Glossary

Term	Definition
Abutment	The part of a valley against which a dam or weir is constructed. Right and left abutments are those on respective sides of an observer looking downstream.
Allocated water	Water that a person or entity has been granted an entitlement to extract.
Alluvial (alluvium)	Weathered material transported and deposited by the movement of water.
Animal	Any member, alive or dead, of the animal kingdom (other than a human being).
Annual Exceedance Probability (AEP)	The probability of a specified magnitude of a natural event being exceeded in any year.
Annual Proportional Flow Deviation	Annual proportional flow deviation is the statistical measure of changes to flow season and volume in the simulation period calculated using the formula in Technical Report 5 of "Fitzroy Basin Water Allocation and Management Planning Technical Reports" (DNRW, 1999)
Anoxic	Without or depleted of oxygen.
Aquatic macrophyte	Submerged, emergent or floating aquatic vegetation that is visible to the naked eye.
Aquifer	A water-bearing stratum of permeable rock, sand, or gravel, able to transmit substantial quantities of water.
Australian Height Datum (AHD)	The datum used for determining elevations in Australia which uses a national network of bench marks and tide gauges, and has set mean seal level as zero elevation.
Average Recurrence Interval (ARI)	The average interval (in years) between the occurrence of a flow, discharge or rainfall greater than or equal to a specified amount.
Biodiversity	Biodiversity is short for “biological diversity”. It describes the variety of life forms and their habitats that make up a region. Biodiversity includes the diversity of plant and animal species, the diversity of ecosystems formed by communities of these organisms, and the genetic diversity within and between species.
Boggomoss	A series of small elevated peat mounds which are fed by springs which are leakages from aquifers of the Great Artesian Basin. Where the water percolates above ground, a unique habitat is formed with sedges, tall grasses and ferns.
Bunding	An artificially created boundary, usually in the form of an embankment used to prevent sediment and substances from entering a water stream or storage facility.
Common	The wildlife is common or abundant and is likely to survive in the wild.
Community	An assemblage of interdependent populations of different species (plants and animals) interacting with one another, and living in a particular area.
Compensatory habitat	A vegetation offset to maintain the extent of remnant vegetation that will be loss as a result of the Project.
Connectivity	Refers to the ease with which organisms move between particular landscape elements.
Dead storage	The volume in a water storage below the lowest operable level.
Easement	An access right held by a third party to enter upon and make use of land belonging to another for a specified purpose.
Ecology	The study of the interrelationships of organisms with and within their environment.
Ecosystem	A biophysical environment containing a community of organisms.
Edge effect	All changes at an ecosystem boundary and within adjacent ecosystems; the negative influence of a disturbed habitat edge on the interior conditions of a habitat, or on species that use the interior habitat.

Term	Definition
Endangered	A species is endangered if: ■ there have not been thorough searches conducted for the wildlife and the wildlife has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife; or ■ the habitat or distribution of the wildlife has been reduced to an extent that the wildlife may be in danger of extinction; or ■ the population size of the wildlife has declined, or is likely to decline, to an extent that the wildlife may be in danger of extinction; or ■ the survival of the wildlife in the wild is unlikely if a threatening process continues.
Endangered Regional Ecosystem	A regional ecosystem is listed as endangered under the *Vegetation Management Act 1999* (Qld) if remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares.
Endemic	Restricted to a certain region or part of region.
Environment	The total of all the external conditions that act upon an organism.
Environmental flow	The flow of water that is required to maintain aquatic and riparian ecosystems in streams and rivers.
Environmental Flow Objective (EFO)	Performance indicators set out in the *Water Resource (Fitzroy Basin) Plan 1999* for the measurement of the environmental performance of the Fitzroy Basin.
Environmental quality	Human (individual or social) concepts of desirable ecological situations.
Ephemeral	Transitory, short-lived.
Erosion	The process by which rocks are loosened, worn away and removed from parts of the Earth's surface. Seven processes of erosion discussed separately; in practice they overlap and it is often difficult to isolate the net effects of any one process. **Rainsplash erosion:** the detachment and removal of soil and debris by raindrop impact. **Overland flow OR surface runoff:** water flowing over the surface before being concentrated into definite streams. **Sheet erosion, sheet wash, or slope wash:** the combined effect of overland flow and rainsplash. **Gully erosion:** the rapid development of gullies, usually in first- or second-order tributaries of streams, BUT also in situations unrelated to an integrated drainage system (e.g. highly dispersive soils) **Mass Movement:** downhill movement of debris ***en masse*** rather than as individual particles. It can occur slowly (creep), or rapidly (rockfalls, slumps, landslides). **Surface rock creep:** the movement of stones down sloping surfaces. **Fluvial erosion:** the detachment and removal by streams of material in solution, suspension, or as bed load. Includes removal of debris supplied to the streams by slope wash, mass movement, and gullies.
Exotic species	Introduced species not native or endemic to the area in question.
Fauna	The collective animals of a given region (see definition for 'animals').
Feral	An introduced or domestic animal living in the wild.
Flood plain	That portion of a river valley that is covered during periods of high flood water.
Flora	The collective plants growing in a geographic area (see definition for 'plants').
Flora	See definition for 'plants'

Term	Definition
Flow duration curve	A cumulative plot showing the percent of time that given flow volumes are equalled or exceeded.
Flow regime	The variation in flow characteristics, such as volume, for a particular stream over time.
Fluvial	The river system.
Fragmentation	A process of landscape alteration in which natural areas are subdivided into smaller patches.
Full Supply Level (FSL)	The maximum normal operating water surface level of a reservoir.
Gilgai	Melon hole, mound depression surface.
Good Quality Agricultural Land (GQAL)	Agricultural land is defined as land used for cropping and grazing but does not include land used for intensive animal husbandry such as aquaculture, feedlots, piggeries, poultry farms and plant nurseries. Agricultural land considered to be of good quality would be: ■ Suitable for, and capable of, sustainable agricultural use; ■ Important for agricultural activities of State or regional significance; and ■ Available for agricultural use.
Groundwater	Water found underground in porous rock or soil strata.
Habitat	The biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms.
Inflatable rubber dams/ Fabridam	Fabric reinforced rubber membranes that are securely anchored to the crest of the weir and inflated with either water or air to raise the FSL of a storage.
Integrated Quantity and Quality (IQQM) Model	The IQQM is a planning model that is used to investigate impacts of water resources management options in regulated and unregulated river systems.
Inundation area	The area that will be flooded with water above the existing water level, from raising of the dam.
Listed species	A plant or animal included in a schedule of vulnerable, rare or endangered biota, such as the schedules in the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) or the *Nature Conservation (Wildlife) Regulation 2004* (Qld).
Matter of National Environmental Significance	The matters of national environmental significance include: ■ listed threatened species and communities ■ listed migratory species ■ Ramsar wetlands of international importance ■ the Commonwealth marine environment ■ World heritage properties ■ National heritage places ■ nuclear actions as defined by the Commonwealth Minister for the Department of Environment and Water (see 'controlled action').
Native species	A species that is indigenous to Australia or an external Territory, or periodically or occasionally visits.
Natural environment	The complex of atmospheric, geological, and biological characteristics found in an area in the absence of artefacts or influences of a well-developed technological human culture.
'Not of Concern' regional ecosystem	A regional ecosystem is listed as 'Not of Concern' under the *Vegetation Management Act 1999* (Qld) if remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares.
'Of Concern' regional ecosystem	A regional ecosystem is listed as of concern under the *Vegetation Management Act 1999* (Qld) if remnant vegetation is 10-30 per cent of its pre-clearing extent across the

Term	Definition
	bioregion; or more than 30 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares.
Overtopping	The process whereby the water level rises above the height of the weir or dam wall
Plant	A member, alive or dead, of the plant kingdom or of the fungus kingdom, and includes a part of a plant and plant reproductive material.
Probable Maximum Flood (PMF)	The flood resulting from the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions.
Rare	An animal is rare / near threatened if: ■ the population size or distribution of the wildlife is small and may become smaller; or ■ the population size of the wildlife has declined, or is likely to decline, at a rate higher than the usual rate for population changes for the wildlife; or ■ the survival of the wildlife in the wild is affected to an extent that the wildlife is in danger of becoming vulnerable.
Recharge	The process involving the infiltration of water from the surface to groundwater.
Recovery plan	A recovery plan is a document stating the research and management actions necessary to stop the decline, support the recovery and enhance the chance of long-term survival in the wild, of a stated species or community of protected wildlife.
Regional ecosystems (RE)	Regional ecosystems were defined by Sattler and Williams (1999) as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
Regrowth	A young, usually even-aged forest stand that has regenerated after disturbance.
Rehabilitation	Making the land useful again after a disturbance. It involves the recovery of ecosystem functions and processes in a degraded habitat.
Remnant vegetation	Small remaining areas of naturally occurring vegetation in a landscape that has been altered by human activity such as agriculture. These remnants were once part of a continuously vegetated landscape.
Riparian	Pertaining to, or situated on the bank of, a body of water, especially a watercourse such as a river.
Riverine	Pertaining to rivers.
Sediment	Any usually finely divided organic and / or mineral matter deposited by air or water in non-turbulent areas.
Sedimentation pond	An artificial retention basin designed to trap suspended sediments carried in overland water flow before discharge into a water storage facility.
Species	A group of biological entities that (a) interbreed to produce fertile offspring; or (b) possess common characteristics derived from a common gene pool.
Spotter/catcher	An ecologist who is accredited by the Queensland Parks and Wildlife Service (QPWS) to capture and relocate fauna (mainly mammals) from trees prior to vegetation clearance.
Terrestrial	Pertaining to land, the continents, and/or dry ground. Contrasts to aquatic.
Threatened	A collective term for native plants and animals which are presumed extinct, endangered and vulnerable.
Threatened species and ecological communities	Threatened species or ecological communities listed and protected under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) or the Nature Conservation Regulation (Qld).
Topography	Description or representation of natural or artificial features of the landscape; the description of any surface, but usually the earth's.

Term	Definition
Translocation	The transfer of plants and animals from one part of their range to another.
Unallocated water	Water to which an entitlement to extract has not been granted.
Vulnerable	A species is vulnerable if: ▪ its population is decreasing because of threatening processes, or ▪ its population has been seriously depleted and its protection is not secured; or ▪ its population, while abundant, is at risk because of threatening processes; or ▪ its population is low or localised or depends on limited habitat that is at risk because of threatening processes.
Water Allocation Security Objective (WASO)	Means an objective that may be expressed as a performance indicator and is stated in a water resource plan for the protection of the probability of being able to obtain water in accordance with a water allocation.
Weathering	Changes in the coherence, texture and composition of rocks and minerals by either physical (mechanical) or chemical processes as a result of exposure at the Earth's surface.
Weed	A plant that is considered undesirable because it threatens the persistence of native plants.
Wetlands	Low-lying areas regularly inundated or permanently covered by shallow water. Usually important areas for birds and other wildlife.
Wildlife	An animal, plant or specimen derived from an animal or plant.
Wildlife corridor	A strip of habitat that facilitates fauna movement between otherwise isolated patches of habitat.
World Heritage property	Under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), a World Heritage property is either: ▪ an Australian property on the World Heritage List kept under the World Heritage Convention; or ▪ a property declared to be a World Heritage property by the Commonwealth Environment Minister.

Abbreviations

Term	Definition
APIA	Australian Pipeline Industry Association
AS	Australian Standard
CEMP	Construction Environmental Management Plan
CG	Coordinator-General
DERM	Department of Environment and Resource Management
DNRW	Department of Natural Resources and Water (now part of DERM)
DO	Dissolved Oxygen
DPIF	Department of Primary Industries and Fisheries
DVDA	Dawson Valley Development Association
EFO	Environmental Flow Objectives
EIS	Environmental Impact Statement
EMP	Environmental Management Plan

Term	Definition
EP Act	*Environmental Protection Act 1994*
EPA	Environmental Protection Agency (now part of DERM)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activity
ESCP	Erosion and Sediment Control Plans
EVR	Endangered Vulnerable and Rare
FBF&F	Fitzroy Basin Food and Fibre Association
FPWF	First Post Winter Flow
FSL	Full Supply Level
ha	hectare
IAC	Irrigator Advisory Committee
IDAS	Integrated Development Assessment System
IP Act	*Integrated Planning Act 1997*
km	kilometre
LOS	Level of Service
LSV	Local Supply Volumes
m	metre
m^2	metres squared
m^3	metres cubed
ML	megalitre
MSDS	Material Safety Data Sheet
NWI	National Water Initiative
OEMP	Operational Environmental Management Plan
QLD	Queensland
RE	Regional Ecosystem
ROP	Resource Operations Plan
SBR	Surat Basin Rail
SWIMS	SunWater Water Information Management System

1 Introduction

1.1 Proponent

The Proponent for the Project is the Wandoan Joint Venture (WJV). SunWater Limited, the owner and operator of the Glebe Weir, has entered into commercial arrangements with the WJV to carry out the Glebe Option.

1.2 Location

Figure 1-1 of volume 4 of the EIS has been updated to include the proposed route of the Surat Basin Rail (SBR) corridor and is included on the following page.

Figure 1-1 The Raised Glebe Weir inundation Area and Pipeline Route

2 Rationale and Alternatives

2.1 Rationale

The decision making process to determine which water supply option will be used is described in Volume 1, Chapter 11, section 11.4.4 of the EIS and Supplementary EIS.

In relation to the concern that if Nathan Dam is not approved, there will be limited scope for improvements in downstream water supply, within the scope of current planning this is correct. SunWater is unaware of any other dam site which could provide the storage capacity of the Nathan Dam site and service the needs of users in the Dawson catchment. As the need for such further storage was identified in the Central Queensland Regional Water Supply Strategy and Nathan Dam was named as the preferred option, should Nathan Dam not proceed for whatever reason, the strategy should be re-visited.

2.2 Alternatives

It is recognised the National Water Initiative (NWI) states water trading should be an option for securing water before new storages are constructed. The NWI and the associated Water Reform Framework under Council of Australian Governments were discussed in sections 3.2.5 and 3.2.6 of volume 4 of the EIS. SunWater has investigated water trading as an option to supply water for the WJV, however determined there to be insufficient availability to meet the full required demand. The current approach uses trading to supply part of the requirement in the form of a permanent trade. Temporary trade would be inappropriate for a high priority need as it does not give the necessary long term supply security.

SunWater also discussed the option of utilising existing privately owned off-stream storages as an alternative to raising Glebe Weir with Fitzroy Basin Food and Fibre Association (FBF&F) (the submitter) during the development of the Supplementary Report. It was established that this solution carried too many technical, physical and regulatory risks and would not supply the level of security that is required for the project.

3 Legislation and Approvals

3.1 Integrated Planning Act 1997

Although it was not noted in the Integrated EIS Summary that a permit will be required for the pump station on Cockatoo Creek, the need for the permit was appropriately identified in Table 3.1 of volume 4 of the EIS.

3.2 Fisheries Act 1994

Section 3.3.17 of volume 4 of the EIS noted that approval of waterway barrier works would be assessed against the relevant provisions of the *Fisheries Act 1994*.

Table 3.1 of volume 4 of the EIS noted the requirement for assessment of barriers across any waterway.

Chapter 21 of volume 4 of the EIS was the Environmental Management Plan for raising of Glebe Weir. Table 21-7 *Aquatic Flora and Fauna* specifically included the performance criteria that "The sizing of temporary bridges or culverts should be such as to not hinder passage". SunWater is committed to appropriate management of all potential waterway barriers.

It was suggested on page 3 of the Department of Primary Industries and Fisheries (DPIF) submission and during the preparation of the EIS, that as an alternative to providing a fishway on Glebe Weir, SunWater could consider retrospectively providing a fishway on a weir elsewhere on the Dawson River. Subsequent discussions with DPIF have now confirmed the preferred alternative as retrospectively fitting a fishway on Tartrus Weir on the Mackenzie River (providing that this fishway was not already funded through alternative means). The proponent agrees with this strategy based on the assumption that a fish movement exemption notice for Glebe Weir would be provided by DPIF and that no fishway will be required on Glebe Weir as a consequence of the WJV.

3.3 Forestry Act 1959

SunWater agrees that the Forestry Act 1959 is certainly, rather than potentially, relevant to the Raising Glebe Weir option.

The Forestry Act regulates the management, silvicultural treatment and protection of State forests, and the sale and disposal of forest products and quarry material, the property of the Crown on State forests, timber reserves and on other lands and for other purposes.

Approval is required for the removal of forestry products including timber and quarry materials. Part 6 of the Act sets out the requirements in relation to the control and disposal of forest products and quarry material. For the Raising Glebe Weir option, the forest products provisions relate to commercial timber within the high banks of the raised weir storage and within the Nathan Road reserve. SunWater appreciates and will act upon the offer made in the submission by the Manager, NRW Forest Products, to assist with the identification and processing of commercial trees from the project area.

As identified in Table 3-1 of volume 4 of the EIS, permits for quarry material may be required under the Forestry Act and this will depend on the source of the material. As the sources become better defined SunWater will liaise with the Manager, NRW Forest Products, with respect to the appropriate permits.

3.4 Water Resource (Fitzroy Basin) Plan 1999

SunWater acknowledges that the proposed arrangements for Glebe Weir raising will need to be detailed in the Fitzroy Basin ROP after approval by NRW. As discussed with NRW, SunWater will not seek an amendment to the current Fitzroy ROP as it will expire in late 2010 but will instead propose that the new arrangements be included in the new Fitzroy ROP which will in turn be based on the Fitzroy Basin Water Resource Plan (WRP) now undergoing its 10 year review. At a later date SunWater will make a formal proposal to NRW regarding Glebe Weir raising in the new Fitzroy ROP. The modelling results provided in the EIS are preliminary results, which may

be considered as indicative. However, the final arrangements will be as approved by NRW and included in the Fitzroy ROP.

3.5 Environmentally Relevant Activities

Table 3.1 of volume 4 of the EIS identifies the requirement for a development application for a material change of use for a number of Environmentally Relevant Activities (ERA). The table below provides further detail on the ERAs and identifies where the EIS describes the mitigation measures to achieve an acceptable level of environmental performance.

Since the submission of the EIS, the Environmental Protection Regulation has been updated. The descriptions and terminology of the new regulation (*Environmental Protection Regulation 2008*), differ from the previous regulation and are used to describe the ERAs in the table below.

• **ERA 16 – Extractive and Screening Activities**	
Legislative Description	(1) Extractive and screening activities (the *relevant activity*) consists of any of the following— (a) dredging a total of 1000t or more of material from the bed of naturally occurring surface waters, in a year; (b) extracting, other than by dredging, material from a wild river area; (c) extracting, other than by dredging, a total of 5000t or more of material, in a year, from an area other than a wild river area; (d) screening 5000t or more of material in a year. (2) The relevant activity does not include— (a) extracting material— (i) under an environmental authority (mining activities); or (ii) in the course of cutting and filling land for constructing a road or railway; or (b) extracting material from a wild river area if— (i) the primary purpose of extracting the material is not to gain the material; and (ii) no more than 1500m^3 of materials is extracted or the surface area from which the material is extracted is less than 5200m^2; or (c) extracting material from a road reserve in a wild river area if— (i) the material is to be used for constructing or maintaining a road; and (ii) no more than 5000t of material is extracted in the relevant year.
Project Activity	The weir is to be constructed of material that will be sourced from within the project area or external quarries, including: ▪ coarse aggregate —from existing licensed sources; ▪ coarse sand — A deposit in Cockatoo Creek / Sandy Creek junction area approximately 30 km south-east of Glebe Weir, and / or other local sources to be confirmed or an existing licensed source outside the shire; ▪ fine sand — from existing licensed sources and / or from a local deposit to be confirmed; It is anticipated that ERA 16 Level 1(c) will be required to be obtained for extractive operations within the project area. It is possible that all sand will be obtained from areas adjacent to the Cockatoo Creek and Sandy Creek therefore dredging would not be triggered, however given the preliminary stage of the project, it is assumed that some dredging will occur. It is anticipated that ERA 16 Level 1(a) will be required to be obtained for screening activities. The onsite washing, screening and blending plant will be located within the construction footprint and will manufacture filter materials to meet the specified requirements for the weir wall. It is anticipated that ERA 16 Level 1(d) will be required to be obtained for screening activities.
Mitigation Measures	Refer to the following tables in the EMP in Chapter 21 of volume 4 of the EIS for details of the mitigation measures: ▪ Table 21-3 Soils, Geology and Geomorphology ▪ Table 21-5 Water Quality ▪ Table 21-6 Air Noise and Vibration
• **ERA 43 – Concrete Batching**	

Legislative Description	(1) Concrete batching consists of producing 200t or more of concrete or concrete products in a year, by mixing cement with sand, rock, aggregate or other similar materials.
Project Activity	A concrete batching plant will be located within the weir wall construction site. The batching plant will process in excess of 200t annually over the construction period.
Mitigation Measures	Refer to the following tables in the EMP in Chapter 21 of volume 4 the EIS for details of the mitigation measures: ▪ Table 21-6 Air Noise and Vibration
• **ERA 56 – Regulated Waste Storage**	
Legislative Description	(1) Regulated waste storage (the relevant activity) consists of operating a facility for receiving and storing regulated waste for more than 24 hours. (2) The relevant activity does not include— (a) storing less than 5t, or fewer than 500 equivalent passenger units, of tyres or parts of tyres; or (b) storing regulated waste in transit; or (c) storing at a facility, for no more than 28 days, any of the following, awaiting removal from the facility for recycling, reprocessing, treatment or disposal— (i) fewer than 500 batteries; (ii) pharmaceuticals; (iii) body parts; (iv) clinical waste consisting only of sharps in sharps containers that comply with AS 4031 or AS/NZ 4261; (v) less than 5000L of waste oil; or (d) carrying out an activity to which section 20, 25, 27, 53, 59, 60, 61 or 62 would apply if the activity were carried out within a stated threshold under the section; or (e) carrying out an activity to which section 55 or 58 applies.
Project Activity	Waste products (e.g. acidic solutions from the passivation of stainless steel surfaces, curing oils and form oils), will be located in the construction footprint and contained within sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater.
Mitigation Measures	Refer to the following tables in the EMP in Chapter 21 of volume 4 the EIS for details of the mitigation measures: ▪ Table 21-4 Land contamination ▪ Table 21-5 Water Quality ▪ Table 21-10 Waste ▪ Table 21-11 Hazard and Risk
• **ERA 61 – Waste Incineration and Thermal Treatment**	
Legislative Description	(1) Waste incineration and thermal treatment (the relevant activity) consists of operating a facility for incinerating or thermally treating waste. (2) The relevant activity does not include thermal treatment of waste carried out as part of another activity mentioned in this schedule.
Project Activity	Clearing of existing vegetation will be required in the construction footprint and inundation area. Cleared vegetation will be reused on site wherever possible (i.e. harvestable timber, mulch etc), however some vegetation may be burnt on site. Any weed material cleared will not be reused on site and will be removed to a licensed landfill that accepts green waste or burnt on site to prevent re-seeding. It is anticipated that a 'pit' will be constructed at each location, and blowers would be used to maintain heat and reduce smoke emissions.
Mitigation Measures	Refer to the following tables in the EMP in Chapter 21 of volume 4 the EIS for details of the mitigation measures: ▪ Table 21-5 Water Quality ▪ Table 21-6 Air Noise and Vibration ▪ Table 21-11 Hazard and Risk

4 Consultation

4.1 Stakeholder List

FBF&F is included in the stakeholder list for the consultation program.

4.2 Downstream Users

Section 4.4.1 of volume 4 of the EIS discusses the consultation process and that a number of '*Interested Persons'* were identified by:

- assessing which Local or State authorities had a controlling or regulatory interest in any land impacted by this option; and
- researching and identifying community groups and stakeholders that held an indirect interest in the Glebe Option, such as cultural, environmental or industry groups.

The FBF&F Association, the Irrigator Advisory Committee (IAC) and the Dawson Valley Development Association (DVDA) were identified as representatives of the irrigation community. Representatives from FBF&F and IAC met with the regional manager of SunWater in Biloela as part of the consultation program for the EIS. DVDA were also consulted.

Further consultation with FBF&F has been undertaken during the development of the Supplementary Report, particularly in relation to potential impacts to downstream users. SunWater is committed to ongoing communication with FBF&F throughout the approval and implementation process. Consultation with other representatives of the downstream irrigation community will continue.

5 Description of Project

5.1 Weir Design

Overshot and undershot are terms that refer to the operation of gates on a spillway, not to offtakes.

With reference to overshot spillways, this has always been incorporated into the design of the Weir Raising (**Figure 5-1**). In relation to DPIF's preference for smooth spillways, the Glebe Weir is currently a smooth non-stepped spillway and will remain this way following the raising of the weir. Similarly DPIF's recommendation that offtakes be screened was discussed in section 5.3.1.2 and section 5.3.2.1 of volume 4 of the EIS with respect to both the existing offtake and the intake to the pump station.

5.1.1 Fabridams

As discussed in section 5.3.1.3 of volume 4 of the EIS, the Glebe Weir design will be reviewed in light of the findings from investigations into the Bedford incident and alternative options for raising Glebe Weir may be assessed. An alternative may include the use of collapsible steel shutters instead of fabridams. The gates operate in a similar manner to fabridams. This design has been utilised by SunWater on two other water storages, including Clare Weir on the Burdekin River, and Ben Anderson Barrage on the Burnett River.

Should SunWater decide to use the steel shutters, the weir will be raised to an identical height to that currently outlined in this EIS. Subsequently whilst some minor changes may occur in relation to the construction process, the vast majority of impacts outlined in the EIS document will remain unchanged.

The submissions' suggestion that draining of the weir would result in downstream impacts related to increased flow is based on the assumption of a significant rate of release. This is incorrect. SunWater propose to construct the part of the weir which requires lower water levels during the dry season when levels within the weir are not at FSL. It is anticipated that no extra water will need to be released beyond the current release rate. However, if water is required to be released, it would be done so slowly, likely more slowly than it is currently released for downstream purposes. There has been no suggestion that the current rate of release has resulted in any of the potential impacts suggested in the submission so there is no reason to believe that lowering of the water level within the weir would have any greater potential to cause impacts. It should also be noted that the existing weir is quite often completely drained in order to meet downstream irrigation demands.

Figure 5-1 Typical Cross Sections

5.1.2 Pipeline

The Canadian Code of Practice is not referenced in volume 4 of the EIS.

The design and construction of the pipeline is based on AS2566.1:1998 and AS2566.2:2002 for buried flexible pipelines as this is the more relevant standard, not AS2885 as this is for the design and construction of gas and liquid petroleum pipelines. SunWater also has its own standards for the design and construction of pipelines which comply with and/or exceed the requirements of AS2566. The Glebe – Wandoan pipeline will also be in accordance with the SunWater standards.

In relation to the Australian Pipeline Industry Association (APIA) Code of Environmental Practice, the mitigation measures proposed in the EMP are in accordance with the recommendations outlined in the APIA Code.

5.2 Construction

5.2.1 Pipeline

Section 5.4.3 of volume 4 of the EIS notes one of the strategies underpinning the rehabilitation program for the project is to minimise the area disturbed during construction. Similarly, Chapter 22 Summary of Commitments (Aquatic Ecology) included the following commitments:

- the area physically disturbed will be kept to the minimum necessary;
- works will be undertaken during the dry season;
- the streambed at pipeline crossings will be disturbed for only short periods and will be restored to their initial profile and character on completion;
- key habitat features at pipeline crossings to be restored include the sediment profile and other physical structures such as logs and boulders which will be stockpiled when first removed then replaced on completion of works;
- riparian areas along the pipeline route will be revegetated with endemic grasses only because they will be within the maintenance corridor, so trees will not be planted;
- works will be scheduled to provide for the progressive and timely stabilisation and rehabilitation of disturbed areas; and
- on-going sediment and erosion control around the worksites following construction.

These commitments aim to ensure that disturbance to waterway bed and banks will be minimised. In creek beds it will not be necessary to use the full easement width because no lay down area will be required. However the trench itself and the area required for machinery access will be necessary.

The preferred pipeline alignment does not cross any permanent pools. When the route was surveyed, no pools were encountered along the specific route, yet it was not a period of substantial drought. However, if any bunds are required and they constitute a waterway barrier, the appropriate permits will be sought.

5.2.1.1 Easement

As discussed in section 5.2.1 of volume 4 of the EIS, the construction of the pipeline will require a maximum 30 m wide construction corridor. This width is comparable to similar water and gas pipelines either constructed or proposed to be constructed throughout the state including:

- Northern Pipeline Interconnector Stage 1 (30m);
- North Queensland Gas Pipeline (20m to 30m);
- Southern Regional Water Pipeline (30m); and
- Central Queensland Gas Pipeline (30m).

Figure 5-2 shows a cross section of a trench area indicating how clearing, grading, trenching and stockpiling activities will occur during pipeline construction.

The pipeline easement is proposed as 15 m either side of the centreline. This is the maximum easement width required but depending on terrain it will be possible to reduce this to approximately 10 m either side of the centreline.

Section 5.3.3.2 of volume 4 of the EIS noted that access tracks for construction and maintenance of the pipeline would be required in areas where they could not be accessed from existing roads and Nathan Road was specifically named. The assumption therefore was that with appropriate traffic controls as stipulated in a Traffic Management Plan, the proximity of Nathan Road would allow the work area, and therefore the area to be cleared, to be reduced. In the interests of safety of both the workforce and the travelling public, SunWater would aim to be off the road completely in areas where little or no significant vegetation was present but to use the formed road in areas where avoidance of significant vegetation could be achieved.

In order to minimise the impact from the construction of the pipeline on native vegetation, a detailed survey of the pipeline corridor was undertaken in September 2008 to identify specific areas that should be avoided and the preferred route was selected accordingly.

Clearing will be limited to the minimum width necessary for the safe access and installation of the pipeline. Restricted clearing widths will apply to waterway crossings or threatened vegetation communities and vegetation with significant natural, heritage or visual amenity values.

Figure 5-2 Indicative Cross Section for Pipeline Construction

5.2.2 Construction Camp

SunWater is committed to on-going discussions with Banana Shire Council about the location, scale and timing of the construction camp as stated in section 5.4.4 of volume 4 of the EIS.

5.3 Land Acquisition

SunWater is committed to on-going discussions with Banana Shire Council about implications of land acquisition on the Council and its rate payers. It should be noted that all landholders have indicated that they will remain on the land and intend keeping it in productive use.

6 Climate and Natural Disasters

7 Land

7.1 Land Use

As stated in Table 21-30 of volume 4 of the EIS, SunWater propose as part of the Operational Environmental Management Plan (OEMP) for Terrestrial Fauna to revegetate weir pool edges and erect fencing to exclude livestock. In addition, SunWater will provide off-stream watering for stock, as discussed in section 17.4.2.2 of volume 4 of the EIS.

7.2 Infrastructure

As discussed in section 5.1 of volume 4 of the EIS, works that will be required as part of the raising of Glebe Weir include relocating private infrastructure such as pumps and irrigation pipes in the storage to allow for the increased storage level. The relocation of this infrastructure will be negotiated between the infrastructure owner and SunWater and will be a project cost.

7.2.1 Recreational Infrastructure

As discussed in section 5.5.1 of volume 4 of the EIS, on completion of construction the reservoir area will be available for recreational use in a similar manner to present. Facilities for public use will be equivalent to or better than those currently provided. For safety, the public will be excluded from areas near the weir wall and control rooms.

As discussed in section 5.3.3.5 of volume 4 of the EIS, the existing boat ramp at Glebe Weir in the Camping Reserve will need to be upgraded. The upgrade of the boat ramp will be fully funded by the project as part of the overall costs associated with the raising of the weir. The design of the boat ramp will be finalised during the detailed design phase of the project. SunWater is committed to working with Queensland Transport and Banana Shire Council on the provision and design standards for the boat ramp.

8 Water Resources

8.1 Surface Water

8.1.1 Water Resource Plan and Resource Operations Plan

Wildlife Queensland's views with respect to taking water from the Dawson River system are acknowledged. It is also acknowledged that existing water entitlements may not be carried forward in their current form following the 10 year review of the Fitzroy Basin WRP. The potential changes to the existing water entitlements and the WRP requirements following the ten year review, if any, are not known at this stage. Therefore this proposal has been assessed against the current WRP requirements.

SunWater acknowledges that the proposed arrangements for raising Glebe Weir will need to be detailed in the Fitzroy Basin Resource Operations Plan (ROP) after approval by DERM. As discussed with DERM, SunWater will not seek an amendment to the current Fitzroy ROP as it will expire in late 2010 but will instead propose that the new arrangements be included in the new Fitzroy ROP which will in turn be based on the Fitzroy Basin WRP now undergoing its ten year review. At a later date, SunWater will make a formal proposal to DERM regarding the inclusion of Glebe Weir raising in the new Fitzroy ROP.

The modelling results provided in the EIS are based on the scenario of converting Medium A priority water from the Theodore reach to High Priority water. It is possible, and likely, that the required High Priority demand will be obtained from both Medium and Medium-A Priority water anywhere in the system and therefore the results given in the EIS only provide an indication of the likely outcome. The final arrangements for raising Glebe Weir will be as approved by DERM and included in the Fitzroy Basin ROP. If required, these arrangements will include the agreed conversion rates from Medium-A priority to High Priority and from Medium Priority to High Priority. SunWater will continue discussions with DERM on this matter and on all ROP related matters.

SunWater is currently liaising with the Fitzroy Basin Food and Fibre Association (FBF&F) and the Dawson Valley Development Association as key stakeholders representing the interests of current entitlement holders. SunWater is currently modelling impacts on downstream water harvesting entitlements with a view to proposing a methodology for compensation; once this model has been established SunWater will engage directly with any affected supplemented and unsupplemented water entitlement holders to ensure that equitable compensation is provided for impacts to their entitlements. This will occur prior to the commencement of construction. SunWater will continue to keep DERM informed of these matters.

To clarify the statement presented in section 8.3.3.5 of volume 4 of the EIS "*retirement of medium priority water*"; the procedures outlined in the Fitzroy WRP will be used to obtain the 'new' High Priority allocation for Wandoan Coal following the raising of Glebe Weir. It will include the change (trading) rules to enable the proponent to obtain additional allocation from other allocation holders and to convert Medium Priority allocation to High Priority.

8.1.2 Environmental Flow Objectives

While DPIF's suggestion that the water release strategy for Glebe Weir should be based on inflows and their exclusive focus on the needs of fish is appreciated, the human use components of the WRP dictate that it would not be possible to manage the weir solely on inflows. The fact that fish use flow as an environmental cue for movement was acknowledged in the EIS. Section 13.4.2.1 of Volume 4 (p39) noted that as the volume of the weir is small relative to the flow at the site, a significant amount of spillage in natural sequence will occur, providing the necessary flow triggers. If a fishway is fitted to Glebe Weir, or any other structure as an alternative to Glebe Weir, releases will be made through the fishway as a priority (acknowledging that the agreed approach is to fit a fishway to Tartrus Weir rather than Glebe Weir).

The existing water quality in the Dawson River is a function of several factors of which flow is one and soil types and the various land management practices in the catchment are others. From a flow perspective, water quality is managed through the use of Environmental Flow Objectives (EFOs) outlined in the Fitzroy Basin WRP. These EFOs have been developed in consultation with a range of specialists including hydrologists, aquatic biologists,

fish and vertebrate ecologist and fluvial geomorphologists to manage the releases from the various storages to maintain or improve the ecological functioning of the water ways, of which water quality is an important aspect. As discussed in Section 8.3.3.2 of Volume 4, the proposal outlined in the EIS meets all of the mandatory EFOs in the Fitzroy Basin WRP and most of the non-mandatory EFOs for the three demand scenarios. In addition, the EFO results for the three demand scenarios proposed are also very similar to the existing ROP scenario results. Therefore, it is not correct to say that the environmental flows will be reduced by either of the three demand scenario proposals outlined in the EIS.

The current flow regimes will not be significantly changed by the proposal. Further to this, as explained above, the existing EFO's in the Fitzroy WRP have been developed to 'mimic' the natural flow regime and the natural variability of the system wherever possible, particularly with respect to the timing of flows, including the critical first post winter flow event. Section 8.3.3.4 also shows that the flow volumes in the system are not significantly affected by the proposal.

With respect to climate change, the existing WRP has been developed to manage flows in the system to ensure that the environmental water requirements for natural ecosystems are catered for. The ten year timeframe for plan reviews allows for updates of flow regime information. In addition, Section 6.8 of Volume 4 of the EIS notes that "natural climatic variability is likely to remain a more significant difficulty for management, particularly in terms of providing a secure water supply, than is climate change, at least in the foreseeable future."

8.1.3 Water Allocation Security Objectives

SunWater's proposal adopts the principle that there should be no detrimental effects on existing water allocation holders in the Dawson Valley WSS. High priority customers for the new proposed high priority water supply from Glebe Weir have indicated that they are agreeable to the concept of a water product with a lower reliability than is currently attached to the existing high priority allocations. As a precedent for this, other WRPs have separate high priority groups with differing reliabilities e.g. High class A priority and high class B priority in the Pioneer Valley WRP. However, any such proposal requires DERM's approval and possible amendment to the relevant ROP and WRP. Finally, it should be noted that scheme operating rules in the current ROP protect the supply of existing high priority entitlement.

It is possible that two water sources could be used to supply water to Wandoan Coal if sufficient allocations can not be purchased from existing entitlement holders along the Dawson River. Other options have been investigated by Wandoan Coal and were reported in the EIS.

Table 8-15 of volume 4 of the EIS has been revised to show both Medium and Medium A Priority groups and is presented as **Table 8-1** below. Hydrological modelling presented in the EIS demonstrated that the maximum amount of water that can be extracted from the raised weir without impacting existing allocation holders or Environmental Flow Objectives is 6,500 ML/yr, and subsequently the analysis presented below relates only to this scenario. The EIS also stated that the shortfall of 2,000 ML/yr against the WJV's requirements would be met through alternative measures, such as purchase of existing allocations. Whilst the EIS contemplated other scenarios such as extracting 7,000 ML/yr and 8,500 ML/yr through the weir raising alone, these scenarios have subsequently been dropped from further analysis as they generate unacceptable impacts

Table 8-1 Mandatory Medium and Medium A Priority WASOs for Upper and Lower Dawson

Mandatory Water Allocation Security Objectives	WRP Target Reliability (%)	Medium-A Reliability (%)	Medium Reliability (%)
Fitzroy WRP (Existing ROP Scenario)			
UPPER DAWSON			
Median Monthly Reliability	82-88	89	83
LOWER DAWSON			
Median Monthly Reliability	82-88	-	90
6,500ML/yr Demand Scenario			
UPPER DAWSON			
Median Monthly Reliability	82-88	89	84
LOWER DAWSON			
Median Monthly Reliability	82-88	-	90

The results show that the proposed demand scenario achieves the WRP target reliability for both Medium A and Medium Priority licences. Note that there are no Medium A Priority entitlement holders in the Lower Dawson.

A 'Level of Service' (LOS) analysis was undertaken for the existing ROP scenario and the proposed development scenario (6,500ML/yr) to determine the change in frequency and duration of restrictions of supply throughout the water year. The LOS analysis, which is presented in Table A1 to Table A2 in **Appendix 8-A**, shows that these changes do not significantly impact on the level of water availability (announced allocations) in the early months of the year and in fact shows that announced allocations are equal or higher at the start of the water year in the development scenario compared to the existing ROP scenario.

The results in **Appendix 8-A** show that there are no impacts on the reliabilities of Medium Priority users downstream to Theodore as a result of changes to Local Supply Volumes (LSV) for Gyranda and Theodore. The existing ROP scenario reliabilities of Medium Priority and Medium-A Priority have been preserved. During years of low water availability, there was a slight impact on the announced allocations at the end of the 1st quarter. This appears to be more than adequately compensated by achieving a better announced allocation in the majority of years.

The changes in the LSV of Gyranda and Theodore Weirs were made to alter the timing of spills and hence meet the first post winter flow objectives of the WRP.

There are no proposed changes to the operating rules for Glebe Weir other than for the development of a strategy to pass the first post winter flow. In particular it is not proposed to alter the LSV from the value in the current ROP.

The statement in the EIS of Glebe Weir being full or near full more often is incorrect. The statement was intended to refer to the existing full supply volume. In the existing ROP scenario, Glebe Weir with a full supply volume of 17,000ML, is shown to exceed the full supply volume for about 40% of the time over the historical simulation period. In comparison, the proposed scenario for a raised Glebe Weir at fully supply volume of 30001ML is shown to exceed the FSV 27- 28% of the time over the same historical simulation period. That is, the larger weir would be full or near full for less of the time, although of course it will store more water due to its larger size. Again, the Level of Service analysis given in **Appendix 8-A** shows that the impact of the change on end of year announced allocations is minimal.

8.1.4 Conversion Rates

Several submissions were concerned about conversion rates presented in the EIS. As stated previously, the modelling results provided in the EIS relate to one scenario of conversion of Medium-A Priority water to High Priority water. The final arrangements for raising Glebe Weir will be as approved by DERM and included in the new Fitzroy Basin ROP. If required, these arrangements will include the agreed conversion rates from Medium-A Priority to High Priority and from Medium Priority to High Priority. These conversion factors are not intended to apply to any other proposed projects, i.e. conversion factors relating to the proposed Nathan Dam are not the subject of this EIS.

8.1.5 Unsupplemented Users

Table A-3 in **Appendix 8-A** of the Supplementary Report show the number of days of water harvesting (pumping) opportunity for the proposed development scenario and compare the results against the existing ROP scenario. Results are provided for the 15m^3/s and 30m^3/s licence holders within each of the water management zones identified in the Fitzroy ROP. The results indicate that there are no systemic changes to the seasonal distribution of available pumping days when compared to the existing ROP scenario. There are some occasional timing effects evident, which are generally associated with the Glebe to Gyranda reach and the Theodore to Moura reach. On a year-by-year basis, the amount of water harvested was estimated to be between 0% and 2% less than the amount of water harvested under the existing ROP scenario. It is noted that the Fitzroy WRP has no mandatory requirements related to these timing considerations.

SunWater propose to offer monetary compensation to unsupplemented water users for any lost harvesting opportunities. Compensation by providing Medium Priority allocations will not be considered.

8.1.6 Relationship to Nathan Dam

It is agreed that the Glebe Weir raising should not impact on the prospects of future construction of Nathan Dam. Glebe Weir's raising is regarded by DERM (and the Central Queensland Regional Water Supply Strategy) as a temporary measure pre Nathan Dam. SunWater will ensure that all contractual arrangements with the WJV stipulate their requirement to surrender their Glebe supply agreement in favour of a Nathan Dam supply agreement should the dam proceed.

8.1.7 First Filling

If spare allocation is available from the weir raising in the initial years of the project when the WJV's requirements are less than the full operational requirement, then SunWater will assess its options for the use of the allocation at that time. If a supply customer requires water over a short term period that coincides with the availability of excess water from Glebe, then SunWater may opt to sell this water on the temporary trade market. However if no customers are seeking a short term supply the allocation may be used to increase the reliability of existing allocations. A determination will be made by SunWater in this regard following commissioning of the raised weir.

8.1.8 Weir Operation

8.1.8.1 Fish Stranding

DPIF were concerned that if the membrane is inflated too quickly on the falling limb of the flood hydrograph, then the rapid draw down of downstream flows may cause the saturated river backs to collapse and potentially strand fish in pools. The crest control structure would be programmed for a stepped inflate which will reduce the rate discharge reduction.

8.1.8.2 Levee

The Boggomoss Creek levee is required to contain the design Full Supply Level (FSL) of the weir and to prevent premature break out of the river to the left bank flood plain. Without the levee there is the possibility of significant erosion on the left bank flood plain that in a worst case scenario could lead to a change in the course of the river. The levee would be a low embankment with gentle slopes (1:3) that could be overtopped without eroding.

8.1.8.3 Operating Rules

As stated in Section 8.3.3.2 (page 8-21), new release rules are proposed for both Glebe Weir and Theodore Weir to meet the mandatory first post winter flow (FPWF) objective in the WRP. No changes are required to the local supply level or minimum operating level for Glebe. These rules are preliminary at this stage and will be refined as part of a formal proposal to DERM regarding raising Glebe Weir within the new Fitzroy ROP.

8.1.9 Construction Impacts

As stated in Section 8.3.3.4 of volume 4 of the EIS, the lowering of the Weir during the construction phase will be completed during the dry season to minimise the potential for lost capture opportunities. The weir will not be fully drained during the construction phase. The work schedule will ensure that a reduction in reliability of supply during the construction process is unlikely.

8.1.10 Lower Fitzroy Impacts

Tables A-4 and A-5 in **Appendix 8-A** of the Supplementary Report show the impacts of the existing ROP scenario and the proposed development scenario on the Lower Fitzroy WASO's and EFO's. The results show that the proposed development scenario meets the mandatory WASO's and EFO's objectives and meet most non mandatory objectives. There are effectively no changes in the flow statistics between the existing ROP scenario and the development scenario except for minor differences (1% to 2%) for the first post winter flow objectives at Eden Bann Weir. However, all mandatory objectives are well and truly met at this location.

8.1.11 Corrections and Clarifications

A number of corrections and clarifications were requested by submitters. These are presented in **Table 8-2**.

Table 8-2 Corrections and Clarifications

Issue	Clarification or Correction
8.3.2.1, p 8-4 Typo 'Errorl Reference source not found. Table 8-2 (twice)	It is noted that the table referred to in section 8.3.2.1 should have read Table 8-2.
8,4,4,1, p8- 43 Typo — the figure referring to Boggomoss No 8 is FIG ## ## 2 (nota-13)	It is noted that the figure referring to the location of Boggomoss No. 8 in section 8.4.4.1 should have read Figure 8-12.
Incorrect and inconsistent terminology for unsupplemented 'Water Management Areas' should be corrected.	The water management areas in the Fitzroy Basin are as follows: ▪ Dawson Valley Water Management Area; ▪ Nogoa Mackenzie Water Management Area; and ▪ Fitzroy Water Management Area.
Section 8.3.2.3 contains several references to the existing 'WRP' scenario, condition etc. The reference or comparison case being used is the existing ROP case and the EIS should be corrected accordingly	Noted
Section 8.3.2.2 of volume 4 of the EIS should read "Therefore water harvesting (unsupplemented) entitlements have not yet been converted to water allocations in the Dawson Water Management Area"	Noted
In relation to the first post winter flow event, the criteria should be corrected to 'starts between 15 September and 10 April'.	Noted
The EIS should indicate that the operational rules for the Dawson Valley Water Supply Scheme are specified in the ROP. The operational arrangements in the ROP aim to maintain a supply from Glebe Weir for local use. SunWater should confirm the validity of the related statements in the EIS, including the reference to reduced allocation charges.	The operation rules of the Dawson Valley Water Supply Scheme are specified in the ROP. These rules aim to maintain supply from Glebe for local use by stipulating a local supply level or minimum storage volume at which releases cannot be made to maintain the nominal operating level of the downstream storages. Under the development scenarios modelled in the EIS, the local supply level

Issue	Clarification or Correction
	of Glebe Weir will not change and therefore the proposal will not impact on the three entitlements that extract water directly from the weir. The statement in Section 8.3.2.2 (page 8-14) regarding reduced allocation charges for these three allocation holders is not correct.
Environmental Flow Objectives are established by the Water Resource (Fitzroy Basin) Water Resource Plan, not by the Resource Operations Plan as stated in the EIS.	Noted
The EIS should state that the unsupplemented water entitlement holders take water in accordance with the rules and arrangements specified in the ROP. The Dawson Valley Water Management Area is not divided into two areas as indicated. The Dawson Valley Water Management Area covers the Dawson River from the current upstream limit of Glebe Weir (AMTD 356.5) to the Fitzroy River junction (refer ROP Chapter 5, Section 5.1.1).	Noted
Figure 8-4 of volume 4 of the EIS incorrectly named the Fitzroy Water Management Area.	This is corrected in **Figure 8-1**.

Figure 8-1 **Fitzroy Basin Water Management Areas**

8.2 Groundwater

The potential impact of waterlogging on boggomoss communities is addressed in **section 12.2.1** of the Supplementary Report.

8.3 Surface Water Quality

8.3.1 Vegetation Burning

The burning of cleared vegetation is a last resort. Before this option is utilised, millable timber or timber suited to artisans will be salvaged for sale, suitable larger material in the weir area will be salvaged and used as habitat for fauna and as much of the remaining suitable material as practicable will be mulched for use in construction site rehabilitation and landscaping of recreational facilities, provided it is ensured that no weeds are incorporated into the mulch. Any remaining materials may be burnt. If burning is to be undertaken it will be in excavated pits which are then covered when burning is complete, hence there will be no run-off into waterways.

8.3.2 Cockatoo Creek Outbreak Area

The treatment of the Cockatoo Creek outbreak area is a question of balance. SunWater recognise that the removal of topsoil may generate some negative consequences as noted by DPIF; however, SunWater believes that the strategy will mitigate other potential negative impacts, including:

- macrophyte growth which can potentially reach excessive levels in shallow relatively warm water and lead to low dissolved oxygen levels. Water level fluctuation may lead to die off and impact on water quality (an issue also raised by DPIF);
- potentially favourable conditions for Typha, which if in high proportions does not provide significant habitat;
- shallow warm water with macrophytes is suitable habitat for mosquitoes and biting midges which would impact on Glebe Homestead and the camping reserve at Glebe Weir;
- the uneven substrate would lead to isolated shallow pools as water levels receded. These pools would be of poor water quality, not favour fish but would favour mosquitoes and biting midges;
- if cattle accessed the area it would be boggy, potentially trapping the stock and at least collecting their waste within the waterbody; and
- the soil in the area is high quality alluvial topsoil and if left in place would constitute a wasted natural resource.

The removal of topsoil aims to increase the depth of the waterbody in those areas most susceptible to the negative issues identified above. While the detailed contour plan has not been finalised this would likely entail deepening existing channels or lower lying areas such that more of the water volume was contained in these channels and less spread over very shallow areas. The area would be contoured such that isolated low pockets were either filled or connected so drainage was more even as the water level in the weir was lowered. Removal of topsoil would have the following positive consequences:

- the material would be beneficially re-used in rehabilitation associated with the Project, both weir and pipeline components;
- increasing the depth decreases the likelihood that mosquitoes and biting midges could successfully breed and live in the waterbody as they prefer water <0.5 m deep;
- deeper areas would be less favourable to dominance by Typha;
- water level fluctuations would have less impact and result in shorter periods of substrate exposure; and
- the substrate could be contoured to prevent the formation of isolated pools reducing both the impact on water quality and on potential cattle bogging

In this way the removal of topsoil will improve water quality in the overflow area and it will more often reflect the quality of water on the surface of the weir pool.

SunWater disagrees that the action will significantly increase sediment mobility as the area is and will remain very low gradient. Similarly the area is predominantly grazing pasture with very limited shrub or tree growth so there is very little existing root structure that would stabilise sediments.

SunWater also disagrees in part that topsoil removal will reduce productivity and macrophyte cover per se. The aim with respect to macrophytes is to reduce the potential dominance by Typha, as when dense, it provides little beneficial habitat and the highly dispersible seeds are both available to colonise other areas and potentially cause a nuisance to local residents and campers. Few other rooted macrophytes are likely to grow in any case because the local turbidity makes them very uncommon. The action will not affect the potential abundance of floating macrophytes. The substrate will still be fertile alluvial soil so the potential for soil / plant / microbial interactions will still be present.

9 Transport

9.1 Construction Impacts

SunWater is committed to liaise with Banana Shire Council on the management of construction traffic. Specifically, SunWater will consult with Banana Shire Council on the development of a Traffic Management Plan for all phases of the construction program.

9.1.1 Workforce Transport

As discussed in section 9.4.1 of volume 4 of the EIS, buses will be utilised to bring employees to the weir work sites from the camp site. Sedans, utilities, and light vans will still be required to bring personnel, visitors on business, and small tools or work items to the work sites.

10 Air Quality and Greenhouse Gas

11 Noise

12 Terrestrial Ecology

12.1 Fauna

12.1.1 Boggomoss Snail

The DEWHA submission requested provision of recent reports sponsored by SunWater on the distribution of the Boggomoss snail and on a proposal to undertake translocation trials. These reports were prepared by Dr John Stanisic, author of the Recovery Plan for the species. The reports can be found in **Appendix 12-A** and **Appendix 12-B** of the Supplementary Report. It should be noted that the translocation trial proposal relates to the Nathan Dam and Pipelines project and the translocation process is not required as part of mitigation strategies related to the proposal to raise Glebe Weir as no snail habitat is either directly impacted or indirectly threatened to the extent that such a strategy would be warranted.

At the time of writing the Wandoan Coal Project EIS the reports by Dr Stanisic were not available; however, the most significant factor relative to the Glebe Weir Raising, the finding of the snail at two more sites, was noted in section 12.4.1.1 of volume 4 of the EIS. Using this latest information, Figure 12-10 of volume 4 of the EIS has been updated and is shown in **Figure 12-1**. From a thorough survey of 52 sites considered to have potential to contain the snail within its known range, it was found at four sites, two being previously known.

Figure 12-1 Boggomoss Locations in Close Proximity to the Inundation Area

No sites were found within the directly impacted footprint nor was any part of this area identified as potentially suitable habitat.

Sites 15 and 16 were surveyed in 1996 and no snails were found. The first of two surveys in 2008 found three snails at Site 15 and four at Site 16. Those at Site 16 were not actually on the boggomoss but in pushed timber (felled and pushed into a pile) adjacent to the boggomoss. Dr Stanisic returned to the sites in an attempt to obtain a population estimate but found no snails. Dr Stanisic concluded that the snails existed here at very low densities. In comparison, 231 snails (including dead specimens) were found at Site 14, the known core site for the species.

Dr Stanisic concluded that the boggomosses represented refugial, but not primary habitat because the primary habitat of alluvial forest had largely been cleared. The Isla-Delusion area represents the physically largest surviving area of alluvial riparian forest.

SunWater examined the potential for impact on habitat of the Boggomoss snail in both construction and operation phases in detail in the EIS. The EIS concluded:

- there would be no direct impact to snail habitat as a result of the action;
- the only identified construction phase risk was related to curious workers who may wish to see the snail (this was regarded as a very low risk);
- during operations the only risk was related to the possible waterlogging of soils adjacent to the levee on Boggomoss Creek. This was identified as a low risk in a limited area and would only occur when the weir storage was full or near full;
- the risk was appropriately mitigated via cessation of irrigation in the area (which was identified as potentially already leading to waterlogging) and planting of riparian trees adjacent to the levee;
- as a precautionary measure, a monitoring program was designed which would detect waterlogging beyond this zone if it did arise;
- a secondary or "insurance" mitigation strategy was identified to be used in the possible circumstance that monitoring detected waterlogging; and
- the EIS noted that the level of mitigation and monitoring offered would not normally be justified by the risk but was employed in recognition of the critically endangered status of the snail.

Another means of addressing the potential impact on the snail or its habitat is to review the risks identified in the Recovery Plan as they specifically relate to the project.

The overall objective of the Recovery plan for the Boggomoss snail is to manage and protect the Boggomoss snail and its habitat. Section 3.2 of the plan assessed the threats to the snail and its habitat as:

- land clearing;
- fire;
- cattle grazing;
- weeds;
- earthworks; and
- changes to hydrology.

While the threats applied to both of the then known habitats of the snail (Mt Rose Boggomoss no.8 (the equivalent of Site 14 in the recent Stanisic reports) and Isla-Delusion crossing) they did not apply equally to both. For example the Mt Rose site is already fenced to exclude cattle and while quarrying and minor road works already take place at the Isla-Delusion site, they do not, and are not planned, at the Mt Rose site.

Each of the above threats is discussed with respect to the Glebe Weir project below.

Land clearing; the project does not include land clearing of known or suspected snail habitat. The land to be inundated is not known or suspected to support the snail. Mitigation strategies included within the project include

substantial rehabilitation of the riparian zone on alluvial areas adjacent to the proposed levee and in the immediate vicinity of boggomoss site 16. Site 16 commences approximately 20 m beyond the planned riparian zone rehabilitation area and will be marked (construction fencing tape) to ensure no persons or vehicles approach the area.

The relevance of the proposed rehabilitation can be seen through a comparison of the background image used in Figure 12-10 of volume 4 of the EIS (image dated 1994 and pre *Vegetation Management Act*) with a more recent image used in Figure 3-2 of the Stanisic (2009) report. Further land in the catchment of Boggomoss creek in the vicinity of sites 15 and 16 has been cleared since the 1994 image. The snails found at site 16 were in some of this timber which now constitutes debris near, but not on, the boggomoss. The rehabilitation program will rehabilitate the terrestrial alluvial habitat between the levee and to within about 20 m of site 16 though it will take decades for a substantial habitat to be established. This time lag is the primary reason that the groundwater monitoring component was included in the EIS; to ensure no threatening waterlogging occurred during the establishment period of the rehabilitated area. To be clear, this rehabilitation is the replacement of natural alluvial forest that was historically cleared.

Fire; while the project does not include deliberate burning of actual or potential snail habitat, the works associated with the construction phase of the project do increase the fire risk in the area. This was considered a low risk and was addressed through the Construction and Operation Hazard and Risk EMP elements. A new and specific Boggomoss Snail Habitat Management Plan has been developed and incorporated into the EMP (section 21.2.8). The Raising Glebe Weir project will thereby not conflict with Action 1.2 of the Recovery Plan in this area.

Cattle grazing; the project does not include nor will it lead to an increase in cattle grazing in any area near boggomoss snail habitat. The project does include fencing of riparian zones and rehabilitation areas in order to protect habitat from cattle, including the rehabilitation area near site 16. The fencing component of habitat management is included in the new Boggomoss Snail Habitat Management Plan and will thereby satisfy Action 1.4 of the Recovery Plan in this area (noting that site no 8 is already fenced).

Weeds; the potential for weeds to be transported on construction machinery or to colonise disturbed land was recognised in the EIS and an EMP element developed (Table 21-8 and Appendix 12-C of volume 4 of the EIS). The new Boggomoss Snail Habitat Management Plan incorporates equivalent actions and will thereby not conflict with Action 1.1 of the Recovery Plan in this area.

Earthworks; the earthworks identified in the Recovery Plan were related to quarrying and minor road works and were identified as a risk at the Isla-Delusion site. Various earthworks will occur as part of the Glebe Weir project but none will directly impact on snail habitat. The Construction Terrestrial Flora and Fauna EMP element includes the recognition and demarcation of all sensitive environmental areas to ensure no accidental damage occurs. Boggomosses and Boggomoss Snail habitat are specifically included as sensitive environmental areas under the new Boggomoss Snail Habitat Management Plan.

Changes to hydrology; two threats related to this issue were identified in the Recovery Plan, namely inundation of snail habitat by a weir or dam, and drying of riparian habitat downstream of these structures as a result of changes to river flows. Change to groundwater regimes and waterlogging was not identified as a threat.

No snail habitat will be inundated by the project and the flow regime downstream at Isla-Delusion crossing will change only very minimally (Chapter 13 of Volume 4; mean annual flow reduction at Nathan Gorge of 1.5%) such that drying of the riparian zone will not occur. The snail has been found in habitat adjoining the weir pool of Gyranda Weir, which was built in 1987, so the riparian zone will react more to water levels in the weir than to natural water levels. Given the weirs presence, it is highly unlikely that this site would be under threat from drying as the river has a higher standing water level than natural and will remain so.

As various measures related to managing threats will be undertaken with respect to sites 15 and 16, Action 3.2 of the Recovery Plan will be largely satisfied.

With respect to issues raised by DEWHA, and based on the above, the following can be stated:

1. further targeted surveys: the report by Dr John Stanisic is appended;
2. further discussion as to why the project will not result in an impact: included above;
3. potential impacts of hydrological change: discussed above;
4. a specific management plan for the Boggomoss Snail: has been developed based on the above and the Raising Glebe Weir EMP and is presented in **section 21.2.4** of the Supplementary Report;
5. mitigation in the event of levee failure: is addressed in the following paragraphs and concludes that no mitigation is necessary;
6. inclusion of the proposal to trial translocation (**Appendix 12-B** of the Supplementary Report):; and
7. discussion that the action is not inconsistent with the Recovery Plan: discussed above and the conclusion was that many actions were specifically in accordance with the Plan, thereby progressing the actions within the Plan, and none were inconsistent with the Plan.

The DEWHA submission suggested that further mitigation measures should be proposed in the event that the purpose built levee (on the eastern side of Boggomoss Creek) breaks.

Section 5.3.1.2 of volume 4 of the EIS stated “Constructed levee banks will be required on the left and right banks to contain the storage up to the level at which the rubber dams start to deflate. The crests of the levee banks will be at 173.5 m AHD, 0.6 m above FSL and approximately 0.45 m above the storage level at which the inflatable rubber dams will commence to deflate so they will not be overtopped until the Dawson River is in full flood. By the time the levee banks overtop, tailwater level will be approximately 173.3 m AHD giving a drop of only 0.2 m over the banks. The downstream face of the levees will be designed and protected as necessary to withstand this flow.”

In other words, as this is a weir rather than a dam, flood waters will pass down the river such that when the river overtops its banks the difference between the water level immediately upstream of the weir and that downstream will be less than 30 cm. By the time the levees are overtopped that difference will be only 20 cm. Hence there will be no rush of water over the levees that might lead to failure. In non-flood circumstances failure would not be expected because the depth of water abutting the levee will be no more than 1.8 m and will be abutting a compacted earth battered structure 12 m wide. From an engineering perspective the levee as designed is very secure.

12.2 Flora

12.2.1 Boggomoss Communities

The submission on the EIS by DEWHA did not raise any issues regarding the assessment of the endangered ecological community “Community of Native Vegetation species dependent on natural discharge of groundwater from the Great Artesian Basin".

However, management of the boggomoss communities adjacent to the levee is addressed above as it is essentially identical to the issue of managing habitat of the Boggomoss Snail.

12.2.2 Vegetation Clearing

As discussed in section 5.3.2.2 of volume 4 of the EIS, the rationale for the selection of the corridor of the pipeline was based on the following criteria:

- minimising route length;
- possible redundancy of a section if the Nathan Dam Project proceeds;
- minimising maximum elevations along the route;
- avoiding crossing the Dawson River or Cockatoo Creek within the Glebe Weir reservoir area; and
- maximising the use of existing road reserves and co-locating with existing or proposed infrastructure as far as possible (including the planned SBR corridor).

The option to co-locate within the proposed SBR corridor was assessed, however:

- the location of the alignment was not well defined within a broader planning corridor;
- the Nathan Road reserve represented a more direct route with fewer impacts to private property; and
- other services were already co-located within the road reserve (power and telecommunications as well as the road itself).

It is critical to note that SunWater has addressed section 1.5 of the Terms of Reference by not only assessing co-location opportunities but maximising such co-location. Due to its requirements for certain radius of curvature and grades, the Surat Basin Rail cannot co-locate with the existing other services but the water supply pipeline does not have this restriction. Discussions with Surat Basin Rail also revealed that the water supply pipeline would need to be adjacent to the rail easement rather than within it so the benefit obtained from sharing the road easement, and minimising the practical easement required for the water supply pipeline, could not be achieved by co-locating with the rail line. As a result, the Nathan Road reserve route was assessed as being the preferred option.

As discussed in section 12.3.2.1 of volume 4 of the EIS, within the inundation area existing cleared land will be left undisturbed and grasses will not be removed. Trees and shrubs will not be cleared within 1 m vertical of FSL in the riparian zone of the Dawson River or tributaries or where significant vegetation is present. In these cases, it will be left in place as trees and shrubs may survive, depending on inundation frequency and duration. As the total raising is only 2.36 m, this means a vertical distance of just 1.36 m will be cleared. This distance also decreases with horizontal distance upstream from the weir wall. If the trees do not survive, the EIS suggested that they be allowed to stand, and eventually fall, so they provide habitat to a range of species, including fish. There is no intention to undertake broad scale clearing in riparian zones as the scale of clearing and its location dictates small scale hand operation. Trees and significant shrubs will be cut off within 0.5 m of ground level with the bases left in place. The exceptions will be in areas where personal safety relating to boating or to swimmers may be affected as a result.

As a result of potential water quality problems in the relatively shallow area near Cockatoo Ck, broad clearing is anticipated along with soil extraction as discussed in **section 1.3** of Volume 4 of the Supplementary Report.

12.2.2.1 Vegetation Management Act 1999

All vegetation on State lands was classified and mapped irrespective of its condition. SunWater accepts that all vegetation on state land is assessable.

The discussion on the status of Brigalow communities relative to the EPBC Act was not intended to infer any relevance to the state VM Act.

12.2.3 Habitat Loss

Section 12.3.2.1 of volume 4 of the EIS concluded that the necessary clearing of RE 11.3.25, though listed as Not of Concern, represented a Significant preliminary (unmitigated) impact which would require significant offset in the form of habitat rehabilitation in order to achieve the targeted post-mitigation impact level of Minor. The assigned impact level recognised the role of this ecosystem in providing the major wildlife corridor in the region.

The impact was therefore clearly recognised. Appropriate mitigation for a corridor cannot be provided through offset in another location. As such, the mitigation proposed was rehabilitation of the remaining vegetation within the corridor. Section 12.4.2.1 recognised restoration of the buffer linking the east – west wildlife corridor as critical. The Habitat Rehabilitation Management Plan was described in Appendix 12-C and while it recognised that the existing corridor was at times represented by just a single row of mature trees and in places it was degraded through access by stock and feral animals, it also recognised that it served a corridor role. The Plan represents a substantial commitment by the proponent. The mitigation emphasis would also appear to be appropriate. The revegetation planned for the Boggomoss Ck levee will also reinstate the north-south corridor in this area.

A number of other measures have been incorporated into the design of the project to reduce the impacts as much as possible, including:

- maintain vegetation within the inundation area in the riparian zone of tributaries or where significant vegetation is within 1 m vertical distance of the FSL in the Dawson River;
- develop and implement a Construction Management Plan and confine construction impacts to the inundation and infrastructure footprint areas;
- for affected ecosystems and species – offset through protection of comparable habitat, habitat restoration and enhancement of comparable ecosystems in the local area;
- for significant flora species – include seeds or seedlings of local provenance species in habitat rehabilitation and restoration in the local area;
- Weed Management Plan;
- Clearing Management Plan;
- Construction Habitat Management Plan; and
- Operational Habitat Management Plan.

Once appropriate mitigation measures and management plans are implemented, the detrimental impacts of the construction and operational phases of the weir project on terrestrial flora and fauna are predicted to be "minor" or "negligible" as identified in Table 12-5, Table 12-6, Table 12-12 and Table 12-13 of volume 4 of the EIS.

12.2.4 Regional Ecosystems

It is noted regional ecosystem 11.9.2 listed in the EIS as 'Of Concern' is actually a 'Not of Concern' regional ecosystem, however this has no implications on the assessment of impact as it was correctly referred to in the remainder of the document.

Following an approval or otherwise of the project, a map amendment will be submitted to the Queensland Herbarium.

A primary purpose of the levees near Boggomoss Ck and Cockatoo Ck is to minimise the area inundated and as a result reduce the area of vegetation that needs to be cleared. A number of other levee options were considered during the design process to further reduce the inundation of vegetation, however were found to be unsuitable because:

- Levee bank at mouth of Cockatoo Creek – such a levee bank would block the natural drainage of the Cockatoo Creek catchment which is a very large area. This catchment can produce runoff from events that are independent of Dawson River flows. Even minor events would necessarily overtop the levee so it would have to be erosion resistant. The area upstream of the levee would still temporarily inundate the remnant vegetation area until it was drained. This temporary storage would have to be pumped out or drained to a point downstream of Glebe Weir. A drainage pipe around the right abutment of the weir would require a one way valve to prevent back flow for the case where there is a flow in the Dawson and no flow in Cockatoo Creek. This option would also block access to the weir via the Glebe and Balcaris properties;
- Levee bank across Glebe property – a levee across the Glebe property to prevent inundation of remnant vegetation presents similar issues to the levee at the mouth of Cockatoo Creek in that the catchment upstream of the levee would still be temporarily inundated from its own catchment. Drainage of this area can only be by gravity when the river level has dropped with the lower portion having to be pumped in any case. Pumps would be low head, high capacity to minimise inundation time and would be used very infrequently. Such an arrangement is not considered practical;
- Diversion of Cockatoo Creek – This option requires the relocation of the natural stream from a point about 1 kilometre upstream from the junction of Cockatoo Creek with the Dawson River just upstream of Glebe Weir. Excavation of a significant volume of material would be required to provide a channel of similar bank full flow capacity as the natural stream so that flood levels upstream are not adversely affected. Disposal of this material could present some issues. Possible disposal areas would be the unused length of Cockatoo

Creek though this is likely to be detrimental to the remnant vegetation that is to the preserved or on the triangle of land between the new channel and the Dawson River. Any impacts of disposal embankments on flood plain flows would have to be examined. It is possible that the excavated material would have to be disposed of off the flood plain with associated high transport costs. The bed slope in the channel would have to be low to match the existing slopes otherwise significant erosion protection measures would need to be provided along the length of the excavated channel. A control structure may well be required at the entrance to the excavated channel to prevent stream bed erosion. This would appear to be the only practical method of preserving the remnant vegetation but has other environmental impacts that may outweigh the benefits.

A number of other measures have been incorporated into the design of the project to minimise the area as much as possible, these are discussed throughout the EIS and include:

- confine weir construction impacts to inundation footprint;
- design pipeline to avoid threatened vegetation where possible and restrict clearing to the minimum width necessary for safe access where avoidance is not possible; and
- maintain vegetation within the inundation area in the riparian zone of tributaries or where significant vegetation is within 1 m vertical distance of FSL in the Dawson River.

As discussed in section 12.3.2 of volume 4 of the EIS, vegetation management offsets will be in accordance with the DNRW Policy for Vegetation Management Offsets (NRW, 2007). Biodiversity offsets will be in accordance with the Queensland Government's Environmental Offsets Policy and, where relevant, the policies of Department of Environment, Water, Heritage and the Arts.

12.2.5 Condition Assessment

The condition of non-remnant vegetation was assessed and mapped for the Glebe Weir as part of the overall condition assessment method. This assessment was based on ranking each patch (remnant and non-remnant) according to a 0-4 condition category. Category 0 was used as a default for water and crops. Categories 1 and 2 were used for remnant vegetation and categories 3 and 4 were used for non-remnant vegetation. The condition for non-remnant vegetation was described as follows:

- category 3 - Vegetation not regarded as remnant, but sufficient structure present to identify climax regional remnant regional ecosystem if facilitated back to a remnant vegetation condition. Patch size >2ha.

- category 4 - Vegetation not regarded as remnant, but sufficient structure present to identify climax regional remnant regional ecosystem if facilitated back to a remnant vegetation condition. Patch size <2ha. This includes several linear patches associated with road reserves which are frequently subjected to significant edge effects.

12.3 Mitigation Measures

An offset strategy or plan, under both Commonwealth and Queensland government guidelines, applies to residual impacts of a project after mitigation strategies have been taken into account.

With respect to EPBC listed migratory species volume 4 of the EIS concluded that all but one species present or likely to be present would either be positively impacted or not impacted. The Rainbow bee eater was predicted to incur a minor negative impact but at such a scale that no mitigation or compensation was necessary.

With respect to EPBC listed threatened fauna species, volume 4 of the EIS concluded that in some cases a minor positive impact would occur but most resulted in no or negligible impact after mitigation. A minor negative impact was predicted for the Brigalow Scaly Foot but at such a scale that no mitigation or compensation was necessary.

With respect to EPBC listed threatened communities, volume 4 of the EIS concluded that in the construction phase there would be a minor residual impact on Brigalow and on the "Community of species dependant on discharge from the Great Artesian Basin". With respect to Brigalow, coordination of offsets between those required under the State VM Act and DEWHA was noted as an appropriate action. As the effected community was found in a number of small and isolated patches, it was recommended that larger coordinated areas of rehabilitation be used to replace them as these larger patches would afford greater environmental value. The one boggomoss that would be inundated by the project could not be replaced. This particular boggomoss had not been recognised by any surveys prior to EIS surveys. The spring, located on Balcaris Station, is adjacent to an area of *Eucalyptus coolabah* woodland. The spring's zone of influence covers an area of around 40-50m diameter. The raised central portion, dominated by *Phragmites australis*, is surrounded by open water which gives way to an ephemeral edge supporting species such as C*yperus bifax, C. difformis, Ludwigia peploides subsp. montevidensis* and *Marsilea drummondii*. The area is currently grazed, and although is subject to this disturbance, it supports a suite of native species. No flora species of significance were present within parts of the spring that could be accessed. Visual inspection indicated that the spring did not include any attributes that clearly distinguished from others in the area it in terms of significance.

The residual impact on all listed communities as a result of the operation of the project was considered negligible (likely to be undetectable).

With respect to EPBC listed threatened flora species, volume 4 of the EIS concluded that in the construction phase there would be no impact, negligible impact or a minor positive impact. The latter related to using seed from local provenance species in site rehabilitation works, despite not being directly impacted, and implementing weed and pest management plans.

In summary, the net result of impact mitigation is a small number of minor negative scale impacts and a larger number of minor positive scale impacts. The latter relate to actions taken to enhance the local populations of threatened species that in themselves were not impacted by the project. These voluntary actions already included in the EIS constitute an offset because no mitigation was originally required with respect to these species.

SunWater has committed to substantial replanting of riparian and alluvial floodplain vegetation along the Dawson River and outside the levee on Boggomoss Creek. The species selected for planting will include threatened species where it is their natural habitat, such as Brigalow and Hairy Joint Grass. The habitat will suit Brigalow Scaly Foot and Rainbow Bee eater and will reconstitute the east – west and north- south movement corridors which will benefit a range of species.

With respect to the Queensland Government's Draft Policy for Biodiversity Offsets, volume 4 of the EIS concluded that for threatened flora under the VM Act in most cases there was likely to be a minor positive impact and for the *Bertya pedicellata* there would be no impact and for *Cadellia pentastylis - Ooline* there would be a negligible impact after mitigation such that no mitigation or compensation was necessary. Furthermore, as most of the flora species are associated with REs that require offsets under the NRW Policy for Vegetation Management Offsets, no further offset is required.

For threatened fauna species under the VM Act there was likely to be a minor positive impact for *Nettapus coromandelianus* and *Ephippiorhynchus asiaticus* but most resulted in no or negligible impact after mitigation. As most of the fauna species are associated with REs that require offsets under the NRW Policy for Vegetation Management Offsets, no further offset is required.

As discussed in section 12.3.2 of volume 4 of the EIS, vegetation offsets will be in accordance with the NRW Policy for Vegetation Management Offsets (DNRW, 2007). Approximately 644 ha of remnant vegetation will be directly impacted by the Raising Glebe Weir project. This includes 5.29 ha of EPBC listed Brigalow. As such, it is proposed to develop the total offset package in consultation with DEWHA. While SunWater will negotiate appropriate offsets for those communities affected only by the raising of Glebe Weir (RE 11.3.25 for example),

Wandoan Joint Venture will incorporate other communities as part of a package for all elements of the Wandoan Project. This is discussed in section XX of the Supplementary Report [Cross reference to Xstrata Chapter]. SunWater will work with EcoFund Queensland and Greening Australia to identify an appropriate offsets package for the project. [This section is for discussion with Xstrata at workshop on 21/08/09]

As discussed in Appendix 12-A and section 1.4 of volume 4 of the EIS, reference sites have been established in undisturbed or lightly disturbed vegetation communities within the vicinity of the project area. Secondary site data for reference sites is presented in Appendix 12-A of volume 4 of the EIS.

As discussed in section 12.3.2 and 12.4.2 and described in Appendix 12-C of volume 4 of the EIS, an Operational Habitat Management Plan will be developed to minimise impacts to flora and fauna during the operation of the weir and pipeline. With respect to "how" the plan will identify and minimise operational impacts, the EIS identified weeds, pests and fire as the major forms of potential impact to vegetation in the operations phase. Exclusion of cattle from parts of the riparian zone was also recommended and SunWater committed to do so and to provide effected landholders with offstream watering points. Monitoring programs were recommended and the frequency provided. Means of undertaking corrective actions in the event of failure to meet performance criteria were given and referred to the applicable DPI Fact Sheet with respect to weed control. The Plan and associated sub-plans will be further developed during detailed design.

The Operational Habitat Management Plan for the management of State-owned land and rehabilitated areas will be incorporated into the overall operational management plan. An aim of the Operational Habitat Management Plan is to ensure the long-term success of revegetated and rehabilitated areas. The Operational Habitat Management Plan will consist of a number sub-plans and actions, including:

- a fire management plan as described in Table 19-16 of volume 4 of the EIS;
- a weed management plan as described in Appendix 12-C of volume 4 of the EIS;
- a pest management plan as described in Appendix 12-C of volume 4 of the EIS;
- a boggomoss snail habitat management plan as described in Appendix 12-C of volume 4 of the EIS and **section 21.2.8** the Supplementary Report;
- active management of revegetated areas and weir pool edges including adding logs and leaf litter and additional plantings to increase structural diversity as well as maintaining fences to excluding cattle;
- development of an operational monitoring program based on recommendations from the Habitat Rehabilitation Management Plan, at least including:
    - regular (monthly) inspection around the perimeter of the weir, weir wall and adjacent pipeline route to determine the distribution of declared and environmental weeds;
    - regular (6 monthly) inspection to identify the progress of the habitat rehabilitation/ restoration;
    - regular (annual) inspections of the Boggomoss communities;
    - annual monitoring of nest box use for first three years of operation;
    - fauna surveys to be replicated in the area every five years for the initial 25 years, with 10-yearly surveys following that if it is deemed necessary;
    - groundwater monitoring bores are to be installed on the downstream side of the Boggomoss Creek levee and the data will be reviewed by a hydrogeologist before being discussed with an ecologist.
- implement corrective actions following complaints or where monitoring indicates poor performance of rehabilitated areas. Corrective actions include:
    - review control/eradication plans for problem species;
    - review management plan and wash-down procedures;
    - treatment and eradication of listed pest and weed species; and
    - determine altered habitat components and implement remedial actions to restore habitat for affected species.

The importance of riparian habitat was clearly recognised in sections 12.3.2.1 and 12.4.2.1 of volume 4 of the EIS. As such, a primary aim of the revegetation within the Habitat Rehabilitation Management Plan is the

replacement of riparian vegetation. As discussed in Appendix 12-C of volume 4 of the EIS, the aim of the plan will have a broader focus than just the replacement of riparian vegetation. The plan will focus on delivering the following conservation values:

- re-establishment of REs as appropriate to landform, particularly those endangered, regionally significant or locally significant;
- re-establishment of locally significant plant species as appropriate to landform;
- provision of habitat suitable for native fauna, particularly those EVR (Endangered, Vulnerable and Rare) species, migratory species, and regionally or locally significant species known to occur or considered likely to occur;
- creation of east-west corridors to alleviate the disruption to movement caused by the weir; and
- establishment of shallow wetland areas around the perimeter of the weir.

13 Aquatic Ecology

13.1 Flora

13.1.1 Excessive Macrophyte Growth and Weeds

Section 13.4.2.1 of volume 4 of the EIS predicted that macrophyte growth would increase, particularly in the shallow areas of Cockatoo and Boggomoss creeks however it is unlikely to promote the growth of exotic species such as *Hymenachne*, because as discussed in section 13.3.3 of volume 4 of the EIS, no declared pest or weed species were found during field surveys or have been recorded in the study area. The EIS noted that no submerged macrophytes grew in the current weir pool, probably as a result of the high turbidity, and predicted that this was unlikely to change as a result of the raising.

Section 13.4.2.1 of volume 4 of the EIS noted that seasonal die off would occur in the Cockatoo Creek area as water levels in the weir were reduced. That section also noted the potential for poor water quality during low water levels and explained why this impact in the Cockatoo Creek area would have little if any effect on the weir pool.

It is noted that in Table 21-29 the corrective action for preventing the introduction of exotic species should also include "under guidance from DPIF".

13.2 Fauna

13.2.1 Habitat Loss

The EIS recognised a range of negative impacts, including the increased inundation of riverine habitat (section 13.4.2.1 of volume 4 of the EIS). However, the EIS also assessed the data obtained from field surveys when estimating what changes to fish communities may be produced by those habitat changes. In order to be able to make those assessments the EIS baseline aquatic studies sampled fish in the existing Glebe and Gyranda weir pools, in riverine reaches above and below Glebe Weir and in tributaries. Analysis of that data showed:

- Fish diversity was highest in a weir pool (Gyranda);
- Fish diversity in Glebe Weir was the highest pre-wet season, equalling or exceeding that at all riverine sites;
- Fish abundance was highest in Glebe Weir both pre- and post- wet season;
- 14 of the 19 species recorded overall were recorded in weir pools, with only uncommon and very patchily distributed species not present (though some uncommon species were only recorded in weir pools); and
- Introduced species were not more abundant in weir pools.

The EIS concluded that while changes in the length of river inundated were acknowledged and there would be an increase in deep inhospitable areas, there would be a net increase in diversity of habitat because of that offered by the over-bank areas of Cockatoo Creek and Boggomoss Creek.

While DPIF considers the loss of riverine habitat "major", the EIS noted that the area of catchment upstream of Glebe Weir was 23,180 km^2 while the increased inundation area of the weir would represent 901 ha. Similarly the increased riverine inundation represents between 7.5% and 20% of the current inundated length of individual waterways entering Glebe Weir. As the data above indicates no detrimental impact of the existing weir pool, it is difficult to agree with DPIF that this level of change would result in an impact on riverine fish communities that could be classified as major.

13.2.2 Habitat Creation

As discussed in section 5.4.1.2 and 12.3.2.1 of volume 4 of the EIS, vegetation will be cleared for all work areas including within the inundation area, for the construction of levee banks and the construction of permanent and temporary access roads. Within the inundation area existing cleared land will be left undisturbed and grasses will not be removed. Tree and shrub vegetation will be cleared to FSL. Trees and shrubs will not be cleared in the riparian zone of tributaries or where significant vegetation is within 1 m vertical of FSL. In these cases, it will be left in place as trees and shrubs may survive depending on inundation frequency and duration.

While not stated, clearing involves cutting the stems of trees and shrubs off near ground level such that roots will be maintained in the ground. Also not explicitly stated was that if the trees within 1 m of FSL do not survive, they should be allowed to stand, and eventually fall, so they provide habitat to a range of species. This in fact was the practice for the initial construction of Glebe Weir in 1971 and many dead trees are still standing in the upper inundation area.

Appendix 12-C page 8 states "suitable larger material in the weir area will be salvaged and placed in low flow areas of the reservoir to provide fish habitat".

With respect to floodplain habitat, the only areas beyond the bed and banks of the Dawson River or tributaries that could be classified as floodplain and which will be effected by the weir raising are those areas in lower Cockatoo and Boggomoss creeks. These are currently terrestrial habitat consisting primarily of cleared grazing pasture. They offer very little aquatic habitat value other than when flooded and, due to the frequency and duration of such events, the benefit is largely restricted to the ephemeral watercourses in the Cockatoo Creek area. The habitat changes as a result of increased flooding of this area act to increase rather than decrease the value of floodplain habitat because:

- it will be flooded more often but will still not be permanent;
- it will be shallow but will provide a variety of depths; and
- it will support primarily aquatic rather than terrestrial flora.

The potential limiting factor was water quality as water levels receded. This was acknowledged in the EIS and it should be noted that this also occurs on natural floodplains.

SunWater notes that DPIF's comments on section 13.4.1.3 state that the expanded weir pool may be partially beneficial to fish that utilise floodplains.

The reference in section 13.4.1.3 to "an appropriate offset" was not made in regards to an offset for fish movement or habitat; rather it was made in reference to an offset for lost recreational fishing opportunity during the construction phase. The other component of this offset noted in the same sentence was the improved boating area offered by the expanded weir pool.

13.2.3 Fish Passage

As discussed in section 5.3.1.2 of volume 4 of the EIS, the proposal to raise the weir includes the provision of a fishway and multi-level offtake, however, the installation of the fishway and multi-level offtake would be deferred until a decision was made on the future of Nathan Dam. Further to this, SunWater has been in consultation with DPIF to discuss alternative options for the installation of a fishway. These discussions with DPIF have now confirmed the preferred alternative as retrospectively fitting a fishway on Tartrus Weir on the Mackenzie River (providing that this fishway was not already funded through alternative means). As a result no fishway will be required on Glebe Weir as a consequence of the WJV.

The installation of a fishway on Tartrus Weir would be highly beneficial as the weir is the only barrier to fish movement between the upper Fitzroy River and the Isaac Connors River, and between the upper Fitzroy and Bingengang Weir on the Nogoa – Mackenzie River.

With regard to the multi-level offtake, SunWater now propose to install a multi-level offtake at Glebe Weir as part of this project regardless of the status of Nathan Dam.

With respect to the fourth point from the EPA, section 13.4.2.1 "Barriers to movement" of volume 4 of the EIS addresses this issue and is the source of the quote in the previous dot point from DPIF.

Section 5.3.1.2 of volume 4 of the EIS acknowledges that design of a fishway and mechanism to facilitate turtle movement will be produced in consultation with DPIF, EPA and other relevant agencies and experts. Banana Shire Council will be invited to take part in that process.

13.2.4 Intake Pipes

It is noted that DPIF support the use of screens on intake pipes.

13.2.5 Fish Salvage

The quote, *"It is highly unlikely that such pools will be significantly connected to other water so the impact will remain local",* was not referring to the Dawson River but to ephemeral and intermittent waterways crossed by the pipeline. When inspected, no standing water was present anywhere along the pipeline route.

SunWater commits to salvage any fish in accordance with the DPIF fish salvage guidelines and to report any fish kills to the EPA fish kill hotline. SunWater also has its own Environmental Management Standard for Fish Management (EM 18) and for investigating fish deaths (EM 18.1) which it will also manage fish kills in accordance with (**Appendix 13-A**). These environmental management standards were developed using the EPA Fish Kill Reporting guidelines and in consultation with the EPA.

14 Matters of National Environmental Significance

Submissions received on Matters of National Environmental Significance are addressed in Chapter 12 – Terrestrial Environments of the Supplementary Report.

15 Waste

15.1 Construction Waste

As discussed in section 15.4 of volume 4 of the EIS, disposal of waste to landfill will be the last resort. Waste streams will first be reused or recycled. It is anticipated that the majority of waste produced on site will be able to be reused or recycled with only a small proportion requiring disposal at landfill. SunWater commit to on-going discussion with Banana Shire about the use of the councils landfill.

16 Cultural Heritage

17 Social

17.1 Water Availability

As discussed in section 17.4.2.3 and 18.3.2.2 of volume 4 of the EIS, currently there are about 135 irrigators operating in the Dawson Water Supply Scheme, allocated approximately 56,253 ML. The volume actually delivered varies from year to year depending on the yield capabilities of the system and the intentions of the irrigators.

Historically, most of the irrigation water has been used to grow cotton but resources are switched between crops depending on relative economics and available allocation. In recent years there has been a substantial decrease in the percentage of water used to irrigate cotton in favour of other crops.

If trading is used to increase the volume obtainable by the Wandoan Coal Project, then this will lead to decreased availability of medium priority entitlements by approximately 5% to 10%. The entitlements will be purchased from willing sellers so it is assumed that the sellers do not currently utilise their whole allocation or either plan to or have already started to use their property for other ventures. Data extracted from SunWater Water Information Management System (SWIMS) for the last four water years (2004 to 2008) indicates that anywhere between 16% and 47% of available water (including Announced Allocations and Available Water) is not used in any one water year. This indicates that the use of trading to obtain the volume of water required for the Wandoan Coal Project would have a negligible impact on agricultural production as much of the water is not used currently.

18 Economics

19 Hazard and Risk

20 Cumulative Impacts

21 Environmental Management Plan

21.1 Who, When and How

Section 21 of volume 4 of the EIS noted that the EMP for the Raising Glebe Weir project would initially be prepared and implemented by SunWater. If the Glebe Weir raising is approved, the conditions of approval will be incorporated into the Draft EMP as appropriate. The Draft EMP will then be used as a guide during the detailed design phase. The designs for the dam, pipeline and associated infrastructure will be submitted to the relevant approval agencies as appropriate to the particular design element and this iterative approach may lead to further modifications to the Draft EMP. This process was noted in section 21.2 of volume 4 of the EIS.

The Draft EMP will then be used in the tendering process when selecting a construction contractor. The selected contractor will use the detailed designs and Draft EMP to develop their detailed construction program and methodology. Based on each of these inputs, the Final EMP will be developed. The contractor may also have standard EMP elements that they prefer to use as they have been successfully employed on previous projects and their employees are aware of what they entail. This is usually the case with elements that relate to occupational health and safety, emergency management plan, waste handling and sediment and erosion control.

The Final EMP will be submitted by the contractor for approval by SunWater. It will then be submitted as required with permit applications and will be forwarded to DIP to ensure the conditions of approval have been met. It will detail the roles and responsibilities for implementation and will generally be in accordance with Table 21-1 of the Draft EMP but updated to reflect the final roles of construction staff, as was noted in Section 21-3 of the Draft EMP.

Section 21.9 of the Draft EMP noted that implementation would be audited both internally and externally, the latter by an accredited auditor. Auditing is for the purpose of ensuring compliance with legislation and the conditions of permits and approvals, and also compliance with the performance criteria stipulated in the EMP. Section 21.9 noted that copies of the audit reports and of corrective action reports would be made available to regulatory agencies upon request.

As a result of this process, it is not possible to include Final EMP elements in the EIS but it is possible, as was requested by the EPA, to include outlines.

21.2 Outline of Environmental Management Plans

The EPA noted that the Draft EMP provided as Section 21 of volume 4 of the EIS mentioned several plans which were committed to but not yet produced. EPA requested an outline of these plans. For plans noted in Table 21-8 Terrestrial Flora and Fauna (being Weed Management, Clearing Management, Construction Habitat Management and Operational Habitat Management), further detail on each was provided in Appendix 12-C of Volume 4 of the EIS but unfortunately the cross reference was not provided in Table 21-8. SunWater remains committed to production and implementation of the plans previously described. The finalisation and implementation of the plans is described above.

This section outlines the content of the remaining environmental management plans, as requested by the EPA. Minor update from previously provided information has been undertaken where appropriate.

Appendix 12-C also mentioned protection of Boggomoss communities but provided no further detail. An EMP element has now been developed to address Boggomoss snail habitat (section 21.2.4) and as noted in section 12.2.1 this plan equally addresses boggomosses in close proximity to the site.

21.2.1 Sediment and Erosion Control

The information in this section is taken from Table 21-3, Table 21-5, Table 21-7, Table 21-8, Table 21-9, Table 21-14, Table 21-17, Table 21-19 and Chapter 7 and Chapter 8 of volume 4 of the EIS.

Environmental Objective – Sediment and Erosion Control • Minimise environmental impact by preventing soil loss and erosion	
Performance Criteria	▪ As per the requirements of the site discharge licence conditions (negotiated with the EPA prior to construction works commencing), runoff to waterways not to exceed agreed limits at the point of discharge ▪ The design for sediment devices is to allow for the capture of the 'first flush' of 25 mm for a rain event. When possible, cleaner water will be pumped from the surface layer of the devices to reduce overflow potential in the next rain event ▪ Compliance with the EPP Water (EPA, 1997c), Section 32, Prohibition on build-up of sediment
Implementation Strategy	▪ Development of Erosion and Sediment Control Plans (ESCPs), which comply with erosion and sediment control guidelines for Queensland Construction Sites (Witheridge and Walker, 1996, or appropriate more recent guidelines) which include measures such as: ○ rapid revegetation of disturbed areas; ○ minimising time that areas are left exposed; ○ diverting uncontaminated run on away from cleared/contaminated areas; ○ controlling runoff through sedimentation dams, drains and disposing to stable drainage lines; ○ bunding stockpiled material; ○ remove of loose, surplus excavated sand, gravel and clays to prevent excessive erosion; ○ confining traffic to defined roads and access tracks; ○ compacting high traffic areas; and ○ excavations backfilled and covered with topsoil
Monitoring	▪ Implement specific monitoring programs to assess the impacts of the immediate construction site on sensitive receiving environments (i.e. waterways and aquatic ecosystems) over the course of the project; ▪ Following rainfall events, daily monitoring of turbidity, pH, DO and EC, upstream and downstream of construction site; ▪ Weekly visual inspection of erosion and sediment control devices and receiving waters. This inspection is required during, or immediately following rainfall events; ▪ Regular monitoring of rehabilitation work in accordance with the Habitat Rehabilitation Management Plan; ▪ Regular clean out accumulated sediments from applied measures to reinstate performance capacity. Return material to stockpile and do not dispose of adjacent to sediment trap.
Reporting	▪ Necessary corrective action implemented following incident or complaint. ▪ The Contractor will ensure that all appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding soil management and erosion control.
Corrective Action	▪ Appropriate control measures implemented where unacceptable sediment or erosion is identified or may occur; ▪ The erosion and sediment control plans should be amended to account for changes in site conditions or treatment methods in the case of the failure of a device; ▪ The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

21.2.2 Stormwater Management

As identified in Table 21-5 of volume 4 of the EIS, a sub-plan should be developed for stormwater management. The stormwater management plan is closely linked with the Erosion and Sediment Control Plans described in **section 21.2.1** of the Supplementary Report. The final content of the plan will depend on detailed design; however the plan should incorporate the following measures as appropriate:

- works that will require high levels of soil disturbance (creek crossings) or traffic movement should be scheduled for the April to September period (dry season);
- staged clearing and rehabilitation of work sites to minimize exposure of soils, particularly dispersible, sodic subsoil materials;
- diversion of stormwater away from disturbed areas;
- managing potential run-on so that flows are dispersed over the site;
- collection, treatment and re-use of sediment laden stormwater;
- installing silt fences on the upstream side of works to prevent water flowing into the work area and silt fences or bunds installed on the downstream side;
- shaping landforms to provide slopes similar to or lower than those of the surrounding landscape;
- constructing stockpiles so the surface is level and with sufficient roughness to trap water and aid infiltration rather than large conical or elongated crested stockpiles where runoff would be more rapid;
- ensuring adequate soil material to support plant growth by placing a layer of material with appreciable water holding capacity to increase profile water storage and covering this with topsoil stockpiled during excavation;
- utilising rock check dams to reduce erosive velocities in drainage lines;
- planning drainage for sites subject to prolonged disturbance and installing sediment barriers and sedimentation ponds where required;
- runoff water quality will be visually monitored during works and especially following wet weather events;
- should a significant spill occur ,sampling and analysis of stormwater and receiving waters to determine the level and extent of contamination; and
- if water quality monitoring indicates significant sediment losses from the site, additional control devices are required in the corresponding runoff flow paths.

21.2.3 Waste Management

The information in this section is taken from Table 21-10, Table 21-22, Table 21-31 and Chapter 15 of volume 4 of the EIS.

Environmental Objective – Waste Management • **Management of waste associated with general construction**	
Performance Criteria	▪ Cleared vegetation to be used in rehabilitation or soil stabilisation works or mulched provided that it is weed free. ▪ Material suitable for artisans to be reserved if local interest in use. ▪ Waste hierarchy to be clearly implemented such that minimal waste goes to landfill. ▪ Hazardous wastes stored, transported and disposed of in accordance with legislation.
Implementation Strategy	Cleared Vegetation ▪ All cleared vegetation will be recycled wherever possible as millable timber, artisans' raw material, fauna habitat, mulch for site reinstatement or firewood. ▪ Mulching of suitable vegetation will be undertaken for use in rehabilitation and stabilisation of exposed areas during construction and site rehabilitation. ▪ Vegetation will also be used in erosion control on embankments. ▪ Burning of vegetation will be last resort and will utilise pit burning.

Environmental Objective – Waste Management • Management of waste associated with general construction	
	Construction waste (e.g. steel, tyres, ceramics, packaging material, excess spoil) ▪ All liquid contaminants will be stored in designated storage areas in accordance with AS 1940 – The Storage and Handling of Flammable and Combustible Liquids. ▪ All spillages of fuels and chemicals in the works area are to be contained and cleaned up immediately using appropriate equipment (e.g. on-site spill kits). Soils that are contaminated by hydrocarbons can be treated by bioremediation techniques on-site, or removed and disposed of at a licensed facility. ▪ Construction wastes generated from the site area should be minimised through thoughtful procurement. ▪ Suppliers of construction materials to be encouraged to reuse or collect packaging (e.g. plastic wrapping or cardboard boxes) for recycling or reuse. ▪ Segregate and provide receptacles for cardboard, recyclable plastics, scrap metal, waste oils and concrete. ▪ Recycle drums to merchants and return plastic containers to manufacturers. ▪ Excess spoil or construction and demolition waste to be reused onsite, where applicable such as to repair gully erosion and to produce a slight mound over the pipeline. Excess Spoil ▪ Excess spoil will be used in rehabilitation, levee banks at the weir or for embankments associated with the SBR railway corridor (pending confirmation of need and agreement with SBR). ▪ Excess spoil which is not re-used will be shaped to conform to the surrounding landscape, topsoiled and revegetated. Domestic Wastes ▪ Paper / cardboard, plastic, glass, aluminium cans and scrap steel will be segregated onsite and then processed at the Biloela transfer station. ▪ Segregated materials will be securely stockpiled until an economic volume can be transported. ▪ Further investigation of local recycling opportunities will be undertaken; for example, local schools, Scouts or other community groups may be involved in the recycling of aluminium cans. ▪ Putrescible wastes generated by mess facilities will be collected on-site in lidded industrial bins stipulated by the *Environmental Protection (Waste Management) Regulation 200*0. ▪ Putrescible waste will be transported offsite and disposed of by licensed contractors to appropriate treatment or receiving facilities. Liquid wastes and sewage ▪ Any liquid wastes to be disposed of by an approved contractor or taken to the local council for disposal at an approved facility. ▪ Provision of portable toilet facilities and pump-out wastes. ▪ Grey water from the office and showers will be kept separate, labelled as unfit for human consumption and used for dust suppression. ▪ Stormwater retained in sediment and erosion control devices will be pumped out and similarly used in dust suppression. Hazardous waste (e.g. batteries, contaminated soil, paints, asbestos) ▪ All hazardous wastes will be transported from site via an approved contractor. ▪ Designated areas for empty drums and containers should be established in an adequately bunded and sheltered area.

Environmental Objective – Waste Management • Management of waste associated with general construction	
	▪ Appropriate spill kits (hazardous chemical or general) will be provided near the storage area.
Monitoring	▪ Weekly inspection of work sites will be undertaken to detect any chemical/oil spills. ▪ The treatment method of cleared vegetation will be recorded. ▪ Weekly inspections to ensure waste segregation is occurring. ▪ Monthly waste audits re volumes, status of stockpiles etc. ▪ Maintain waste disposal records
Reporting	▪ Should a significant spill occur which potentially causes or threatens environmental harm, the EPA will be notified, the cause of the incident investigated and effective measures to cease discharge and recover contaminants implemented. ▪ Records to be kept of all waste movement from the site, including date, material removed contractor and treatment / disposal destination. ▪ Reports should be prepared after each monitoring period (monthly) that include monitoring results, audits, training and incidents.
Corrective Action	▪ Review waste management processes. ▪ Revise waste management plan.

21.2.4 Boggomoss Snail Habitat Management Plan – Construction Phase

Environmental Objective – Boggomoss Snail Habitat Management Plan • No environmental impact to Boggomoss Snail Habitat as a result of construction activities associated with the raising of Glebe Weir	
Performance Criteria	▪ A Boggomoss Snail Habitat Management Plan will be included in the Final EMP and will be approved by DEWHA. ▪ No action undertaken by the contractor or any personnel associated with the Raising of Glebe Weir will result in physical damage to either Boggomoss Snails or to Boggomoss numbers 8, 15 or 16 as shown on Figure 9-1.
Implementation Strategy	▪ Site induction will include this EMP element. ▪ Prior to mobilisation on to site, cattle will be removed from the boggomosses and each boggomoss will be fenced with stock proof fencing (specifically site 15 and 16). This will be discussed with the landholder beforehand to ensure minimum impacts on stock movement and handling. The fenced area will include the pushed timber associated with boggomoss 16. The fenced areas will be signed "No construction vehicles or personnel allowed". ▪ Irrigation in the area of the boggomosses will cease. ▪ All monitoring and management of the boggomosses will be undertaken under the supervision of Dr John Stanisic or an approved scientist. ▪ Each boggomoss will be inspected for the presence of weeds. If any infestation is deemed to be a threat to the habitat, it will be controlled in a manner approved by DPI, as long as this manner does not represent a threat to the snail. This will be decided by the leader of the Recovery Team for the snail, Dr John Stanisic or an approved scientist. ▪ No construction activities, including vegetation clearing or earthmoving, will occur within the fenced areas and should be kept as far from the fenced areas as is reasonably practicable. ▪ No construction personnel should enter the boggomosses except if in order to control an

Environmental Objective – Boggomoss Snail Habitat Management Plan • No environmental impact to Boggomoss Snail Habitat as a result of construction activities associated with the raising of Glebe Weir	
	emergency situation (e.g. fire). ▪ The boggomosses shall be regarded as highly sensitive areas with respect to other EMP elements such as Hazard and Risk, and Clearing Management.
Monitoring	▪ A series of permanent groundwater monitoring bores will be established between the levee to the east of Boggomoss Ck and Boggomoss no.16. Further bores will be established near Boggomoss no.8. Water level in the bores will be monitored by SunWater on a monthly basis until it is shown that the weir does not impact groundwater levels in the vicinity of the boggomoss. ▪ The boggomosses will be inspected with respect to their condition following any flood event that inundates the area. ▪ Habitat monitoring of the boggomosses will be in accordance with that for terrestrial flora and fauna (EMP element 21-30) which dictates annual assessments. These surveys must be coordinated with and not conflict with any research being undertaken as part of implementation of the Recovery Plan for the Boggomoss Snail or translocation trials (should they be approved).
Reporting	▪ All incidents and associated implemented corrective actions will be immediately reported to SunWater who will forward to DEWHA. ▪ Annual reports regarding this EMP element, including all monitoring results, will be submitted to SunWater who will forward to DEWHA.
Corrective Action	▪ Appropriate corrective actions include fixing any fences damaged by floods, stock or vehicles; extinguishing fires (only using water or wet blankets); reminding staff of obligations if they are found within the fenced areas. ▪ The Construction Manager can stop work at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring. ▪ The installation of subsurface drainage will be investigated and undertaken should the groundwater level and habitat monitoring conclude that the weir water level was detrimentally impacting on the boggomoss. Alternative management approaches may be considered if they achieve the same result.