Santos | PETRONAS

Section 3 EIS Project Description

The respondent comments provided in this section have been collated from all stakeholder submission comments relating to EIS Section 3 Project Description. Please refer to **Attachment A** for copies of all submissions received.

3.1 Introduction

Respondent Comment

Gladstone Regional Council's comments have been provided based upon the information supplied in the EIS. Council is aware that there appears to have been changes proposed to the project, in particular the proposals relating to the construction workforce, which are now different to those stated in the EIS. Any changes to the proposed methods of housing the imported and local workforce will have a far reaching affect upon the assumptions and conclusions as stated in the EIS. As such, major alteration to the assessments for transportation, social/community, and to a lesser extent infrastructure demands will need to occur in the provision of a supplementary EIS. The fact that Santos are now proposing these changes also highlights the inadequacies of the EIS as detailed in the following pages.

Santos Response

Santos has identified changes to the project (including changes to its construction workforce accommodation strategy) since the publication of the EIS, largely in response to the various submissions made. Section 2 of this EIS Supplement outlines the project description changes made since the release of the EIS, and why these changes have occurred. Where these project description changes warrant additional assessment, this has been undertaken as part of EIS Supplement studies.

The revised construction workforce accommodation proposal has been re-assessed, with results of the amended social assessment provided in Appendix F6, and transport assessment provided in Appendix C.

3.2 Project Components

Respondent Comment

Department of Environment and Resource Management requests that plans and maps be provided showing waste streams and discharge points accompanied with detailed descriptions of the various components. Information should be presented describing the mitigation measures to be implemented during all stages of construction and operation of the project. The basis for these measures should also be included.

Santos Response

These issues (including waste streams and discharge points) are addressed by the additional information provided within the amended EMPs in **Attachment B**. The detailed design of these features, which will reflect the proposed mitigation measures, will be provided during the statutory approvals process (such as applications for Environmental Authorities).

Section 3 EIS Project Description

3.3 Description of LNG

3.3.3 LNG Safety and Risks

Respondent Comment

Submitter number 8 stated that:

- *A significant hull breach of a loaded LNG vessel may result in a violent "cold" explosion as the liquid almost instantaneously undergoes massive temperature change.*
- *Even without an explosion, the initial resulting cloud of vaporised gas from a hull breach could potentially asphyxiate large numbers of people in Gladstone and surrounding areas.*
- *The cloud of gas may drift over large areas of Gladstone before reaching ignition point, the outcome will be a flash fire and (where the gas has infiltrated confined spaces), hot explosions. The outcome could be death, injury and property damage.*
- *It is submitted that the impact of oxygen being sucked into the fire, and concentrations of carbon monoxide after the methane flash fire are additional considerations.*
- *It is submitted that similar scenarios can be identified for the LNG plants and LNG loading operations; the LNG gas pipeline will also be vulnerable.*

Santos Response

LNG safety and risk issues have been addressed in two sections of the GLNG EIS, including:

- EIS Section 3.3.3 (LNG Safety and Risks); and
- EIS Section 10.3.3 (LNG Shipping).

EIS Section 3.3.3 described the risk of LNG (in its liquid state) exploding or burning as extremely low. EIS Section 10.3.3 discusses shipping controls and presents the findings of a risk assessment of marine operational activities; including while LNG vessels are at berth, during loading and during vessel movement within the port limits. It determined that the likelihood of incidents during transit was calculated to be extremely low, being less than 2.2 per 1,000 LNG carrier visits. The assessment concluded that the societal risk from the transiting of these carriers through the port was negligible.

EIS Sections 3.3.3 and 10.3.3 also identified mitigation measures required to ensure that operational activities associated with LNG vessels do not impact on other operational activities within the port.

Respondent Comment

Submitter number 8 states the possibility of a fully laden LPG bulk carrier being involved in significant incident within a few hundred metres of urban areas is dreadful. The recent loss of rudder control by the "Endeavour River" is a timely reminder of how feasible the scenario is.

Santos Response

Santos does not propose to use LPG carriers to service the LNG facility as part of the project. LNG carriers are significantly different to the “Endeavour River”, which is a bulk carrier. LNG ships have safeguards on all systems to significantly reduce the risk of mechanical failure.

As part of the shipping safety process for rudder and other mechanical failure, Santos has undertaken detailed investigations, including real-time navigation simulations. It is the result of these studies that has driven the tug strategy for proposed LNG shipping activities, including the level of tug support required. Part of the management strategy will be to ensure that these tugs are made available. Santos is proactively working with the relevant government agencies on this matter.

Section 3 EIS Project Description

A risk assessment of marine operational activities has been conducted by Santos, with results provided in EIS Section 10.3.3. This assessment has highlighted the transiting of LNG carriers through Port Curtis as a hazard. However, Gladstone Port includes navigation features, support systems and redundancy which all contribute to a low risk of an incident occurring during ship transit.

EIS Section 10.3.3 also includes details of risk mitigation measures currently being developed in consultation with the Gladstone Ports Corporation, Maritime Safety Queensland and other LNG industry proponents to minimise the risk of a significant incident occurring.

3.4 Project Location

No submissions have been received on this section.

3.5 Project Schedule

No submissions have been received on this section.

3.6 CSG Fields

Respondent Comment

Queensland Health states the proponent needs to determine whether they are a drinking water provider as regulated by the Water Supply (Safety and Reliability) Act 2008 and the Public Health Act 2005. If the proponent is not a Drinking Water Service Provider, then the proponent needs to develop a management system that will be used to ensure that all potable water consumed on site complies with the Australian Drinking Water Guideline 2004 (ADWG). This should include how potable water will be sourced, transported, stored, reticulated and the water quality monitored (also include in section 3.7 and 3.8).

Santos Response

Santos has determined that it is not providing a "water service" as defined under Schedule 3 of the *Water Supply (Safety and Reliability) Act 2008* as the water is used only by the owner of the infrastructure or the owner's guests or employees and therefore is not subject to the requirements of a water service provider.

In any case, the potable water consumed at operational sites is subject to regular testing and compared against the ADWG. The monitoring requirements in the EMP (**Attachment B1**) include measurement and reporting to ensure that potable water is maintained at a standard that is suitable for drinking.

Respondent Comment

Queensland Health states that if recycled water is to be used in the project, the management system for the safe use of recycled water should be described. For example, the proponent should include details on how recycled water will be managed to preclude the potential for direct and indirect contact with humans thereby minimising the potential for water borne disease transmission.

Queensland Health recommends that recycled water activities comply with the Australian Guidelines for Water Recycling - managing health and environmental risks (Phase 1) (2006) released by the National Environmental Protection Council, which provides guidance on water quality and management planning for recycled water. This document can be located at http://www.nepc.gov.au/taxonomy/term/39 (also include in section 3.7 and 3.8).

Santos Response

The CSG field EMP has been updated with the following text.

Associated Water Management

- Santos will ensure that recycled water activities comply with the *NWQMS Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (November 2006).*

Refer to **Attachment B** for all revised EMPs. Section 11.16.12 of **Attachment B1** outlines the management measure proposed for anssociated water.

3.6.2.1 Nature of Field Development

Respondent Comment

Department of Environment and Resource Management states the proponent should provide detailed preliminary testing, control measures and monitoring that will be adopted to ensure gas containment will be effective and groundwater aquifers are not impacted by the gas. Contingency measures should be developed to ensure gas is not released to atmosphere should unforseen circumstances arise.

Santos Response

Santos is an Australian pioneer in the underground storage of gas in its Central Australian operations and Santos will utilise this expertise to safely store CSG prior to the commissioning of the LNG facility. The integrity of each reservoir will be tested prior to commissioning using an inert gas (nitrogen). Once the reservoir investigations and testing is complete, monitoring will continue during storage through pressure testing and mass balance calculations. A summary of results of the reservoir investigations will be provided as part of the statutory approvals process.

3.6.6 Support Activities and Infrastructure

Respondent Comment

Gladstone Regional Council states that if the State Government expects this community to support the continuation of developing industries in the region and accept the environmental impacts which will occur, then the region should be receiving much more infrastructure assistance (both hard and soft) to enable the community to be sustained. The community should also be given the opportunity to realize the potential economic benefits from the construction phase of the projects.

Santos Response

Santos' Consultation Strategy, designed to identify community needs and inform the community on economic opportunities available during construction, is being implemented in parallel with the EIS process. As part of this strategy, Santos is currently participating in workshops with local businesses to discuss the requirements of contracting to the LNG industry and providing support to develop those requirements. The program has been implemented at the current phase of the project to allow businesses time to implement changes.

Santos has undertaken a supplementary Social Impact Assessment and has revised that based on project description changes. It is in **Attachment F6**. This document assesses the impacts on the community and the mitigation measures that might be used.

3.6.6.5 Sewerage

Respondent Comment

Department of Environment and Resource Management states the proponent should provide detailed information regarding sewage treatment infrastructure, processes, irrigation methods and expected water quality parameters.

Santos Response

Santos is in the process of finalising the LNG facility layout (which will include a sewage treatment plant) with an indicative layout included in Part 1 Section 2 of this EIS Supplement. Santos will provide further details once the LNG facility design has been finalised.

Please refer to **Attachment F3** for a more detailed description of the potential impacts from possible sewage treatment infrastructure.

3.6.6.7 Telecommunications

Respondent Comment

Central Highlands Regional Council states that the private telecommunications service proposed to be established to service the GTP and CSG fields are set out in Section 3.6.6.7 of the EIS. The CHRC is separately proposing a Council operated network of communication towers and associated Infrastructure with a capability to provide high bandwidth data and voice service that would also be operated within the project area. There is mutual benefit to Santos, CHRC and the community if a cooperative approach to the telecommunication network results in a capacity to incorporate public access. This would involve the CHRC, and other Councils along the route of the gas pipeline, having legal access to the project's communicational assets such as towers, buildings and with consideration to access to the spare capacity on the fibre optic cables. Alternatively the Council could install a duplicate fibre that would share the communication assets of the towers and buildings.

A legal agreement and protocol would need to be entered into prior to commissioning the first pipeline.

Santos Response

Santos is currently pursuing several options for providing communications for the construction and operational phases of the pipeline and also increasing the level of voice and data communications to the area for the general public. These options include:

- Collectively with other LNG proponents requesting Telstra to increase its Next G mobile coverage to service the areas through which these projects traverse;
- There are many commercial issues to be addressed regarding the sharing of resources for communication services. However, Santos will continue to investigate other options; and
- Santos will be using the latest technology digital radio services for communication during construction and following that during the operational phase. Certain channels could be dedicated to emergency response channels and these can be made available to the general public if they were to obtain their own digital radio compatible unit.

Santos will investigate options for mutually beneficial telecommunications infrastructure with CHRC.

Section 3 EIS Project Description

Respondent Comment

Queensland Police Service states that GLNG should contribute to the construction of 3 additional radio sites in the Gladstone Police District.

Santos Response

Santos will make appropriate commitments to community infrastructure commensurate with its level of impact and noting the presence of other possible contributors in the Gladstone area.

3.7 Gas Transmission Pipeline

3.7.3 Construction

Respondent Comment

Queensland Primary Industries and Fisheries (Department of Employment, Economic Development and Innovation) comments that the burial depth and placement of pipelines, roads and wells should not adversely impact (unless negotiated with the landholder) on specific farm/soil management practices which include but are not limited to: soil tillage, the placement of farm infrastructure such as the farm irrigation pipelines, construction of fences, erosion management structures like contour banks and grassed waterways, water storage facilities, and current and future cropping activities.

Santos Response

The gas transmission pipeline EMP has been updated with the following text.

Pipeline laying and backfilling

- Unless otherwise negotiated with the landholder, Santos will ensure that burial and placement of infrastructure such as pipelines, roads and wells will not adversely impact on existing landholder management practices such as placement of farm infrastructure, fences and erosion management structures.

Refer to **Attachment B2** for the revised gas transmission EMP.

Respondent Comment

Queensland Primary Industries and Fisheries (Department of Employment, Economic Development and Innovation) state that the proponent should adopt a minimum pipeline burial depth of 1,200 mm as a standard in cropping areas. Any requirement for greater burial depth can be established after consultation with individual landholders.

Santos Response

The gas transmission pipeline EMP has been updated with the following text.

Pipeline laying and backfilling

- Where landholders require a depth greater than 1,200 mm, this can be negotiated with Santos and it will be formalised in project documentation.

Refer to **Attachment B2** for the revised gas transmission pipeline EMP

3.7.3.19 Railway Crossings

Respondent Comment

Queensland Department of Transport and Main Roads states that this section of the EIS should note that prior to any details being finalised discussions with QR Limited will include any rail upgrade projects on the Moura Line.

Reference to this note should also be made in section 7.11.4 which details a list of railways to be crossed by the gas transmission pipeline.

Santos Response

Santos will continue discussions with Queensland Rail (QR) regarding the requirements where the pipeline crosses the QR network prior to construction.

3.7.3.20 Watercourse Crossings

Respondent Comment

Gladstone Ports Corporation (GPC) states the following:

- *Consideration should be given to the reduction of the excavated depth associated with the pipeline crossing Port Curtis. Figure 3.7.7 in the EIS shows an effective trench depth of 3 metres, with a protective covering of sands and gravels placed over the pipeline. The completed crossing remains effectively at the original seabed profile;*
- *By reducing the depth of the excavation to 1.5 to 2 metres it may be possible to retain the same effective protection to the pipeline through the placement of rock on the surface of the pipeline crossing and have the final crossing profile approximately 1 metre above the natural surface. This will result in less dredging of the seabed material and may effectively reduce the separation distance for subsequent crossings;*
- *The reduction in the channel cross-section does not significantly reduce the natural depth of 12 - 14 metres, which occurs in the main channel at low water; and*
- *The reduced excavation quantity would also result in a reduction of the impacts from suspended solids on the adjoining eco-system.*

Santos Response

Santos considered a reduced excavation depth but excluded this option on a number of grounds including the:

- Introduction of a navigation hazard (although the maximum depth is more than adequate, recreational vessels do have a tendency to wander); and
- Reduced contingency (factor of safety) against changing bed level and scour which would be induced by the mound on the seabed.

A reduced excavation depth would possibly decrease the volume of suspended solids in adjoining ecosystems, however this impact is temporary, and this factor is influenced predominantly by duration of disturbance activities as opposed to quantity of material moved. Therefore Santos will be focusing on minimising the duration of the dredging activities as opposed to minimising the depth at which the pipeline is buried.

Section 3 EIS Project Description

Respondent Comment

Queensland Primary Industries and Fisheries (Department of Employment, Economic Development and Innovation) states that it would recommend and support that any major waterway including the Dawson and Calliope River crossings should be underground and undertaken by directional boring techniques.

Santos Response

Horizontal Directional Drilling (HDD) will be used on selected watercourses where practicable, taking into account environmental, engineering, logistical and geotechnical issues and advice from the drilling operator. The various options are outlined in **Attachment B2**.

3.8 LNG Facility

Respondent Comment

Gladstone Area Water Board (GAWB) noted that the EIS detailed how the water needs of the project, potentially both in construction and operation, were intended to be met by an on-site desalination facility.

GAWB noted that there appeared on the face of the EIS document no analysis of the comparative environmental or economic benefit that would accrue to the Project and the Gladstone Region from accessing GAWB's water supply network.

It was agreed that further work be undertaken by the proponent and supplied to GAWB, to better understand these matters to inform subsequent meeting/s, but also to assist GAWB in drafting of this submission.

GAWB noted that the environmental impact of a fresh water source would be expected to have a much reduced environmental impact than a desalination facility.

GAWB noted that an economic impact of the provision of water from GAWB's existing network would be likely, in the absence of further analysis, to represent the least cost method to provide for the water needs of Curtis Island to support sustainable economic development in the region.

Santos Response

A design concept for the Raw Water Pipeline Study was forwarded to GAWB on 26 August 2009.

Santos is liaising with GAWB to further investigate the option of delivering water from the existing GAWB raw water system to the GLNG site.

Respondent Comment

The Department of Infrastructure and Planning (DIP) State Development Areas Implementation Branch (SDAIB) states that given the proposed timing of construction, it is recommended that further refinement studies be undertaken on the alignment of the bridge and access road, assuming the infrastructure corridor will be in use.

Santos Response

Access to Curtis Island

The GLNG EIS presented and assessed two options for access to the LNG Facility from the mainland (refer to EIS Section 3.11). These two options were:

- **Bridge and Road** – the provision of road access to Curtis Island by way of an access road and bridge from the mainland crossing Port Curtis between Friend Point and Laird Point with construction access for the first train being by barge and ferry; and
- **Barge and Ferry** – access to the site on Curtis Island by barge and ferry for the life of the GLNG Project (for both construction and operation) on the assumption that the access road and bridge is not constructed.

The EIS described the establishment of a working group by the Queensland Coordinator-General to develop engineering designs for the proposed bridge and road option. The working group, comprising the DIP, Gladstone Ports Corporation (GPC), Santos and the BG Group/Queensland Gas Company (QGC) joint venture, engaged consultants to prepare concept designs of the potential road and bridge that could provide access from the mainland to Curtis Island.

The EIS stated that a decision on which option is to be adopted would be made during FEED when it would be expected that greater clarity will be available on the likelihood and timing of the access road and bridge option.

Some public submissions which were received during the EIS exhibition period strongly supported the barge and ferry option over the bridge option based on the potential environmental impacts of the construction and operation of the bridge and road (see submission no. 18 (Selwyn Appo, Port Curtis Coral Coast Aboriginal Corporation), no. 38 (Capricorn Conservation Council) and no. 45 (Tony Johnson, Port Curtis Coral Coast Native Title Claim Group).

Santos has participated in further concept design work within the working group and has undertaken further technical, commercial and environmental assessment of the proposed bridge and has considered the public submissions. This work has concluded that:

- Construction of a bridge is not commercially viable and cannot be justified in the context of the first three to four LNG projects on Curtis Island;
- It is highly unlikely that all projects proposed for Curtis Island will proceed;
- The environmental impacts of the barge and ferry option are less than the impacts of the bridge option; and
- Based on the community consultation undertaken by Santos and the public submissions on the EIS, the majority of the community do not support the bridge option.

On this basis, Santos preferred option for the GLNG Project is to access the site on Curtis Island by barge and ferry. Santos does not, at this time, support the construction of a bridge to Curtis Island as a preferred mode of transport for construction and operation of the LNG Project.

3.8.2 Construction

Respondent Comment

Department of Environment and Resource Management suggests providing an illustrated description of the staging of construction and the proposed mitigation measures including monitoring. An example would be the staged construction of the material offloading facility (MOF), including the construction of the dredge spoil rehandling facility (proposed to be located adjacent to the haul road) and associated discharge.

Santos Response

Santos notes this comment. At this stage of the project, dredge material from the MOF dredging is proposed to be disposed on site and mitigation measures have been included in the EMP. A number of construction methodologies have been assessed and a summary provided in EIS Section 3.8.2.4, along with potential mitigation measures, which are provided in **Attachment B4**.

3.8.2.5 Construction Equipment and Materials

Respondent Comment

Gladstone Ports Corporation states that the quantum of materials imported to site, as nominated in Table 3.8.2, appears to be low. There is insufficient information available to determine whether the materials sourced on the island are suitable for the construction of the facility.

Santos Response

Attachment C sets out a revised summary of construction materials to be transported to Curtis Island. Note that summaries and estimates in this attachment are based on further geotechnical information obtained since the EIS was issued.

Respondent Comment

Gladstone Ports Corporation states that when consideration is given to the haul road from the MOF facility to the site, an allowance of 80,000 m^2 results in approximately 8,000 m^3 of road base. This would not account for pavement work within the site.

Santos Response

Attachment C sets out a revised summary of construction materials to be transported to Curtis Island. At this stage it is estimated that around 259,000 cubic metres of road base will need to be imported to Curtis Island.

Respondent Comment

Gladstone Ports Corporation states that the initial advice from other sources would indicate that 30,000m^3 of concrete is required for the construction of a cryogenic tank for an operation of this size. A total of 37,330m^3 of concrete has been quoted as the total concrete needed for the LNG Facility.

Santos Response

Attachment C sets out a revised summary of construction materials to be transported to the island. At this stage it is estimated that around 29,000 cubic metres of concrete is required for the two LNG tanks. Approximately 103,000 cubic metres of concrete is estimated to be required for the whole facility including paving, grouting and temporary facilities.

Respondent Comment

Gladstone Ports Corporation states that no allowance appears to be made for the quantity of fuel that will need to be transported to Curtis Island for power generation and mobile equipment purposes.

Santos Response

Refer to Table 4.3 in **Attachment C,** which sets out a revised summary of construction materials to be transported to the island. Table 4.3 includes an estimate of 2 tankers/month (20 m^3 /tanker) of fuel to be transported to Curtis Island

Section 3 EIS Project Description

Respondent Comment

Gladstone Ports Corporation states that with the final design yet to be completed to FID stage and the quantities quoted being subject to review, approvals associated with the transport of materials should be conditioned subject to the proposed final quantities being determined. The impacts with transportation of material from the mainland will flow in to the utilisation of the road network within the city.

Santos Response

As material quantities (and construction methodology) will not be finalised until after the EIS Supplement, the traffic impacts have been assessed for a series of “worst case” potential scenarios to demonstrate their suitability and mitigation requirements. Further construction methodology scenarios have been assessed in traffic terms within **Attachment C**.

Respondent Comment

Gladstone Ports Corporation states that the issues associated with the transfer of petroleum products to and from Curtis Island for both the construction and operational phases may have not been addressed in the EIS. Both safety issues and potential pollution issues should be identified. Traffic generation on the harbour would be impacted should special conditions apply to the transfer of petroleum products from the mainland to the island.

Santos Response

Road tankers (from accredited dangerous goods transport companies) will be barged to Curtis Island where the tankers will discharge their loads into an above-ground storage facility built to required specifications.

Should any emergency take place while the tanker is over the water, Santos will comply with the Emergency Response Management Plan which will be put in place for the LNG facility (and aligned with GPC’s emergency system).

The impact associated with increased traffic movements has been assessed in **Attachment C**.

3.8.2.7 Construction Workforce and Accommodation

Respondent Comment

Queensland Gas Company notes that GLNG's preferred option for a Construction Accommodation Facility (CAF) is to develop one on Curtis Island. GLNG has indicated "that there are good town planning, environmental, safety and security reasons to establish the CAF on Curtis Island as opposed to other alternatives." QGC supports the view that the best location for CAFs associated with Curtis Island LNG facilities is on Curtis Island.

Santos Response

Santos appreciates the support for the location of the CAF on Curtis Island. Further refinement of GLNG’s accommodation strategy now includes a proposal to house a percentage of the workforce (local based workers) on the mainland. These workers will subsequently travel to the work site each day and return to the mainland at the end of each day’s shift. Non-local workers (on a fly-in/fly-out roster) will be accommodated in the CAF on Curtis Island. Refer to **Appendix F6** for further details.

Respondent Comment

The DIP State Development Areas Implementation Branch states that there appears to be a mismatch in terms of workforce numbers and accommodation to be provided, with the CAF to accommodate up to 2,000 workers (as indicated in ES11); however the estimated peak workforce is indicated to be 3,000 workers for option 1. Further to this, Table 2.3.8 indicates the CAF is to be a 3,000 person accommodation facility. Clarification of the capacity of the CAF should be provided.

Santos Response

The EIS Appendix Z assessed the size of the CAF for the stick build option in order to assess the worst case scenario. If the project is stick build, the CAF capacity will be for a peak workforce of 3,080 as indicated in the EIS. However, it is likely construction will be modular.

If Santos opts for modular design the CAF capacity will be reduced to reflect the reduced workforce numbers. Construction duration is anticipated to remain the same, except for a change in peak workforce timing for month twenty for stick build and to month thirty for modular. This would result in a reduced scale of the services required to support the CAF, such as water supply and power generation, as well as reduced traffic load.

Current capacity is anticipated to be 1,600 but CAF capacity will be modified to accommodate the imported workforce as required. The capacity may be affected by several variables from cumulative effects including housing availability on the mainland and local worker availability.

3.8.2.8 Sewerage

Respondent Comment

Gladstone Regional Council states that the EIS does not give any indication of the size of the proposed sewage treatment plant for operations. There is mention of irrigation of treated water from the facility but no detail on the required area or its location on the site. This should be required from the proponent.

Santos Response

Santos is in the process of finalising the LNG facility layout (which will include a sewage treatment plant) with an indicative layout included in Part 1 Section 2 of this EIS Supplement. Santos will provide the Gladstone Regional Council further details once the LNG facility design has been finalised. Santos is proposing to discharge the treated effluent as part of the discharge of the brine stream from the desalination plant. Details of the impacts of the discharge are described in **Attachment F3**.

3.8.3 Regulatory Framework

Respondent Comment

Department of Environment and Resource Management requests a detailed illustrated description of the LNG process. The description should include all inputs and outputs (as well as fugitive emissions). Where output wastes are to be disposed, their characterisation, and the location and the method of disposal should be assessed and described.

Santos Response

Figure 3.8.6 of EIS Section 3.8.3.1 shows a conceptual LNG process flowchart and EIS Section 8.8.5 provides a summary of emissions from the LNG facility.

Section 3 EIS Project Description

Please refer to Figure 2.2.4 of Part 1, Section 2 for a schematic of the GLNG facility showing inputs and outputs.

3.8.3.9 Water Supply

Respondent Comment

Gladstone Regional Council states that it is noted that the potable water source is proposed to be a desalination (reverse osmosis) plant. The plant should be designed to cater for the combined needs of all proponents of LNG plants on Curtis Island to obviate the need for multiple/separate reverse osmosis plants being established.

Santos Response

Santos notes this comment and will consult with other approved proponents to establish the feasibility and functionality of a combined desalination plant on Curtis Island.

Respondent Comment

Queensland Primary Industries and Fisheries (within the Department of Employment, Economic Development and Innovation) has requested that the following additional information be provided to allow the DPIF to accurately assess impacts:

- *Location of the LNG facility desalination plant, or the inlet and outlet structures;*
- *Impacts of this plant; and*
- *The ability of the receiving location to mix or dilute the high saline water discharge or alternatives.*

Santos Response

The impact of the brine waste product from the desalination plant on the receiving environment is discussed in EIS Section 8.7.4.6 and EIS Appendix R2. The following is a quote from this section:

"Based on a worst case salinity level in intake waters of 35 g/L, the reverse osmosis concentrate (ROC) could have a salinity level of 63.5 g/L. As well as producing ROC, the proposed desalination system will produce wastewater at a small rate (1 % of the waste flow) associated with periodic membrane cleaning. This waste stream will be treated on site.

To assess the water quality impact of the ROC discharge, near-field and far-field modelling was conducted (refer to Appendix R2)."

Santos has conducted further investigations as part of the EIS Supplement process regarding the desalination plant on Curtis Island, including water quality of the associated brine discharge. **Attachment F3** provides the findings of this assessment and assessed that the impact is expected to be negligible.

3.8.3.10 Electricity

Respondent Comment

Gladstone Regional Council states that the EIS indicates that a temporary (and how long is temporary?) desalination plant will be constructed for the construction phase. What will be the energy source to power the desalination plant - gas turbines or diesel generators or other? What is the staging of desalination plant? When will it be constructed and what is the proposed water source before this comes on line?

Santos Response

Diesel generators will be used to power the desalination plant because gas turbines will not be available until the plant is commissioned and gas is available. Until the desalination plant is commissioned, construction water will be brought in via tankers and/or barges during the early stages of construction with provisions to use impounded rainwater run-off. It is anticipated that the desalination plant will be installed within the first 12 months of construction.

3.9 LNG Shipping

Respondent Comment

Submitter number 14 notes the number of ships that this industry will add to the ever increasing number of coal ships is gravely concerning. Gladstone historically has a large recreation use of its harbour and with the proposed coal expansion and LNG industry it would appear that this is going to be seriously curtailed. Surely the citizens of Gladstone deserve better than this.

Santos Response

EIS Section 3.9.2 provides a description of anticipated ship visits associated with the operation of the GLNG facility. LNG ships will cause a small increment in ship numbers relative to coal, with an anticipated one ship visit per week for the first LNG train, and one ship visit every two days generated by the three-train facility. Based on currently available port use data (2007/2008 figures), this will represent an estimated 3.6 % (1 train) and 11.7 % (3 train) increase in existing port traffic.

As stated in EIS Section 3.9.2, the GPC and regional harbour master have been actively involved in a number of real-time navigation simulation sessions and workshops in relation to shipping safety issues associated with the GLNG Project. This has resulted in the design of navigational areas and operational procedures, including those associated with interactions with local watercraft.

In addition, port traffic and congestion modelling has been conducted in conjunction with GPC, with the results of this modelling helping to define the triggers for expansion of port facilities. Note that currently laden bulk carriers are confined to movement on the high tide, while LNG carriers, which sit much higher in the water even when fully loaded, are able to travel into and out of the port at any state of the tide. Hence LNG and bulk shipping in the case of the Port of Gladstone is complementary.

Santos will continue to work with Maritime Safety Queensland, GPC, other LNG proponents and non-LNG industries that use the harbour to further refine operational procedures and define port facility requirements.

Respondent Comment

Queensland Department of Transport and Main Roads states that further clarification of the requirements for maritime infrastructure is required including (for example) aids to navigation such as buoys, beacons and vessel traffic services including radars. This is required to ensure consideration of all impacts on safety of navigation within the port.

Santos Response

The risks associated with passing ships during loading operations are mitigated through the development of detailed marine operations protocols using the results of comprehensive real-time navigation simulations to guide the development process. Santos is continuing to work closely with MSQ, GPC and other proponents through a series of navigation simulations to assist in the development of port operations protocols. These simulations have resulted in the agreement of mitigation measures such as

speed limits and escort tug strategies for LNG vessels transiting the Port of Gladstone. Santos will continue to work collaboratively with the GPC, MSQ, other LNG proponents and stakeholders with regard to issues of shipping and navigation safety within the Port of Gladstone.

Recent work conducted within the established industry working group on marine operating protocols has included the development and discussion of protocols for vessels operating within the Port of Gladstone associated with construction and operating phases.

3.10 Dredging and Dredged Material Management

3.10.1 Dredging

Respondent Comment

Submitter number 14 states at this stage nothing has been mentioned of the extra dredging to provide a second channel to the entrance of Gladstone outer Harbour that this industry requires for both safety and commercial expedience.

Santos Response

Port capacity modelling undertaken by the GPC indicates that the LNG industry does not require a second channel to the entrance. Note that any expansion of the harbour facilities is managed exclusively by GPC. Should outer channel duplication be required the GPC will manage the development process, including any impact assessment requirements. GPC has released an EIS for the Western Basin Dredging and Disposal Project (http://www.gpcl.com.au/Project_Western_Basin_Dredging_&_Disposal.html) which outlines the effects of all of the dredging necessary to accommodate the growth of the LNG industry in Gladstone.

3.10.2 Marine Dredged Material Placement Facility

Respondent Comment

Submitter number 14 states she was quite dismayed to read that Santos is proposing an alternative to the Gladstone Ports Corporation dredging and have included in their EIS plans to do their own dredging and put this spoil near Laird Point which is bordering Grahams Creek, a part of the Great Barrier Reef Marine Park. As per "Curtis Coast Management Plan" dated September, 2003 it also consist of "Significant Coastal Wetlands" which includes seagrass beds.

Santos Response

The GLNG EIS stated that:

- The Queensland Government and GPC are presently reviewing the dredged material management plan for Port Curtis to plan for the long term dredging and dredged material disposal that may be required to provide safe and efficient access to existing and proposed port facilities in the harbour for the foreseeable future. The plan considers the dredging and dredged material disposal required for industrial and port related projects currently proposed for Gladstone. As part of the plan, GPC is considering a single dredged material disposal area which will be large enough to accommodate the combined dredged material from all of these projects in a manner which is consistent with GPC's long term port development objectives An EIS for the Western Basin Dredging and Disposal (WBDD) Project was released for public review on 14 November 2009 which assesses the impacts of the disposal of material into a single dredged material disposal area which will be large enough to accommodate the combined dredged material from all of these projects;

- GPC proposes to obtain the necessary approvals for the WBDD Project. If the project is approved, the dredging and the associated dredged material placement for the GLNG Project will be undertaken in accordance with the WBDD Project provided the timing of its approval is compatible with the GLNG Project requirements; and
- If for some reason the WBDD Project is delayed or does not proceed, Laird Point has been put forward by Santos as an alternative project-specific disposal site for management of the project's dredged material.

The Laird Point site was assessed in EIS Section 8.17. Results of further investigations relating to the proposed dredged material placement facility at Laird Point in response to EIS submissions are provided in **Attachment G** of the EIS Supplement.

Key impacts on seagrasses and subtidal communities from dredging have been assessed and include:

- Increased turbidity and resultant reduction in light penetration;
- Physical burial of vegetation at the disposal site;
- Limited increased sedimentation in adjacent seagrass meadows;
- Temporarily reduced dissolved oxygen concentration;
- Release of nutrients and pollutants from contaminated sediments; and
- Hydrodynamic changes

GLNG recognises that the disposal of dredge material at Laird Point would require an approval for a material change of use from the Coordinator-General.

Respondent Comment

Queensland Gas Company notes that GLNG has proposed to place dredge spoil on Laird Point on Curtis Island. This disposal option involves pipelines either traversing the QC LNG Project LNG facility site or the marine areas directly in front of the QC LNG site. QGC believes that these options would potentially interfere with QGC's proposed development works which are proposed within the same timeframe as the GLNG Project.

Santos Response

Santos recognises the need to work with the proponents of other developments to coordinate construction activities appropriately including the dredge material placement processes.

The Queensland Government and GPC are presently reviewing the dredged material management plan for Port Curtis to plan for the long term dredging and dredged material disposal that may be required to provide safe and efficient access to existing and proposed port facilities in the harbour for the foreseeable future. The plan considers the dredging and dredged material disposal required for industrial and port related projects currently proposed for Gladstone. As part of the plan, GPC is considering a single dredged material disposal area which will be large enough to accommodate the combined dredged material from all of these projects in a manner which is consistent with GPC's long term port development objectives An EIS for the Western Basin Dredging and Disposal (WBDD) Project was released for public review on 14 November 2009 which assesses the impacts of the disposal of material into a single dredged material disposal area which will be large enough to accommodate the combined dredged material from all of these projects;

GPC proposes to obtain the necessary approvals for the WBDD Project. If the project is approved, the dredging and the associated dredged material placement for the GLNG Project will be undertaken in accordance with the WBDD Project provided the timing of its approval is compatible with the GLNG Project requirements; and

Section 3 EIS Project Description

If for some reason the WBDD Project is delayed or does not proceed, Laird Point has been proposed by Santos as an alternative project-specific disposal site for management of the project's dredged material. EIS Section 2.3.9 identified a range of sites on and around Curtis Island for the potential location of a dredged material placement facility (DMPF), with the emphasis being on land-based placement and the containment of fine material. Laird Point was preferred because of its smaller footprint due to greater wall heights (compared to the Boatshed Point site), reduced visual amenity impact, and greater distance from seagrass meadows (compared to Boatshed Point site). The Laird Point site was assessed in EIS Section 8.17. Results of further investigations relating to the proposed DMPF at Laird Point in response to EIS submissions are provided in **Attachment G** of the EIS Supplement.

On 18 August 2009 (since the EIS was prepared), the Queensland Government and Australia Pacific LNG announced Laird Point on Curtis Island as the site for Australia Pacific LNG's proposed LNG Plant. This site is the same area proposed for the DMPF for the GLNG Project.

The GPC's submission on the GLNG Project EIS stated that the option for disposal of dredge material at Laird Point impacts significantly on the site nominated for Australia Pacific LNG. In particular the submission stated that the greater percentage of the site consists of unconsolidated material that would require a significant period to consolidate before it could be used for industrial purposes.

Santos recognises the conflict in proposed land use of the Laird Point site for the APLNG Plant and its proposed DMPF. If the site was to be used for the DMPF, it is unlikely that it would be able to be used for the construction of an LNG plant in the short to medium term. Whilst the site may be able to be used over the longer term for a facility with the implementation of suitable engineering works, it is not likely that this would meet the time frame requirements for the APLNG plant.

Despite the announcement by the Queensland Government and APLNG, it is not a foregone conclusion that the site will ultimately be used for the construction of an LNG plant as the development of the site will depend on a range of factors. For example, it is recognised that at some point in the future there may be consolidation of the LNG projects in the Gladstone area and that not all currently proposed LNG projects are likely to proceed. If this occurs, it is possible that the Laird Point site may not be required for the construction of an LNG plant in the short to medium term.

Further, in the event that the WBDD Project does not proceed or is delayed, Laird Point remains a viable stand-alone option for disposal of dredge material arising from the GLNG Project, and the only viable alternative dredge spoil disposal site at this time for the LNG industry.

On this basis, GLNG seeks approval of the DMPF at Laird Point subject to the following two conditions:

- The CG being satisfied that the site is not required for another LNG plant in the short to medium term; and
- The Coordinator-General being satisfied that the WBDD Project is not available to be utilised within the time required to commence construction of the GLNG facility.

Santos recognises that an approval to dispose of dredge material at Laird Point would require a material change of use approval by the Coordinator-General.

3.11 Access to Curtis Island

3.11.3 Ferry/Barging Option

Respondent Comment

Queensland Gas Company notes that GLNG has indicated its preferred option for access to Curtis Island during construction and operation is via development of marine transportation operations between Gladstone and the island. QGC supports this view on the relative benefits and disadvantages of marine transportation versus construction and operation of a bridge.

Section 3 EIS Project Description

Santos Response

Santos appreciates this support for marine transportation as a means of accessing Curtis Island.