Key Issues

Land disturbance during construction activities may potentially change the surface water hydrology, in particular increased runoff to streams due to the removal of vegetation, landscaping and an increase in area of hard surfaces. Changes to the amount of sediment entering the watercourses will have an overall impact on downstream estuaries. Potential impacts from the discharge of hyper-saline brine concentrate from the proposed reverse osmosis plant, if required, will be assessed.

5.6 Marine Hydrology

The project is located in Port Curtis, a sheltered waterway that is protected by Facing Island and Curtis Island. Tidal flushing and high velocities have led to a naturally maintained deepwater channel. The Port Curtis Ecosystem Health Report Card (Storey et al., 2007) indicates that water quality in the area is generally good, with elevated turbidity, total phosphorus and some metals.

Curtis Island is separated from the mainland by a narrow estuarine passage known as 'The Narrows'. Graham Creek forms part of this passage and is located approximately 7 km north of the proposed site (see Figure 4.3).

Key issues

Potential changes to coastal processes and sediment transport could occur once the construction of the marine infrastructure is complete and during the operational life of the project. The construction of the marine infrastructure will increase suspended sediments and turbidity in the areas of construction activity where the seafloor is directly disturbed.

Two locations are being investigated for the LNG loading facility—North China Bay and Boatshed Point. Either option will require deepening and possibly widening of the Clinton Channel and dredging of a new channel and swing basin to access the jetty and loading facility.

Dredging activities may result in increased suspended sediment and turbidity in Port Curtis, as well as changes to sedimentation patterns. Disposal of the dredged spoil will result in impacts to the surrounding water quality from temporary sediment plumes and smothering of marine benthic fauna and flora. Dredged spoil will require testing for contaminants prior to construction.

Shell's proposal includes the investigation of channels to either Boat Shed Point or to North China Bay. Shell acknowledges Gladstone Ports Corporation's Western Basin Strategic Dredging and Disposal Project and will participate in this process by liaising closely Gladstone Ports Corporation.

5.7 Groundwater

Geotechnical studies recently undertaken on Shell Australia's allocated site did not indicate groundwater was present, with the exception of one test pit showing slow seepage of groundwater after 45 minutes. Local rainfall may influence groundwater conditions of the project area, however soils in the area have low permeability and transmission of groundwater through the profiles is expected to be slow (Coffey, 2009).

Key Issues

Potential contamination of groundwater resources (shallow aquifers) from fuel, lubricating oils and chemical spills may occur during the construction and operation phases. Mitigation measures will need to be implemented to avoid damage to pipes, processing units or transfer vessels.

5.8 Air Quality and Greenhouse Gases

The Queensland EPA is currently monitoring the air quality of the Gladstone region. The current air quality monitoring results indicate that nitrogen oxide, sulphur dioxide and ozone are within the ambient air quality standards issued by the Environment Protection and Heritage Council. Monitoring of particulate concentrations of PM_{10} has shown background levels to exceed the national standard of 50µg/m^3 over a period of 24 hours during dust storm and grass fire events (EPA, 2008).

Concerns have been raised about the cumulative impact of air emissions from industry on the health and well-being of the Gladstone community (EPA, 2009). The Gladstone air shed is impacted by the proliferation of industrial developments in the area, including coal-fired power stations, aluminium smelters and metal refineries.

Key Issues

Air quality impacts of construction, particularly dust emissions, will depend on seasonal conditions at the time the work is undertaken. Airborne particulate matter in dust can affect human health, particularly as PM_{10}. Total suspended particulates (TSP) and dust deposition are more likely to have an aesthetic and amenity impact.

During operation, emissions will occur from gas-fired equipment and flaring and will largely involve emissions of NO_x, carbon monoxide (CO) and carbon dioxide (CO_2). The cumulative impacts of the project on the Gladstone airshed will be assessed as part of the EIS using Queensland Government approved airshed models.

Greenhouse gas emissions will be generated from both fuel and feed gas. The selected process will determine the ratio of carbon dioxide (CO_2) produced per tonne of LNG. Emissions are expected to be in the order of 0.26 tonnes of CO_2 per tonne of LNG.

5.9 Noise and Vibration

Ambient noise levels on the mainland are generated from the industrial estates and shipping traffic around Gladstone and Port Curtis. Curtis Island currently has no industrial activity and communities are confined to the eastern and northern coasts. Noise on the island is primarily generated from wind, animals and recreational activities.

There are numerous sources that contribute to ambient ocean noise including oceanic processes, noise from shipping activities and naturally occurring biological background noise.

Key issues

Heavy earthmoving equipment and construction vehicles, plant and equipment are likely to be the main sources of noise during the construction phase of the project. In addition, blasting, if

required, will cause elevated noise levels and vibration of a short duration. Blasting may occur at irregular intervals.

Noise will be generated from all operating components of the LNG facility, shipping operations and from vehicles, plant and equipment. All noise emissions will be required to comply with Queensland EPA's guidelines. Emergency procedures including safety alarms, venting and flaring may generate high noise levels, which may temporarily impact the surrounding environment.

The project will result in increases to existing underwater noise levels. Change in noise levels may impact fish and marine mammals within the vicinity of the area. Potential impacts to marine fauna and flora species and appropriate mitigation measures would be investigated as part of the EIS.

5.10 Landscape and Visual

Curtis Island currently has no built infrastructure in the vicinity of the Curtis Island Industry Precinct, providing an undisturbed vista from the mainland. The LNG facility will be lit for safety and security purposes during construction and operation. Gladstone, however, is a significant industrial centre, with the landscape affected by major industrial developments.

Key Issues

The proposed LNG facility will impact on the landscape and visual amenity of the surrounding area. The LNG plant and associated infrastructure will operate 24 hours a day, 365 days a year and will be illuminated for both security and occupational health and safety reasons. Significant flaring of gas from the facility will only happen occasionally due to process upsets and in preparation for production start up following maintenance or inspections. Small pilot flares as well, as lighting to meet appropriate HSSE standards will be permanently visible on the plant.

Development of the LNG facility on Curtis Island will result in a change to the landscape character. Residents on privately owned islands are the most likely to be impacted by changes to the landscape. The extent of visual impact will be addressed in the EIS and design responses investigated.

Natural light, such as the light of the moon, are used by some marine fauna (e.g., turtles) for navigation. Increased lighting may have an impact on the movement and migration of marine fauna utilising the local region. Design responses including plant layout and lighting type and orientation will need to be investigated and addressed in the EIS.

5.11 Traffic, Roads and Infrastructure

There is no existing road infrastructure in the vicinity of the project area. Vehicle tracks provide access to the LNG investigations area. Access to the Island is currently via boat.

The Bruce and Dawson highways service the Gladstone region and facilitate the transport of resources from central Queensland to the port and associated industry. The road network has been designed to allow large vehicles alternative access to major highways and industry facilities without travelling through residential and built up areas. There are export coal rail lines between major inland mining centres and Gladstone. Gladstone is connected to the national rail network that provides passenger and freight services to Rockhampton and Brisbane.

A domestic airport is situated in Gladstone, which provides connections to Brisbane, Rockhampton, Mackay, Townsville and Cairns.

Key Issues

Construction of the LNG facility will bring additional light and heavy vehicle traffic to the region and project area, which may impact on road safety, local amenity, road maintenance and road use.

5.12 Marine Traffic

Port of Gladstone currently supports both commercial and recreational marine traffic including bulk carriers, liquefied petroleum gas (LPG) ships, support tugs, commercial trawlers, small recreational fishing boats, yachts and sailing boats. On average, approximately 1,200 vessels enter the Port of Gladstone each year (GPC, 2009).

Key Issues

During construction, impacts to existing marine traffic will be short-term and include movement of the construction workforces and materials from the mainland to the site, and movement of construction equipment and operation of dredging equipment in and adjacent to existing shipping channels. During operation, Shell Australia anticipates that between three and five LNG carriers per week will be required for export of LNG from the facility.

5.13 Archaeology and Cultural Heritage

The Port Curtis Coral Coast (PCCC) native title claim group have legislative responsibility for the project area under the Queensland *Aboriginal Cultural Heritage Act 2003*. Initial investigations undertaken for the geotechnical program involving the PCCC and their technical advisor evaluated the aboriginal cultural heritage potential of the site and identified areas with the greatest sensitivity for potential finds. Isolated stone artefacts and an artefact scatter were identified in three locations.

Key Issues

The key historic and cultural heritage issues associated with the project will be the potential presence of indigenous cultural sites and materials. Further detailed investigations will be undertaken as part of the cultural heritage management plan that will be prepared for the project. The cultural heritage management plan will also set out management and mitigation measures for Aboriginal cultural heritage during construction and operation phases.

5.14 Socio-economic

Gladstone City and neighbouring communities of Boyne Island, Tannum Sands, Yarwun, Targinnie and Calliope sustain a growing population of over 30,000 people (PIFU, 2008). Major industrial developments are the main driver of population growth in the Gladstone region as it provides a sound economic base for the communities. The region’s major industry includes:

- Boyne Smelters Limited (BSL) who operates Australia’s largest aluminium smelter.
- Queensland Alumina Limited (QAL) who operates one of the world’s largest alumina refineries.

- Gladstone Power Station which is Queensland's largest black coal fired power station.
- Cement Australia (QLD) who operates a cement production plant.
- Orica who manufactures chemicals (including explosives) for the mining industry.

The Port of Gladstone is Queensland's largest multi-commodity port and is the fifth largest port in Australia.

Coastal waters of Gladstone provide the community with many social and recreational activities such as fishing, boating, diving and other water sports. Commercial fishing is considered an important industry within the region, as the seafood is exported to South East Asia markets and provides a considerable number of jobs to the community.

Key Issues

Concerns about health, the continued industrialisation of Gladstone and the proposed industrial development on Curtis Island are key community issues. Potential social impacts of the project include:

- Increased demand for services affecting local businesses.
- Increased pressure on local infrastructure, such as roads, schools, hospitals etc.
- Potential employment opportunities during operation and maintenance.
- Regional development opportunities.
- Accommodation of the construction workforce and impacts of short-term population increases on Gladstone and surrounding rural communities.

Some of these impacts may be affected by the cumulative effect of other proposed projects for the region. Cumulative impacts of the proposed development will be addressed in the EIS

6. ENVIRONMENTAL MANAGEMENT

An Environmental Management Plan (EMP) will be prepared for the project. The EMP will provide a mechanism for implementing mitigation strategies for avoiding or reducing potential environmental impacts. The purpose of the EMP is to:

- Outline the commitments of the project to avoid or minimise and monitor the potential environmental impacts.
- Enable Commonwealth, state and local government authorities to assess the project's compliance with any conditions of approval.
- Provide reassurance to the community that impacts are being effectively managed and monitored.

Health, Safety, Security and Environment (HSSE)

A specific HSSE management system will be developed for the project, to provide a systematic framework for the management of potential environmental impacts (see Section 5.9).

Key issues of the project, to be managed via the HSSE management system will include:

- Management of greenhouse gas emissions.
- Integrated environmental, social and health impact assessments, including stakeholder engagement.
- Development and implementation of energy efficiency initiatives.
- Management of solid waste.
- Spill response preparedness.
- Flaring and venting at the LNG facility.
- Management of sulphur oxides (SO_x) and nitrogen oxides (NO_x) emissions from major production and manufacturing facilities.
- Management of impacts on water (produced water and process effluents).

Sustainable Development

As part of its Business Principles, Shell is committed to contributing to sustainable development. This requires balancing short and long term interests, and integrating economic, environmental and social considerations into business decisions; and regularly engaging with our many stakeholders (see Sustainable Development Commitment, Appendix 2).

Further information on Shell's efforts to contribute to sustainable development are contained in the Shell Sustainability Report 2008, available at:

http://www.shell.com/home/content/responsible_energy/sustainability_reports/dir_shell_sustainability_reports.html

Climate Change

Shell is actively responding to climate change and has established voluntary targets for reducing greenhouse gas emissions from its operations (see Climate Change Commitment, Appendix 3). Shell is taking a number of actions throughout the business to manage carbon dioxide (CO_2) emissions across six main pathways:

- Improving energy efficiency in its operations.
- Building capability in Carbon dioxide Capture and Storage (CCS).
- Continuing to invest in research and development to deliver new technologies that further increase energy efficiency and reduce emissions.
- Developing low-CO_2 sources of energy, including natural gas and low-CO_2 fuel options.
- Helping manage energy demand by growing the market for products and services that help customers use less energy and emit less CO_2.
- Working with governments to build effective policies and regulations for managing CO_2 and other greenhouse gases.

7. STUDIES PROGRAM

The preliminary studies program developed to assess the environmental and social issues identified in Section 5 is set out in Table 7.1. The proposed studies will describe the existing environment, assess the potential impacts of the proposed activities (see Section 4) on the environment and recommend mitigation measures to address those impacts. Residual impacts that cannot be mitigated will be clearly documented.

Table 7.1 Preliminary Studies Program

Environmental Effects	Social Impacts
Landforms, geology and soils	Air quality
Surface water hydrology	Noise and vibration
Groundwater	Indigenous cultural heritage
River, stream and floodplain morphology	Non-indigenous cultural heritage
Terrestrial flora and fauna	Land use and infrastructure
Aquatic flora and fauna	Traffic and road infrastructure
Physical marine environment	Socio-economic
Marine ecology	Public health
Greenhouse gases	Stakeholder consultation
	Preliminary hazard and risk assessment

The detailed scopes of work for the nominated studies will address the terms of reference prepared by the Queensland Coordinator-General for the EIS.

8. CONSULTATION

Stakeholder engagement and consultation is an integral part of Shell's project development process, helping to both inform business decisions and identify issues that require action. Shell has internal policies and processes, which outline the requirements of stakeholder engagement. These are underpinned by Shell's General Business Principles, which govern how Shell companies that make up the Shell Group conduct their affairs.

Stakeholder engagement is a key part of any environmental and social impact assessment process carried out for any Shell project or activity. For this project (as with all Shell projects) it will be a systematic process, starting with developing an understanding of the issues, identifying stakeholders, developing a Stakeholder Engagement Plan and then creating and maintaining stakeholder relationships and partnerships. Stakeholder engagement is seen as a two-way process, with a willingness to listen to feedback, and to discuss it in an open, unprejudiced fashion. Processes are built around timeframes that permit stakeholders to understand, absorb, respond and interact.

In line with Shell's General Business Principles, as well as those guidelines of the state government, Shell Australia is committed to:

- Informing stakeholders of the proposed project.
- Maximising the level of accurate and accessible information about the project.
- Providing adequate time for stakeholders to consider and engage in meaningful dialogue.
- Identifying and attempting to resolve potential issues.
- Using stakeholder feedback to inform and improve business decisions.

It is anticipated that consultation for this project will engage a wide range of stakeholders, including but not limited to the following stakeholder groups:

- Regulatory authorities.
- Traditional owners.
- Landowners and leaseholders.
- Communities.
- Interest and representative groups.

As part of initial investigations undertaken for the geotechnical program, engagement with the PCCC on the aboriginal cultural heritage values of the project site has been carried out.

Regular consultation with the project's identified stakeholders will continue throughout the project's lifespan, ensuring that queries and concerns raised are addressed and, where feasible, built into the design and management plans.

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LIST OF ABBREVIATIONS

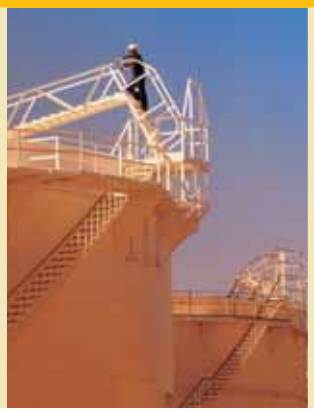
AHD	Australian Height Datum
CSG	Coal Seam Gas
EPA	Environmental Protection Agency
EPBC	Environment Protection and Biodiversity Conservation
ha	Hectares
IUCN	International Union for Conservation of Nature
LNG	Liquefied Natural Gas
Mscf	Thousand standard cubic feet
Mtpa	Million tonnes per annum
PCCC	Port Curtis Coral Coast
PJ	Petajoules
Tcf	Trillion cubic feet
WHA	World Heritage Area

Appendix 1

Health, Safety, Security and Environment Commitment and Policy

Health, Safety, Security and Environment




Shell in Australia has a HSSE performance we can be proud of. At Shell we commit to:

- pursuing the goal of no harm to people;
- protecting the environment;
- using materials and energy efficiently to provide our products and services;
- developing energy resources, products and services consistent with these aims;
- publicly reporting on our performance;
- playing a leading role in promoting best practice in our industries;
- managing HSSE matters as any other critical business activity;
- promoting a culture in which all Shell employees share this commitment; and
- creating a secure business environment that minimises economic loss and business disruption, safeguarding Shell's people, integrity and reputation.

In this way we aim to earn the confidence of customers, shareholders and society at large, to be a good neighbour and to contribute to sustainable development.

Every Shell company:

- has a systematic approach to HSSE management designed to ensure compliance with the law and to achieve continuous performance improvement;
- sets targets for improvement and measures, appraises and reports performance;
- requires contractors to manage HSSE in line with this policy;
- requires business partners under its operational control to apply this policy and uses its influence to promote it in its other ventures; and
- includes HSSE performance in the appraisal of all employees and rewards accordingly.

Each of us has a right and duty to intervene with unsafe acts and conditions or when activities are not in compliance with this policy.

Russell Caplan
Chairman, Shell Companies in Australia

February 2006

SHELL IN AUSTRALIA

Appendix 2

Sustainable Development Commitment

Sustainable Development





- We believe that our commitment to contribute to sustainable development holds the key to our long-term business success. The values that underpin sustainable development are embodied in our Business Principles that provide the foundation for everything we are and everything we do.
- We will strive to help to build a better world in which current and future generations enjoy greater economic, social and environmental security.
- We will embrace the concept of sustainable development in our business decisions, large and small. In this way we will continue to create value for our shareholders and society, while being responsive to society's changing expectations.
- We will participate fully in the development of sustainable, commercially viable alternatives to fossil fuels.
- When making decisions, we will evaluate the economic, environmental and social impacts of our options. We will then select only those which are acceptable in all three respects and strive to ensure the balance between their impacts is also right. This means that some business decisions will be made differently, some decisions will have different outcomes and some options will no longer be considered acceptable.
- We will seek out and value the views of others. We may not always agree about everything with every stakeholder but we will participate in an open and honest process of engagement to develop a shared understanding.
- We will be open about our progress and, wherever needed, we will provide external verification.
- We believe too, that sustainable development is everybody's responsibility. We will therefore actively encourage our service providers, business partners and contractors to support us in our commitment.

Russell Caplan
Chairman, Shell Companies in Australia

February 2006

SHELL IN AUSTRALIA

Appendix 3

Climate Change Fact Sheet

Climate Change

Shell in Australia shares the widespread concern that the emission of greenhouse gases (GHG) from human activities is leading to changes in the global climate.

Action is required now to lay the foundation for eventually stabilising greenhouse gas concentrations in the atmosphere in an equitable and an economically responsible way.

We are taking action now on climate change by:

- **Actively managing greenhouse gas emissions in our worldwide operations** such that by 2010 GHGs are still 5% or more below 1990 levels, even while we grow our business. Measures to manage future emissions include:
  - Measuring our GHG emissions worldwide, subject to independent assurance.
  - Publicly reporting our GHG emissions from operations.
  - Piloting new energy conservation programmes.
  - Developing new technologies to capture and store CO_2.
  - Taking account of future GHG emission costs in new investments.
  - Being a leader in trading GHG allowances in emerging international markets.
- **Helping customers reduce their emissions by:**
  - Promoting natural gas as a cleaner alternative for electricity, heating and transport.
  - Monitoring the development of alternative energy options such as solar, hydrogen and wind power and opportunities for their implementation in Australia.
  - Providing lower emission fuels and the fuels needed by lower emission engines.
- **Supporting policies that promote:**
  - A stable regulatory regime that includes non-industrial emitters, does not distort markets and gives companies the confidence to make long term investments to moderate GHG emissions.
  - Credit for early action.
  - New lower carbon technologies.
  - International cooperation and agreements to deal with this global issue.
  - Involving developing countries and helping them get onto a lower emissions energy path, for example via the Clean Development Mechanism.
  - Flexible market mechanisms like effective 'cap and trade' emissions trading schemes.
  - Natural gas as an important enabler of lower-carbon-intensity economic growth.
  - A well-to-wheels perspective that encourages energy producers to take measures that result in lower end user emissions.

Russell Caplan
Chairman, Shell Companies in Australia

February 2006

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