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1 Introduction

1.1 Overview

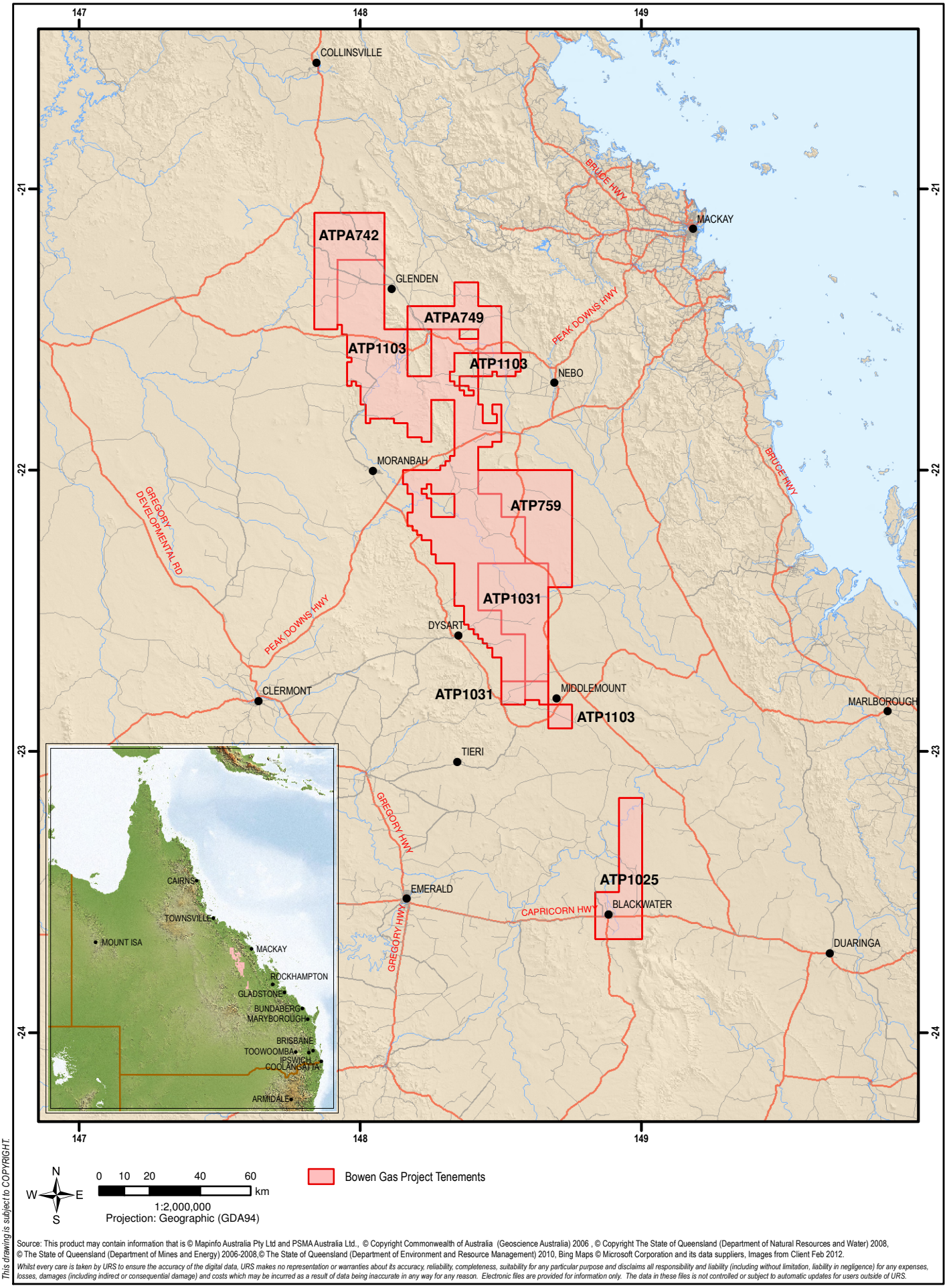
Arrow Energy Pty Ltd (Arrow) is seeking to develop gas reserves in the Bowen Basin for growing overseas gas markets. The Bowen Gas Project (the Project) petroleum tenures cover an area of approximately 8,000 square kilometres (km^2) within the gas exploration acreage. The tenures are located approximately 150 km south-west of Mackay, with the bulk of the area extending from Glenden in the north to Blackwater in the south (Figure 1-1).

The reference case generated for the development of the EIS assumes that up to 6,625 production wells are expected to be drilled throughout the Project area over its 40 year project life (approximately). The Project area will be divided into development areas or gas fields allowing a staged approach to development. Further developments are planned by Arrow as domestic and export expansion opportunities arise in the energy market. In addition to providing ongoing supply to the Queensland domestic gas market, Arrow is presently pursuing an export liquefied natural gas (LNG) market opportunity, through the Arrow LNG Project on Curtis Island near Gladstone. It is expected that much of the gas produced by the Project will be piped to the proposed LNG Plant. This LNG plant and the transmission pipeline are subject to separate environmental approval processes and are not within the scope of the Project.

Before the Project can proceed, Arrow must gain approval from the Queensland and Commonwealth governments. Regulatory authorities must be satisfied that Arrow's activities have been properly assessed, to ensure that all potential impacts, direct and indirect, particularly environmental, social and economic impacts, are fully examined and addressed. To do this, Arrow has prepared this Environmental Impact Statement (EIS), which examines the entire Project development.

This EIS has been prepared to inform decision makers, affected parties, interest groups, and the public about potential issues relating to the development and operation of the Project and how these issues will be managed. The content of the EIS addresses those matters identified in the Terms of Reference (ToR) (Appendix A of this EIS) issued by the Department of Environment and Heritage Protection (EHP). A cross reference to the locations where each of the requirements of the ToR has been addressed is given in Appendix B which references both the study chapters (Sections 1 through 34) and/or Appendices (A through EE).

This EIS has been made publicly available for comment, and submissions are sought from individuals and organisations. After consideration of this EIS and submissions received, EHP will review the Project EIS to identify any uncertainties or omissions. A supplementary report may be necessary to cover any additional matters of concern and address stakeholder submissions. A final decision on the overall acceptability of the Project will then be made on the basis of the information provided.



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BOWEN GAS PROJECT EIS

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1.2 The Proponent

Arrow is an integrated energy company with interests in coal seam gas (CSG) field developments, pipeline infrastructure, electricity generation and a proposed liquefied natural gas (LNG). In Queensland, it operates gas projects at Moranbah in the Bowen Basin and around Dalby in the Surat Basin. Arrow's four operational gas producing projects currently account for about 20% of Queensland's overall domestic gas supply.

Arrow is a Queensland-based wholly owned subsidiary of Arrow Energy Holdings Pty Ltd, a 50:50 joint venture between a subsidiary of Royal Dutch Shell plc (Shell) and a subsidiary of PetroChina Company Limited (PetroChina). The joint venture took ownership of Arrow on 23 August 2010.

Shell has had a presence in Australia since 1901. Current operations include petroleum refining, sale of petroleum products and retail businesses. The company maintains equity in the exploration and development of large gas resources off the coasts of Western Australia and the Northern Territory. Shell is an internationally recognised leader in LNG production and has delivered some of the world's largest and most complex LNG projects in the last 40 years, including facilities in Qatar, Nigeria, Russia and Southeast Asia. Through its subsidiary, Shell International Trading and Shipping Company Limited, Shell operates one of the largest LNG carrier fleets in the world.

PetroChina is a subsidiary of China's largest state-owned oil and gas producer and distributor, China National Petroleum Corporation, and is one of the world's largest oil companies. PetroChina was incorporated as a joint stock company in 1999 and has extensive experience in exploration, refining and marketing of oil and natural gas in China and other countries.

Arrow's domestic and international interests span gas field developments, pipeline assets, electricity generation and proposed investment in LNG projects. Arrow currently operates, or is a major participant in, a number of gas production facilities and supporting infrastructure as well as power stations, within Australia. Arrow has interests in more than 50,000 km^2 of petroleum tenures within Queensland and New South Wales. A significant portion of these tenures are located within the Surat and Bowen Basins, which are located close to Queensland's three key markets: Townsville, Gladstone, and Brisbane. The Moranbah Gas Project in the Bowen Basin and the Tipton West, Daandine and Kogan North Projects in the Surat Basin near Dalby, are Arrow's existing gas producing projects.

Arrow supplies gas to the Daandine, Braemar 1 and 2, Townsville and Swanbank E power stations, which participate in the National Electricity Market. With Arrow's full ownership of Braemar 2 and the commercial arrangements in place for Daandine and Townsville power stations, Arrow has access to supply 600 megawatts (MW) of power generation capacity.

Arrow and its equity partner for the Moranbah Gas Project, AGL Energy, have access rights to the North Queensland Pipeline, which supplies gas to Townsville from the Moranbah Gas Project. They also hold the pipeline licence for the proposed Central Queensland Pipeline between Moranbah and Gladstone.

The Shell and PetroChina investment in Arrow means that it will be underpinned by significant gas field development expertise, established LNG technology, production and supply experience, and industry and market knowledge.

1.2.1 Current Operations in the Bowen Basin

Arrow's existing petroleum operations in the Bowen Basin are located approximately 300 km south of Townsville and 150 km south west of Mackay. The Moranbah Gas Project is one of the largest operating CSG projects in Australia. Annual gas production is in the order of 17 petajoules (PJ). The Moranbah Gas Processing Facility comprises inlet gas conditioning, four 2.6 MW reciprocating gas engine compressor units, a triethylene glycol gas dehydration unit, and export gas metering and monitoring. The facility is used to process gas for injection into the North Queensland Gas Pipeline, which delivers gas to markets in Townsville including Queensland Nickel Industries, Copper Refineries and the Townsville Power Station. The petroleum tenures that support the Moranbah Gas Project do not form part of the Bowen Gas Project.

1.2.2 Environmental Record

Arrow is committed to continual improvement through their integrated health, safety and environmental management system (HSEMS) (Refer to the Health and Safety chapter (Section 30) of this EIS). Arrow Energy Holdings Pty Ltd and/or its subsidiaries have received two penalty infringement notices (PINs) relating to non-compliances with Environmental Authority conditions issued under the *Environmental Protection Act 1994* (EP Act). The PINs are related to:

- Unauthorised clearing of a Category B Environmentally Sensitive Area; and
- Unauthorised release of CSG water to land.

Arrow is not aware of any other fines or prosecutions for breaches of environmental legislative requirements in the past five years.

A copy of the Arrow Environmental Policy is provided in Figure 1-2.

1.2.3 Contact Details

Arrow's registered office address in Australia is:

Level 19, AM60
42-60 Albert Street
Brisbane, Qld 4000
AUSTRALIA

All enquiries should be sent to:

Bowen Gas Project
Reply Paid 81
Hamilton, QLD 4007
Australia

Email: bowengas@arrowenergy.com.au

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Environmental Policy

Policy Statement

Arrow Energy promotes sustainable environmental practices as part of our commitments, beliefs and values.

Scope and Responsibility

This Policy applies to all personnel involved in Arrow operations and it is a cornerstone to the Arrow Management System.

The Chief Executive Officer and the leadership team are responsible for the implementation, review, update and enforcement of this Policy and each employee, consultant, contractor and service provider is responsible for actively participating in and implementing this Policy.

Practice, Implementation and Supporting Documents

Arrow Energy ensures all elements of the Environmental Policy are implemented by:

- Seeking continuous improvement in managing significant environmental impacts by clearly defining objectives and targets and evaluating them through transparent review and implementation processes.
- Establishing programs to reduce environmental impacts, conserve and recycle resources, reduce waste and pollution, and improve processes to help protect the natural environment as well as monitoring and measuring performance.
- Ensuring all of our activities comply with all applicable environmental laws and regulations.
- Promoting a culture where employees and service providers are aware of environmental impacts affecting their work and promptly report any environmental impacts or incidents while encouraging improvements.
- Monitoring Policy implementation at all relevant Arrow controlled workplaces, and periodically reviewing and updating.

Expectations

- Maintaining open and transparent communications with employees, community, government and other stakeholders.
- Communicating expectations to all employees and service providers and holding them accountable for their performance.
- Operating within compliance with all applicable environmental laws and regulations.
- Collaborating with stakeholders and participating in research and development, aimed at enhancing knowledge and improving our environmental performance.
- Employing new and improved technologies and developing industry partnerships that are aimed at reducing the carbon emission per unit of production and improving cost/benefit balance.
- Our Environmental Policy plays a vital role in Arrow's Sustainable Development Policy.

Andrew Faulkner, Chief Executive Officer
18th Day April 2011, Review Date: April 2014

Doc No: 99-V-POL-0002

1.3 The Project

In April 2012, Arrow publically advertised the Project's Initial Advice Statement (IAS). The IAS identified the key components of the proposed Project to provide the authorities with sufficient information about the Project and its potential environmental, social and economic impacts to determine whether or not to accept Arrow's application to prepare a voluntary EIS under the EP Act.

1.3.1 Location

The Project's petroleum tenures currently cover an area of approximately 8,000 km^2 within Arrow's gas exploration acreage. These tenures are located approximately 150 km south-west of Mackay, with the bulk of the area extending from Glenden in the north to Blackwater in the south (see Figure 1-1). The Project area follows the Connors Range to the east and the Denham Range to the west and is located within the Isaac River and Mackenzie River sub-catchments of the Fitzroy River catchment and the Belyando Suttor sub-catchment of the Burdekin catchment.

A number of towns and built up areas fall within or adjacent to the Project area. These include the towns of Moranbah, Glenden, Dysart, Middlemount and Blackwater. Project infrastructure, including CSG wells, gas and water gathering systems and production facilities will be located throughout the development area but not in any of the towns.

The Project area comprises Authorities to Prospect (ATPs) 1103, 1031, 1025, and a small portion of 759; and Authority to Prospect Applications (ATPAs) 742 and 749 (see Figure 1-1).

1.3.2 Scope

The EIS will assess the impacts from the construction, operational and decommissioning stages of the Project, which includes the drilling of CSG wells and construction of associated infrastructure to treat and transport the gas and associated water. For the first phase of development, supply is expected to be approximately 520 terajoules per day (TJ/d) (inclusive of infield gas usage, which is approximately 10%). This is approximately equal to 35% of the total daily demand (plateau) flowrate required by the Arrow LNG plant.

For Arrow to realise the potential of the Project as a viable commercial development, exploration has been conducted across the Project area to identify and define the gas resource. Exploration is governed under existing approvals (environmental authorities) and is therefore outside the scope of this EIS. Exploration and appraisal pilots are ongoing and are at different stages of maturity across the Project area.

Development of the Project will require significant infrastructure and facilities for the construction, operations and decommissioning phases of the Project. Table 1-1 describes the facilities to be constructed as part of the Project. Further details are provided in the Project Description chapter (Section 4) of this EIS.

Table 1-1 General Description of Proposed Facilities and Infrastructure

Key Component	Description
Production wells	• Up to 6,625 wells drilled throughout the life of the Project. • Wells are typically drilled to between 150 to 800 m in depth.
Wellhead facilities	• Separator vessel (if required), piping, valving and instrumentation. • Electrical control panel at the wellhead to control the flow of the gas and associated water from the well to the low pressure gathering systems.
Low pressure gas and water gathering systems	• Pipeline diameters between 63 mm and 630 mm. • High-density polyethylene pipelines. • Buried pipelines and associated infrastructure (low point drains and high point vents) used to transport gas and water from the wellhead.
Field compression facilities (FCF)	• Compression facilities where gas from an area of wells is compressed to increase the pressure from low pressure (approximately 30 – 100 kilopascal gauge (kPag)) to medium pressure (approximately 1,000 – 2,000 kPag). • FCFs may also include a water transfer station (WTS) (storage tank and pumps) to facilitate transfer of water from the FCF to an integrated processing facility (IPF).
Medium pressure infield pipelines	• Medium pressure buried pipelines constructed of lightweight plastic composite, glass-fibre reinforced epoxy or lined steel used to deliver gas from FCFs to either central gas processing facilities (CGPF) or IPFs.
Central gas processing facilities (CGPF)	• High pressure compression facilities where gas is dehydrated to sales specification and increased in pressure (approximately 10,200 – 15,000 kPag) to allow export to the Arrow Bowen Pipeline via a pipeline lateral. • CGPFs will also include a WTS to facilitate transfer of water from a CGPF to an IPF.
Integrated processing facilities (IPF)	• High pressure compression facilities where gas is dehydrated to sales specification and increased in pressure (approximately 10,200 – 15,000 kPag) to allow export to the Arrow Bowen Pipeline via a pipeline lateral. • IPFs also include water treatment facilities (WTF) for the treatment of associated water, storage of brine, and temporary storage of irrigation and associated waters.
Water treatment facilities (WTF)	• Located at an IPF, WTFs include associated (feed) water dams, brine dams and associated pumps and pipework.
Water transfer stations (WTS)	• Generally located at a FCF or a CGPF, these facilities include pumps and associated pipe work for the pumping of water to an IPF.
Supervisory control and data acquisition (SCADA)	• Telemetry and control systems (hardware and software) for the remote operation and monitoring of wells, pipelines and facilities from a central control room.
Other infrastructure / facilities	• Including: power supply which may include local generation or powerlines, water monitoring bores, workshops, warehouses, offices, camps, depots, etc.

1.3.3 Project Phasing

The Project area will be split into a number of development areas allowing for progressive development.

Initially the Project is expected to involve the development of several development regions, with around 600 production wells being drilled in the first two years of ramp up.

Arrow will stagger the development of subsequent resource areas to sustain the required production rate, and increase it subject to the LNG plant demand. Production well installation, facility construction, operation, decommissioning and rehabilitation will therefore occur concurrently at different locations throughout the Project life.

The life of a production well will vary in accordance with the density of wells, the gas extraction rate and the production performance of the well. Production performance is predominately dependent on the physical characteristics of the coal. Modelling of well life is based on probabilities and averages. Arrow's current modelling suggests an average well life of 15 to 20 years. Once the wells cease production, the wells and well sites are to be decommissioned and rehabilitated and new wells will be established in new development areas.

1.3.4 Project Considerations

It is important to note that the nature of CSG development is such that at this stage, it is not possible to establish the specific detail on the location of all infrastructure or its design and layout. This is due to a number of factors including:

- The continuing identification of viable gas reserves through exploratory drilling and pilot well programs;
- The economic and commercial risks that influence the extent and rate of field development. These include proximity of new resources to existing infrastructure, market constraints, land access, and long-term gas supply contracts with positive rates of return on capital invested.
- The extended timeframe over which field development will occur, including ongoing refinement of the field development plan as new reservoir data from operating regions is collected and assessed;
- The application of new technology and innovations into the Project design and layout;
- The potential development of new techniques (including new standards and best practices) that may emerge over the lifetime of the Project;
- The outcome of consultation with landowners to ensure Project activities are planned and conducted with regard to existing land use activities; and
- The potential environmental and social impacts.

Conceptual designs have been developed as a reference case for the EIS with the purpose of identifying, describing and assessing the likely impacts of the Project. The designs propose potential development areas and sequencing stages rather than specific locations; and consequently, uncertainty about the exact location of wells and associated infrastructure remains a limitation of this EIS. The Project reference case as part of the conceptual design is discussed further in the Project Description chapter (Section 4) of this EIS.

Although there is uncertainty about infrastructure site locations and timing, potential impacts have been described based on the known typical construction and operational characteristics of each of the separate Project activities and infrastructure types. Greater certainty about potential impacts has been achieved by identifying areas that are not amenable to certain types of development and for other areas where development may be acceptable, what management controls should be applied.

This has been achieved through the identification of environmental constraints to development and the establishment of management controls that apply to Project activities in constrained areas. Known as the environmental framework, this approach is an internal planning process developed by Arrow for optimising site locations for its various Project activities so that the environmental values of the Project area are protected.

Constraints mapping, an integral part of the environmental framework approach, guides site and route selection decisions based on the known level of environmental constraints in the area and the level of impact posed by the Project activity. In this way Project planning will seek to avoid and minimise impacts, thereby protecting environmental values. A detailed description of the environmental framework approach is provided in the Environmental Framework chapter (Section 7) of this EIS.

1.4 Relationship to Arrow LNG Project

The relationship of the Project to the Arrow LNG Project is discussed below.

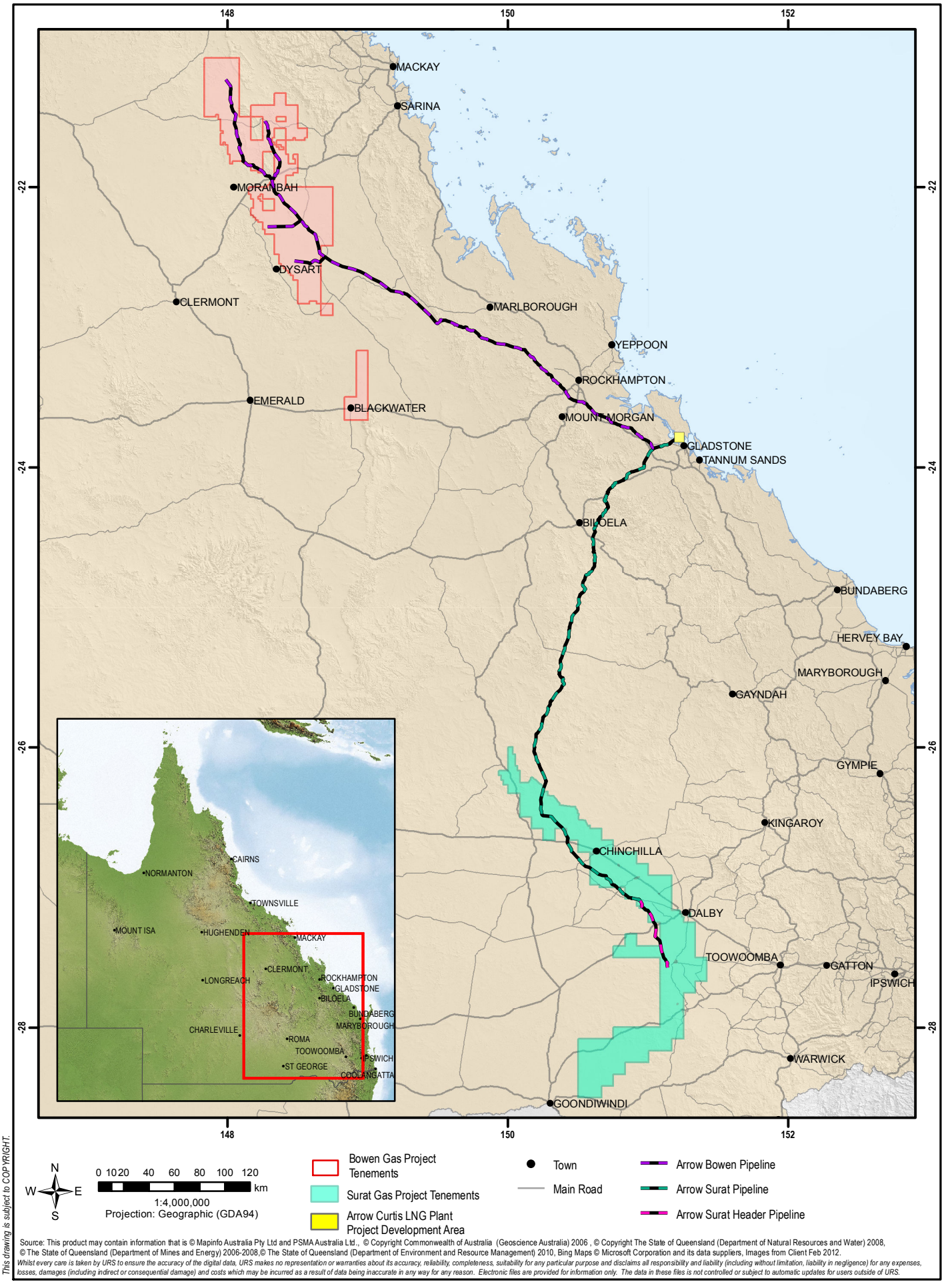
1.4.1 Arrow LNG Project

Following Shell's acquisition of Arrow Energy Holdings, the Arrow and Shell Australia projects were combined to form the Arrow LNG Project. Separate approval is being sought for each component of the Arrow LNG Project, as described below:

- **Arrow LNG Plant** (formerly the Shell Australia LNG Project). This is the construction of an LNG plant which will be located on Curtis Island, adjacent to Gladstone, on the Queensland east coast. The current expectation is that the plant will consist of up to four LNG trains and associated facilities and will produce approximately 16 million tonnes per annum (mtpa) of LNG, with a total plant capacity of up to 18 mtpa. In the first phase of development it is anticipated that two approximately 4 mtpa LNG trains, storage tanks, export jetty and amenities will be installed. The Arrow LNG Plant Project also includes construction of a gas gathering station located on the western side of Gladstone, and the associated delivery pipeline and subsea tunnel to deliver gas for the gas gathering station to the Arrow LNG Plant on Curtis Island. The Arrow LNG Plant is presently undergoing an EIS process in accordance with Part 4 of the *State Development and Public Works Organisation Act 1971* and is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- **Surat Gas Project**. The proposed upstream field development is located approximately 160 km west of Brisbane in Queensland's Surat Basin. The 8,600 km^2 Project area extends from the township of Wandoan in the north towards Goondiwindi in the south, in an arc through Dalby. The Project is presently undergoing an EIS process in accordance with the EP Act. The project is a controlled action under the EPBC Act.
- **Arrow Surat Pipeline** (formerly the Surat to Gladstone Pipeline Project). The proposed 470 km (approximate), high-pressure gas transmission pipeline commences from the Kogan area of the Surat Basin and terminates at Fisherman's Landing at Gladstone. An EIS was completed on 15 January 2010 under the EP Act and a petroleum pipeline licence (PPL 144) was granted in February 2010.

- **Arrow Bowen Pipeline**. Construction of a proposed 475 km (approximate), high-pressure gas transmission pipeline consisting of a main pipeline and several lateral pipelines to transport gas from the Bowen Basin to the gas gathering station in Gladstone. The Arrow Bowen Pipeline project is presently undergoing an EIS process under the EP Act.

The regional location of the different components of the overall Arrow LNG project described above, including the Bowen Gas Project, are depicted in Figure 1-3.



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BOWEN GAS PROJECT EIS

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Figure: **1-3**

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1.5 Environmental Impact Statement (EIS)

This section describes the objectives, process, methodology and structure of the EIS, and also provides details on making submissions / comments on the content of the EIS as well as the timing of the EIS process.

The EIS process allows for community consultation and ensures environmental protection by comprehensive consideration of potential impacts and management strategies. The content of the EIS addresses the environmental, social and economic aspects of the Project as identified in the ToR (Appendix A) of this EIS.

1.5.1 Objective of the EIS

The objective of the EIS process is to ensure that all impacts, direct and indirect, particularly environmental, social and economic are fully examined and addressed. The EIS aims to be a self-contained and comprehensive document that provides for:

- **Interested bodies and persons:** a basis for understanding the Project, alternatives and preferred solutions where possible, the existing environment that would be affected by the Project, the potential impacts that may occur, and the measures to be taken to mitigate all adverse impacts;
- **Regulatory agencies and the advisory bodies:** a framework for assessing the impacts of the Project, in view of legislative and policy provisions; and
- **The Proponent (Arrow):** a statement of measures or actions to be undertaken to mitigate any adverse impacts during and following the implementation of the Project. An Environmental Management Plan (EM Plan) is included in the EIS, describing potential impacts and environmental management measures designed to meet agreed performance criteria.

The EIS relates to the whole life of the Project, including construction, operation, maintenance and decommissioning. The EIS proposes reasonable, cost-effective and technically achievable conditions to ensure that the potential environmental, social and economic impacts of the Project are reduced to acceptable levels.

1.5.2 Steps of the EIS Process

The process for the EIS is governed by the EP Act and the steps can be generally defined as:

- Scoping and preparation of the EIS using the minimum expectations as outlined in the Project ToR;
- Submission and public exhibition of the EIS; and
- Assessment and approval.

Following any decision on the EIS, the Project will also need to obtain a range of planning and environmental approvals and permits before construction can begin and the Project is approved for operation. These approvals and permits will be in accordance with local, state and federal legislation. A full outline of the project approvals is detailed in the Project Approvals chapter (Section 2) of this EIS.

1.5.3 Scoping and Preparation of the EIS

The EP Act requires a draft ToR to be developed as a first step in the EIS process. The ToR establishes the potential impacts, environmental issues and requirements that need to be investigated and addressed within the EIS. The process begins with the Chief Executive (EHP) preparing a draft ToR based on the project-specific information provided in the IAS. The ToR is then released for public comment.

On 2 July 2012, EHP published a notice in local and state newspapers advising the consultation period during which interested persons could make written submissions on the Project draft ToR. The consultation period extended from 2 July 2012 to 14 August 2012.

EHP received a total of 34 submissions consisting of 242 comments on the ToR from government agencies, companies, landholders and private individuals. Arrow provided a written summary of all comments and responses to comments made, to EHP.

Following consideration of the submissions, EHP, in consultation with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), finalised the ToR. The Project Final ToR was placed on the Department of Natural Resources and Mines (NRM) website for public viewing and a notice was published in various newspapers.

Arrow commissioned a range of supporting studies to identify the environmental, social and economic values that may be affected by Project activities and to address the final ToR. Supporting study reports are contained in Appendices A to EE of this EIS. These studies are summarised in the chapters of this EIS.

1.5.4 Method of the EIS

The EIS addresses all environmental, social and economic aspects of the proposed Project throughout the Project life (including construction, operation and decommissioning). The methodology of the EIS follows these key aspects:

- Project description;
- Baseline studies; and
- Impact assessment and environmental management.

1.5.4.1 Project Description

A detailed Project Description (Section 4 of this EIS) has been developed to provide sufficient information to enable the reader to gain an understanding of the construction, operation and decommissioning phases of the Project.

The Project Description is a reference case generated at the early stages of Concept Select phase of the project to inform the EIS. Upon selection of the concept and as the Project moves into the detailed design phase (front end engineering design (FEED)) some aspects of the Project will change. While the nature of the field development is known, details of the specific locations of wells, gathering systems and associated infrastructure require progressive determination.

1.5.4.2 Baseline Studies

A major component for the preparation of the EIS was the collection of relevant baseline information on the environmental and social values for the Project area. Some baseline data was available from previous investigations and reports. A baseline assessment program was developed, which included data gathering for the following environmental and social aspects:

- Climate;
- Air quality;
- Greenhouse gas (GHG);
- Contaminated land;
- Soils and land suitability;
- Geology;
- Groundwater;
- Surface water;
- Aquatic ecology;
- Terrestrial ecology;
- Landuse and tenure;
- Landscape and visual amenity;
- Roads and transport;
- Noise and vibration;
- Economics;
- Social and community;
- Cultural heritage;
- Hazard and risk;
- Waste management; and
- Decommissioning and rehabilitation.

Based on this baseline work, the existing environmental and social values of the Project area were identified.

1.5.4.3 Impact Assessment and Environmental Management

The potential impacts of the Project on environmental values for each environmental aspect have been assessed using one of three methods: significance assessment, risk assessment and compliance assessment (for further details see the Impact Assessment Method chapter (Section 6) of the EIS).

The methods detailed above ensure the EIS focuses on the most significant and important environmental and social values and potential impacts relevant to the Project area. Under these methods, the EIS study recommendations will be used to:

- Establish guidelines (including buffers, thresholds, trigger levels and appropriate environmental controls) to inform site and route selection for infrastructure; and
- Prepare constraints to identify environmentally sensitive areas where development should not occur or where it might occur under appropriate environmental controls that reflect the significance of the affected value.

Site selection and management procedures will identify the standard management requirements for all project activities, as well as additional environmental protection required in areas identified as having high environmental and social sensitivity. The methodology applied in this EIS is presented in more detail in the Impact Assessment Method chapter (Section 6).

Mitigation and management measures have been identified in the EIS sections and have also been summarised in the draft EM Plan (Appendix Z), and the summary table of commitments (Appendix D) of this EIS. Each mitigation and management measure has been identified consistently throughout the EIS with a unique identifier (e.g. [B001]) to facilitate cross referencing.

1.5.5 Structure of the EIS

The EIS has the following structure listed in Table 1-2 below.

Table 1-2 EIS Structure

Chapter	Title	Chapter Description
-	Executive Summary	Provides an outline of the proposed Project, its principal environmental management strategies and commitments.
1	Introduction	Provides a general description of the Project and information on Arrow. It also summarises the objectives and methodology of the Project as well as the EIS process.
2	Project Approvals	Outlines the relevant legislation, approvals and policies applicable to the Project.
3	Project Need	Justifies the rationale for the Project, both in a domestic and international context.
4	Project Description	Provides a detailed description of the Project, including information on Project components, design, construction and operation, schedule, workforce and decommissioning.
5	Community Consultation	Presents the community consultation and stakeholder engagement carried out to identify community issues and concerns so Arrow can be responsive in mitigating against issues, to proactively work with stakeholders and to contribute a long-term relationship with the local community.
6	Impact Assessment Method	Describes the methods used by the EIS studies to undertake an assessment of the potential impacts of construction, operation and maintenance and decommissioning activities of the Project
7	Environmental Framework	Details Arrow's environmental framework approach, and identifies and maps environmental constraints.
8	Climate	Presents a summary of climate statistics local to the Project area, and predicts future climate values under a number of GHG emission scenarios. A climate change impact assessment for the Project is also described.
9	Air Quality	Outlines existing air quality values and assesses the Project's potential direct and indirect impacts on these values. Further, it describes impact mitigation measures that may be implemented during construction and operational phases.

Chapter	Title	Chapter Description
10	Greenhouse Gas Emissions	Estimates the GHG emissions resulting from exploration, construction, operation and decommissioning of the Project; describes the potential impact of these emissions and of climate change on the Project; and, identifies methods to reduce or mitigate GHG emissions.
11	Contaminated Land	Presents the desktop assessment carried out to determine if any previous or current land uses have resulted in possible contamination issues. Further, it describes Arrow's approach to contaminated land within the Project area.
12	Soil and Land Suitability	Identifies the environmental values of soils and land suitability within the Project area, provides an assessment of potential impacts, and outlines mitigation measures where required. The section also provides a description of topsoil resources, distribution, and suitability for rehabilitation.
13	Geology	Describes the geomorphologic features and site geology of the Project area.
14	Groundwater	Describes and characterises the groundwater resources and hydrogeological environment of the Bowen Basin within, and adjacent to, the Project leases. Groundwater quality and aquifer characteristics are also evaluated to determine current uses and impacts and to establish the environmental values of the groundwater resources within the Project area. An assessment of potential impacts on groundwater resources and impact mitigation measures are provided.
15	Surface Water	Describes the surface water resources of the Project area and surrounds. It includes descriptions of regional stream flows, existing draining conditions, and existing water quality, among others. Impacts of the Project on the surface water resources and water management measures are identified.
16	Aquatic Ecology	Describes the aquatic ecology of the Project area in terms of environmental values and potential impacts and mitigation measures. The status of aquatic ecological values are determined through searching of relevant databases, review of other secondary data, and field surveys.
17	Terrestrial Ecology	Identifies and describes the terrestrial ecology values within the Project area, and potential impacts on these from the Project. The status of terrestrial ecological values are determined through searching of relevant databases, review of other secondary data, and field surveys. Potential impact management and mitigation measures are also described.
18	Environmentally Sensitive Areas	Describes the environmentally sensitive areas of the Project area including any national parks, state forests and other registered national estate properties, mapped essential habitat, significant vegetation communities and wildlife corridors within the region of the Project.
19	Land Use and Tenure	Provides a description of land use and tenure values within the Project area, and assesses potential impacts on existing and planned future land uses.
20	Landscape and Visual Amenity	Assesses the existing visual character of the Project area to determine the extent and nature of the Project's potential visual impact on surrounding areas. Further, it identifies measures and strategies to mitigate any potential visual impacts.
21	Roads and Transport	Describes the existing traffic demands within and adjacent to the Project area, and outlines expected traffic impacts associated with each phase of the Project. Impact management and mitigation measures are also identified.

Chapter	Title	Chapter Description
22	Noise and Vibration	Identifies the environmental values of typical sensitive receptors, investigates the Project's potential impact on the existing acoustic environment and recommends mitigation measures.
23	Economics	Examines the likely impacts of the Project on the local and regional economies, as well as impacts to the Queensland and Australian economies as relevant. These potential impacts are quantified where possible. Strategies have been provided to mitigate potential negative economic impacts and maximise the potential economic benefits that would potentially occur.
24	Social Assessment	Presents a baseline study of the community's existing social environment developed by analysing demographic characteristics, social infrastructure, social values and lifestyles. The predicted social impacts the community, or changes that may occur to the existing social environment, by introducing the proposed Project are presented.
25	Indigenous Cultural Heritage	Presents a description of the process for identification and management of indigenous cultural heritage associated with the Project.
26	Non-Indigenous Cultural Heritage	Summarises non-Indigenous cultural heritage values within the Project area and assesses potential impacts associated with the Project. Impact mitigation and management measures are outlined, and cultural heritage protection objectives presented.
27	Preliminary Hazard and Risk	Analysis of hazards to identify any significant residual risks to human health and safety
28	Waste Management	Summarises the waste streams expected to be generated by the Project, assesses environmental values that may potentially be impacted, and outlines mitigation measures to achieve the stated environmental protection objectives.
29	Decommissioning and Rehabilitation	Details the Projects rehabilitation, decommissioning and closure procedures and commitments are provided.
30	Health and Safety	Assesses the health and safety issues associated with the Project's construction, operational and decommissioning phases. Mitigation strategies are outlined where appropriate.
31	Cumulative Impacts	Assesses the cumulative impacts that could be expected from the construction of the Project and other projects identified within and surrounding the Project area.
32	EM Plan (Summary)	Outlines the objectives for protecting various environmental values, the mitigation measures, how it will be audited and reported as well as corrective action methods for the Project.
33	References	Documents the references consulted by all studies of the EIS.
34	Glossary and Abbreviations	Presents a glossary of technical terms, acronyms and abbreviations.

1.5.6 EIS Schedule

Milestone and target dates for the Project are provided in Table 1-3. This program shows that the environmental approvals process commenced in Q1 2012, with a decision on the EIS targeted for Q3 2013.

Table 1-3 EIS Schedule

Milestone	Target Milestone
IAS lodged with DERM (now EHP)	24 April 2012
EPBC Act Referral lodged with DSEWPaC	08 May 2012
EPBC Act Referral Decision	15 June 2012
Final Terms of Reference	2 November 2012
Draft EIS Submission to EHP	Q4 2012
Public Notification and Submission Phase	Q1 and Q2 2013
EIS Supplementary Report (if required)	Q4 2013
Chief Executive of EHP's Environmental Assessment Report	Q4 2013
DSEWPaC EPBC Act Assessment Report	Q4 2013

1.5.7 Document Submission and Public Exhibition

The draft EIS will be submitted to the Chief Executive of EHP, the Queensland Government department that administers the EP Act. Following a compliance check against the final ToR, the EIS will be placed on public exhibition for comment and referred to relevant State government agencies for additional comments. A notice will be published in state and local newspapers to advise interested and affected persons of the period in which the public can lodge formal submissions with the Chief Executive of EHP. Public exhibition will be undertaken for a minimum of 30 business days.

1.5.8 Viewing the EIS

Viewing locations of the EIS are set out in Table 1-4 below.

Table 1-4 Viewing Locations for the EIS

Location	Address
Isaac Regional Council	
Middlemount Library	Middlemount Shopping Mall, Middlemount, QLD 4746
Clermont Library	Cnr. Karmoo and Herschel Streets, Clermont, QLD 4721
Dysart Library	Council Premises, Shannon Crescent, Dysart, QLD 4745
Glenden Library	Town Centre, Ewan Drive, Glenden, QLD 4743
Moranbah Library	Grosvenor Complex, Batchelor Parade, Town Square, Moranbah, QLD 4744
Nebo Library	10 Reynolds Street, Nebo, QLD 4742
Central Highlands Regional Council	
Emerald Library	44 Borilla Street, Emerald, QLD 4720
Blackwater Library	Wey Street, Blackwater, QLD 4717
Bluff Library	6 Church Street, Bluff, QLD 4702
Duaringa Library	Elizabeth Street, Duaringa, QLD 4712
Whitsunday Regional Council	

Location	Address
Bowen Customer Service Centre	7 Herbert Street, Bowen, QLD 4805
Collinsville Customer Service Centre	Cnr. Stanley and Conway Streets, Collinsville, QLD 4804
Proserpine Customer Service Centre	3-85 Main Street, Proserpine, QLD 4800
EHP Regional Offices	
Department of Environment and Heritage Protection (Brisbane)	Floor 3, 400 George Street, Brisbane, QLD 4000
Department of Environment and Heritage Protection (Emerald)	99 Hospital Road, Emerald, QLD 4720
Department of Environment and Heritage Protection (Mackay)	22-30 Wood Street, Mackay, QLD 4740

1.5.9 Obtaining Copies of the EIS

EIS documentation can be obtained:

- Via download from Arrow's website at www.arrowenergy.com.au
- On DVD by contacting 1800 038 856 (free call) or emailing bowengas@arrowenergy.com.au

Hard copies can be ordered by phone or email at a small cost. Please see Arrow's website for further details.

1.5.10 Submissions

The public may make submissions on the EIS to the Chief Executive of EHP. The Chief Executive must accept all properly made submissions and may accept submissions even if they are not properly made. A properly made submission is one that:

- Is written and signed by or for each person (signatory) who made the submission;
- States the name and address for each signatory;
- Is made to the Chief Executive; and
- Is received on or before the last day of the submission period.

Please note that it is a statutory requirement that all submissions will be forwarded to the proponent for consideration and provision of a response to EHP. Submissions should be addressed to:

The Chief Executive Department of Environment and Heritage Protection

Attention: The EIS Co-ordinator (Arrow Bowen Gas Project)

By Post GPO Box 2454, Level 8 400 George St, BRISBANE QLD 4001.

1.5.11 EIS Assessment Report

EHP will provide copies of relevant public and agency submissions to Arrow. Following the receipt of submissions, Arrow will prepare a supplementary report that summarises and addresses the submissions and responds to any additional matters identified by EHP.

Following completion of the preparation of any supplementary information required, the Chief Executive of the EHP will consider all public submissions as well as recommendations from advisory agencies (listed below in Table 1-5) in preparing the EIS assessment report.

Subsequent to confirmation from EHP that the submissions and additional matters have been suitably addressed; the Chief Executive (EHP) will prepare the assessment report, which will consider how well the EIS has addressed the final ToR (and identifies any further information required). The report may also make recommendations on the suitability of the Project and recommend conditions to be applied to the Project should it proceed.

The report will be provided to DSEWPaC, who will approve, not approve, or approve the EIS with conditions, under Part 9 of the EPBC Act.

Table 1-5 EIS Advisory Agencies

Jurisdiction	Advisory Agency
State	Department of Communities, Child Safety and Disability
	Department of Environment and Heritage Protection
	Department of Natural Resources and Mines
	Department of Energy and Water Supply
	Department of National Parks, Recreation, Sport and Racing
	Department of Science, Information Technology, Innovation and the Arts
	Department of Community Safety
	Department of Education, Training and Employment
	Department of Housing and Public Works
	Department of State Development, Infrastructure and Planning
	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
	Department of Agriculture, Fisheries and Forestry
	Department of Justice and Attorney-General
	Department of Local Government and Planning
	Department of Premier and Cabinet
	Queensland Health
	Queensland Police Service
	Queensland Treasury and Trade
	Department of Transport and Main Roads
	Public Service Commission
	Tourism, Major Events, Small Business and the Commonwealth Games
Regional / Local	Isaac Regional Council
	Central Highlands Regional Council
	Whitsunday Regional Council
	Mackay Regional Council
	Gladstone Regional Council
	Rockhampton Regional Council

Jurisdiction	Advisory Agency
Federal	Department of Sustainability, Environment, Water, Population and Communities

1.6 Public Consultation

Consultation with local regional councils, advisory agencies, members of the public, community groups and other stakeholders will form an integral role to project approval as the Project progresses and will continue during project construction and operations.

The community consultation phase of the EIS aims to ensure clear, transparent, two-way communication between Arrow and any interested and potentially affected stakeholders. This will be achieved by listening, recording and responding to any potential issues relating to the Project. Further details are contained in the Community Consultation chapter (Section 5) of the EIS. Feedback already obtained through public consultation has been taken into consideration in the impact assessment. Sections of the EIS have utilised some of this collected information to define mitigation and monitoring requirements for the Project.