ Pipeline trenches will be backfilled as soon as practicable after pipe laying and rehabilitated within three months of commissioning; ▪ Compaction relief (e.g. ripping, scarifying) will be undertaken as required; ▪ Surface soils should be reinstated along the pipeline right of way to match the natural ground level, with sufficient compaction to reduce the likelihood of subsidence. Backfill will need to be compacted and spread to ensure that excess spoil does not divert surface runoff resulting in erosion; ▪ Where sufficient compaction may not be achieved during final re-profiling of the pipeline construction area, a low crown of soil mounded over the trench may be necessary to

Environmental Objective – Geology & Soils ▪ Minimise environmental impact by managing the soil resource and preventing soil loss and erosion.	
	compensate for consolidation. Sufficient breaks in the crown of soil will be incorporated to mitigate surface water runoff diversion and erosion; ▪ Stockpiled topsoil will be re-spread on graded surfaces in an even layer to assist natural regeneration; ▪ Hydro-seeding may be utilised in areas where exposed soils/surfaces are disturbed through work practices and is required to re-establish vegetation; ▪ Exposed areas shall be protected as soon as possible after finishing by hydro-seeding or other appropriate processes to provide a protective cover.
Monitoring	Vegetation, clearing and grading ▪ Weeds must be controlled prior to clear and grade activities; ▪ Vegetation windrows must be periodically inspected to confirm that topsoil and other materials are not mixed through the cleared vegetation. Topsoil stripping and management ▪ The topsoil materials within the ROW and construction areas will be monitored once reinstated to confirm that restoration objectives are met. Subsoil excavation and management ▪ Stockpiles must be periodically inspected (including after rain events) to monitor stability and erosion; ▪ The ROW and construction areas must be monitored to confirm restoration objectives are met and for evidence of tunnel erosion and subsoil hard setting. Erosion and sediment control ▪ All erosion and sediment control measures must be periodically inspected and must be maintained in good working order. More frequent inspections will be required in wet weather periods; ▪ The effectiveness of the ESCP must be monitored as construction progresses. Progressive ESCPs will need to be created to suit progress. Watercourse protection ▪ Implement detailed monitoring programs to assess the impacts of the project on sensitive receiving environments (i.e. water ways and aquatic ecosystems) as follows: ▪ Prior to any disturbance, establish baseline data for the waterway(s). This involves selecting three locations, being 1. Upstream 100m from the construction site, 2. Most southern area of the disturbance zone, and 3. Downstream 100m of the construction site; ▪ Prior to any earthworks/disturbance at the three locations – obtain background monitoring data including pH, electrical conductivity, dissolved oxygen, temperature, suspended solids, visible grease/oil; ▪ For high disturbance areas (e.g. dam area/located adjacent waterways), conduct monitoring initially once a day for the first week and then every second day (e.g. Mon, Wed, Fri). If there are no significant changes to results within the first month or any changes to construction activities, then the frequency of the monitoring may be reviewed and reduced if necessary; ▪ For low disturbance areas (e.g. pipelines/areas not within 100m of waterways), monitoring should occur once per week unless the earthworks/disturbance becomes a high disturbance area; ▪ Monitor meteorological forecasts for storm and heavy rain events to assist in scheduling key activities; ▪ Monitor watercourses before, during and after construction to ensure the stability remains consistent with pre-construction conditions; ▪ Visual inspections to assess effectiveness of erosion controls; ▪ Visual inspections of watercourse banks to ensure no visible evidence of erosion, deteriorated bank conditions at crossings, changes in sedimentation in watercourse beds.

Environmental Objective – Geology & Soils ▪ Minimise environmental impact by managing the soil resource and preventing soil loss and erosion.	
	Cropping soils and restoration ▪ Visual inspections conducted a minimum of twice annually for the first 2 years to monitor effectiveness of restoration measures including at watercourse crossings. Requirement for monitoring beyond 2 years following completion of construction to be determined at the end of the 2-year period and will depend on success of restoration; ▪ Post-disturbance crop yields/vegetation re-establishment will be compared with pre-disturbance yields/vegetation cover and adjacent undisturbed lands; ▪ Annual reports of the Rehabilitation Program must be submitted to the administering authority; ▪ Post-construction audits must be conducted at least annually for the first two years.
Reporting	▪ A Monthly Report must be prepared and submitted to the proponent to include details of monitoring results, audits, training and incidents; ▪ Incidents, spills and releases to the environment must be initially reported to the Project Supervisor and the Contractor Environmental Advisor, and escalated through the Proponent and to the administering authority if serious or material environmental harm is threatened or caused.
Responsibilities	▪ 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.
Corrective Action	▪ Appropriate control measures must be implemented where sedimentation or erosion is identified or may occur; ▪ Necessary corrective actions must be implemented following any incidents or complaints; ▪ 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.

4.2. Land Contamination

Environmental Objective – Land Contamination (spills and remediation) ▪ Prevention of spills that can cause land contamination	
Performance Criteria	▪ Major spills to land must be prevented from occurring; ▪ Minor spills to land must be adequately contained and managed to minimise the extent and severity of land contamination; ▪ Imported fill must be certified as uncontaminated and weed free before being accepted at the site, or transferred between work sites.
Mitigation Measures	Contaminated soil ▪ The requirements of AS1940-2004: *The Storage and Handling of Flammable and Combustible Liquids* must be integrated into the design and operation of all areas and activities that involve a land contamination risk; ▪ Temporary bulk fuel storages (>1,000 litres) must be in double skinned steel tanks; ▪ Temporary minor fuel storages and waste products (e.g. drums and intermediate bulk containers of less than 1,000 litres) must be stored in bunded areas (preferably roofed if practicable); ▪ Safety data sheets and spill kits must be kept in accessible areas near to where hazardous substances are stored; ▪ Appropriate management methods for contaminated soil should be determined through liaison with the administering authority (Department of Environment and Heritage Protection); ▪ Contaminated soil must only be transported by a licensed waste transporter that holds a current environmental authority under the *Environmental Protection Act 1994*, and disposed of to a facility authorised to accept such wastes.
Monitoring	▪ Hazardous substance storage facilities including bund walls must be inspected for integrity periodically, ensuring that contaminated rainwater or spills are not able to be released to

Environmental Objective – Land Contamination (spills and remediation) ▪ Prevention of spills that can cause land contamination	
	land;
Reporting	▪ Emergencies and incidents resulting in major spills of hazardous substances to land must be managed upwards by the Contractor to the Proponent, and notified to the administering authority where environmental harm is caused or threatened. Major spills to land can result in land contamination and impacts to surface and ground waters;
Responsibilities	▪ Contractor: prevent land contamination from occurring, and prepare monthly reports for submission to the Proponent. Report incidents of land contamination to the Proponent; ▪ Proponent: report major incidents to the administering authority. Oversee the remediation of the contaminated site;
Corrective Action	▪ Appropriate training and awareness programs to maintain competence amongst site personnel in preventing and managing land contamination; ▪ The Construction Manager can request the cessation of works at any time should environmental harm be caused or threatened; ▪ Resources should be available at all times to deal with environmental emergencies and incidents. This includes spill kits and other materials that may be useful in constructing temporary bunds (e.g. soil) if required.

4.3. Hydrology

Environmental Objective - Hydrology ▪ Maintain environmental flows within the Severn River and tributaries throughout construction.	
Performance Criteria	▪ Environmental 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 the 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 minimises the impacts of flooding; ▪ 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 for release downstream; ▪ Preparation of flood management plans.
Monitoring	▪ Upstream flow gauging weir to monitor daily flows to determine environmental pass flows.
Reporting	▪ The Department of Natural Resources and Mines (DNRM) will be notified immediately if surface waters are impeded by construction works.
Responsibilities	▪ Contractor: work with the Proponent to ensure that EFOs and WASOs are achieved.
Corrective Action	▪ Adverse impacts to environmental flows within the Severn River must be reported to DNRM; ▪ Rehabilitation will be conducted on areas where unacceptable flow conditions have occurred; ▪ The Contractor will ensure that appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding environmental flow requirements; and ▪ 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.

4.4. 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	▪ Maintain existing ecosystem attributes and water quality within the Severn River throughout the construction period; ▪ Refer to the water quality objectives as per the *Environmental Protection (Water) Policy 2008;* and ▪ Refer to the aquatic ecosystem environmental values as per the latest version of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Queensland Water Quality Guidelines.
Mitigation Measures	Water quality management plan Development of a Water Quality Management Plan encompassing the following principles: ▪ Provision of a water quality monitoring framework, including water quality objectives for ecosystem protection during construction of the project. This will provide details of the routine and event based sampling and analysis that will be conducted for a range of parameters that meet the requirements of stakeholders and interested persons, and provision for specialised sampling and analysis for parameters including toxicants such as heavy metals, pesticides and herbicides; ▪ Attempts will be made to coincide the construction activities with low rainfall periods to minimise erosion and sedimentation; ▪ Land disturbance will be kept to a minimum and progressively cleared to avoid exposing large areas of land to erosion; ▪ Clean stormwater should be diverted around the construction sites where practicable; ▪ Dirty stormwater will need to be treated prior to discharge downstream into the Severn River 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 solids do not settle out of the water in the ponds; ▪ Stormwater and surface 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 sediment basins and ameliorants as required; ▪ Exposed soils will be stabilised via a method deemed appropriate for the soil types and local conditions (e.g. binders, matrix formulations, mulch, matting, geo-fabric); ▪ Progressive stabilisation and revegetation of areas impacted by all construction activities outside of the inundation area, which includes areas disturbed by pipe laying; ▪ Stormwater flow velocities within the construction area will be controlled through the use of energy dissipaters where practicable, and where possible, diverted to existing ponds (e.g. in the former quarry) for treatment and reuse; ▪ Vehicles will be washed down before leaving the construction site if sediment is likely to be transported off-site; ▪ Hydrocarbons and chemicals will be stored in accordance with AS1940-2004: T*he Storage and Handling of Flammable and Combustible Liquids*, the *Work Health and Safety Act 2011* 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; and ▪ Emergency response procedures will be developed, with chemical spill response kits available at all construction sites.
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 impacts from the event; ▪ Routine water quality program (every second month program with four (4) event based occasions per year when inflows exceed 30 ML/day) upstream and downstream of the construction works for the following parameters:

Environmental Objective – Water Quality ▪ Maintain water quality within the Severn River and tributaries throughout construction of the Project and associated activities.	
	▪ temperature, pH, and turbidity; ▪ nuisance algae and chlorophyll-a; and ▪ dissolved oxygen, total phosphorus, 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; and ▪ Emergencies and incidents must be notified to regulatory agencies, as required under the *Environmental Protection Act 1994*.
Responsibilities	▪ Contractor: responsible for minimising the impacts on water quality throughout the construction stage; and ▪ Proponent: review monthly reports provided by the Contractor and oversee the management of water quality.
Corrective Action	▪ Contaminated waters (e.g. elevated turbidity, suspended solids etc) observed flowing from the construction site into the Severn River catchment, will be investigated immediately with a view to ceasing the activity causing the event until control measures can be implemented; ▪ Impacts to downstream water quality shall be reported to the EHP, with records kept of the subsequent investigation and remedial actions taken; ▪ Where erosion has occurred as a result of project activities, the land shall be stabilised as soon as practicable following construction works; ▪ Appropriate training and awareness programs to maintain competence amongst site personnel in preventing and managing land contamination; and ▪ The Construction Manager can request the cessation of works at any time should environmental harm be caused or threatened by the project activities.

4.5. Groundwater

Environmental Objective – Groundwater ▪ Ensure that impacts on groundwater are minimised.	
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; and ▪ Minimisation of changes to groundwater levels throughout the dewatering program.
Mitigation Measures	▪ A Groundwater Monitoring Program must be developed prior to construction to monitor groundwater levels as part of the 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); and ▪ The final bore construction details will be designed by a hydro-geologist as each borehole is drilled, to ensure target yields are obtained for the localised ground conditions encountered.
Monitoring	▪ The Groundwater Monitoring Program must be carried out during the construction and operation of the Project to assess any changes in groundwater levels in accordance with approval conditions.
Reporting	▪ A Monthly Report must be prepared and submitted by the Contractor to the Proponent to include details of monitoring results, audits, training and incidents.

Environmental Objective – Groundwater	
▪ Ensure that impacts on groundwater are minimised.	
Responsibilities	▪ Contractor: responsible for developing and implementing the Groundwater Monitoring Program. Preparation and submission of monthly reports to the Proponent; and ▪ Proponent: oversee the Groundwater Monitoring Program and review the monthly reports provided by the Contractor.
Corrective Action	▪ Significant changes to groundwater levels outside of the zone of influence will be 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; and ▪ 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.

4.6. 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; and ▪ Weed invasion is prevented both within the construction site and in surrounding areas.
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 and EVR will be retrieved in accordance with the Offset Area management Plan; and ▪ 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); and ▪ 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; and ▪ 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; ▪ 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; and ▪ 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; and ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.
Responsibilities	▪ Contractor: responsible for minimising impacts on terrestrial flora through the mitigation measures described above. Preparation and submission of monthly reports to the Proponent; and ▪ Proponent: oversee terrestrial flora management and review monthly reports provided by the 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, SDRC 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.

4.7. 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; and ▪ Fauna species continue to utilise the retained habitat area post-development.
Mitigation Measures	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); and ▪ 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. Any orphaned/injured fauna will be transported to a qualified carer. Retention and Re-use of Hollow Logs ▪ Hollow logs not mulched until inspected by a qualified Ecologist; and ▪ As many hollow logs as possible relocated to areas within Offset Area/Buffer Area
Monitoring	▪ Monitoring of vegetation clearance, earthwork components and requirements of this EMP on a continual basis to confirm that specific controls have been implemented 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; and ▪ Monitor translocation sites to determine the success of the translocation and management actions.
Reporting	▪ Monthly report prepared and submitted to SDRC 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; and ▪ Incidents, complaints and any significant environmental harm reported to regulatory agencies where required.
Responsibilities	▪ Contractor: responsible for terrestrial fauna management according to the mitigation measures described above. Preparation and submission of monthly environmental reports to Proponent; ▪ Proponent: review monthly reports submitted by the Contractor.
Corrective Action	▪ Ensure that the appropriate personnel undertake adequate environmental awareness and

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.		
		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, SDRC 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.

4.8. 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; and ▪ No uncontrolled or untreated release of water or sediment from a work site.
	Mitigation Measures	Increased turbidity and sedimentation ▪ An erosion and sediment control plan developed and implemented during works and operation ▪ Sediment dams constructed before works begin ▪ Works occur in the dry season, if possible Loss of in-stream habitat from works ▪ Locations directly affected by works are assessed for Bell's turtles and nests by a qualified professional before work begins ▪ Fauna are translocated from in-stream areas directly affected by works by qualified professionals before work begins ▪ Riparian vegetation is preserved and maintained, where possible Restriction of passage ▪ Maintain passage for aquatic fauna during construction using diversion channels
	Monitoring	▪ Implement and maintain a program to monitor and control pest species in waterways (both flora and fauna); ▪ Implement and maintain a program for monitoring threatened, near-threatened and iconic aquatic 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; and ▪ Incidents, complaints and any significant environmental harm to aquatic environment reported to regulatory agencies where required.
	Responsibilities	▪ Contractor: responsible for managing impacts on aquatic flora and fauna through the mitigation measures provided above. Preparation and submission of monthly reports to the Proponent; and ▪ Proponent: review monthly reports provided by the 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; and

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.	
	▪ 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.

4.9. Weed Management

Environmental Objective – Weed Management	
▪ To prevent the introduction and spread of weed and pest species throughout the project areas.	
Performance Criteria	▪ Meet obligations under the *Land Protection (Pest and Stock Route Management) Act 2002*; ▪ No mature (or seeding) weeds observable at construction sites or rehabilitated areas; ▪ No new weed infestations within the project area (including ancillary activities and pipeline right of way)All employees working on site must attend induction training sessions to raise awareness of weed management; ▪ Construction vehicles entering the project site must be certified weed free; and ▪ Washdown facilities are available at all times.

Mitigation Measures	Weed Management
	▪ Weed survey of the project areas (including ancillary areas and pipeline right of way) must be completed prior to developing a Weed Management Plan;
	▪ Contractor/proponent to consult with local and state agencies, and landholders where relevant to identify the presence of weeds of major concern;
	▪ Proponent/contractor to develop a Weed Management Plan that covers the construction and operational phase, making provision for:
	  ▪ Raising and maintaining awareness of weed management amongst site personnel;
	  ▪ Developing sub-plans for weeds of major concern, based on information collected from the weed survey and consultation with local and state agencies and landholders
	  ▪ Develop appropriate weed management zones based on the results of the survey and consultations – distinguishing between infested areas and clean areas – this will assist in controlling vehicle and machinery movements
	  ▪ Engaging suitably qualified and competent persons to identify and eradicate declared weeds throughout the construction and operation of the project, using appropriate methods in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002* ;
	  ▪ Preventing the spread of weeds within the project site by managing vegetation clearing practices appropriately and treating exposed areas and stockpiles that contain a seed bank. This includes determining when vehicles/machinery may require a washdown before moving within the project site;
	  ▪ Preventing the import of materials to the site (e.g. mulch/soil/vegetation) that contain weeds and/or weed seeds; and
	  ▪ Preventing weeds and weed seeds being transported to the project site by personnel, vehicles and machinery. This may include specifying the need for Weed Hygiene Declarations for vehicles and machinery entering the project site from other local government areas.

Monitoring	▪ Continual monitoring of project areas (including ancillary activities and pipeline right of way) is needed due to the nature of the construction activities. Training and awareness amongst all site personnel represents the first line of defence against weed spread; and ▪ Areas downstream of the project site must be inspected monthly, and immediately after rainfall and/or flow events. New germinations or infestations of declared weed species will be managed accordingly.
Reporting	▪ Site personnel to report the identification of declared weeds to the Site Supervisor or Environmental Advisor; and

Environmental Objective – Weed Management ▪ To prevent the introduction and spread of weed and pest species throughout the project areas.	
	▪ Contractor to include weed management as an item within the Monthly Report that will be submitted to the proponent. The report should include aspects such as training, areas inspected, type of declared weeds that were identified, and corrective actions taken.
Responsibilities	▪ Proponent: undertake weed management activities that cover the project site up until the site is handed over to the Contractor; ▪ Contractor: Develop and implement a Weed Management Plan as described in the Mitigation Measures above, and submit monthly reports to the proponent; ▪ Supervisors: raise and maintain awareness of weed management amongst all site personnel and sub-contractors and provide feedback on the effectiveness of the Weed Management Plan to the contractor; ▪ Plant/vehicle operators: take responsibility for ensuring that machinery is clean prior to arrival at the project site. If bringing machinery from other Shire areas, obtain a Weed Hygiene Declaration; and ▪ Weed inspectors: undertake routine inspections of the project site and machinery to control the spread of weeds and weed seeds.
Corrective Action	▪ Declared weeds to be controlled as soon as practicable after being identified at the project site, and at least before obtaining maturity or seeding; and ▪ Construction Manager can issue a stop work order if declared weeds are present in a particular construction area, or if vehicles/machinery are brought onto the site without being weed free.

4.10. 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	▪ Meet obligations under the *Land Protection (Pest and Stock Route Management) Act 2002*; and ▪ Completion of pest animal surveys monthly and after rain events.
Mitigation Measures	Contractor to develop a Pest Management Plan that includes: ▪ Responsible waste management practices; ▪ Identification and control of pests; ▪ 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 to avoid creating breeding habitats for mosquitoes.
Monitoring	▪ Presence of pests monitored as part of weekly site inspections; ▪ Waste audits and monitoring to be conducted regularly; ▪ Employees / contractors working on site to report presence of feral animals to the Environmental Advisor; and ▪ Quarterly audits of the EMP to determine effectiveness.
Reporting	▪ Monthly Report prepared and submitted to Proponent to include details of monitoring results, audits, training and incidents.
Responsibilities	▪ Proponent: undertake pest management activities that cover the project site up until the site is handed over to the Contractor; ▪ Contractor: Develop and implement a Pest Management Plan as described in the Mitigation Measures above, and submit monthly reports to the proponent; ▪ Supervisors: raise and maintain awareness of pest management amongst all site personnel and sub-contractors and provide feedback on the effectiveness of the Pest Management Plan to the contractor; and ▪ Pest inspectors: undertake routine inspections of the project site to control the spread of

Environmental Objective – Pest Management ▪ Pest infestations do not increase as a consequence of the project and existing populations of introduced fauna are controlled.	
	pests.
Corrective Actions	▪ Pests must be controlled as soon as practicable after being identified at the project site; ▪ Appropriate control measures must be implemented where infestations are occurring; ▪ Maintain appropriate training and awareness sessions on pest management for relevant site personnel.

4.11. Air Quality

Environmental Objective – Air Quality ▪ To minimise the potential to generate air quality impacts at sensitive receivers.	
Performance Criteria	Air quality objectives: ▪ Total suspended particulates (TSP): 90 µg/m^3 ▪ Particulates as PM_{10} (24 hour average): 50 µg/m^3 (5 exceedances per year allowed) ▪ Dust deposition (monthly average): 120 mg/m^2/day
Mitigation Measures	▪ Haul roads and stockpiles will be watered regularly using truck water carts as required to reduce emissions of dust. Recycled water will be used preferentially for dust suppression purposes; ▪ Stockpiles will be located at least 200m from sensitive receivers; ▪ The size of cleared areas will be minimised to limit exposed areas available for dust emissions by wind erosion; ▪ Surface excavation works will incorporate consideration of prevailing meteorological conditions wind speed and direction, with works ceasing if high winds are blowing in the direction of 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; ▪ 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 affected residents; 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; ▪ Effective communications with local stakeholders on air quality issues associated with construction activities, including providing a dedicated single contact person for complaint handling; ▪ Installation of high efficiency pumps to reduce energy consumption and the implementation of effective leakage management systems to minimise operational losses.
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; and ▪ 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; ▪ Collect one water quality sample of rainwater at affected residences. In the event that air quality monitoring during construction exceeds the air quality objectives, an additional water quality sample will be undertaken.

Environmental Objective – Air Quality ▪ To minimise the potential to generate air quality impacts at sensitive receivers.	
Reporting	▪ Monthly Report prepared and submitted to the proponent to include details of air quality monitoring results, audits, training and the occurrence of any complaints; and ▪ Dust complaints and incidents should be reported by site personnel to the Construction Manager.
Responsibilities	▪ Proponent: manage air quality up until the project site is handed over to the Contractor; ▪ Contractor: manage air quality issues throughout the construction phase. Submit monthly reports to the proponent outlining issues, complaints and corrective actions taken; ▪ Supervisors: raise and maintain awareness of air quality issues amongst all site personnel and sub-contractors and provide feedback on the effectiveness of the control measures to the Construction Manager; and ▪ Site personnel: report air quality issues (e.g. excess dust, smoke, fumes) to the supervisor to determine appropriate control methods.
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. This may include the physical treatment of residences to maintain indoor air quality; ▪ Ensure that the appropriate personnel undertake adequate environmental awareness training regarding air quality management and the environmental management commitments relating to dust generation; and ▪ The Contractor can request the cessation of works at any time if air quality impacts are occurring.

4.12. Noise & Vibration

Environmental Objective – Noise & Vibration ▪ To minimise noise and vibration impacts from construction activities at sensitive receivers.	
Performance Criteria	Noise and blasting objectives ▪ Construction noise (7am – 6pm): LAeq, 1hr 50dB(A) ▪ Construction noise (6pm – 10pm): LAeq, 1hr 50dB(A) ▪ Construction noise (10pm – 7am): LAmax, 1hr 52dB(A) & LAeq, 1hr 37dB(A) ▪ Blasting noise/overpressure (7am – 6pm): 115 dB Lin Pk (9/10) & 120 dB Lin Pk ▪ Vibration: 5mm/s PPV (9/10) and 10mm/s PPV (max).
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*; and ▪ 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 program will continue to be developed in consultation with the local community to schedule activities 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 operational hours; ▪ Appropriate selection of construction processes / methodologies and equipment that

Environmental Objective – Noise & Vibration ▪ To minimise noise and vibration impacts from construction activities at sensitive receivers.		
		minimise the generation of noise will be further considered during the development of the project schedule; ▪ Employ respite periods for activities that have the potential to cause impacts on sensitive receivers where possible; and ▪ 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; ▪ Effective communication with local stakeholders on construction noise including the provision of well designed system for complaint handling and a single point of contact for complaints to be received. 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" noise,

Environmental Objective – Noise & Vibration ▪ To minimise noise and vibration impacts from construction activities at sensitive receivers.	
	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 routes 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; ▪ Construction access road to be located on the same site as the final access road to minimise noise impacts from machinery and construction traffic. 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

Environmental Objective – Noise & Vibration ▪ To minimise noise and vibration impacts from construction activities at sensitive receivers.	
	goals); ▪ identifying the need for further controls or modified site noise management practices; and ▪ establishing the effectiveness of noise mitigation implemented. 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 EHP 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	▪ Contractor: responsible for compliance monitoring and complaint investigation. Provision of monthly reports to the Proponent; and ▪ Proponent: participation at community meetings.
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; and ▪ 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 and/or relocation of the affected resident in the event that established mitigation measures prove to be ineffective.

4.13. Waste

Environmental Objective – Waste Management ▪ To prevent or minimise the generation of wastes, and to appropriately contain, control and dispose of all waste generated.	
Performance Criteria	▪ Implementation of waste management principles (e.g. waste hierarchy) and effective and sustainable disposal strategies on site; and ▪ 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;

Environmental Objective – Waste Management ▪ To prevent or minimise the generation of wastes, and to appropriately contain, control and dispose of all waste generated.	
	▪ 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 at a licensed waste facility; and ▪ Construction and storage areas must be kept 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; and ▪ 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 Contractor. Vegetation unsuitable for timber will be chipped on site to provide mulch for landscaping, or made available to local revegetation projects; and ▪ 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 and oil contaminated materials, fuels, lubricants, tyres, batteries, paints, resins, solvents, sewage sludge and residues. The generation of these wastes will be minimised where possible; and ▪ The management of regulated wastes (collection, transport, tracking, treatment and disposal) will be in accordance with the EHP 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; and ▪ No vegetation waste is to be burnt on site without a 'Permit to Burn' issued by the Rural Fire Brigade. Waste Transport ▪ Restriction of site works and surface truck movements to designated hours; ▪ Ensure the movement of hazardous materials and regulated wastes occurs at non-peak times to minimise the possibility of traffic conflicts and associated risks; and ▪ Transport of wastes will be carried out by a licensed carrier, and in accordance with the EHP 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;

Environmental Objective – Waste Management ▪ To prevent or minimise the generation of wastes, and to appropriately contain, control and dispose of all waste generated.	
	▪ 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 EHP'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; and ▪ 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; and ▪ Incidents, complaints and any significant environmental harm reported to regulatory agencies where required.
Responsibility	▪ Contractor: overall responsibility for effective waste management, including ensuring that all wastes are removed from the site progressively.
Corrective Action	▪ Ensure that the appropriate personnel undertake adequate environmental awareness training covering the requirements of the EMP regarding waste management; and ▪ The Construction Manager can issue corrective action orders if environmental harm or nuisance is being caused or threatened through inappropriate waste management practices.

4.14. 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;
	  ▪ Work Health and Safety Act 2011; and
	  ▪ Local council requirements.
	▪ Undertake refuelling and maintenance activities in designated areas to minimise the potential for soil and water contamination. 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 SDS for each chemical / product used on site, will be available on site

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.		
		and readily available to all site personnel; ▪ Appropriate signage provided using HAZCHEM codes that 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; and ▪ 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 ▪ 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; and ▪ Adequate night lighting through the provision of lighting towers and vehicle headlights will be

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.	
	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*; and ▪ The storage of explosives must be in a suitable location. Public Risk ▪ enhancing physical protection to the public by the use of natural ground features; and ▪ vehicular access routes and junctions with public roads. Security ▪ other activities within the proximity of the site; ▪ 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; and ▪ 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.

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; and ▪ Incidents, complaints and any significant environmental harm reported to regulatory body/ies

Environmental Objective – Hazard & Risk (Hazardous Substances) ▪ Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.		
		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; and ▪ Schedule construction to avoid periods with highest risk from heavy rain events.

4.15. 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 (TMR and/or SDRC) 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; and ▪ Corrective measures implemented in response to traffic impacts subsequent to construction works.

Mitigation Measures	▪ Transport of hazardous and dangerous materials during the construction phase will be undertaken in accordance with the EHP tracking system as defined in *Environment Protection (Waste Management) Regulation 2000;*
	▪ Prepare a Traffic Management Plan in consultation with TMR and SDRC (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;
	  ▪ Traffic management;
	  ▪ Operations;

Environmental Objective – Transport & Roads ▪ Manage construction traffic and transport issues to minimise potential impact on the community and the operation of the road network.	
	▪ 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; and ▪ 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; and ▪ 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; and ▪ 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; and ▪ Incidents, complaints and any significant environmental harm reported to regulatory agencies where required.
Responsibility	▪ Contractor: responsible for minimising impacts on transport and roads. Participation at community consultation meetings; and ▪ Proponent: participation at community consultation meetings.
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; and ▪ The Construction Manager can request the cessation of works at any time if necessary.

4.16. 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; and ▪ All unknown indigenous archaeological records found during the course of the Project are reported to the DNRM and the proponent.
Mitigation Measures	▪ Cultural Heritage Management 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; and ▪ 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, DNRM and the Proponent; and ▪ Report any findings of any European archaeological items to EHP and Proponent.
Responsibilities	▪ Contractor: including all site personnel; ▪ Proponent: including all site personnel.
Corrective Action	▪ Non-compliances to be followed to completion.

4.17. Visual Amenity

Environmental Objective – Visual Amenity ▪ Minimise the potential impacts on the visual environment during construction	
Performance Criteria	▪ Disturbed areas are to be rehabilitated with native endemic vegetation; ▪ Recreation facilities are established and completed prior to opening of the site for public access and use; and ▪ Areas cleared around the full supply level of the dam are maintained and 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 and conserving vegetation downstream of the dam wall to act as a visual screen.
Monitoring	▪ Inspections carried out to assess the health of rehabilitated areas and the foliage growth rates and percent cover.
Reporting	▪ As stipulated by the Proponent.
Responsibility	▪ Contractor: overall responsibility for managing visual amenity. Participation in community consultative meetings and operating the complaints handling system; ▪ Proponent: participation in community consultative meetings.
Corrective Action	▪ Complaints of visual amenity impacts must be investigated and followed up accordingly; ▪ Details of complaints are to be recorded as per the complaints handling system developed by the Proponent and Contractor.

5. OPERATION ENVIRONMENTAL MANAGEMENT PLAN

The operator of the project will be responsible for managing the ongoing environmental impacts associated with the operation of the dam and the ancillary activities and areas. The environmental aspects associated with the operation of the project are described in the following tables.

5.1. Management of Water Storage

Environmental Objective ■ Conform to flow requirements of the Resource Operations Plan. ■ Maintain downstream Environmental Flow Objectives and Water Allocation Security Objectives.	
Performance Criteria	■ Compliance with Environmental 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; ■ Environmental releases to be matched to inflows; and ■ Quality of water within the dam (including sediment levels) to be managed appropriately to ensure nutrients and sediment do not impact on downstream waters, which may contain Bell's freshwater turtle.
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; and ■ 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.
Responsibilities	■ Dam Operator: responsible for conforming to the flow requirements of the Resource Operations Plan and for maintaining environmental flow objectives and water allocation security objectives.
Corrective Action	■ Adverse impacts to environmental flows within Severn River must be reported to the DNRM. ■ SDRC will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding environmental flow requirements.

5.2. 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	▪ Maintain existing ecosystem attributes and water quality within the Severn River throughout the construction period; ▪ Refer to the water quality objectives as per the *Environmental Protection (Water) Policy 2008; and* ▪ Refer to the aquatic ecosystem environmental values as per the latest version of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Queensland Water Quality Guidelines.
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. Turbidity ▪ Exposed soils will be stabilised as quickly as possible; ▪ Revegetation of areas impacts outside the inundation area; ▪ Where possible, rehabilitate 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
	  ▪ dissolved oxygen, 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

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.	
	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; and ▪ 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; and ▪ 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.

5.3. Terrestrial Flora

Environmental Objective – Terrestrial Flora ▪ Ongoing monitoring to determine potential impacts from dam operation	
Performance Criteria	▪ Retained vegetation and downstream vegetation not compromised by dam operation

Mitigation Measures	▪ Environmental Release Strategy:
	  ▪ Inflow to the dam < 30 ML/d – release from dam = inflow to dam
	  ▪ Inflow to the dam > 30 ML/d – release from dam = 30 ML/d
	▪ Weed and pest management

Monitoring	▪ 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 downstream from the dam wall; ▪ Periodic condition monitoring by SDRC of all retained vegetation, with a maximum interval between inspections of 12 months;
Reporting	▪ Any significant environmental harm reported to regulatory body/ies where required.
Responsibilities	▪ Proponent: oversee terrestrial flora management

Corrective Action	▪ If monitoring downstream shows that the Project is having an impact, SDRC 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.

5.4. 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 area; and ▪ 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 Fauna ▪ inclusion of fish lock as proposed, with measures to restrict access to high velocity water release sites and the hydraulic mechanism ▪ managed environmental releases to maintain connectivity consistent with current conditions ▪ Develop management plan to control exotic and pest species such as goldfish within and downstream of the dam. ▪ Develop a management plan for water quality in the storage and environmental releases Aquatic Flora ▪ Develop a program 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 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 grass. Auditing ▪ Regular auditing undertaken to ensure compliance with objectives of the EMP.
Monitoring	Aquatic Ecology ▪ a comparison of the condition of aquatic ecology in the Severn River upstream of, within and downstream of the proposed dam ▪ an assessment of impacts, if any, to key aquatic species and aquatic habitat (including a comparison of fish populations upstream, within and downstream of the dam) ▪ complete at least two baseline surveys before commissioning works, and at least two surveys after works begin (with the need for further surveys to be determined based on the results) Turtles ▪ an assessment of the turtle populations in the Severn River upstream of, within and downstream of the proposed dam; ▪ a targeted survey of Bell's turtles during a period of high activity (i.e. October–December); and ▪ recommendations for monitoring and management of impacts, if any.
Reporting	▪ SDRC to report on dam operations as per Resource Operations Plan; and ▪ 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; and ▪ Implementation of measures to protect aquatic biota if impacts from operation are affecting the viability of the ecosystem.

5.5. 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; and ▪ 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. 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 EHP 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; and ▪ 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.