CHAPTER 11

GLADSTONE – FITZROY

PIPELINE PROJECT

Environmental Impact Statement

Waste

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11.1 Introduction

Waste has the potential to impact ecological function and services, biodiversity, water quality, social value and human health. Waste can also be considered a resource if re-use options are available.

This chapter identifies and assesses the impacts due to waste generation during construction, testing and commissioning, operations and decommissioning of the Gladstone-Fitzroy Pipeline project (the project) then describes the proposed mitigation measures.

The aims of this chapter are to:

- Describe the legal framework associated with waste management in the context of the project
- Describe the surrounding baseline environment, which determines the impact of waste
- Explain the processes associated with the project that generate waste and the characteristics of the waste itself
- Recommend mitigation and management measures to ensure the minimisation of health risks associated with waste management
- Minimise environmental impacts related to waste generation.

11.2 Methodology

Baseline data collection and impact assessment has been undertaken based on a desktop review.

For simplicity and clear illustration, this chapter describes wastes that are generated by all parts of the project and then, if applicable, describes more specific wastes generated by particular elements of the project. These infrastructure elements include the:

- Fitzroy River Intake pump station
- Alton Downs water treatment plant (WTP), reservoir and pump station
- Raglan pump station and reservoir
- Pipeline
- Aldoga water reservoirs.

The impact of waste was evaluated using the significance criteria shown in Table 11.1. These criteria allow for a standard assessment process and provide a context for describing the significance of the impact.

Table 11.1 Impact Significance Criteria for Waste

Significance	Criteria
Major adverse	Irreversible and severe change to current amenity (e.g. visual amenity, odour or chemical or radiation exposure), resulting in significant human health effects and the displacement of residents and businesses. Irreversible and significant disturbance of ecology due to contamination of the environment over a regional spatial scale. Mitigation measures are unable to reduce impacts.
High adverse	Extensive disturbance to current amenity (e.g. visual amenity, odour or chemical or radiation exposure), resulting in some minor human health effects upon nearby residents and businesses. Considerable permanent adverse disturbance of ecology due to contamination over a local scale. Mitigation measures and detailed design work are unlikely to remove all of the significant effects.
Moderate adverse	Adverse change resulting in some loss or permanent lowering of amenity; though no impact upon human health. Loss and permanent damage to ecology on a local scale. Some recovery is anticipated following completion of the works concerned. Mitigation measures are anticipated to alleviate some impacts.
Minor adverse	Limited or temporary effects resulting in low levels of disturbance or loss to local amenity and ecology. No impact upon human health. Close to full recovery is anticipated following completion of the works concerned. Mitigation measures are anticipated to alleviate close to all impacts.
Negligible adverse	No appreciable impact upon local amenity or ecology. No impacts upon human health. Effects are within normal bounds of variation or within the margin of forecasting error.
Beneficial	Any measures that are expected to result in an improvement of social values, amenity and ecological health. These can, for example, include creation of new habitat features (such as wetlands) to manage waste, or the introduction of measures that would achieve improvements in social values. Also included in this category are measures to ensure the long-term protection Threatened ecological functions or social values.

11.3 Assumptions and Limitations

The impacts of waste are assessed at a stage in the project where detailed design for construction is still under development. As such, waste streams, quantities and their associated impacts are assessed based on existing data available up to 31 May 2008. Throughout the project planning, impacts and quantities will be further refined, elaborated and identified as the planning of the project progresses. Management requirements during construction and operation will also be developed and documented in Environmental Management Plans (EMPs) (see Chapter 20, Planning Environmental Management Plan) and Waste Management Plans.

In the absence of detailed information, mitigation and management measures follow a precautionary approach.

11.4 Relevant Legislation, Policy and Guidelines

11.4.1 Environmental Protection Act 1994 (Qld) and Associated Regulations

Section 13 of the *Environmental Protection Act 1994 (Qld)* (EP Act) defines waste as:

1. (1) Waste includes any thing, other than a resource approved under subsection (4), that is:

   (a) left over, or an unwanted by-product, from an industrial, commercial, domestic or other activity; or

   (b) surplus to the industrial, commercial, domestic or other activity generating the waste.

   Example of paragraph (a) — abandoned or discarded material from an activity is left over, or an unwanted by-product, from the activity

2. (2) Waste can be a gas, liquid, solid or energy, or a combination of any of them

3. (3) A thing can be waste whether or not it is of value.

Under section 319 of the EP Act, the proponent is bound by the general environmental duty. This means that the project must not release waste that is likely to cause environmental harm, unless all reasonable and practical measures are taken to prevent or minimise the harm.

The waste generator must follow this general environmental duty and ensure that waste is transported by a licensed transporter and that it is delivered to a licensed facility. This is particularly important for Regulated (hazardous) Wastes as defined under Schedule 7 of the *Environmental Protection Regulation 1998 (Qld)*.

The transportation of some wastes is regulated. In Queensland legislation, these are referred to as 'trackable wastes' under Part 4 and Schedule 1 of the *Environmental Protection (Waste Management) Regulation 2000 (Qld)*. If wastes are considered trackable, then appropriate records of the waste must be passed on to the transporter. At this stage however, no wastes generated by the project are considered trackable due to their low quantities.

The Environmental Protection Regulation 1998 (Qld) (EP Regulations) also applies as the WTP can be considered an Environmentally Relevant Activity (ERA). ERA 16 (EP Regulations, Schedule 1, pp 88) applies because the WTP is:

"Treating 20 ML or more of water a day in a way that releases treated or untreated waste into the environment, other than by-

(a) a treatment involving the disinfection of the water only."

For this provision to apply, the definition of "environment" from the EP Act has been interpreted whereby releasing residue to landfill (for example) is considered "*releasing waste into the environment*".

Under this ERA, a development permit for a material change of use is required along with a registration certificate, which requires renewal each year (see Appendix C). The requirements of the ERA (e.g. monitoring) will be determined in negotiation with the Environmental Protection Agency (EPA).

Further aspects of the EP Act (e.g. *Environmental Protection (Water) Policy 1997 (Qld)*) will apply depending on the characteristics of the wastes and how waste is managed. The application of these relevant subordinate policies and regulations are discussed below where applicable.

11.4.2 Local Government Conditions

Under the *Environmental Protection (Interim Waste) Regulation 1996 (Qld),* a council may also stipulate where wastes are to be deposited and disposed. Such conditions are normally attached to development application approvals.

11.5 Baseline Environmental Conditions

The environment can influence the impacts of waste and be impacted by waste. Refer to the following chapters for baseline information that is relevant to the impact of waste:

- **Chapter 5, Soils and Contaminated Land -** Topography can influence the way in which some wastes are distributed spatially. Soils can be directly impacted by the release of waste into the environment.
- **Chapter 6, Terrestrial Flora; and Chapter 7, Terrestrial Fauna –** Terrestrial flora and fauna can be impacted by the release of waste.
- **Chapter 8, Aquatic Flora and Fauna -** Aquatic flora and fauna can be impacted by the release of waste.
- **Chapter 9, Water Resources and Water Quality -** Water resources and water quality can be impacted by the release of waste.
- **Chapter 10, Air Environment; and Chapter 3, Climate -** Climatic factors such as rainfall and wind conditions can spread the impact of wastes spatially. Likewise, air quality can be impacted by the release of gaseous wastes such as odour or vehicle emissions.
- **Chapter 15, Social and Economic Environment -** Social and economic environments can be impacted by the release of waste. The impact of waste can also be positively influenced by the existence of environmental management practices (e.g. legislation and waste re-use options) which are in turn influenced by the social and economic environment.

11.6 Waste Generation, Associated Impacts and Management

This section outlines waste streams and the management that will be undertaken. Residual environmental impacts are identified and their significance has been assessed using the significance criteria. Further environmental management measures are documented in the Planning EMP (see Chapter 20, Planning Environmental Management Plan) and will be further developed in the Construction and Operation EMPs.

Most of the waste streams do not need to be assessed for each type of infrastructure (e.g. pump stations or the intake site) as they are similar across each site. However, the Alton Downs WTP and the pipeline will generate site-specific wastes that require separate assessment.

11.6.1 The Waste Management Hierarchy

Waste management for this project follows the waste management hierarchy as a guiding principle. The waste management hierarchy is a framework for prioritising waste management practices to achieve the best environmental outcome. The preferred order of adoption is as follows:

1. Avoid waste by optimising construction, operation and decommissioning methods
2. Re-use waste by identifying sources that can utilise the waste
3. Recycle waste by identifying facilities that are able to recycle waste
4. Energy recovery from waste
5. Disposal of waste at an appropriate facility.

The hierarchy illustrates that despite the management practices stated within this chapter, waste avoidance will always be followed as priority.

11.6.2 Construction

11.6.2.1 General Wastes

All of the construction sites along the project area will have similar construction waste characteristics due to materials used and the construction method. The following sections outline these wastes, the impacts and methods for impact mitigation and management.

Prior to construction, a Waste Management Plan will be prepared as part of the Construction EMP. Emphasis will be placed on housekeeping and all work areas will be maintained in a neat, orderly and hygienic manner.

There are numerous waste collection and disposal contractors within the Rockhampton and Gladstone region that deal with a variety of wastes, including recyclables, liquid and regulated wastes. It is envisaged that these will be engaged as part of the project.

Table 11.2 outlines the type of waste, the associated impacts, management methods and the significance of impact after appropriate management is adopted.

Impact Significance

Impacts from the waste streams are considered minor in the context of the project. After mitigation and management, all general construction waste streams (as shown in Table 11.2) are expected to result in a **negligible impact.**

Table 11.2 Construction Waste Streams, Impacts and Management

Waste stream	Potential impacts	Management
Debris from vegetation clearance.	Impacts include: • Aesthetic impacts • Potential distribution of weeds • Interruption of nutrient cycles.	Where practicable, vegetation will be mulched, stockpiled and spread with topsoil during rehabilitation of the ROW, as recommended in the Australian Pipeline Industry Associated Ltd's *Code of Environmental Practice – Onshore Pipelines 2005*. This is done to reduce fire hazards, recycle nutrients and to provide surface protection from erosion or access barriers. Care will be taken to ensure that weeds are not spread during transportation and upon application of the mulch.
Building waste Building waste will include non-contaminated soil, rubble, bricks, cement, timber skids, pallets, drums, scrap metals, plastics, glues, insulation packaging used in freight, bitumen, tyres and blasting waste such as containers, caps and wires.	No impacts are anticipated as the waste will be transported to a landfill that is managed in accordance with its licence conditions.	Management will include the following: • Suppliers will be encouraged to reduce and/or collect packaging • Sorting, stockpiling and containing recyclable wastes • Arrange transfer of the wastes to the appropriate facility • If waste is inevitable, it will be sorted for disposal • Non-recyclable waste will be disposed of by a licensed contractor to a designated landfill.
Wash-down waste water Wash-down water is generated from cleaning and rinsing equipment and machinery.	Equipment and machinery that is washed down on site with water and detergent will create runoff potentially containing oils, sediments, weed seeds and detergents. The impact is greatly reduced where offsite wash-down facilities are utilised.	To avoid impacts arising from the release of wash-down waste water, all equipment will be washed down in a suitable wash-down facility that is bunded, is away from waterways and has a sump to collect any grease, oil and other contaminants that can be removed by an appropriate and approved disposal method. Where applicable preference will be given to off-site wash down facilities that recycle water and have water efficiency programs.
General waste from staff General waste from staff may include food scraps and other putrescible wastes, garden clippings, toiletries, recyclable and non-recyclable office waste.	The following impacts may occur: • Contamination arising due to litter • Aesthetic impacts of litter.	Management measures will include: • Appropriately placed litter bins to avoid the dispersal of litter and regular site maintenance duties • Waste sorting, composting and recycling • Sealable litter bins to minimise the attraction of vermin, insect and pests • The use of a mobile composting facility (e.g. Bokashi Bin) for food scraps • Collection and transportation of waste by a licensed contractor with disposal at a suitable landfill facility.
Sewage (blackwater) Onsite sewage will be generated from temporary staff toilets and chemical rinsing showers.	Impacts are likely to include: • Odour • Contamination if accidentally released into the surrounding environment.	Domestic sewage waste will be treated by an approved septic or anaerobic treatment system where possible or via connection with the municipal waste sewage infrastructure, depending on location of the site. It is likely that construction sites will use mobile toilet systems (port-a-loos) and shower systems and hence, sewage and sink water will be managed through the mobile system contractor. GAWB will ensure that the contractor is licensed and disposes of sewage in an acceptable manner. Construction staff will be residing at offsite accommodation.

Waste stream	Potential impacts	Management
Trench water due to groundwater infiltration and rain events.	No impacts of mention are expected.	Water within the trenches is expected to be contaminant-free and therefore disposed off onto the land with the use of pumps or allowed to evaporate if practical. Management will ensure that the pumping of the water does not contribute to erosion. If the water is contaminated due to soluble toxicants within the trenches, this water will be collected and treated prior to disposal to land, or disposed of to an approved council facility if it cannot be treated. In Acid Sulfate Soils water will be dealt with as per the requirements of the Acid Sulfate Soils Management Plan (see Chapter 5, Soils and Contaminated Land).
Hazardous and regulated wastes Including those listed in Schedule 7 of the *Environmental Protection Regulation 1998 [Qld]).* For example hydrocarbons (see below) radiography film and developer chemicals used during pipeline weld examination.	Impacts can range from environmental contamination to aesthetic impacts and impacts associated with landfill. At this stage, there is limited information available on the generation of regulated and hazardous wastes however it is expected that minimal quantities of hazardous waste will be generated from the project.	Hazardous and regulated wastes are to be: • Controlled as per any Local Government stipulations or management requirements under legislation • Appropriately contained as to avoid release of the waste into the environment • Transported and disposed of using appropriately licensed transporters and waste management facilities.
Hydrocarbon wastes from end-use Hydrocarbon waste may include lubricants, oils, oil filters from equipment and machinery, waste fuels, absorbable pads and oily rags.	Management measures will reduce the risk of a hydrocarbon spill occurring, however in the event of a spill the impacts may include soil and creek contamination. Spill procedures will be developed and a spill kit will be on hand to manage any spills if they occur. (See Chapter 20, Planning Environmental Management Plan).	Hydrocarbon wastes will be: • Controlled as per any Local Government stipulations or management requirements under legislation • Managed through the use of a spill kit • Appropriately contained as to avoid release of the waste into the environment • Transported and recycled using appropriately licensed transporters and waste management facilities.

11.6.3 Commissioning

The commissioning of the pipeline and its associated infrastructure will generate waste water that will be discharged to the environment (to both land and into waterways). In total, it is expected that between 111 and 579 ML of water will be discharged to the environment at various times throughout the commissioning process (see Table 11.3 below). Between 111 and 251 ML of waste water will be discharged to land and adjacent waterways during pipeline commissioning. The variance in the amount of water required for commissioning is due to:

- The quantity of debris that needs to be flushed from the pipeline and its associated infrastructure and
- The requirement to achieve operational stability for the system (i.e. water is at a quality suitable for integration into GAWB's existing network).

An additional 328 ML of water may be required for the potential re-flushing of the entire system if necessary (this is discussed in section 11.6.3.5).

Waste water discharges at each part of the project are further detailed in sections 11.6.3.1 to 11.6.3.5. Where applicable, specific mitigation measures are included in these sections; however mitigation that applies to all discharges is detailed in section 11.6.3.6.

Table 11.3 Estimated Minimum and Maximum Discharges of Waste Water During Commissioning

Process	Estimated Minimum Discharge (ML)	Estimated Maximum Discharge (ML)
WTP flushing and wet commissioning (Section 11.6.3.1)	0	0
Pipeline cleaning and flushing (Section 11.6.3.2)	6	8
Pipeline pressure testing (Section 11.6.3.2)	15	20
Raglan pump station and reservoir flushing (Section 11.6.3.3)	15	15
Aldoga Reservoir Flushing (Section 11.6.3.4)	50	50
Pipeline wet commissioning (Section 11.6.3.5)	25	85
Raglan pump station and reservoir wet commissioning (Section 11.6.3.5)	0	15
Aldoga Reservoir wet commissioning (Section 11.6.3.5)	0	50
End of pipe discharge at Yarwun (Section 11.6.3.5)	0	8
Potential re-flushing of the entire system (Section 11.6.3.5)	0	328
Total	111	579

11.6.3.1 Alton Downs Water Treatment Plant

Preliminary testing will involve two steps:

1. The WTP will be filled with water, tested for leaks and flushed
2. The WTP will undergo initial wet commissioning, process commissioning and performance testing.

This process will use Fitzroy River water and will produce water that has been treated through normal WTP flocculation and clarification processes, using Alum or equivalent suitable chemical additions. It will be near potable quality but will not initially be chlorinated. It is expected that these steps will be completed within 72 hours (three days).

During these stages and until the WTP reaches operational stability, water will be reused within the system whenever possible. During this time it is intended that treated wet commissioning waste water will be discharged to a stormwater retention basin, however this will be further developed during design. Once water has been discharged to this basin, it is then returned to the head of works via the stormwater pump station. Thus no discharge of waste water to the environment is expected during wet commissioning of the WTP.

11.6.3.2 Pipeline Cleaning, Flushing and Pressure Testing

Once the pipeline has been constructed, it will be pigged (cleaned) in sections and then pressure tested (hydrotested). The pigging debris (suspended solids) will be captured and removed by truck to landfill whilst the waste water will be discharged through the scour outlets onto land and adjacent waterways depending on the location of the scour outlet.

Along the pipeline, scour outlets are located every 200 to 800 m and at topographical depressions in the land, which normally would coincide with a watercourse or natural drainage line. Pipeline scours are designed with an outlet structure at the end of the discharge pipe, which includes a headwall, baffle and area of grouted rock apron to dissipate the energy of water discharge onto the ground and minimise any erosion. Depending on local features, the scour pipe may first discharge into a pump out chamber (provided with a lid).

Where possible, scours will discharge into existing stormwater drains or creeks. At locations remote from a nearby watercourse water will be designed to flow over the scour chamber and disposed of via overland flow. The discharge flow rate has been designed to minimise any impact on the receiving environment.

The entire stretch of pipeline will be broken down into 22 pigging sections. It is expected that approximately 250 to 350 kL of water will be discharged per section at the scour outlet. Exact locations of scour outlets are to be determined during design. Measures to prevent erosion (e.g. reducing the water pressure of the discharging water) will be present at each scour outlet. An approximate total of 6 ML to 8 ML of water will be discharged during this phase.

Pressure testing is then undertaken to verify pipeline strength and to detect leaks. The process involves filling sections of the pipeline with water between two isolation valves (Isolation valves are typically to be installed every 5 km and are to be installed at the inlet and outlets of all pump stations and storage reservoirs). Each segment is pressurised with water, enabling possible leak and weakness detection. These segments will be tested in turn, down the pipeline until the entire pipeline is full of water. Water for this process will be sourced from the Gracemere Main or Eastern Main pipelines (which will be potable water and therefore chlorinated). Once the pipeline is hydrotested, it will remain in the pipeline until the wet commissioning process.

Hydrotesting water may remain in the pipeline for over six months to maintain integrity of the pipeline "floating" due to water within the ground during the wet season. This particular water may be chlorinated to prevent biological growth during the long residence period.

It is likely that the waste hydrotesting water will contain a low amount of residual solids that were not removed by the pigging and flushing (cement residue and sediment) and also have low dissolved oxygen.

Prior to wet commissioning approximately 15 ML to 20 ML of hydrotesting water will be discharged via the scour outlets onto land and into waterways. Each disposal location will have suitable erosion control measures (e.g. the rate of flushing will be controlled as to not create erosion) and the discharge water will be quality tested and oxygenated over aeration beds to increase dissolved oxygen levels, if required.

Residual chlorine[1] may persist up to the flushing point; hence, at the time of flushing, manual chlorine residual testing will take place to ensure the levels of chlorine are not in breach of regulatory requirements. If necessary, the flush discharge will be dechlorinated before discharge.

In discharging waste water from pigging and hydrotesting, the aim will be to meet regulatory requirements and protect the ecological values of the surrounding waterways.

11.6.3.3 Raglan Pump Station and Reservoir Cleaning, Flushing and Pressure Testing

The reservoir at Raglan will undergo flushing and hydrostatic testing. Flush water will be sourced from excess flush water used during pipeline flushing. Due to this, the flush water may contain some residual sediment particles not removed by pipeline scouring, however it is unlikely to contain chlorine. Before discharge, the waste water will undergo onsite testing and treatment (if necessary) to ensure that it is within the regulatory requirements.

In total, 15 ML of water will be discharged to Raglan Creek at the rate of 80 L/s (over 53 hours). The discharge point will have suitable erosion control measures in place.

11.6.3.4 Aldoga Reservoirs Cleaning, Flushing and Pressure Testing

The Aldoga reservoirs will be flushed and hydrostatically tested with water sourced from the Eastern Main pipeline. This water will be potable or near potable quality.

Before discharge of this water, it will undergo onsite testing and treatment (if necessary) to ensure the water quality is within regulatory requirements. This water will be discharged into the environment via stormwater drains. 50 ML of water will be discharged over 174 hours at a rate of 80L/s.

11.6.3.5 Pipeline, Pump Stations and Reservoirs Wet Commissioning

The pipeline and its associated infrastructure will require wet commissioning before it can become operational. This will entail filling and wet testing to ensure that units operate correctly. As part of this process, it is expected that waste water will be generated and will be discharged to the environment.

Chlorine is not expected to be used during the wet commissioning of the plant and pipeline units.

The following sections outline the wet commissioning process for each component of the project and the associated wastes.

Alton Downs Treated Water Storage

The treated water storage at the WTP will be filled to operating capacity with the treated water from the process operations. Once the operating capacity is reached, the pumps will be started to transfer water to Raglan pump station and reservoir. No discharge of waste water is expected during wet commissioning of the treated water storage. It is expected that the water will be pushed through to Raglan pump station and reservoir.

[1] The sum of free chlorine plus combined chlorine. See ANZECC 2000 Water Quality Guidelines pp 8.3-162.

The Pipeline

Output water from the commissioning of the WTP will be pumped through the pipeline once the acceptable operating conditions are in place at the WTP. This will occur in stages as Raglan pump station and Aldoga reservoir will require wet commissioning along the way. The wet commissioning stages of the pipeline will be:

1. Firstly between the WTP and Raglan
2. Between Raglan and Aldoga reservoir
3. Between Aldoga reservoir and the point of termination at Yarwun.

During these stages of pipeline wet commissioning, the scour valves along the pipeline route will be checked for operability and then left in the operating condition (closed). Hence, water will be discharged via these outlets along the entire length of the pipeline. The volume of water that will be discharged through the scour outlets will be between 110 and 370 kL per outlet (based on a total of 25 ML to 85 ML discharge over the 230 proposed scour outlets). It is likely that this water will contain residual sediments from within the pipeline.

Raglan Pump Station and Reservoir

After water has passed through the pipeline between the WTP and Raglan, it will reach Raglan pump station and reservoir and will then be used for wet commissioning of the pump station. During this wet commissioning process, water may be discharged as waste (as sediments that remained in the pipeline will reduce water quality to below that which is required by GAWB's customers). Where possible all water will be reused within the system, however, if required, water will be discharged to Raglan Creek. If this occurs, a maximum of 15 ML of water will be discharged into Raglan Creek at a rate of 70 L/s over 60 hours.

Nonetheless, it is expected that the water quality will be suitable to continue transfer to Aldoga reservoir.

Aldoga Reservoirs

After wet commissioning of the Raglan pump station and reservoir, water will pass to Aldoga reservoirs. Wet commissioning of the pipeline upstream of the Aldoga reservoir will remove any residual sediment within the pipeline and the initial water quality that enters the reservoirs may not be at a standard that can be passed on to GAWB's customers. However, it is anticipated that the water in the Aldoga reservoir will be well diluted due to the large water volume capacity. In addition, any residue or material amounts will be small, and will also settle rapidly in the reservoir volume.

Due to dilution and settling at this hold point, the water quality within the reservoir is expected to be of a quality that can be passed onto GAWB's customers. However, if required, water will be discharged to Larcom Creek. If this occurs, a maximum of 50 ML of water will be discharged into Larcom Creek.

End of pipe discharge at Yarwun

After wet commissioning of the Aldoga reservoir, water at full velocity will pass via the pipeline to Yarwun. Again, this will remove any residual sediment within the pipeline and the water quality may not be at a standard that can be passed on to GAWB's customers. Where the water is unable to be passed onto GAWB's customers, it is proposed that the water will be discharged to Boat Creek. The volume of water discharged could be up to 8 ML of water at 1157 L/s (full flow).

Potential re-flushing of the entire system

In the event where water tested at Yarwun is still below a standard that can be passed on to GAWB's customers, an entire system flushing is proposed to be carried out at two proposed locations (subject to EPA approval), discharging water at full velocity of 1,157 L/s and to a volume of up to 328 ML. The two proposed discharge locations include:

- Boat Creek, or
- Larcom Creek.

Running the pumps and pipes at full velocity (100 percent of flow), will entrain some remaining sediment from the walls of the pipeline.

In spite of this final wet commissioning process, it is expected that the water quality in this stage will meet GAWB's water quality requirements and hence will be delivered into the GAWB distribution network through the Mt. Miller interconnection point, avoiding the need for this discharge to occur.

11.6.3.6 Mitigation and Impact Significance

The impact of waste waters discharged during commissioning will vary depending on where the discharges are released. If it is discharged to a waterway, the waste water will have different chemical properties of the receiving waters and therefore may affect the ecology of the receiving waterway. In addition, the impact will be determined by the flow volumes of the receiving waterway and hence the size of the initial mixing zone.

Where water used in commissioning is water that has been treated in the WTP processes and will be discharged to land, it is acknowledged that it may contain weed seeds that have not been removed in the water treatment process. The spread of weed seeds through commissioning activities will be considered in the detailed design phase for construction, which will include the formulation of a detailed weed management plan.

For all waste waters that are discharged during commissioning, measures will be taken to:

- Minimise the waste volumes of water generated
- Minimise the treated water to be discharged to the environment
- Ensure that the water to be discharged meets the requirements of the Department of Primary Industries and Fisheries, the EPA (expressed in the documented EPA Guidelines), the Water Quality Objectives for the receiving waters, the ANZECC 2000 Water Quality Guidelines and the requirements of stakeholders
- Ensure that treated water meets the requirements of the operations manual (GAWB requirements) as soon as possible after the commissioning process begins
- Ensure erosion protection measures are in place.

The discharge of commissioning water into waterways along the entire pipeline and from the storages is assessed as a **minor adverse impact.**

If it is discharged to land and mitigation measures are in place to prevent erosion, the impact has been assessed as **negligible**.

11.6.4 Operation

11.6.4.1 General Waste

As the project will require onsite personnel during operations, general domestic waste (packaging, food and other putrescible waste, office waste, toiletries) and sewerage will be created.

Along with general domestic waste, industrial wastes such as hazardous (regulated) wastes, waste oils, packaging, drums and general refuse may be generated.

Waste is to be separated into recyclables, landfill and hazardous waste (if necessary) for collection by a licensed collector and disposed at an appropriate waste transfer station.

Waste management will be outlined in the Operations EMP for the various components of the project.

With these above measures in place, the impact arising from waste during operation is considered to be **negligible.**

11.6.4.2 Waste Water at the WTP

Any treated or partially treated water discharged to the environment will be monitored to ensure it meets regulatory requirements and any requirements set out in the detailed weed management plan will be formulated in the detailed design phase for construction. Plant design will prevent unplanned overflow from the WTP to the environment.

11.6.4.3 Residue

At the WTP itself, the water treatment process removes suspended solids from the water using a coagulant (e.g. Aluminium chlorohydrate), which on dissolution forms an aluminium hydroxide floc. At the end of the process, this produces a residue that consists of the aluminium hydroxide and other solids removed from the raw water such as sediment and potentially algae. Residue will be placed in hoppers (silos) for storage, ready for transport offsite. The entire residue area, including the emergency residue stockpile area, will be bunded and runoff will be directed to a sediment basin to prevent the residue produced from running offsite.

The quantity of residue produced by the plant will depend on the influent water quality (e.g. level of Total Suspended Solids in the Fitzroy River - seasonal and catchment conditions will influence this) and the amount of water being treated through the WTP at the time. The WTP will produce an average of 118 tonnes per day of wet residue at a consistency of 30 percent dry solids and 70 percent water (i.e. sludge solids percentage of 30 percent). The sludge solids percentage (mass of dry solids divided by total mass of wet residue x 100) may also vary due to the type of sludge produced, the coagulant added, the ability of the sludge to be dewatered and the type of sludge dewatering equipment used.

The estimated chemical composition of the residue is presented in Table 11.4. With exceptions to the chemicals added during the WTP process, the level of constituents is primarily due to the water quality of the Fitzroy River.

Table 11.4 Estimate of Alton Downs WTP Residue Constituents

Constituent	Average (mg/L)	Average (kg/t)
Total Solids*	300,000	300
Arsenic (As)	1.22	0.00101
Cadmium (Cd)	0.07	0.00006
Copper (Cu)	7.83	0.00653
Nickel (Ni)	23.80	0.01984
Lead (Pb)	1.57	0.00131
Mercury (Hg)	0.02	0.00002
Zinc (Zn)	13.04	0.01087
Projected Alum (Al)**	6210	5.175
Projected Polyelectrolyte		1.59

*Suspended Solids Percentage = 30%

**May be replaced or partially substituted with PolyDADMAC, which is a Cationic polymer effective in flocculating, decolouring, algae removal and removing organics. PolyDADMAC enhances flocculation by attracting negatively charges particles and having a large molecular structure, enables particles within the water to be entrained within the floc mesh and settled. PolyDADMAC is not classified as hazardous.

An Operational Policy for determinations for the management of regulated waste from the Environmental Protection Agency (EPA) (2007) states that as the WTP is not treating municipal waste water, the residue is not considered a regulated waste under the *Environmental Protection Regulation 1998 (Qld).*

The WTP process is unlikely to produce undesirable odour or gaseous emissions. However, if potential odour sources are identified in the design stage, a treatment strategy will be developed. This is discussed further in Chapter 10, Air Environment.

There are currently two options under consideration for the disposal of the residue. One of the options involves the supply of the residue to a local contractor. The other option involves a local government approved landfill. The environmental impacts associated with these options include land use change (either as a direct or cumulative impact) and also the generation of vehicle emissions associated with the transport of the residue to the external residue management site (discussed in Chapter 13, Transport and Access Arrangements). All of these options will have onsite management practices in line with current and applicable legislation, standards and guidelines.

There is a risk that residue may contain weed seeds that have not been removed in the water treatment process. The spread of weed seeds through residue reuse as a soil improver will be considered in the detailed design phase for construction which will include the formulation of a detailed weed management plan to minimise risk of weed seed spread through residue disposal.

The environmental impact of residue waste has been assessed as **minor adverse.**

11.6.4.4 Pigging

During operations, sediments, algae and other chemical deposits associated with river water attach and accumulate on the inside of the pipeline between the intake station and WTP. Once or twice a year, depending on the water quality, pigging maintenance will be undertaken in order to remove these deposits. Pigging involves the movement of a scouring 'pig' through the pipeline.

The deposits are not considered hazardous and as the waste will be deposited at the WTP, disposal of pigging waste will be included with the residue waste generated by the WTP, which will be taken to landfill. With management, the impact has been assessed as **negligible**.

11.6.4.5 Pipeline Maintenance

Bacteria and algae and other solid deposits may build up throughout the pipeline. There are two maintenance processes that are carried out to remove these deposits – disinfection (to kill and remove biofilm) and scouring maintenance.

11.6.4.6 Disinfection

Treated water from the Alton Downs WTP will be treated with Sodium Hypochlorite to ensure growth of biofilm does not occur throughout the pipeline network. This treatment may be either continual or periodic in nature, depending on the requirements of the operating system. The system will control Sodium Hypochlorite dosing based on algal control and the minimisation of chlorination by-products.

Disinfected water is transferred to the existing GAWB network and is thus not released to the environment.

11.6.4.7 Scour Maintenance

This maintenance occurs when fine particles from the pre-treated water deposit at the low points of the pipeline and need to be flushed out. Depending on the quality of the pipeline water, sediments are flushed out through the scour outlets onto land and into waterways approximately once every two to five years. This process usually lasts several hours at low pressures. Residual chlorine will not be present during scouring as chlorine dosing can be stopped for a period prior to scouring without detriment to the pipeline. Thus, the scour water would be chlorine-free. It is acknowledged that scour waste water discharged to land may contain weed seeds that have not been removed in the water treatment process. The spread of weed seeds through the scour process will be considered in the detailed design phase for construction, which will include the formulation of a detailed weed management plan. Currently, the volume of water that will pass out the scour outlets is unknown as it will depend on the location of the scour outlet. It is likely that water will be discharged at around 70 L/s.

The release of treated water to waterways is expected to result in a **minor impact.** If treated water is discharged to land, the impact is expected to be **negligible**.

11.6.4.8 Overflow at the Alton Downs WTP, Raglan and Aldoga Reservoirs

At the Alton Downs WTP, Raglan and Aldoga reservoirs there will be an overflow pipe for the discharge of surplus water.

The design of the overflow system for these facilities will consist of an outlet structure at the end of the overflow pipe that is similar to the outlet structure described for the scour (outlined above in section 11.6.3.2).

At the reservoir at the Alton Downs WTP, the overflow system for the reservoir is designed for the event when the downstream pipeline is closed and the WTP Pump Station is still operating. The overflow pipe will discharge to the stormwater retention basin and therefore no water would be discharged to the environment.

Likewise, at the Raglan Pump Station and Reservoir, the overflow system is designed for a potential situation where the downstream pipeline is closed and the WTP pump station is still operating. Water will be discharged to a flat area of open native grassland about 200 m from the reservoir. This is to reduce the outlet velocity of the discharge to a level where the overflow will spread and flow along the existing ground without causing any erosion. This discharge will then follow natural drainage lines eventually into Raglan Creek, which is located between 370 m and 400 m to the south.

At the Aldoga Reservoir, the purpose of the overflow is to discharge surplus reservoir water should the control equipment fail and pumps continue pumping water to a level above the capacity of the reservoirs. Discharge from the overflow is directed towards the surface water drain for the site alongside the access road from where it will follow a natural drainage channel to the culverts under Myrlea Road. The water from this point will discharge into Larcom Creek.

The pipeline and its associated infrastructure has been designed to minimise the necessity for overflow discharges. Despite this, overflow water from these facilities may be discharged on occasions and this is likely to contain chlorine. In the case of overflow discharges at Raglan Pump Station and Reservoir and Aldoga Reservoir, the level of chlorine entering the two aquatic environments will depend on numerous factors. These include the available reducing organic compounds within the environment, volume of water in the waterway, the weather conditions and the length of time the water discharged is exposed to the weather, the size of the initial mixing zone and other environmental factors.

Despite the reductions in residual chlorine that may occur, some organic chlorine compounds will form and remain in the ecosystem as these compounds are considered persistent environmental contaminants that are toxic to aquatic organisms (ANZECC 2000, pp. 8.3-162; Emmanuel E et al, 2004).

The overflow water will also have other different chemical properties of the receiving waters and therefore may affect the ecology of the receiving waterway. Again, the impact will be determined by the volume of water that will reach the waterway, the flow volumes of the receiving waterway and hence the size of the initial mixing zone.

In addition, the water may contain weed seeds that have not been removed in the water treatment process. The spread of weed seeds will be considered in the detailed design phase for construction and will include the formulation of a detailed operations weed management plan.

Discharges will be in line with regulatory requirements and as mentioned above, measures will be incorporated into the design to minimise erosion.

Where water is discharged to the stormwater retention basin at the Alton Downs WTP, the impact is considered **negligible**. Each instance of overflow water discharge at Raglan Pump Station and Reservoir and Aldoga Reservoir is expected to result in a **minor impact.**

11.6.5 Decommissioning

Decommissioning has the potential to create waste, however, as noted in the limitations section, technology and legislation is likely to change throughout the 80-year life of the pipeline and this will influence how the waste is managed. For example, the infrastructure is likely to follow the waste hierarchy where refurbishment is preferred over demolition, thus avoiding the generation of waste. It is also likely that wastes generated during decommissioning will be controlled through a Waste Management Plan.

Due to the unknown fate of the infrastructure, the waste management processes that will be employed, and the unknown characteristics of the waste, decommissioning wastes are not discussed further.

11.7 Summary and Conclusions

With the available information, this chapter identified waste streams, management and the associated residual impacts. It has been shown that waste will be generated throughout construction and operations, however decommissioning wastes are too uncertain to identify due to the long life of the project.

Construction wastes consist of general building wastes and hazardous wastes. Most wastes are able to be managed through disposal to one of the landfill sites within the region.

Other construction wastes will be generated upon commissioning of the project. This may result in water discharges from the WTP and from the pipeline and associated infrastructure onto land and into waterways. In discharging this water, the aim will be to meet regulatory requirements and protect ecological values.

During operation, general wastes such as sewage and litter will be generated along with site-specific wastes. General wastes shall be managed as appropriate to the waste type i.e. sewage waste will be treated onsite with a package wastewater treatment plant before discharge. Sewage sludge removal will occur with a registered contractor. General litter will be removed by an appropriate contractor.

The quantity of residue produced by the plant is expected to be approximately 120 tonnes per day of wet residue at a consistency of 30 percent dry solids and 70 percent water. The appropriate residue disposal strategy will be determined in consultation with the relevant council authority and approving bodies. The disposal options under consideration include:

- Local government approved landfill
- Supply to a local contractor.

The preferred disposal option will be selected prior to construction.

Likewise, pigging waste will be generated and disposed of in an appropriate landfill.

Operations will result in the discharge of wastewater from scour maintenance and potential discharges from the overflow system. These will be discharged to land and waterways in line with regulatory requirements and management plans.

The significance of the impact of each waste stream is summarised in Table 11.5.

Table 11.5 Summary of Impacts

EIS Area: Waste Feature/ Activity	Current Value + Substitutable Y:N	Description of Impact		
		Description in Words	Mitigation Inherent in Design/ Standard Practice Mitigation	Residual Impact Using Significance Criteria
Construction Impacts				
Construction sites	N/A	Waste generated from construction activities.	Waste Management Plan and planning EMP.	Negligible
Commissioning Impacts				
Alton Down WTP Commissioning	N/A	Waste water released into the environment from flushing, hydrotesting and wet commissioning of the WTP.	Discharged in line with regulatory requirements. Erosion protection measures.	Negligible/Minor adverse
Pipeline cleaning, flushing and hydrotesting	N/A	Discharge of wastewater through scour outlets onto land and into waterways.	Discharged in line with regulatory requirements. Erosion protection measures.	Negligible/Minor adverse

EIS Area: Waste Feature/ Activity	Current Value + Substitutable Y:N	Description of Impact		
		Description in Words	Mitigation Inherent in Design/ Standard Practice Mitigation	Residual Impact Using Significance Criteria
Raglan pump station and reservoir cleaning, flushing and pressure testing	N/A	Discharge of wastewater to Raglan Creek.	Discharged in line with regulatory requirements. Erosion protection measures.	Negligible/Minor adverse
Aldoga reservoirs cleaning, flushing and pressure testing	N/A	Discharge of wastewater through scour outlets onto land and into waterways.	Discharged in line with regulatory requirements. Erosion protection measures.	Negligible/Minor adverse
Pipeline, Pump Stations and Reservoirs Wet commissioning	N/A	Discharge of wastewater onto land and into waterways.	Discharged in line with regulatory requirements. Erosion protection measures.	Negligible/Minor adverse
Operational impacts				
Operational sites	N/A	General waste generated at operational site.	Planning EMP.	Negligible
Pigging	N/A	Waste created from pigging of the pipeline between the intake and WTP.	Pigging waste will be disposed of into landfill within the residue.	Negligible
WTP residue generation	N/A	Residue generated from the WTP process.	Planning EMP. Disposed of residue in landfill or supplied to a local contractor.	Minor adverse
Scour maintenance	N/A	Wastewater discharging through scour outlets.	Planning EMP. Discharged in line with regulatory requirements.	Negligible/Minor adverse
Periodic pipeline disinfection	N/A	Not intended to be released to the environment.	Disinfected water is transferred to the existing GAWB network.	Negligible
Overflow Discharges	N/A	Overflow discharges may occur at Raglan pump station and reservoir, and at Aldoga reservoir.	Design of the pipeline system and control systems have minimised the chances of this occurring. Erosion and sediment control measures will also reduce the impact if this discharge occurs.	Minor Adverse

11.8 References and Bibliography

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