CHAPTER 19

GLADSTONE – FITZROY
PIPELINE PROJECT
Environmental Impact Statement

Sustainability Impacts

Gladstone Area Water Board

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19.1 Introduction

The purpose of this chapter is to assess the sustainability performance of the Gladstone-Fitzroy Pipeline project (the project) at the impact assessment stage. The sustainability assessment draws on the detailed studies undertaken for the EIS for the project. As the assessment is undertaken at a point in time it is intended to provide a 'snapshot' of the sustainability issues relevant to the project now and does not reflect possible changes to the project over time.

19.2 Sustainability in Queensland

In 1994, the *Environmental Protection Act 1994* (EP Act) was introduced to protect Queensland's environment while allowing for development that improves the total quality of life, now and in the future, in a way that maintains ecological processes on which life depends. The EP Act is underpinned by the concept of Ecologically Sustainable Development (ESD) and aims to address specific aspects of the environment including air, noise, water and waste that are covered in separate environmental protection policies[1]. The Queensland Government has also included the concept of ESD in other introduced legislation such as the *Nature Conservation Act 1992 (NC Act)* and the *Coastal Protection and Management Act 1995*.

In 1997, the Queensland Government introduced the concept of ESD into planning and development legislation in Queensland through the enactment of the *Integrated Planning Act 1997*, commonly referred to as IPA. The purpose of IPA is to balance community well-being, economic development and the protection of the natural environment by providing a framework for managing growth and change within Queensland. The IPA includes various planning schemes and policies at a state, regional and local level, and an Integrated Development Assessment System, (IDAS[2]).

19.3 Sustainability Assessment

19.3.1 Purpose and Scope

The assessment considers all aspects of the project but does not generally include an assessment of GAWB's policies and operations unrelated to the project. The scope of the assessment includes construction and operational issues. Arup's Sustainable Project Appraisal Routine (SPeAR®) tool has been used for this assessment.

19.3.2 Background to SPeAR®

SPeAR® is a tool that is used to qualitatively assess the sustainability performance of projects, plans or developments. It can be used to compare scenarios, provide a snapshot of sustainability performance at a point in time, or demonstrate continual performance improvement through the life of a project. Central to SPeAR® is a graphical output (a 'SPeAR® diagram') that summarises the diverse range of issues assessed.

The SPeAR® assessment provides scores against a range of sustainability indicators defined in the four key areas of environment, social, economics and natural resources (the four quadrants of the SPeAR® diagram), as shown in the Figure 19.1. There are over 100 indicators in the base SPeAR® tool.

Information shown on the SPeAR® diagram is based on the information available at the time of data collection, which was used to complete the assessment. The nature of some of the indicators assessed means that the appraisal consists of both quantitative and qualitative values.

The four sectors of SPeAR® and their accompanying indicators are not weighted, and the outcome of the SPeAR® appraisal therefore reflects the utilisation of an un-weighted indicator set.

A yellow median line on the diagram is used to represent best practice. Positive elements of the project are represented by green tones from the median line towards the centre of the diagram, and negative elements by orange to red tones from the median line towards the circumference (see Figure 19.2).

1 See http://www.epa.qld.gov.au/about_the_epa/legislation/environmental_protection

2 See http://www.ipa.qld.gov.au/overview/default.asp

Figure 19.1: The Four Quadrants of the SPeAR® Diagram

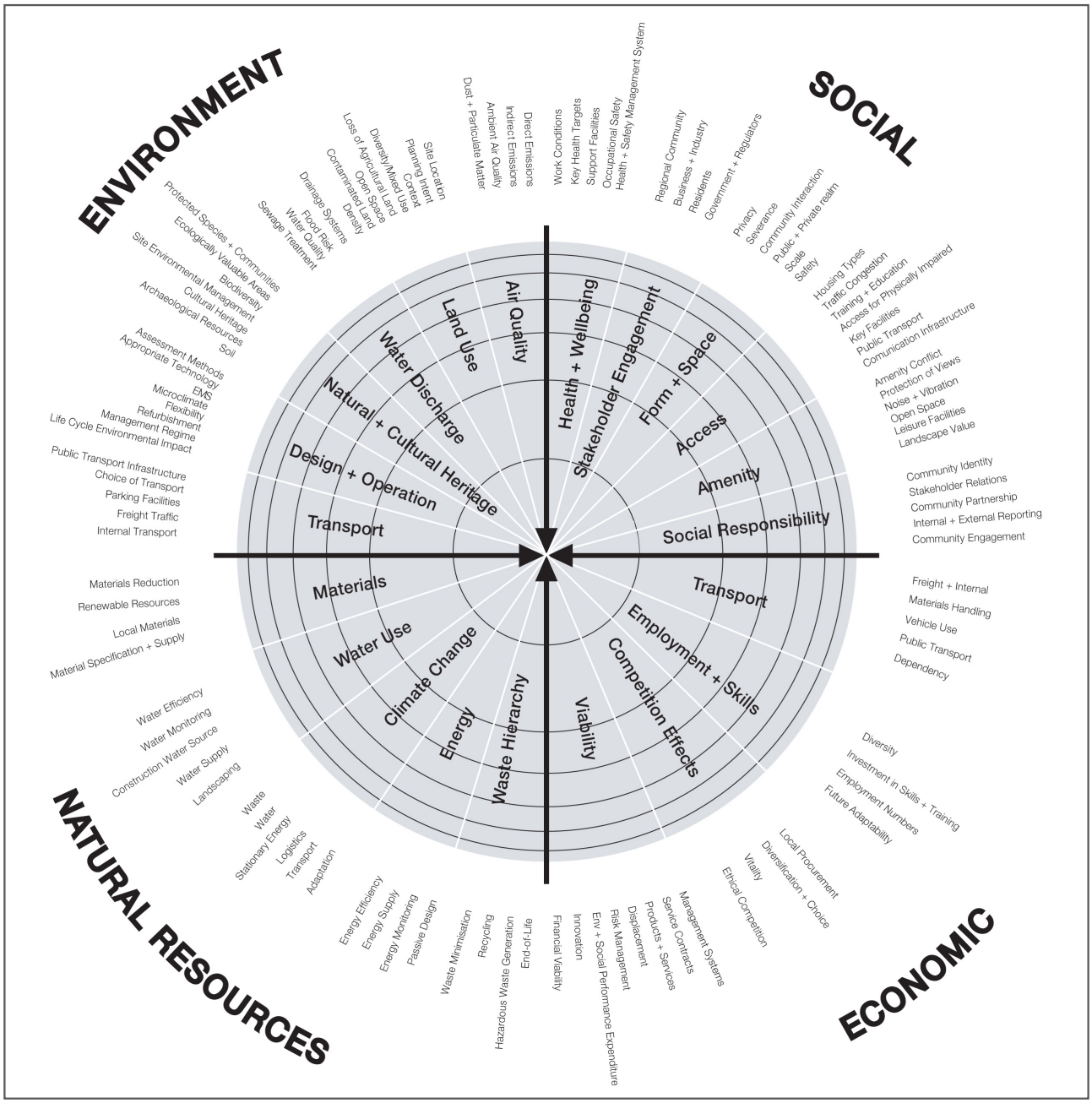
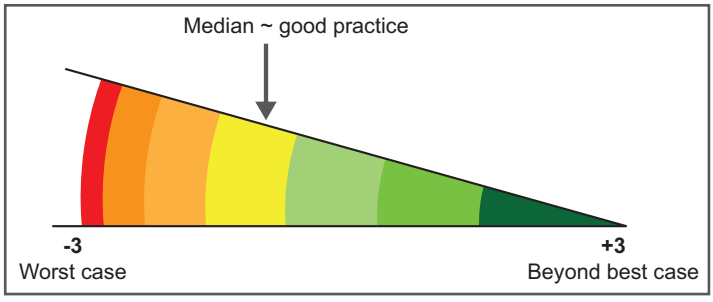


Figure 19.2: A yellow Median Line is Used to Represent Best Practice



19.4 Methodology

The information used for this SPeAR® assessment has been obtained from the detailed studies undertaken during the EIS phase of the project.

The steps undertaken in the assessment are outlined below:

- A review of other water pipeline projects for similar projects to gain an understanding of the benchmark water pipeline projects worldwide
- A review of the base SPeAR® indicators to ensure their relevance to the project
- Addition or removal of indicators relevant to the project
- An assessment of the project against the SPeAR® indicators using the information from the multi-disciplinary studies undertaken for the EIS
- Generation of the SPeAR® diagram
- Reporting of the results of the analysis against SPeAR® indicators.

The indicators used for the assessment are outlined in Table 19.1.

19.5 Results

The sustainability issues discussed in this chapter are referenced with their relevant quadrant and segment (e.g. Environment – Water), so that they can be easily read and aligned with the SPeAR® diagram. A description of each segment is provided so that the context of the comments is clear and the description is marked with the colour allocated in the assessment to indicate its performance. The link between the segments and the topic areas of the Draft EIS is also highlighted.

A SPeAR® diagram indicating the sustainability performance of all indicators considered is provided in the summary section at the end of this chapter. The following assessment is described in order of the four quadrants and then headline indicators as previously discussed.

19.6 Environment Quadrant

19.6.1 Environment – Air Quality:

Air emissions indicators address direct and indirect emissions resulting from the project including nuisance dust, particles as 10 µm (PM_{10}), Oxides of Nitrogen (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOCs) and Greenhouse Gases (GHGs) emissions and take into account the baseline environment. Emissions resulting from the operation of construction equipment, water treatment plant (WTP), pump station and booster station have been considered as direct emissions. Indirect emissions sources considered for the project include emissions resulting from the purchase of electricity for operation of the pipeline itself.

Relevant Chapters of the EIS: Chapter 10, Air Environment and Chapter 3, Climate

Baseline pollutant levels for Queensland (including the project area) are set by the Queensland Environment Protection Agency (EPA) through the *Environmental Protection (Air) Policy 1997* and *National Environment Protection Measures* (NEPM) – National air quality goals – set by the National Environment Protection Council of Australia. Baseline levels for Total Suspended Particulate Matter, particles smaller than PM_{10}, NO_x, CO, VOCs and GHGs in the project area are all within air quality goals, except for the occasional exceedence caused by extreme events such as a bushfire or dust storm.

Comparing the project construction Greenhouse Gas Emissions to the total Industrial Process sector emissions for Queensland indicates that this project will result in an increase in emissions of approximately 3.3 percent for each of the two years the project is under construction and 0.077 percent per annum during operation (see Chapter 10, Air Environment).

Table 19.1: The GAWB SPeAR® Assessment Considered the Following Headline Sustainability Indicators

Quadrant	Environment	Social	Natural Resources	Economic
Headline Indicators	Air Quality	Social Responsibility	Materials	Viability
	Land Use	Amenity	Water Use	Competition Effects
	Water Discharge	Access	Energy	Employment Skills
	Natural and Cultural Heritage	Form and Space	Waste Hierarchy	Transport
	Design and Operation	Stakeholder Satisfaction		
	Transport	Health and Wellbeing		

GAWB is currently investigating options to offset its corporate greenhouse gas emissions (or carbon footprint). Options under consideration include the purchase of offsets, the use of GAWB land for carbon sequestration or the use of alternative (i.e. non-carbon) fuel sources (e.g. solar and wind) in its operations.

The air quality impacts arising from the project, during construction and operation, were assessed as being minor to negligible and would generally comply with all relevant air quality goals at the nearest residential locations. This includes the Alton Downs WTP, which will be designed to minimise the potential for generating odours. There will be a high level of control during construction, e.g. for dust and particulate matter, via suppression, through adherence to the activities outlined in the Environmental Management Plan (EMP) for the project.

19.6.2 Environment – Land Use:

Land use indicators take account of site location, planning intent and issues such as flooding, contaminated land and acid sulfate soils (ASS). A more sustainable project makes use of previously developed land, is in context with surrounding land uses and complies with relevant planning intents for the site.

Relevant Chapters of the EIS: Chapter 4, Land Use and Infrastructure; Chapter 5, Soils and Contaminated Land; and Chapter 9, Water Resources and Water Quality.

Whilst the pipeline corridor will traverse land that is used for a mix of activities, the route generally crosses pastoral and agricultural properties, with the majority of the route dominated by cattle grazing and some areas of intensive cattle pasture. Other land uses in proximity to the route include infrastructure corridors, rural dwelling houses and some extractive industries.

The location of the project is in line with State, regional and local planning intent. It is generally consistent with regional planning documents, such as the Central Queensland Regional Growth Management Framework and the Curtis Coast Regional Coastal Management Plan, as well as local planning schemes. Planning documents reviewed in relation to this project are largely supportive of the proposed pipeline given the potential economic and social benefits that would arise from its construction. The most important of these benefits is the viability of the Gladstone State Development Area (GSDA) to function as an internationally significant industrial hub, which will contribute significantly to the local, State and national economies.

In relation to the context with the surrounding area, the majority of the pipeline falls within either the Stanwell - Gladstone Infrastructure Corridor (SGIC) or the GSDA. These are designated areas, especially set aside for specific forms of development. In the case of the SGIC, whilst GAWB may be the first pipeline to be constructed within the corridor, it is envisaged that a number of other underground pipelines will also be developed in the same corridor. For the GSDA, the project will be confined to a pre-determined corridor based on existing and future development.

The project will impact upon Good Quality Agricultural Land (GQAL) in different ways. GQAL loss and fragmentation as a result of the project will be minimised as almost all current agriculture, such as grazing and cropping, will be able to continue post-construction. However, new areas of irrigation, ploughing and cropping may be unable to develop above the pipeline post-construction depending on the terms of the easement agreements. Over 90 percent of the land in the construction corridor is classified as C-Class GQAL and therefore deemed unsuitable for cropping.

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. The project does not adversely affect water flows.

Variable levels of Potential Acid Sulfate Soils (PASS) and actual Acid Sulfate Soils (ASS) have been detected across the project area. Acid sulfate soils are soils that, when disturbed, oxidize and produce sulfuric acid that lowers the pH in runoff and groundwater. This leads to the release of toxic aluminium and iron into the groundwater. ASS material has been excavated and treated onsite with agricultural lime for earlier geotechnical work, as will be the case for site preparation associated with construction of the pipeline. An ASS Management Plan will be developed prior to construction to effectively manage ASS during construction.

There is a small number (approximately five) of contaminated sites that have been identified from State Government database/register searches that are located within or in close proximity to the pipeline corridor. Potential contaminants in these sites include unexploded ordinances and lead contaminated soil from a rifle range, potential for toxic leachate from landfill and mobilisation of arsenic from a registered site. Preliminary site investigations will be undertaken for each identified site prior to the initiation of any construction work. The EMP also describes the mitigation measures that will manage the risks associated with these contaminants during construction.

19.6.3 Environment – Water Discharge:

SPeAR® indicators for water discharge assess the impact of the project on natural drainage systems and the risk of water pollution during construction and operation. A more sustainable project will reinforce natural water cycles and set challenging water quality targets.

Relevant Chapters of the EIS: Chapter 9, Water Resources and Water Quality.

Please Note: EIS Chapter 9, Water Resources and Water Quality did not address the allocation of water from the Fitzroy River or possible impacts to downstream environmental flows. This is managed through the Queensland Government water planning process (described in EIS Chapter 1, Introduction) and is not included in the Terms of Reference for the project.

The Project will cross a number of waterways including rivers, ephemeral streams, tidal streams and groundwater aquifers. Principal surface water drainages intersected by the proposed pipeline corridor include Fitzroy River, Gavial Creek, Eight Mile Creek, Twelve Mile Creek, Raglan Creek and Larcom Creek. Two semi-permanent lagoons and approximately 24 ephemeral streams of varying size were also identified within the project area from baseline fieldwork.

The majority of smaller surface water drainages in the project area were found to be dry at the time of sampling. Furthermore, the quality of surface water at the time of sampling was found to be significantly impacted by past and/or existing agricultural and mining activities (e.g. high sediment loads, high nutrient loads and poor dissolved oxygen content).

The potential effects on water quality resulting from both the construction and subsequent operation of the project were assessed as being principally:

- Effects related to discharge of construction site run-off during earthmoving, general construction works or maintenance works
- Potential for contamination of water by releases of polluting substances (e.g. oil, ASS) from spillages at the project site or disturbance of contaminated material
- The impact of surface and stormwater discharge from the project site during construction on receiving watercourses, in terms of impact on water quality and bank stability
- Release of water during pipeline operation/maintenance.

It has been acknowledged that there will be some minor releases of contaminants into water bodies during the operational phase and to minimise surface water quality impacts during construction, mitigation measures will be implemented through the Construction EMP.

The guiding premise behind the groundwater assessment was that the 'highest beneficial usage' categories of the existing groundwater resources are maintained. Analysis concluded that the highest beneficial use for groundwater systems relevant to the study area was agricultural water (with residential use as secondary).

Along the entire pipeline alignment, the existing land use is described as "production from relatively natural environments". It is therefore likely that the groundwater resources in close proximity to the pipeline alignment may have been historically exposed to pollutants typical for agricultural practices, such as dispersed application of pesticides or fertilisers. The possibility of point source contamination cannot be discounted, such as unlicensed private rural disposal sites or spills. Pollutants typically associated with urban or industrial developments, such as hydrocarbons or heavy metals are not generally expected.

It will be a requirement of the pipeline project to ensure that the capacity of existing aquifer systems to meet general agricultural usages and secondary residential usages is not compromised. With mitigation however, this impact to groundwater is expected to be manageable.

19.6.4 Environment – Natural and Cultural Heritage:

The indicators for natural and cultural heritage relate to the impact of the project on natural habitats, biodiversity, cultural and archaeological resources. A more sustainable project will contribute to habitat conservation, not impact designated sites, maximise opportunities for species diversity, and will protect, retain and enhance cultural or archaeological resources.

Relevant Chapters of the EIS: Chapter 5, Soils and Contaminated Land; Chapter 6, Terrestrial Flora; Chapter 7, Terrestrial Fauna; Chapter 8, Aquatic Flora and Fauna; and Chapter 14, Cultural Heritage.

The region between Rockhampton and Gladstone has a long history of pastoralism and agriculture (since the 1850s) and is currently dominated by extensive cattle grazing activities. Clearance of native vegetation, pasture improvement and cattle grazing is a land use sequence which has significantly influenced flora and fauna values and the characteristics. The ability of native flora and fauna to adapt to changes in habitat extent and condition varies considerably, and for a variety of taxa, there has been a notable decline in their local and regional distribution and abundance.

19.6.4.1 Aquatic Flora & Fauna

The key ecological functional groups considered for the purposes of the EIS were:

- Aquatic macrophytes (aquatic plants that are typically large enough to be visible to the naked eye) and habitats
- Macroinvertebrates (animals without backbones that are visible with the naked eye)
- Fish (estuarine and freshwater)
- Freshwater turtles
- Marine megafauna (Marine mammals and Marine reptiles).

On the basis of a review of existing data, six main drainages were identified within the project area, namely Fitzroy River, Gavial Creek, Inkerman Creek, Twelve Mile Creek, Raglan Creek and Larcom Creek. Furthermore, two semi-permanent floodplain lagoons and approximately 24 ephemeral drainages of varying size were identified within the project area. Of these streams and drainages, a total of 16 sites were selected for field assessments.

Marine and aquatic habitat and flora surveys were undertaken at these 16 representative sites from 23 to 28 August 2007 inclusive. A survey of the habitat characteristics of each site was undertaken, documenting riparian vegetation characteristics, stream substrate composition and profile, adjacent land uses and several other indicators of habitat condition.

Key potential impacting processes to aquatic flora, fauna and their habitat resulting from the construction and operation phases of the project were identified as being:

Construction phase

- Vegetation clearing and channel disturbance
- Water quality modifications
- Creation of instream barriers (i.e. culverts)
- Creation of new mosquito and biting midge breeding sites.

Operational phase

- Alterations to habitat, both surrounding the intake pipe and within the Fitzroy River weir pool
- Translocation of exotic species, especially the noxious water hyacinth (Eichhornia crassipes) from the Fitzroy River
- WTP operational impacts, which include entrainment of biota and bed and bank scouring (refer Chapter 8, Aquatic Flora and Fauna, Section 8.6.3.1 for further details).

In response to this, key mitigation measures identified within the EIS were:

- Where possible, trenchless methods have been selected for creek crossings at ecologically significant or sensitive watercourses to reduce vegetation clearing and channel disturbance, water quality modifications and the creation of in-stream barriers
- The corridor width has been reduced in sensitive areas (such as Raglan Creek)
- Works will be undertaken in existing tracks where possible
- Sediment control measures will be employed to control disturbed sediments
- Where possible, vegetation will be replanted after construction is complete to ensure the long-term stability of stream banks
- Any small areas of ponded water resulting from local rainfall or flooding (i.e. within borrow pits or pools upstream of temporary barriers) will be emptied within a few days to avoid breeding of biting insects
- Construction activities will be conducted in a manner so as to minimise disturbance to stream/wetland banks and beds
- Where disturbance of PASS is unavoidable, soils will be treated appropriately and the generation of acid runoff will be minimised (or avoided)
- Translocation of exotic species will be controlled through the appropriate disposal of residue.

In terms of instream barriers, the construction of the sheet pile coffer dam around the water intake structure within the Fitzroy River represents a potential risk to fish trapped within the pool formed by the dam walls. However, the intake has been designed such that there will be an adequate distance between the pump and the intake screens to reduce the risk of fauna being sucked on to the intake screens (i.e. reduced flow velocity).

The clearing of estuarine vegetation, especially in and around Raglan and Horrigan Creeks, where the corridor crosses extensive mapped areas of mangroves, dominated by *Excoecaria agallocha* and *Avicennia marina,* was assessed as having a higher level impact. The loss of this vegetation is expected to result in highly localised impacts to estuarine ecosystems within the footprint. Detectable impacts to fisheries productivity at Raglan Creek at an estuary-wide scale are not expected, although ecological functions at this scale could be impeded (i.e. loss of nursery habitat values, bank stabilisation impacts).

19.6.4.2 Terrestrial Flora

The study of terrestrial flora looked at the vegetation communities (classified as REs by EPA 2007) and Threatened species (as defined under the relevant Acts) along the proposed pipeline corridor, which are likely to be impacted by the project. Weed issues in the study area were also considered to avoid exacerbating problems, particularly with parthenium and giant rats-tail grass.

Almost all of the species listed as Endangered or Vulnerable in the *NC Act* from Wildlife Online, and reported on by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), are scrub species. These species were therefore assumed to occur most likely within remnant patches of softwood scrub or vine-thicket, so targeted surveys for these species was restricted to these remnant patches. Partially cleared, or re-growth, areas of scrub were also surveyed as part of the vegetation survey. None of the listed scrub species were found during the surveys, but as a safety measure, the areas of scrub that they might reside in are protected nonetheless.

Eucalyptus raveretiana (black ironbox) was listed in researched databases as Vulnerable and is known to occur in riverine areas that are likely to be intersected by the corridor route, however, it was not found during the survey, despite being specifically searched for at each of the creek crossings. The two cycads *Cycas megacarpa* and *C.ophiolitica* were listed in researched

databases as Endangered, but were not reported in the EPBC Act search for the study area. They are known to occur in the study area and are likely to be in forested areas intersected by the corridor route. As reported in the remnant vegetation communities section, *Macrozamia sp.* were seen in the understorey in places, but not along the actual corridor itself. It is accepted that there is the possibility that a young *Cycas sp.* without a trunk may be confused with *Macrozamia sp.*, but nothing that looked like either genus was seen along the corridor (except, at a distance, for the marginally similar *Xanthorrhoea johnsonii*). There is a chance that it may have been missed as there was burning off being done in the area at the time of the detailed surveys (September) and not all of the area could be accessed.

No Rare or Threatened plant species were observed during surveys in the project area except for one possible record of a Vulnerable plant species under the EPBC Act.

The overall findings of the terrestrial vegetation survey were generally in accordance with those of previous survey work in the same general area by HLA-Envirosciences (2006). A notable difference is that the two Threatened species found by HLA-Envirosciences survey (*Macrozamia serpentina* and *Eucalyptus raveretiana*) were not found on the corridor (most likely due to the fact that the study areas were not exactly the same).

The main potential impacting processes to terrestrial flora associated with the construction of the pipeline corridor were identified as:

- Clearing of vegetation remnants
- Reduction of flora species habitat
- Removal of individual species of significance
- Reduction of wildlife corridor functionality
- Remnant vegetation edge effects
- Riparian vegetation disturbance
- Weed introduction.

The activities associated with these impacts were identified as:

- Felling of individual trees
- Clear-felling of stands of trees, and increasing edge-effects such as wind and weed penetration
- Bulldozing of shrubby areas
- Trenching across ephemeral wetlands and creeks
- Digging pits on either side of wet creeks for entry and exit of underground boring
- Possible accidental introduction of weeds to site.

A number of measures have been identified to mitigate impacts associated with terrestrial flora, with some of the key measures including:

- A pre-construction survey of all scrub communities will take place, focusing on the identification of Threatened species along the proposed right-of-way (ROW)
- Avoid removing vegetation where possible to enhance habitat conservation
- Trenching will be confined to already-cleared or open areas wherever possible
- Replacement of removed vegetation with new planting stock of relevant size and species
- Where possible, replacement of topsoil after trenching to allow vegetation to re-establish
- Selection of trenchless creek crossing methods where possible to minimise the impact to riparian vegetation
- Minimise width of clearing of vegetation within area needed for pipeline and ROW
- Mark boundary of scrub along existing fence-line with continuous length of high-visibility poly-web fencing and prohibit access to the areas to prevent risk of fire or other damage
- Sediment and erosion control measures will be implemented to prevent impacts downstream (if construction occurs in the wet)
- If Rare or Threatened sapling species are identified from samples taken onsite, these will be translocated
- ROW will be narrowed where possible across creeks and creek banks
- The arrangements for vegetation offsets will be finalised following successful completion of the EIS process and in the context of vegetation clearing applications under the Vegetation Management Act.

The construction of the pipeline and ROW was assessed as having an overall minor adverse impact on terrestrial flora. Close supervision of construction staff by a trained ecologist in areas of the corridor where negative impacts on flora communities (in general) and Threatened species are possible, was recommended. The main ongoing concerns for the operational phase of the project were identified as monitoring the success of vegetation rehabilitation and weed control.

19.6.4.3 Terrestrial Fauna

The majority of the project area is located within the eastern extent of the Brigalow Belt bioregion. This includes sections of the project area extending from the Fitzroy River, south to about Yarwun. That section of the project area extending further south to Gladstone is located within the extreme northern part of the Southeast Queensland bioregion. These regions influence the characteristics of the region's terrestrial biodiversity, resulting in a unique assemblage of temperate, tropical, semi-arid and coastal species.

The greatest threats to the native fauna of both bioregions remain grazing by domestic animals, land clearance and the invasion of feral animals and exotic weed taxa (particularly following fire or overly intensive grazing impacts). Of the introduced fauna and flora known to occur within the wider area, there is a variety of species either known to, or have a potential to pose a significant threat to the maintenance of terrestrial biodiversity values. The most widespread introduced species within the region are cattle. Cattle grazing can result in a loss of understorey vegetation and ground microhabitat diversity, poor recruitment of native plants and provide favourable conditions for weeds to gain dominance over native flora.

As effected through changes to soil conditions, native plant diversity and vegetation community structure, habitat modification can result in the decline in habitat suitability for a variety of native fauna species, including species of conservation significance.

The findings of desktop assessments assisted in prioritising habitat areas for field surveys of Threatened species. The field work program comprised of the following survey events:

- A preliminary biodiversity investigation
- A series of monthly surveys to monitor known and potential habitat areas for the Threatened Yellow Chat *Epthianura crocea macgregori*
- A spring-season avifauna survey
- A comprehensive target species and biodiversity survey.

Overall, the field program recorded 266 terrestrial fauna species, including 32 mammals, 39 reptiles, 16 frog and 179 birds. A large proportion of this recorded fauna assemblage was comprised of species regarded as relatively common and widespread within either bioregion.

The characteristics of the fauna assemblage and the species diversity were not unexpected given the relatively limited diversity of habitat types, the restricted extent of remnant habitats and the comparatively higher extent of disturbed habitats which do not have the capacity to support a diverse fauna assemblage.

Despite widespread habitat disturbance within the project area and surrounding lands, these lands were found to support habitat areas of value to various species of conservation significance, for fauna movement and maintenance of local biodiversity. Species recorded in the surveys that are listed as Rare, Threatened, or otherwise significant under the provisions of the Commonwealth and/or State legislation, included:

- Critically Endangered - Yellow Chat (*Epthianura crocea macgregori*)
- Vulnerable - Squatter Pigeon (sth. sub-sp.) (*Geophaps scripta scripta)* and Ornamental Snak*e (Denisonia maculate)*
- Regionally Vulnerable - Koala (Southeast Queensland) (*Phascolarctos cinereus*)
- Rare - Cotton Pygmy-goose (*Nettapus coromandelianus*), Jabiru *(Ephippiorhynchus asiaticus),* Radjah Shelduck (*Tadorna radjah)* and Black-chinned Honeyeater (*Melithreptus gularis*).

The primary potential impacts to Rare and Threatened taxa have been identified as loss of shelter and food resources, loss of breeding sites, trench fall (primarily herpetofauna) and possibly increased predation (primarily small ground mammals and birds) resulting from:

- Clearing of remnant vegetation and riparian communities
- Removal of habitat trees, especially mature hollow-bearing trees
- Removal of ground debris in the construction of the pipeline
- Trenching operations
- Increased ease of access for introduced predators.

The pipeline alignment has generally been selected to minimise impacts to native fauna habitats (i.e. to enhance habitat conservation). In particular, the alignment has been strongly influenced by the requirement to avoid traversal of as many wetland habitats and large and connected areas of native vegetation habitat as possible. To a large extent, this has been achieved, though given the length of the pipeline and topographic constraints, it is not possible to avoid all areas that may support fauna habitat. With successful implementation of appropriate environmental management controls (identified within Chapter 7, Terrestrial Fauna and Chapter 20, Planning Environmental Management Plan), any potential impacts on fauna species are likely to be limited to direct impacts associated with construction of the proposed pipeline.

The overall assessment indicates that the residual impact ranges from negligible to minor adverse for the vast majority of the habitat areas described. The only area which may sustain a higher residual impact is associated with the Raglan Creek crossings (moderate adverse). Whilst there is scope to reduce the level of residual impact, the extent to which this can be achieved can only be determined following post-construction rehabilitation.

19.6.4.4 Indigenous Cultural Heritage

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) states that if a project area is within the external boundaries of a registered native title claim, then the native title party for that area is the Aboriginal party with whom consultation occurs. In the case of the project, almost the entire proposed corridor is within the external boundaries of two registered native title claims, namely the Darumbal People and the Port Curtis Coral Coast applications.

Management and protection of Aboriginal cultural heritage for the project was divided into two key stages:

i) Geotechnical investigations

ii) The Cultural Heritage Management Plan (CHMP).

The first stage was associated with an initial phase of corridor selection for geotechnical studies. As potential to harm Aboriginal cultural heritage existed during the geotechnical program, consultation was conducted with the relevant Aboriginal parties.

In the case of the Darumbal People, agreement was reached between the Aboriginal parties and GAWB's representatives that a Terms of Reference would be developed for monitoring of the geotechnical program within the Darumbal native title claim area. As avoidance of cultural heritage was the first principle of this Terms of Reference, monitors had the ability to change the position of, or request abandonment of each geotechnical site. Once executed by the parties, the Terms of Reference became an agreement under section 23(3)(a)(iii) of the ACH Act, resulting in the geotechnical program meeting its cultural heritage duty of care.

In the case of the Port Curtis Coral Coast native title claim group, initial discussions about developing a section 23(3)(a)(iii) agreement commenced. After the second meeting of the Aboriginal parties, a Federal Court decision ruled that a change of applicants for the claim would occur on 29 June 2007, effecting an immediate change of the Aboriginal parties. This necessitated re-commencing consultation with the new Aboriginal parties, resulting in the execution of an agreement that provided appropriate management of cultural heritage during the geotechnical program.

A CHMP will be required for the project and planning for this has commenced. This involves notification of the Aboriginal parties pursuant to section 91 of the ACH Act, followed by endorsement of those Aboriginal parties who respond to the notification. Public notification will also be required for the small area of land the corridor passes through that is not within the external boundaries of a registered native title claim. Once Aboriginal parties are endorsed, agreement will be reached on the best way to develop the CHMP. It is anticipated that cultural heritage surveys will be undertaken by Darumbal and Port Curtis Coral Coast representatives, resulting in comprehensive cultural heritage reports. Recommendations made by these reports about appropriate management of Aboriginal cultural heritage will guide the contents of the CHMP agreement. Once the agreement has been executed by all parties, it will be registered by the Chief Executive of the Department of Natural Resources and Water. Intentions are that the agreement will contain all directions and processes required to achieve compliance with the project's cultural heritage duty of care.

An approved CHMP is not a requirement of the EIS, rather the process needs to have commenced (in accordance with the requirements of the ACH Act.

From the perspective of Aboriginal cultural heritage, the development of a CHMP will provide protection and/or management of cultural heritage values for any objects or areas found during the cultural heritage survey and consultation with Elders nominated by Aboriginal parties.

19.6.4.5 Historical Cultural Heritage

Two Historical Archaeological Sites that may potentially be impacted by the project were identified in baseline studies (see figure 14.1) included:

i) Woolwash – Frogmore Pipeline (Site Ref: HAS 2)

ii) Twelve Mile Road and Stone Culvert (Site Ref: HAS 3).

Both HAS 2 and HAS 3 are sites that extend over a considerable area and thus only part of each site will potentially be directly impacted by the project. The potential impact of the project on these sites is in the nature of sub-surface and surface disturbance such as vegetation clearance and open trenching associated with the pipeline's construction, and the development of associated infrastructure.

Mitigation measures for these sites included avoidance of sites, recording of sites, further survey of sites, preparation of a Heritage Management Plan (HMP) and variation to the project design, if appropriate.

19.6.4.6 Soils

Areas of low lying alluvial floodplain soils (mainly clays, with some sands and loams) predominate in the central and western portion of the corridor, but are absent in the first 30 km or so of the corridor extending west from Gladstone. This part of the alignment traverses through elevated 'hilly' country, comprising residual land forms underlain by geology comprising 'Mixed Volcanic and Sedimentary Rocks'. In this area of steeper grades, the influence on erosion potential is significant.

Results of soil testing indicated 28 soils of Emerson Class One (highly dispersive) and six soils of Emerson Class Two (dispersive). None of the samples screened were non-dispersive.

As the soils are generally considered highly dispersive, rain events or other contact with water is likely to result in the break-down of soils into clays, sand silt and clay creating sediment and nutrient laden runoff. Exposed soils will experience a loss of soil quantity and quality in the local area and will contribute to potential productivity yield losses. In addition, if the sediment and nutrient laden runoff is able to enter waterways, this will lower water quality (see Chapter 9, Water Resources and Water Quality). Impacts are likely to be greater at creek crossings and during the wet season.

Soil descriptions and test pit logs indicate that topsoils along the project alignment are generally shallow. Mostly, topsoils comprise low plasticity silty/sandy loams, clay loams and light sandy clays, all of which have a moderate to high potential for erosion if left uncovered on significant gradients (i.e. steeper than 15 percent). The topsoils are generally fine grained (i.e. more than 33 percent passing 0.02 mm). Therefore fines transported by surface run off would be both dispersive and of significant quantity.

Where present, unless stripped and removed offsite, topsoils will need to be stockpiled within bunds well away from any waterways. Topsoils reused following embedment of the pipeline, a light application of agricultural lime should be applied to the surface to limit dispersion potential until grass cover can be reinstated.

Erosion will potentially impact soil stockpiles, soil left exposed at construction sites (e.g. the trench itself) and soils left exposed in areas cleared of vegetation. The following erosion and sediment control measures are recommended where excavation will occur within 100 m of a waterway:

- Temporary drains or bunds, constructed where necessary to direct runoff and any overland flow from upslope of excavations, away from any nearby waterways
- Perimeter diversion drain or bund around any stockpiles (i.e. reserved topsoil for revegetation)
- Temporary sediment barriers around any nearby stormwater inlets, and along the base of any sediment fences situated along the banks of waterways
- Prompt revegetation or covering/sealing of the backfilled trench, avoiding leaving excavations opened over weekend breaks
- Erosion and sediment control guidelines will be in accordance with the *Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites* (the Queensland Division of the Institution of Engineers, Australia 1996).

Should potentially dispersive soils be retained for reuse onsite, they would need to be treated by the addition of lime or gypsum in order to buffer dispersion characteristics. Treatment at a rate of 2.5 kg/m^3 is common. 'Topsoil' of local origin used near waterways should be treated promptly if to be left exposed. Soils that have been lime treated for acid sulfates need not be further treated and would be considered non-dispersive.

Due to the presence of ASS and low level actual acidity in alluvial soils on several parts of the route, near surface soils will be treated with agricultural lime (calcium carbonate) to neutralise potential acidity. The lime will act to reduce dispersion potential in the soils at these locations. Treatment of run-off in areas not treated with lime will need to be further addressed in the project Erosions and Sediment Control Plan, to be prepared prior to construction.

19.6.5 Environment – Design and Operation:

Sustainability assessment of the design and operation of the project takes into account the assessment methods used, the use of appropriate technology and other issues such as Environmental Management Systems, management principles, flexibility of the project and consideration of life cycle impacts. A more sustainable project will use new assessment techniques and appropriate technology in the design, will be operated according to sustainable principles and will have in-built flexibility to extend life.

Relevant Chapters of the EIS: Chapter 1, Introduction; Chapters 2, Project Description; and Chapter 16, Hazard & Risk.

The detailed studies undertaken as part of the EIS process for the project have described the baseline conditions in the project area and assessed the potential impacts arising from the project. The information from this process has been used to inform the design and methods of construction in order to minimise impacts where possible. Best practice methodologies have been used throughout this project, including:

- A constraints analysis using Geographical Information Systems was used as the process for determining the most appropriate location for the pipeline route, particularly at the northern end of the alignment
- Arup's SPeAR® sustainability assessment tool has provided a leading edge approach to sustainability assessment of the project enabling all aspects of the project to be considered holistically and document the sustainability performance of the project
- In order to ensure transparency and consistency in the impact assessment contained in the EIS, Arup's Significance Criteria© have been used
- The *risk management strategy* developed for the project has enabled the identification of risks at all stages of the project and the implementation of management measures where possible/practicable
- The EMP has been developed in accordance with the Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines.

Appropriate technology has been incorporated into the construction methods and design of the project. A value-engineering approach to the project has been taken, with a optioneering process to determine the most suitable technology from a whole-of-life cost perspective. This has included economic, social and environmental considerations.

The EMP for the project will encourage the consideration of best practice and more sustainable practices during construction and operation. GAWB has an integrated Quality and Environmental Management System (both certified to AS/NZS ISO standards), which outlines strategic action plans for a range of prescribed environmental elements across GAWB's operations, including major projects such as the Gladstone-Fitzroy Pipeline project.

In terms of in-built flexibility, all design criteria were strongly objectives based, to ensure flexibility in the design and to ensure the design is fit-for-purpose. This included consideration of possible augmentation and flow reversibility.

Consideration of life cycle environmental impacts (whilst minimal) for the project has resulted in the following:

- The proposed reuse of topsoil in rehabilitation activities
- The planned use of cleared and chipped vegetation in rehabilitation activities
- The matching of cut and fill volumes where practicable (to minimise materials being imported to site).

19.6.6 Environment – Transport:

Sustainability assessment of the transport aspects of the project considers the variety of transport choices available/to be used for the project and the project's dependence on road-based freight traffic during construction. A more sustainable project will integrate with public transport infrastructure (where appropriate), encourage more sustainable transport choices and minimise the need for freight traffic.

Relevant Chapter of the EIS: Chapter 13, Transport and Access Arrangements.

In general, the project is quite heavily dependent on road-based transport/freight. This is predominantly due to the location of the project area (i.e. quite remote so limited access to public transport) and the nature of the materials needing to be transported to site.

19.6.6.1 Construction Traffic

Traffic generated by construction of the pipeline will consist of the following:

- Transportation of construction equipment to/from site
- Delivery of pipe
- Delivery and relocation of construction materials
- Construction workers
- Removal of construction waste.

The pipe is expected to be transported from manufacturers based in either Brisbane or Adelaide by road to the construction site using standard mass semi-trailers. The Bruce Highway from the south is therefore expected to be the main access route into the pipeline corridor. Transportation of the pipe via rail was considered however was deemed a less economically viable option.

Depending on the type of pipe chosen for the pipeline, the total number of vehicles required to deliver the pipe for the total project would be approx 2,300 trips as a worst case scenario. This equates to an average delivery rate of 15 loads per day over the six month delivery period. However, it is anticipated that peak delivery rates up to 40 loads per day may occur.

In addition to the pipe, other construction materials will need to be delivered to the pipeline corridor. These deliveries are expected to be made using standard dimension trucks and are estimated to average around two deliveries or four trips per day.

It is expected that there will be two pipeline laying crews of 25 personnel each. Additionally, specialist crews of eight to 25 personnel will be used where boring or bridging is required at road and creek crossings. The workers are expected to be accommodated in the Rockhampton area and would travel each day to the pipeline corridor via the various access routes described previously. It is expected that workers will travel to site via car, ute or shuttle bus, depending on the need.

Overall, the generation of construction traffic will create a short-term increase in traffic volumes on the road network during the construction period. The duration of this impact ranges from just a few weeks up to two years, depending on the road section under consideration.

Calculation of the potential maximum traffic flows and distribution on the road network showed that such increases are relatively low and could be readily absorbed by the road network without undue road capacity problems.

19.6.6.2 Operational Traffic

The pipeline is expected to generate a negligible level of traffic during its operational phase. Access into the corridor would be required by four-wheel drive passenger vehicles to conduct inspections. Occasional access for maintenance by heavy machinery may also be required throughout the life of the pipeline.

Transport impacts due to the operation of the project are expected to be relatively minor. The only element of the project that generates regular traffic flows is the WTP, and this level of traffic is in the order of four light vehicle trips and 12 heavy vehicle trips per day. Other operational traffic consists of only occasional access required for maintenance purposes. This traffic would mainly be passenger vehicles, though access by heavy machinery may also be required on an occasional basis.

19.6.6.3 Road and Rail Crossings

Generally, trenching is the preferred method of road crossing as this is most economical and time efficient method. However, where road closures would cause unacceptable delays to traffic (i.e. the Bruce Highway and the Capricorn Highway), the construction method would be trenchless, which would not cause any disruption to traffic.

All railway line crossings will be trenchless, thus resulting in no disruption to rail services. The importance of the rail network, particularly the North Coast Rail Line for freight and passenger movement means that no disruption to rail services should occur.

Traffic Management Plans (TMPs) will be developed during detailed design for construction to address site-specific details for each element of the project. These plans will detail the design of site accesses, including the provision of signage and traffic control during construction at site accesses and pipeline crossings. Temporary speed reductions may be required in the vicinity of site accesses. The TMPs will be approved by the relevant Local or State Road Authority before the commencement of construction.

Given the implementation of the proposed mitigation measures, it is expected the transport impact would only be minor during construction and would be negligible during operation of the project.

19.7 Social Quadrant

19.7.1 Social – Social Responsibility:

Social responsibility indicators consider issues such as community interaction, stakeholder relations, equity, corporate responsibility and social planning. A more sustainable project will promote equity and community interaction, will consult with stakeholders and assess social impacts.

Relevant Chapters of the EIS: Chapter 1, Introduction and Chapter 15, Social and Economic Environment.

Following an extensive stakeholder identification process, key stakeholders for the project have been identified as:

- Landowners within the pipeline corridor
- Landowners within close proximity (500 m) of the pipeline corridor
- Elected representatives
- Key portfolio Ministers and the Premier
- GAWB customers
- Community, environmental and business groups
- Government agencies (such as Department of Infrastructure and Planning, Department of, Environment, Water, Heritage and the Arts, EPA and local councils)
- Local media.

Stakeholder consultation for the project will be undertaken in and major phases, including:

Phase 1:

- Establish community query and response mechanisms
- Establish stakeholder database
- Prepare of project materials i.e. Project Overview
- Project launch
- Contact with key community influencers about the project
- Contact with landholders to seek access for baseline studies
- Develop dedicated project website.

Phase 2:

- Regular information updates produced for stakeholders i.e. newsletters, fact sheets, media releases, stakeholder letters and advertisements
- Ongoing contact with landowner to coordinate access for studies
- Up keep of stakeholder communication in database
- Contact with landowners within close proximity of the project area.

Phase 3:

The third phase of communication activity will build upon previous activities and will focus on the public comment period for the EIS, providing stakeholders with information on key findings of the EIS through a range of channels. These channels will be supported with mechanisms through which questions can be answered and submissions and feedback received and accurately logged.

Meeting the requirements of the EIS Terms of Reference (ToR) in relation to community consultation remains the overarching objective for Phase 3. Other key consultation objectives include:

- To prepare the community for the release of the EIS
- To provide the community with information on key findings from the EIS during the public comment period and facilitate community feedback
- To assist GAWB and the contracted designer with land access requirements
- To assist GAWB with the land acquisition process
- To assist GAWB with its corporate communication (CSR) activities.

The project has encouraged community interaction from all identified stakeholder groups. The project's potential social impact on key stakeholder groups, including the local community, has also been assessed.

19.7.2 Social – Amenity:

The assessment of the project against amenity indicators takes account of the level of landscape design integrated into the project that enhances the area, the levels of noise and vibration from construction and operation and identifies and solves amenity conflicts with surrounding land uses.

Relevant Chapters of the EIS: Chapter 1, Introduction, Chapter 12; Noise and Vibration; Chapter 15, Social and Economic Environment; and Chapter 17, Landscape and Visual Assessment.

19.7.2.1 Landscape

The project traverses approximately 115 km of landscape between Rockhampton and Gladstone. Creeks dissect the landscape which is primarily rural in character and utilised as an agricultural resource, with a predominance of beef cattle grazing. The topography is generally gently undulating landform of low hills and flat plains, rising to the northeast of the project area to coastal ranges providing a prominent and scenic green backdrop to the project area. Major urban centres occur at Rockhampton to the north of the project, and Gladstone to the south, with small settlements and individual rural residential properties scattered throughout. Grazing land is sparsely vegetated throughout the region, with individual trees, some scrub and grazing fodder. The agricultural weed *parthenium* is prevalent across the majority of the project area. Coastal foothills and ranges tend to be densely vegetated with native bushland. The GSDA to the south of the project area is composed of major industrial development and associated infrastructure. It is used for urban development, primary industries, mining, heavy and light manufacturing industries, port activities, residential and public facilities, tourism and recreation.

Visual impacts resulting from the project will be derived primarily from associated pipeline infrastructure (e.g. WTP, pumping stations, intake point and reservoirs) as the pipeline itself will be underground. Construction activities, including the clearing of vegetation, earthworks and construction vehicles use and movement are likely cause the most significant visual intrusion.

Initially, the new pipeline elements, access road and landscaping at key sites (i.e. WTP & Aldoga Reservoir) would have an impact upon the viewing experience of visual receptors. The visual amenity of the area would be, in parts, affected by the project intruding into views. Residential receptors and large numbers of road users along and crossing the route would experience the most significant changes due to their respective viewing opportunities and proximity to the project. The change in view would be permanent and initially prominent, but would become less prominent over time as vegetation naturally regenerates or screening matures.

The landscape and visual impacts once the project becomes operational are generally likely to be minor, with the exception of the WTP. This is considered to have a moderate impact given it is a fairly large, new and permanent structure.

With the implementation of recommended mitigation measures (e.g. planting of screening vegetation), it is expected that there will be some lessening of the visual effects of the proposal, during both construction and operational phases.

19.7.2.2 Noise

Acoustic measurements were taken at selected noise sensitive locations along the route. Unattended noise monitoring was conducted at four locations and attended noise monitoring was conducted at seven locations. Noise measurements were also made at similar facilities to benchmark expected operational noise; the Glenmore Water Treatment Plant, the Laurel Bank Water Intake and the Parkhurst Booster Station. The purpose of these measurements was to develop a benchmark noise level from similar operations to the operations which will form part of this project.

Key noise sources resulting from pipeline construction were identified as:

- Drilling rigs
- Excavators
- Dump trucks
- Diesel generators
- Rock breakers.

As it is possible that blasting will take place as part of the construction of the pipeline and associated operational facilities (e.g. Aldoga Reservoir), noise levels associated with blasting will comply with appropriate noise level guidelines.

It is expected that the only significant sources of noise associated with the operation of the pipeline will be from permanent structures such as the intake, WTP, pump stations and booster station. However, with adequate mitigation measures (e.g. house WTP pumps and equipment in a building that contains specific noise mitigation measures), project-related noise levels will have a minimal impact on identified noise sensitive receptors.

19.7.3 Social – Access:

Access issues relate to the various transport options available for travelling to and from work and training available to employees and contractors.

Relevant Chapter of the EIS: Chapter 13, Transport and Access Arrangements and Chapter 15, Social and Economic Environment.

Given the pipeline route extends approximately 115 km and is in a fairly remote regional area, public transport options (for work-related travel) will be limited. Thus, it is expected that construction workers will be dependent on personal cars to access the work site. There is likely to be some level of organised transport (e.g. car pooling and shuttle buses) available for construction workers. Accommodation will also be suitably located to minimise travel distances to and from work.

There are good public transport options available for accessing the major regional centres (i.e. Rockhampton and Gladstone) including air travel, train and bus.

It is intended that detailed training sessions will be provided to all construction staff, covering issues such as Occupational Health and Safety (OH&S), emergency response, cultural heritage, weed identification and management. This is actually a requirement of the Project's EIS/EMP and GAWB's own EMS.

19.7.4 Social – Form and Space:

The indicators for form and space take account of internal and external security features and severance requirements resulting from the project.

Relevant Chapters of the EIS: Chapter 2, Project Description; Chapter 4, Land Use and Infrastructure; and, Chapter 16, Hazard & Risk.

Security features are inherent in the pipeline design (e.g. location of surge control devices at key sites only) and operation.

A Supervisory Control and Data Acquisition (SCADA) system will be used to monitor intake pumps and the pipeline to the WTP, and signals will be sent to centralised control rooms at the existing Gladstone WTP.

The Alton Downs WTP and pumping stations will generally be designed for unattended, fully automatic operation with manual override of critical functions. Local automatic control is the normal mode of operation. Local manual control is generally used for testing, maintenance and during failure of the automatic control system.

Elements of construction (e.g. permanent structures such as the WTP) will be fenced to limit access and provide security. Construction areas will be signposted and measures will be taken by the contractor to prevent access of unauthorised personnel.

Severance is not a significant issue for the project, given the pipeline will be buried underground. There will be a small number of landowners affected by the construction process (e.g. farmers with irrigation lines directly under the pipeline route), however disturbance/disruption to existing agricultural land practices has been avoided where possible (e.g. via realignment of the pipeline, particularly in the northern end).

19.7.5 Social – Stakeholder Satisfaction:

The indicators for stakeholder satisfaction take account of employees, customers, regulatory authorities and other stakeholders.

Relevant Chapters of the EIS: Chapter 1, Introduction and Chapter 15, Social and Economic Environment.

Employee satisfaction for the project will be addressed through GAWB's own procurement policy for new staff, contract provisions and through the implementation of formal systems to ensure employee health and safety. It is anticipated that wages for employees engaged on the project will be in accordance with market rates.

Customer satisfaction for the project relates to the users of the piped water. The project will support the growth and development of GAWB's downstream industrial customers by providing an additional and secure source of raw water.

Regulatory authority satisfaction includes federal, state and local government who are responsible for administering approvals for the project and whose policies and plans may have a bearing on project planning.

The indicator for stakeholder satisfaction relates to the opportunity for the community to feel that they have had a say and that they have been listened to. This is an aspect that can only be assessed once the EIS public notification period (or Phase three of the stakeholder consultation program mentioned previously) is completed.

GAWB has invested a significant amount of effort into a comprehensive project Communication Plan, which to date has included:

Table 19.2: Phases within the Communication Plan

Phase 1	
April – September 2007	• Establishment of community query and response mechanisms • Establishment of stakeholder database • Preparation of project materials i.e. Project Overview • Project launch • Contact with key community influencers about the project • Contact with landholders to seek access for baseline studies • Development of dedicated project website.
Phase 2	
September 2007 – January 2008	• Regular information updates produced for stakeholders i.e. newsletters, fact sheets, media releases, stakeholder letters and advertisements • Ongoing contact with landowner to coordinate access for studies • Up keeping of stakeholder communication in database • Contact with landowners within close proximity of the study area • Assisting with the land acquisition process • Corporate communication support.

A requirement of the EIS/EMP process is for GAWB to review and report on all submissions received during the 30 day public notification period. It should also be noted that a formal system will be implemented for any queries and complaints arising from pipeline construction and operation.

19.7.6 Social – Health and Wellbeing:

The indicators for health and wellbeing take account of security, health and safety issues, community environmental health and the risk of hazard that arises from operation of the project.

Relevant Chapter of the EIS: Chapter 16, Hazard and Risk.

As previously mentioned, security features are inherent in the pipeline design (e.g. location of surge control devices at key sites only) and operation. See the section 19.7.4 for information on the SCADA system, operational control, fences and signposts.

Health and safety during construction will be ensured by the Health and Safety Management System of each contractor and required to adhere with existing GAWB health and safety requirements (i.e. AS 4801 Occupational Health and Safety Management Systems).

As with any major infrastructure project, there will be certain associated hazards and risks, particularly during the construction phase. Potential risk scenarios identified as part of the EIS (e.g. under emergency conditions) included spills, explosions, fires, floods and accidents. Consequences of these scenarios were also identified and included as a worst case death/injury to personnel or member of the public.

No hazards or risks identified received a risk rating of more than medium and all identified hazards and risks will be managed via EMPs, Traffic Management Plans, Construction OH&S Plans, Emergency Management Plans etc. There are also legislative requirements for OH&S and for the storage and handling of dangerous goods and hazardous substances. These requirements, as they apply to the project, will be complied with.

19.8 Natural Resource Quadrant

19.8.1 NATURAL RESOURCES – Materials:

The indicators for assessment of material used during construction takes into account minimal use of new materials, the design being driven by efficiency of materials use. Materials used are from a renewable, reused or recycled source, maximised use and sourcing of local materials and a materials specification and purchasing policy that requires the supplier to demonstrate commitment to sustainability.

Relevant Chapter of the EIS: Chapter 2, Project Description.

The pipeline material is proposed to be Mild Steel Cement Lined (MSCL). It is also possible that Glass Reinforced Plastic (GRP) could be used for different lengths of the pipeline. The proposed pipeline is approximately 115 km in length from the Fitzroy River to the interconnection with the Gladstone raw water network. Where the pipe is made of MSCL it is proposed to have

an external diameter of 1,067 mm with rubber ring jointed or welded joints at certain connection points. If the pipe is GRP, the external diameter will be 1,025 mm and it will be rubber ring jointed with rubber ring and flanged joints at fittings. The pipe will be buried for its full length with varying cover depending upon pipe material, ground conditions and loading (there will be a minimum cover of between 750 mm as per Table 2.2 in Chapter 2, Project Description), and will be laid with a minimum grade of 1 in 500, meaning that for every 500 m of horizontal distance, the vertical distance will be no less than 1 m.

The main construction activity will be excavating a trench in which to lay the pipeline. Native fill will be placed back into the trench where practicable (i.e. imported fill minimised to bare essentials). Excavated materials may also be crushed to achieve fill suitability.

Temporary gravel access tracks will be constructed along the pipe route, to all temporary facilities and work areas. These will be designed and located by the contractor prior to construction, as part of the detailed design for construction. Where possible, existing roads and tracks will be used for access and a traffic management plan will be completed to limit disruption to local traffic - which will also be completed by the contractor prior to construction.

Materials used in construction will be sourced locally as a priority (e.g. chemicals, cement, steel etc.) and this should not pose many problems given Gladstone is a major industrial hub. Any pavement and structural materials required to be brought onto the project site (e.g. sand, crushed rock and gravel) would be sourced from local land based quarries.

Construction of the pipeline will require the supply of various materials to the project site to suit the contractor's construction requirements. In selecting the supplier to provide any pavement and structural materials to the project, the contractor will be required to consider a number of factors including:

- The ability of the supplier to provide the specified materials
- The ability to deliver the materials to the site in the required timeframe
- The price to supply the specified materials
- Environmental performance of suppliers and their ability to consistently meet the licence conditions applying to their various facilities (e.g. operating hours).

The whole pipeline design process is specifically based around performance objectives and not traditional approaches. This includes maximising design and operational efficiencies, such as:

ii) Aldoga Reservoir 'value engineered' from 400 ML (BAU) to 100 ML

iii) WTP process has been researched in an attempt to minimise treatment levels, and thus material and chemical use, while still achieving the necessary performance criteria.

19.8.2 NATURAL RESOURCES – Water Use:

The indicators for assessing water quality take account of water efficiency, water monitoring and the sourcing of water for construction purposes (where appropriate). A more sustainable project is highly water efficient through construction and operation, includes water monitoring to drive improvements and uses onsite or renewable water sources for construction water.

Relevant Chapter of the EIS: Chapter 9, Water Quality and Water Resources.

Fundamentally this project is for new water supply, not water reuse. The project will supply up to 30,000 ML per annum to the Gladstone raw water network. During construction, water will be required for hydrostatic testing, commissioning the pipeline and dust suppression (may be from potable, recycled or bore water sources). The quantities of these will be determined by design specifications for the pipe material being tested. At the WTP, a potable water supply will be set up for site activities as the site currently has no potable water supply. Potable water will also be required for domestic use at site offices and will be kept separate from construction activities.

Approvals for extraction of water from local waterways will be obtained as required, and a management protocol for the disposal of water produced in construction and operation activities will be prepared to address the impacts of release of these waters to the local environment. Any reservoirs will be roofed to prevent evaporation and flow metering is being installed to monitor any water losses/leakages.

At a corporate level, GAWB has developed a process for triggering augmentation of supply that is currently being reviewed by the Queensland Competition Authority. Depending on the trigger scenario, this would include seeking proposals from customers to reduce their contracted demand. GAWB has previously contributed to investigations for major demand management options, and notes that industry invested in significant efficiency measures during the drought ending in 2003.

GAWB has a drought management plan and other methods, such as contracts with customers, to drive efficiency and conservation. GAWB is also currently implementing improvements to its water monitoring systems and the same philosophy will be reflected in the pipeline project.

Water efficiency design criteria and a water efficiency management plan will be developed at appropriate stages for the project.

19.8.3 NATURAL RESOURCES – Energy:

The indicators for energy consider issues such as energy efficiency and conservation during construction and operation as well as the types of energy sources used.

Relevant Chapters of the EIS: Chapter 2, Project Description and Chapter 3 Climate.

An application for connection has been submitted to Ergon to supply power to the pumping stations, WTP and storage (where required). Subsequent to this, negotiations will be made between Ergon, GAWB and customers to agree an energy supply contract. Substations may be required in some locations and investigation is being conducted to determine any additional requirements of Ergon relating to the capacity of their existing system.

During construction energy will be required for lighting, construction compounds and construction equipment and will be sourced from mains electricity and generators. The use of alternative energy sources is not included in planning for the construction phase. Energy efficiency during construction is driven by the project timeframes and the reduced cost of efficient operations, however specific energy efficiency measures are not planned for the construction phase. The project may have some requirement for 24-hour construction work, with artificial lighting required either from mains electricity or generator. At other times, construction will be in daylight hours and will therefore not require artificial lighting.

19.8.4 NATURAL RESOURCES – Waste Hierarchy:

Indicators regarding waste hierarchy consider how waste is avoided and reduced and whether reuse and recycling is implemented in the project. Where waste disposal is unavoidable, best practices should be employed for disposal and minimal waste should be sent to landfill. The amount of hazardous waste generated should be minimised.

Relevant Chapter of the EIS: Chapter 11, Waste.

A Waste Management Plan (WMP) will be implemented for the project taking consideration of the waste management hierarchy and will be subject to regular monitoring. Segregation of waste at the source is specified within the WMP in order to enhance recovery rates of reusable and recyclable materials.

The various waste streams from construction, commissioning, operation and maintenance have been identified within Chapter 11, Waste, with corresponding management measures.

The project has considered the following opportunities for waste avoidance/reduction:

- Accurate estimation of required material quantities to reduce over-ordering or onsite stockpiling of materials
- Goods to be ordered in bulk where possible to minimise packaging wastes and packaging material returned to the suppliers wherever practicable
- Minimisation of waste water to be generated and discharged to the environment
- Encouraging employees to avoid and reduce waste wherever possible
- The detailed design for construction will endeavour to find balance between cut and fill to minimise the requirement to stockpile excess soil, remove excess soil from the site or import fill material. Reuse of excavated soils as fill will be maximised where practicable (e.g. native trench fill will be placed back into the trench once the pipeline is laid)
- Vegetation for ROW clearing will also be mulched and reused onsite, to stabilise exposed soil and encourage rehabilitation.

19.8.4.1 Construction Wastes

General solid waste

This waste stream may include food scraps and other putrescible wastes, toiletries, recyclable and non-recyclable office waste.

Management options:

- Appropriately placed litter bins to avoid the dispersal of litter and regular site maintenance duties
- Waste sorting, composting and recycling
- Collection and transportation of waste by a licensed contractor with disposal to a suitable landfill facility.

Sewage (Blackwater)

Onsite sewerage will be generated from temporary staff toilets and chemical rinsing showers

Management options:

- Mobile chemical treatment systems, approved septic systems 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.

Hydrocarbon wastes from end-use

This waste stream may include lubricants, oils, oil filters from equipment and machinery, waste fuels, absorbent pads and oily rags.

Management options:

- Controlled as per any Local Government stipulations or management requirements under legislation
- Appropriately contained (e.g. fully sealed drums in bunded compound) to avoid releases into the environment
- Transported and recycled using appropriately licensed transporters and waste management facilities
- Provision of spill kits.

19.8.4.2 Commissioning Wastes

During commissioning, waste water may be discharged to the environment at the WTP, and at points along the pipeline route. This occurs due to initial cleaning, flushing and pressure testing, and due to the wet commissioning process.

Management options:

- 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 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
- Ensure erosion protection measures are in place.

19.8.4.3 Operational Wastes

Residue

At the WTP itself, the water treatment process removes suspended solids from the water using a coagulant (e.g. polyaluminium chloride). At the end of the process, this produces a residue that consists of the coagulant and other solids removed from the raw water such as sediment and potentially algae.

As the WTP is not treating municipal waste water, the sludge is not considered a regulated waste under the *Environmental Protection Regulation 1998 (Qld)*. For this reason, the waste will likely be disposed of to a landfill. The exact disposal strategy is still being determined.

19.8.4.4 Maintenance Wastes

Pigging Wastes

During operations, sediments, algae and other chemical deposits associated with river water attach and accumulate on the inside of the pipeline (between the intake and the 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 the waste will be deposited at the WTP. Disposal of pigging waste will be included with the sludge waste generated by the WTP, which is taken to landfill.

19.8.4.5 Scouring Wastes

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 will be chlorine free. 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.

19.9 Economic Quadrant

19.9.1 ECONOMIC – Viability:

This aspect of the sustainability assessment of the project takes into account the financial viability of the project and back-up where financial risk is present, expenditure on improving environmental and social performance that goes beyond best practice, the degree of innovation and Research and Development (R & D)and risk management measures in place.

Relevant Chapters of the EIS: Chapter 1, Introduction and Chapter 2, Project Description.

There are two key platforms supporting the need for GAWB to undertake detailed augmentation planning and investigations for this project including:

- As a drought response and contingency measure
- To meet the spikes in demand associated with new industrial developments in the region.

GAWB is currently obliged to supply approximately 55,000 ML per annum. Unlike most regions in Australia, this water is largely required to service major industry. Gladstone is a burgeoning industrial centre of national significance due the availability of a number of key resources and infrastructure including port, energy, rail and water. It is expected that growth in industrial demand will continue into the future, with a number of major industrial developments currently being considered by various proponents.

As part of its own strategic planning processes, GAWB prepared the report "Securing the Gladstone Region's Future: Water, Final Report of Gladstone Area Water Board's Strategic Planning Project (Nov 2004)". This report (SWP) identified the region's future water needs and the preferred strategic options for GAWB to meet these needs and aimed to feed into the Central Queensland Regional Water Supply Strategy (CQRWSS). The SWP considered water use efficiency options, demand management options, surface water options and desalination options.

A strategic water planning project by GAWB in 2004, and the CQRWSS (2006), identified a pipeline from the Fitzroy River as the preferred future water source for the Gladstone region. Nevertheless, before the project is constructed, final business case approval is required. A preliminary business case has been completed in relation to the preparatory expenditure on this project (including this EIS). The current review by the QCA will set out principles in relation to pricing after augmentation. The project will only be constructed if demand growth or drought conditions meet trigger criteria being reviewed by the QCA.

The Business Case indicated that the pipeline would be the most suitable option (from those identified via the comprehensive SWP process) and was necessary given the increased demand by its customers and decreased supply as a result of the drought.

As part of the EIS process, a range of mitigation measures have been planned to improve environmental and social performance of the project. Measures have included:

- Retention of habitat where possible e.g. by avoiding sensitive areas in selection of the alignment or reducing the ROW to 10 m in sensitive areas
- Erosion and sediment control measures
- Planting screening vegetation around permanent fixtures (e.g. at the WTP) to reduce visual impacts
- Housing WTP equipment in buildings that contain specific noise mitigation measures.

In terms of innovation and Research and Development (R&D), this project is part of a broader SWP process by GAWB to keep ahead of demand. R&D has been undertaken on options identified in the SWP for water delivery, including a desalination plant. Considerable R & D has gone into the development of the EIS.

Risk management has underpinned the EIS stage of the project, including the business case, project management and stakeholder consultation processes. This has ensured identification of risks and control measures for all stages of the project, and integrates with the risk management reporting that GAWB performs at a corporate level.

19.9.2 ECONOMIC – Competition Effects:

The assessment of competition effects considers the extent to which the project promotes ethical competition, brings vitality and regeneration to the region and precipitates downward pressure on prices through local, regional and national competition. Diversity of employment and consumer choice as well as supply chain issues are also considered.

Relevant Chapters of the EIS: Chapter 1, Introduction; Chapter 2, Project Description; and Chapter 15, Social & Economic Environment.

19.9.2.1 Economic Modeling

An input-output model was developed and used to determine the impact of the proposed pipeline on the study area's economy. Industry and employment information from the Australian Bureau of Statistics (ABS) was used as a basis for developing assumptions about the linkages between activities associated with the construction, ongoing operation and maintenance stages of the pipeline, and other industry sectors in the study area.

A tailored regional input-output model was built for the purpose of this project, in order to capture economic impacts and multiplier effects.

Important assumptions made about the project, for the purposes of economic modeling included:

- The total construction cost is expected to be $293.2 million (July 2007)
- With regard to labour requirements, it is expected that 60 percent will be full-time direct hire while 40 percent will be contractors. It is assumed that the 60 percent of full-time direct hire staff would be sourced from outside and 40 percent from within the region while with sub-contracted staff it is expected to be 50 percent local and 50 percent from outside the region
- The pipeline will take up an area approximately 30 m wide and 115 km long. The WTP will be built on an 11.5 ha lot that will be owned by GAWB. It is anticipated that GAWB will require an additional four to eight workers in order to operate the WTP.

[1] This figure is an estimate only and could differ from the actual cost) and the component of this being spent locally is estimated to be $57.4 million or almost 20 percent of the total construction expenditure

Economic impacts from the project, and based on model outcomes, were summarised as follows:

Impacts for the Project Area

- The construction expenditure of the project is $293.2 million, including an estimated $57.4 million of expenditure being spent in the project area comprising of Gladstone, Fitzroy, Calliope and Rockhampton
- The multiplier for the construction sector in the economy of the project area is 1.98. Therefore the flow-on or indirect contribution of the construction expenditure to the study area is $56.4 million and the total impact is $113.8 million
- The direct contribution of the construction phase to value added (i.e. total turnover less the amount spent on non-labour inputs and imported inputs) is $23.7 million. The indirect component is $23.1 million and the total contribution is $46.8 million
- The average number of jobs at any time of the construction phase is 194. With an indirect impact on jobs of 207, the total impact is 401 jobs
- Property and business service industries would be impacted the most. The indirect contribution to this sector is $12.7 million. The second highest impact is to the retail trade sector for $5 million and then wholesale trade for $3.9 million
- Other annual impacts on the project area were estimated costs, for instance WTP chemicals $11 million total annual impact, power costs $4.4 million total annual impact and general repairs $2.4 million.

Impacts for Queensland

- The total construction expenditure of $293.2 million is the direct impact on the Queensland economy
- The multiplier for the construction sector in the Queensland economy is 2.63. Therefore the flow-on or indirect contribution of the construction expenditure to the study area is $477.3 million and the total impact is $770.5 million.
- The direct contribution of the construction phase to Queensland's value added $126.6 million. The indirect component is $190 million and the total contribution is $316.5 million
- Of the 194 average number of jobs during the construction phase, the indirect impact on jobs is 313, the total impact is 507 jobs
- Other annual impacts on the study area were WTP chemicals $15.5 million total annual impact, power costs $6.2 million total annual impact and general repairs $3.2 million.

Clearly, from the economic modeling results, the project will result in economic growth both for the local region and Queensland, will create more jobs and positively contribute to local service/business providers. The project is also fundamental to the ongoing vitality of the region, given Gladstone is major industrial hub for Queensland and Australia - as emphasised in previous sections.

19.9.2.2 Relevance to GAWB

GAWB is a price-regulated monopoly and a commercialised Statutory Authority under the *Water Act 2000*. It has sole control over water supply to industrial customers in the region. Water pricing undergoes regular reviews by the Queensland Competition Authority to ensure it remains competitive.

GAWB has a procurement policy for contractors specifying the tender process for jobs of varying sizes to ensure fair procurement and competitive behaviour. The GAWB procurement policy does not specify the percentage of goods and services to be supplied by local companies, however during the pipeline project, materials will be sourced from local suppliers (e.g. based in Gladstone or Rockhampton) where possible.

19.9.3 ECONOMIC – Employment/Skills:

The indicators for employment and skills relate to the contribution of the project to creation of local jobs and a commitment to using local labour and materials, the nature of employment generated by the project (preference given to higher proportion of permanent employees on fixed-term contracts) and the diversity of employment opportunities that are created.

Relevant Chapters of the EIS: Chapter 1, Introduction; Chapter 2, Project Description; and Chapter 15, Social and Economic Environment.

The project will increase the size and scope of GAWB's operations and activities, enabling a greater range of specialists in different areas to be employed.

It is expected that the project will employ up to 330 contractors (at peak times), averaging around 200 people during the construction phase, and up to 10 additional permanent employees once the pipeline is operational. GAWB and the contractor will source workers locally as a matter of priority.

It should be noted that ABS information used for economic modeling purposes indicated that a range of qualified persons currently reside in the region. This would suggest that the skills do exist in the region. However, given the construction activity currently occurring in the region, it is likely that the project will need to compete with other projects. Consultation with key stakeholders in the region supported this statement and noted that it is difficult to find suitably skilled contractors,

in particular construction workers, in the region who are available. Nonetheless, it is noted that major construction companies are present in the region and that they may have the capacity to increase their workforce, and/or some of their workforce may wish to take up external opportunities. Given the low unemployment rates in the region and relatively high participation rates, additions to the workforce are likely to be required from outside the region.

The nature of employment, such as permanent or temporary and the diversity of employment opportunities for project-related jobs, depends on the nature of the positions available and is determined by GAWB's employment policies. GAWB has structured its operations to ensure staff are retained where possible, by offering flexibility to work part-time and the option of working from home or Brisbane.

During construction, employment conditions will be determined by the contractor's employment policies and are not necessarily directly linked to GAWB policy.

GAWB will include a requirements to comply with local industry policy and the 10 percent training policy (see Chapter 15, Social and Economic Development) in the Construction Contract Agreement.

19.9.4 ECONOMIC - Transport:

The transport indicators in the economic quadrant deal with issues such as the need for reduced travel dependency, facilitates the modal switch to public transport use, reduces the need for road haulage and truck kilometres, optimises the use of rail and water for goods transport, minimises the number of kilometres travelled per annum and promotes efficient handling of goods, material and waste within the site.

Relevant Chapter of the EIS: Chapter 13, Transport and Access Arrangements.

For the operational phase, the pipeline control system is being designed to be highly automated (particularly for the WTP), minimising onsite attendance and thus the need to travel to work.

Unfortunately, given the nature of the project (linear, in a remote location), there will be a high dependency on road travel during construction. Some shipping and rail freighting of pipeline construction materials is possible, however it is anticipated the majority of freight will be carried by truck.

Employees are likely to travel to work by road (via car, ute or shuttle bus) during construction, especially given there are no public transport opportunities for the majority of the pipeline length, except at the major regional centres at either end of the pipeline.

The efficiency of internal transport and handling is driven by the need for reduced time and cost, however a strategy for efficient internal materials handling that could reduce travelling distances has not been formulated specifically for the project.

19.10 Summary

In summary, key strengths (green tones on the SPeAR® diagram) have been identified for many of the social aspects of the assessment including health and wellbeing, stakeholder satisfaction, access and amenity. The project development has had a strong focus on stakeholder engagement, hazard and risk assessment and health and safety which has helped to contribute to this score. In addition, the project would not present any significant visual amenity issues given the rural nature of the project location and the fact that the majority of the infrastructure (the pipeline) would be buried underground.

In addition, economic aspects of viability and competition effects, environmental aspects of air quality, land use and design and operation have also been identified as strengths.

The assessment has identified that all other remaining aspects meet requirements of general compliance/best practice with the exception of transport which is identified as a weakness given the more rural location of the project and the dependence on road-based transport.

Figure 19.3: GAWB SPeAR® Diagram