CHAPTER 16

GLADSTONE – FITZROY

PIPELINE PROJECT

Environmental Impact Statement

Hazard and Risk

Gladstone Area Water Board

Contents

Gladstone Area Water Board

Figures

Tables

16 Hazard and Risk

16.1 Introduction

This chapter documents the Hazard and Risk Assessment (HRA) that has been undertaken for the Gladstone–Fitzroy Pipeline project (the project) EIS and the measures to be adopted in managing these hazards and risks. The HRA considered sources of risk related to natural hazards, human activity, and technological or technical issues, and the potential impact of these risks to persons, the environment or the community and property. In this context, natural hazards refers to flood, bushfire or landslide.

The HRA has not considered commercial risks relevant to the Gladstone area Water Board (GAWB) as a corporation and nor are environmental risks comprehensively assessed here as these risks are documented in other chapters of the EIS.

Also included is a description of health and safety measures for the project and emergency management procedures to be employed.

16.2 Assumptions and Limitations

Assessment of hazard and risks associated with the project was undertaken prior to the commencement of detailed design for optioneering. As a result the risks and hazards identified are based on existing information about the project at the time of writing, and proposed construction and operational features. The HRA provides examples of the likely hazards and risks associated with the project however full assessment of hazards and risks is an ongoing process that will be fully developed as part of GAWB's risk management processes as the project progresses.

Further risks and hazards may be identified in future stages or identified risks could be downgraded or upgraded in terms of the level of risk they pose. Additional mitigation measures as required will be developed and documented in the Construction and Operational and Risk Management Plans for the project which are to remain live documents throughout the relevant project phases.

Health and Safety considerations identified in this chapter will be further developed in relevant construction and operation documentation. The relevant documentation is listed in Section 16.3.

The consideration of natural hazards is based on existing information about the study area including overlay mapping from relevant Shires' Planning Schemes and local disaster management plans for former Rockhampton City, Fitzroy Shire, Calliope Shire and Gladstone City Councils. This enables a high level assessment to be made of the risk of natural hazards in the project area, however, detailed modelling or prediction of natural hazards has not been undertaken. This chapter considers flood, landslide and bushfire. Chapter 3, Climate, provides information on cyclones, storms and heat waves which have not been discussed in this chapter.

Emergency Management measures described in this chapter are also based on existing knowledge about the possible emergency situations that could arise during construction or operation of the project and will be further detailed in the Construction and Operational Management Plans.

This risk assessment undertaken for the purposes of the EIS is broad and qualitative and forms part of the larger risk management process which is continual throughout the project life and linked to GAWB's corporate risk management process. Further HRAs will be undertaken to inform development of relevant construction and operation management plans (as listed in Table 16.8).

16.3 Relevant Legislation, Policy and Australian Standards

Table 16.1 outlines the relevant legislation, policy and Australian standards for this chapter and how the project complies.

Table 16.1 Relevant Legislation and Policy

Legislation, policy or standard	Requirement	Compliance
AS/NZS Risk Management Standard 4360:1999	Establish and implement a risk management process that involves the identification, analysis, evaluation, treatment and ongoing monitoring of risks.	Hazard and risk Assessment.
AS/NZS 4084:2001 Occupational Health and Safety Management Systems – General Guidelines on Principles, Systems and Supporting Techniques	Provides guidance on the development and implementation of occupational health and safety management systems (OHSMS) and principles, and their integration with other management systems.	OHSMS for GAWB and the contractor. Safety management plan. Work method statements.
Workplace Health and Safety Act 1995 (Qld) and *Workplace Health and Safety Regulation 1995* (Qld)	To prevent a person's death, injury or illness being caused by a workplace, by a relevant workplace area, by work activities, or by plant or substances for use at a workplace.	Occupational Health and Safety Management System. Safety management plans. Compliance with construction industry codes of practice.
Dangerous Goods Safety Management Act 2001 (Qld) and *Dangerous Goods Safety Management Regulation 2001* (Qld)	The objective of the *Dangerous Goods Safety Management Act 2001* is to protect people, property and the environment from harm caused by hazardous materials, and dangerous goods.	Environmental management plans, safety management plans. Management of dangerous goods in accordance with the Act and Regulations.
Explosives Act 1999 (Qld) and *Explosives Regulation 2003* (Qld)	To ensure the safe utilisation, storage, handling and disposal of explosive material so as not to endanger persons, property or the environment.	Safety management plan. Emergency management plan.
Fire and Rescue Services Act 1990 (Qld) and *Fire and Rescue Service Regulation 2001* (Qld)	Establish effective relationships with Queensland Fire and Rescue Service (QFRS) and to provide for the prevention of and response to fires and certain other incidents endangering persons, property or the environment.	Involvement of QFRS in emergency planning.
SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide	Minimise the potential adverse impacts of flood, bushfire and landslide on people, property, economic activity and the environment.	Identification of natural hazard areas. Implementation of mitigation measures where necessary to minimise the risk.
Disaster Management Act 2003 (Qld)	This Act provides the framework for effective disaster management planning at State, District and Local levels.	Review of existing local disaster management plans for the region.
AS/NZS 2187 Explosives – Storage, Transport and Use	This standard provides measures for the storage, transport and use of explosives.	Compliance with standard during construction or operation.
AS/NZS 1940 2004 The Storage and Handling of Flammable and Combustible Liquids	This standard provides measures for the storage and handling of flammable and combustible liquids.	Compliance with the standard during construction and operation.
Stanwell - Gladstone Infrastructure Corridor – Draft Development Scheme	One of the outcomes for the Stanwell - Gladstone Infrastructure Corridor (SGIC) is that infrastructure is able to operate effectively during and immediately after a natural hazard event.	Project infrastructure located above the 100 year flood and pipeline within flood prone areas is below ground..

16.4 Natural Hazards

State Planning Policy 1/03 (the SPP) aims to minimise potential adverse impacts of flood, bushfire and landslide on people, property, economic activity and the environment. The SPP has effect when development applications are assessed, when planning schemes are made or amended and when land is designated for community infrastructure. Cyclones and earthquakes are also considered to be natural hazards but are not addressed in the SPP.

The SPP is relevant to the project on the basis that the former local government areas which the project will traverse are listed in Annex 2 of the SPP as areas in which the SPP is applicable. These include the former Fitzroy Shire, Rockhampton City and Calliope Shire. The planning schemes for these shires identify natural hazard management areas in accordance with Section 5.1 (Annex 3) of the SPP. These areas are shown in Figure 16.1.

Following council amalgamations in March 2008, the local government areas relevant to the project are Rockhampton Regional Council and Gladstone Regional Council, however the SPP and planning schemes still relate to the former local government areas.

Generally, 'natural hazard management areas' include:

- Areas identified as reflecting medium and high bush fire risk (the project passes through areas that are classified as medium bushfire risk in the Fitzroy Shire and Calliope Shire Planning Schemes)
- Land of 15 percent and greater slope and land known or suspected of being geologically unstable. (The project passes through areas with slopes greater than 15 percent in the Gladstone State Development Area (GSDA) near Yarwun)
- Land defined in a planning scheme as being affected by a 'defined flood event' (the project passes through areas that are below the flood level as defined by the Fitzroy Shire Council Planning Scheme overlay maps).

16.4.1 Bushfire Hazard

It has been identified that the proposed pipeline route crosses low and medium bushfire hazard areas within former Calliope and Fitzroy Shires. Bushfire risk areas in former Rockhampton City are not in close proximity to the project area.

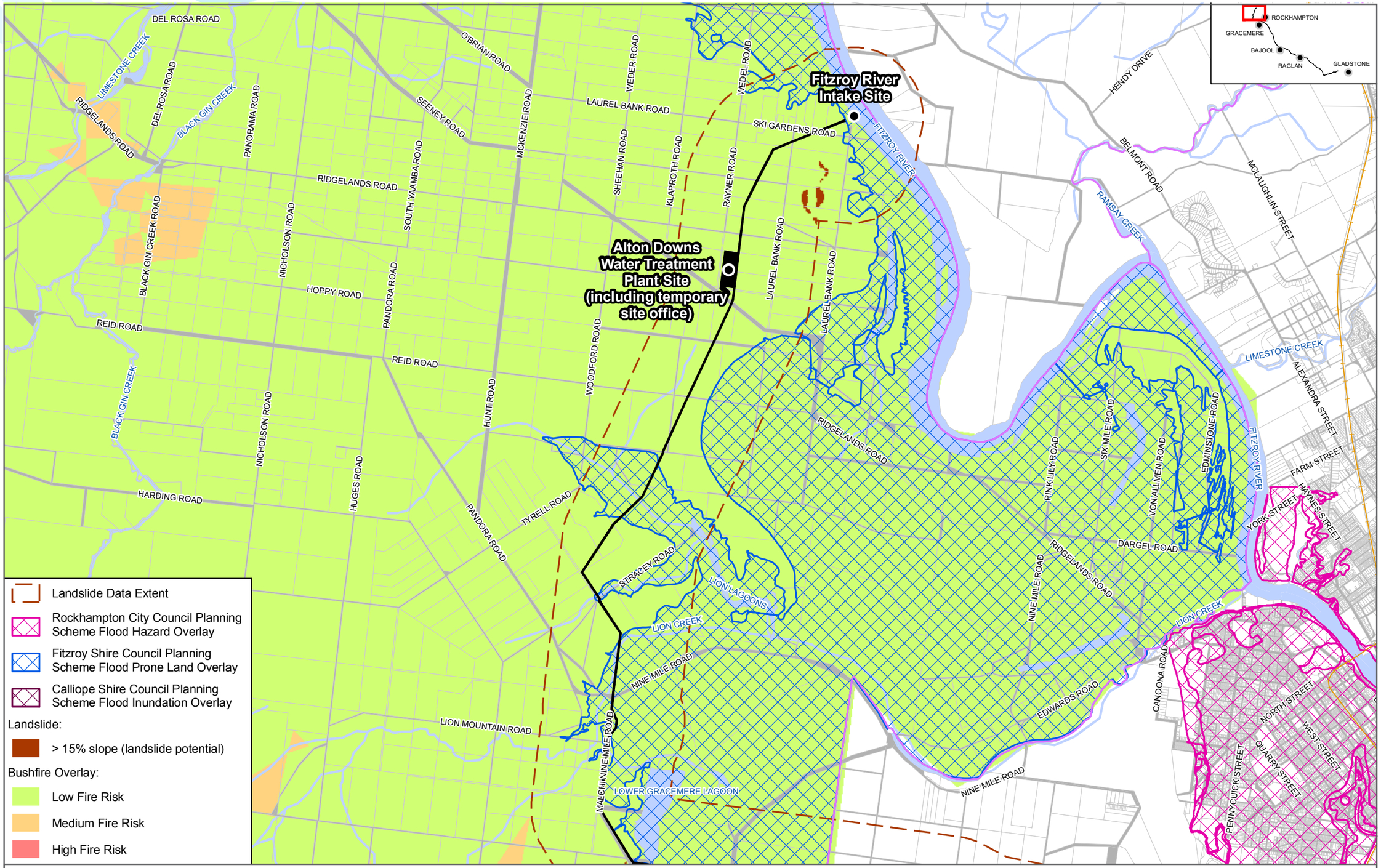
During operation of the project the majority of the project area will not be affected by bushfire due to the pipeline being underground. The infrastructure associated with the project including the Alton Downs water treatment plant (WTP), Raglan pump station and Aldoga Reservoir will be above ground and would therefore be at greater risk from the effects of bushfires. However none of these sites are located in areas that are classified as medium or high bushfire risk in the relevant planning scheme overlay maps, and with the exception of the WTP, these premises would only be occupied on a short-term or intermittent basis (e.g. by construction or maintenance workers). Thus these elements of the project do not result in an increase in the number of people living or working in the natural hazard management area. There is still a potential risk of fire damaging infrastructure. A Bushfire Management Plan will be prepared to protect infrastructure and minimise damage or loss. This will be prepared in accordance with the Australian Pipeline Industry Association's Code of Environmental Practice for Onshore Pipelines 2005.

During the construction phase of the project, construction work will occur in areas identified as being of medium or high bushfire risk in former Fitzroy and Calliope Shires. However as construction workers are only present at the site on a short-term or intermittent basis and construction would not involve the manufacture or storage of hazardous materials in bulk, the SPP does not apply in relation to bushfire hazard. Construction activities (e.g. pipe cutting, welding and grinding activities) do have the potential to temporarily increase the risk of bushfires however this is considered a low risk. Nevertheless, the Safety Management Plan for the project will address mitigation measures to reduce this risk (e.g. discontinuing construction during periods of high fire danger, clearing all flammable material from fire ignition sources etc.).

16.4.2 Landslide Hazard

Landslide hazard areas have been identified in the former Fitzroy Shire and Calliope Shire Planning Schemes. There is no specific overlay map for landslide hazards in Fitzroy Shire. However a review of the contours in Geographic Information System (GIS) mapping shows that the terrain is mostly flat with only very small areas being at or above 15 percent slope. Generally the affected part of the pipeline in Calliope Shire is the final part of the alignment through Yarwun, from the proposed Aldoga Reservoir site to where the pipeline connects to the existing Gladstone network. There are lengths of the project route in this area that pass through areas of slope greater than 15 percent that are classified in the Calliope Shire Planning Scheme as being steep land (refer to Figure 5.3, Chapter 5, Soils and Contaminated Land).

The works in the GSDA will involve earthworks exceeding 50 m^3 and vegetation clearing so the SPP is therefore applicable. The SPP requires a development to which the SPP applies to be compatible with the nature of the natural hazard. The specific outcome to achieve this is that the development maintains the safety of people, property and hazardous materials manufactured or stored in bulk from the risk of landslide. Solutions to achieve this outcome for this project are the undertaking of a geotechnical study so that measures are implemented during the detailed design for construction to ensure the long-term stability of the site (see Chapter 5, Soils and Contamination. Also as the site is on a ridge, it is not likely to be adversely affected by landslide activity originating on sloping land above the development site.



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 1 of 8

The Right of Way
Project Infrastructure
Railway Line
Road Reserve
Waterways
Cadastre
LGA Boundary
SGIC
GSDA

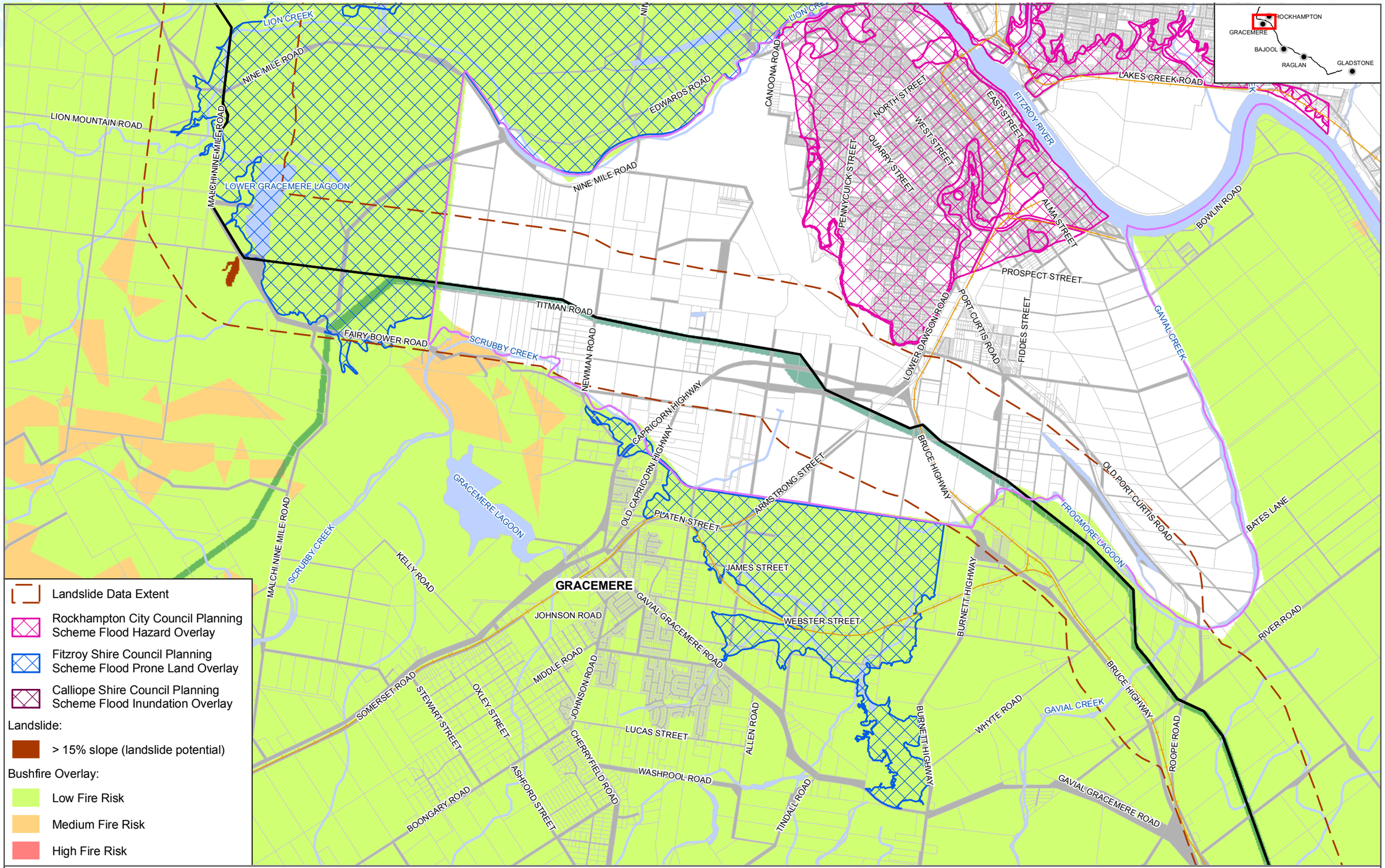
0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP



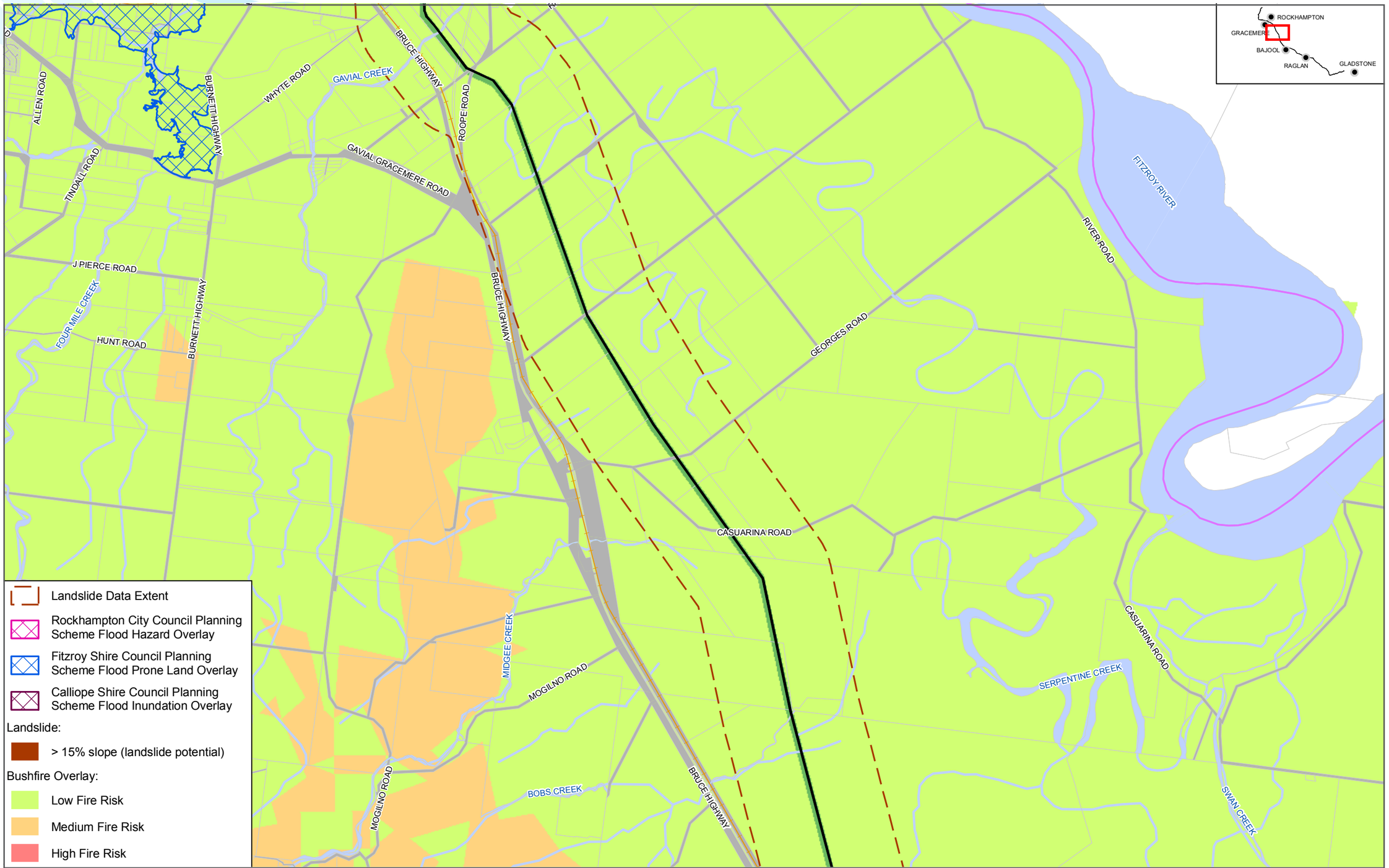
Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 2 of 8

Gladstone Area Water Board

ARUP



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 3 of 8

The Right of Way | **Road Reserve** | **LGA Boundary**
Project Infrastructure | **Waterways** | **SGIC**
Railway Line | **Cadastre** | **GSDA**

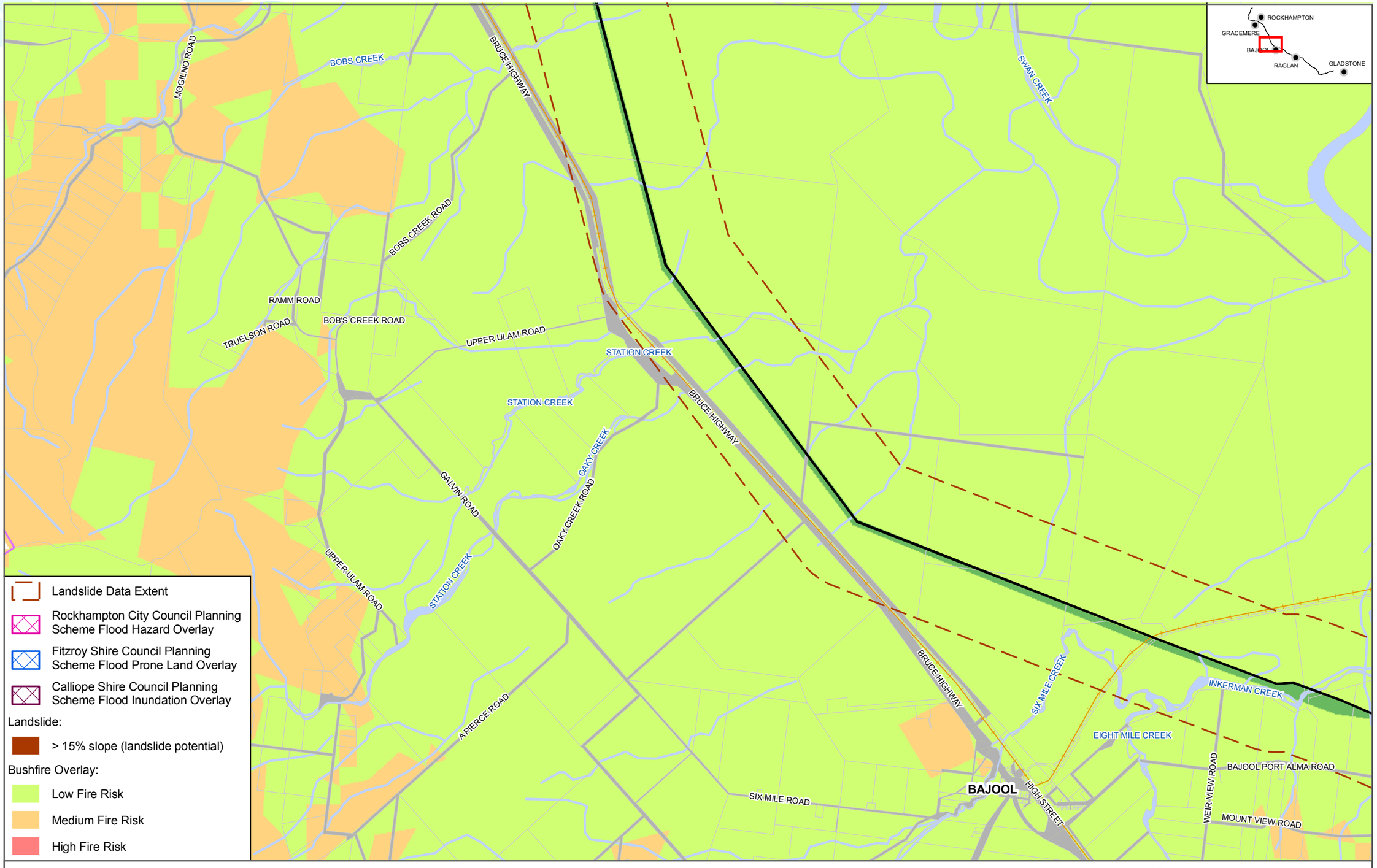
0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 4 of 8

The Right of Way
Project Infrastructure
Railway Line
Road Reserve
Waterways
Cadastre
LGA Boundary
SGIC
GSDA

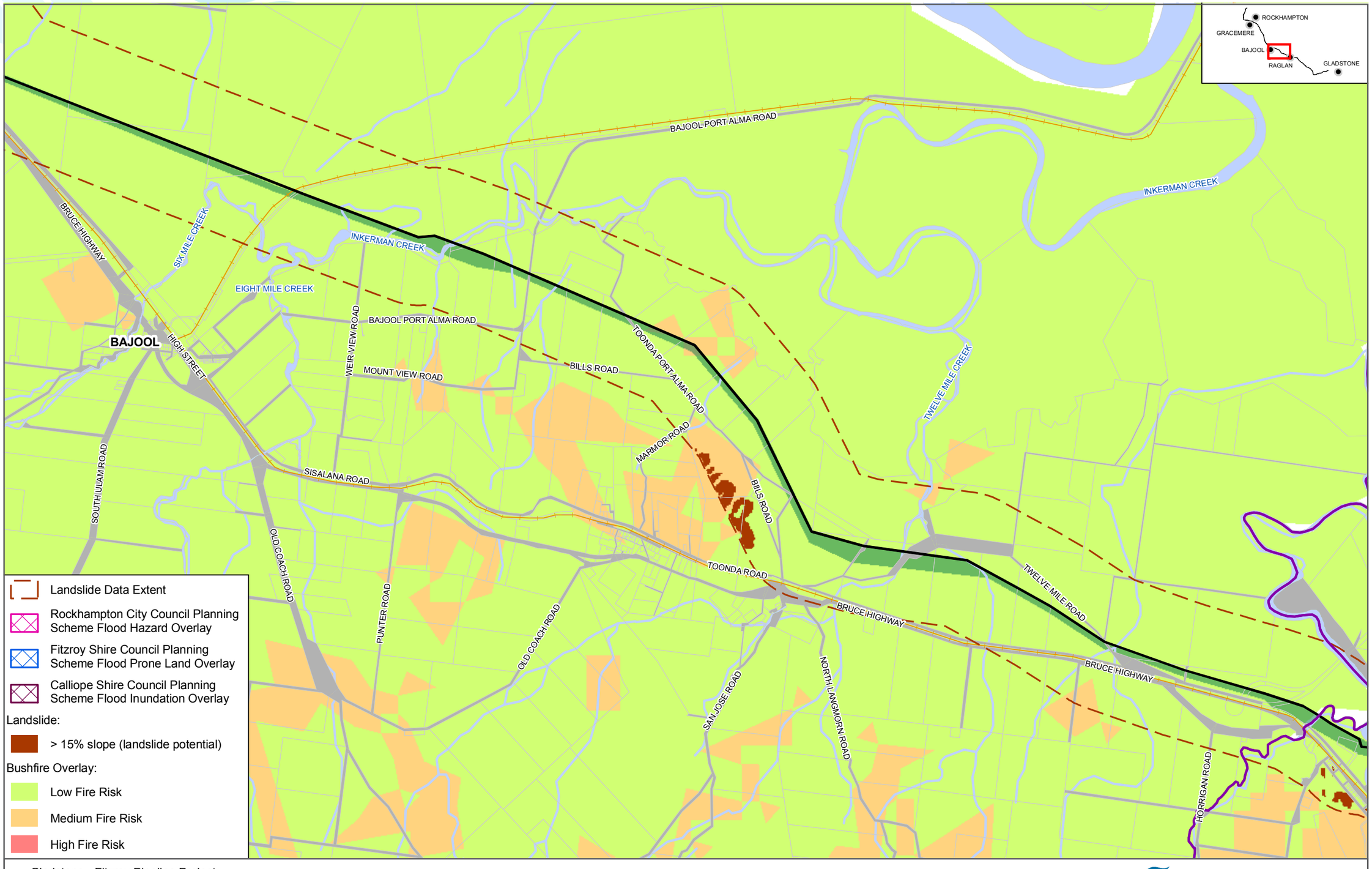
0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 5 of 8

The Right of Way | **Road Reserve** | **LGA Boundary**
Project Infrastructure | **Waterways** | **SGIC**
Railway Line | **Cadastre** | **GSDA**

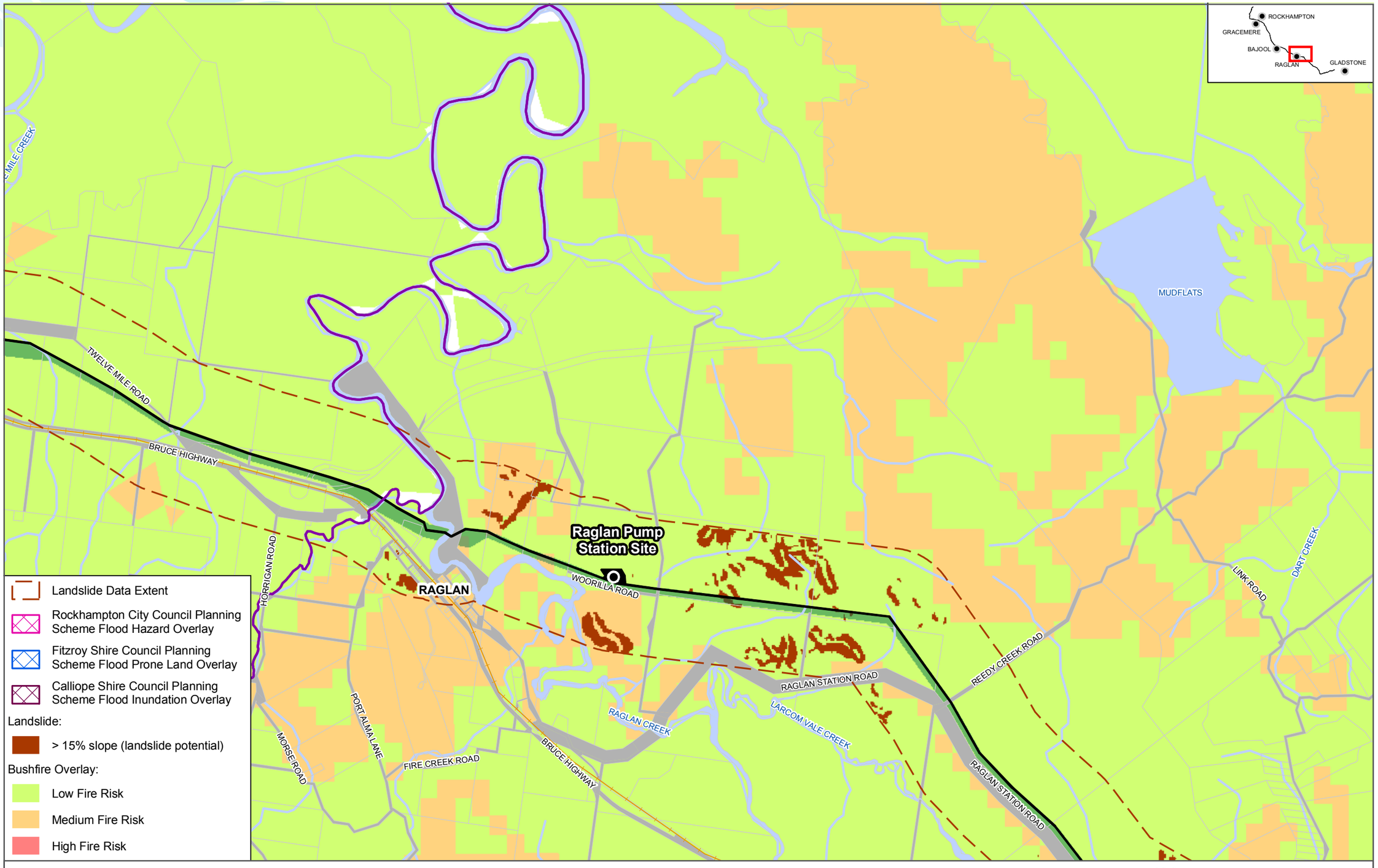
0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 6 of 8

The Right of Way
Project Infrastructure
Railway Line
Road Reserve
Waterways
Cadastre
LGA Boundary
SGIC
GSDA

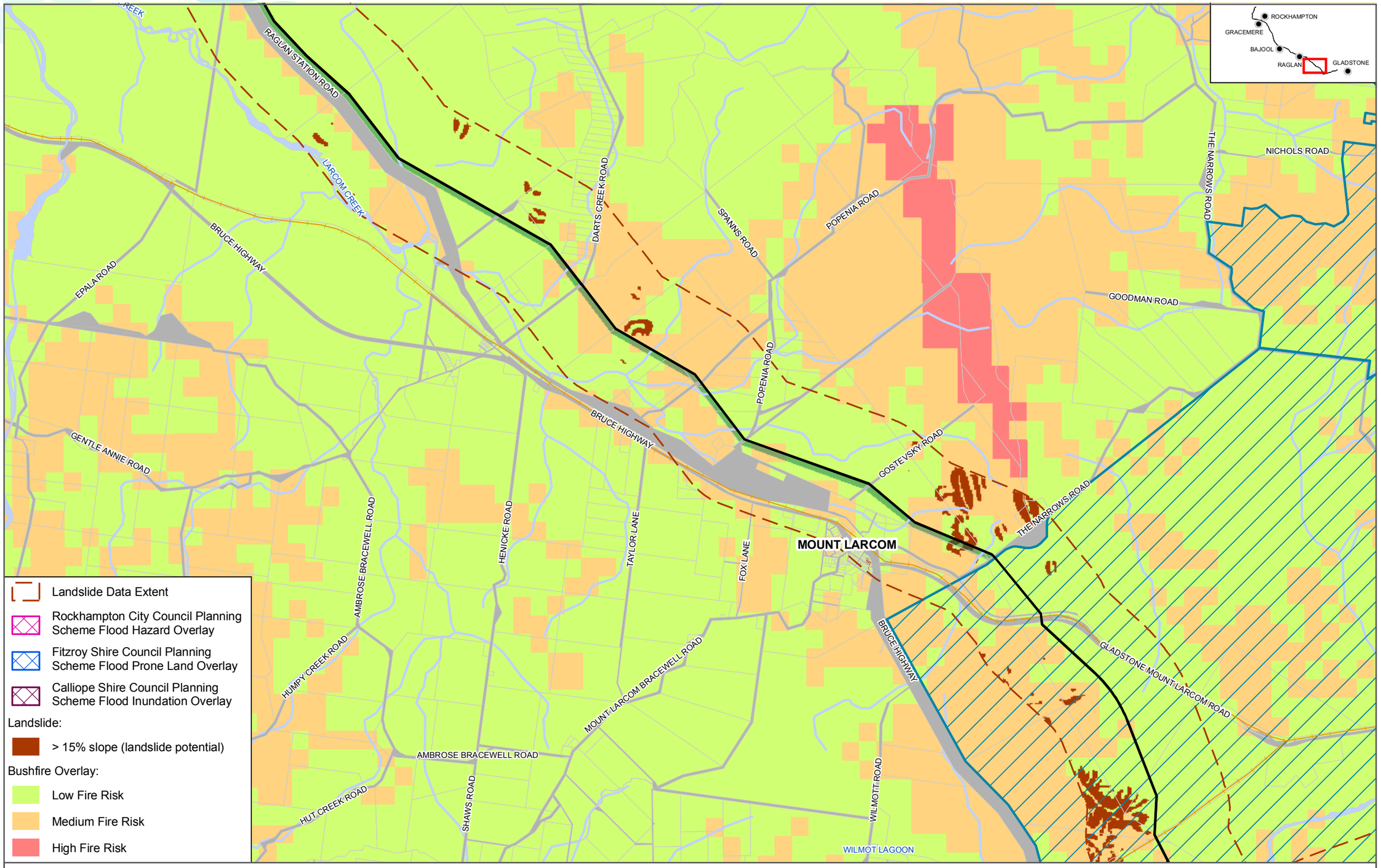
0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 7 of 8

The Right of Way
Project Infrastructure
Railway Line
Road Reserve
Waterways
Cadastre
LGA Boundary
SGIC
GSDA

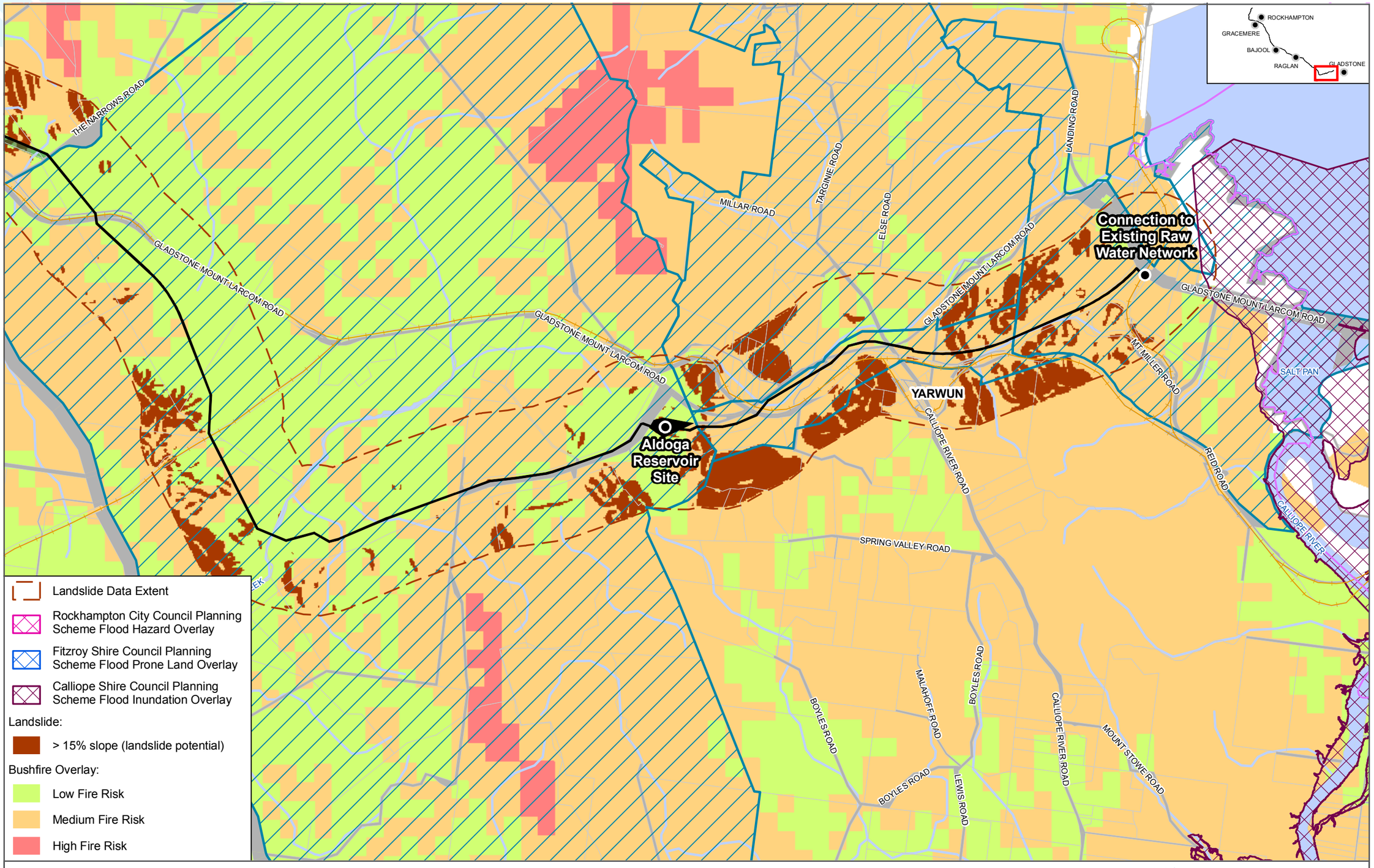
0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP



Gladstone - Fitzroy Pipeline Project

Figure 16.1 - Natural Hazard Management Areas

Sheet 8 of 8

The Right of Way
Project Infrastructure
Railway Line
Road Reserve
Waterways
Cadastre
LGA Boundary
SGIC
GSDA

0 1 2 3 4 km

1:50,000 at A3

N

Gladstone Area Water Board

ARUP

16.4.3 Flood Hazard

The Fitzroy River at Rockhampton has a long and well documented history of flooding with flood records dating back to 1859. Flooding in 1991 reached a height of 9.3 m at Rockhampton and recent flooding in February 2008 reached levels of over 7 m, which is classified as a major flood event by the Bureau of Meteorology (BOM 2008). A major flood event is likely to cause inundation of large areas, isolation of towns and cities and major disruptions to road and rail links. In rural areas widespread flooding of farmland is likely in a major flood event.

The pipeline traverses areas that are identified in the Fitzroy Shire Planning Scheme as being within 'flood prone land' based on the 1991 Fitzroy River flood study. However the pipeline will be underground so is therefore not likely to be affected by flooding. The intake point on the Fitzroy River is also within this zone. The WTP site at Alton Downs is not within flood prone land as defined by the Planning Scheme however, landholders in the area have advised that it is occasionally subject to local flooding. Additionally, the access routes to the pipeline infrastructure traverse areas of flood prone land.

An outcome sought for flood hazard areas in the SPP is to minimise risk to persons and property and facilitate evacuation in the event of any flood threat. Although the Fitzroy River intake structure and pump stations would be within flood prone land, the use of these facilities does not involve habitable or non-habitable rooms as they relate to a house/dwelling, and are not intended for frequent or long-term visitation by employees or other persons (as stated in the SPP). Thus the proposal complies with the solutions outlined in Appendix 5 of the SPP Guidelines where there is no increase in the number of people living or working on the site, except where the premises are occupied on a short-term or intermittent basis (e.g. by construction or maintenance workers).

Outcome 3 of the SPP states that wherever practicable, community infrastructure is located and designed to function effectively during and immediately after a natural hazard event. As 'water cycle management infrastructure', the WTP is considered to be community infrastructure. The SPP Guidelines recommend that community infrastructure including WTPs, pump stations and intake facilities are located above the recommended flood level (RFL) or can continue to function effectively during and after the flood event. The RFL for a WTP is specified in the SPP Guidelines as being the 0.5 percent Annual Exceedance Probability Flood (AEP) or the 1 in 200 year flood. Whether the WTP site is above this level is not known. As the 1:200 ARI is not defined, it is therefore possible that there would be temporary disruption to the operation of the WTP during a 1 in 200 year flood event. Disruption may also occur if access routes to the pipeline infrastructure are blocked during a flood event for long periods. This is more of an issue at the WTP, where residue is required to be regularly transported off site. However, detailed design for optioneering has allowed for an emergency residue stockpile area at the WTP, which can hold residue for approximately 5 days of peak operations.

Outcome 3 is considered to be met as the water supply to Gladstone would be able to function effectively during and immediately after a natural hazard event. The project represents an additional water supply to GAWB's customers in Gladstone. Their short-term water supply needs could still be met from the Awoonga system during periods of flood that may temporarily affect the operation of the project. The project is considered to be part of a larger system and it reduces the risk of water supply disruption in Gladstone by providing an alternative source of water and therefore assists in maintaining the health, safety and wellbeing of the community in the event of a natural disaster. For this reason the siting of the WTP and intake are considered to be consistent with the outcomes of the SPP.

16.5 Dangerous Goods

Given the nature of the construction works it is not anticipated that large quantities of dangerous goods will be used or stored onsite during the construction phase. The most likely source of any chemical spill during construction would be oil or diesel from plant and machinery or from small quantities stored at construction areas.

Explosives are likely to be required during the construction of Aldoga Reservoir and are classified as Class 1 Dangerous Goods (in the Australian Code for the Transport of Dangerous Goods by Road and Rail (the code)).

During operation of the WTP quantities of sodium hypochlorite, sodium hydroxide and ammonium sulfate will be transported and stored in small quantities. These chemicals are classified as Dangerous Goods under the code. Any Dangerous Goods used during construction or operation would be handled and transported in accordance with the code to minimise the risk of spill or leaks occurring or causing harm. Chemical use will be limited wherever possible, and the minimum practicable volume stored on site. Those chemicals that are required will be stored in a suitable bunded area with appropriate spill equipment made available on site.

16.6 Hazard and Risk Assessment (HRA)

The project is believed to be both a safe and efficient means for supplying water to GAWB's industrial customers. All developments present some level of risk however, which can be identified through an HRA so that appropriate management measures can be implemented to reduce or remove the risk.

The HRA for the project has been carried out in accordance with the principles set out in AS/NZS Risk Management Standard 4360:2004 (which supersedes 4360:1999), in line with GAWB's own procedure. The HRA seeks to identify risks during the construction, operational and decommissioning phases of the project and to document proposed mitigation and management measures.

16.6.1 Methodology for the HRA

In adopting the recommended methodology for implementing risk assessments in line with AS 4360 the following steps have been followed:

- **Establish context** – define the basic parameters within which the risk must be managed and set the scope for the process. This includes reviewing the organisation's external and internal environment and the purpose of the risk management activity.
- **Identify risks** – identify the risks to be managed using an identification and analysis process.
- **Analyse risks** – develop an understanding of risks which provides an overview of whether the risks should be treated and how they should be treated.
- **Evaluate risks** – focuses decisions based on the outcomes of risk analysis and identifies which risks need treatment and treatment priorities.
- **Treat risks** – identifies options for treating risks, assesses options and proposes appropriate treatment plans.
- **Review risks** – ensures that any changes to project scope are re-examined and the risk assessment amended accordingly if required.

A description of these steps undertaken for the project is included in the following sections.

16.6.2 Establish Context

GAWB's objectives for the project have formed the context for the scope of the risk assessment and have shaped the development of the consequence, likelihood and evaluation criteria. The objectives relevant to the HRA include:

- To minimise or prevent potential environmental impacts associated with the project's construction or operation
- To undertake the construction and operation in a safe environment with minimal risk of injury to personnel or the public. This includes providing appropriate measures to reduce the risks posed by natural events
- To minimise or prevent the loss of or damage to public or private property.

The HRA undertaken for the project has considered hazards and risks associated with natural and manmade risks during construction, operational and decommissioning phases of the project. For the purposes of the EIS, the HRA has considered the sources of risk and areas of impact that are outlined in Table 16.2.

Table 16.2 Sources of Risk and Areas of Impact

Sources of risk	Area of impact		
	Project personnel (Health and safety risks)	Community and property	Environment
Natural events	✓	✓	✓
Human activity	✓	✓	✓
Technological or technical issues	✓	✓	✓

The spatial scope of the HRA includes all areas directly affected by the pipeline and associated infrastructure as well as surrounding areas such as residential properties, agricultural activities, road crossings and rail crossings which could potentially be affected by project activities. General risks relevant to all aspects of the project have been identified, as well as those risks specific to certain elements such as the WTP or pump stations.

Decommissioning risks have been considered, however due to the length of time until this occurs, they have not been addressed in detail. Risk registers for the project will be updated as it progresses, thus risks assessment is focused on design, construction and operation. GAWB's own risk register will also factor in the decommissioning process.

It should be noted that this HRA for the EIS aims to identify risks and hazards arising from the project and does not include political or commercial risks to GAWB which are considered in a separate process that will be ongoing throughout the project.

The assessment has considered normal and abnormal operations and also possible emergency conditions that may arise during the project and the impact of these risks. The mitigation measures or controls that are to be implemented to reduce the likelihood and severity of hazards, consequences and risks to people the environment and property are also documented.

16.6.3 Identify Risks

Risks have been identified for the project in the context described above and are related to the following activities:

- Pumping water
- Storage and transport of dangerous goods
- Transport
- General construction/operational activity
- Trenching/excavation
- WTP operation
- Water intake from river
- Manual handling

Risks were identified in consultation with GAWB, at a risk workshop for the project. Risks are explored in detail in Table 16.7. There is generally no additional risk associated with a particular location, and risks relate to both construction and operational activities, with impacts identified affecting the environment, project personnel and/or the community. The identification of risks considers what can happen as well as possible risk sources (activities) and scenarios.

GAWB has in place a certified Safety Management System and Environmental Management System (Safety (AS/NZS 4801:2001, Environment (ISO14001:2004) and Quality (ISO9001:2000)) which forms the overarching systems for the management of health and safety and environmental risks during construction and operation of the project. GAWB is represented on several external committees in relation to natural resource management. For quality assurance purposes GAWB regularly reviews the systems in place and makes improvements where practical. In this regard GAWB is about to introduce a more efficient on-line tracking system for records and task management. The recent safety audit re-accreditation revealed no non-compliances.

Risks identified in the EIS draw on GAWB's environmental risk registers (e.g. environment, operations) and will also inform future reviews.

16.6.4 Analyse and Evaluate Risks

The objectives of the risk analysis are to separate minor acceptable risks from the major risks and to provide data to assist in the evaluation and treatment of risks. The residual risk is analysed by combining the estimates of consequences and likelihood after mitigation measures have been applied. The analysis of risks has been undertaken using the defined consequence and likelihood criteria shown in Table 16.3 and Table 16.4. These criteria are then used to define the risk level as outlined in Table 16.5. The risk evaluation criteria used in the HRA are shown in Table 16.6. The risk analysis did not identify any extreme or high level risks which would require immediate attention. All risks identified were categorised as medium or low level risks, which will require ongoing monitoring and review, or can be managed by routine procedures.

Table 16.3 Consequence Look-up Table

Descriptor	Insignificant	Minor	Moderate	Major	Catastrophic
Project personnel	No injuries	First aid treatment or out-patients	A number of injuries or hospitalisation	Extensive injuries or hospitalisation or long-term treatment	Fatality or significant irreversible effects to a number of persons
Community and property	Negligible social or cultural impacts, negligible damage to or loss of assets	Minor, medium-term social impacts on local population, mostly repairable with appropriate management/remediation Minor damage to or loss of assets, some repairs required	Ongoing social issues or permanent damage to structures or items of cultural significance. Moderate to high damage to or loss of assets – requires specialist or contract equipment to repair or replace	Ongoing, serious social impacts or significant damage to structures or items of cultural significance. Significant or permanent damage to assets and/or infrastructure	Widespread, ongoing, significant serious, irreversible social impacts Widespread, substantial or permanent damage to assets and/or infrastructure
Environment	No effects or effects which are below levels of perception, within normal bounds of variation or within the margin of forecasting error	These effects may be raised as local issues but are unlikely to be of importance in the decision making process. However, they are of relevance in enhancing the subsequent detailed design for construction of the project and consideration of mitigation measures	Important considerations at a local level but are not likely to be key decision making issues. Mitigation measures and detailed design for construction may ameliorate some of the consequences upon the affected communities or interests	Important considerations at a local or regional scale. Mitigation measures and detailed design for construction work are unlikely to remove all of the effects upon the affected communities or interests	Associated with sites and features of national or state importance. Typically mitigation measures are unlikely to remove such effects

Table 16.4 Likelihood Look-up Table

Likelihood Scale		
Descriptor		**Description of Frequency**
Rare	A	May occur only in exceptional circumstances – can be assumed not to occur during the period of the project (or life of the facility)
Unlikely	B	Event is unlikely to occur, but it is possible during the period of the project (or life of the facility)
Possible	C	Event could occur during the period of the project (or life of the facility)
Likely	D	Event likely to occur once or more during the period of the project (or life of the facility)
Frequent or almost certain	E	Event occurs many times during the period of the project (or life of the facility)

Table 16.5 Qualitative risk analysis matrix

Likelihood		Consequences				
		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
Rare	A	L	L	L	M	M
Unlikely	B	L	L	M	M	H
Possible	C	L	M	M	H	E
Likely	D	M	M	H	E	E
Frequent or almost certain	E	M	H	E	E	E

Table 16.6 Risk Evaluation Criteria

Level of Risk	Recommended Level of Management Attention
E – Extreme	Immediate senior management attention needed. Action plans must be developed with clear assignment of individual responsibilities and timeframes.
H – High	Senior management attention needed. Action plans must be developed with clear assignment of individual responsibilities and timeframes.
M – Medium	Risk requires specific ongoing monitoring and review, to ensure level of risk does not increase. Otherwise manage by routine procedures.
L – Low	Risk can be accepted or ignored. Manage by routine procedures, however unlikely to need specific application of resources.

16.6.5 Treat/Manage Risks

The risk analysis matrix and risk evaluation criteria have been used for the identified risks in order to identify those requiring further management. Table 16.7 summarises the identified risks for the project and the likelihood, consequence and risk level for these risks. Only key activities relevant to planning, construction and operation risks identified in this EIS are addressed in this table. None of the risks identified have been classified as more than a medium level of risk and as such are considered to be adequately managed through existing and/or proposed management measures.

The proposed management measures for environmental and community impacts are further described in the other chapters of the EIS, and specifically Chapter 20, Planning Environmental Management Plan. Table 16.7 includes reference to the relevant sections of the Environmental Management Plan (EMP) for specific identified risk subjects and the corresponding proposed management measures. Mitigation measures will be identified through other mechanisms, such as the Project Health and Safety Plan and specific Work Method Statements, as the project progresses.

GAWB has in place a certified Safety Management System and Environmental Management System which forms the overarching systems for the management of health and safety and environmental risks during construction and operation of the project. Risks identified in the EIS will be included in GAWB's own environmental risk register. The management or mitigation measures in the EIS will also be reflected in management plans for construction and operation. The Australian Pipeline Industry Association has published a Code of Environmental Practice for Onshore Pipelines (2005), which will be drawn upon to provide management measures. GAWB also has a disaster management plan in place for the management of natural hazards and site specific emergencies.

16.7 Health and Safety

16.7.1 Introduction

All construction and operational works carry with them a level of potential health and safety risk both to the project personnel and to other stakeholders such as landowners and road users.

With an average expected workforce numbering approximately 194 construction staff and 10 operational employees (their numbers may fluctuate at times), there is a duty of care to manage the health and safety interests of all those working on the various project stages and living within the vicinity of works is a priority.

GAWB has a corporate occupational health and safety policy and a certified health and safety management system. GAWB is committed to continually improving occupational health and safety performance with the intention that no staff, contractors or visitors suffer injury or illness as a result of GAWB's activities.

The health and safety policy acknowledges that each site under GAWB's control and its respective operations have varied hazards and risks which GAWB is committed to managing in compliance with all relevant workplace health and safety legislation, as well as the codes of practice and standards with which GAWB must comply to maintain industry best practice.

Health and safety risks specific to this project have been identified through the risk assessment (Table 16.7), which has been undertaken in accordance with AS 4360 and with reference to the Queensland *Workplace Health and Safety Act 1995.* A number of specific health and safety risks were identified (such as snake bits, heat stroke, traffic accidents) and management and mitigation measures proposed.

A Safety in Design assessment will be undertaken prior to the detailed design for construction of the project to provide further information regarding existing and future health and safety risks to designers, constructors and operators.

The risks are to be managed through the documentation detailed in Section 16.7.2. A key element in the management of risks during construction and operation is the monitoring and review of the risks and control measures and updating of the relevant plans and procedures accordingly. It is also critical that the requirements of the workplace health and safety documentation are communicated to all project personnel so that they are aware of their roles and responsibilities.

16.7.2 Relevant Documentation

The management of workplace/occupational health and safety risks for the project is undertaken through the range of systems, plans and policies outlined in Figure 16.2 and Table 16.8. This provides a framework for GAWB and the contractor to meet their obligations under the Queensland *Workplace Health and Safety Act 1995.*

All of the plans and statements outlined below have not yet been developed for the project but will be in place prior to the commencement of works and will be developed in line with existing occupational health and safety management systems in place within GAWB and the construction contracting company.

Figure 16.2 Relationship of Key Procedures and Plans with Overall Management System

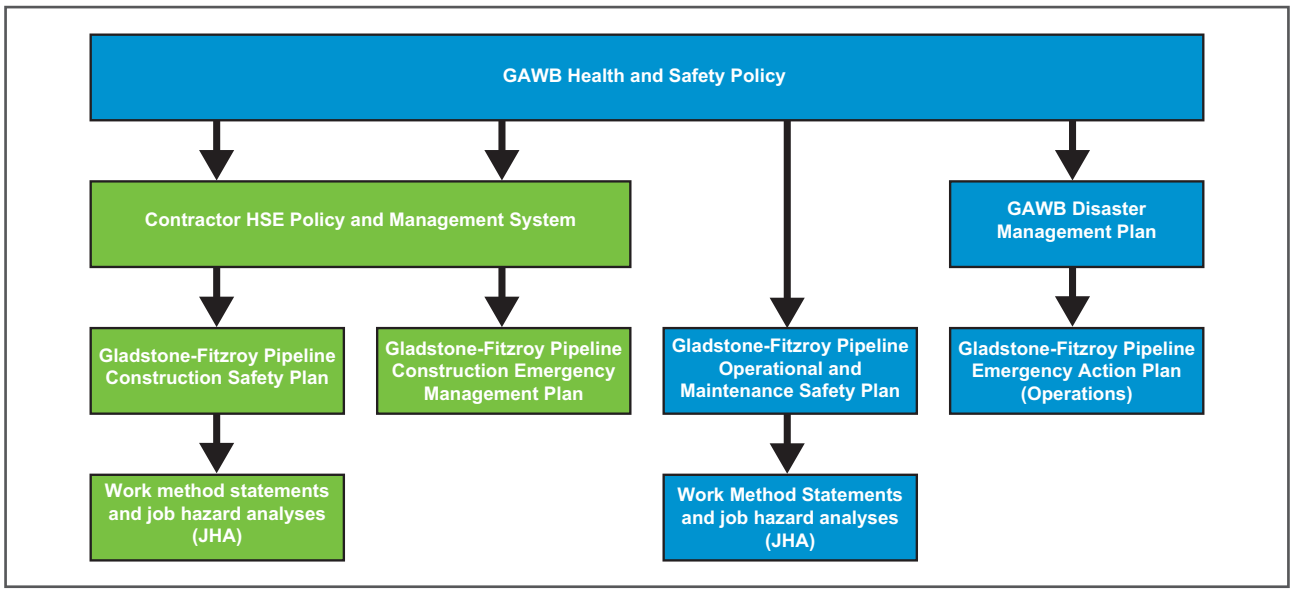


Table 16.7 Risk Assessment Summary

Activity	Risk scenario	Outcome	Area of impact	Consequence	Mitigation and Management measures	Likelihood Rating	Consequence rating	Risk level
Pumping water	Pipeline failure (from system failure or 3rd party damage)	Unplanned release of water to the environment	Environment Project personnel Community	• Erosion • Damage by chlorine to sensitive environments • Death or injury of personnel or community members of wildlife	• Operational and maintenance control system • Design standards that limit volume of material released • EMP's (See Chapter 20, Tables 20.5, 20.12, 20.22) • Spill Prevention and Response Plan (in accordance with APIA COEP)	B	2	Low
Storage, handling & transport of dangerous goods/hazardous substances	Spill, inhalation or explosion	Fuel ignition, health impacts, harm to environment	Environment Project personnel	• Death or injury of personnel or community members or wildlife • Environmental contamination	• EMP's (See Chapter 20, Tables 20.10, 20.20) • Construction Safety Plan • Operation Safety Plan • APIA COEP	A	5	Medium
Transport	Vehicle accident & driver fatigue	Collision with other vehicles, pedestrians or wildlife	Project personnel Community Environment	• Death or injury of personnel or community members or wildlife	• Health and Safety Plan • Traffic Management Plans • APIA COEP • EMP's (Chapter 20, Tables 20.10, 20.17)	B	3	Medium
General construction/ operational activity	Normal conditions	Sun exposure	Project personnel	• Sunburn • Heatstroke • Dehydration	• Construction Safety Plan • Operational Safety Plan • EMP's (Chapter 20, Table 20.21)	C	1	Low
	Normal conditions	Interaction with wildlife (e.g. snake bite)	Environment	• Injury to personnel	• EMP's (See Chapter 20, Table 20.21) • Emergency Management Plan	B	2	Low
	Normal conditions	Weed spread	Environment Community	• Loss of agricultural productivity • Impacts to natural habitat	• EMP's (See Chapter 20, Tables 20.9, 20.10, 20.11)	B	3	Medium
	Normal conditions	Dust generation	Environment Community	• Residential disturbance • Air pollution	• EMP's (See Chapter 20, Table 20.13)	D	2	Medium
	Clearing	Removal of vegetation	Environment	• Loss of Threatened species or reduction in biodiversity	• EMP's (See Chapter 20, Table 20.8)	B	3	Medium
	Normal conditions	Noise generation	Community	• Loss of social amenity	• EMP's (See Chapter 20, Table 20.16)	D	2	Medium
	Normal conditions	Slips/trips/ falls	Personnel	• Injury to personnel	• Construction Safety Plan • Safety in design	C	2	Medium
	Working near road or rail crossings	Collision with road or rail traffic	Project personnel Community	• Death of personnel	• Construction Safety Plan • Liaison with Department of Main Roads and/or Queensland Rail • Traffic Management Plans (See Chapter 20, Table 20.17)	A	5	Medium
	Natural hazard	Fire	Project personnel Community Environment Infrastructure	• Death or injury of personnel or community members or wildlife • Damage to infrastructure	• Emergency Management Plan • Bushfire Management Plan	A	5	Medium
	Natural hazard	Landslide	Project personnel Community Environment	• Death or injury of personnel or community members or wildlife	• Emergency Management Plan	A	5	Medium
	Natural hazard	Extreme Flood Event (1 in 100 yr)	Project personnel Community Environment	• Death or injury of personnel or community members or wildlife • Loss of property • Restricted access to pipeline infrastructure/restricted residue removal from the WTP	• Emergency Management Plan	A	5	Medium
	Equipment use	Cuts or lacerations	Project personnel	• Injury of construction/operation personnel	• Construction Safety Plan • Operation Safety Plan	C	2	Medium

Activity	Risk scenario	Outcome	Area of impact	Consequence	Mitigation and Management measures	Likelihood Rating	Consequence rating	Risk level
		Excessive noise	Personnel Community	• Hearing damage • Loss of social amenity	• Construction Safety Plan • Operation Safety Plan	C	3	Medium
	Blasting	Use of explosives	Project personnel Community	• Death or injury of personnel or community members or wildlife	• Construction Safety Plan	A	5	Medium
	Working in confined spaces	Entrapment, lack of air	Project personnel	• Injury of personnel	• Construction Safety Plan • Operation Safety Plan	B	4	Medium
Trenching/excavating	Normal conditions	Trench subsidence	Project personnel	• Injury to personnel	• Construction Safety Plan • Operation Safety Plan	B	3	Medium
	Normal conditions	Disturbance of Cultural Heritage	Community	• Loss of cultural heritage	• Cultural Heritage Management Plan • EMPs (See Chapter 20, See Table 20.18)	C	3	Medium
	Normal conditions	Disturbance of acid sulfate soils	Environment Community	• Acidification of soils or waterways	• EMPs (See Chapter 20, See Table 20.7)	C	2	Medium
	Normal conditions	Entrapment of wildlife	Environment	• Injury of death of wildlife	• EMPs (See Chapter 20, See Table 20.10)	C	2	Medium
WTP operation	Normal conditions	Odour dispersion	Community	• Loss of social amenity	• EMPs (See Chapter 20, Table 20.13)	C	1	Low
	Spill, overflow or uncontrolled discharge	Discharge of residue or water to the environment	Environment Community	• Sedimentation of waterway • Erosion • Pollution of surrounding property	• EMPs (See Chapter 20, Tables 20.5, 20.12, 20.22)	A	3	Low
Water intake from river	Normal conditions	Entrapment of fish or aquatic fauna,small craft	Environment Community	• Lowering of biodiversity in the Fitzroy River • Injury to community members	• Design standard • EMPs (See Chapter 20, Table 20.10) • Community Consultation	C	3	Medium
Manual handling	Normal conditions	Incorrect lifting of heavy objects	Project personnel	• Injury of personnel	• Construction Safety Plan	C	2	Medium

16.8 Emergency Management Planning

16.8.1 Introduction

Potential emergency situations that could arise during the construction and operation of the project have been determined through the hazard and risk assessment in Table 16.7 and include the following:

- Natural hazards such flood, landslide, fire or cyclone
- Spills of hazardous materials
- Accidents at road or rail crossings
- Accidents involving explosives
- Pipeline failure and water discharge
- Third party damage.

The HRA did not identify any of the above risks to be of a high level however risk identification is an ongoing process throughout the life of the project as new emergency risk situations could arise. Emergency situations require effective planning and management to reduce the impact arising from the situation. This information is usually documented in an Emergency Management Plan specific to the project.

Table 16.8 Minimum Requirements to be Included in Plans and Procedures

Health and safety management systems	Operational and construction safety plans	Work method statements and JHAs
Responsibility: GAWB/Operator and the construction contractor	Responsibility: GAWB/Operator and the construction contractor	Responsibility: GAWB/Operator and the construction contractor
• Health and safety policy • Management commitment • Responsibilities and accountability • Controls for suppliers, sub-contractors and purchasing • Health and safety consultation • Hazard identification, evaluation and control. • Training and competence • Incident reporting and investigation • Measuring and evaluating workplace health and safety performance	• Workplace address • Name and address of the principal contractor • Principal contractor's ABN • WHS committee • WHS officer appointed • Expected start date and duration of the work • Induction and consultation procedures • Type of construction • Plant provided for common use • Site rules • Site hazards and risks and proposed control measures • How the controls will be implemented • Identification of major hazards and corresponding Work Method Statements • Personal protective equipment • First aid • Contractor management • Monitor and review procedures • Emergency procedures • Public safety strategies • Site housekeeping • Site security and access	• Nature of the high risk construction/operational activity • The control measures to be used • The way the activity will be performed • How the control measures will be monitored and reviewed • Any relevant prescribed occupations

16.8.2 Emergency Planning and Response Procedures

GAWB currently has a Disaster Management Plan in place under which there are sub plans including a Wildfire Action Plan, Cyclone Management Plan and site specific Emergency Action Plans (EAPs) e.g. the Awoonga Emergency Action Plan. A site specific EAP will be developed for the operation of the project.

During construction, emergency management will be undertaken through an Emergency Management Plan. The Planning EMP in Chapter 20, Planning Environmental Management Plan, includes control plans for some of the issues that could be considered in an Emergency Management Plan. These include:

- Handling and storage of hazardous goods
- Emergency incident response
- Health and safety management.

An emergency management plan for the construction phase will include an emergency response procedure, example contents of which are outlined below:

- Emergency contacts and chain of command
- Responsibilities
- Alert systems
- Identification and control of emergency sources
- Access routes and transport methods
- Reporting and review requirements.

16.8.3 Involvement of State Agencies

Relevant state agencies that could be involved during an emergency situation are listed below with the likely nature of their involvement. There are local branches of these services, details of which are provided in Table 16.9. As can be seen from the locations of these local branches there are a number of services available in close proximity to the pipeline and infrastructure site locations. This will enable rapid response from the relevant agency in the event of an emergency situation during construction or operation of the project.

Table 16.9 Emergency Services: Local Branches

State Agency	Likely Involvement in an emergency situation	Location
Queensland Ambulance Service	• Provision of first aid • Transport of injured • Establishment of Casualty Clearing Station if required	Calliope Gladstone Mt Larcom Rockhampton
QFRS	• The control of existing fire or explosive situations • The negation of possible fire or explosive situations • The rescue of trapped and/or injured • The control of chemical emergencies	Calliope Gladstone Mt Alma Raglan Rockhampton
SES	• Provision of personnel and equipment • Assistance with traffic and crowd control • Assistance in the evacuation of person if necessary • Construction of earth bunds • Other assistance as required	Calliope Mt Larcom Rockhampton
Police	• Traffic control • Crowd control • Evacuation of persons if required • Coordination of rescue of trapped or injured persons if required	Calliope Gladstone Mt Larcom Rockhampton

16.9 Summary and Conclusions

Natural hazard management areas have been identified in the relevant planning schemes of the shires through which the project passes. Areas of flood, bushfire and landslide risk occur adjacent to or within the project area and therefore require consideration under SPP 1/03 Mitigating the Adverse Effects of Bushfire, Flood and Landslide. It is considered that the project meets the requirements of this SPP and can demonstrate overriding need.

In addition to the natural hazards identified in the project area, human activity and technological issues can also present hazards. An HRA has been undertaken for the project in accordance with the principles set out in AS/NZS Risk Management Standard 4360:2004 (which supersedes 4360:1999). The risks identified in the HRA are considered to be at most a medium risk level, which in the context of the HRA, means that these risks are considered to be adequately managed through existing and/or proposed management measures.

GAWB's certified health and safety management system is the overarching mechanism for the management of health and safety on the project. GAWB also has a Disaster Management Plan in place for the management of natural hazards and site specific emergencies.

During construction, the construction contractor will also have a Safety Management Plan in place and an Emergency Management Plan which will determine day-to-day procedures and responsibilities for health and safety and emergency planning.

16.10 References

AS/NZS Risk Management Standard 4360:2004

AS/NZS 4801:2001 : Occupational health and safety management systems - Specification with guidance for use

Australian Pipline Association, 2005, Code of Environmental Practice for Onshore Pipelines

BOM Bureau of Meteorology 2008 *Flood Warning System for the Fitzroy River. Sourced from:* www.bom.gov.au

Calliope Shire Council 2007 Calliope Shire Planning Scheme

Department of Local Government and Planning, Department of Emergency Services 1997 *State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.*

Fitzroy Shire Council 2005 *Fitzroy Shire Planning Scheme*

ISO14001:2004 is the internationally recognised environmental standard for an environmental management system (EMS)

ISO 9001:2000 : Quality management systems - Requirements

National Transport Commission 2007 *Australian Code for the Transport of Dangerous Goods by Road and Rail Seventh Edition*, Australian Transport Council

Rockhampton City Council 2005 *Rockhampton City Plan*