Wandoan Coal Project
Supplementary EIS:
Southern Coal Seam Methane Water Supply Pipeline, Aquatic Ecology

Prepared for:

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Glossary

Term	Definition
Aestivate	To be dormant, often buried within the soil or under leaf litter, during months of drought.
Aggradation	The build-up of sediment or some other substance.
Algal mat	A thin layer of algae formed over the surface of the benthos.
Anaerobic	Having or producing no oxygen.
Anthropogenic	Caused by humans or human activity.
Benthos	A term for all of the flora and fauna that live in or on the bottom substrate of waterbodies, including creeks, rivers and wetlands.
Biodiversity	The range of organisms present in a given community or system.
Catchment	The area of land which collects and transfers rainwater into a waterway.
Channelisation	The formation of deeper channels within a waterway.
Crustacean	An arthropod with jointed appendages, a hard protective outer shell, two pairs of antennae and eyes on stalks, e.g. crabs, prawns.
Culvert	A covered channel that carries water, often be covered by a bridge or a road.
Desiccation	Drying out due to the effects of the environment.
DEEDI	Queensland Department of Employment, Economic Development and Innovation.
DERM	Queensland Department of Environment and Resource Management.
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts.
DNRW	The former Queensland Government Department of Natural Resources and Water. Department now forms part of the Department of Environment and Resource Management (DERM).
DPI&F	The former Queensland Government Department of Primary Industries and Fisheries. Department now forms part of the Department of Employment, Economic Development and Innovation (DEEDI).
Dissolved Oxygen (DO)	The amount of oxygen dissolved in water.

Term	Definition
Diversity	The variety of a particular factor.
Ecological	Relating to the relationships between organisms and their environment.
Edge (habitat)	The habitats on the edge of a stream, which may contain undercut banks, trailing bank vegetation, aquatic macrophytes, tree roots etc.
Environmental flow	Freshwater flow that is maintained solely for environmental reasons, e.g. flows to act as an environmental cue, to deliver nutrients and sediment downstream etc.
Ephemeral	Lasting for a short amount of time, e.g. ephemeral waterways are often dry.
Erosion	The wearing away of rock or soil caused by physical or chemical processes.
Euryhaline	Tolerant of a wide range of water salinities.
Eutrophic	A body of water impacted by high concentrations of nutrients.
Eutrophication	The process whereby water bodies, such as lakes, estuaries, or slow-moving streams receive excess nutrients that stimulate excessive plant growth. This enhanced plant growth, reduces dissolved oxygen in the water when dead plant material decomposes and can cause other organisms to die.
Habitat	The natural conditions and environment in which a plant or animal lives.
Invertebrate	Animals that don't have a backbone, e.g. insects, crustaceans.
Macro-invertebrate	An invertebrate large enough to be seen without magnification.
Macrophyte	A plant large enough to be seen with the naked eye.
Noxious	Harmful to the environment or ecosystem.
Perennial	Lasting for an indefinite amount of time.
PET richness	The richness of pollution-sensitive invertebrate taxa (**P**lecoptera (stoneflies), **E**phemoptera (mayflies), and **T**richoptera (caddisflies) within an area.
pH	Measure of the acidity or alkalinity of a substance, with 1 being the most acidic, 7 being neutral and 14 being the most alkaline.
Pool	An area in a stream that has no water flow and that is often deeper than other parts of the stream.
Quantitative	An assessment based on the amount or number of something.
Riffle zone	An area within a stream that is characterised by shallow water, rocky sediment and fast water flows.

Term	Definition
Riparian	Situated along or near the bank of a waterway.
Run	An area in a stream that is characterised by moderately straight channels and medium water flow.
Senescing	Ageing and deteriorating, e.g. pools that drying out over time.
SIGNAL 2	An index of macro-invertebrate communities that gives an indication of the types of pollution and other physical and chemical factors affecting a site.
Species / taxonomic richness	The number of different species/taxonomic groups present in a given area.
Substrate	The underlying base to something, e.g. the streambed.
Trailing bank vegetation	Riparian vegetation that hangs over the bank of a creek into the water.
Triangular-framed dip net	Aquatic macroinvertebrate sampling device designed to sample bed and edge habitat according to AusRivAS protocols with net size of 250 µm.
Trophic	Describes the diet of groups of plants or animals within the various levels of a food web.
Turbidity	The clarity of a waterbody; depends on the concentration of particles that are suspended in the water column.
Velocity	The rate of water movement with respect to time.

Summary

This report has been prepared for PB, on behalf of the Wandoan Joint Venture (WJV). It contributes information on aquatic ecology for the Supplementary Environmental Impact Statement (EIS) for the Wandoan Coal Project (the Project). This report builds upon the information provided in the EIS aquatic ecology technical report for the southern coal seam methane (CSM) water supply pipeline (frc environmental 2008), and its purpose is to update the description of the existing environment, and the assessment of potential impacts and mitigation measures, based on: the results of seasonal surveys, refinements / modifications to the Project, and comments received in submissions to the EIS. This report should be read in conjunction with EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment, and forms an addendum to the EIS technical report.

Since the EIS was completed, the proposed pipeline route has been amended. Waterways crossed by the revised section of pipeline are located in the Dawson River Catchment, and include Six Mile Creek, along with a floodplain containing a number of small channels that drain to Juandah Creek. These differences have been assessed and included in this report.

The legislation and guidelines relevant to aquatic ecology were described in EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment. In summary, approval through the *Integrated Planning Act 1997* (under the provisions of the *Water Act 2000* and *Fisheries Act 1994*) will be required for the construction of pipeline crossings of watercourses. The Project is highly unlikely to impact on any conservationally significant habitats or listed rare or threatened aquatic species or communities.

Aquatic floral and faunal surveys and collection of water quality data were undertaken at 24 sites in the dry season (August 2008, as discussed in the EIS) and wet season (February 2009, as discussed in this report). There was no flow during either baseline survey event, and the sites sampled were characterised by isolated pools. Aquatic habitat was considered to be in moderate condition at most of the sites surveyed, and there was little variation in habitat quality between surveys, except where higher water levels in the wet season had inundated a greater diversity of habitat. Water quality was variable among sites.

In the wet season, the majority of aquatic macrophytes were native, and diversity and coverage was higher than in the dry season. Floating and submerged growth forms were found in the wet season, while only emergent forms were found in the dry season.

Non-biting and phantom midge larvae (sub-family Chironominae, Tanypodinae and Chaoboridae), diving beetles (family Dyticidae) and water bugs (family Corixidae) dominated the macroinvertebrate communities of the study area in both the dry and wet seasons. These taxa are tolerant of a range of environmental conditions and are common in systems with poor or degraded water quality and / or habitat. Macroinvertebrate communities were indicative of improved edge habitat quality between the dry and wet seasons, which is probably related to increased water levels inundating a great diversity of edge habitat in the wet season. Macroinvertebrate communities of Dogwood Creek are more indicative of moderate habitat conditions than those sampled in smaller tributaries within the sub-catchment. The larger waterways in the study area are likely to have more permanent water, and therefore offer more stable habitat for macroinvertebrates.

Fish richness and abundance was generally higher in the wet season than the dry season. Seasonal differences in the richness and abundance of fish may be caused by variation in fish migration and dispersal behaviour between the dry and wet seasons. The presence of high numbers of fish in relatively small pools highlights the importance of these pools as fish habitat. Three introduced species were captured during the survey: goldfish, common carp and mosquitofish. No species listed as rare or threatened were captured during either survey.

Krefft's river turtles were captured in Dogwood Creek. No other turtles were captured in the study area.

The results of surveys in the early wet season were consistent with those in the dry season. While the aquatic flora and fauna communities are spatially and temporally variable, the assessment of aquatic ecological environmental values remains unchanged and consistent with that presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment. The assessment of environmental values at the new sites surveyed along the revised section of the pipeline route is consistent with that made for the other sites surveyed, as presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

The assessment of impacts and proposed measures to avoid, minimise or mitigate impacts, presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment are considered to be accurate and current based on the results of seasonal surveys and the nature of the changes to the pipeline route. In summary to the comments raised in EIS submissions:

- where the CSM water (and surface waters within the Fitzroy River basin) does not come into contact with surface waters from the Condamine Catchment, or equipment that has been used in the surface waters of the Condamine catchment,

the risk of inter-basin transfer of noxious carp and aquatic disease is considered to be negligible

- the alignment of the pipeline route along existing road corridors, and the mitigation measures discussed in the EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment, are consistent with the objectives of *AS2885: Pipelines – Liquid Gas and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice* (APIA 2009)
- pipeline installation will avoid drought refuge pools where practicable, and waterway barrier works approvals are likely to be required for the construction of temporary crossings and pipeline crossings
- depending on the nature of the works required at each crossing, waterway barrier works may be either assessable or self-assessable development under the *Integrated Planning Act 1997* (IPA). This will be determined for each crossing during the detailed design of the Project, and applications will be made for development approvals where required
- if an isolation method is used, stranded fish will be captured and translocated in accordance with the *Fish Salvage Guidelines* (DPI&F 2004) and relocated to suitable waterholes in the same waterway to prevent the transfer of exotic fish or aquatic disease
- underground (trenchless) pipeline installation techniques (such as drilling) will be used for crossing of larger waterways holding water, such as Dogwood Creek, if necessary, and
- the WJV commits to incorporating biting insect management into its Health and Safety System for the Project, which will be developed prior to the commencement of construction.

1 Introduction

This report has been prepared for PB, on behalf of the Wandoan Joint Venture (WJV). It contributes information on aquatic ecology for the Supplementary Environmental Impact Statement (EIS) for the Wandoan Coal Project (the Project). This report builds upon the information provided in the EIS aquatic ecology technical report for the southern coal seam methane (CSM) water supply pipeline (frc environmental 2008), and its purpose is to:

- update the description of aquatic flora and fauna occurring and likely to occur in areas affected by construction and operation of southern CSM pipeline, based on the results of seasonal surveys (including wetlands and matters of National Environmental Significance identified in the *Environment Protection and Biodiversity Conservation Act 1999*)
- refine the aquatic ecology impact assessment based on the results of the seasonal wet season surveys
- discuss potential direct and indirect effects of any refinements / modifications to the Project on aquatic flora and fauna, and
- address comments relevant to aquatic ecology that were raised in government department and public submissions to the EIS.

This report should be read in conjunction with EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment, and forms an addendum to the EIS technical report.

1.1. Project Background

A Project Description was provided in EIS Volume 2, Book 2, Chapter 1 Introduction, and summarised in EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment.

Since the EIS was completed, the northern section of the pipeline route (north of Giligulgul) has been refined. The pipeline now runs from the northern end of Bailey's Road north along the Leichhardt Highway to the south-eastern corner of MLA 50230. These differences have been assessed and included in this report.

1.2. Description of Southern Pipeline Study Area

The southern CSM water supply pipeline crosses waterways of the Dawson River Catchment (Southern Tributaries or 'Taroom' Subcatchment), part of the Fitzroy Basin, and the Condamine Catchment, part of the Murray-Darling Basin (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment).

Waterways crossed by the revised section of pipeline are located in the Dawson River Catchment, and include Six Mile Creek, along with a floodplain containing a number of small channels that drain to Juandah Creek. These waterways were not assessed in the EIS, but are described in the current report.

2 Relevant Legislation and Guidelines

The legislation and guidelines relevant to aquatic ecology were described in EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment. In summary:

- The Project is highly unlikely to impact on any listed rare or threatened aquatic species or communities.
- The Project is highly unlikely to impact on any wetlands of national, state or regional significance.
- An approval through the *Integrated Planning Act 1997* (under the provisions of the *Water Act 2000*) will be required for the construction of pipeline crossings of watercourses.
- As indicated by the Department of Primary Industries and Fisheries (DPI&F) (now Department of Employment, Economic Development and Innovation (DEEDI)) submission regarding the EIS, approvals under the *Integrated Planning Act 1997* (construction of waterway barrier works, as outlined in Division 8 of the *Fisheries Act 1994*) are likely to be required for the construction of the pipeline if the waterways are temporarily bunded e.g. by the use of coffer dams.

3 Study Methodology

Aquatic floral and faunal surveys and collection of water quality data were undertaken in the dry season (as discussed in the EIS), with surveys repeated in the wet season, from the 3rd to the 12th February 2009. During the wet season field survey, the weather was generally fine and hot, to partially cloudy. In the months preceding the survey, a total of 260.8 mm of rain fell in the region between November 2008 and January 2009 (based on rainfall records from Miles, BOM 2009). There was no rain in the week prior to the survey, though 9 mm of rain fell during the survey period on the 4th February 2009 (BOM 2009).

3.1. Study Sites

Twenty four sites on waterways crossed by the proposed pipeline route (sites were generally located at the proposed crossing location, with the exception of sites 6 and 16, which were located downstream of the proposed crossing location) were surveyed during the dry (August 2008) and wet (February 2009) seasons (Table 3.1). Dry crossing locations were revisited, and it was confirmed that aquatic habitat characteristics had not changed at these sites. Wet season surveys were completed at the eight sites that held water. These were generally at the same location as sites surveyed in the dry season, with the exception of:

- site 5a, which was located at the proposed pipeline crossing of Dogwood Creek (site 5 was surveyed downstream of this location in the dry season, due to land access issues), and
- site 19, which was located on the revised section of the pipeline route, at the Leichhardt Highway.

All waterways north of site 21 to the boundary of the MLAs were dry at the time of survey (including Six Mile Creek), and habitat at each crossing was consistent with that at sites 19 to 21. Therefore, habitat assessments were not repeated at every crossing location, rather, brief field notes and photographs were taken.

Table 3.1 Date and type of survey completed at watercourses on the revised southern coal seam methane water supply pipeline route.

Crossing Number	Channel Name	Survey Completed		Location (UTM, GDA 94, Zone 56J)	
		Dry season (August 2008)	Wet season (February 2009)	Easting	Northing
4	Tributary to Dogwood Creek	Dry, habitat descriptions only	Dry, no habitat changes	221 873	7 051 744
5	Dogwood Creek	Habitat, water quality and aquatic flora and fauna	Not surveyed, replace with site 5a at crossing location	219 858	7 049 837
5a	Dogwood Creek	–	Habitat, water quality and aquatic flora and fauna	221 200	7 051 839
6	Dogwood Creek	Habitat, water quality and aquatic flora and fauna	Habitat, water quality and aquatic flora and fauna	219 216	7 048 343
7	Tributary to Eleven Mile Creek	Dry, habitat descriptions only	Dry, no habitat changes	217 315	7 055 369
8	Tributary to Eleven Mile Creek	Dry, habitat descriptions only	Dry, no habitat changes	216 871	7 056 204
9	Wallan Creek	Habitat, water quality and aquatic flora and fauna	Habitat, water quality and aquatic flora and fauna	215 832	7 058 483
10	Nine Mile Creek	Habitat, water quality and aquatic flora and fauna	Habitat, water quality and aquatic flora and fauna	215 115	7 060 738
11	Tributary to Eleven Mile Creek	Dry, habitat descriptions only	Dry, no habitat changes	213 744	7 062 528
12	Eleven Mile Creek	Dry, habitat descriptions only	Dry, no habitat changes	212 860	7 063 034

Crossing Number	Channel Name	Survey Completed		Location (UTM, GDA 94, Zone 56J)	
		Dry season (August 2008)	Wet season (February 2009)	Easting	Northing
13	Tributary to Nine Mile Creek	Habitat, water quality and aquatic flora and fauna	Habitat, water quality and aquatic flora and fauna	209 572	7 065 554
14	Tributary to Nine Mile Creek	Dry, habitat descriptions only	Dry, no habitat changes	208 828	7 067 415
14a	Tributary to L Tree Creek	Dry, habitat descriptions only	Dry, no habitat changes	207 921	7 069 373
14b	Tributary to L Tree Creek	Dry, habitat descriptions only	Dry, no habitat changes	207 420	7 071 372
15	Tributary to L Tree Creek	Habitat, water quality and aquatic flora and fauna	Habitat, water quality and aquatic flora and fauna	207 395	7 071 544
16	L Tree Creek	Habitat, water quality and aquatic flora and fauna	Habitat, water quality and aquatic flora and fauna	207 502	7 073 845
16a	Tributary to Juandah Creek	Dry, photographs only	Dry, no habitat changes	206 115	7 074 312
17	Tributary to Juandah Creek	Dry, habitat observations only	Dry, no habitat changes	204 251	7 079 579
18	Juandah Creek	Dry, habitat observations only	Dry, no habitat changes	204 909	7 081 153
19	Tributary to Juandah Creek	–	Habitat, water quality and aquatic flora and fauna	206 478	7 085 487
20	Tributary to Juandah Creek	–	Dry, habitat observations only	206 450	7 088 511
21	Tributary to Juandah Creek	–	Dry, habitat observations only	205 831	7 090 694

Attachment A contains site details and photographs of each of the sites surveyed for aquatic flora and fauna in the wet season (February 2009). Descriptions from the dry season surveys are presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment.

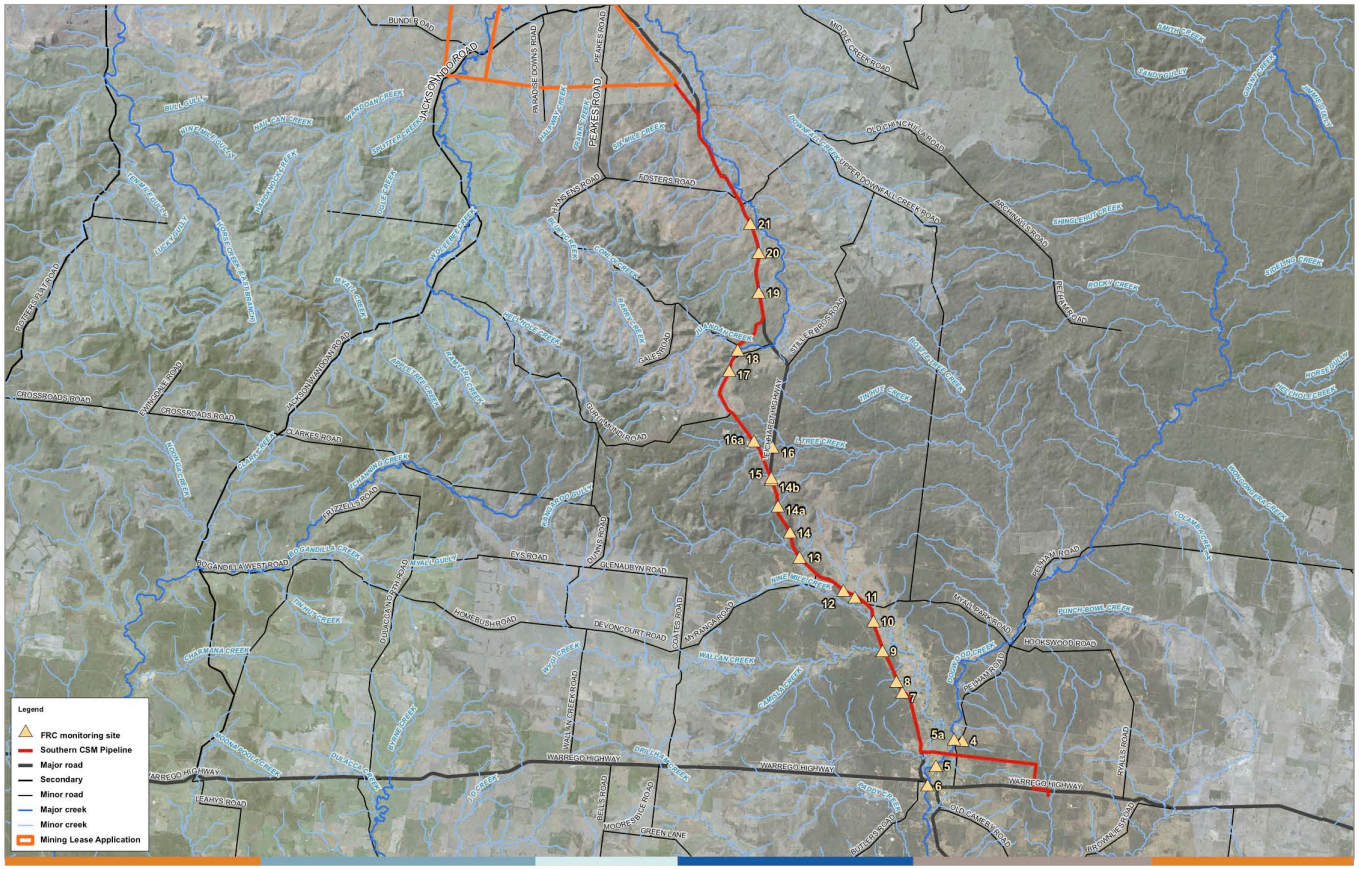

Figure 17B-1-SV2.3
Southern CSM water supply pipeline aquatic survey sites

	Wandoan Coal Project Supplementary EIS
	Figure 3-1 Aquatic flora and fauna survey sites for the southern CSM water pipeline study area.
	Source: Provided by PB | August 2009

3.2. Aquatic Habitat

At each site, habitat descriptions, River Bioassessment Program habitat assessment scores and observations were recorded, using the same methods as in previous surveys (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment). These built upon information collected during previous surveys to provide an assessment of habitat quality in the proposed pipeline study area. Assessments were not repeated at sites that remained dry in the wet season.

3.3. Water Quality

The objective of water quality sampling was to describe water quality at each of the sites at the time of survey, to aid in the interpretation of biological data. For a full description of water quality, refer to the surface water quality impact assessment technical report, included in the EIS Volume 2, TR 11-1-V2.5.

Water quality was measured at each site using a TPS 90 FLMVT water quality meter. The following parameters were measured:

- water temperature (°C)
- electrical conductivity (μS/cm)
- pH
- dissolved oxygen (DO) (mg/L and % saturation), and
- turbidity in NTU (Nephelometric Turbidity Units).

As outlined in the Environmental Protection Agency's (now Department of Environment and Resource Management (DERM)) comments on the EIS, application of the Queensland Water Quality Guidelines (QWQG) is not appropriate for physical water quality and other parameters such as nutrient levels in small isolated pools (EPA 2007a). Rather, water quality should be compared to the QWQG during normal baseflow conditions. There was no flow during either survey, therefore an assessment of water quality during flows could not be made. Rather, the interpretation of the water quality data collected has been primarily designed to aid in the interpretation of the biological data collected, and therefore has not been compared with water quality guidelines. A more detailed description of water quality is provided in EIS Volume 2, Chapter 11 and associated technical report.

3.4. Aquatic Flora

Aquatic flora (macrophytes) were described at each site in accordance with the methods used in the previous aquatic flora and fauna survey (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment).

3.5. Aquatic Macroinvertebrates

Aquatic macroinvertebrates were described at each site in accordance with the methods used in the previous aquatic flora and fauna survey (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment). Taxonomic richness, PET richness and SIGNAL 2 scores were calculated and compared among sites and seasons using standard methods (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment).

3.6. Fish

3.6.1 Sample Collection

Fish communities were surveyed using a combination of backpack or boat electrofishing, baited traps and dip nets. Survey methods were consistent with those used in the previous survey (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment), and sampling effort is presented in Attachment B.

The sampling of fishes was conducted under General Fisheries Permit No. 54790 and Animal Ethics Approval No. CA 2006/03/106 issued to frc environmental (Attachment C).

3.7. Turtles

At sites where water depths were suitable, five large baited cathedral traps were set along the bank and adjacent to cover (vegetation, snags etc.) for a minimum of two hours (Attachment B). The design of the traps was consistent with traps used by the DERM turtle research group and in previous surveys (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment). Turtles captured or observed were identified to species level and a photographic record was kept. The sampling of turtles was conducted under

Scientific Purposes Permit WISP05080608 and Animal Ethics Approval No. CA 2006/03/106 issued to frc environmental (Attachment C).

3.8. Limitations

The assessment of impacts has been updated where appropriate, based on the results of the wet season field survey (February 2009), and on changes to the pipeline alignment. Land access issues and changes to the pipeline alignment meant that the waterways crossed by the revised portion of the pipeline route were only assessed in the wet season. For example, in the dry season, Dogwood Creek, and a major tributary of Dogwood Creek, could not be surveyed at the proposed pipeline crossing location, due to property access restrictions. However, Dogwood Creek was surveyed at the CSM pipeline crossing during the early wet season (February 2009), and downstream of the confluence with the major tributary also crossed by the pipeline route. This does not have a significant impact on the interpretation of results or the assessment of impacts, as habitat at these sites were consistent with the other sites surveyed, and seasonal variation in aquatic flora and fauna communities at these sites is expected to be similar to that at the other sites surveyed in both the dry and wet seasons.

The habitats surveyed were isolated pools, and there was no flow. This limits the interpretation of water quality data to providing context for the biological results, rather than providing an assessment of water quality against the relevant guidelines. Water quality is discussed in more detail in EIS Volume 2, Chapter 11 and associated technical report.

4 Existing Environment

4.1. Aquatic Habitat

4.1.1 Southern Pipeline

Sites surveyed along the southern water supply pipeline typically have a moderate River Bioassessment Program habitat assessment score, both in the dry (August 2008) and early wet (February 2009) seasons (Figure 4-1). Generally, lower scores resulted from low habitat variability (with only pool habitat observed), moderate to extensive bank erosion, and substrates dominated by finer sediments such as sand and silt.

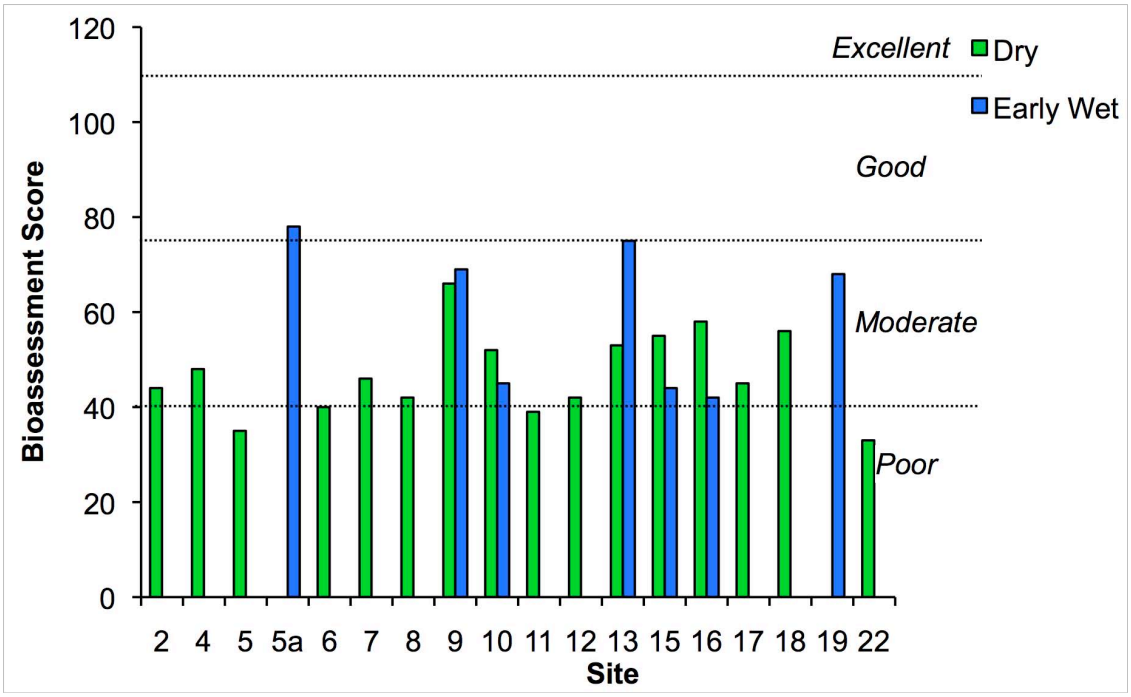

Figure 4-1 River Bioassessment Scores at each site surveyed in the dry (August 2008) and wet (February 2009) season surveys.

Land use practices (predominantly grazing on cleared pastures) have impacted on aquatic habitat quality within the southern pipeline study area, and passage of aquatic fauna is likely to be restricted at some waterway road crossings, in particular the pipe culvert on Dogwood Creek approximately 200 m downstream of the proposed pipeline crossing (site 5a) (Figure 4-2). Habitats on the waterways crossed by the revised northern portion of the alignment are similar to other smaller, dry watercourses further south. Generally the

aquatic habitats are in similar condition to those found throughout the wider catchment (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment).

Figure 4-2

Culvert with hatch on the upstream side in Dogwood Creek (site 5a).

4.1.2 Flow Conditions at the Time of Survey

There was no flow during either baseline survey event, and the sites sampled were characterised by isolated pools. Man-made structures such as culverts created artificial pool habitat at some sites (such as in Dogwood Creek (Figure 4-2) and a number of the creeks crossed by the Leichhardt Highway).

4.2. Water Quality

4.2.1 Water Temperature

Water temperature was generally much higher in the wet season (summer) than in the dry season (winter), due to seasonal factors (though water temperature can also vary on a daily basis and in response to site-specific factors such as water depth). Water temperature at sites along the pipeline alignment ranged between 23.2 and 30.2°C early in the wet season, and between 10.6 and 20.4°C in the dry season.

4.2.2 Dissolved Oxygen

Dissolved oxygen (DO) concentrations were highly variable among sites, both in the dry (August 2008) and wet (February 2009) seasons, though DO was generally much higher

in the dry than wet season (Figure 4-3). In the wet season, DO ranged from 2.9% saturation (sat.) at site 16, to 76.8% sat. at site 10 (Figure 4-3).

As noted in the EPA's submission on the EIS, DO levels in stagnant pools are naturally variable. Low DO concentrations are common, and can be caused by high biological oxygen demand and low mixing of the waters in isolated pools. High DO concentrations (>100%) measured during the day can be caused by large quantities of algae and aquatic plants photosynthesising and producing oxygen, which at night respire and consume the DO within the water column (together with all other organisms within the system), thereby creating critically low DO levels for fauna at night. Water temperature also influences DO levels.

The variable DO levels in the study area are likely to be somewhat characteristic of natural conditions, though DO is likely to be influenced by factors such as clearing of the riparian zone (leading to reduced shading and increased sediment and nutrient runoff into the waterways). This can influence water temperature and primary productivity in the waterways, which influences DO levels.

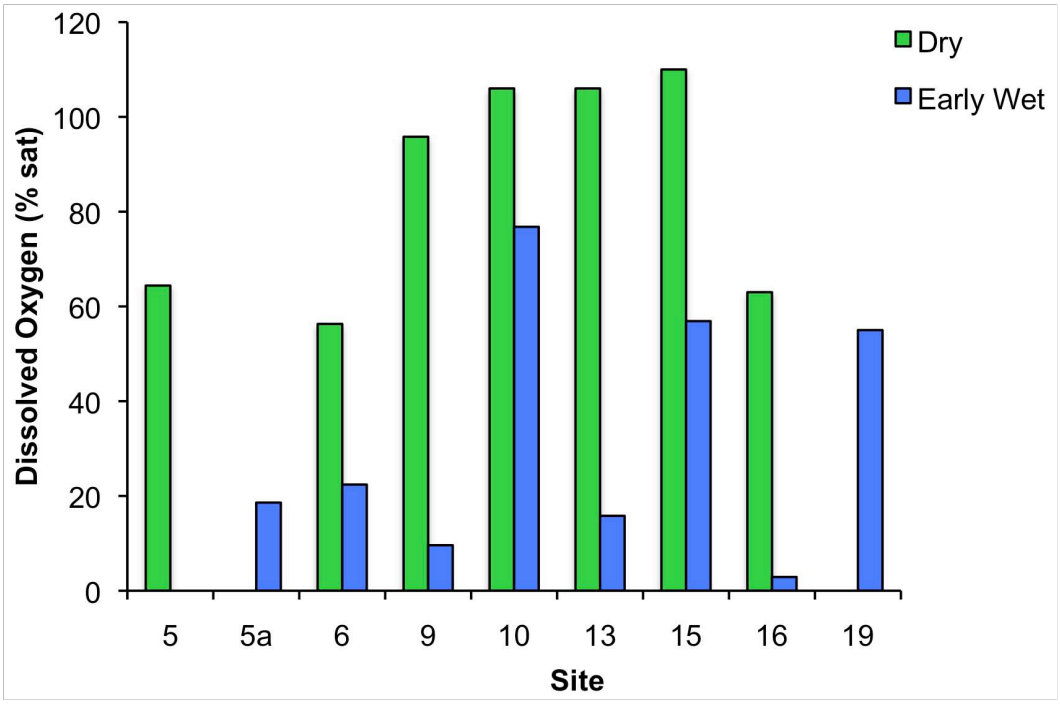

Figure 4-3 Dissolved oxygen at each site in the study area, in the dry (August 2008) and wet (February 2009) season surveys.

4.2.3 pH

pH was more variable in the dry season than in the wet season, with pH generally more acidic in the wet season, ranging from 5.8 to 6.5 (Figure 4-4).

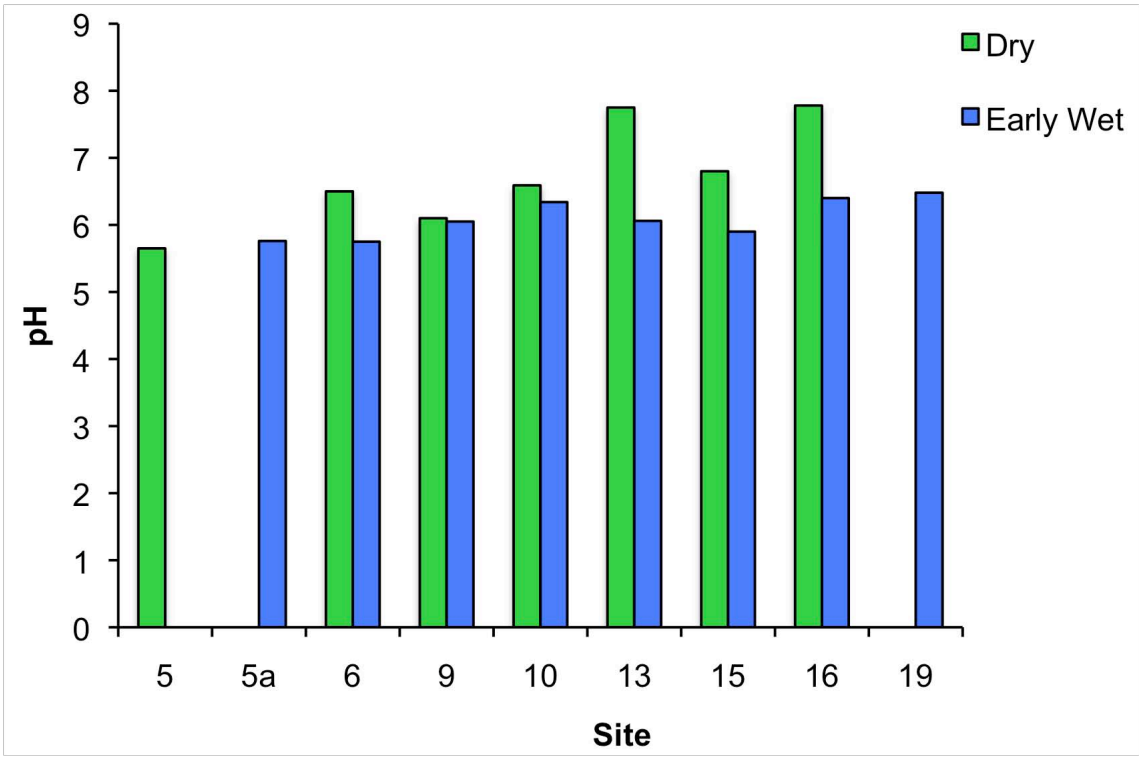

Figure 4-4 pH at each site in the study area, in the dry (August 2008) and wet (February 2009) season surveys.

4.2.4 Electrical Conductivity

Electrical conductivity is proportional to the salinity of a water body, i.e. more saline water is more conductive. Conductivity was highly variable among sites within the study area; with lower conductivity levels at most sites in the wet season than in the dry season (Figure 4-5). In the wet season, conductivity ranged between 44 and 192 µS/cm and conductivity was highest in waterways further north near Wandoan (sites 16 & 19). Differences in conductivity could be associated with evaporation (effectively concentrating the salts in the remaining water) or related to the local geology and environmental factors at a site.

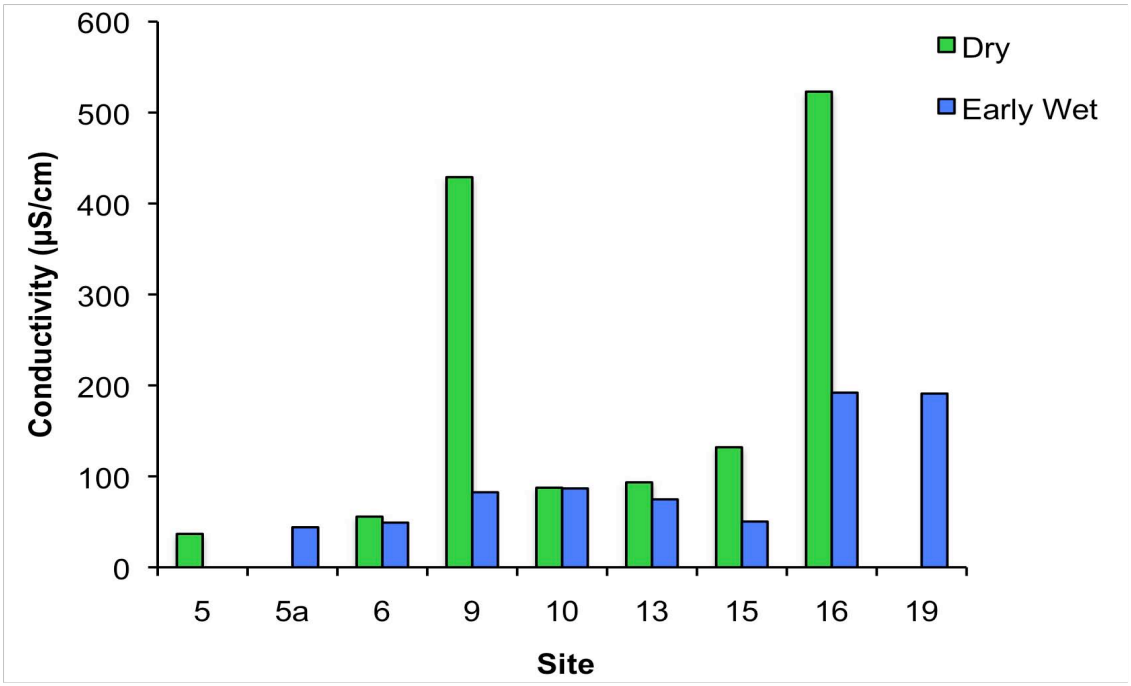

Figure 4-5 Electrical conductivity (µS/cm) at each site in the study area, in the dry (August 2008) and wet (February 2009) season surveys.

4.3. Aquatic Macrophytes

In the wet season, the majority of aquatic macrophytes were native, diversity was generally high and coverage at each site was generally greater than 38%.

The number of species found across most sites increased substantially from nine species in the dry season (August 2008), to 20 species in the wet season (February 2009) (Table 4.1). Floating and submerged growth forms were found in the wet season, while only emergent forms were found in the dry season.

The common rush (*Juncus usitatus*) was the most commonly occurring macrophyte, which was present at five of the eight sites sampled during the wet season (Figure 4-6). The coverage of any one species was generally less than or equal to 20% at all sites sampled early in the wet season, except at Wallan Creek (site 9), where common reed (*Phragmites australis*) covered 50% of the lower bank and bed area, at Dogwood Creek where *Lomandra* spp. (Figure 4-7) covered 40% of the bank, and at the tributary of Nine Mile Creek where the giant sedge (*Cyperus exaltus*) covered 40% of the lower bank and bed area.

Figure 4-6

Common rush was the most common macrophyte species.

Figure 4-7

Lomandra spp. grew on the bank at Dogwood Creek (site 5a).

Table 4.1 Percent coverage of aquatic macrophytes listed by growth form, at each site during the dry (August 2008) and wet (February 2009) season surveys.

GROWTH FORM / Family / *Species*	**Common name**	**Native/ Exotic**	**% Coverage at Each Site**														
			5	**5a**	**6**		**9**		**10**		**13**		**15**		**16**		**19**
			Dry	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Wet**
EMERGENT																	
Amaranthaceae																	
Alternanthera denticulata	lesser joy-weed	N						2			1						
Cyperaceae																	
Cyperus sp.	unknown sedge	N				5			2			10					
Cyperus difformis						5		2		10		2		3			8
Cyperus polystachyos	bunchy sedge	N				5			2				10				
Cyperus eragrostis												5					
Cyperus exaltus	giant sedge	N									5	40		8			
Eleocharis acuta	common spikerush	N									1	5	5	25			
Graminae																	
Paspalum vaginatum	water couch					2											15
Phragmites australis	common reed	N	5	15	1	5	20	40	5	20							
Juncaceae																	
Juncus usitatus	common rush	N	5	10	3	10		5	2	15	2		2	15	5		5

GROWTH FORM / Family / *Species*	**Common name**	**Native/ Exotic**	**% Coverage at Each Site**														
			5	**5a**	**6**		**9**		**10**		**13**		**15**		**16**		**19**
			Dry	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Wet**
Lomandraceae																	
Lomandra sp.	rush	N	1	40	5			2			2	5		5		5	
Polygonaceae																	
Persicaria attenuata		N						2									
Persicaria decipiens	slender knotweed	N				15											
Poaceae																	
Eragrostris elongata	clustered lovegrass	N									5						
Pseudoraphis spinescens	spiny mudgrass	N				30						5					
Leersia hexandra	swamp ricegrass															10	
Leptochloa digitata	umbrella canegrass	N															5
SUBMERGED																	
Hydrocharitaceae																	
Blyxa aubertii		N										5					

GROWTH FORM / Family / *Species*	**Common name**	**Native/ Exotic**	**% Coverage at Each Site**														
			5	**5a**	**6**		**9**		**10**		**13**		**15**		**16**		**19**
			Dry	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Wet**
FLOATING																	
Azollaceae																	
Azolla pinnata	ferny azolla	N				10						20					
Ludwigia peploides sub sp. *montevidensis*	water primrose	N				2						2					5
Total Coverage			**11**	**65**	**9**	**89**	**20**	**53**	**11**	**45**	**16**	**99**	**17**	**56**	**5**	**15**	**38**
Species Richness			**3**	**3**	**3**	**10**	**1**	**6**	**4**	**3**	**6**	**10**	**3**	**5**	**1**	**2**	**5**

4.4. Aquatic Macroinvertebrate Communities

Non-biting and phantom midge larvae (sub-family Chironominae, Tanypodinae and Chaoboridae), diving beetles (family Dyticidae) and water bugs (family Corixidae) dominated the macroinvertebrate communities of the study area in both the dry and wet seasons. These taxa are tolerant of a range of environmental conditions and are common in systems with poor or degraded habitats (Chessman 2003), and as such they are likely to be able to tolerate fluctuations in environmental conditions experienced in ephemeral and intermittent waterways (Chessman, B. [Centre for Natural Resources NSW] pers. comm. 2003, 21 October).

4.4.1 Richness

Taxonomic richness (the number of macroinvertebrate taxa, generally families, per sample) ranged from 1 to 9 in bed habitats and 6 to 24 in edge habitats across both seasons. Taxonomic richness in bed habitat was similar between seasons at many sites, however there was a small decline in richness between surveys at Wallan (site 9) and L Tree (site 15) creeks. During the wet season, richness was greatest in bed habitats in the L Tree Creek tributary (site 15) and Nine Mile Creek (site 10).

Generally, taxonomic richness was higher in edge habitat than bed habitat at most sites (Figure 4-8 & Figure 4-9), which is to be expected, as edge habitats provided a more diverse array of microhabitats than bed habitats. In edge habitat, taxonomic richness was greatest at Dogwood Creek (site 6) and a tributary to L Tree Creek (site 15) (Figure 4-9). This may be related to increased availability of suitable habitats at those sites. There were no clear seasonal patterns among the sites.

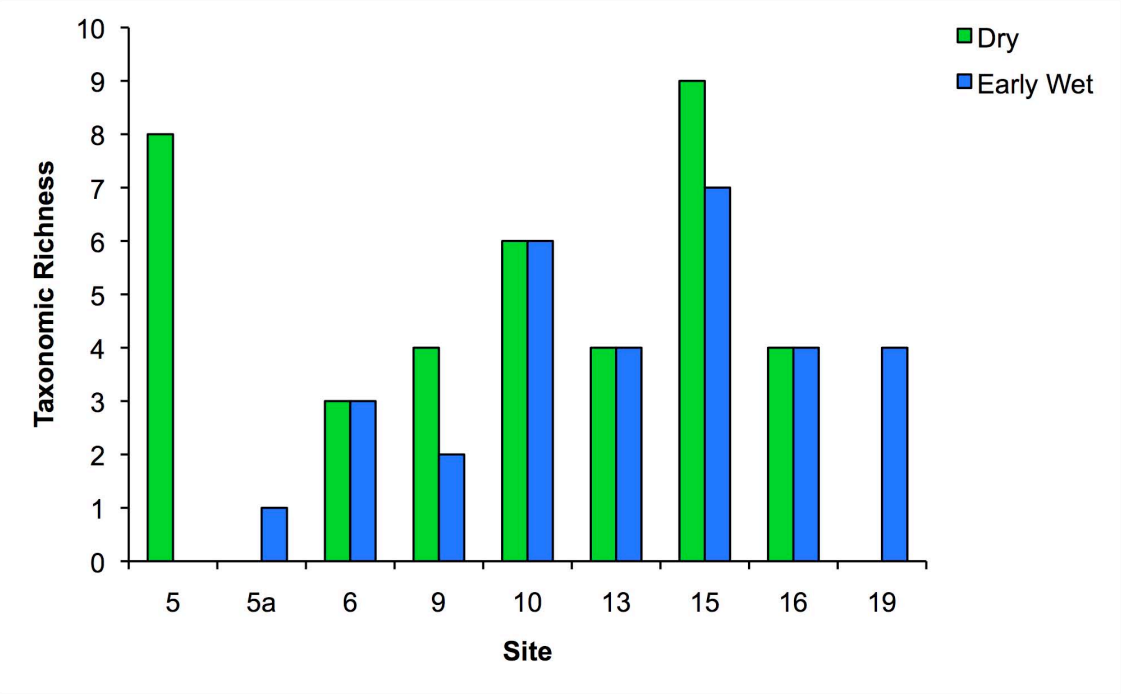

Figure 4-8 Taxonomic richness of macro-invertebrate communities in bed habitats of the study area, sampled in the dry (August 2008) and wet (February 2009) season surveys.

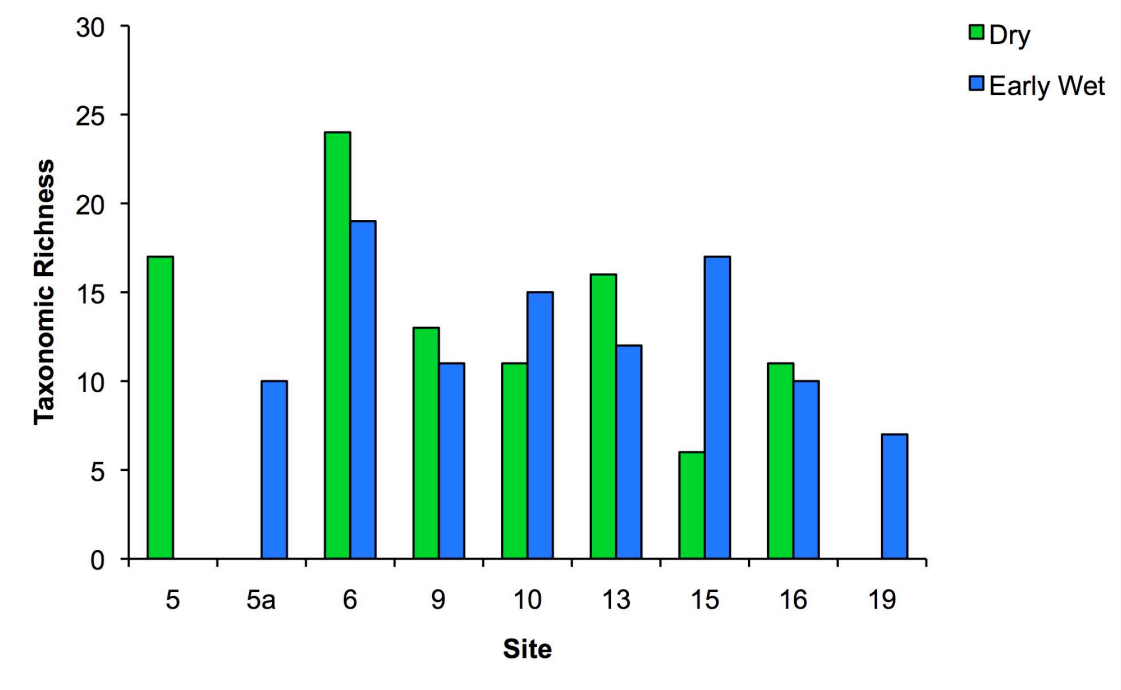

Figure 4-9 Taxonomic richness of macro-invertebrate communities in edge habitats of the study area, sampled in the dry (August 2008) and wet (February 2009) season surveys.

4.4.2 PET Richness

PET richness is a measure of the number of pollution-sensitive invertebrate taxa (PET richness of <1 is indicative of degraded water or habitat quality, 1 – 4 is considered to indicate moderate water / habitat quality, and PET richness of >4 indicates good water / habitat quality. PET richness was higher in edge than bed habitats, which generally had few or no PET taxa (Figure 4-10 & Figure 4-11). The difference is likely to be due to increased habitat complexity in edge habitats. Overall, the low abundance of PET taxa (< 3) at most sites may be due to the ephemeral or intermittent nature of these waterways, which are subjected commonly to a range of severe (natural) stresses, such as nutrient enrichment, turbidity and salinity (Chessman, B. [Centre for Natural Resources NSW] pers. comm. 2003, 21 October).

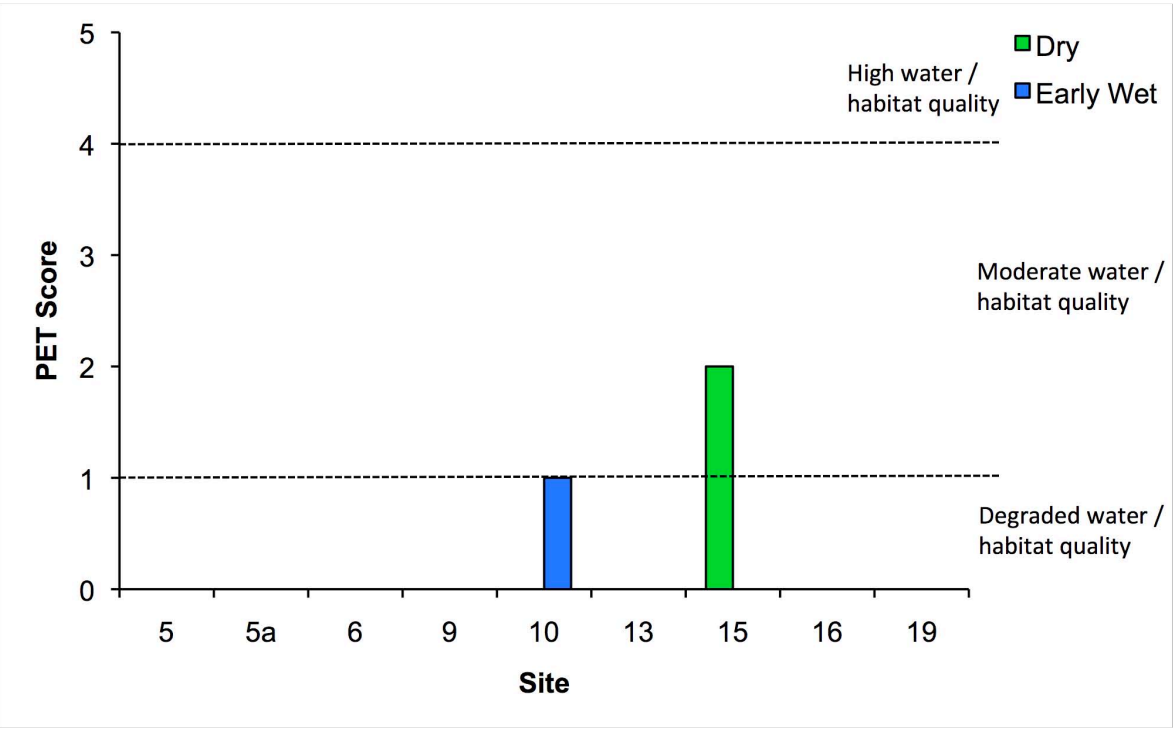

Figure 4-10 PET richness of macro-invertebrate communities in bed habitats of the study area, sampled in the dry (August 2008) and wet (February 2009) season surveys.

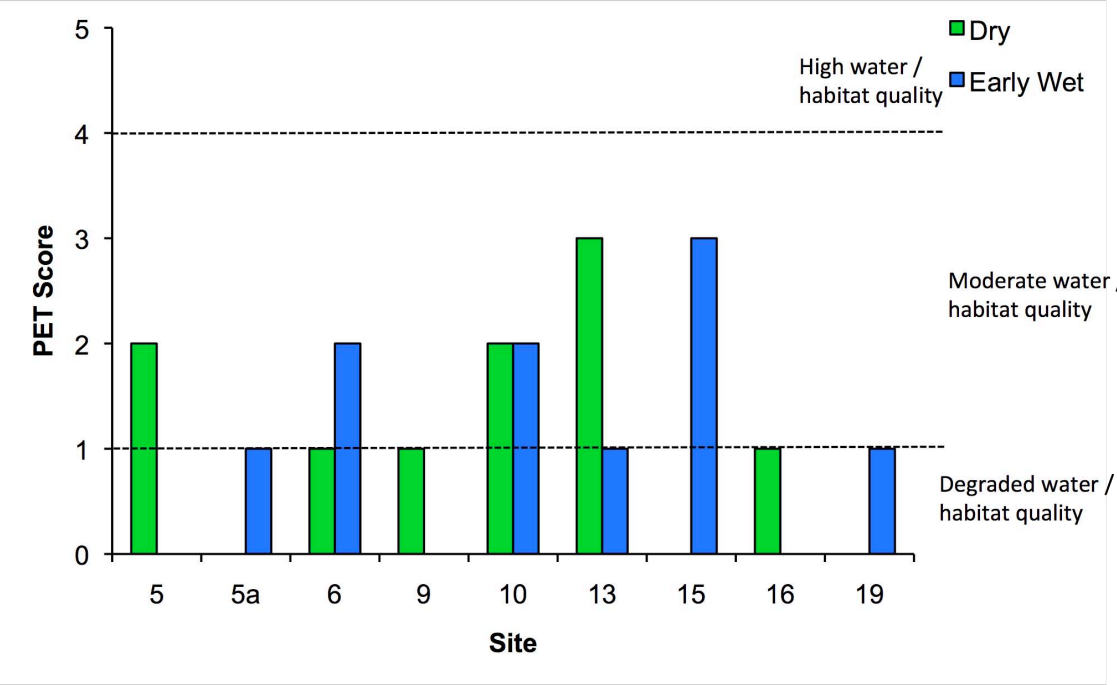

Figure 4-11 PET richness of macro-invertebrate communities in edge habitats of the study area, sampled in the dry (August 2008) and wet (February 2009) season surveys.

4.4.3 SIGNAL 2 / Family Bi-plots

SIGNAL 2 / Family Bi-plots are described in EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment. Macroinvertebrate communities surveyed from bed and edge habitats throughout the study area were generally within quadrant 4 of the bi-plot during both seasons, however some samples from edge habitat extended into quadrant 2 (Figure 4-12 & Figure 4-13). The location of the majority of samples in quadrant 4 indicates that communities may be impacted by agricultural impacts (e.g. nutrient enrichment) and runoff due to the surrounding land use practices.

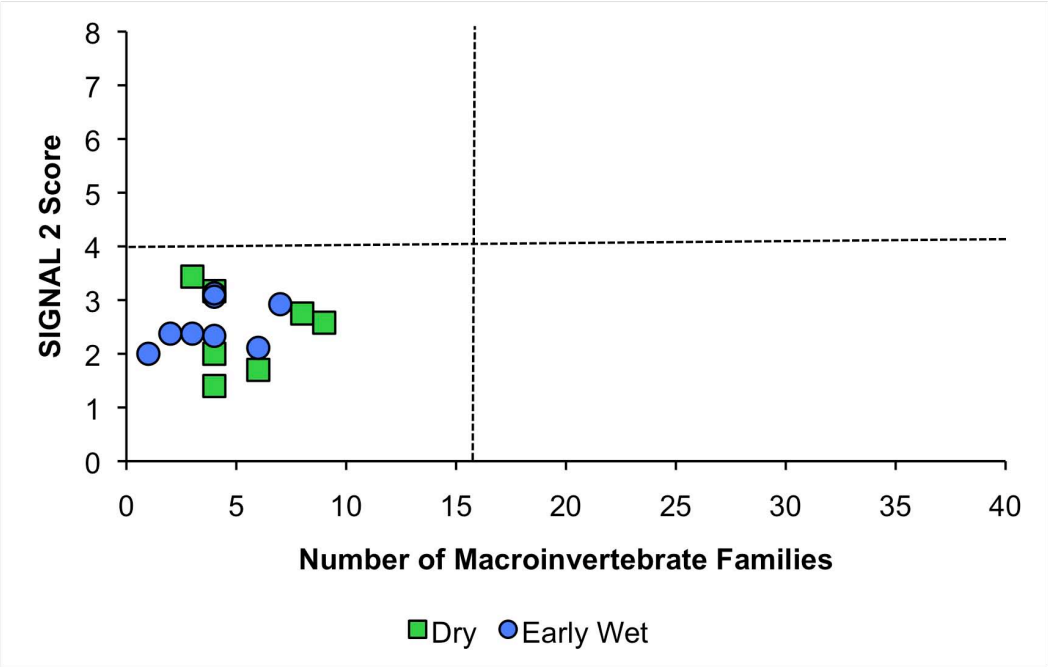

Figure 4-12 SIGNAL 2 / Family Bi-plot for the macro-invertebrate communities sampled from bed habitats in the study area, sampled in the dry (August 2008) and wet (February 2009) season surveys.

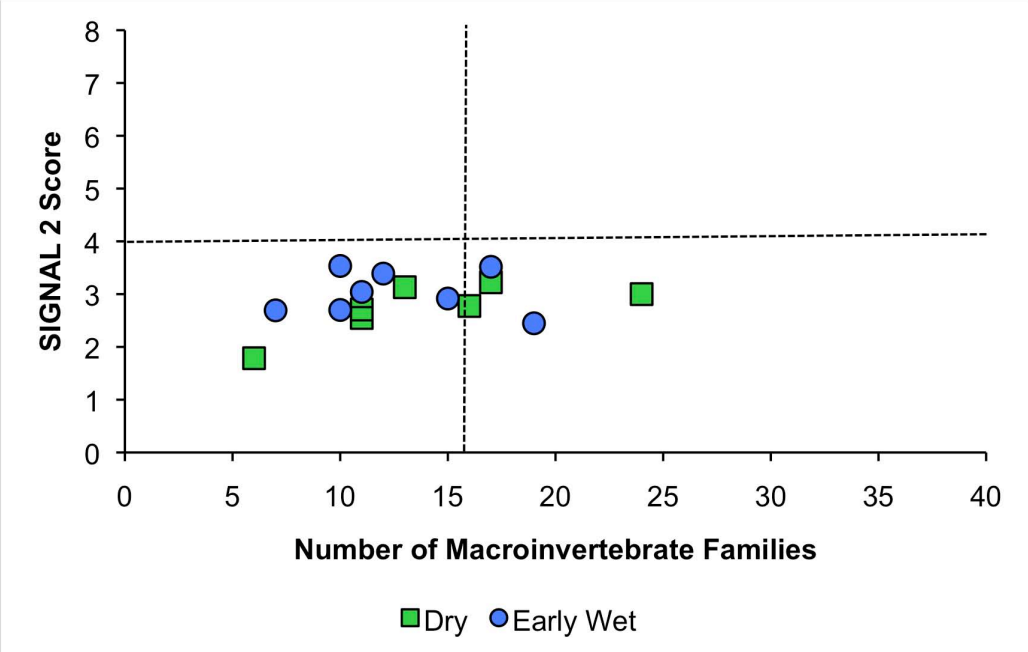

Figure 4-13 SIGNAL 2 / Family Bi-plot for the macro-invertebrate communities sampled from edge habitats in the study area, sampled in the dry (August 2008) and wet (February 2009) season surveys.

4.4.4 Macrocrustaceans

A total of 505 macrocrustaceans from at least four different species were captured across the eight sites surveyed in the wet season. The species richness was consistent between seasons at most sites, except at Wallan Creek (site 9) and a tributary of Eleven Mile Creek (site 10), where richness has decreased slightly from the dry to the wet season (Figure 4-14). Higher species richness in the dry season may be due to a contraction of species in smaller pools. In the wet season, abundance was greatest at Eleven Mile Creek (site 10) and the culvert on the Leichardt Highway (site 19), where between 175 and 215 individuals were captured per site (Figure 4-15). Very few macrocrustaceans were captured in Dogwood Creek (sites 5a & 6), Wallan Creek (site 9) and in the tributaries of Nine Mile (site 13) and L Tree creeks (site 15).

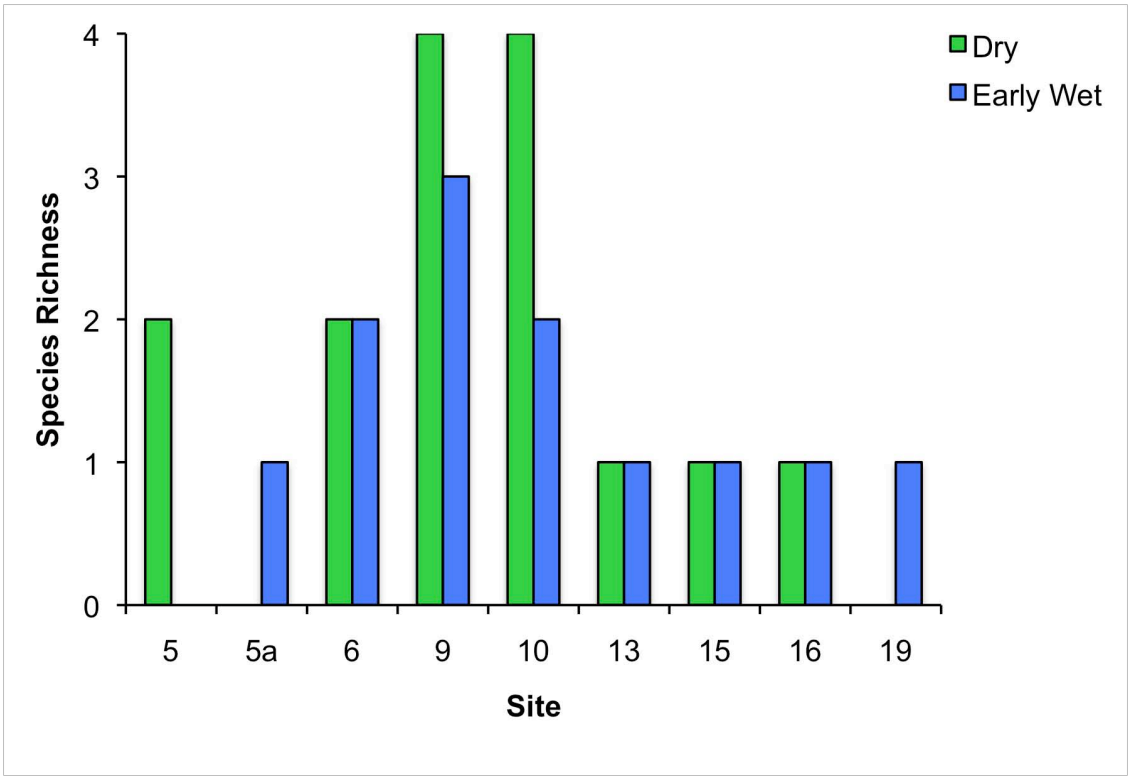

Figure 4-14 Macro-crustacean species richness among sites sampled in the dry (August 2008) and wet (February 2009) season surveys.

The freshwater yabby (*Cherax destructor destructor*) was the most common species, recorded at seven of the eight sites surveyed. Freshwater yabbies were also the most abundant macrocrustaceans sampled, dominating the community in the culvert on the Leichardt Highway (site 19) (Table 4.2).

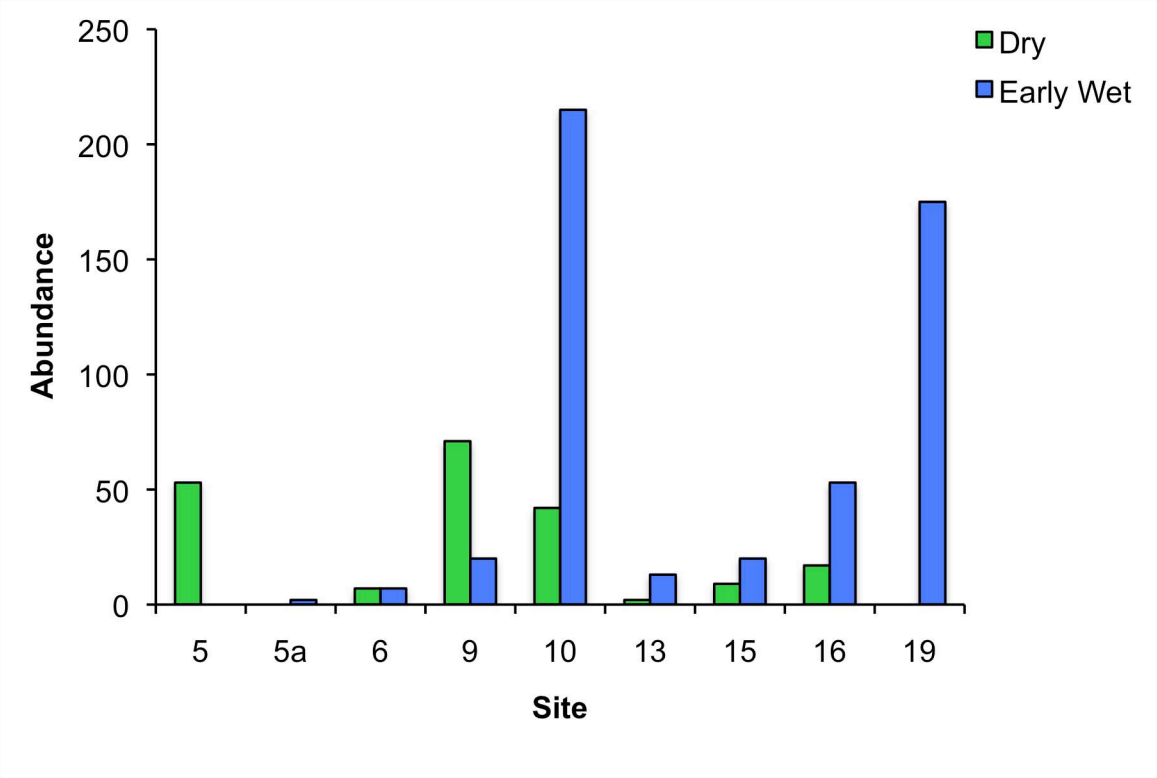

Figure 4-15 Total abundance of macrocrustaceans among sites sampled in the dry (August 2008) and wet (February 2009) season surveys.

Table 4.2 Abundance of macrocrustaceans sampled at each site (all survey methods combined) in the dry (August 2008) and wet (February 2009) season surveys.

Family / *Species*	**Common Name**	**5**		**5a**		**6**		**9**		**10**		**13**		**15**		**16**		**19**
		Dry	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Wet**
Atyidae																		
Caradina sp.	freshwater shrimp	5	2	-	2	1	13	1	196	-	-	-	-	-	-	-		
Paratya sp.	freshwater shrimp	48	-	6	-	64		21	-	2	-	-	-	-	-	-		
Palaemonidae																		
Macrobrachium sp.	river prawn	-	-	1	-	3	1	3	-	-	-	-	-	-	-	-		
Parastacidae																		
Cherax destructor destructor	Common freshwater yabby	-	-	-	5	3	6	17	19	-	13	9	20	17	53	175		

4.4.5 Summary

The structure of aquatic macroinvertebrate communities in the study area was representative of poor – moderate habitat and / or water quality during both seasons (see Sections 4.1 & 4.2). Differences in macroinvertebrate community structure appeared to be related to site-specific differences in habitat complexity, with very large differences between communities in bed and edge habitats. There were no consistent differences between seasons.

Macroinvertebrate communities of Dogwood Creek are more indicative of moderate habitat conditions than those sampled in smaller tributaries within the sub-catchment. The larger waterways in the study area are likely to have more permanent water, and therefore offer more stable habitat for macroinvertebrates. In contrast, the communities living within the smaller creeks of the study area are influenced by harsh and variable physical conditions, such as the drying of pools, so are more indicative of communities found in these ephemeral or intermittent waterways.

4.5. Fish Communities

In total, 2,641 fish from eleven species were captured across the eight sites where water was present in the wet season. Species richness varied among sites from zero to seven species. In the wet season, fish abundance also varied among sites, from no fish at L Tree Creek (site 16) and the road culvert on the Leichardt Highway (site 19), to 1,901 fish caught in the tributary to Nine Mile Creek (site 13) (Figure 4-16 & Table 4.3). In the dry season, the greatest number of fish was caught in the tributary to Nine Mile Creek (site 13). High numbers of fish at some sites may reflect the perennial nature of the pools and serves to highlight the importance of these areas as fish habitat.

Difference in the richness and abundance of fish among sites is probably related to site-specific factors such as pool size, and the availability and suitability of habitat features such as large woody debris. For example, where the quality of habitat was good, there was commonly a high diversity of fish (Dogwood Creek sites 5a and 6). Conversely where habitat quality was poor, fish assemblages were less diverse (e.g. the tributary to L Tree Creek, site 15).

Fish richness and abundance was generally higher in the wet season than the dry season. Seasonal differences in the richness and abundance of fish may be caused by variation in fish migration and dispersal behaviour between the dry and wet seasons (Pusey et al 2004).

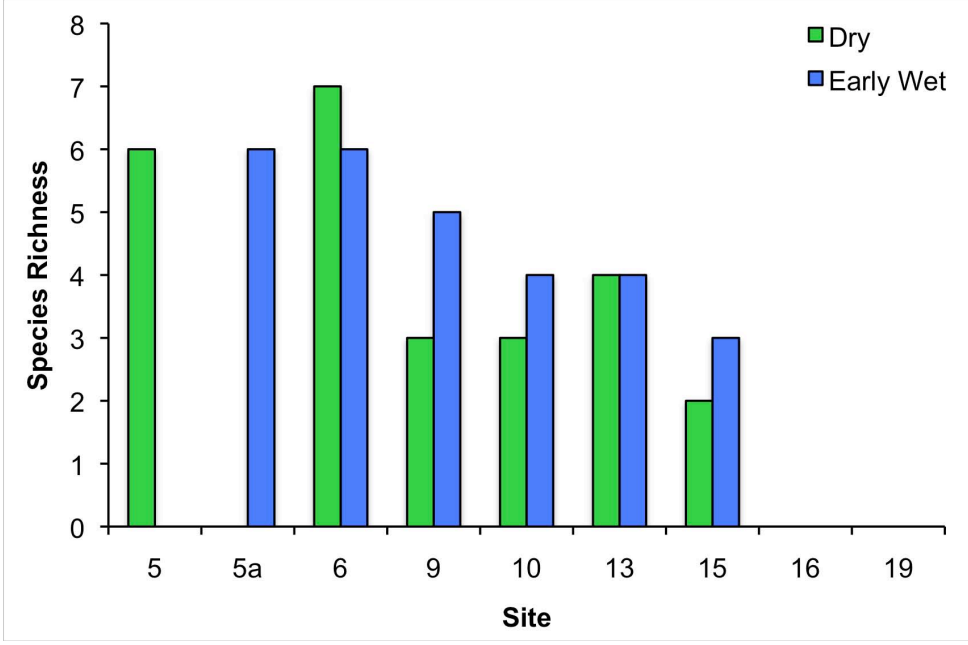

Figure 4-16 Fish species richness among site (all survey methods combined) sampled in the dry (August 2008) and wet (February 2009) season surveys.

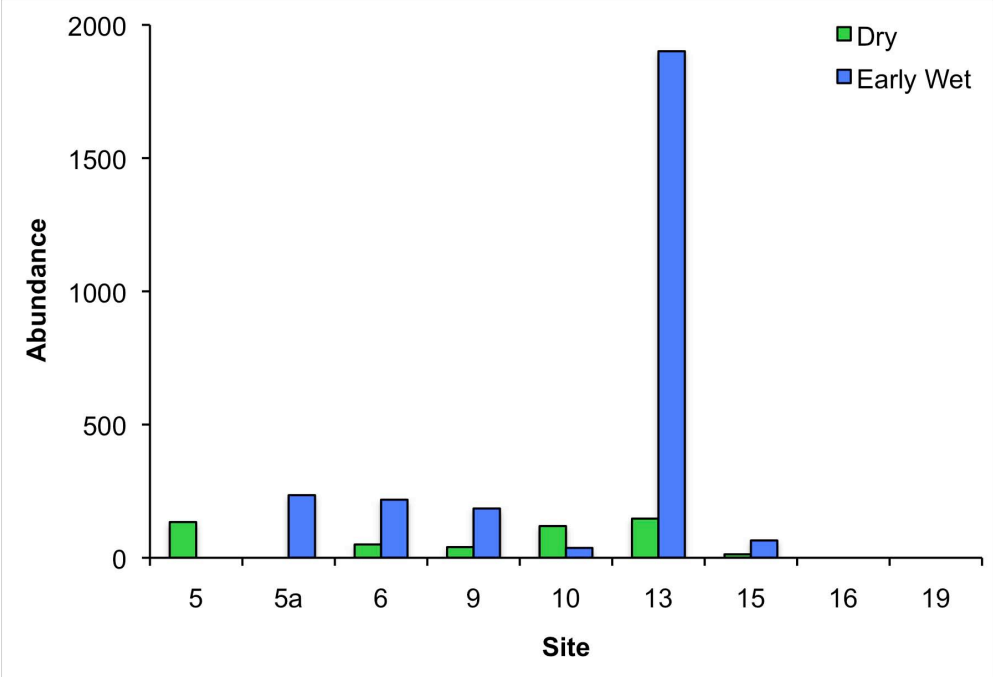

Figure 4-17 Fish abundance among sites (all survey methods combined) sampled in the dry (August 2008) and wet (February 2009) season surveys.

Table 4.3 Abundance of fish species at each site (all survey methods combined) sampled in the dry (August 2008) and wet (February 2009) season surveys.

Family / *Species*	**Common Name**	**Site**															
		5	**5a**	**6**		**9**		**10**		**13**		**15**		**16**		**19**	
		Dry	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**
Ambassidae																	
Ambassis agassizi	Agassiz's glassfish									8	1024	1	19				
Ariidae																	
Tandanus tandanus	eel-tailed catfish			1													
Clupeidae																	
Nematalosa erebi	bony bream	1		7	27												
	unidentified			1													
Cyprinids																	
*Cyprinus carpio**	common carp	1	1	1	1												
*Carassius auratus**	goldfish	7	2	14			1	8	2	30	5						
Eleotridae																	
Hypseleotris spp.	carp gudgeon	117	144	23	74	36	71	76	19	107	815	12	49				
Melanotaeniidae																	
Melanotaenia fluviatilis	Murray River rainbowfish			1	8												

Family / *Species*	**Common Name**	**Site**															
		5	**5a**	**6**		**9**		**10**		**13**		**15**		**16**		**19**	
		Dry	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**
Melanotaenia splendida	Eastern rainbowfish		1														
Percichthyidae																	
Macquaria ambigua	golden perch					1	1										
Poeciliidae																	
*Gambusia holbrooki**	mosquitofish	5	58		95	3	109	35	13								
Retropinnidae																	
Retropinna semoni	Australian smelt	3	29		12												
Terapontidae																	
Leiopotherapon unicolor	spangled perch			2			3		3	2	53		1				
TOTAL		**134**	**235**	**50**	**218**	**40**	**185**	**129**	**37**	**147**	**1 897**	**19**	**69**	**0**	**0**	**–**	**0**

* Introduced species

^ The gudgeon *Hypseleotris* complex is extremely difficult to identify correctly in the field and can hybridise (interbreed), therefore carp gudgeons were pooled into a single generic group.

Carp gudgeons were the most widely distributed and abundant species during the dry and wet seasons (Table 4.3). The carp gudgeon (*Hypseleotris*) complex is extremely difficult to identify correctly and can hybridise (interbreed) (Pusey et al. 2004) therefore voucher specimens were identified by experts at the Queensland museum (Figure 4-18 & Figure 4-19), who determined that at least two *Hypseleotris* species were found. Given the difficulty in identifying with certainty in the field, all carp gudgeons have been pooled into a single generic group for this report.

Introduced species such as goldfish (Figure 4-20) and mosquitofish were relatively widely distributed and abundant across the sites in the wet season. Less common species included Agassiz's glassfish, bony bream, spangled perch, common carp, Murray River rainbowfish, golden perch and Australian smelt (Figure 4-24), however many of these species were only caught in Dogwood Creek (Table 4.3).

Figure 4-18

Adult carp gudgeon (*Hypseleotris* sp. 1) at a tributary of Nine Mile Creek (site 13).

Figure 4-19

Adult carp gudgeon (*Hypseleotris* sp. 2) at tributary to L Tree Creek (site 15).

Figure 4-20

A goldfish at Dogwood Creek (site 5a).

Figure 4-21

An intermediate eastern rainbowfish at Dogwood Creek (site 6).

Figure 4-22

Intermediate golden perch at Wallan Creek (site 9).

Figure 4-23

Adult common carp at Dogwood Creek (site 6).

Figure 4-24

Adult Australian smelt at Dogwood Creek (site 6).

4.5.1 Life History Stages

All life history stages (juvenile, intermediate and adult) were captured for most species (Agassiz's glassfish, bony bream, carp gudgeons, spangled perch, Australian smelt, and mosquitofish). Across the study area, intermediates were the most abundant life history stage for most species of fish. The largest species (on average, in terms of length) was common carp and the smallest species' (on average, in terms of length) were carp gudgeons and Australian smelt.

4.5.2 Indicators of Stream Health

Three introduced species were captured during the survey: goldfish, common carp and mosquitofish. In total, 287 introduced fish were captured in the wet season. No introduced fish were captured in the tributary of L Tree Creek (site 15) during the dry or

wet seasons, no fish at all were recorded in the main channel of L Tree Creek at the Leichhardt Highway crossing (site 16). No fish were recorded in the tributary to Juandah Creek (site 19) in the wet season. The reasons for this are unclear, but could include low connectivity to these pools, which would reduce the ability of fish to disperse to these habitats. Low dissolved oxygen levels at site 16 may also be a contributing factor.

The increased diversity (richness and abundance) of fish communities at a number of sites during the early wet season, reflect increased structure and complexity of habitats due to higher water levels, increased coverage of macrophytes and seasonal changes in the breeding and dispersal of some species (Pusey et al. 2004).

No species listed as threatened were captured during the survey. Several spangled perch caught in Wallan Creek (site 9) had lesions, which may be due to the fungal disease Epizootic Ulcerative Syndrome (EUS or red spot disease) (EIS Volume 2, TR 17B-1-V2.5 Aquatic Ecology Impact Assessment). No testing was done to confirm this as it was beyond the scope of the current study. The factors that cause this disease are unclear (Humphrey & Pearce 2004). All other fishes appeared to be healthy.

4.6. Turtle Communities

Emydura macquarii krefftii[1] (Krefft's river turtle) (Figure 4-25) was the only species of turtle captured or observed throughout the study area early in the wet season. This species was only captured in Dogwood Creek, with one juvenile and one adult captured at site 5a, and one adult captured at site 6. Turtles were not surveyed in the dry season.

Figure 4-25

An adult Krefft's river turtle at site 6.

[1] Formerly known as *Emydura krefftii*. This species has recently been re-classified and included in the *Emydura macquarii* complex, a group of closely related sub-species (Wilson & Swan 2008).

4.7. Other Aquatic Vertebrates

This survey did not target other aquatic vertebrates, however, abundant water dragons and a number of nesting water birds were noted at sites with perennial water holes. Platypus were not observed at any sites in the survey area, and anecdotal evidence from landowners suggests that platypus have not been seen in the waterways crossed by the pipeline route for many years.

4.8. Summary of Environmental Values

The results of surveys in the early wet season were consistent with those in the dry season. While the aquatic flora and fauna communities are spatially and temporally variable, the assessment of aquatic ecological environmental values remains unchanged and consistent with that presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment. The assessment of environmental values at the new sites surveyed along the revised section of the pipeline route is consistent with that made for the other sites surveyed, as presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

No rare or threatened aquatic species were recorded during either survey.

5 Updated Description of Proposed Development

The proposed pipeline route differs from the route initially assessed in Volume 2 of the EIS. The proposed route commences at the Condamine Power Station and progresses in a northerly direction to an existing high voltage transmission line easement. A turn to the west is then made and the pipeline travels along the existing transmission line easement until it intersects with the Leichhardt Highway. A turn to the north is made and the proposed pipeline travels along the eastern side of the road reserve of the Leichhardt Highway, crossing the highway into the road reserve of Baileys Road and continuing north. At the intersection of Baileys and Giligulgul Roads, the proposed pipeline proceeds in a north-east direction within the road reserve. Where Giligulgul Road intersects with the Leichhardt Highway, the alignment turns into the road reserve of the Leichhardt Highway on the western side and progresses in a northerly direction until the south-eastern corner of Lot 3 FT695. At this point, the proposed alignment traverses this allotment in a northerly direction to enter the MLA areas at the south-east corner (Figure 3-1).

Waterways crossed by the revised section of pipeline include:

- Six Mile Creek, and
- at least 17 minor tributaries of Juandah Creek, many of which are channels within a large floodplain area.

6 Updated Assessment of Potential Impacts

The assessment of impacts presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment are considered to be accurate and current based on the results of seasonal surveys and the nature of the changes to the pipeline route, except where varied below.

6.1. Operation of Vehicles and Equipment

The assessment of the potential impacts of the operation of vehicles and equipment on aquatic ecology is consistent with the assessment presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

6.2. Vegetation Clearing and Earth Moving

The assessment of the potential impacts of vegetation clearing and earth moving on aquatic ecology is consistent with the assessment presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

6.3. Construction of Creek Crossings

Construction of temporary vehicle and permanent pipeline creek crossings will disturb bed and bank stability, leading to increases in localised erosion, potentially leading to increases in turbidity and sediment deposition, the impacts of which were discussed in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

The waterways crossed by the northern section of the pipeline that has been re-aligned are small order streams, predominantly located within a floodplain of Juandah Creek. These waterways do not contain any significant habitat, and they are very similar to the small order creeks crossed by the remainder of the pipeline route. No fish were caught in the channel crossed by the realigned pipeline route that held water, and most of the channels were dry and are only likely to carry and hold water for a short time during rainfall events. That is, they are not considered to be significant fish habitats. As such, the likely consequence of impacts to these habitats is considered to be ecologically

insignificant in a local and regional context. Nevertheless, mitigation of impacts to aquatic habitat is required (refer to Section 7.3).

6.4. Supply and Storage of CSM By-Product Water

Overall, the CSM by-product water is expected to be high in total dissolved solids (TDS) compared with the TDS concentration in the natural waterways. If water supplied from the southern CSM pipeline enters the creeks crossed by the pipelines or within the MLAs, it may impact on aquatic ecology.

As noted by the former Department of Primary Industries and Fisheries (DPI&F), there is a theoretical possibility for inter-basin transfer of aquatic disease associated with this water supply option. However, the risk of inter-basin disease transfer is considered to be negligible for reasons including:

- CSM by-product water is sourced from sub-surface aquifers and is unlikely to contain aquatic diseases that are a threat to aquatic flora and fauna found in surface waters
- surface water from watercourses in the Condamine catchment should not at any time enter or mix with CSM by-product water used for this Project, and
- CSM by-product water should not be discharged into a watercourse without first being treated.

6.5. Biting Insects

The assessment of the potential impacts of biting insects on human health is consistent with the assessment presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

6.6. Conservationally Significant Habitats

As discussed in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment, no impacts to conservationally significant habitats are expected as a result of the Project.

6.7. Threatened Species and Ecological Communities

As discussed in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment, Murray Cod may be present in Dogwood Creek. however, they were not recorded during the dry or wet season survey, and the likelihood that they are present at the crossing location is low. Therefore, no impacts to threatened aquatic species or ecological communities are expected as a result of the Project, where the appropriate measures to avoid, minimise or mitigate impacts to riparian and aquatic habitat are followed.

7 Avoidance, Minimisation and Mitigation of Impacts

The assessment of appropriate measures to avoid, minimise and mitigate impacts of the Project presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment are considered to be accurate and current based on the results of seasonal surveys and the nature of the changes to the pipeline alignment, except where varied below.

7.1. Operation of Vehicles and Equipment

The assessment of appropriate measures to avoid, minimise or mitigate the impacts of operation of vehicles and equipment on aquatic ecology is consistent with the assessment presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

7.2. Vegetation Clearing and Earth Moving

The assessment of appropriate measures to avoid, minimise or mitigate the impacts of vegetation clearing and earth moving on aquatic ecology is consistent with the assessment presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment.

7.3. Creek Crossings

This section has been updated in accordance with *AS2885: Pipelines – Liquid Gas and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice* (APIA 2009). In addition to the mitigation measures discussed in the EIS and aquatic ecology technical report, which are consistent with the objectives of the standard and code of practice, additional mitigation measures to minimise the impacts associated with the construction of permanent creek crossings could include:

- following existing road corridors, which is being done for the majority of the southern CSM water supply pipeline
- the avoidance of sensitive or problem soil/geotechnical areas (such as contaminated soil), where practicalble

- recontouring, revegetation and rehabilitation of pipeline corridors and the banks of watercourse crossings, and
- observation of flood and severe weather warnings on a daily and longer term basis during construction.

As noted in the Department of Primary Industries & Fisheries (DPI&F, now DEEDI) submission, pipeline installation should avoid drought refuge pools as far as practicable, and waterway barrier works approvals are likely to be required for the construction of temporary crossings and pipeline crossings where construction is done by the use of coffer dams etc. (as will be done for small-order streams, as described in the EIS). Depending on the nature of the works required at each crossing, the works may be either assessable or self-assessable development under the *Integrated Planning Act 1997*. This will be determined for each crossing during the detailed design of the Project, and applications will be made for development approvals where required.

The Wandoan Joint Venture (WJV) will use underground (trenchless) pipeline installation techniques (such as drilling) for crossing of larger waterways holding water, such as Dogwood Creek, if necessary. The use of these techniques will not impact on fish passage or aquatic ecology where the recommended mitigation measures outlined in the EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment are followed, in addition to the following (APIA 2009):

- Drilling muds shall consist of approved water based products or synthetic lubricants and shall be contained within the fluid circulation system during drilling.
- Drilling muds shall be recycled where practicable, or disposed of in accordance with regulatory requirements.
- Sediment and erosion control measures should be in place around bellholes and drill exit points.

Table 7.1 outlines the revised creek crossing recommendations for Dogwood Creek, based on the survey at the proposed crossing location in the wet season, and the commitment to use trenchless drilling for major waterway crossings. It also outlines crossing recommendations for waterways along the revised northern portion of the pipeline alignment.

Table 7.1 Summary of creek crossing recommendations for Dogwood Creek and the revised section of the southern CSM water supply pipeline.

Site	Recommended Pipeline Crossing		Recommended Road Crossing		Fish Salvage Required?	Water Quality Monitoring required?	Description of Required Rehabilitation	Minimum width of planted Riparian Vegetation
	Dry Conditions	Wet Conditions	Dry Conditions	Wet Conditions				
Six Mile Creek	Open cut, avoid pools	Isolate with steel plates.	Use existing highway crossing, or create temporary ford.	Use existing road and culvert, or Isolate with steel plates and install culvert if required.	Yes if pools are affected or channel is isolated.	Yes in wet conditions if flowing.	Replace in-stream habitat (including substrate, large woody debris etc.), stabilise banks using revegetation and erosion control if required.	To match the width at the crossing location, minimum of 5 m.
Minor tributaries of Juandah Creek	Open cut, avoid pools	Isolate with steel plates.	Use existing highway crossings, or create temporary fords.	Use existing road and culvert, or Isolate with steel plates and install culvert if required.	Yes if pools are affected or channel is isolated.	Yes in wet conditions if flowing.	Stabilise banks using revegetation and erosion control if required.	To match the width at the crossing location, minimum of 5 m.
Dogwood Creek	Drill	Drill	Use existing ford with pipe culvert	Use existing ford with pipe culvert, or construct temporary bridge or box culvert if required.	Required if temporary culvert is constructed.	Yes	Re-vegetate banks and rehabilitate bed and in-stream habitat.	15 m

7.3.1 Stranding of Fish and Other Aquatic Fauna

If an isolation method is used, fish and other aquatic fauna will become stranded once the work area is isolated. As noted in the DPI&F submission, stranded fish will be captured and translocated, following the DPI&F *Fish Salvage Guidelines* (DPI&F 2004), as outlined in the EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment, section 7.3.5. Captured fish will be relocated to suitable waterholes in the same waterway to prevent the transfer of exotic fish or aquatic disease.

7.4. Supply and Storage of CSM By-Product Water

The pipeline should be regularly inspected and maintained so that water does not leak from the pipeline into surrounding natural waterways. If a leak occurs, impacts to the receiving environment can be minimised where water supply in the pipeline is shut down until the leak is repaired.

As noted in Section 6.4, the risk of aquatic flora and fauna (and their associated diseases) being present in the by-product water is considered to be negligible, as the water is sourced from underground and will not be allowed to mix with surface water in the CSM water collection pond. Where practicable, the water will be stored in the CSM water collection pond, which will be an isolated, secured area (such as a tank or similar) that does not allow mixing with surface flows or access to the supply by humans, birds or other animals that could introduce aquatic species or diseases into the water. Where this can be achieved, this would be an adequate and reasonable measure to prevent the transfer of species along the pipeline.

Where storage in an isolated secured area is not possible, the supplier of the CSM by-product water will sample the water in the CSM water collection pond to determine what species are present, and therefore the risk posed to the aquatic ecology of the Fitzroy Basin if aquatic flora or fauna (and potential associated diseases) are translocated via the pipeline. Mitigation measures will be designed to address this risk, and will include ensuring that the supplied water is free from micro and macroalgae, macrophytes and aquatic fauna (including seeds, eggs and larvae). This may be achieved in a number of ways, for example by treating the water prior to supply, and / or screening at the pipeline intake.

The Proponent should also ensure that the raw water dam is free from exotic and / or noxious fish, and that any fauna in the dam do not show signs of disease such as

parasites, lesions or abnormalities (refer to Volume 1 of the EIS for details regarding monitoring of fish in the raw water dam).

Additionally, to prevent aquatic disease transfer, no equipment that is used in surface waters in the Condamine Catchment (such as water quality meters or sampling equipment) will have contact with the CSM water (or direct contact with surface waters of the Fitzroy River basin), unless it has been thoroughly cleaned with an appropriate chemical product.

7.5. Biting Insects

In response to the Submission from Queensland Health, the WJV commits to incorporating biting insect management into its Health and Safety System for the Project. In brief, biting insect management will be in accordance with the *Guidelines to Minimise Mosquito and Biting Midge Problems in New Development Areas* (Queensland Health 2002). The plan will include, as required, consideration of the following:

- extent of potential mosquito and biting midge breeding habitat within the development footprint and surrounding areas
- mosquito and biting midge species likely to occur in the region
- incidence of arboviruses in the region
- extent to which construction and operation of the proposed pipeline will create mosquito and biting midge breeding habitat
- extent to which mosquitoes and biting midges will pose a threat to the health to construction crews, and visitors to and residents of the region
- opportunities available to minimise the incidence of mosquitoes and biting midges on the site, and
- recommended guidelines for the monitoring and control of mosquitoes and biting midges on the site.

7.6. Threatened Species and Ecological Communities

The Project is unlikely to have a significant impact on any threatened species or ecological communities where each of the mitigation measures described above and in

EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment is adopted (and in particular, where riparian and aquatic habitat is rehabilitated after construction).

8 Residual Impacts

The assessment of residual impacts presented in EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment is considered to be accurate and current based on the results of seasonal surveys and the nature of the changes to the pipeline route.

9 Conclusions

Results of the wet season survey in the southern CSM water supply pipeline study area have not altered the assessment of environmental values or potential impacts of this component of the Project.

The assessment of potential impacts and mitigation measures is consistent with that presented in the EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment. In summary to the comments raised in EIS submissions:

- where the CSM water (and surface waters within the Fitzroy River basin) does not come into contact with surface waters from the Condamine Catchment, or equipment that has been used in the surface waters of the Condamine catchment, the risk of inter-basin transfer of noxious carp and aquatic disease is considered to be negligible
- the alignment of the pipeline route along exiting road corridors, and the mitigation measures discussed in the EIS Volume 2, TR 17B-1-V2.5 Aquatic ecology impact assessment, are consistent with the objectives of *AS2885: Pipelines – Liquid Gas and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice* (APIA 2009)
- pipeline installation will avoid drought refuge pools where practicable, and waterway barrier works approvals are likely to be required for the construction of temporary crossings and pipeline crossings
- depending on the nature of the works required at each crossing, waterway barrier works may be either assessable or self-assessable development under the *Integrated Planning Act 1997*. This will be determined for each crossing during the detailed design of the Project, and applications will be made for development approvals where required
- if an isolation method is used, stranded fish will be captured and translocated in accordance with the *Fish Salvage Guidelines* (DPI&F 2004) and relocated to suitable waterholes in the same waterway to prevent the transfer of exotic fish or aquatic disease
- underground (trenchless) pipeline installation techniques (such as drilling) will be used for crossing of larger waterways holding water, such as Dogwood Creek, if necessary and
- the WJV commits to incorporating biting insect management into its Health and Safety System for the Project, which will be developed prior to the commencement of construction.

10 References

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Attachment A Description of the Sites Surveyed

				
View of left bank approach (10-02-09)	View of right bank approach (10-02-09)	View upstream (10-02-09)	View downstream (10-02-09)	

Channel Habitat

Morphology

Pattern:	Straight
Flow Regime:	Ephemeral
Channel Width (m):	30
Wetted Width (m):	18
Water Level:	Moderate
Bank Shape:	Sloping

Water Quality

	Aug-08	Feb-09
Temperature (C):	17.2	25.9
pH:	5.65	5.76
Conductivity (uS/cm):	36.7	44
DO (mg/L):	64.4	1.5
DO (% Sat):	5.88	18.6
Turbidity (NTU):	-	127.3
ORP (mV):	256	-

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	High

Substrate (%)

Bedrock:	-
Boulder:	-
Cobble:	-
Pebble:	-
Gravel:	-
Sand:	20
Silt/Clay:	80

Flora and Fauna

Vegetation

Riparian Width (m): Left: 20 Right: 20

Dominant Type: Eucalypt, Callistemon

Fauna

Water Dragons
Birds
Sedge frogs

Cover (%)

Periphyton:	None
Moss:	None
Filamentous algae:	None
Macrophytes:	<10%
Detritus:	65-90%

Dominate Cover Type:
Deep pools
Sub Dominate Cover Type:
Large woody debris, Detritus

Comments: Pooled area created by pipe culvert with flow control flaps fitted just downstream of the crossing location.

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08.11.16 Wandoan South

Survey Date: 10-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

Dogwood Creek

Habitat

frc site number 5a

UTM Zone 56J 221200 E 7051839 S GDA94

G

				
Typical view of right bank (05-02-09)	Typical view of left bank (05-02-09)	Typical view downstream through the site (05-02-09)	Typical view upstream through the site (05-02-09)	Typical view upstream through the site (15-08-08)

Channel Habitat

Morphology

Pattern:	Meanders
Flow Regime:	Intermittent
Channel Width (m):	80
Wetted Width (m):	20
Water Level:	Moderate
Bank Shape:	Sloping

Water Quality

	Aug-08	Feb-09
Temperature (C):	20.4	25.9
pH:	6.5	5.75
Conductivity (uS/cm):	55.7	49.1
DO (mg/L):	5.2	2.0
DO (% Sat):	56.3	22.4
Turbidity (NTU):	-	113.7
ORP (mV):	253	

Flora and Fauna

Vegetation

Riparian Width (m): Left: 10 Right: 20

Dominant Type: Eucalypt

Fauna

Cockatoos

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	Moderate

Substrate (%)

Bedrock:	-
Boulder:	-
Cobble:	-
Pebble:	-
Gravel:	-
Sand:	60
Silt/Clay:	40

Cover (%)

Periphyton:	None
Moss:	None
Filamentous algae:	None
Macrophytes:	35-65%
Detritus:	10-35%

Dominate Cover Type:

Deep Pools

Sub Dominate Cover Type:

Instream Veg incl Roots

Comments: Water levels higher in the wet season than in the dry season. Spiny mudgrass forms a mat over the substrate in places.

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08.11.16 Wandoan South

Survey Date: 05-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

Dogwood Creek

frc site number 6

UTM Zone 56J 219216 E 7048343 S GDA94

Habitat

M

				
View downstream through the site (10-02-09)	Typical view of right bank (10-02-09)	View of left bank (10-02-09)	View upstream through the site (10-02-09)	View upstream through the site (15-08-08)

Channel Habitat

Morphology

Pattern:	Irregular, Meanders
Flow Regime:	Ephemeral
Channel Width (m):	8
Wetted Width (m):	7
Water Level:	Moderate
Bank Shape:	Vertical

Water Quality

	Aug-08	Feb-09
Temperature (C):	11.2	23.2
pH:	6.1	6.05
Conductivity (uS/cm):	429	82.5
DO (mg/L):	10.51	.85
DO (% Sat):	95.8	9.6
Turbidity (NTU):	40	102.6
ORP (mV):	234	-

Flora and Fauna

Vegetation

Riparian Width (m): Left: 8 Right: 10

Dominant Type: Eucalypt

Fauna

Wallaby
Water Dragon

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	

Substrate (%)

Bedrock:	-
Boulder:	15
Cobble:	20
Pebble:	-
Gravel:	-
Sand:	55
Silt/Clay:	10

Cover (%)

Periphyton:	None
Moss:	None
Filamentous algae:	None
Macrophytes:	10-35%
Detritus:	10-35%

Dominate Cover Type:
Deep Pools
Sub Dominate Cover Type:
Instream vegitation incl Roots

Comments: Common reed (*Phagmites australis*) covers entire lower banks. Water level higher in the wet season than in the dry season.

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08.11.16 Wandoan South

Survey Date: 10-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

Wallan Creek

frc site number 9

UTM Zone 56J 215832 E 7058483 S GDA94

Habitat

M

				
View upstream through the site (03-02-09)	View of right bank (03-02-09)	View of left bank (03-02-09)	View downstream through the site (03-02-09)	View downstream through the site (15-08-08)

Channel Habitat

Morphology

Pattern:	Sinuous
Flow Regime:	Intermittent
Channel Width (m):	20
Wetted Width (m):	7
Water Level:	Low
Bank Shape:	Sloping, U?

Water Quality

	Aug-08	Feb-09
Temperature (C):	10.6	30.2
pH:	6.59	6.34
Conductivity (uS/cm):	87.5	86.7
DO (mg/L):	11.7	5.64
DO (% Sat):	106	76.8
Turbidity (NTU):	-	339
ORP (mV):	263	-

Flora and Fauna

Vegetation

Riparian Width (m):	Left: 20	Right: 10
Dominant Type:	Eucalypt	

Fauna

Water Dragons

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	Low

Substrate (%)

Bedrock:	5
Boulder:	5
Cobble:	10
Pebble:	10
Gravel:	10
Sand:	40
Silt/Clay:	20

Cover (%)

Periphyton:	None	Dominate Cover Type:
Moss:	None	Large Woody Debris
Filamentous algae:	<10%	Sub Dominate Cover Type:
Macrophytes:	None	Small Woody Debris
Detritus:	10-35%	

Comments: Water levels similar in each season surveyed. Extensive erosion.

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08.11.16 Wandoan South

Survey Date: 03-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

Nine Mile Creek

frc site number 10

UTM Zone 56J 215115 E 7060738 S GDA94

Habitat

M

				
View upstream through the site (03-02-09)	View of right bank (03-02-09)	View of left bank (03-02-09)	View downstream through the site (03-02-09)	

Channel Habitat

Morphology

Pattern:	Irregular, Meanders
Flow Regime:	Ephemeral
Channel Width (m):	14
Wetted Width (m):	14
Water Level:	Moderate
Bank Shape:	Sloping

Water Quality

	Aug-08	Feb-09
Temperature (C):	14.3	29.9
pH:	7.75	6.06
Conductivity (uS/cm):	93.4	74.7
DO (mg/L):	11.56	2.6
DO (% Sat):	106	15.8
Turbidity (NTU):	-	43.9
ORP (mV):	267	

Flora and Fauna

Vegetation

Riparian Width (m):	Left: 10	Right: 3
Dominant Type:	Eucalypt	

Fauna

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	high

Substrate (%)

Bedrock:	-
Boulder:	-
Cobble:	-
Pebble:	-
Gravel:	-
Sand:	35
Silt/Clay:	65

Cover (%)

Periphyton:	None
Moss:	None
Filamentous algae:	None
Macrophytes:	<10%
Detritus:	<10%

Dominate Cover Type:
Trailing Bank Vegetation
Sub Dominate Cover Type:
Instream Vegetation incl roots

Comments: There is a large ponded area covered in floating *Azolla pinnata* immediately to the north of the creek. Water level higher in the wet season than in the dry season.

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deep thinking, science.

08.11.16 Wandoan South

Survey Date:
Written By: TNM Approved By: LT
Date Issued: May 2009

Tributary to Nine Mile Creek

frc site number 13

UTM Zone 56J 209572 E 7065554 S GDA94

Habitat

G

				
View upstream through the site (03-02-09)	View of right bank (03-02-09)	View of left bank (03-02-09)	View downstream through the site (03-02-09)	View downstream through the site (12-08-08)

Channel Habitat

Morphology

Pattern:	Irregular
Flow Regime:	Ephemeral
Channel Width (m):	2
Wetted Width (m):	1.5
Water Level:	Low
Bank Shape:	Open

Water Quality

	Aug-08	Feb-09
Temperature (C):	16.9	25.9
pH:	6.8	5.9
Conductivity (uS/cm):	132	50.3
DO (mg/L):	10.98	2.9
DO (% Sat):	110	56.9
Turbidity (NTU):	-	418
ORP (mV):	318	-

Flora and Fauna

Vegetation

Riparian Width (m):	Left: 1	Right: 2
Dominant Type:	Eucalypt	

Fauna

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	Low

Substrate (%)

Bedrock:	-
Boulder:	-
Cobble:	-
Pebble:	5
Gravel:	10
Sand:	80
Silt/Clay:	5

Cover (%)

Periphyton:	-	Dominate Cover Type:
Moss:	-	Instream vegetation incl roots
Filamentous algae:	-	
Macrophytes:	35-65%	Sub Dominate Cover Type:
Detritus:	10-35%	Large Woody Debris

Comments: Dammed wetland area downstream of creek, not fished as too large for backpack electrofisher and not accessible for boat electrofisher. Water levels and macrophyte coverage higher in the wet season than the dry season.

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08.11.16 Wandoan South

Survey Date: 03-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

Tributary to L-Tree Creek

frc site number 15

UTM Zone 56J 207395 E 7071544 S GDA94

Habitat

M

				
View Downstream through the site (03-02-09)	View of right bank (03-02-09)	View of left bank (03-02-09)	View upstream through the site (03-02-09)	View upstream through the site (14-08-08)

Channel Habitat

Morphology

Pattern:	Irregular
Flow Regime:	Ephemeral
Channel Width (m):	7
Wetted Width (m):	4
Water Level:	Low
Bank Shape:	Sloping

Water Quality

Water Quality	Aug-08	Feb-09
Temperature (C):	13.7	23.6
pH:	7.78	6.4
Conductivity (uS/cm):	523	192
DO (mg/L):	6.4	0.5
DO (% Sat):	63	2.9
Turbidity (NTU):	-	3100
ORP (mV):	213	-

Flora and Fauna

Vegetation

Riparian Width (m):	Left: 20	Right: 20
Dominant Type:	Eucaplypt, Acacia	

Fauna

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	Low

Substrate (%)

Bedrock:	-
Boulder:	-
Cobble:	10
Pebble:	-
Gravel:	-
Sand:	50
Silt/Clay:	40

Cover (%)

Periphyton:	None	Dominate Cover Type:	
Moss:	None	Trailing Bank Vegetation	
Filamentous algae:	None	Sub Dominate Cover Type:	
Macrophytes:	None	Undercut Banks	
Detritus:	10-35%		

Comments: State forest and power easement surround site; water level similar or slightly higher than in August 2008. Blanketing clay covers the substrate, water very turbid. Dissolved oxygen levels very low in February 2009. No fish caught during either survey.

frc environmental
deep thinking, science.

08.11.16 Wandoan South

Survey Date: 03-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

L-Tree Creek

frc site number 16

UTM Zone 56J 207505 E 7073772 S GDA94

Habitat

M

				
View upstream through the site (03-02-09)	View of right bank (03-02-09)	View of left bank (03-02-09)	View downstream towards Juandah Creek (03-02-09)	

Channel Habitat

Morphology

Pattern:	Irregular
Flow Regime:	Ephemeral
Channel Width (m):	8
Wetted Width (m):	6
Water Level:	Low
Bank Shape:	Sloping

Water Quality

	Aug-08	Feb-09
Temperature (C):	-	23.3
pH:	-	6.48
Conductivity (uS/cm):	-	191
DO (mg/L):	-	4.9
DO (% Sat):	-	55
Turbidity (NTU):	-	283
ORP (mV):	-	-

Flora and Fauna

Vegetation

Riparian Width (m): Left: 8 Right: 10

Dominant Type: Grasses

Fauna

Habitat (%)

Riffle:	-
Run:	-
Pool:	100
Rapid:	-
Cascade:	-
Fall:	-
Overall Complexity:	Moderate

Substrate (%)

Bedrock:	-
Boulder:	-
Cobble:	-
Pebble:	-
Gravel:	-
Sand:	10
Silt/Clay:	90

Cover (%)

Periphyton:	None
Moss:	None
Filamentous algae:	<10%
Macrophytes:	35-65%
Detritus:	10-35%

Dominate Cover Type:

Instream Vegetation incl Roots

Sub Dominate Cover Type:

Trailing, Overhanging Vegetation

Comments: This site is at a culvert crossing of the Leichhardt Highway. The waterway is a tributary to Juandah Creek, within a floodplain area where numerous small channels are crossed by the highway. Not surveyed in August 2008.

frc environmental
deep thinking, science.

08.11.16 Wandoan South

Survey Date: 12-02-09
Written By: TNM Approved By: LT
Date Issued: May 2009

Tributary to Juandah Creek

frc site number 19

UTM Zone 56J 206478 E 7085487 S GDA94

Habitat

M

Attachment B Fish and Turtle Survey Effort

Table B1 Fishing and turtle survey effort at each site.

Site	Method	Habitat	Date	Time In	Time Out	Settings	Effort	Comments
5	Boat Electrofishing	Pool	28/08/08	9:00	10:15	50-1000 V, 40%	536 s	electrofishing effective
5a	Boat Electrofishing	Pool	10/02/09	10:15	11:15	50-1000 V, 100%	1013 s	electrofishing effective
5a	Small bait traps	Pool	09/02/09	17:45	09:15		77.50 hrs	
5a	Cathedral traps	Pool	09/02/09	17:30	09:00		77.50 hrs	
6	Boat Electrofishing	Pool	28/08/08	13:30	14:10	50-1000 V, 60%	1045 s	electrofishing effective
6	Boat Electrofishing	Pool	05/02/09	9:50	10:50	50-1000 V, 100%	1035 s	electrofishing effective
6	Small bait traps	Pool	09/02/09	16:15	07:30		76.25 hrs	
6	Cathedral traps	Pool	09/02/09	16:00	07:15		76.25 hrs	
9	Backpack Electrofishing	Pool	26/08/08	8:00	8:30	250 V, 30 Hz, 12%	487 s	electrofishing effective
9	Boat Electrofishing	Pool	11/02/09	8:50	9:50	50-1000 V, 100%	1009 s	electrofishing effective
9	Small bait traps	Pool	10/02/09	15:30	08:30		85.00 hrs	
9	Cathedral traps	Pool	10/02/09	15:00	08:30		87.50 hrs	
10	Backpack Electrofishing	Pool 1	22/08/08	8:40	9:10	425 V, 30 Hz, 12%	223 s	electrofishing effective
10	Backpack Electrofishing	Pool 2	22/08/08	9:45	10:15	300 V, 30 Hz, 12%	407 s	electrofishing effective
10	Backpack Electrofishing	Pool	22/08/08	14:45	15:50	260 V, 30 Hz, 12 ms	483 s	electrofishing effective

Site	Method	Habitat	Date	Time In	Time Out	Settings	Effort	Comments
13	Boat Electrofishing	Pool	26/08/08	10:40	11:20	50-1000 V, 60-90%	390 s	electrofishing effective
13	Boat Electrofishing	Pool	11/02/09	12:45	13:50	50-1000 V, 60%	713 s	electrofishing effective
13	Small bait traps	Pool	10/02/09	16:30	11:30		95.00 hrs	
13	Cathedral traps	Pool	10/02/09	16:30	11:30		95.00 hrs	
15	Backpack Electrofishing	Pool	21/08/08	13:30	14:00	300 V, 30 Hz, 12%	463 s	electrofishing effective
15	Backpack Electrofishing	Pool	03/02/09	11:30	12:45	250 V, 30 Hz, 12 ms	482 s	electrofishing effective
16	Backpack Electrofishing	Pool	21/08/08	15:15	15:40	300 V, 30 Hz, 12%	345 s	electrofishing effective
16	Backpack Electrofishing	Pool	03/02/09	9:45	10:25	200 V, 30 Hz 12 ms	573 s	electrofishing effective
16	Small bait traps	Pool	02/02/09	17:00	09:30		82.5 hrs	
16	Cathedral traps	Pool	02/02/09	17:00	09:30		82.5 hrs	
19	Backpack Electrofishing	Pool	12/02/09	10:50	11:30	190 V, 12 Hz, 60 ms	438 s	electrofishing effective

Attachment C Copies of Permits

Queensland Government
Department of Primary Industries and Fisheries

Fisheries Act 1994

General fisheries permit

COPY

LT

10 Sep 2007

JOHN THOROGOOD
FRC ENVIRONMENTAL
185 MAIN ROAD
WELLINGTON POINT QLD 4160

Delegate of the Chief Executive
Department of Primary Industries and Fisheries

Permit Number	Issue Date	Expiry Date
54790	01/07/2006	15/05/2010

AUTHORISED ACTIVITIES

(1) The permit holder is authorised to collect fish from all Queensland waters other than those waters closed to such apparatus described. The permit holder is permitted to keep and be in possession of a maximum of ten specimens of each species other than those species listed in condition 4 to this permit, taken per year for identifications and other biological research studies. This does not include species that are subject to no-take regulations.

(2) The permit holder is authorised to use:

* gill nets
  - 1 x 10m in length, 25mm mesh
  - 1 x 20m in length, 50mm mesh
  - 1 x 20m in length, 75mm mesh
* seine nets
  - 1 x 70m in length, 2.5m drop, 25mm mesh
  - 1 x 50m in length, 1m drop, 10mm mesh
  - 1 x 10m in length, 3m drop, 2mm mesh
* multi-panel nets
  - 1 x 3x15m panels, 1", 2", 3" mesh
  - 1 x 3x15m panels, 4", 5", 6" mesh
* dip nets
  - 0.1 20mm mesh, up to 600mm mouth diameter
* recreational bait nets
* beam trawl
  - 1 x 0.5m mouth, 12mm mesh
* traps
  - 20 x 0.2m x 0.2m x 0.2m volume, 5mm mesh
  - 40 x 0.2m x 0.2m x 0.2m volume, 1mm mesh
* vessels
  - 4.3m punt, 2.2m wide, 430kg tonnage
  - 3m punt, 1.5m wide, 250kg tonnage
  - 4m hovercraft

Fisheries

- various chartered vessels away from brisbane

* backpack electrofisher
* fyke nets
  - wings up to 10m in length, 2mm, 10mm and 25mm mesh

CONDITIONS

(1) The permit extends to the permit holder, John Thorogood, Carol Conacher, Arthur Hawthorn, Andrew Olds, Lauren Thorburn, Brad Moore, Ashley Morton and Kylie McPherson and any person under their direct supervision on the water involved in the authorised activities.

(2) The following fish species are not to be taken:
- Maori wrasse
- Barramundi cod
- Potato cod
- Red bass
- Chinaman
- Paddletail
- Great white shark, and Grey nurse shark
- Clam
- Helmet Shell
- Trumpet Shell

This permit does not apply to threatened fish as listed under the Environmental Protection and Biodiversity Conservation Act 1999 or that are protected under the Nature Conservation Act 1992 or the Fisheries Act 1994.

(3) The permit holder shall ensure that all apparatus used during permitted activities is marked clearly with the holders name, address and Department of Primary Industries and Fisheries permit number and be in attendance of such apparatus at all times. In attendance means within 100m.

(4) A sign, minimum dimensions of 30cm x 50cm, with the message "Scientific Research in progress under DPI&F permit" is to be located within 15m of collecting activities when nets are in use.

(5) The holder shall ensure that all fish specimens taken are for research purposes only and are not to be sold.

(6) The holder shall ensure that all fish taken unintentionally during permitted activities are returned to the water as soon as practicable with as little harm or injury as possible.

(7) The holder shall ensure that all noxious fish captured during permitted activities are to be destroyed and disposed of appropriately by burying or placing in a bin.

(8) The holder shall notify the local office of the Queensland Boating & Fisheries Patrol not less than 48 hours prior to any activities commencing under this permit.

(9) The holder shall submit a written report one year after the issue of the permit and each subsequent year of the permit outlining the

Fisheries

number of fish taken, apparatus used and days fished to the Chief Executive, Department of Primary Industries and Fisheries, GPO Box 2764, BRISBANE QLD 4001.

(10) The holder must carry this permit (or a copy) during authorised activities and produce it at any time on request for inspection by an officer authorised under the Fisheries Act 1994.

(11) The holder must ensure that the use of electrofishing apparatus is in accordance with the Australian Code of Electrofishing Practice.

Fisheries

ecoaccess
environmental licences & permits

Permit[1]

This permit is issued under the following legislation:

S12(E) Nature Conservation (Administration) Regulation 2006

Scientific Purposes Permit

Permit number: **WISP05080608**

Valid from: **12-MAR-2008** **to** **12-MAR-2013**

Parties to the Permit

Role	Name	Address
Principal Holder	JA Thorogood Pty Ltd (t/a FRC Environmental) 72 002 896 007	185 Main Road WELLINGTON POINT QLD 4160
Joint Holder	Mr Andrew Olds	185 Main Road WELLINGTON POINT QLD 4160
Joint Holder	Ms Lauren Thorburn	185 Main Road WELLINGTON POINT QLD 4160

Permitted Location Activity Details

Location (s)	Activity (s)
Non Protected Areas - Queensland	Research on non-protected areas for scientific purposes

1 Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation administered by the Environmental Protection Agency and the Queensland Parks and Wildlife Service.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Permit Details

Species Details

Location	Activity
Non Protected Areas - Queensland	Research on non-protected areas for scientific purposes

Schedule	*Category*	*Quantity*
Turtles and tortoises (family Chelidae) Nature conservation (Wildlife) Regulation 2006	Live	Unlimited Animal/s

Conditions of Approval

Agency Interest: Biodiversity

PB1 The Principal Holder must obtain permission from the landholder prior to commencing activities.

Environmental impact is to be kept to a minimum.

This permit (or a copy plus proof of identity of Principal Holder) must be carried while engaged in any activity authorised by the permit.

This permit is issued subject to the Principal Holder holding the current approval of a registered animal ethics committee.

All collecting activities are to be effected away from public view.

The Principal Holder may trap animals by methods as outlined in the application. Animals are to be released unharmed at the point of capture within 24 hours of capture. Any mortality during capture or subsequent handling is to be reported immediately to the Assessment and Approvals Unit, Queensland Parks and Wildlife, Toowoomba. The Queensland Museum has first refusal of any material resulting from mortality.

To prevent the risk of spreading disease, all traps, items of clothing (including footwear), vehicles and handling equipment must be cleaned before and after each separate collection activity.

Two (2) specimens of possible new or undescribed species may be kept as voucher specimens and must be deposited with the Queensland Museum.

Upon completion of field work, a detailed list is to be supplied to the Assessment and Approvals Unit, Queensland Parks and Wildlife, Toowoomba, showing numbers of specimens of each species, the type of habitat and locality or localities where they were collected. Separate data

returns and reports must be provided for each survey.

A copy of any resulting report/publication must be forwarded to the Assessment and Approvals Unit, Queensland Parks and Wildlife, Toowoomba.

All practices and procedures undertaken pursuant to this permit are to be in accordance with those details contained in and attached to the Application for a Scientific Purposes Permit signed by the Principal Holder on 22 January 2008.

.....

Signed

Ian Bryant
Delegate
Environmental Protection Agency

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Queensland Government Department of Primary Industries and Fisheries	***DPI&F Animal Ethics***	Form: AE 08
	Amendment request for an approved project	

Please Note:
Any proposed change to a project must be submitted to an Animal Ethics Committee (AEC) for approval.

If a person uses or allows an animal to be used for a scientific purpose other than in accordance with the AEC approval, that person is acting without approval and, therefore, unlawfully.

Text boxes will expand automatically to accommodate entry. Please do not delete headers or footers.

1. Applicant details

Name: John Thorogood		
Organisation: FRC Environmental		Centre:
Postal Address: 185 Main Rd, Wellington Point, QLD, 4160		
Phone: 3207 5135	Fax: 3207 5640	E-Mail: jthorogood@frcenv.com.au

2. Project Details

Title of the Project	AEC Proposal Reference Number
Aquatic Ecological Surveys **(proposed change from Fisheries Ecological Surveys)**	CA 2006/03/106

3. Amendment

In plain English, cite each section of your proposal that you wish to amend and then describe the proposed amendment to that section and outline your reasons for the request.

We propose to expand our ethics permit to cover surveys of freshwater turtles as well as fish (which we are currently permitted for). We will conduct turtle surveys on an 'as required' basis, throughout the freshwaters of Queensland. Where required, turtle surveys will be conducted under a Scientific Research Purposes Permit, issued by the EPA.

Freshwater turtles species in Queensland include: the broad-shelled river turtle, *Chelodina expansa*; the eastern snake-necked turtle, *C. longicollis*; the northern snake-necked turtle, *C. rugosa*; *C. novaeguineae*; the northern snapping turtle, *Elseya dentata*; the Burnett River turtle, *E. albagula*; the saw-shelled turtle, *E. latisternum*; the Krefft's river turtle, *Emydura krefftii*; the Murray turtle, *E. macquarii*; *E. signata*; *E. subglobosa*; *E. victoriae*; and the Fitzroy River turtle, *Rheodytes leukops*. Each of these species may be caught depending on the particular area surveyed. Surveys of freshwater turtles (including population numbers, and the size / age distribution and sex ratios of the population) will provide valuable information on the populations of these turtles in various waterways throughout Queensland, and will add to our current understanding of the population dynamics of freshwater turtles. Knowledge of these populations is likely to become increasingly important in the face of increasing water resource development throughout Queensland, which can impact on turtle populations, including threatened species. Knowledge of current freshwater turtle populations will provide essential information for impact assessments of proposed dams, weirs, water extraction and other development on freshwater creeks and rivers.

Turtles will be captured so that they can be accurately counted, as well as measured, weighed and sexed. This will provide important information regarding the population dynamics of the turtle populations. Knowledge of the population dynamics of each species (e.g. size distributions, sex ratios) is an important information requirement for developing management plans that "address population numbers, population dynamics, habitats and sustainability… as a whole" (Hamman et al. 2007). For example, a bias towards adult animals in the wild is indicative of poor survival of clutches laid in the wild, and would lead to a focus on managing habitats to improve hatchling survival (Hamman et al. 2007).

Turtles will be caught following the methods used by the EPA in similar turtle surveys (e.g. Hamann et al. 2004). Specifically, we will use capture turtles a combination of seine nets, dip nets, traps and by hand using snorkel. Discrete sites along the waterway will be sampled in a single sample event. Each of the sampling apparatus will

be thoroughly cleaned between sites, to minimise the risk of translocation of aquatic plant or algae species, and any potential diseases.

With the exception of the traps, all sampling apparatus will have an operator in immediate attendance to prevent the accidental drowning of turtles. Traps will be fitted with an 'air chamber' to ensure that no turtles drown during our surveys. Our trap design follows the 'Cathedral Trap' design used by the Queensland EPA for freshwater turtles surveys (Hamann et al. 2004). As per the EPA methods, traps will be checked every 24 hours at a minimum (Hamann et al. 2004). During sampling, every effort will be made not to disturb the aquatic habitat of the creek or river, which may provide habitat for turtles and fish (e.g. logs, macrophytes etc.). Any fish caught during our surveys will be handled and released unharmed, as per our existing ethics approval.

Once caught, the turtles will be carefully removed from the sampling apparatus. The turtle will be held firmly by its shell in a quite and controlled manner by one team member to minimise stress, while another team member measures the animal with a clean measuring tape, and sexes the animal (if possible) via a brief visual inspection of their tail. Animals will also be weighed by placing them in a bag suspended from a scale. The dark environment of the bag will calm most animals (NSW DPI 2007). It is anticipated that each individual will be handled for a period of less than 5 minutes. The turtles will then be released back to the environment at the point of capture. However, turtles will only be released once the waterway is clear of all nets and traps. If necessary, prior to release, turtles will be held in 50 L Nallie Bins half-filled with ambient river water until the waterway is cleared of sampling apparatus. As each site will only be sampled once, the chance of recapture of individuals is considered to be extremely low. No native turtles will be kept.

The red-eared slider turtle (*Trachemys scripta elegans*) is a listed Class 1 pest in Queensland, and cannot be returned to the environment or kept. This turtle can be readily identified by the distinctive red stripe behind its eyes (which may fade with age, however pale stripes will remain) and the fact that it can retract its head straight back into its shell (native turtles withdraw their heads to the side). If the red-eared slider turtle is caught, a Department of Natural Resources and Water Lands Protection Officer will be contacted for advice. We will either surrender the animals to DNRW, or If advised to do so, we will euthanase turtles of this species.

Euthanasia will be done in accordance with the publication *Euthanasia of Animals Used for Scientific Purposes* (ANZCCART 2001). Specifically, we will cool the animal (by 3–4 ºC) to facilitate handling and injection of a euthanasia solution. Sodium pentobarbitone (at a dose of 60 mg/kg of body weight) will be injected intravenously. The needles and syringes used will be sterile and only used once. We do not anticipate having to euthanase any native turtles. However, if a turtle has unforseen serious injuries, it will be allowed to recover in a 50L nallie bin filled with ambient water that also contains a 'dry' rest areas (e.g. exposed rock). If the turtle remains stressed and its condition does not improve (to the point where it can be released) it would be humanely euthanased using the methods described above.

All frc staff are trained in animal welfare and anatomy, and are familiar with our animal ethics permit and responsibilities. Each of the senior frc staff responsible for the turtle surveys have had previous experience in handling freshwater turtles during previous studies, including during their university studies under the supervision of experienced academics and researchers.

References

ANZCCART 2001, *Euthanasia of Animals Used for Scientific Purposes,* ed. J.S. Reilly, Australian and New Zealand Council for the Care of Animals in Research and Teaching, Adelaide.

Hamman, M., Schäuble, C. S., Limpus, D. J., Emerick, S. P. & Limpus, C. J. 2007, *Management Plan for the Conservation of Elseya sp. [Burnett River] in the Burnett River Catchment*, Environmental Protection Agency, Brisbane.

NSW DPI 2007, *Model Standard Operating procedures for the Humane Research of Pest Animals*, New South Wales Department of Primary Industries [online] http://www.dpi.nsw.gov.au/aboutus/resources/majorpubs/guides/model-sops-research-pest-animals.

	Lauren Thorburn (Senior Environmental Scientist, FRC Environmental)	15/10/07
Signature of the Applicant (or its duly authorised agent).	**Please print name if signing as a duly authorised agent.**	**Date**

4. AEC Decision

The amendment has been considered by the AEC and is:

☒ Approved as submitted

☐ Approved subject to modifications

☐ Pending

☐ Rejected

Any inquiry regarding this response should be directed to the AEC Coordinator, in the first instance. The Coordinator may be contacted via the DPI&F Call Centre on 13 25 23.

Comments/Reasons:

Name of AEC Chair	Geoff Smith
Signature	
Date	29 October 2007

Queensland Government
Department of Primary Industries and Fisheries

The Animal Care and Protection Act 2001, Section 57

Scientific Use Registration Certificate

The following person, having satisfied the registration requirements of Section 52 of the *Animal Care and Protection Act 2001*, has this day been registered as a person who can use animals for scientific purposes.

FRC Environmental
185 Main Road, Wellington Point Qld 4160

Registration Number:

47

This approval is valid until: *14 February 2009*

This registration may be cancelled or suspended pursuant to section 73 of the *Animal Care and Protection Act 2001.*

Dated 13 January 2006

Dr Rick Symons
delegate of
Director-General
Department of Primary Industries and Fisheries

Queensland Government
Department of Primary Industries and Fisheries

DPI&F Animal Ethics	Form: AE 08

Amendment request for an approved activity

Please Note:
Any proposed change to an activity must be submitted to an Animal Ethics Committee (AEC) for approval.

If an activity leader carries out an activity other than in accordance with the AEC approval, that person is acting without approval.

Agenda Item 8.4

1. Activity Leader details

Name: John Thorogood		
Organisation: FRC Environmental		Centre:
Postal Address: 185 Main Rd, Wellington Point, QLD, 4160		
Phone: 3207 5135	Fax: 3207 5640	E-Mail: jthorogood@frcenv.com.au

2. Activity Details

Title of the Activity	AEC Approved Application Number
Fisheries Ecological Surveys	**CA 2006/03/106**

3. Amendment

In plain English, describe the proposed amendment:

We propose to include electrofishing in our suite of sampling techniques to conduct freshwater fisheries surveys. To ensure safe operation of the electrofisher, electrofishing will be conducted following the procedures outlined in the *Australian Code of Electrofishing Practice* (1997). We will be using an approved, commercially produced backpack unit from Smith-Root. By following established procedures and the instructions that accompany the equipment, we anticipate that the fish will be stunned by the electrofisher for a very short period (<5 secs), and that they will recover quickly. The senior operator of the electrofisher will be certified by DPI&F to conduct electrofishing. All frc staff are trained in animal welfare and are familiar with our animal ethics permit and responsibilities.

Approximately 100 m of a stream reach will be sampled, incorporating as many habitats as possible (e.g. riffles, runs etc.). Nets will be set (in accordance with our current animal ethics approval) at each end of the reach, to prevent fish movement in and out of the reach during sampling. The operator will sample a variety of habitats as he/she moves upstream along the reach. At each habitat sampled, pulses of current will be passed through the water from the anode ring for a period of 5 – 10 seconds. Stunned fish will be collected from the water by the operator using a net connected to the anode ring, and by a second person using an insulated dip net. The pass of the reach will be repeated heading downstream. It is anticipated that 3 – 4 passes of the reach will be required in order to effectively characterised the fish community.

Amendment request for an approved activity

Only the minimum power necessary to attract and stun the fish effectively will be used. We will not touch the fish with live anodes, and we will not continue electrofishing when within 15 m of a non-target animal standing in or drinking from the water, or if an animal is in contact with a wire fence line that enters the water. Electrofishing will be stopped if there are / we suspect there are native birds, turtles or mammals (e.g. platypus) in the water.

After capture in the nets, all animals will be placed into a 50L nallie bin or 10L buckets half filled with 'fresh' ambient water for identification and counting. All animals not required for further research will be returned to the waters of capture, as soon as possible (once electrofishing of the reach has ceased, although larger fish and eels may be released downstream of the set net straight away, to avoid fouling of the water in the container (e.g. with slime)). Set nets will be removed once the reach has been effectively sampled; any animals caught in these nets will be removed in accordance with the protocols outlined in our current ethics approval.

Some animals may need to be kept for positive identification in the laboratory (e.g. by counting fin rays etc.) or for further analysis, e.g. gut content analysis or otolith ageing. Animals to be kept will be euthanased in a bath of clove oil/water (by adding clove oil at 10 ppt). Deceased animals will be bagged, tagged and frozen for transport to the laboratory for further analysis. Introduced pest species will also be euthanased using the above methods.

In plain English, outline your reasons for the request:

Electrofishing has become an essential sampling tool in the study of freshwater fish ecology. It is successful in catching a range of different species and individuals, such that it is effective in characterising the resident fish communities. Fish surveys are often required by Local and State Governments (through formal terms of reference) in order for these agencies to assess the significance of fisheries habitat against, for example, the likely impacts of urban / commercial / agricultural development of an aquatic environment. In some instances, the use of electrofishing to survey the fish communities is specifically required by these agencies.

Electrofishing is currently used by various government agencies (such as the Department of Primary Industries & Fisheries, and the Department of Natural Resources, Mines & Water) to sample freshwater fish communities. In particular, electrofishing is used in the Ecological Health Monitoring

Amendment request for an approved activity

Program (EHMP) in south east Queensland (using the same model of electrofisher that we intend to purchase). The use of electrofishing will enable us to directly compare our data to data collected by the government agencies. In some instances, this may reduce the amount of sampling that is required, as we will be able to obtain government data for some sites (e.g. data from the EHMP in south east Queensland).
Signature of Activity Leader:
Date:

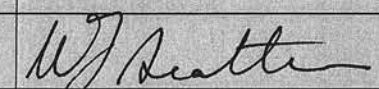
3. AEC Decision

The amendment has been considered by the AEC and is:

- ☑ Approved as submitted
- ☐ Approved subject to modification/conditions*
- ☐ Pending*
- ☐ Rejected*

Any inquiry regarding this response should be directed to the AEC Coordinator, in the first instance. The Coordinator may be contacted via the DPI&F Call Centre on 13 25 23.

* Comments/Reasons:

Name of AEC Chair	**Wal Scattini**
Signature	
Date	**31 July 2006**