

Jemena Northern Gas Pipeline Pty Ltd

Northern Gas Pipeline

Draft Environmental Impact Statement

APPENDIX O – WATER MANAGEMENT PLAN

Public

August 2016



Jemena Northern Gas Pipeline Pty Ltd

ABN 12 607 728 790

Level 16, 567 Collins Street

Melbourne VIC 3000

Postal Address

PO Box 16182

Melbourne VIC 3000

Ph: (03) 9713 7000

Fax: (03) 9173 7516


Northern Gas Pipeline Construction Water Management Plan

Jemena Pty Ltd



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DOCUMENT CONTROL RECORD

Document Code:	EZ16232-C0301-SWS-R-0002
Catalogue Number:	64784
Project Director	Jeff Richardson
Project Manager:	Kylie Welch
Author(s):	Helen Dwyer
Approved by:	Jeff Richardson
	
Approval date:	1 July 2016

DOCUMENT HISTORY

Version	Issue Date	Brief Description	Reviewer/Approver
1.A	9 Feb 2016	Report preparation by authors	Authors
1.B	8 Mar 2016	Internal review	J. Richardson
1.C	10 Mar 2016	Minor updates	H. Dwyer
1.D	11 Mar 2016	Jeff's review version	J. Richardson
1.E - F	11 Mar 2016	Update and finalising post review	H. Dwyer
1.G	4 Apr 2016	Draft provided to MCD	K. Unternahrer (MCD)
1.0	27 Apr 2016	EcOz update post MCD review	H. Dwyer
1.1	24 Jun 2016	Jemena review	Jemena
2.A	25 Jun 2016	EcOz update post Jemena review	H. Dwyer
2.0	25 Jun 2016	Updated version submitted to Jemena for approval	Jemena
3.0	1 Jul 2016	Finalised for preliminary EIS review	H. Dwyer
3.1-3.2	29 Jul 2016	Amendments and review prior to EIS submission	Jemena
4.0	11 Aug 2016	Final for EIS submission	H. Dwyer

Recipients are responsible for eliminating all superseded documents in their possession.

PREPARED BY:

EcOz Pty Ltd.
ABN: 81 143 989 039
Winlow House, 3rd Floor
75 Woods Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Facsimile: +61 8 8981 1102
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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1 INTRODUCTION

This Water Management Plan (WMP) is a supporting document of the Environmental Impact Statement (EIS) prepared for the Northern Gas Pipeline (NGP) Project. The environmental risk assessment conducted as part of the EIS process identified a number of potential impacts to surface water and groundwater resources associated with the NGP Project activities. Risks are greatest in the Project construction phase during which there are potentially high risks associated with soil erosion and sedimentation of water courses, extraction of groundwater and pollution from hazardous materials and wastes produced by the Project activities.

This WMP (Construction) outlines the measures that will be implemented during the Project construction phase to mitigate environmental risks to 'as low as reasonably possible', so that potential impacts of the Project on water resources are minimised. The WMP is a requirement of the EIS Terms of Reference (ToR) issued pursuant to the Environment Protection and Biodiversity Conservation Act 1999 (*Cth*) and Environmental Assessment Act (*NT*); the document also provides a framework for compliance with the conditions of the Environmental Authority issued under the Environment Protection Act (*Qld*) for the NGP Project in Queensland (*Qld*).

1.1 Scope and objectives

The scope of the WMP is to identify and minimise the risks to surface water and groundwater as relevant to the construction of the NGP. Operational phase risks to water resources relate mainly to extraction of groundwater, and generation of produce water, due to operation of the nitrogen reduction facility at Phillip Creek Compressor Station. Mitigation of these risks is discussed in the Chapter 7 and Chapter 13 of the EIS and will be addressed through an Operational Environmental Management Plan (OEMP) and associated procedures, to be developed prior to commencement of operations.

This WMP outlines all relevant surface and groundwater aspects, potential impacts relating to the construction of the NGP, and mitigation measures to minimise those impacts. Monitoring programs, corrective actions and reporting requirements relevant to water management are also addressed. The objectives of the WMP are to minimise risks to surface and groundwater and provide a framework for the sustainable use of water during the construction phase.

The WMP specifically aims to:

- summarise the existing environment relevant to surface and groundwater features within the Project footprint
- outline the risks to surface and groundwater resources as a result of construction activities
- stipulate the management framework and specific management measures to minimise the risks and potential impacts
- detail the monitoring program for the relevant water sources and/or wastewater streams and nominate guideline values for comparison of water quality data
- establish triggers, corrective actions and audit criteria
- outline emergency response plans as relevant to water quality.

1.2 NGP Project overview

The NGP is a gas pipeline project which will involve the construction of 622 km of pipeline linking existing gas pipelines in the Northern Territory (NT) and Queensland (Qld). The pipeline will commence at Warrego, approximately 45 km north-west of Tennant Creek, and will terminate 7 km south-west of Mount Isa where it will connect to the existing Carpentaria Gas Pipeline (Figure 1-1). The construction contractor has

responsibility for implementation of the mitigation measures outlined in this WMP; Jemena will take possession post-construction and will be responsible for mitigation of operational risks to water resources.

1.2.1 Construction activities with potential to impact water resources

This WMP specifically addresses the water related activities associated with construction of the NGP including, but not limited to, trenching and pipe laying, watercourse crossing, camp and wastewater management, hydrostatic testing and water use and disposal. Where applicable, it outlines the monitoring and assessment requirements for the planning phase.

A risk assessment was undertaken for the EIS to identify potential impacts to water (see Chapter 7). The environmental risk assessment identified the following construction activities with a potential to impact water:

- clearing, grading, trenching and installing the pipeline within a 30 m wide construction Right of Way (ROW), specifically through major and minor watercourses
- disturbance of soils along the pipeline alignment
- the use of water for dust suppression
- construction of compressor stations and ancillary infrastructure at either end of the pipeline (Warrego and Mount Isa) , including installation of stormwater drainage
- construction and operation of six temporary construction camps (for up to 300 people) and two mobile fly camps (for up to 50 people) along the construction ROW
- construction of eight low consequence dams up to 12 ML
- dewatering of trench and/or dams
- construction of temporary vehicle wash-down bays at all camps and additional locations, as required
- hydrostatic testing of the pipeline
- storage and use of hazardous substances, including diesel fuel and chemicals.

All works listed above will be undertaken within the 'construction footprint'.

1.2.2 Forecast water use

During the construction phase, water will be used for workers' camps (potable and non-potable), dust suppression, vehicle wash-downs and hydrostatic testing. Water extraction will be managed by the construction contractor, whose responsibility it is to seek the necessary permits and approvals and liaise with the appropriate regulators, prior to the commencement of construction.

Project water use, including both potable and construction water requirements, is estimated to be a maximum of 0.44 ML per day. This includes:

- 20 ML of potable water for the six construction camps, including water for vehicle wash-down activities
- 69 ML for construction activities such as dust suppression.

In addition to the above water requirements, approximately 22 ML of water will be used for hydrostatic testing. The maximum amount for any given test section is 8.5 ML, and water will be re-used in subsequent test sections where practicable. Hydrostatic test water will be sourced from the existing supplies at Mount Isa, and supplemented if required with water from Tennant Creek. Hydrostatic test water will be stored in low consequence dams within the construction footprint before being reused along the length of the pipeline, and discharged when testing is complete.

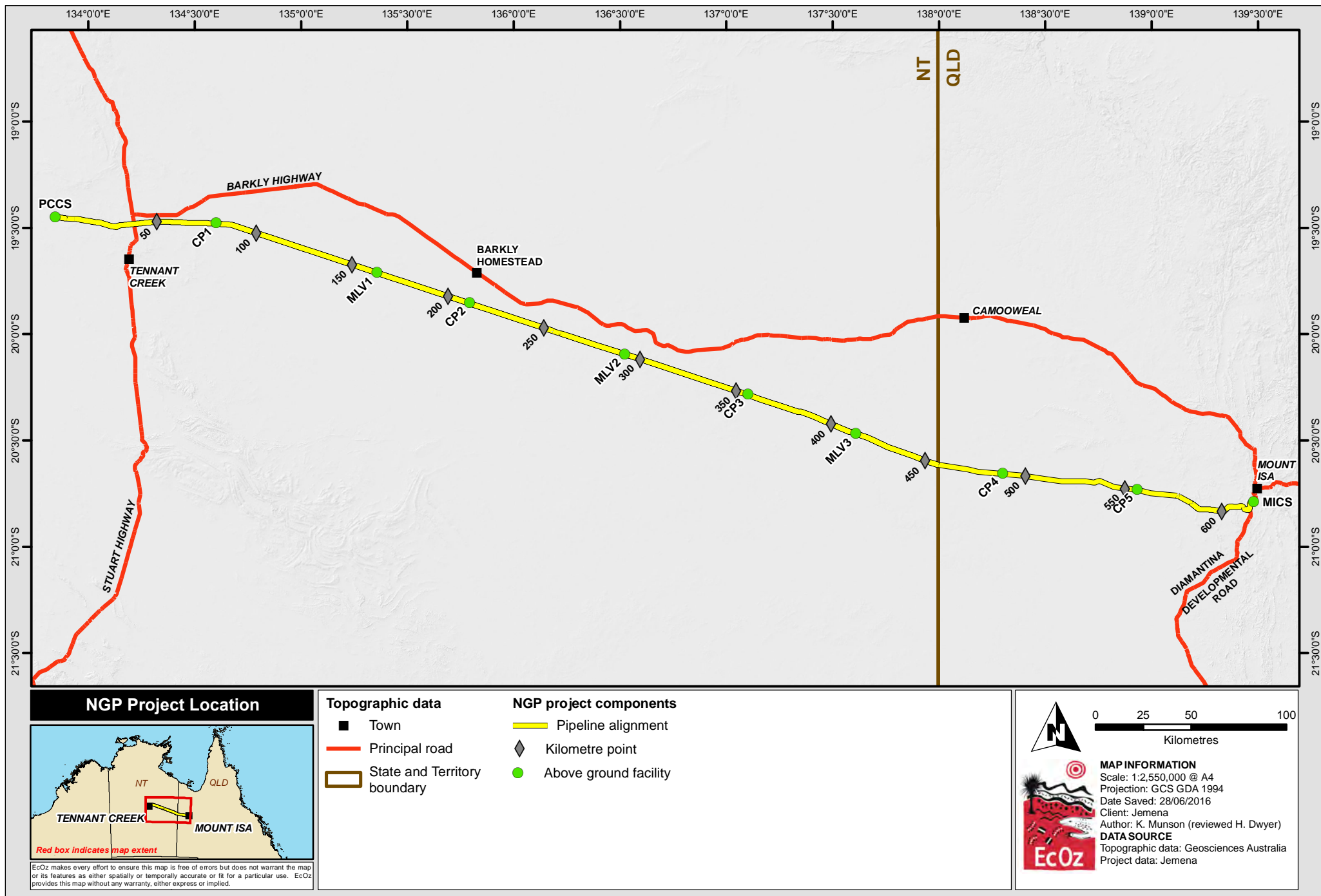
A Water Availability Study was conducted to inform source requirements based on demand and location of resources (see Appendix N). Construction water requirements and sources are summarised as follows:

- potable water will be sourced from existing municipal sources at Tennant Creek and Mount Isa, under agreements with appropriate authorities
- non-potable construction water will be sourced from existing groundwater bores within and/or near the pipeline alignment subject to availability, required approvals and agreements with landholders (see Water Availability Study - Appendix N). With the necessary approvals in place and with landholder agreement, new groundwater bores may be drilled. Construction water will be stored in low consequence dams with standpipes and trucked in allocated water carts to construction areas
- hydrostatic test water is expected to be sourced from approved sources along the construction ROW.

1.2.3 Construction schedule

Construction is currently scheduled to commence in early 2017 and the pipeline system is planned to be operational in 2018. The exact timing is dependent on a number of factors including the timeliness of the required approvals, access agreements with relevant stakeholders and weather conditions.

Construction of the PCCS and MICS is planned to extend through to early 2018, as access to these locations is less dependent on dry weather conditions. Commissioning of the pipeline, PCCS and MICS will follow the construction period. The construction schedule is driven by the Project objective to achieve commencement of gas transportation services in 2018.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Ch2\Figure 2-2. Map of NGP pipeline route and above-ground facilities locations.mxd

Figure 1-1. Map of Project location and infrastructure

1.3 Legislative approvals, permits and licences

The NGP Project falls within the legal jurisdiction of the Commonwealth, Northern Territory and Queensland governments. Approvals, permits and licences are required pursuant to the appropriate legislation within in each jurisdiction as described below.

1.3.1 Pipeline Licences

The primary approvals required for construction and operation of the NGP and associated facilities are Pipeline Licence issued pursuant to the Energy Pipelines Act (NT) and Petroleum and Gas (Production and Safety) Act 2004 (Qld). It is expected that Pipeline Licences will be granted once the NGP has obtained all required environmental approvals under the relevant legislation. .

1.3.2 Primary environmental approvals

The Project requires environmental assessment and approval pursuant to the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act), Environmental Assessment Act (NT) (EA Act) and Environment Protection Act 1994 (Qld). This WMP is a requirement of the Terms of Reference (ToR) issued pursuant to the EPBC Act and EA Act; the document also provides a framework for compliance with the conditions of the Environmental Authority issued under the EP Act 1994 for the NGP project in Queensland.

The tables below cross-reference the requirements of the EIS ToR (Table 1-1) and EA conditions (with the relevant sections of this WMP).

Table 1-1. Cross-reference between NT and Cth EIS Terms of Reference requirements and WMP

ToR section	Details	WMP Reference
2.2.3	The EIS should provide information on the quantity, quality, source, storage and infrastructure requirements for water use for the Project, considering dust suppression, drinking water, ablutions and sewage treatment, watercourse diversion works and hydrostatic testing.	Section 1.2, Section 3 and Water Availability Study (Appendix N)
2.2.3	The EIS should describe the details of proposed groundwater extraction.	Water Availability Study (Appendix N)
3	The EIS should discuss the components of the existing environment including weather and climate, surface water and groundwater.	Section 3
5.5.2	The EIS should include an assessment of risks to surface and/or groundwater resources.	Section 4
5.5.3	The EIS should contain a Water Management Plan (WMP) that outlines clear and concise measures to mitigate likely impacts. The WMP must include measures to avoid contamination of surface and groundwater resource, protect water quality, avoid exposure of sensitive biological receptors to contaminants, treat and manage wastewater and sewage, and ensure extraction, use and disposal of water is in accordance with relevant legislation.	Section 5
5.5.4	The WMP should outline details of monitoring programs, thresholds and contingency measures. Reporting requirements for surface and groundwater quantity and quality to evaluate effectiveness of management measures must be summarised. This includes provision to notify and respond to emergencies.	Sections 6.2, 6.3, 6.4 and 7

Table 1-2. Cross-reference between Queensland Environmental Authority conditions and WMP

Approval section	Condition	WMP Reference
C9	Sediment and erosion control measures to prevent soil loss and deposition beyond significantly disturbed land must be implemented and maintained.	Section 5
C11	Chemicals and fuels must be stored in effective containment systems which meet Australian Standards.	Section 5.1
C17	Treated sewage effluent or greywater can be released to land provided it meets or exceeds secondary treated class B standards for a system with a daily peak design capacity of 150-1500 Equivalent Persons (EP)	Section 5.4
C18	Release of treated sewage effluent or greywater must: <ul style="list-style-type: none"> be to a fenced and signed release area not contain any properties or organisms in concentrations capable of causing environmental harm not result in pooling, runoff, aerosols, spray drift or vegetation die-off not adversely affect soil or the quality of shallow aquifers. 	Section 5.4
E2	Any non-linear infrastructure activity requiring earthworks, vegetation clearing or other construction activities must not be undertaken within 200 m of a wetland, lake or spring, or 100 m of the outer bank of a watercourse.	Section 5
E3	Linear infrastructure activities can be undertaken in watercourses but should be done when there is no water present, or in times of low flow, or in a manner which does not impede low flow.	Section 5.5
E4	Activities must not result in an increase in turbidity of >10 % in high ecological value (HEVs) waters, excluding contained construction areas.	There are no HEVs within construction footprint – see Section 3.4
E5 and E6	Linear infrastructure activities in watercourses and wetlands must be designed and undertaken by a suitably qualified person, in accordance with the <i>Activities in a watercourse, lake or spring associated with a resource activity or mining operation</i> guideline.	Section 5.5
E8	Pipeline wastewater may be released to land provided it can demonstrably meet the acceptable standards for release to land, and does not result in erosion or scouring.	Section 5.4 and 6.2.3
E9	If hydrostatic testing water does not meet condition E8, it must be contained and removed off-site by a licenced contractor for appropriate disposal.	Section 5.4 and 6.2.3
E14, E15, E16 and E17	The consequence category of dam and levee structures must be assessed in accordance with the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Structures</i> and a consequence assessment report and certification must be prepared for each structure. All low consequence dams must be constructed, operated and maintained in accordance with engineering standards and monitored for early signs of loss of structures of hydraulic integrity.	Section 5.7, 6.2.3 and 6.2.9
G1-G6	Requirements for monitoring and assessment.	Section 6.1
G9	Requirements for notification for unauthorised releases to land or water, or spills.	Section 6.3 and 7.1

1.3.3 Water-related approvals, permits and licences

Approvals, permits and licences applicable to the use and management of water resources in association with the Project are documented in Table 1-3 and Table 1-4 for the Northern Territory and for Queensland respectively.

Table 1-3. Water resources approvals, permits and licences required in the Northern Territory

Legislation/policy	Approvals, permits and licences
Water Act	<p>This Act is administered by the Department of Land Resource Management (DLRM) and by the NT EPA (for Waste Discharge Licences only).</p> <p>Tennant Creek is within a Water Control District (WCD) established under the Act. While permits are required to drill bores or extract water within the WCD, these are not required for the NGP Project as it is classed as a petroleum activity and regulated under the Energy Pipelines Act. In order to ensure compliance with industry standards, any new bores for the NGP Project should be drilled by an NT licenced water bore driller and constructed to minimum construction standards for water bores in Australia.</p> <p>A <i>Permit to Construct or Alter Works</i> is required for construction or alteration of dams, water storages or other water control in a watercourse or in a manner which will affect water flows. This permit will only be required for the NGP if flows occur in watercourses at the time of works, which is not expected during the dry season construction schedule.</p> <p>A Waste Discharge Licence will be required for disposal of hydrostatic test water.</p>
Waste Management and Pollution Control Act	<p>This Act provides for the protection of the environment by encouraging effective waste management, and pollution prevention and control practices. The Act establishes environmental nuisances as an offence, which is relevant to managing potential nuisance impacts associated with noise and dust emissions during the Project construction phase. Project activities will not require licencing under the WMPC Act.</p>
Public and Environmental Health Act	<p>Onsite wastewater management and disposal, and camp water supply and use, are regulated under this Act by the Northern Territory Department of Health (DoH). Approvals will be required during the design phase of the construction camps and prior to commencement of operations.</p>
Soil Conservation and Land Utilisation Act	<p>This Act provides for the prevention of soil erosion, and for the conservation and reclamation of soil. Development projects require Erosion and Sediment Control Plans (ESCP) to be devised. Erosion and associated impacts on watercourses is identified as a high risk during the NGP construction phase and the NGP EIS ToR requires that an ESCP be developed.</p>

Table 1-4. Water resources approvals, permits and licences required in Queensland

Legislation/policy	Approvals, permits and licences
Environmental Protection Act 1994	<p>This Act provides the framework for environmental assessment of Environmentally Relevant Activities (ERAs). The Project includes a number of ERAs governed by the Act.</p>
Environmental Protection	<p>Jemena was granted an Environmental Authority (EA) for the NGP in December</p>

Legislation/policy	Approvals, permits and licences
Regulations 2008	2015. The EA, granted by the Department of Environment and Heritage Protection (DEHP), is subject to a number of conditions, including management of waste and wastewater and activities in a watercourse.
Environmental Protection (Water) Policy 2009	The EPP (Water) defines watercourses for which specific environmental values (EVs) and water quality objectives (WQOs) are outlined in a Healthy Waters Management Plan or a Water Quality Improvement Plan, which are developed for specific watercourses and catchments. No such plans have been developed specifically for the watercourses crossed by the pipeline alignment.
Fisheries Act	The Fisheries Act provides for the protection of declared fish habitat areas, none of which are within the NGP construction footprint. The act also regulates Temporary Waterway Barrier Works in conjunction with the Sustainable Planning Act (see below).
Sustainable Planning Act 2009	The Act outlines the requirements for development permits and assessments, and also provides codes for self-assessable development. The <i>Code for Self-assessable Development for Temporary Waterway Barrier Works</i> relates to the NGP watercourse crossings in Queensland. All of the proposed crossings are self-assessable under this code, therefore approvals or permits are not required, however certain reporting requirements do apply and are detailed in this WMP.
Water Act 2000	This Act is the key legislative document for use of surface and groundwater in Queensland, and provides the framework for sustainable use and management of water resources. Under the Act water resource plans are established for the use of water resources in certain regions, and the <i>Georgina and Diamantina Water Resource Plan</i> applies to the NGP construction footprint. A water licence will be required for any water extraction that occurs in Queensland for the NGP construction phase.

1.3.4 Guidelines and standards

The following guidelines and standards apply to the assessment, management and monitoring of water resources impacts associated with the NGP Project:

Activity	Guidelines and standards
Works in or near watercourses	<ul style="list-style-type: none"> Northern Territory Land Clearing Guidelines (NRETAS 2010) Water Resource (Georgina and Diamantina) Plan 2004 (Queensland Government 2004) Queensland Guideline – Activities in a watercourse, lake or spring associated with a resource activity or mining operations (DNRM 2012)
Water extraction	<ul style="list-style-type: none"> Water Resource (Georgina and Diamantina) Plan 2004 (Queensland Government 2004)
Water storage structures	<ul style="list-style-type: none"> Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (DEHP 2013)
Wastewater	<ul style="list-style-type: none"> AS/NZS 1547:2012, Australian/New Zealand Standards for Onsite Domestic Wastewater Management (AS/NZS 2012) Northern Territory Code of Practice for Onsite Wastewater Management System (THS 2014)
Erosion and	<ul style="list-style-type: none"> International Erosion Control Association Best Practice Erosion & Sediment Control

Activity	Guidelines and standards
sediment control	Guidelines, "The IECA Guidelines" (IECA 2008)
Pollution prevention	<ul style="list-style-type: none"> • AS/NZS 1940:2004, The Storage and Handling of Flammable and Combustible Liquids (AS/NZS 2004) • AS/NZS 1692:2006, Steel Tanks for Flammable and Combustible Liquids (AS/NZS 2006)
Monitoring	<ul style="list-style-type: none"> • ANZECC & AMRCANZ 2000, Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC 2000b) • ANZECC & AMRCANZ 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, "The ANZECC Guidelines" (ANZECC 2000a) • AS/NZS 5667.1:1998, Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 1998a) • AS/NZS 5667.6:1998, Water Quality Sampling - Part 6: Guidance on sampling of rivers and streams (AS/NZS 1998b) • Australian Drinking Water Guidelines (NHMRC 2011). • Queensland Water Quality Guidelines 2009 (DEHP 2009a) • Queensland Monitoring and Sampling Manual 2009: Environmental Protection Policy (Water) Policy 2009 (DEHP 2009b)

2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

The Project environmental management framework is illustrated in Figure 2-1 below. This WMP forms part of the approvals phase environmental assessment and management documentation; implementation will occur through the Jemena and construction contractor Environmental Management Systems (EMS).

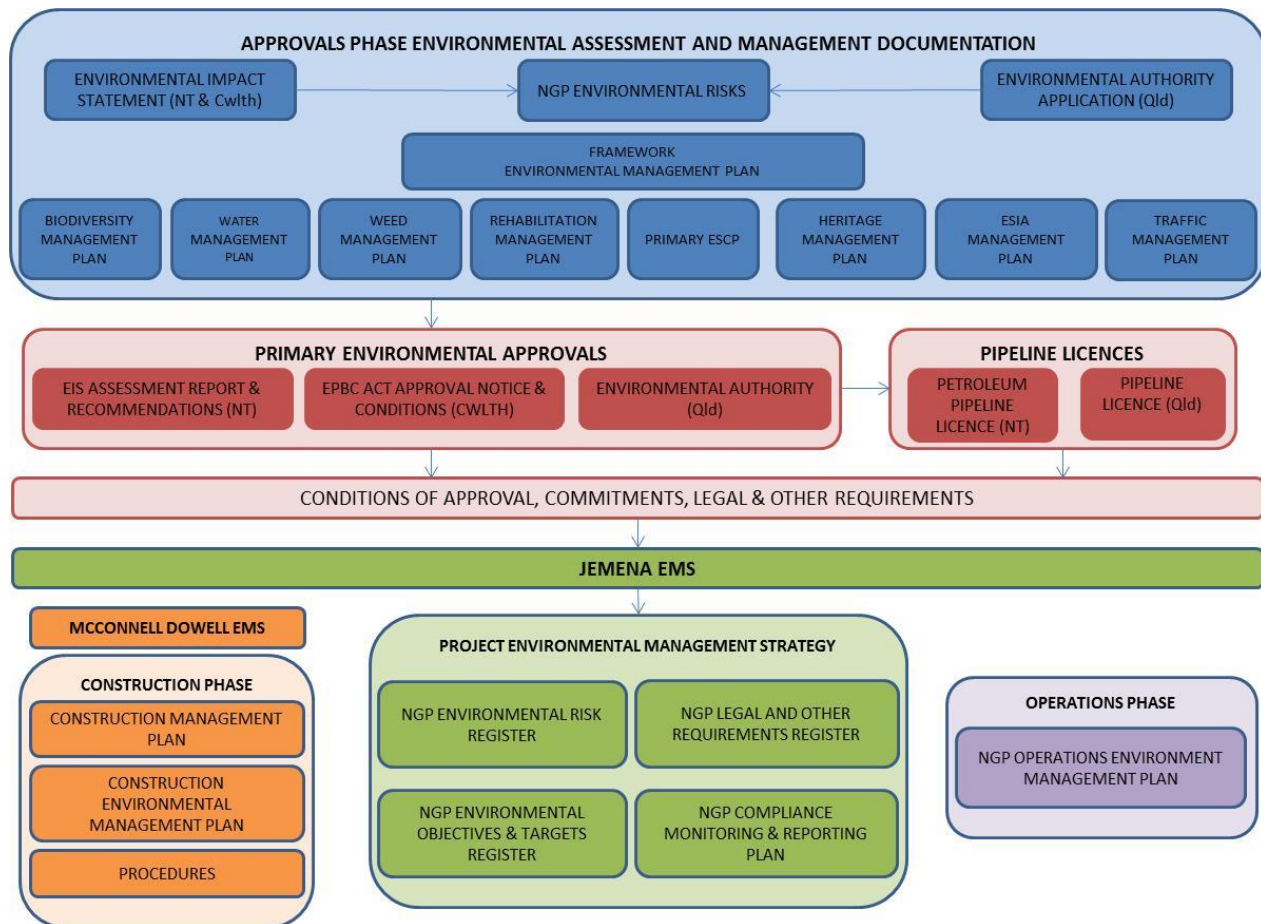


Figure 2-1. NGP project environmental management framework

The Jemena EMS forms part of the company's Health, Safety, Environment and Quality (HSEQ) Strategy. The EMS provides a framework for identifying and managing environmental risks, and for compliance monitoring and reporting. During the Project construction phase, environmental risk management is delegated by Jemena to the Construction Contractor. Jemena is responsible for overarching compliance monitoring and reporting in accordance with the primary environmental approvals and pipeline licences.

During construction, the Construction Contractor and any subcontractor will operate under the Construction Contractor's EMS. This system provides the structure and supporting documents for the environmental management for all aspects of the construction contractor and construction projects. The EMS forms part of the construction contractor's Management System, which is accredited to *AS/NZS ISO 9001:2008 – Quality Management System*, *AS/NZS ISO 14001:2004 – Environmental Management System* and *AS/NZS 4801:2001 – Occupational Health and Safety Management System*.

The water management measures and monitoring programs documented in this WMP will be implemented through the Construction Environmental Management Plan (CEMP) and associated procedures prepared by the construction contractor prior to commencement of construction. The CEMP assigns Project-specific roles

and responsibilities for environmental management and establishes a framework for the provision of environmental induction and training, complaints management and, meeting the Project internal and external environmental monitoring and reporting requirements.

All Construction Contractor staff and subcontractors will be inducted prior to commencing works. The induction will include an explanation of the environmental management framework and requirements of management plans, including this WMP.

Any staff involved in designing, implementing or monitoring water management infrastructure will be suitably qualified and/or trained through the construction contractor Project Training Plan. This includes works relevant to dams, hydrostatic testing, watercourse crossings, wastewater treatment and disposal and erosion and sediment controls

Operational water management requirements prescribed through the environmental approvals processes will be implemented through an OEMP prepared by Jemena. Both the CEMP and OEMP will be consistent and integrated with the Jemena EMS and construction contractor EMS.

3 EXISTING ENVIRONMENT

3.1 Climate

The NGP alignment borders the division of two major rainfall zones (as defined by BoM 2005): the Northern Australia region, which has a marked wet summer and dry winter, and the central arid zone, which is generally dry with low rainfall throughout the year. In general, rainfall in the region is summer dominant with occasional winter rain, and annual rainfall is highly variable (Duguid et al. 2005). Evapo-transpiration is high, with annual averages far exceeding annual rainfall.

The climate and arid zone divisions align with the surface water characteristics of the various regions traversed by the pipeline alignment. In general, a number of small, disconnected and ephemeral drainage lines are located near the Tennant Creek end, while larger braided intermittent rivers are located near the Mount Isa end and in the eastern portion of the Northern Territory. There are very few drainage lines or surface water features in the central section of the alignment, where the alignment crosses the arid zones and grasslands of the Davenport Murchison Ranges and Tanami bioregions. The majority of watercourses flow only after rainfall, and the climate can be dry for a number of years immediately followed by a period of significant rainfall and flooding.

3.2 Surface water

3.2.1 Regional catchment context

The NGP alignment traverses two major river basins entirely, and covers a small section of two other river basins at either end respectively (basins defined as per Geoscience Australia 1997). From west to east, the pipeline alignment commences in the eastern most section of the Wiso Basin, traverses the Barkly and Georgina river basins and ends at the western most section of the Leichhardt River Basin (Figure 3-1). These basins generally contain a number of smaller catchments. Except for the Leichhardt River Basin, which drains north toward the Gulf of Carpentaria, all watercourses within the basins drain inland.

Surface water flows in the region are seasonal and dependent on rainfall, and all watercourses traversed by the construction ROW are ephemeral or intermittent.

Wiso Basin

Only 15 km of the pipeline alignment is within the Wiso Basin, and no major watercourses or drainage features are crossed in the segment.

Barkly Basin

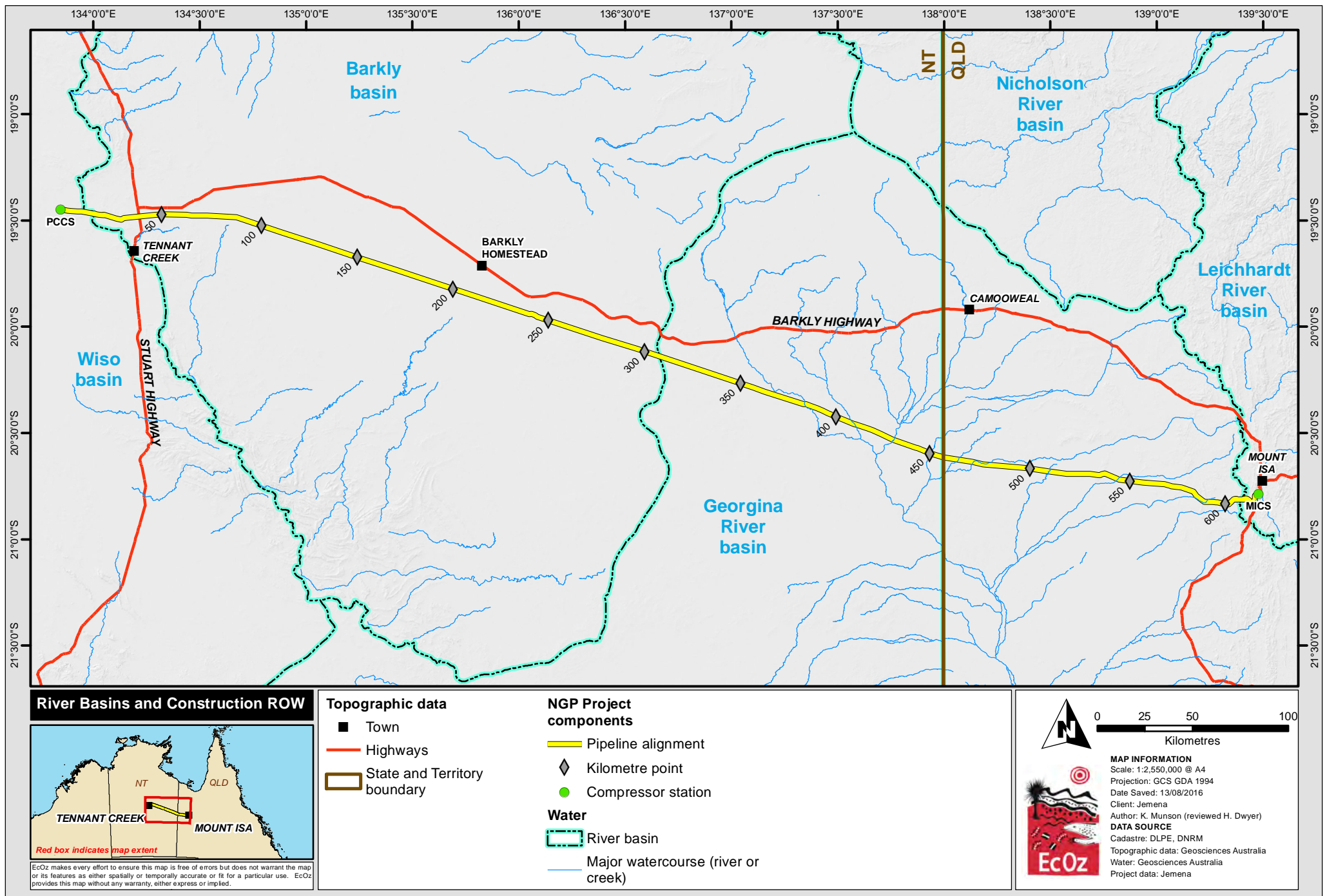
The pipeline alignment is within the Barkly Basin for most of its eastern half. The drainage features of the Barkly Basin mostly commence in upland areas, forming defined channels and eventually draining into floodout areas. The drainage lines are mostly disconnected and ephemeral to intermittent, and no major drainage lines are crossed by the pipeline alignment within this basin.

Georgina River Basin

From half way along to almost Mount Isa, the pipeline alignment traverses the Georgina River Basin, which contains the most significant watercourses traversed by the pipeline. The basin contains major rivers which drain south toward Lake Eyre, and is the north-western most river basin in the 'Channel Country' of south-west Queensland. The watercourses within the basin are highly braided and flows are reliant on rainfall. Major rivers within the basin to be traversed by the construction ROW include the Ranken River, James River and Georgina River, the headwaters for which commence in the Northern Territory.

Leichhardt River Basin

The final 13 km segment of the pipeline alignment is within the Leichhardt River Basin. The construction ROW traverses the basin near the headwaters of the Leichhardt River, which drains north and eventually discharges into the Gulf of Carpentaria. The Leichhardt River is ephemeral, but feeds the main water source for Mount Isa city, Lake Moondarra, when it flows.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Ch7-EMP\Water\Figure 7-8. With access tracks.mxd

Figure 3-1. Map of river basins and major watercourses in relation to the construction ROW

3.2.2 Watercourses

Within the two main river basins traversed by the construction ROW (the Barkly and Georgina river basins) there are a number of water crossings (Figure 3-2 and Figure 3-3). All watercourses will be crossed using an open trench method with progressive reinstatement.

Many of the watercourses in the eastern portion of the Northern Territory and Queensland are braided and the pipeline alignment crosses the same watercourses a number of times. A summary of watercourse crossings is provided in Table 3-1, including the stream order (as defined by Strahler and provided in the Northern Territory *Land Clearing Guidelines* – see NRETAS 2010), relevant basin, KP of crossing and number of crossings (for braided watercourses).

Some minor, unnamed drainage lines which are not connected to other major watercourses are traversed in the Barkly Basin. These are not listed in Table 3-1 but are displayed on Figure 3-2.

A watercourse crossing survey was undertaken for all major watercourse crossed by the construction ROW in May 2016. The results are presented in the Watercourse Crossing Survey Report (Appendix K). Further, more detailed surveys will be undertaken prior to construction to provide information for the Progressive Erosion and Sediment Control Plans.

Table 3-1. Summary of watercourses traversed by the construction ROW

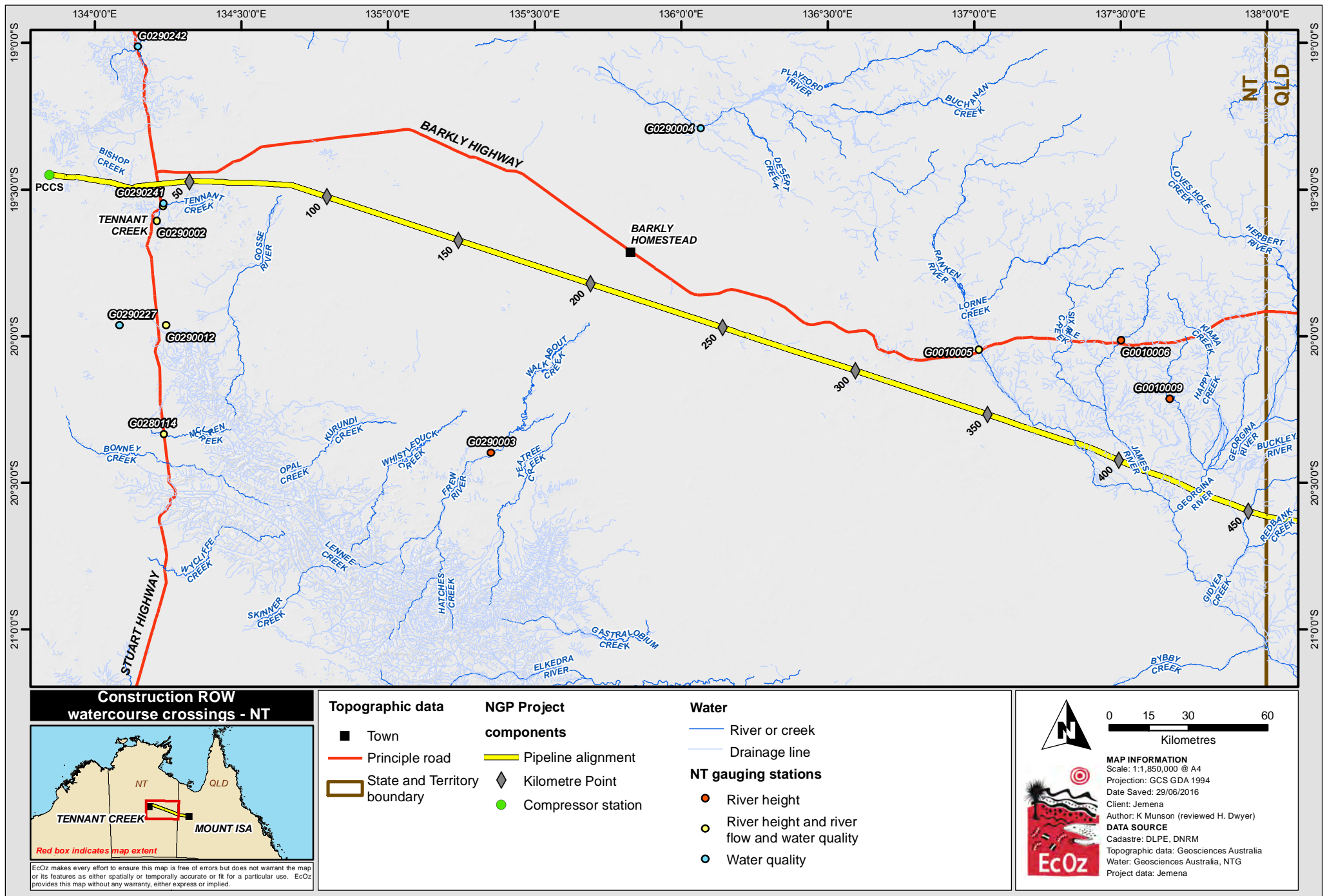
Name	Stream order*	Watercourse type	Basin	KP	Number of crossings
Northern Territory					
Bishop Creek	2	Drainage line	Barkly	18	1
Gosse River	Not applicable	Flood-out		87	1
Ranken River	5+	River	Georgina River	383	1
	1	Drainage line		383 – 396	5
James River	5+	River		410	1
	1 – 2	Drainage line		408 – 420	5
Georgina River	5+	River		431	1
	1 – 2	Drainage line		422-424	2
Blue Bush Creek	4	Creek		443 – 451	2
	1	Drainage line		448 – 453	4
Two additional unnamed drainage lines are crossed in the Barkly Tablelands, all stream order 1-2.					
Queensland					
Redbank Creek	3-4	Creek	Georgina River	464-465	2
Mingera Creek	5+	River		472	1
	1 – 2	Drainage line		472 – 498	3
Polygonum Creek	1 – 2	Drainage line		505 – 515	5
One Mile Creek	1	Drainage line		531	1
Lily Hole Creek	3	Creek		537	1
Templeton River	5+	River		544	1
	1 – 2	Drainage line		544 – 609	11
Yaringa Creek	5+	River		590	1
	3 – 4	Creek		585 – 601	3
	1-2	Drainage line		584 – 604	14
Mica Creek	3 – 4	Creek	Leichhardt River	611 – 619	4
	1 – 2	Drainage line		609 – 621	9
15 additional unnamed drainage lines are crossed; all stream order 1-2.					

*At point where construction ROW crosses watercourse

The Northern Territory Water Data Portal (see DLRM 2016a) and Queensland Water Monitoring Information Portal (see DNRM 2016) provide stream flow (water level and stream discharge) and water quality data for a number of monitoring stations within the vicinity of the Project area. The location of gauging stations in proximity to the construction footprint is provided in Figure 3-2 and Figure 3-3. Refer to Section 3.2.4 for information on the water quality monitoring stations.

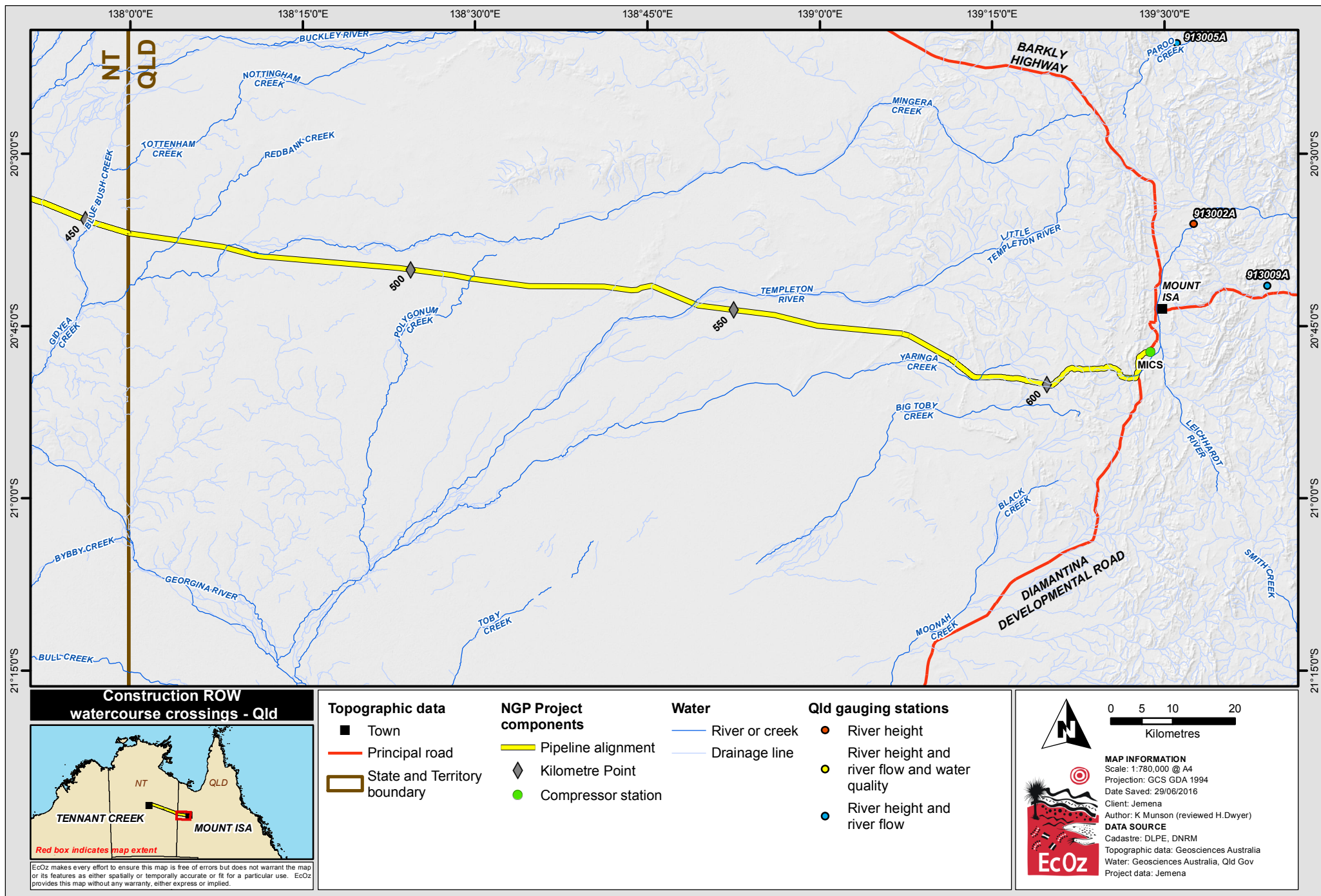
The stream flow data from these stations indicate that water levels and discharge rates are highly seasonal, with flows mostly recorded February and April of each year (i.e. the later months of the wet season). Flow volumes fluctuate significantly depending on the seasonal rainfall volumes, and cease to flow conditions are experienced for the majority of the year.

The gauging data confirms that watercourses within the construction footprint are highly seasonal, and intermittent to ephemeral. None are expected to be flowing or contain pools at the time of construction.



Path: Z:\01 EcOz Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Biodiversity & Threat Species\Figure 7-9. Map of watercourses and monitoring stations in relation to the construction ROW - NT.mxd

Figure 3-2. Map of watercourses and monitoring stations in relation to the construction ROW - Northern Territory



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Biodiversity & Threat Species\Figure 7-10. Map of watercourses and monitoring stations in relation to the construction ROW - Qld.mxd

Figure 3-3. Map of watercourses and monitoring stations in relation to the construction ROW - Queensland

3.2.3 Wetlands and High Conservation Value Aquatic Ecosystems

Although the region surrounding the construction footprint is dry for much of the year, and on the border of the arid environment, there are a number of lakes, floodouts and waterholes (all referred to here as 'wetlands') which are important features in the landscape during wet periods (see Duguid et al. 2005 for detail), and are detailed below. The pipeline alignment avoids all significant wetlands and no Ramsar or nationally important listed wetlands are within, or near, the construction footprint.

Sites of Conservation Significance (Northern Territory)

The Northern Territory Government has identified Sites of Conservation Significance (SOCS) across the Territory for areas of important or unique habitat, or areas with significant biodiversity values. The closest SOCS to the pipeline alignment is the Frew River floodout swamps, which is approximately 45 km south of the construction ROW (at approximately south of the junction of the Barkly and Tablelands highways). Nearly all SOCS in proximity to the Project area are seasonal wetlands. As none are located near the Project area and no works will be undertaken during periods of flooding (when wetlands are interconnected) no impacts to SOCS are expected and no specific management measures are detailed in this WMP.

Lake Eyre Basin

The eastern end of the construction ROW is within the headwaters of the Lake Eyre basin. No discharges to the Lake Eyre basin will occur as no works will be undertaken during periods of significant rainfall, when watercourses flow and Lake Eyre floods.

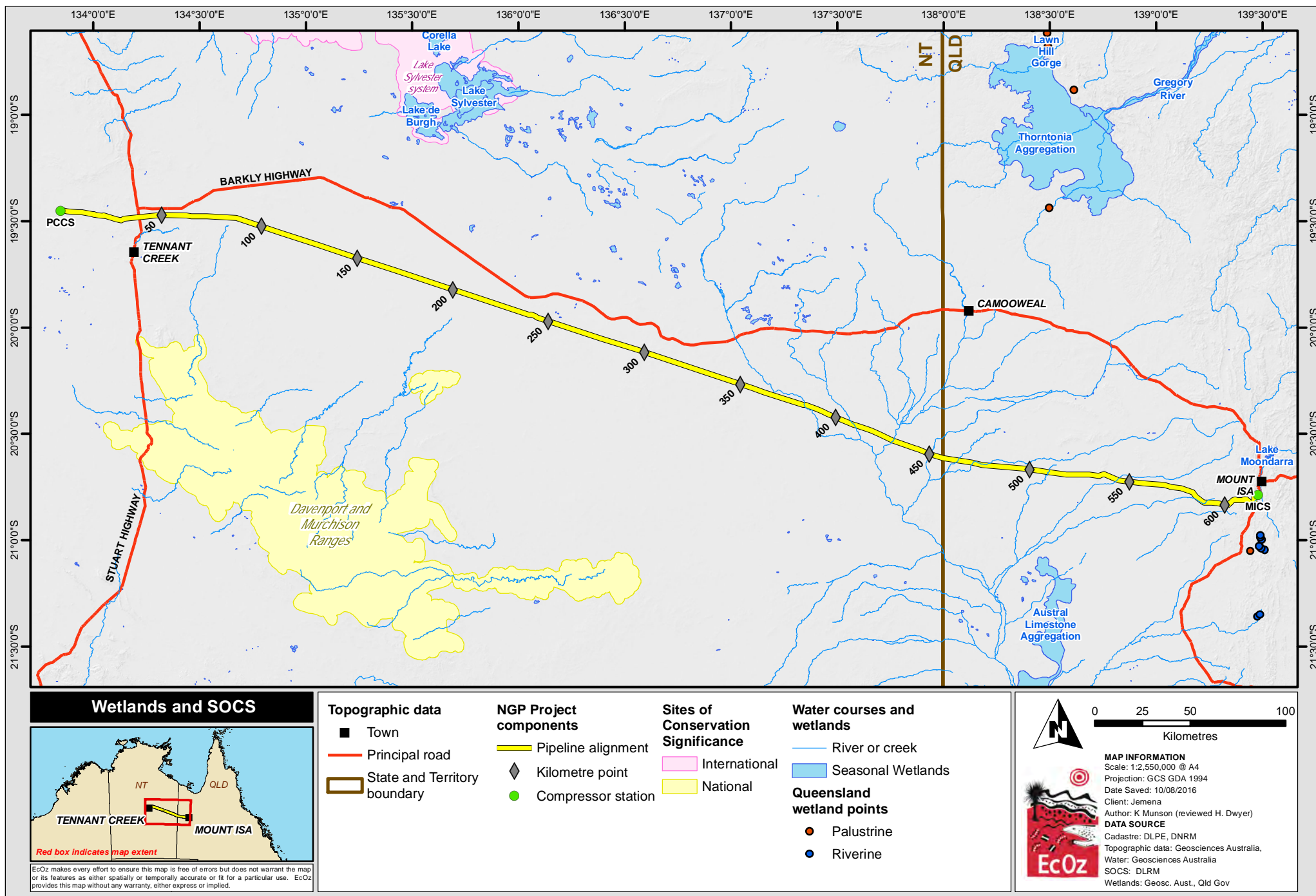
Queensland Wetlands and Matters of State Environmental Significance

The Queensland Government has mapped wetlands and groundwater dependent ecosystems in the online resource Wetland Info (DEHP 2016; see Section 3.3.1). Additionally, Matters of State Environmental Significance (MSES), as regulated and defined under the Sustainable Planning Act 2009, are mapped in the online resource *SPP Interactive Mapping System* (see MapData Services 2015). Although a number of wetlands are mapped in the region, no wetlands or watercourses are mapped as High Ecological Significance wetlands, high ecological value waters or declared fish habitat.

The Camooweal Caves National Park is considered a Matter of State Environmental Significance (MSES), but is located in excess of 70 km north of the construction ROW and therefore will not be impacted by the Project.

The closest Strategic Environmental Area and High Ecological Significance Wetland to the construction ROW is approximately 60 km south, and is associated with the Georgina River (at the confluence of the Templeton and Georgina rivers).

No impacts on significant wetlands or watercourses are expected as a result of the pipeline construction. Works will be undertaken during the dry period of the year and the alignment avoids all significant wetland systems.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Ch7-EMP\Water\Figure 7-16. Map of SOCS and wetlands in relation to the construction ROW.mxd

Figure 3-4. Map of SOCS and wetlands in relation to the construction ROW

3.2.4 Surface water quality

Existing data for the watercourses in the region is limited.

The Northern Territory Water Data Portal (see DLRM 2016a) provides online water quality data for monitoring stations around the Northern Territory. The stations in proximity to the construction ROW are displayed in Figure 3-2. There is minimal data available for watercourses within the construction footprint; the closest station to the construction ROW is 7 km south (G0290240 - Tennant Creek). The dates and number of monitoring events range significantly between sites, and is generally sporadic as a result of the irregular flow conditions. Consequently it has not been used to derive site specific water quality guidelines.

The Queensland Water Quality Guidelines (QWQG) provides local guidelines for water quality based on regions and water types (DEHP 2009a). The Georgina and Leichhardt river basins are within the Lake Eyre and Gulf regions respectively and the QWQG state there is very little or no water quality data for the watercourse in these regions. As such no WQO are provided for these regions in the QWQG.

The ANZECC guidelines are not appropriate for highly variable watercourses such as those within the construction footprint (DEHP 2009a).

Guideline values are therefore not available for the watercourses traversed by the pipeline alignment.

3.3 Groundwater

The BoM national scale Geofabric identifies three broad groundwater provinces that underlie the construction ROW (see Figure 3-5): local scale aquifers associated with Proterozoic fractured rocks of the Tennant Creek Inlier, regional karstic and fractured rock aquifers of the Georgina Basin, and local fractured rock aquifers within the Proterozoic Mt Isa-Cloncurry Province.

Tennant Creek Province

In the Tennant Creek Province, groundwater in the vicinity of the ROW mainly exists in fractured and weathered rock aquifers that occur in sandstone, conglomerate and minor volcanic rocks (DLRM 2016c). These are local scale aquifers with limited resource potential and an expected bore yield between 0.5 and 2.5 L/s. Water quality ranges from fresh to relatively saline (Total Dissolved Solids [TDS] of <1 000 mg/L to > 3 000 mg/L - see DIPE 2002). Limited information exists regarding groundwater flow directions, recharge and discharge processes within these aquifers.

Twenty-five kilometres south of Tennant Creek are the Cabbage Gum and Kelly Well borefields, which provide the municipal water supply for the town. These borefields tap highly productive aquifers developed in Cainozoic silcrete deposits and in the weathered top of the underlying basement. These aquifers are distinct from the more marginal fractured rock aquifers within the Tennant Creek Province. The aquifers targeted by the Kelly Well and Cabbage Gum borefields contain water of potable quality with all parameters within Australian Drinking Water Quality Guideline values.

Georgina Basin

The Georgina Basin is a regional aquifer system that contains a significant but largely undeveloped groundwater resource with water availability estimated at 100,000 ML/year (NALWTF 2009). Along the proposed pipeline alignment major aquifers are expected to occur in the Gum Ridge Formation in the west of the Georgina Basin, the Camooweal Dolomite in the east and, potentially, the Woonarah Formation in the central basin. At a regional level these aquifers are considered to form a single continuous carbonate aquifer which represents the principal resource for stock, domestic and community water supply within the Barkly region. Both the Gum Ridge and Camooweal Dolomite are known to be cavernous and are associated with sinkhole development (Tickell, 2003). Depth to groundwater commonly ranges from 30 – 100 mGBL (Tickell 2003) and is largely a function of surface elevation (i.e. deeper groundwater levels occur on elevated rises

and shallow groundwater in lower lying areas). Bore yields for the carbonate aquifers typically range between 0.5 and 5 L/s (Tickell 2003).

Regional groundwater flow within the Georgina Basin is separated by a groundwater divide located in the vicinity of the Barkly Homestead. Groundwater to the north of this divide flows in a north-westerly direction toward Mataranka, where springs in the Roper River form a major discharge for the Georgina Basin aquifer. South of this divide groundwater moves in an easterly direction toward springs draining into Lawn Hill Creek and the Gregory River in Queensland.

Recharge from the percolation of rainfall (diffuse recharge) is expected to occur where carbonate formations outcrop and where they underlie permeable surface formations, in particular, dune sands and the Austral Downs Limestone (Randal 1978). Indirect recharge is also expected where water courses cross outcropping limestone and dolomite.

In the vicinity of the ROW, groundwater quality in the Georgina Basin aquifers is generally of good quality with most bores reporting a TDS of less than 1,500 mg/L.

Mount Isa – Cloncurry Province

Marginal groundwater resources occur in the basement rocks of the Mount Isa Inlier. These formations have limited primary porosity and most bores source groundwater from fractured rock aquifers. Randal (1978) reports an average aquifer depth of around 30 m, a water level range of 5 – 56 mBGL (average of 18 mBGL). Bore yields are typically 1.8 L/s for volcanic aquifers and 0.6 L/s for granite aquifers. Groundwater flow paths within these aquifers are local but the broad gradient is to the west toward the Georgina Basin. Groundwater quality in the fractured rock aquifers is variable but is typically less than 1,500 mg/L TDS.

Further east of Mount Isa is the western border of the Great Artesian Basin (GAB), which underlies the vast majority of central Queensland from Cape York to the southern border, and extends into sections of the Northern Territory, South Australian and New South Wales. The Project area does not overlie the GAB, nor will the project involve extraction from the GAB.

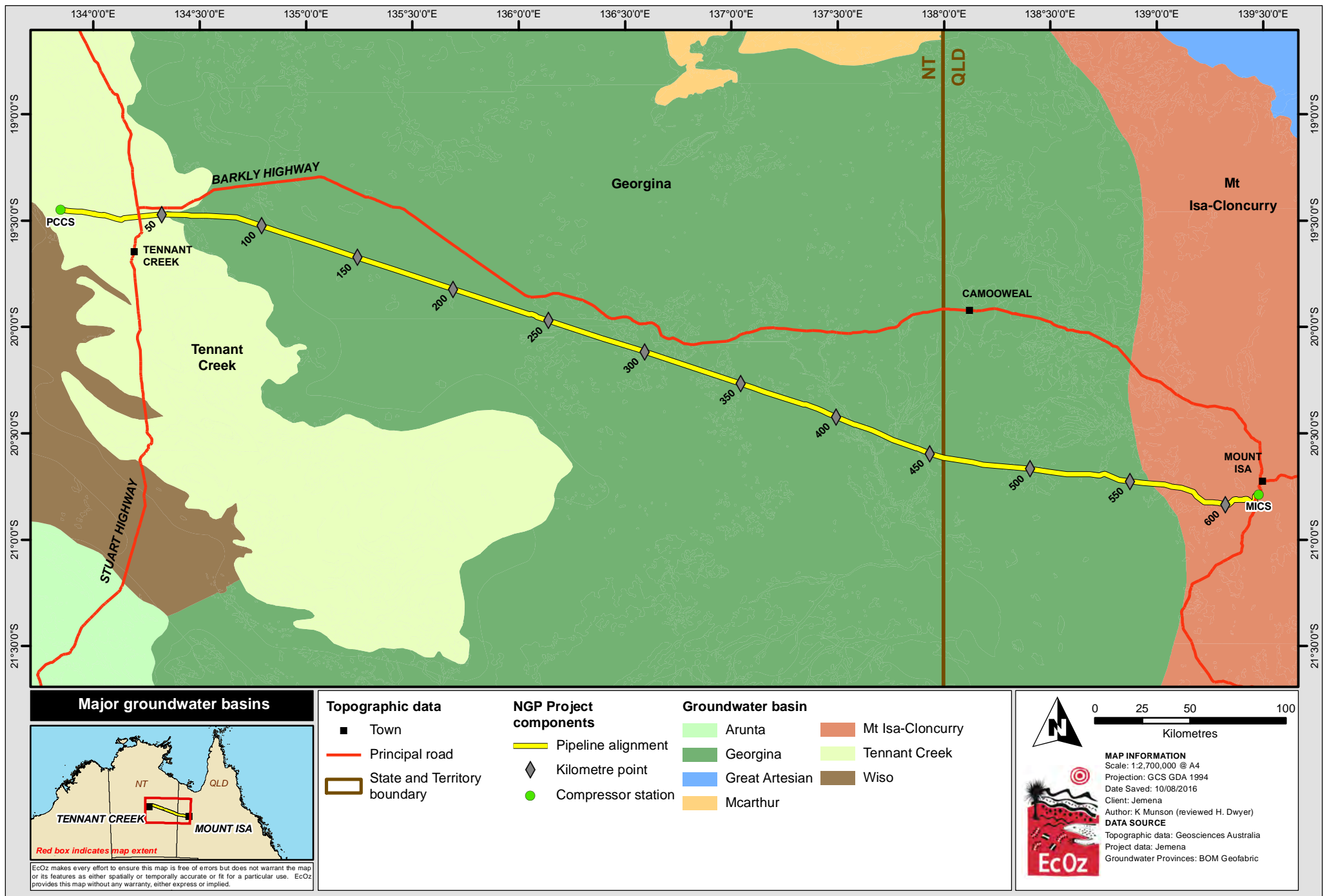
3.3.1 Ground-surface water interaction

No significant wetlands or groundwater dependent ecosystems (GDEs) are mapped within the construction footprint.

In the Northern Territory there are records of permanent waterholes along the Ranken, Georgina and James rivers. The permanency of these pools in an arid environment suggests they are likely to be sustained by groundwater seepage. The location of permanent pools in relation to the construction ROW is not currently known, but will be further investigated through detailed survey prior to construction.

The Queensland wetland mapping system (see DEHP 2016) indicates that there are a number of riverine wetland systems mapped along the watercourses traversed by the construction ROW. A number of palustrine and lacustrine wetlands are also mapped, although many are artificial (e.g. Lake Moondarra). None of the wetlands are considered significant (see Section 2.2.3) and the majority of them are ephemeral, with the exception of artificial and man-made dams and lakes.

GDEs are mapped around the Camooweal area and along the western boundary of Queensland where the construction ROW crosses from the Northern Territory (Figure 3-5). All are subterranean (i.e. below ground) and are associated with the caves of the Camooweal Dolomite aquifer system (DEHP 2016). Sinkholes may occur in this region and these features could potentially provide a high level of connection between surface water and the underlying aquifer and associated GDEs. The location and extent of the Camooweal GDEs are approximate and all mapped GDEs underlying the construction footprint are 'derived' (i.e. versus known) with low to moderate confidence.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Ch7-EMP\Water\Figure 7-17. Map of construction ROW and underlying groundwater basins.mxd

Figure 3-5. Map of construction ROW and underlying groundwater basins

3.4 Existing water users and beneficial uses

Aside from the townships of Tennant Creek, Camooweal and Mount Isa, the main land tenements are perpetual pastoral leases and Aboriginal Land Trust land with some freehold, vacant Crown land, perpetual crown leases and reserves throughout. Some Territory and Queensland government owned land also exists.

Figure 3-6 displays land tenure and populated places, including communities and homesteads, in relation to the construction footprint. Groundwater will be sourced from landholder bores where possible, see Water Availability Study (Appendix N).

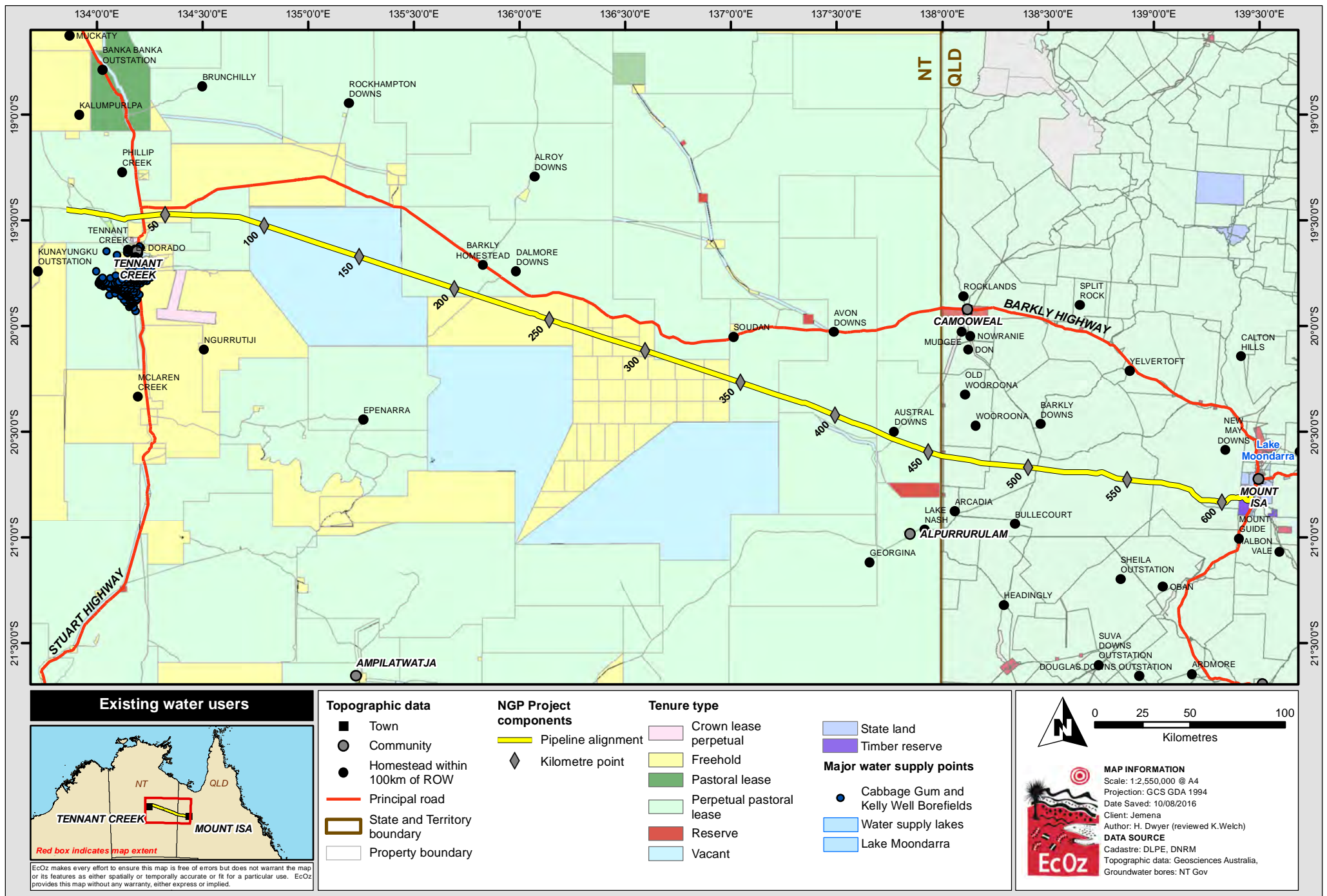
A number of mineral and petroleum leases are held by various parties along the pipeline alignment, many of which are not currently active. In Queensland, consultations have commenced with large users and the Project is not expected to interact with, or impact on, these users.

Apart from Mount Isa, the majority of water sourced for the regions surrounding the pipeline alignment is from groundwater as surface water flows are generally seasonal, and thus not a reliable water source. The main use for water in the region is for potable uses in cities, towns and communities, and potable and pastoral uses on stations.

In Mount Isa, water for potable consumption and for industrial use, is sourced from Lake Moondarra, an artificial lake approximately 20 km north of Mount Isa that is supplied by the Leichhardt River. The water supply to the lake is dependent on rainfall and river flows in the Leichhardt, and the variability of seasonal rainfall necessitates water supply to be supplemented by Lake Julius Dam in dry years. The pipeline alignment crosses Mica Creek which is in the headwaters of the Leichhardt River and upstream of Lake Moondarra. Management measures outlined in Section 5 aim to minimise impacts to watercourses crossed by the construction ROW, and any impacts to Mica Creek (and downstream watercourses) will therefore be minimised.

In the Northern Territory, there are no declared beneficial uses for the watercourses traversed by, or within the vicinity of, the construction footprint. In Queensland, none of the watercourses within the construction footprint have declared environmental values, HEVs or WQOs.

Water for Tennant Creek is sourced from the Cabbage Gum and Kelly Well borefields (PowerWater 2016), approximately 15 – 25 km south of Tennant Creek, and in excess of 30 km south of the construction ROW. Similarly, water for Camooweal is sourced from groundwater by two sub-artesian bores (Viridis Consultants 2015).



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\JEMENA\IS (NT)\01 Project Files\Ch7-EMP\Water\Figure 7-19. Map of construction ROW and water users; towns, stations and communities.mxd

Figure 3-6. Map of construction ROW and water users; towns, stations and communities

4 RISK ASSESSMENT

A comprehensive risk assessment was undertaken for the EIS (refer to EIS Chapter 5 – Risks, Chapter 7 – Water, and Appendix F – Environmental Risk Register). The risks identified for each phase of the Project are summarised below. The focus of this WMP is to describe the management and mitigation measures that will be undertaken to reduce these risks to an acceptable level (as defined in the risk rankings). Other management plans for this Project are referenced where relevant.

4.1.1 Planning

Activities during the planning phase, including early survey works, have potential to cause the following impacts to water:

- watercourse crossings not adequately assessed leading to insufficient detail for development of Progressive Erosion and Sediment Control Plans
- soils are not adequately mapped and problematic soils are not identified leading to inaccurate information for the development of progressive Erosion and Sediment Control Plans
- physical damage to watercourses when accessing survey activities.

4.1.2 Construction

Activities during the construction phase have potential to cause the following impacts to water:

- chemicals or hazardous substances entering groundwater or surface water due to a spill of chemicals or hazardous substances, and subsequent reduction in water quality
- sediment and/or vegetative material entering local watercourses due to ground disturbance, erosion of exposed soils, stockpiling of cleared vegetation and topsoil, and trenching across watercourses, and subsequent reduction in water quality
- sediment and/or vegetative material entering local watercourses due to the dewatering of water collected within trench, or uncontrolled release from low consequence dams, and subsequent reduction in water quality
- sediment and/or vegetative material and/or contaminants entering groundwater aquifer due to the interception of shallow groundwater underneath watercourse crossings, and subsequent reduction in water quality
- reduced surface water flows due to the sourcing and extraction of water from watercourses, and subsequent impacts on downstream users and aquatic ecosystems
- alteration of surface water hydrology due to trenching across watercourses, via open cut, and subsequent impacts on downstream users and aquatic ecosystems
- exposure of problematic soils (e.g. dispersive, acid sulfate or contaminated) during surface and sub-surface excavations and subsequent impacts reduction in water quality due to inadequate handling and/or treatment of problematic soils
- contaminated water entering watercourses or groundwater aquifers due to the generation and disposal of wastewater, and subsequent reduction in water quality
- drawdown of groundwater due to the sourcing and extraction of water for testing, and subsequent impacts on other groundwater users, groundwater dependent ecosystems and areas of ground-surface water interaction
- erosion and sedimentation of watercourses due to the failure of reinstatement, and subsequent reduction in water quality.

4.1.3 Operations

Activities during operations phase have potential to cause the following impacts to water:

- sediment entering local watercourses due to the erosion and scour of soils, and subsequent reduction in water quality
- chemicals or hazardous substances entering groundwater or surface water due to a failure of pipeline and release of contaminants, and subsequent reduction in water quality
- reduction in flows in watercourses due to the sourcing and extraction of water for operation of compressor stations, and subsequent impacts on downstream users and aquatic ecosystems
- drawdown of groundwater due to the sourcing and extraction of water for operation of compressor stations, and subsequent impacts on other groundwater users, groundwater dependent ecosystems and areas of ground-surface water interaction
- contaminated produced water entering watercourses or groundwater aquifers due to uncontrolled release from evaporation ponds, and subsequent reduction in water quality.

4.1.4 Decommissioning

Activities during the decommissioning phase have potential to result in the following impacts to water:

- alteration of surface water flows associated with removal of infrastructure
- sediment entering local watercourses and reducing water quality associated with scour and erosion during removal of infrastructure.

This WMP applies specifically to construction phase risks; other risks are noted for context but are not discussed further in this document. Refer to Chapter 13 – Environmental Management Plan of the NGP EIS for details of water management for other Project phases.

5 WATER MANAGEMENT MEASURES

This section documents the water management measures that will be implemented to reduce construction phase water risks to As Low As Reasonably Possible (ALARP). For each potential impact identified through the environmental risk assessment process the sections below document:

- environmental objectives
- management actions required to achieve those objectives
- monitoring that will be undertaken to measure performance
- reporting requirements
- performance indicators
- corrective actions to be applied if performance indicators are not being met.

5.1 Chemicals or hazardous substances entering groundwater or surface water and causing contamination

Chemicals, fuels and hazardous substances which will be stored and used during the construction phase include diesel, lubricants, oils, paints and primers, chemicals, blasting materials, hydrostatic test chemicals and gases.

All fuel will be stored at camps in 110,000 L self-bunded tanks. Storage will comply with relevant Australian Standards and industry guidelines. Service trucks will refuel all machinery along the construction ROW and fuel will be logged to monitor for leaks and spills. All other vehicles will be refuelled at the camp in designated bunded areas.

Hazardous materials will be stored as required by their Safety Data Sheets (SDS), but generally in ventilated, self-bunded and secure containers. Blasting materials will be stored in secure areas by the blasting contractor in accordance with regulatory requirements.

Industry storage and spill response measures will be implemented to minimise the risk of contamination as a result of the storage and use of chemicals, fuels and hazardous substances.

Weekly visual inspections of the storage and refuelling areas will be undertaken as part of the inspection checklist protocol. Any issues will be identified during these inspections and remediation will be undertaken as required.

Objective: No chemical or hazardous substance to enter surface water bodies or groundwater as a result of construction activities

Management actions	Monitoring	Performance indicators	Corrective actions
All chemicals, hazardous substances and fuels will be stored and used in accordance with Australian standards, legislation and safety data sheets (SDS).	Daily inspections of machinery, refuelling areas and storage areas for spills or signs of contamination or soil staining. Regular environmental	No spills or soil staining identified in storage and/or refuelling areas.	Incident investigations and remedial actions based on investigation.
Fuels will be stored in accordance with AS1940-2004 and AS1692-2006. This includes storage within impervious and bunded areas with a capacity of 110 per cent of the total capacity of the largest storage vessel.		No hydrocarbons identified in runoff water or water captured in sediment dams.	Reporting to Pollution Hotline (see Emergency Response).
All other hazardous substances, including smaller mobile drums, will be stored in dedicated, bunded, signed and covered areas as required for the product.		No significant spill	Implement

Management actions		Monitoring	Performance indicators	Corrective actions
A Dangerous Goods and Hazardous Substance Procedure will be developed and implemented that will include handling, storage and spill response requirements.		audits, to include audit of spill kits. Water sampling as per Section 6.2 prior to release to land. Records of incoming and outgoing fuel and chemical stores.	events. Records of incoming and outgoing fuel and chemical stores do not indicate pattern of loss.	remediation as soon as issue is identified.
A Dangerous Goods and Hazardous Materials Register will be maintained and copies of SDS kept in storage areas.				
The transport of fuels and hazardous substances is to be in accordance with the Traffic Management Plan to minimise risks of accidents resulting in spills.				
No waste product of any type will be discharged to, or dumped in, watercourses.				
Spill kits must be kept and maintained with adequate stock in storage areas and refuelling areas, including along the ROW. Additional hydrocarbon spill response equipment may be kept in vehicles and machinery.				
A Spill Response Plan will be developed for the Project and all workers will be trained in the plan.				
Machinery will be maintained and checked for leaks, wear and tear.				
Prior to construction, identify and map the location of permanent pools in the Ranken, James and Georgina rivers in relation to the construction ROW crossings.				
Prior to construction, identify and map the location of sinkholes within the construction footprint.				
No chemicals or hazardous substances are to be stored within 200 m of a sinkhole, 200 m of a wetland or spring, or 100 m of a watercourse.				
No refuelling of vehicles or machinery to be undertaken within 200 m of a sinkhole, 200 m of a wetland or spring, or 100 m of a watercourse.				
Waste oil or chemical will be stored in sealed containers in bunded areas for collection and disposal by a licenced waste disposal contractor.				
Material used in spill clean-up must be removed once product is absorbed and stored in sealed container for disposal off-site by a licensed contractor.				
Recording and reporting	Internal logs of incoming and outgoing fuel and chemical stores Fuel logs Daily inspection logs Weekly inspection logs Water quality data			
Responsibility	Construction Manager – storage areas and refuelling procedures Construction Environmental Manager – spill response procedures, inspections and monitoring			

5.2 Sediment and/or vegetative material entering surface watercourses and reducing water quality

Objective: No sediment of vegetative material to enter surface watercourses as a result of construction activities

Management actions		Monitoring	Performance indicators	Corrective actions
Staged ESCP (Primary and Progressive) are to be developed for the construction phase of the Project. The Progressive ESCP will be in accordance with the IECA Guidelines and will include specific requirements for controls for watercourse crossings and other phases of construction.		Regular environmental audits. Water monitoring as per Section 6. ESCP monitoring and maintenance.	All controls and devices are installed as per ESCP.	Implement remediation as soon as issue is identified. Notify relevant authorities where required.
Erosion and sediment controls are to be installed and maintained as per ESCP to minimise release of soil to watercourses.				
Only activities directly required for linear infrastructure construction are to be undertaken within: <ul style="list-style-type: none">• 200 m of a wetland, lake or spring• 100 m of the outer bank of any watercourse				
Discharge of hydrostatic test and pre-fill water will be such that no erosion or sediment issues result from discharge (see ESCP).				
A Water Discharge Licence will be sought for discharge of hydrostatic test water, which will guide the method of release to land. Discharge will be via level spreaders, >100 m from a watercourse, and via sediment controls as required. Hydrostatic test water to be discharged only once.				
Minimise the area of exposed soils with progressive reinstatement.				
Water monitoring will be implemented to monitor for sediment loads and turbidity.				
Water management infrastructure (e.g. dams and storage tanks) will be established such that no unauthorised discharges occur.				
Any required trench dewatering will ensure no dewatering discharges to watercourses (see Section 5.4 and ESCP) and will discharge via sediment filtration media (socks or filter fence).				
Recording and reporting	Water quality monitoring database Incident register Environmental audits			
Responsibility	Construction Manager – storage and handling of soils and vegetation Construction Environmental Manager – implementation and monitoring of management measures Environmental Auditor – regular audit			

5.3 Exposure of problematic soils, such as dispersive, acid sulfate or contaminated and subsequent release of acids or contaminants

Objective: Manage soils such that no problematic soils result in pollution of surface water or groundwater as a result of construction activities

Management actions		Monitoring	Performance indicators	Corrective actions
Prior to construction, undertake a soil survey of the construction ROW to identify, and map, areas of problematic soils.		Regular environmental audits. ESCP monitoring and maintenance. Any additional monitoring as per specific management plans.	All controls and devices in Erosion and Sediment Control Plans installed.	Additional soil sampling and analysis. Review and updated management plans.
Develop specific management plans if detailed soil surveys identify problematic soils. Management plans to be in the form of either a: <ul style="list-style-type: none">• Progressive ESCP for dispersive soils• Acid Sulfate Soils Management Plan• Contaminated Soils Management Plan			Any acid sulfate soils are treated as per management plan.	
Erosion and sediment controls to be installed and maintained as per ESCP to minimise discharge of soil to watercourses.			No acidic leachate discharged from construction footprint or to watercourses.	
Management plans to include specific storage, treatment and monitoring measures for problematic soils as required.			All contaminated soil is remediated or removed from site as appropriate.	
Recording and reporting	Incident register Regular audits Specific management plans			
Responsibility	Soil Scientist – assessment of soils for dispersion potential, acid sulfate presence or contamination Construction Manager – storage and handling of waste and hazardous substances Construction Environmental Manager – implementation and monitoring of management measures, development of specific management plans Environmental Auditor – regular audit			

5.4 Contaminated wastewater entering surface watercourses or groundwater aquifers

The main construction activities with the potential to generate wastewater are hydrostatic testing, camp wastewater treatment and vehicle washdowns. In the event that rainfall occurs or shallow groundwater is intercepted during trenching, trench dewatering will be required. The management measures are separated here based on these activities.

Hydrostatic testing

The pipeline will be hydrostatically tested prior to operation to detect potential leaks and confirm the pipeline's capability to operate at the proposed operating pressure. Testing will be undertaken in accordance with AS2885.5. A Hydrostatic Test Management Plan will be developed by the hydrostatic testing contractor prior to construction, and will include details of the location and quality of source water, requirements for additives, controls for pre-fill and hydrostatic test water management, and monitoring and mitigation measures.

Sections of the pipeline will be tested as they are completed (referred to as 'test sections'). It is currently anticipated that there will be 10 hydrostatic test sections along the length of the pipeline; the number of test sections, and lengths, will be confirmed during the planning phase.

Prior to hydrostatic testing, the test section will be cleaned with an absorbent pig and then flushed with approximately 0.02 ML of water (called 'pre-fill') to remove any sediment that is sitting in the bottom of the pipe. Pre-fill water will be discharged to a bell hole at the end of the test section, with any remaining water discharged to land at a designated location at the end of each test section. Pre-fill water will be discharged via sediment controls (e.g. filter sock or sediment fence) to reduce sediment loads. Following pre-fill, the test section will be filled with hydrostatic test water.

Approximately 22 ML of water will be used in total for hydrostatic testing. The maximum volume for any given test section is approximately 8.5 ML, and water will be re-used in subsequent test sections where practicable. Hydrostatic test water is expected to be sourced from approved sources along the construction ROW.

Prior to use in hydrostatic testing, the source water will be sampled to determine water quality, and the requirement for additives. Any additives used will be selected with consideration of their residual impacts and toxicity.

Once hydrostatic testing is complete for each test section, the water will be transferred to a low consequence dam for storage, in preparation for use in the next test section. Water will be piped to the low consequence dam or carted with water carts where necessary.

Prior to discharge of hydrostatic test water, it will be sampled and analysed as per Section 6.2.4. For discharges in the Northern Territory a Waste Discharge Licence (WDL) will be sought from the NT EPA, the conditions of which will stipulate water quality and discharge requirements. Discharges in Queensland will be in accordance with conditions E8 and E9 of the Environmental Authority (EA).

If water quality guidelines cannot be met, water treatment will be undertaken, or water will be pumped to purpose built evaporation ponds and disposed via evaporation.

Objective: No contaminated wastewater to enter surface water bodies or groundwater as a result of hydrostatic testing

Management actions	Monitoring	Performance indicators	Corrective actions
Hydrostatic testing will be conducted in accordance with Australian Pipeline Industry Association (APIA) <i>Code of Environmental Practice: Onshore Pipelines (2013)</i> and AS2885.5.	Monitoring of hydrostatic source water quality prior to use as per Section 6.2.4. Monitoring of hydrostatic test water prior to release as per Section 6.2.4.	No unauthorised discharge of hydrostatic test water to watercourses or areas of ground-surface water interaction. All discharge water meets guideline values	Treat hydrostatic test water prior to discharge or dispose via evaporation Install or review erosion and sediment controls as required.
Water for hydrostatic testing will be sourced from approved sources in accordance with agreements with suppliers.			
Develop and implement a Hydrostatic Test Management Plan.			
No wastewater or waste product of any type will be discharged to, or dumped in, watercourses.			

Management actions		Monitoring	Performance indicators	Corrective actions
No hydrostatic test water to be discharged in areas overlying limestone or dolomite aquifers, or within 100 m of a sinkhole.		Inspections prior to, during and after discharge for erosion in discharge area.	in Table 6-5.	
Prior to hydrostatic testing, the pipeline will be pre-cleaned with an absorbent pig to remove weld debris, dust and surface scale, and flushed with pre-fill water to remove sediment and debris. Pre-fill water will be filtered prior to discharging to land via erosion and sediment controls at the end of each test section.			There is no visible erosion or sediment in water discharge area during or after discharge.	
Hydrostatic test water to be stored in low consequence dams along the length of the construction ROW and reused at each test section.			All controls and devices in Erosion and Sediment Control Plans installed.	
Hydrostatic test water will be tested and results analysed prior to discharge. Water treatment will be undertaken as required to ensure discharge water meets approved guideline values for discharge.				
Subject to compliance with water quality guidelines water will be discharged to land via erosion and sediment controls at approved locations.				
If water quality guidelines cannot be met alternative disposal options will be implemented such as via evaporation ponds, the details of which will be developed with the relevant regulators.				
Water monitoring will be implemented as per Section 6.2.4.				
Water management infrastructure (e.g. dams and storage tanks) will be established such that no unauthorised discharges occur.				
A Waste Discharge Licence will be sought prior to discharging hydrostatic test water in the Northern Territory and discharges will be undertaken in accordance with conditions of the licence.				
Recording and reporting	Maintenance and hydrostatic testing records Water quality data Reporting requirements under EA and WDL			
Responsibility	Project Manager – reporting requirements Construction Manager – hydrostatic testing Construction Environmental Manager – monitoring and reporting of results			

Camp Wastewater Treatment

Allowance has been made for five construction camps along the construction ROW, and one construction camp at the PCCS, each with a capacity of up to 300 people. Two additional mobile fly camps (with up to 50 people each) will also be established and moved along the length of the pipeline progressively. Sewage from all camps will be treated through an onsite wastewater treatment plant and treated wastewater will be released to land via irrigation. Solids and sludge will be transported to a licenced facility. Kitchen waste will also discharge to the wastewater treatment plant via a grease trap (installed at the kitchen).

All required approvals will be sought from the Northern Territory DoH for the camps.

Objective: No contamination of surface water bodies or groundwater as a result of wastewater treatment and irrigation

Management actions		Monitoring	Performance indicators	Corrective actions
Install and maintain suitably sized and designed wastewater treatment plant for each camp.		Monitoring of treated wastewater as per Section 6.2.6 Weekly inspection checklist. Regular environmental audits.	All wastewater is treated onsite. Water treatment is achieving secondary quality and parameters are within guideline limits outlined in Section 6.2.6. No pooling or erosion within irrigation area. Buffers from sinkholes, limestone and dolomite outcrops and watercourses are adhered to. Vegetation is maintained to promote nutrient uptake.	Investigate treatment issues and upgrade system as required. Modify irrigation system. Move irrigation system.
Wastewater from camp ablution blocks and kitchen will be treated to a suitable quality for release via irrigation (as per NT <i>Guidelines for Wastewater Works Design Approval</i>).				
Validation sampling will be undertaken on treated effluent to ensure treatment is effectively removing contaminants.				
Irrigation will be managed to minimise runoff, pooling, spray drift, aerosols or deep drainage.				
No irrigation of treated camp wastewater will occur on areas of limestone or dolomite outcrop, or within 100m of a sinkhole.				
No irrigation of treated wastewater within 200m of a spring or wetland, or 100m of a watercourse.				
Irrigation area will be fenced off and signposted.				
Irrigation of treated wastewater will be designed and operated in accordance with the <i>Guidelines for Wastewater Works Design Approval of Recycled Water Systems</i> (DoH 2013) including obtaining a <i>Wastewater Works Design Approval</i> from DoH prior to installation of the systems, undertaking a <i>Land Capability Assessment</i> for each site or assessing onsite soil characteristics, and obtaining Waste Discharge Licences where required.				
All systems will be designed and installed by a licenced plumber.				
Recording and reporting	Water quality data Weekly inspection logs Maintenance records Regular audits			
Responsibility	Construction Manager – installation and maintenance of systems as per design Construction Environmental Manager – approvals, monitoring and reporting Construction Contractor – design and installation of wastewater treatment and irrigation systems Environmental Consultant – land capability assessment Environmental Auditor – regular audits			

Vehicle Washdowns

Washdowns for vehicle and equipment hygiene will be located at every camp and at additional sites as required (refer to the Weed Management Plan). The washdown pads will capture wastewater from vehicles and equipment, which may include weed seeds, soil and hydrocarbons. The pads will be concreted, bunded and graded to capture wastewater in lined sumps. Water will be recycled through the system, and all weed seeds and washdown residue will be captured in the sump. Sumps will be cleaned out as required and as part of reinstatement of the camps, and all sump residue will be taken to a licenced facility for disposal.

Objective: No discharge will occur from vehicle washdown bays that will result in surface or groundwater contamination

Management actions		Monitoring	Performance indicators	Corrective actions
No washdown water will be discharged to watercourses.		Regular environmental audits.	No washdown water discharged to land or watercourses. No weeds spread or new weeds introduced in areas around washdown pads.	Review and upgrade wash-down system.
Washdown pads for vehicles will be constructed to capture and recycle all wastewater. No discharge will occur from washdown bays.				
All washdown bays constructed by construction contractor will be bunded to capture runoff for treatment.				
Washdown facilities will capture weed seeds in a sump to ensure they are not spread to surrounding environment.				
Sump residue will be removed and disposed of at a licenced facility.				
Recording and reporting	Regular audits			
Responsibility	Construction Manager – washdown bay design and maintenance Environmental Auditor - regular audits			

Trench dewatering

Trench dewatering may be required if rainfall occurs, if shallow groundwater is intercepted in watercourse crossings, or if watercourses contain water when crossing are constructed. To minimise the risk of capturing surface water flows, watercourse crossings will be constructed in as per Section 5.5. The Erosion and Sediment Control Plan will include contingencies for rainfall events, including the installation of diversion bunds to minimise the volume of water captured in trenches.

Seasonal watertables underlying major watercourses are often lower in the dry season than the wet season, however, there are noted permanent pools along the Ranken, Georgina and James rivers, which indicates the presence of shallow, perched watertables. Further survey work will be undertaken prior to construction to confirm the location of any permanent pools in relation to the construction footprint.

Objective: Discharges from trench dewatering water will not result in contamination or erosion of receiving land

Management actions	Monitoring	Performance indicators	Corrective actions
No trench water will be discharged to watercourses.	Visual inspections for sheens, odour,	No contaminated water discharged to land.	Review and upgrade dewatering
Identify and map the location of permanent pools in the Ranken, James and Georgina rivers in relation to			

Management actions		Monitoring	Performance indicators	Corrective actions
the construction ROW crossings.		smell prior to discharge. Monitoring as per ESCP.	No erosion of discharge area. No discharges to watercourses.	infrastructure. Implement additional pre-treatment or sediment controls.
Trench water will be discharged to land via level spreaders and erosion and sediment controls (e.g. grassed areas or filter socks) to minimise sediment loads and avoid creating erosion in discharge zone.				
The trench construction layout will include drainage, erosion and sediment controls to minimise the volume of water captured in the open trench (refer to ESCP).				
Approval from landholders or authorities will be sought prior to discharge as required.				
Recording and reporting	Water quality data ESCP monitoring logs Regular audits			
Responsibility	Environmental Manager – monitoring and reporting Project Manager – discharge approvals and landholder agreements Environmental Auditor - regular audits			

5.5 Alteration of surface water flows

All major watercourse crossings will be located at the eastern end of the alignment, from KP 383 – 534. In the Northern Territory a *Permit to Construct or Alter Works* is required for works within a watercourse crossing where works will interfere with flow. Works will be timed to avoid periods of flow, which will likely negate the requirement for a permit. Information on the location, timing and nature of works will be submitted to Department of Land Resource Management (DLRM) prior to commencement of works to inform the department of proposed works. If water flows commence during works, then a permit will be sought.

Watercourse crossings will be constructed in the following order of preference:

1. In times when there is no water present
2. In times of no flow
3. In times of flow, but in a way that does not impede low flow

Each watercourse crossing will be reinstated as soon as practicable after construction.

In Queensland the works are a Temporary Waterway Barrier Works, and are self-assessable under the *Code for Self-assessable Development Temporary Waterway Barrier Works* ('the Code' – see Appendix A). The Code stipulates requirements for waterway barrier works according to the risk of impact to waterways, as determined by the Queensland Government risk mapping (see Figure 5-1 of watercourse crossings and risk colour codes). Based on this mapping the construction ROW will cross red, amber and green watercourses. Specific management requirements based on these colours are as follows:

- In **RED** waterways (Mingera Creek, Templeton River) works must commence and be completed within 180 days
- In **AMBER** and **GREEN** waterways (Redbank Creek, Yaringa Creek and tributaries, Mica Creek and tributaries) works must commence and be completed within 360 calendar days

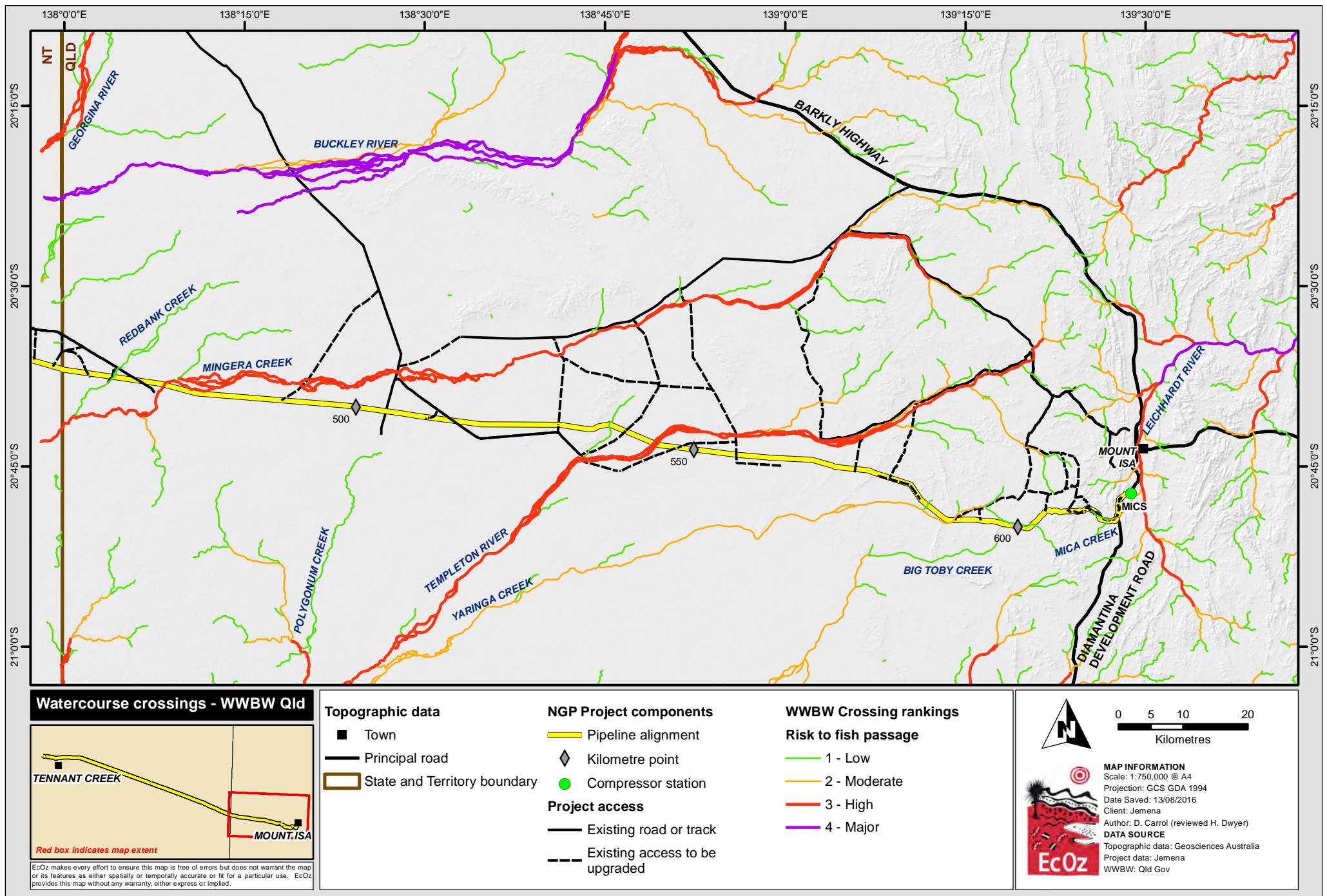
The requirements for waterway crossings are detailed in Appendix A.

Under the Queensland Environmental Authority works must also be undertaken in accordance with *Activities in a watercourse, lake or spring associated with a resource activity or mining operation* guideline (DNRM 2012).

Objective: Minimise impacts to surface water flows as a result of watercourse crossings

Management actions		Monitoring	Performance indicators	Corrective actions
No water is to be extracted from watercourses.		Regular environmental audits. Climate data monitoring. Recording of quantity and location of spoil and vegetation removal and disposal. Post disturbance inspections as per ESCP. Pre, during and post disturbance survey and photographs in Queensland. Water monitoring as per Section 6.2.2.	All controls and devices in Erosion and Sediment Control Plans installed. Turbidity downstream of watercourse crossings does not exceed approval conditions. All works compliant with relevant codes and approvals. Watercourse crossings reinstated and stabilised following works. No fish kills or barriers to fish passage in watercourses.	Reinstatement works and/or further erosion and sediment control works. Incident investigation. Review and amendment of ESCP as required. Amend crossing design to minimise impacts.
Any construction water sourced from surface water is to be sourced from approved sources.				
An exclusion zone will be established 100m either side of a watercourse; only linear construction activities to be undertaken within the exclusion zone.				
Watercourse crossings will be undertaken firstly, in times when there is no water present, secondly, in times of no flow, and thirdly, in times of flow, but in a way that does not impede low flow.				
Pre-construction assessment of all watercourse crossings will be undertaken, and specific management identified in Progressive ESCP to minimise disturbance of banks and time of disturbance.				
Crossing work will be completed promptly and beds and banks reinstated and stabilised as soon as possible following completion of works to minimise duration of disturbance. Crossings will be reinstated to as close to pre-disturbance condition as practicable.				
Information on the nature, location, extent and timing of watercourse crossings works in the Northern Territory will be submitted to DLRM prior to works commencing.				
If watercourse flows commence during works in the Northern Territory a <i>Permit to Construct or Alter Works</i> will be sought from DLRM.				
All crossings in Queensland will be undertaken in accordance with the <i>Code for Temporary Waterway Barrier Works</i> and the <i>Activities in a watercourse, lake or spring associated with a resource activity or mining operation</i> guideline (see Appendix A).				
Trenches to be perpendicular to watercourse crossing where possible and select shortest possible distance across watercourse.				
Trenches to be constructed as per ESCP to minimise erosion and sediment risks				
Reinstate watercourse crossings as soon as possible after construction of crossing is complete to minimise duration of disturbance.				
Weather conditions to be monitored and, if rain is predicted, watercourse crossing works to cease until erosion and sediment controls and flow diversion systems are installed.				
Recording and	Water quality monitoring database			

Management actions		Monitoring	Performance indicators	Corrective actions
reporting	Temporary Waterway Barrier Works Code pre and post disturbance advice sheet to Fisheries Queensland Regular audits			
Responsibility	Project Manager – Waterway Barrier Works Code requirements Construction Manager – Works in accordance with ESCP Construction Environmental Manager – Monitoring and reporting of results Environmental Auditor – regular audit			



Path: Z:\01 EcOz Documents\04 EcOz Vantage GIS\JEMENA\EIS (NT)\01 Project Files\Ch7-EMP\Water\Figure 4-1. Map of construction ROW and WWBW Qld.mxd

Figure 5-1. Map of construction ROW and waterway barrier works crossings in Queensland

5.6 Drawdown of groundwater

Objective: No change in groundwater quantity as a result of extraction for construction sources

Management actions		Monitoring	Performance indicators	Corrective actions
Source water from existing bores where possible.		Monitoring of standing water levels in bores used for construction prior to, during and immediately following extraction. Water extraction volumes. Water use volumes.	No change between pre-construction and post-construction water levels in bores used for water sources. Hydrostatic water is reused to minimise demand.	Investigate demand volumes and sources to identify opportunities for improved efficiency.
Obtain all relevant approvals and landholder or water supplier agreements for groundwater extraction.				
Any new bores will be constructed by a driller licenced under the Water Act (NT). New bores will be pump tested to determine sustainable yields.				
Source groundwater from higher yielding aquifers to reduce load on low yield aquifers.				
Manage water to minimise waste and maximise reuse, reducing overall demand.				
Prior to extraction, determine sustainable yields from all groundwater sources, and use this information to inform groundwater extraction locations and volumes.				
Prior to construction, collect a snapshot of water levels in existing bores that will be used to provide comparison data for water levels post extraction.				
Identify and map the location of permanent pools in the Ranken, James and Georgina rivers in relation to the construction ROW crossings.				
Undertake a groundwater risk assessment prior to construction of camps or dams in areas overlying limestone and dolomite aquifers to determine connectivity with underlying groundwater.				
Target non-potable groundwater for construction purposes.				
Conduct consultation with community members and landholders for most appropriate water sources.				
Recording and reporting	Internal water extraction and use records Approvals documentation from Northern Territory and Queensland Governments Landholder agreements for water extraction			
Responsibility	Project Manager – required approvals and licences Construction Manager- groundwater risk assessment Construction Environmental Manager – recording and reporting of water extraction volumes and use			

Note that trenching will be to an average maximum depth of 1,500 mm below the natural ground surface and no deep underground activities will occur. The majority of groundwater aquifers underlying the pipeline alignment and ancillary infrastructure are deep, which reduces the potential impact on those resources. Limestone and dolomite aquifers are mapped underlying some areas of the construction footprint. These aquifers and overlying sandy soils are highly porous and may also be associated with sinkholes and are addressed in Sections 5.1 and 5.4.

It is not expected that new bores will be drilled for the construction phase of the Project; however if new bores are required, the following controls will be implemented to minimise potential impacts to drawdown of groundwater:

- the location and depth of new bores is to be determined in consultation with the landholders, considering available groundwater resources, existing infrastructure, distances to watercourses, and potential ground-surface water interactions. No new groundwater bores will be drilled within 100 m of existing groundwater bores, or in shallow groundwater resources in the vicinity of creeks and rivers with permanent pools.
- new bores will not be constructed in shallow groundwater resources in the vicinity of rivers and creeks
- bores will be drilled and constructed according to industry standards and by a water bore driller licenced under the Water Act (NT)
- pump test any new bores to determine sustainable yields.

5.7 Water storage

Hydrostatic test water and construction water will be stored in up to eight dams along the construction ROW, with a capacity of 12 ML each.

Water for the dams will be sourced from hydrostatic test water and additional approved sources along the construction ROW (as per the Water Availability Study – Appendix N).

The consequence of all dams will be assessed in accordance with the Queensland *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (DEHP 2013). A consequence assessment report will be prepared for each dam in Queensland and submitted to DEHP, and all structures will be certified as required under the guidelines. This will be completed by the constructors progressively throughout the construction phase.

Objective: Dams to be constructed and managed to minimise impacts on existing environment

Management actions	Monitoring	Performance indicators	Corrective actions
The consequence category of dams will be assessed in accordance with the Qld Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (DEHP 2013) prior to design and construction. Only low consequence dams will be constructed.	Regular environmental audits. Water quality monitoring as per Section 6.2.5. Dust suppression volume records. Monitoring as per ESCP.	No unauthorised release of water from dams or sediment basins.	Maintain and upgrade dams as required. Amend ESCP or implement remediation/rectification works as required to maintain stable landform for reinstated dams.
Dams will be designed by a suitably qualified engineer to ensure hydraulic and structural integrity.		Water quality to meet guideline values as per 6.2.5.	
Water storage dams will be engineered to accommodate projected quantities, and to include sufficient free board to accommodate additional filling during rainfall events.		No erosion or failure of dam structures.	
Dams will be designed such that the risk of failure (seepage or overtopping) or dam break is low.		Once no longer required, dams to be reinstated to a stable landform appropriate to surrounding environment unless required	
Dams will not be constructed in or near sensitive environments. The dams will be designed such that the consequence of failure of the dam would not result in: <ul style="list-style-type: none"> impacts to locations where people are routinely present contamination of water used for human consumption 			

Management actions		Monitoring	Performance indicators	Corrective actions
<ul style="list-style-type: none">• release of potential contaminants to areas of Significant Values or Moderate Values• impacts to environmental values of slightly to moderately disturbed waters, wetlands of ecological significance, riverine areas, springs or lakes.			for landholder’s beneficial use.	
Water in sediment basins will be tested prior to reuse or release as per ESCP.				
Dams to be constructed under agreements with landholders or occupiers.				
Dams to be monitored for signs of structural or hydraulic integrity loss.				
Water quality in dams will be sampled prior to dewatering.				
Dams to be backfilled and reinstated upon completion, unless landholders have requested they remain. Any dams to remain permanently will be inspected prior to handover to ensure they are fit for proposed future use.				
Recording and reporting	Engineered designs Consequence assessment reports in Queensland Water quality data ESCP inspection checklists Rehabilitation reports Regular audits			
Responsibility	Project Manager – landholder agreements Construction Manager – design, consequence assessment reports, construction and reinstatement Environmental Manager – monitoring and reporting Environmental Auditor – regular audits			

6 WATER MONITORING PROGRAM

6.1 Sampling methods

Any surface water sampling undertaken for the Project will be in accordance with:

- AS/NZS 5667.1:1998, *Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*
- AS/NZS 5667.6:1998, *Water Quality Sampling - Part 6: Guidance on sampling of rivers and streams*
- ANZECC & AMRCANZ 2000, *Australian Guidelines for Water Quality Monitoring and Reporting*,
- ANZECC & AMRCANZ 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*
- Australian Pipeline Industry Association (2013) *Code of Environmental Practice*
- Queensland Government *Queensland Water Quality Guidelines 2009* (DEHP 2009a)
- Queensland Government, *Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2009* (DEHP 2009b)

Inspections of erosion and sediment controls will be in accordance with:

- International Erosion Control Association (IECA 2008), *Best Practice Erosion and Sediment Control Guidelines 2008*, and associated standard drawings

All internal inspections will be undertaken in accordance with the Construction Contractor's environmental management and monitoring system.

All monitoring is to be undertaken by a suitably qualified person. All laboratory samples will be submitted to a National Association of Testing Authorities (NATA) accredited facility for analysis.

6.2 Monitoring

6.2.1 Pre-construction monitoring

A watercourse crossing assessment was undertaken for major watercourses (stream order 3+) intersected by the construction ROW as part of the threatened species surveys for the EIS (refer to Watercourse Crossing Survey Report in Appendix K). In the Northern Territory, the assessment was undertaken in May 2016, and included an aerial survey of the crossings and stream sections immediately upstream and downstream, and on-ground assessment of the watercourse crossing to describe the beds, banks, riparian condition and bed and bank profiles. Signs of permanent pools, springs or groundwater dependent ecosystems were also assessed, although this was limited as many of the watercourses contained water at the time of survey (the survey coincided with a period of rainfall).

Further, more detailed investigations of watercourse crossings will be undertaken prior to construction to inform the Progressive ESCP and also provide further insight into the location of permanent pools in relation to the construction ROW. Soil landscape mapping and soil surveys will also be undertaken to inform the Progressive ESCP and specific management plans for any problematic soils identified.

The Progressive ESCP will contain specific construction methodologies to minimise impacts to watercourses as a result of construction, and provide specific reinstatement and rehabilitation criteria. Refer to the Primary ESCP (Appendix P of the EIS) for details of the ESCP process and future plans.

Prior to extraction of any construction water, standing water levels will be measured in all water supply bores to be used during the construction phase. This will provide a baseline data set for comparison of post-construction standing water level data.

The source water for hydrostatic test water will be sampled and analysed for parameters relevant to hydrostatic testing to inform the Hydrostatic Test Management Plan.

6.2.2 Watercourse crossings

Construction will be timed for periods of no flow or low flow. Where there are no flows, no water quality monitoring will be undertaken.

If there is water flowing at the time of the watercourse crossing, water samples will be collected upstream and downstream of that crossing. This will allow comparison of water quality results from an undisturbed site (upstream) and a disturbed site (downstream). Samples will be collected just prior to, during and after construction from the same two sites. Sample collection will be undertaken in accordance with the *Queensland Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2009* (DEHP 2009b) and will be consistent with relevant Australian Standards and ANZECC Guidelines.

In addition to water quality monitoring, physical condition monitoring will be undertaken as part of the weekly inspection checklist. Photographs will also be collected at each watercourse crossing at points upstream, downstream and within watercourse crossing construction area (as stipulated in Appendix A).

The monitoring program is summarised in Table 6-1 below.

Table 6-1. Watercourse crossing monitoring program

Monitoring type and sites	Sites	Frequency	Measurements/Analytes
Water quality All major watercourse crossings identified in Figure 3-2. Only when water is flowing	Upstream: One site 20m upstream of construction zone Downstream: One site 20m downstream of construction zone	Pre-construction: Once prior to any disturbance During construction: Weekly field measurements One laboratory sample event Post construction: Once post construction, following reinstatement of bed and bank	Field measurements and observations: <ul style="list-style-type: none"> Stream flow rate (visual estimate). Records to indicate whether flowing or pooling water is present. Temperature, pH, oxidation-reduction potential (ORP), electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO) and turbidity. Laboratory analyses: <ul style="list-style-type: none"> Total suspended solids (TSS) Major anions (Cl, SO₄, CO₃/HCO₃, and NO₃) and cations (Ca, Mg, Na and K) Dissolved metals (Al, As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Zn and Fe) Ammonia and nutrients (NO₂, NO₃, TKN, Total N and Total P) Hydrocarbons (TPH and BTEXN)
Physical condition: All major watercourse crossings identified on Figure 3-2. To be conducted	Upstream: One site 20m upstream of disturbed construction zone In Construction ROW:	Pre-construction: Once prior to any disturbance During construction: Daily	Stream condition: <ul style="list-style-type: none"> Presence/absence of water Presence/absence of erosion or sedimentation Vegetation condition, extent of clearing within construction ROW Presence/absence of pollution (rubbish,

Monitoring type and sites	Sites	Frequency	Measurements/Analytes
for every crossing, regardless of flow.	<p>One site within construction disturbance area</p> <p>Downstream: One site 20m downstream of disturbed construction zone</p>	<p>Post construction: Once post construction, following reinstatement of bed and bank</p>	<p>waste, surface scum or sheen, soil staining)</p> <ul style="list-style-type: none"> • Presence/absence of weeds • Signs of discharges to watercourse • Record of location and treatment of spoil and cleared vegetation • Ensure buffer in place – only linear construction activities within 100m of watercourse • Photographs at each location at angles stipulated in Appendix A.

The hydrology of the region is characterised by ephemeral to intermittent watercourses which flow seasonally depending on rainfall, and this results in significant variation in the volume of flows and water quality. As outlined in Section 3.2.4 the QWQG and ANZECC Guidelines are not directly applicable to the watercourses crossed by the construction ROW due to lack of data and significant variation in flow volumes and water quality (DEHP 2009a). Additionally, caution should be used in applying the ANZECC Guidelines, which provide default guideline values for the regions of Australia, as they do not account for the fluctuations in water quality associated with the ephemeral watercourses of the region. Guideline values for watercourse crossing monitoring are therefore not provided, and water quality will be compared between upstream and downstream sites:

- a variation of +/- 10 % between upstream and downstream water quality will be considered acceptable
- >10 % will trigger investigation into the cause of this variation
- >25 % will trigger an internal incident report
- >50 % variation from upstream to downstream sites will trigger reporting to the NT EPA

6.2.3 Sediment basins

The majority of works will be completed during the dry season when the chance of rainfall is low. In the Northern Territory, camps will be constructed with a focus on drainage and erosion controls, and no sediment basins will be installed unless the timing of works changes such that camps will be constructed during the wet season.

In Queensland sediment basins are required for sites with a total estimated soil loss rate > 150 tonne per annum, or if disturbed areas are greater than 1 ha (DERM 2010; DEHP 2009a). As such a sediment basin will be installed in the Queensland camp, and will be engineered and designed according to the relevant guidelines (refer to the Primary ESCP – Appendix P). The sediment basin will only contain water if rainfall occurs, and monitoring will be undertaken weekly when water is present. The monitoring program is outlined in Table 6-2 below.

Table 6-2. Sediment basin monitoring program

Monitoring type and sites	Sites	Frequency	Measurements/Analytes
<p>Water quality Sediment basins at each camp</p>	<p>Inlet: One site at inlet to basin</p>	<p>Prior to release to land Only when water is present</p>	<p>Field measurements and observations:</p> <ul style="list-style-type: none"> • pH • Turbidity <p>Laboratory analyses:</p>

Monitoring type and sites	Sites	Frequency	Measurements/Analytes
	Outlet: One site at outlet to basin		<ul style="list-style-type: none"> • TSS
Physical condition: Sediment basins at each camp	Entire basin Including inlets, outlets and banks	Weekly Regardless of water level	Basin condition: <ul style="list-style-type: none"> • Presence/absence of water • Whether basin is overflowing • Presence/absence of erosion or sedimentation of banks, inlet or outlet • Capacity of basin (sediment accrued) • Presence/absence of pollution (rubbish, waste, surface scum or sheen, soil staining), algae or odour • Presence/absence of weeds

Guideline values for water quality data are provided in Table 6-3, and are based on the Queensland *Stormwater Guidelines* (DEHP 2014) and Queensland *Technical specification: Transport and Main Roads Specification MRTS52 Erosion and Sediment Control* (DTMR 2015).

Table 6-3. Water quality guideline values for sediment basins for release to land

Parameter	Unit	Guideline value
Sediment basins		
pH	NA	6.5-8.5
Turbidity	NTU	< 75
Total suspended solids	mg/L	< 50

6.2.4 Hydrostatic test water

The quality of hydrostatic test water is largely dependent on the quality of source water. In order to minimise impacts to the pipe infrastructure, source water quality will be analysed for a number of parameters including salinity and sulfate reducing bacteria (see Table 6-4). The source water quality will inform whether additives are needed. Additives that may be added are biocides and anti-corrosion additives; the need for these will be determined prior to construction and included in the Hydrostatic Test Management Plan.

Following completion of each hydrostatic test section the water will be piped, or transported by water cart, to low consequence dams for storage and reuse in the next test section. Discharge of hydrostatic test water in the Northern Territory will require a Waste Discharge Licence (WDL) from the Northern Territory Environmental Protection Authority (NT EPA). The licence will be sought prior to discharge and conditions of discharge will be negotiated with the NT EPA. Any additional monitoring requirements or water quality guideline values stipulated in the WDL will be incorporated into the monitoring program, and outlined in the Hydrostatic Test Management Plan. Discharges in Queensland will be in accordance with the requirements of the Queensland EA (which are summarised in Table 6-5).

Prior to discharge, hydrostatic test water will be sampled and analysed as per Table 6-5. No hydrostatic test water will be discharged until sampling has occurred and results have been compared to guideline values. If the guideline values are met then water will be discharged to land at approved locations, and in a manner that minimises erosion and scour (refer to the ESCP).

If guideline values are exceeded then water treatment will be undertaken as required, or the water will be pumped to a purpose built evaporation pond for disposal via evaporation.

Table 6-4. Monitoring parameters and guideline values for hydrostatic source water

Parameter	Unit	Guideline value
Electrical conductivity	µS/cm	3, 000
pH	NA	>6, <9
Sodium absorption ratio (SAR)	NA	8
Sulfur reducing bacteria (SRB)	NA	_*
Total aluminium**	mg/L	20
Total arsenic	mg/L	2
Total cadmium	mg/L	0.05
Total chromium	mg/L	1
Total copper	mg/L	5
Total iron	mg/L	20
Total lead	mg/L	5
Total manganese	mg/L	10
Total mercury	mg/L	0.002
Total nickel	mg/L	2
Total zinc	mg/L	5

**SRB will be analysed to provide background data for comparison of post-hydro-test water and assess whether additives will be required.*

***Total metal guidelines are from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 ("the ANZECC Guidelines") for primary industry, short term trigger values for irrigation water (see Table 4.2.10 of the ANZECC Guidelines).*

Table 6-5. Hydrostatic test water monitoring parameters and guideline values

Parameter	Unit	Guideline value
Electrical conductivity	µS/cm	3, 000
pH	NA	>6, <9
SAR	NA	8
Toxicants (metals) as per Table 6-4	mg/L	ANZECC Guidelines for primary industry, short term trigger values for irrigation, Or site specific guideline values from WDL based on source water quality

Note that if biocides are used the discharge water will be sampled for relevant potential contaminants, depending on the type of biocide added. Biocides will only be used if source water quality deems that they are necessary to protect the pipe infrastructure, and residual impacts and toxicity will be considered when selecting the biocide to be used. Should biocides be added, negotiations will be undertaken between the proponent and the NT EPA and Qld DEHP to develop specific guideline values and requirements for discharge, or disposal of water via evaporation ponds.

6.2.5 Water storage dams

Up to eight 12 ML low consequence water storage dams will be constructed to store hydrostatic test water and other construction water. Upon completion of construction, the water will be discharged to land and the dams will be backfilled and reinstated, unless they are to remain for the benefit of the landholder. If the landholder requests that the dam remains, it will be sampled for the analytes in Table 6-6 and any other additional parameters requested by the landholder to ensure that the water quality is suitable for the intended ongoing use.

If dams will be dewatered and reinstated then the water will be sampled, analysed and managed in accordance with Section 6.2.4, as the dams will be storing hydrostatic test water.

Table 6-6. Water storage water monitoring program

Monitoring type and sites	Sites	Frequency	Measurements/Analytes
Water quality	One site at outlet to basin	Once prior to handover to landholder	Field measurements and observations: <ul style="list-style-type: none"> • pH • Electrical conductivity Laboratory analyses: <ul style="list-style-type: none"> • Metals (Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn, Hg) • Sodium Absorption Rate

The analytes listed above are based on the potential contaminants from hydrostatic testing. Any additional requirements from the landholder will be added based on their requests. Water quality guidelines will be as per Table 6-5, with additional parameters assessed against the ANZECC guidelines for primary industries.

6.2.6 Wastewater

Wastewater treatment of ablutions and camp kitchen waste will be undertaken on-site at each respective camp. Treatment of sewage and onsite disposal via irrigation will require approval from NT DoH. The NT *Guidelines for Wastewater Works Design Approval* (DoH 2013) stipulate the classes of wastewater management based on a risk assessment. The camp wastewater systems are categorised as a “Class C” system (medium risk) and appropriate end uses include irrigation with enhanced restricted access and application. Monitoring requirements and analytes presented in Table 6-7 have been developed based on the guidelines and the assumption that the systems will be a “Class C”. Any additional requirements from the DoH approvals process will be incorporated into the monitoring program outlined in Table 6-7.

Washdown bays will be a closed loop, with water recycled through the system. As such no discharge from washdown bays will occur and no monitoring will be undertaken.

Table 6-7. Camp wastewater monitoring program

Monitoring type and sites	Sites	Frequency	Measurements/Analytes
Validation and verification monitoring			
Influent	One site at inlet of influent into treatment system (prior to treatment)	Weekly For a period of 12 weeks following commission of the treatment plant to validate treatment	Field measurements and observations: <ul style="list-style-type: none"> • pH • Volume of water treated and irrigation rate Laboratory analyses: <ul style="list-style-type: none"> • <i>E. coli</i>
Treated effluent At outlet feeding irrigation infrastructure	One site at outlet to irrigation area (after treatment, prior to irrigation)	Weekly For a period of 12 weeks following commission of the treatment plant to validate treatment	Field measurements and observations: <ul style="list-style-type: none"> • pH • Chlorine residual • Presence/absence of pooling water, vapour, mist • Presence/absence of erosion • Vegetation condition within irrigation area • Photographs of irrigation area • Restricted access in place, signage and system installed as per DoH 2013 Laboratory analyses: <ul style="list-style-type: none"> • Biological oxygen demand (BOD) • TSS • <i>E. coli</i>
Operational monitoring – for duration of operation of system			
Treated effluent At outlet feeding irrigation infrastructure	One site at outlet to irrigation area (after treatment, prior to irrigation)	Regular	Field measurements and observations: <ul style="list-style-type: none"> • Volume of water treated and irrigation rate • Presence/absence of pooling water, vapour, mist • Presence/absence of erosion • Vegetation condition within irrigation area • Photographs of irrigation area Laboratory analyses: <ul style="list-style-type: none"> • TSS • <i>E. coli</i>
		Continuous (online) or weekly	Field measurements: <ul style="list-style-type: none"> • pH • Chlorine residual

**Validation that the wastewater treatment system works according to design is required by DoH. The details of validation monitoring will be confirmed with DoH prior to the installation of the system.*

Guideline values provided in Table 6-8 are from the *Guidelines for Wastewater Works Design Approval* (DoH 2013) and will be reviewed and informed by approval documents and associated monitoring requirements as required.

Table 6-8. Effluent wastewater treatment quality guidelines

Parameter	Unit	Guideline value
pH	-	6.5-8.5
Free chlorine	mg/L	0.2-2
Biological oxygen demand	mg/L	< 20
Total suspended solids	mg/L	< 30
E.coli	CFU/100mL	< 100

6.2.7 Potable water

Potable water will be sourced from existing municipal supplies (Tennant Creek and Mount Isa) and other approved sources and trucked to camps. Potable water will be stored in tanks at each camp for consumption by workers. Monitoring will be undertaken for field parameters weekly, and laboratory parameters monthly (see Table 6-9).

Table 6-9. Potable water monitoring program

Sites	Sample point	Frequency	Measurements/Analytes
Camp Potable water storages	Outlet At outlet of potable water tank	Weekly	Field measurements: <ul style="list-style-type: none"> • Temperature, pH, ORP, EC, TDS, DO and turbidity • Chlorine residual (free and total)
		Monthly	Laboratory parameters <ul style="list-style-type: none"> • Microbiological parameters (E. coli, enterococci)

Potable water guideline values have been sourced from the *Australian Drinking Water Guidelines* (NHMRC 2011) and are presented in Table 6-10.

Table 6-10. Guideline values for potable water monitoring

Parameter	Unit	Guideline value (health, or aesthetic*)
Free chlorine	mg/L	> 0.5, <5
pH	mg/L	6.5-8.5*
E. coli	CFU/100 mL	<1
Enterococci	CFU/100 mL	<1

6.2.8 Groundwater

Pre-construction (i.e. pre-extraction) standing water levels will be assessed for all bores where groundwater extraction will occur for construction purposes. Standing water levels will be monitored during extraction to indicate the drawdown on the aquifer, and will be assessed again at the end of the construction phase. This will allow a comparison to pre-construction levels to provide information on the impact of groundwater extraction on standing water levels (if any). Standing water level data will be analysed in the context of natural seasonal variation, which may be informed by monitoring of standing water levels in nearby bores that are not used for Project water (i.e. establishing a control).

Records of water extraction volumes from each bore will be maintained by the Construction Contractor to monitor extraction volumes.

Additional groundwater quality monitoring will be undertaken if groundwater will be used for hydrostatic test water, in which case water will be sampled once and analysed as per Table 6-4 to determine the quality of source water.

6.2.9 General monitoring

General monitoring of construction areas will be undertaken to ensure compliance with this WMP and other associated management plans. Weekly inspection checklists will include the monitoring required to comply with this WMP, and will be developed prior to construction. Regular environmental audits will be conducted during construction to assess compliance with this WMP, and all other management plans.

6.3 Non-conformance and corrective actions

All monitoring and water quality data will be recorded in internal spreadsheets and compared to guideline values or performance indicators. Any non-conformance will be documented and reported in internal reports.

The severity of the non-conformance will determine the reporting requirements and remedial action. The Construction Manager should be notified of any non-conformance within 24 hours of its occurrence. Any occurrence which results in an unauthorised discharge to watercourses or has the potential to result in material or serious environmental harm must be reported to the Northern Territory EPA or Queensland Pollution Hotline.

The performance indicators stipulated in Section 5 provide the overarching indicators for the site, against which management methods can be assessed. If it is identified that the performance indicators are not being met, corrective actions must be implemented. Corrective actions are provided in Section 5 for each applicable management measure.

6.4 Review and audit program

Compliance with the management and monitoring measures outlined in the WMP will be monitored through:

- weekly environmental inspections undertaken by a Construction Contractor environmental representative
- routine water quality monitoring as outlined in Section 6.2
- regular audits undertaken by an environmental auditor
- pre-construction, construction and post-construction compliance audits against agreed commitments.

Findings of inspections and audits will be reported to project managers and, where relevant, regulators to ensure transparency of auditing and compliance with this WMP. Any issues identified during the inspections and/or audits will be corrected as per Section 6.3.

This WMP is an evolving document which will be reviewed and updated annually, or in response to changes to planned construction activities.

7 REPORTING AND INCIDENT RESPONSE

7.1 Reporting

All inspections, audits and monitoring data will be recorded in internal spreadsheets and compared to guideline values or performance indicators. Any non-conformance will be documented and reported in internal reports. The Construction Contractor will complete internal reports during the construction phase as per its Construction Environmental Management Plan. Additionally, an annual return including an Update Report will be submitted to Queensland DEHP outlining disturbance, reinstatement and rehabilitation, and monitoring activities, and providing details on all valid complaints.

The severity of the non-conformance or incident will determine the reporting requirements and remedial action. The Construction Manager should be notified of any non-conformance within 24 hours of its occurrence. Any occurrence which results in an unauthorised discharge to watercourses or has the potential to result in material or serious environmental harm must be reported to the Northern Territory EPA or Queensland Pollution Hotline.

The performance indicators stipulated in Section 5 provide the overarching indicators for the site, against which management methods can be assessed. If it is identified that the performance indicators are not being met, corrective actions must be implemented. Corrective actions are provided in Section 5 for each applicable management measure.

7.2 Incident management

For the purposes of internal company reporting, incidents include:

- unapproved release of any product, water or solid, to watercourses
- a spill of hazardous substance or fuel
- regulatory breaches
- any impacts to watercourses which are not an approved activity
- any release of untreated effluent
- a release of hydrostatic test water or water captured in sediment basins, trenches or washdown bays which does not comply with the guideline values stipulated in Section 6.2 of this WMP

Any occurrence of the above listed incidents will trigger an incident investigation to identify the causes and impacts of the incident and implement remedial actions to avoid reoccurrence.

In Queensland, the EA outlines the following events which would require reporting to the relevant authority, as relevant to this WMP:

- unauthorised release to land of 5,000 L of raw sewage or 10,000 L of treated sewage effluent
- unauthorised release to land of 200 L of hydrocarbons
- unauthorised release of any volume of prescribed contaminants to water (this includes earth – soil, silt, mud, sand – chemicals, liquids containing dissolved or suspended solids, liquids with a temperature difference of +/- 2°C from ambient water temperatures, animal matter, bulk wastes and construction wastes, oil and hydrocarbons, sewage and putrescible waste). Refer to the *Environmental Protection Regulation 2008, Schedule 9* for the full list.
- potential or actual loss of structural or hydraulic integrity of a dam
- monitoring results where two out of five consecutive samples do not comply with guideline values.

Emergency contact details for relevant Jemena contacts are provided in this EIS. These contact details will be displayed on signs around construction areas, including at camps and in crib huts, for use in the event of

an incident or emergency. Incidents will be reported to Construction Contractor's Construction Manager and Jemena, who are responsible for reporting the incident to the relevant authorities when required (see Section 7.2.1).

7.2.1 Incident reporting

Northern Territory

In the Northern Territory, the *Waste Management and Pollution Control Act* stipulates a Duty to Notify the NT EPA when an incident occurs which causes, or may cause, pollution resulting in material or serious environmental harm. This is referred to as a 'Section 14 Incident Report', and the incident must be reported to the NT EPA within 24 hours using the contact details listed in Table 7-1.

Table 7-1. Government incident reporting contacts

Contact	Contact Details
Northern Territory EPA Pollution Hotline/Pollution Reporting	Post: GPO Box 3675 Darwin NT 0801 Pollution Hotline: 1800 064 567 pollution@nt.gov.au Section 14 Incident Report Form: http://www.ntepa.nt.gov.au/waste-pollution/compliance/incidents

Queensland

Condition G9 of the EA requires that the administering authority be notified, via the Pollution Hotline and in writing, within 48 hours of any of the events listed in Section 7.2 above. In addition, the *Queensland Environmental Protection Act 1994* provides for a duty to notify the administering authority and landholder or occupier when an incident occurs that may have caused serious or material environmental harm. This notification must be within 24 hours of the incident. Refer to the *Duty to Notify of Environmental Harm Guideline*. Relevant contact details are provided in Table 7-2.

Table 7-2. Government incident reporting contacts - Queensland

Contact	Contact Details
Queensland Pollution Hotline	1300 130 372 pollutionhotline@ehp.qld.gov.au
Queensland Department of Agriculture and Fisheries	13 25 23 www.daf.qld.gov.au
Queensland Fisheries (for Temporary Waterway Barrier Works)	Northern Fisheries Facility – Cairns Department of Agriculture, Fisheries and Forestry Manager (Planning and Assessment) PO Box 5396, Cairns Qld 4870 Email: idasnfc@daff.qld.gov.au Telephone: (07) 4057 3700

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9 GLOSSARY, ACRONYMS & ABBREVIATIONS

AMRCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ANZECC	Australian and New Zealand Environment and Conservation Council
APGA	Australian Pipelines and Gas Association (see also APIA)
APIA	Australian Pipeline Industry Association (see also APGA)
AS	Australian Standard
BOD	Biological oxygen demand
BoM	Bureau of Meteorology
DEHP	Department of Environment and Heritage Protection (Qld)
DO	Dissolved oxygen
DoH	Department of Health (NT)
DLRM	Department of Land Resource Management (NT)
DNRM	Department of Natural Resources and Mines (Qld)
EA	Environmental Authority
EC	Electrical conductivity
EIS	Environmental Impact Statement
EMS	Environmental Management System
EP	Equivalent Persons as defined under section 3 of the Planning Guidelines For Water Supply and Sewage 2005.
EPP (Water)	Environmental Protection (Water) Policy
ERA	Environmentally relevant activity
ESCP	Erosion and Sediment Control Plan (s)
EVs	Environmental values
GDE's	Groundwater dependent ecosystems
ha	hectare
HEVs	High Ecological Value waters
HPW	Department of Housing and Public Works (Qld)
ISO	International Organisation for Standardisation
KL	kilo litres
KP	Kilometre point
L/s	litres/second
mBGL	metres below ground level
MCD	McConnell Dowell
mg/L	milligrams/litre
ML	mega litres
NATA	National Association of Testing Authorities, Australia
NGP	Northern Gas Pipeline
NT	Northern Territory
NT EPA	Northern Territory Environmental Protection Authority
NZS	New Zealand Standard
ORP	Oxidative redox potential
Qld	Queensland
QWQG	Queensland Water Quality Guidelines

ROW	Right Of Way
SOCs	Sites of Conservation Significance
SDS	Safety Data Sheet
TDS	Total Dissolved Solids
ToR	Terms of Reference
TSS	Total Suspended Solids
WCD	Water Control District
WDL	Waste Discharge Licence
WMP	Water Management Plan
WQO	Water Quality Objectives

Glossary

Biological integrity	Of water means the water's ability to support and maintain a balanced, integrative, adaptive community of organisms having a species composition, diversity and functional organisation comparable to that of the natural habitat of the locality in which the water is situated (as defined in the EPP (Water); Qld Government 2014).
Camp runoff	Surface water runoff from camp disturbed areas; to be directed to sediment basins.
Construction footprint	Proposed footprint for construction including construction ROW, facilities, access roads, ancillary infrastructure and camps.
Construction ROW	30m wide corridor within which the pipeline construction will occur.
Ephemeral	Watercourses or wetlands which are dry for the most of the year and flow, or fill, only immediately following rainfall.
Floodout	An area where a drainage channel becomes subdivided, indistinct or disappears completely and water is dispersed across a plain (as defined by Duguid et al. 2005).
Highly disturbed waters	Waters where 'the biological integrity of an aquatic ecosystem is measurably degraded and of lower ecological value than waters' defined above (as defined in the EPP (Water); Qld Government 2014).
High ecological value water	Waters where 'the biological integrity of an aquatic ecosystem is effectively unmodified or highly valued' (as defined in the EPP (Water); Qld Government 2014).
Hydrostatic testing	The process of pressure testing pipelines with water to verify strength and test for leaks. Usually undertaken on pipelines at the completion of backfill operations.
Intermittent	Watercourses or wetlands which are alternatively wet and dry. They usually flow annually but cease to flow for weeks or months of each year. Intermittent streams can contain permanent pools of water which sustain life during dry periods.
Lacustrine (as in wetlands)	Large, open, water-dominated systems >8ha in size. Usually lakes and can include modified or artificial (i.e. man-made) weirs and dams (DEHP 2016).
Low consequence dam	As defined in the Queensland <i>Manual for Assessing Consequence Categories and Hydraulic Performance of Structures</i> (DEHP 2013), a low consequence dam is one that is: <ul style="list-style-type: none"> • In a location that people are not routinely present in the failure path and loss of life is not expected • In a location such that contamination of surface and/or groundwater used for human consumption could affect the health of less than 10 people • In a location where contaminants are unlikely to be released to areas of Significant Values or Moderate Values • Or contaminants may be released to those areas but would be unlikely to meet any of the minimum thresholds

	<ul style="list-style-type: none"> • Third party assess in the failure path of would be expected to require less than \$1million in rehabilitation, compensation, repair or rectifications costs.
Moderately disturbed water	Are waters where 'the biological integrity of an aquatic ecosystem is adversely affected by human activity to a relatively small but measurable degree' (as defined in the EPP (Water); Qld Government 2014).
Palustrine (as in wetlands)	Primarily vegetated non-channel environments of <8ha in size. They include billabongs, swamps, bogs, springs and soaks (DEHP 2016).
Perennial	Permanently flowing water courses, or those that flow for the majority of the time except in extremely dry years. In relation to wetlands, perennial refers to those that hold permanent water, although water levels may fluctuate depending on the season.
Pre-fill	A small volume of water used to flush the hydrostatic test section prior to testing.
Project	The Northern Gas Pipeline project
Ramsar	International convention for the conservation and use of wetlands and their resources. Internationally significant wetlands are identified under this treaty, usually based on the ecological significance for species such as waterbirds or fish.
Riverine (as in wetlands)	All wetlands and deep water habitats within a channel which may periodically or continuously contain moving water (DEHP 2016).
Sediment basin	Basin constructed for the purposes of capturing runoff from areas disturbed as a result of construction activities. Basins are sized to hold water, allowing for the settling of suspended sediment matter. To be designed by a suitably qualified engineer and in accordance with the IECA Guidelines.
Slightly disturbed waters	Waters where 'the biological integrity of an aquatic ecosystem has effectively unmodified biological indicators, but slightly modified physical, chemical or other indicators' (as defined in the EPP (Water); Qld Government 2014).
Subterranean (as in Groundwater Dependent Ecosystems)	Underground caves containing water. Includes karst (carbonate) landscapes which often contain sinkholes and springs (DEHP 2016).
Watercourse	A body of water flowing in a particular direction (though not necessarily continuously), with a defined channel, bed and banks, including drainage lines, creeks and rivers.
Waterway	In relation to Queensland Waterway Barrier Works a watercourse that provides fish passage.
Wetland	Areas of permanent or temporary surface water or waterlogged soil. They may be dry for extended periods but waterlogging or inundation reoccurs for a sufficient duration that they provide aquatic habitat (as defined by Duguid et al. 2005).

Appendix A. Code for Self-assessable Development Temporary Waterway Barrier Works

In accordance with the code, the general management requirements which will be implemented for the waterway crossings in Queensland are as follows:

- All works areas must be open for inspection by Fisheries Queensland to monitor compliance. Fisheries Queensland may inspect the site after they have received pre-works advice, during works, and up to 10 business days after completion of works (defined as when Fisheries Queensland receive the post-works advice)
- All effort must be made to minimise impacts to the waterway including:
 - The dimensions of the temporary barrier are limited to the minimum practicable
 - Disturbance to the instream bed and bank sediment must be minimised
 - If vegetation must be removed, it must be cut no lower than ground level to retain the root system. Excavation and removal of vegetation roots can only be undertaken within the construction footprint
- Erosion and sediment controls plans must be devised for the works, in accordance with the *Best Practice Erosion and Sediment Control Guidelines* (IECA 2008), to minimise impacts on water quality
- No works can be commenced during times of elevated flows (above no-flow or base flow conditions)
- Fish kills must be minimised through application of best practice environmental management. Any fish trapped (e.g. upstream of the barrier) which show signs of distress must be managed as per the *Fish Salvage Guidelines*. Fish kills must be reported to the Fish Kill Hotline (1300 130 372)
- On completion of works, all waterway barrier material must be removed from the waterway and be disposed of at least 50 m away from the waterway
- Waterways must be restored and rehabilitated so that:
 - The profiles of the banks and bed are reinstated to the natural stream profiles **within five business days of completion of works**
 - The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency
 - Vegetated and cover is rapidly re-established using native local species

A pre-work and post-works notification must be submitted to the Department of Fisheries as per the form in the Code. This includes providing a map of the location of works and site photographs for each crossing. As a number of crossings will be undertaken, single pre and post-works notifications may be submitted detailing all works. These must be submitted 20 days prior to commencement of the first crossing, and 15 days following completion of the final crossing respectively.

Each works area must be signed while works are being undertaken:

- At least one sign must be erected closest to the works site
- Sign must be 500 mm by 500 mm and state "Operational works conducted under Fisheries Queensland self-assessable code. Call 13 25 23."

Signs must be removed within 48 hours of completion of works.

Code for self-assessable development

Temporary waterway barrier works

Code number: WWBW02 April 2013

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Version history

Version	Date	Comment
1	September 2010	
2	January 2013	<p>This version accompanies the GIS layer <i>Queensland Waterways for Waterway Barrier Works</i>.</p> <p><u>Key revisions:</u></p> <p>2 (incorporation and interpretation of waterway zones) 3 (definitions of waterway, temporary barrier and works) 4.6 (<i>now 5.1.26</i>) (wording on signage) 5.1 (<i>now 5.2.1, 5.3.1</i>) (duration of works) 5.2 (<i>now 5.1.2</i>) (size of barrier) 5.8, 5.9 (<i>now 5.1.6</i>) disturbance to marine plants</p> <p><u>Deletions:</u></p> <p>5.3, 5.5 (distance between barriers) 5.4 (ponded water)</p> <p><u>Additions:</u></p> <p>5.1.1 (sites must be open for inspection) 5.1.21 (notification for emergency works) 5.1.29 (no signage requirement for Main Roads or emergency works) 5.2 (works in grey (tidal) zones) 5.3 (works in purple and red waterways) 5.4 (works in amber and green waterways) 6 (revised details) 7 (expanded glossary) 8 (revised notification forms) Figures Appendix 1 Appendix 2</p>
3	April 2013	5.1.8 (exception for emergency temporary works)

1 Introduction

- 1.1 Most Australian native fish move along waterways as part of their life cycle. Fish movement along both small and large freshwater and estuarine waterways is vital for all native fish species including important recreational and commercial fishing species. Waterway barriers that slow or prevent fish movement have the potential to impact both on commercial and recreational fisheries production and the health, distribution and populations of native fish.
- 1.2 This code is prepared under the *Sustainable Planning Act 2009* (SPA) and *Fisheries Act 1994*. Under the SPA, the construction or raising of temporary or permanent waterway barriers and the disturbance of marine plants are classed as development. The work is operational work¹ and for the purposes listed in the code, the SPA provides that the work covered by the code is self-assessable development.
- 1.3 Under the Sustainable Planning Regulation 2009 (SPR) and the Fisheries Regulation 2008, this code is an applicable code for operational work made self-assessable under SPA².
- 1.4 Self-assessable development must comply with an applicable code. The developer³ is responsible for ensuring the proposed development will comply with this code before proceeding.
- 1.5 Codes are reviewed periodically and may be amended, so the most current version should be used. These are available from the website (www.fisheries.qld.gov.au) or call 13 25 23.
- 1.6 Where the development proposal cannot meet the requirements of the relevant code, an application for a development permit must be lodged.
- 1.7 This self-assessable code is a technical guide to assist individuals and organisations in undertaking minor waterway barrier works that meet legislative and policy requirements under the Fisheries Act⁴.
- 1.8 To assist in the interpretation of this self-assessable code, a glossary is provided in section 7 of this document.

¹ See section 22(2) of the Fisheries Act and the SPA, section 10

² See the SPR, schedule 3, part 2, table 4, item 2(a) and Fisheries Regulation 2008, sections 704 and 706).

³ For this code, the developer is the party undertaking the waterway barrier works.

⁴ Refer to Fisheries Queensland policy *Waterway Barrier Works Development Approvals FHMOP 008*

2 Development relevant to this code

- 2.1 This code is relevant to assessing operational work against the Fisheries Act that is the construction or raising of temporary (up to 12 months) waterway barriers.
- 2.2 This code applies if the waterway barrier works are the construction or raising of a temporary waterway barrier located across waterways and tidal areas marked on the spatial data layer *Queensland Waterways for Waterway Barrier Works* (see Figure 1 and Appendix 1).
- 2.3 This code does not apply to temporary waterway barriers that are regularly constructed or rebuilt, such as sand dams⁵
- 2.4 This code does not apply to the construction of temporary waterway barriers within the boundaries of declared Fish Habitat Areas⁶.
- 2.5 This code does not apply to the construction of temporary waterway barriers within the boundaries of declared Wild River Areas, unless the temporary barrier is necessary for the maintenance of existing works⁷.

⁵ See Fisheries Queensland Regularly constructed temporary waterway barrier works code for self-assessable development WWBW03.

⁶ See section 615 and schedule 3 of the Fisheries Regulation 2008.

⁷ As per the Sustainable Planning Regulation 2009, schedule 3, Part 2, Table 4, item 2.

- 1.a. The works are the construction or raising of a temporary barrier(s)...**Go to 2**
- 1.b. The works are not the construction or raising of a temporary barrier(s)...**Code does not apply**
- 2.a. The site of the works are on a coloured waterway or zone on the GIS layer *Queensland Waterways for Waterway Barrier Works*...**Go to 3**
- 2.b. The site of the works are not on a coloured waterway or zone on the GIS layer *Queensland Waterways for Waterway Barrier Works*...**No waterway barrier works code or approval required.**
- 3.a. The works meet the requirements of sections 1, 2, 3, 4 and 5.1 of this code...**Go to 4**
- 3.b. The works do not meet the requirements of sections 1, 2, 3, 4 and 5.1 of this code...**Development approval required**
- 4.a. The site is in the grey zone on the on the GIS layer...**Go to 5**
- 4.b. The site is not in the grey zone on the on the GIS layer...**Go to 6**
- 5.a. The works will comply with standards under section 5.2 of this code...**Proceed under section 5.2 of this code**
- 5.b. The works will not comply with standards under section 5.2 of this code...**Development approval required**
- 6.a. The site is on a waterway marked as a purple or red waterway on the GIS layer...**Go to 7**
- 6.b. The site is not on a waterway marked as a purple or red waterway on the GIS layer...**Go to 8**
- 7.a. The works will comply with standards under section 5.3 of this code...**Proceed under section 5.3 of this code**
- 7.b. The works will not comply with standards under section 5.3 of this code...**Development approval required**
- 8.a. The site is on a waterway marked as an amber or a green waterway on the GIS layer...**Go to 9**
- 8.b. The site is not on a waterway marked as an amber or a green waterway on the GIS layer...**Go to 2**
- 9.a. The works will comply with standards under section 5.4 of this code...**Proceed under section 5.4 of this code**
- 9.b. The works will not comply with standards under section 5.4 of this code...**Development approval required**

Figure 1 **Decision matrix for use with the data layer *Queensland Waterways for Waterway Barrier Works***

3 Meaning of terms

3.1 For the purposes of applying this code and determining whether development is self-assessable the following meanings of terms apply.

- Waterways⁸ include⁹:
 - rivers
 - creeks
 - streams
 - a watercourse or inlet of the sea
 - those marked on the data layer *Queensland Waterways for Waterway Barrier Works* (see Appendix 1)
 - regardless of whether they are tidal, freshwater, dry, static or flowing (ephemeral or perennial) waters.
- Waterway barrier means a temporary structure such as a bund, culvert crossing, bed level crossing, floodway, coffer dam etc. that is located fully or partially across a marked waterway.
- Works includes the construction or raising of a structure if the works limit (or have the potential to limit) fish access and movement along a waterway.
- Waterway barriers are only considered temporary if they comply with the maximum allowable durations as follows:
 - for assessable (purple and grey zone) and high impact (red) waterways, a maximum time of 180 calendar days
 - for moderate (amber) and low (green) impact waterways, a maximum time of 360 calendar days.

3.2 Other terms used are defined in the glossary of this code (section 7).

⁸ See the *Fisheries Act 1994*, section 4, schedule dictionary

⁹ For further clarification see *Waterway barrier works development approvals*, Fisheries Queensland Fish Habitat Management Operational Policy FHMOP 008.

4 Compliance with this code

- 4.1 If development proceeds but is not compliant with this code and its standards, or makes insufficient use of the data layer Queensland Waterways for Waterway Barrier Works¹⁰, the developer may be prosecuted under provisions of the SPA or the Fisheries Act¹¹.
- 4.2 Other approvals may be required for the development from local governments or other state agencies or under other state legislation. Contact the relevant local government, or the Department of State Development, Infrastructure and Planning for further information (see section 6 for contact details).

¹⁰ See *Disclaimer* in Appendix 1

¹¹ See Fisheries Act, subdivision 6, section 122, section 123 and the SPA, section 574.

5 Code standards

5.1 All work covered under this self-assessable code

All work carried out under this code must meet the following requirements.

General

- 5.1.1 Sites where development is occurring under this code are required to be open for inspection by Fisheries Queensland staff for monitoring compliance with this code during business hours:
- after Fisheries Queensland has received the pre-works advice sheet
 - during works
 - up to 10 business days after Fisheries Queensland has received the post-works advice sheet.

Size of waterway barrier

- 5.1.2 The dimensions of the temporary barrier are limited to the minimum practicable for the site and purpose.

Acid sulfate soil (ASS)

- 5.1.3 In areas of acid sulfate soils (ASS) or potential acid sulfate soils (PASS):
- all material used in the works must be ASS free and PASS free
 - all work affected by ASS or PASS is to be managed in accordance with Queensland Acid Sulfate Soil Technical Manual Soil Management Guidelines¹².

Disturbance to bed and banks

- 5.1.4 During construction, disturbance to the instream bed and bank sediment of the waterway beyond the barrier footprint must be minimised as much as practical.
- 5.1.5 If it is necessary to remove vegetation (marine, aquatic or riparian) for the development, the vegetation is to be cut no lower than ground level and the roots are to be left in the ground to aid in stabilisation. If deep excavation is required during construction the roots may only be removed within the construction footprint area under this code.

¹² These guidelines are available from www.dnrm.qld.gov.au

- 5.1.6 During the works specified under this code any removal, destruction or damage to marine plants must be carried out:
- according to the relevant Fisheries self-assessable code¹³
 - or according to the conditions of a development approval obtained under the Fisheries Act for the proposed marine plant disturbance.

Water quality

- 5.1.7 Impacts on water quality during construction, operation and removal of the barrier are to be minimized by undertaking works to the standards set out in the *Best Practice Erosion and Sediment Control* guidelines 2008¹⁴.

Timing of works

- 5.1.8 Work must not commence during times of elevated flows¹⁵.

Fish kills

- 5.1.9 Provisions must be made to minimise the risk of fish kills arising from the works e.g. through entrapment of fish upstream or between works¹⁶.
- 5.1.10 In the event of fish that have been trapped by the works becoming distressed¹⁷ the Fisheries Queensland *Fish Salvage Guidelines* must be implemented immediately¹⁸.
- 5.1.11 Fish kills must be reported to the Fish kill hotline 1300 130 372.

Removal of a temporary waterway barrier

- 5.1.12 If there is more than one temporary waterway barrier in the location, the most downstream waterway barrier must be removed first.
- 5.1.13 All waterway barrier material must be removed from within the waterway and be disposed of at least 50m away from the waterway.
- 5.1.14 For any part of the waterway bed or bank that has been altered by the temporary waterway barrier works, the site should be restored and/or rehabilitated, so that as a minimum:

¹³ See Fisheries Queensland codes for self-assessable development at www.fisheries.qld.gov.au or contact Fisheries Queensland for further information (See section 6 for details)

¹⁴ *Best Practice Erosion and Sediment Control* Guidelines 2008. International Erosion Control Association, Australasia.

¹⁵ Except for emergency temporary works

¹⁶ Provisions based on best practice environmental management approaches are relevant

¹⁷ Distressed fish may gasp at the water surface, exhibit rapid breathing, be rolling, lethargic etc.

¹⁸ Fish salvage guidelines lists any required permits to undertake these activities available from Fisheries Queensland. View these guidelines at www.fisheries.qld.gov.au or call 13 25 23.

- The profiles of the bed and banks are re-instated to natural stream profiles and stability within five business days of completion of works.
- The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency.
- Vegetation and cover is rapidly re-established so that the native plant community at the site can recover or be enhanced by using native species.

Notification

5.1.15 All works in this code require both pre-works and post-works notification¹⁹.

5.1.16 All applicable sections of the pre-works and post-works advice sheet must be completed in full.

5.1.17 A map of the location and site photographs (see Appendix 2) of the works are to be included with the pre-works and post-works advice sheets.

5.1.18 Separate notification is required for associated works at the same site under other Fisheries Queensland self-assessable codes.

5.1.19 At least five but no more than 20 business days before work commences, the pre-works advice sheet must be completed in full and submitted to the manager (Planning and Assessment) of the relevant Regional Fisheries Centre (see section 6 for contact details).

5.1.20 For entities undertaking a program of works, a single pre-works notification can be made for the program by including an attachment outlining:

- the numbers and types of waterway barrier works
- the location of each barrier site (attach a map(s) and if possible, a GPS mark in decimal degrees for each site)
- estimated commencement and duration of each of the waterway barrier works
- likely associated marine plant disturbance where relevant.

5.1.21 Entities²⁰ undertaking emergency²¹ temporary works shall notify as for 5.1.17, soon as practicable after commencing the works.

5.1.22 Within 15 business days of the completion of works (including emergency works), the post-works advice sheet is to be completed in full and submitted to the manager (Planning and Assessment) of the relevant Regional Fisheries Centre.

¹⁹ For notification of emergency works also see 5.1.22

²⁰ See Glossary for definition of an entity

²¹ See Glossary for definition of a emergency temporary works

5.1.23 For entities undertaking a program of works (including emergency temporary works), a single post-works notification can be made for the program by including an attachment outlining:

- the date each works was completed
- confirming the location of each barrier site (attach a map(s) and if possible, a GPS mark in decimal degrees, for each site).

Signage

5.1.24 At all times while works are proceeding, at least one sign is to be erected at a public road or waterway closest to the works site that enables the highest level of public visibility.

5.1.25 Each sign must have minimum dimensions of 500 mm by 500 mm.

5.1.26 The following words are to be legibly included on the sign—Operational works conducted under Fisheries Queensland self-assessable code. Call 13 25 23.

5.1.27 Signs must be removed within 48 hours of completion of works under this code.

5.1.28 Signage requirements under this code do not apply for:

- emergency temporary works
- temporary works being undertaken on a designated main road, by or on behalf of the Queensland Department of Transport and Main Roads.

5.2 Construction of temporary waterway barriers in tidal (grey) zone waterways

Duration

5.2.1 Works must commence and finish within a maximum time of 180 calendar days and instream sediment and silt control measures associated with the works must be removed within this period.

Tidal works

5.2.2 In tidal areas:

- Excavation work in un-bunded tidal areas is to be scheduled to occur within two hours either side of low tide.
- The area between two barriers, or upstream of a single barrier must be kept free of water to prevent stress and possible mortality of marine

plants. The method of draining the water must not have detrimental impacts on the wellbeing of fish.

- Flow at the site must not be impeded²² beyond 21 days.

5.3 Construction of temporary waterway barriers on assessable (purple) and high impact (red) waterways

Duration

- 5.3.1 Works must commence and finish within a maximum time of 180 calendar days and instream sediment and silt control measures associated with the works must be removed within this period.

5.4 Construction of temporary waterway barriers on moderate (amber) and low impact (green) waterways

Duration

- 5.4.1 Works must commence and finish within a maximum time of 360 calendar days and instream sediment and silt control measures associated with the works must be removed within this period.

²² Tidal flushing must be restored after 21 days

6 Contacts and further information

To assist in interpreting and applying this code, additional information is available on the Fisheries Queensland website, or by contacting the relevant regional centre.

Current versions of all Queensland legislation, including those referred to in the document, can be found at the [Office of the Queensland Parliamentary Counsel website](#).

Fisheries Queensland

Website: www.fisheries.qld.gov.au

Customer service centre: 13 25 23 or (07) 3404 6999

Regional centre contacts

If you are north of and including the Gladstone Regional Council area, contact:

Northern Fisheries Facility – Cairns
Department of Agriculture, Fisheries and Forestry
Manager (Planning and Assessment)
PO Box 5396, Cairns Qld 4870
Email: idasnfc@daff.qld.gov.au
Telephone: (07) 4057 3700

If you are south of the Gladstone Regional Council area, contact:

Maroochy Research Facility – Nambour
Department of Agriculture, Fisheries and Forestry
Manager (Planning and Assessment)
PO Box 5083 SCMC, Nambour Qld 4560
Email: idassfc@daff.qld.gov.au
Telephone: (07) 5453 5860

Department of State Development, Infrastructure and Planning (DSDIP)

DSDIP

PO Box 15009
Brisbane City East
Queensland 4002
Telephone: 13 74 68 or (07) 3227 8548
Facsimile: (07) 3224 4683
Email: info@dsdip.qld.gov.au

For information on the SPA refer to the planning and development section of www.dsdip.qld.gov.au

7 Glossary

Acid Sulfate Soils (ASS)	<p>Acid sulfate soils are soils that contain iron sulfides. When exposed to air these sulfides oxidise to produce sulfuric acid, which has negative consequences for animals, plants and humans. Acid sulfate soils are mainly found on coastal lowland areas below five metres Australian Height Datum (AHD).</p> <p>Acid sulfate soils indicators include:</p> <ul style="list-style-type: none"> • acid scalds • stunted and dead vegetation • jarosite • clear blue-green water • iron staining, rust-red scum and oily-looking bacterial scum • damaged infrastructure such as eaten away cement structures • domination of acid tolerant aquatic plant species such as water lilies, rushes and sedges • pH field tests are also a useful indicator. <p>For additional information see 'Identifying acid sulfate soils' factsheet available at www.dnrm.qld.gov.au</p>
Barrier	<p>For the purpose of this code, a waterway barrier means a temporary structure such as a bund, culvert crossing, bed level crossing, floodway, coffer dam etc. that is located fully or partially across a marked waterway.</p> <p>A waterway barrier limits fish access and movement along a waterway.</p>
Barrier material	Material that is used to construct or raise the waterway barrier.
Calendar day	Calendar day is any day of the year regardless whether it corresponds to a national or state holiday, a work day or a day of the weekend.
Development	<p>As defined in the <i>Sustainable Planning Act 2009</i>, section 7.</p> <p>Includes building work, material change of use and operational work. Operational work includes the construction or raising of waterway barrier works.</p>
Developer	The person or organisation responsible for undertaking the temporary works.
Elevated flows	Flows other than no flow, base flow or low flow conditions.

Emergency temporary works	<p>Emergency temporary works means the necessary temporary barriers associated with emergency maintenance works to replace or repair an instream structure that is no longer is no longer safely functional due to a sudden unforeseen failure or destruction as a direct result of:</p> <ul style="list-style-type: none"> • flooding, fire or earthquake • accidental vehicle impact. <p>The definition of emergency maintenance works does not include: failure due to wear and tear; increased traffic; obsolescence; inadequate design or materials; or construction practices.</p>
Entity	<p>For the purpose of this code, the following are considered entities under section 5.1.24, 5.1.25, 5.1.26:</p> <ol style="list-style-type: none"> 1. A local government under the <i>Local Government Act 1993</i> (Qld) 2. A local government owned corporation under the <i>Local Government Act 1993</i> (Qld) 3. A government department declared under the <i>Public Service Act 1996</i> (Qld) 4. The Queensland Electricity Transmission Corporation Limited (ACN 078 849 233), trading as Powerlink 5. Ergon Energy Pty Ltd (ABN 66 078 875 902) 6. Energex Limited (ABN 40 078 849 055) 7. Queensland Rail (ABN 47 564 947 264) 8. Northern SEQ Distributor-Retailer Authority (trading as Unitywater—ABN 89 791 717 472) 9. Central SEQ Distributor-Retailer Authority (trading as Queensland Urban Utilities—ABN 86 673 835011) 10. Southern SEQ Distributor-Retailer Authority (trading as Allconnex Water—ABN 80 769 308 350).
Footprint of works	The works footprint includes the base of the temporary structure, any scour protection works, and abutments. It does not include approach roads and access tracks.
Freshwater	Waters that are upstream of tidal influence.
Marine plants	As defined under the <i>Fisheries Act 1994</i> , section 8. Includes but is not limited to mangroves, seagrass, saltcouch, algae and samphire (succulent) vegetation and adjacent plants such as Melaleuca and Casuarina. See also FHMOP001.
PASS	Potential acid sulfate soils. PASS are waterlogged soils where the water prevents the air from reacting with the iron sulfides. If the water is drained from PASS soils, sulfuric acid is produced. PASS free refers to soils that are not potential acid sulfate soils.
Tidal	Tidal waters are waters that are tidal or subjected to tidal influence.

8 Pre- and post-works advice sheet for self-assessable code WWBW02

Complete all sections and mail or email to the manager (Planning and Assessment) of the relevant Regional Fisheries Centre (see section 6 for contact details).

Note:

1. All applicable fields must be completed on this form. Incomplete forms will not be registered and works will not be lawful.
2. Both pre and post works notification are required. Post-works notification must include a copy of the completed pre-works notification.
3. Approvals may be required from other agencies prior to commencing work.

PART 1. PRE-WORKS ADVICE

Mail / email at least five business days but not more than 20 business days before works commence

1. Date work to commence:

2. Estimated duration (no. days):

3. Details of person undertaking works and organisation

This person may be contacted by Fisheries Queensland for monitoring purposes

Name:

Organisation:

Address:

Email:

Phone (h):

(w):

(mob):

Facsimile:

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7. Declaration

In completing the Notification Form, I confirm that the following have been undertaken

1. The self-assessable code WWBW02 January 2013 has been read ☐
2. The self-assessable code WWBW02 January 2013 has been understood ☐
3. The proposed works comply with the self-assessable code WWBW02 January 2013 ☐
4. Photographs of the site have been attached ☐

Person (name in full):

Signature:

Date:

8. Notification details

Please provide the name of the Regional Fisheries Facility you have notified.

Regional Fisheries Facility advised:

Date:

OFFICE USE ONLY

Date of entry:

DLS Authority Number:

Please keep a copy of this form for your records

Notes:

1. No acknowledgement/receipt will be given by DAFF.
2. Compliance with the code is the responsibility of the submitter.

PART 2. POST-WORKS ADVICE

Complete and mail / email with a completed copy of the pre-works advice sheet within 15 business days of completion of works

1. Work completion

Date works completed:

Signature:

Attach photographs of completed works at site 9see Appendix 2) ☐**2. Notification details**

Please provide the name of the Regional Fisheries Facility you have notified.

Regional Fisheries Facility advised:

Date:

OFFICE USE ONLY

Date of entry:

DLS Authority Number:

Please keep a copy of this form for your records

Notes:

1. No acknowledgement/receipt will be given by DAFF.
2. Compliance with the code is the responsibility of the submitter.

Appendix 1

Queensland Waterways for Waterway Barrier Works spatial data layer

Disclaimer for the spatial data layer

While every care is taken to ensure the accuracy of the spatial data layer, all data custodians and/or the State of Queensland makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs to which the user might incur as a result of the data being inaccurate or incomplete in any way and for any reason.

While the best available data has been used in generating the layer *Queensland Waterways for Waterway Barrier Works*, waterways are dynamic systems and in a constant state of change which may not be reflected in the data. The information portrayed is therefore subject to revision.

Where the fitness of the data layer in representing the site on the ground is in question, the burden for ensuring that the appropriate procedures are employed at the site rests solely with the user. Therefore the data layer should not be the only source for determining the relation of a site to a waterway. Insufficient site-waterway determinations for barrier works by the user may be prosecuted under provisions of the *Sustainable Planning Act 2009* and the *Fisheries Act 1994*. Any apparent discrepancy should first be checked with the Department of Agriculture, Fisheries and Forestry.

Availability

The most current version of the data layer *Queensland Waterways for Waterway Barrier Works* can be downloaded from the Queensland Government Information Service website at <http://dds.information.qld.gov.au/dds>

User guide

For further information on how to make adequate waterway determinations refer to *Guide for the determination of waterways using the spatial data layer Queensland Waterways for Waterway Barrier Works* available from the Fisheries Queensland website at www.fisheries.qld.gov.au

Appendix 2

Site photograph instructions

Figures 1 and 2 depict where the photographs need to be taken at a given waterway for pre- and post-works notification.

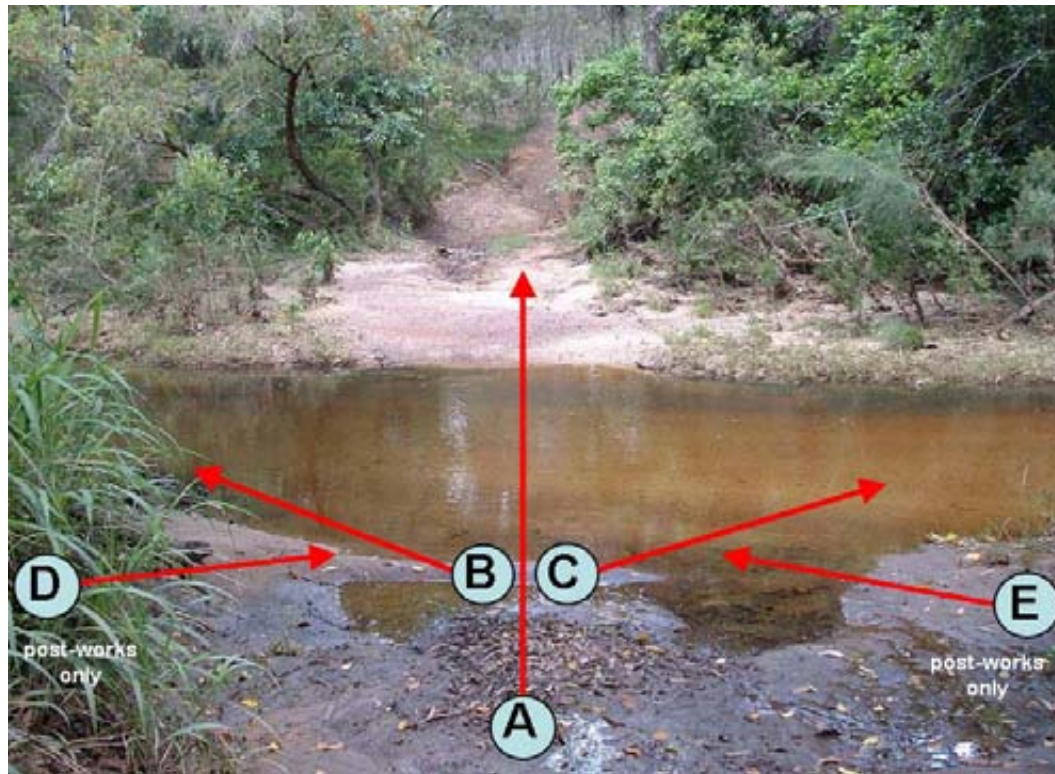


Figure 2 The location and direction of pre- and post-works photos at a site of proposed barrier works

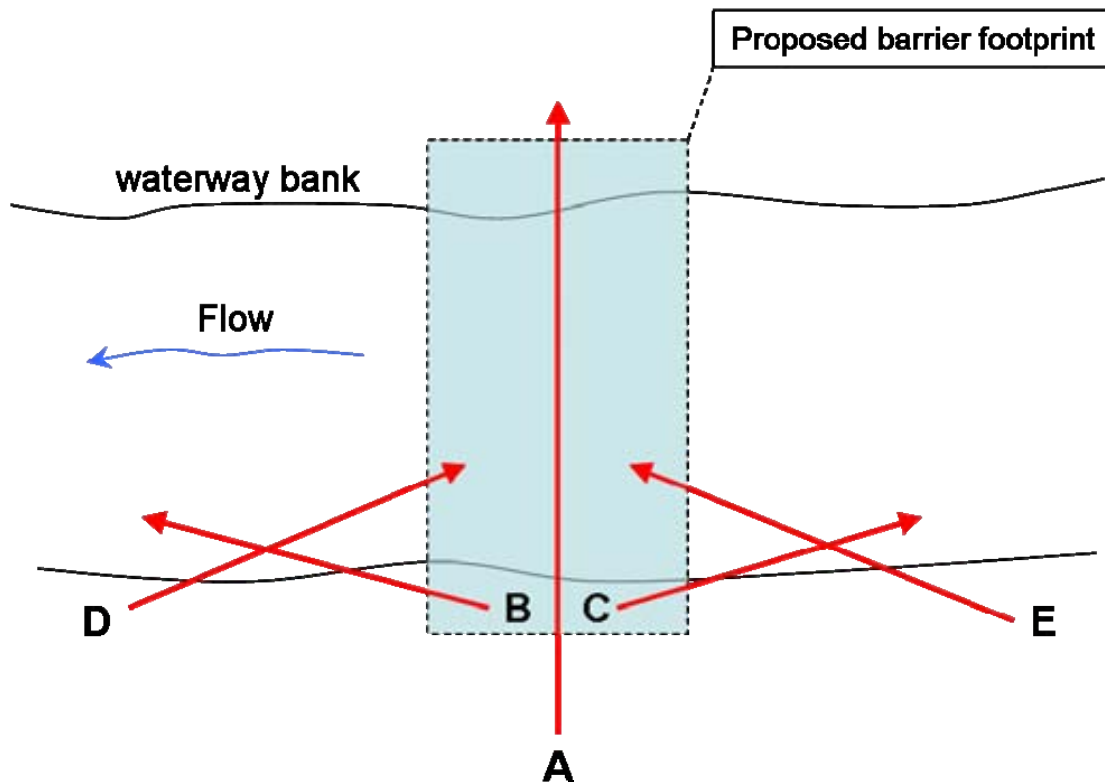


Figure 3 Generalised plan view of a site showing the location of photos to be taken for pre- and post-works notification

Pre-works notification photos

A minimum of three pre-works photographs need to be taken of the waterway at the site of proposed works.

- Photo A—looking across the waterway at the proposed site of works.
- Photo B—looking downstream of the proposed site of works.
- Photo C—Looking upstream of the proposed site of works.



Photo A **Looking across the waterway**



Photo B **Looking downstream**



Photo C Looking Upstream

Post-works notification photos

A minimum of five post-works photographs need to be taken of the waterway after the works are completed. This includes the same photo locations for the pre-works notification and two additional photos looking at the completed barrier works from an upstream and downstream position.

- Photo A—looking across the waterway at the completed works.
- Photo B—looking downstream of the completed site of works.
- Photo C—looking upstream of the completed site of works.
- Photo D—looking at the completed barrier works from a downstream position.
- Photo E—looking at the completed barrier works from an upstream position.



Photo A **Looking across the waterway**



Photo B **Looking downstream (after waterway barrier works)**



Photo C Looking upstream (after waterway barrier works)



Photo D Looking at the completed waterway barrier works from a downstream position



Photo E **Looking at the completed waterway barrier works from an upstream position**

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