Environmental Impact Statement (EIS) Assessment Report under the *Environmental Protection Act 1994*

Arrow Bowen Pipeline Project

Proposed by Arrow Bowen Pipeline Pty Ltd
March 2013

Prepared by: Statewide Impact Assessments, Department of Environment and Heritage Protection

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Contents

1 Introduction

This EIS assessment report provides an evaluation of the environmental impact statement (EIS) process pursuant to Chapter 3 of the *Environmental Protection Act 1994* (EP Act) for the Arrow Bowen Pipeline Project, proposed by Arrow Bowen Pipeline Pty Ltd. The EIS process under the EP Act is administered by the Department of Environment and Heritage Protection (EHP).

On 16 February 2011, the proponent applied for approval to prepare a voluntary EIS for the project. On 4 March 2011, EHP approved the application and, as the administering authority for the EP Act, has coordinated the EIS process for the project under the EP Act.

This report has been prepared pursuant to section 58 and 59 of the EP Act, which require an EIS assessment report to:

- address the adequacy of the EIS in addressing the final terms of reference (TOR)
- address the adequacy of the draft environmental management plan (EM Plan)
- make recommendations about the suitability of the project
- recommend any conditions on which any approval required for the project may be given.

This assessment report summarises the key issues associated with potentially adverse and beneficial environmental, economic and social impacts of the project. It discusses the management, monitoring, planning and other measures proposed to minimise any adverse impacts of the project. It notes those issues of particular concern that were either not resolved or will require specific conditions and notes outstanding actions for the project to proceed once the EIS process has been concluded.

The giving of this report to the proponent will complete the EIS process under the EP Act.

2 Project details

Arrow Bowen Pipeline Pty Ltd, the proponent for this project, is a wholly owned subsidiary of Arrow Energy Pty Ltd (Arrow Energy). Arrow Energy is owned by a joint venture between Royal Dutch Shell Plc. and PetroChina Company Limited.

The project comprises the construction, operation and decommissioning of a 580 kilometre (km) long high pressure gas pipeline system, which would convey coal seam gas (CSG) from Arrow Energy's gas fields in the Bowen Basin to a liquefied natural gas (LNG) plant on Curtis Island near Gladstone. The proposed pipeline would consist of a main pipline, three lateral pipelines (Elphinstone, Saraji and Dysart laterals) and associated above-ground infrastructure and activities.

The 477km long main pipeline, would commence approximately 18km north-west of Glenden, located in the southern portion of the Whitsunday Regional Council local government area (LGA), approximately 113km west of Mackay. The pipeline would run in a generally south-easterly direction parallel to Queensland's east coast and traverse the Isaac Regional Council and Rockhampton Regional Council LGAs, before terminating in the Gladstone Regional Council LGA, approximately 22km south-west of Gladstone. There it would join the proposed Arrow Surat Pipeline (formerly known as the Surat Gas Pipeline) for further transmission to Arrow CSG's proposed LNG plant on Curtis Island. The pipeline would utilise approximately 81km of the Stanwell to Gladstone Infrastructure Corridor State Development Area (SGIC SDA) and traverse 37km of the Gladstone State Development Area (GSDA).

The Elphinstone lateral pipeline would commence approximately 18km north-west of Glenden and run for 52km parallel to the main pipeline, before it would connect to the main pipeline approximately 29km east of Moranbah. The Saraji lateral pipeline would commence 11km east of the Peak Downs Mine, 31km south-east of Moranbah, and run for 26km in an easterly direction, before joining the main pipeline. The Dysart lateral would be located south of the Elphinstone lateral pipeline and commence approximately 37km east of Dysart, joining the main pipeline after 26km. Refer to Figure 1 'Project Layout' for location details.

The highest elevation of the pipeline would be 433 metres (m) Australian Height Datum (AHD), where the main pipeline would traverse mountainous terrain in the vicinity of Glenden, but generally descend into lower lying country including alluvial flood plains and coastal low-lying areas. On several occasions it would ascend again near Mount Gardiner, which is part of the Broadsound Range, near Mount Morgan and near Mount Larcom. Its lowest point would be 2.6m AHD.

The pipeline would be laid in a trench with a minimum depth of cover of 750 millimetres (mm). At watercourse crossings, the minimum depth of cover would be 1200mm. The pipeline would have a nominal diameter of 1.05m and a minimum design life of 40 years; however, with ongoing maintenance the operational life is expected to be greater than that.

The project would require five temporary workers' accommodation camps, sewage treatment plants (STPs), diesel generators and (potentially) water treatment plants to produce potable water. Only two workers camps would expected to be operating at any one time. Temporary support facilities would be needed including laydown areas for equipment, pipe delivery, storage and access including the right of way (ROW). Above-ground facilities would consist of pipeline valves, scraper stations, cathodic protection systems and a gas gathering hub (GGH) at the end of the pipeline. The GGH would consist of pipeline isolation valves, a scraper station and an interconnector. Temporary gates and fences would also be required. Above-ground structures would be located in the ROW and would be fenced and appropriately signed. Special storage would be needed for hazardous materials / dangerous goods (oils, fuels, x-ray film developer, lubricants, solvents or biocides). The workers accommodation camps would be located outside the future petroleum pipeline licence (PPL) tenure.

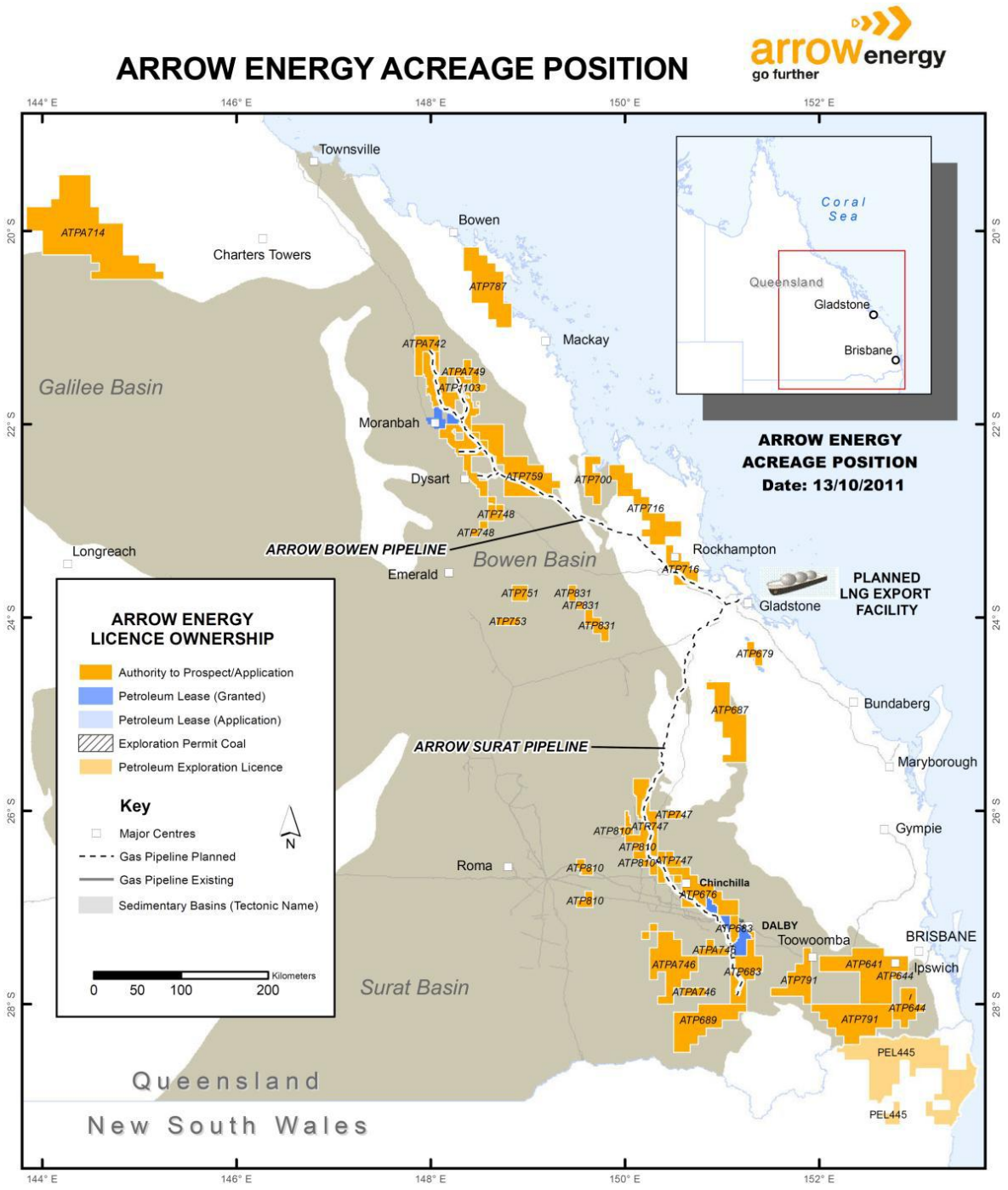

Figure 1. Project Layout (as outlined in the EIS prepared by Arrow Energy for this project)

The pipeline construction would take approximately 15 months, commencing in April 2016, and the pipeline would be operational in 2017. The construction phase would include:

- clearing of vegetation and grading of a 40m wide ROW
- separating and stockpiling topsoil and subsoil within the ROW
- crossing of watercourses, roads and rail lines either by open-cut trenching or Horizontal Directional Drilling (HDD)
- welding of pipe sections to form a string
- excavating a pipeline trench
- lowering of the pipeline string into the trench and placing padding, (e.g. screened trench subsoil), around the pipe to protect the external pipe coating
- backfilling the trench with excavated material and replacing topsoil

- testing the structural integrity of the pipeline by filling it with water and pressurising it to 125% of the maximum allowable operating pressure, a procedure called hydrotesting
- disposing or reusing of hydrostatic test water
- cleaning up and restoring the construction ROW.

Various plant and equipment would be required for construction of the pipeline, including:

- semitrailers, extendable tri-axle trailers or road trains to transport 12m to 18m lengths of pipe (depending on final pipeline details determined during detailed design) to lay down locations along the length of the proposed pipeline route
- graders for topsoil stripping and levelling
- water trucks for dust suppression
- tip trucks to transport bedding sand on-site if required and excavated waste soil off-site
- cranes and side booms for pipe laying
- excavation machinery including excavators and bulldozers
- specialised trenching machines, (i.e. rock saws, rock hammers for blasting in hard rock terrain)
- mobile welding plant
- equipment for HDD and horizontal boring
- personnel transport vehicles, including mini buses and four wheel drives.

Clear and grade would be required to create a construction ROW. The ROW would be necessary to provide a location for the pipe, access for personnel, storage and work space. The EIS stated that to safely and efficiently carry out construction activities in the ROW it would have to be 40m wide, but would be converted into a 30m wide easement for subsequent pipeline operation and maintenance.

The ROW would be cleared of vegetation, however root stock would be left in the ground, where possible, to stabilise the ground and reduce erosion. Breaks would be left in stockpiled vegetation to allow continued access to stock, fence lines, tracks and drainage lines. Any cleared vegetation would be respread to encourage natural revegetation. The ROW would be levelled to the required gradient using graders, backhoes and bulldozers. Topsoil would be removed and stockpiled separately for reuse during rehabilitation in the ROW.

Following construction of the pipeline, landholders would be able to resume the previous use of the land, other than excavation or erection of permanent structures or buildings. Deep-rooted vegetation, such as trees, would not be planted in the ROW to ensure that maintenance of the pipeline during the operational stage could be conducted without any hindrance. Maintenance would include aerial and ground inspections to determine easement conditions and cathodic protection performance, monitoring of rehabilitation success, weed management and potentially incompatible land uses or activities.

Rivers, creeks and streams would be crossed by fords, plumed crossings or bridges. These structures would remain in place until the pipeline had been tested and removed during the rehabilitation phase of the project.

When the pipeline is no longer required it would be decommissioned. All above-ground infrastructure would be disposed of in accordance with the legislative requirements applicable at the time. The pipeline would most likely remain in-situ after decommissioning.

The workforce for construction, commissioning, operation and decommissioning is expected to comprise a total of 728 persons; approximately 693 during construction, 10 during commissioning, 15 during operation and 10 during decommissioning.

3 The EIS process

3.1. Timeline of the EIS process

The proponent initiated the EIS process by submitting an application for approval to prepare a voluntary EIS to EHP on 16 February 2011. On 4 March 2011, EHP determined that the application complied with section 71 of the EP Act and could proceed to the draft TOR public notification stage.

A TOR notice was issued to the proponent on 10 March 2011, including details of the public submission period and the advertisement process. The draft TOR were advertised on 19 March 2011 in the *Courier Mail*, the *Mackay Daily Mercury*, the *Gladstone Observer* and the *Rockhampton Morning Bulletin*. The comment period commenced on 21 March 2011 and closed on 6 May 2011.

Comments on the draft TOR were received from 16 submitters within the comment period. On 18 May 2011, all comments were forwarded to the proponent, together with EHP's comments. The proponent's response to all submissions on the draft TOR was received on 15 June 2011. The final TOR were issued on 9 July 2011.

The proponent submitted an EIS on 12 December 2011 and was advised that the EIS did not completely address the final TOR. The proponent and EHP agreed to extend the decision date on whether the EIS could go to public review from 27 January 2012 to 24 February 2012. Once a revised EIS was submitted and EHP determined that it adequately addressed the final TOR, EHP issued a notice to the proponent, advising of its decision to allow the EIS to proceed to public notification of the EIS, on 24 February 2011. The EIS was published in accordance with Table 1: EIS publication, below:

Table1: EIS publication

Publication	Publication date
Courier Mail	23 March 2012
The Australian	23 March 2012
Queensland Country Life (Northern Edition)	29 March 2012
Courier Mail	31 March 2012
Mackay Daily Mercury	31 March 2012
Gladstone Observer	31 March 2012
Rockhampton Morning Bulletin	31 March 2012

The EIS public review period and the submission period commenced on 26 March 2012 and concluded on 24 May 2012. EHP required that the proponent to issue copies of the public notice to all interested and affected persons. On 17 April 2012, the proponent provided a statutory declaration, stating that it had complied with the public notice requirements for the EIS under the EP Act.

Twenty-seven submissions about the EIS were received within the submission period and 2 outside of the submission period. All of the submissions were accepted by EHP. On 7 June, EHP forwarded the submissions, together with a submission from EHP, to the proponent for consideration and response.

A response in the form of a supplementary EIS (SEIS) was received on 14 December 2012 and forwarded for review and comment to all submitters. On 30 January 2013, EHP decided that the EIS should proceed under division 5 (EIS assessment report) and division 6 (Completion of process) of the EP Act. On 8 February 2013, the proponent provided additional information as agreed with EHP, and on the same day a notice of the decision to proceed with EIS was issued to the proponent.

The finalisation of this report concludes the EIS process for this project.

3.2 Consultation program

3.2.1 Public consultation

Consultation with interested and affected persons is a requirement under the TOR to ensure that any matters between third parties and the proponent be identified and addressed in the EIS. The EIS stated that public consultation was an essential element of the project and that a stakeholder consultation plan (SCP) was developed to:

- identify affected third parties, their needs and values
- identify the key issues associated with the project
- facilitate community input
- provide information on the EIS process, goals, economic benefits, and project-related studies
- demonstrate to the community that their concerns had been identified and considered in the EIS
- gain public support for the project.

The EIS stated that consultation had been undertaken and was continuing in accordance with the SCP, including affected landholders, government agencies and local government. In the consultation process, the following issues were identified based on feedback from 125 affected landholders obtained before August 2011:

- interruption of landholder activities
- loss/reduction of income
- property value depreciation
- land access
- damage to fences and gates not being closed
- concerns that Arrow Energy may install CSG wells in the future
- a lack of trust from landholders due to claims of inconsistent information and inaccurate maps being provided during the consultation program
- lack of privacy regarding the distance of the pipeline from residential dwellings
- consultation fatigue.

The EIS committed to the proponent maintaining:

- the SCP for the duration of the planning, construction and commissioning phases of the project
- an active stakeholder liaison program during the operational phase.

The EIS documentation has generally met the requirements of the TOR for public consultation.

3.2.2 Advisory body

The following organisations were invited by EHP to assist in the assessment of the TOR and the EIS for this project:

- Department of State Development, Infrastructure and Planning (DSDIP)
- Department of Communities, Child Safety and Disability Services
- Department of Education, Training and Employment
- Department of Energy and Water Supply
- Queensland Health (Q Health)
- Department of Housing and Public Works
- Department of Local Government
- Department of Natural Resources and Mines (DNRM)
- Department of National Parks, Recreation, Sport and Racing

- Queensland Police Service (QPS)
- Department of Science, Information Technology, Innovation and the Arts
- Skills Queensland
- Department of Tourism, Major Events, Small Business and the Commonwealth Games
- Department of Transport and Main Roads (DTMR)
- Queensland Treasury and Trade
- Central Highlands Regional Council
- Gladstone Regional Council
- Isaac Regional Council
- Rockhampton Regional Council
- Whitsunday Regional Council
- Fitzroy Basin Association
- Capricorn Conservation Council (CCC)
- SunWater Limited
- QR National Limited
- Ergon Energy.

An 'advisory body' presentation about the project was held in Brisbane on 24 April 2012 and on 27 April 2012 in Rockhampton, during the public submission period of the EIS.

3.2.3 Public notification

In accordance with statutory requirements under the EP Act, advertisements were placed in newspapers to notify of the availability of the draft TOR, final TOR and EIS for review and opportunities for public comment. Refer to section 3.1 Timeline of the EIS process in this report for more details.

Notices advising of the availability of the draft TOR and the EIS for public comment were also displayed on EHP's website.

The draft TOR and EIS were placed on public display at the following locations during their respective public comment and submission periods:

- EHP, Head Office, 400 George Street, Brisbane
- Moranbah Library
- Marlborough Library (draft TOR only)
- Middlemount Library (EIS only)
- Dysart Library
- Nebo Library
- Emerald Library
- Customer Service Centres Whitsunday Regional Council in Collinsville, Bowen and Proserpine
- Customer Service Centre, Rockhampton Regional Council, Rockhampton.

During the public notification period, interested and affected persons had the opportunity to make submissions to EHP on the draft TOR and EIS for consideration by the proponent and EHP.

3.4 Matters considered in the EIS assessment report

3.4.1 Legislative requirements under the EP Act and subordinate legislation

Section 58 of the EP Act requires an EIS assessment report to address the following:

- the final terms of reference for the EIS
- the submitted EIS
- all properly made submissions and any other submissions accepted by the chief executive
- the standard criteria
- other matters prescribed under a regulation.

Section 59 of the EP Act stipulates that an EIS assessment report must:

- address the adequacy of the EIS in addressing the final TOR
- address the adequacy of any EM Plan for the project
- make recommendations about the suitability of the project
- recommend any conditions on which any approval required for the project may be given
- contain another matter prescribed under a regulation.

3.4.2 The final TOR

The final TOR (9 July 2011) were considered during the EIS assessment process. While the TOR were written to include all the potential environmental, social and economic issues associated with the project, they were neither exhaustive nor intended to be interpreted as excluding other matters from consideration in the EIS process. Matters outside of those listed in the final TOR are also considered in this report where they were discussed in the EIS.

3.4.3 The submitted EIS

This report takes into account the EIS received by EHP on 12 December 2011, the SEIS received by EHP on 14 December 2012 and further information provided by the proponent on 8 February 2013.

3.4.4 Properly made submissions

Within the submission period, EHP received and accepted 15 submissions on the EIS. Eleven of the submissions were received from the following advisory bodies:

- Capricorn Conservation Council
- Department of Community Safety (DCS)
- Department of State Development, Infrastructure and Planning – Office of the Coordinator-General
- Department of State Development, Infrastructure and Planning – Strategic Policy section
- Department of Science, Information Technology, Innovation and the Arts
- Gladstone Regional Council
- Department of Housing and Public Works
- Department of Natural Resources and Mines
- Queensland Police Service
- Skills Queensland
- Department of Transport and Main Roads.

EHP provided its own submission on the EIS and 4 submissions were received from industry.

All submitters were invited to provide a follow-up response to EHP on their view of the suitability of the proponent's response to their respective submissions.

3.4.5 The standard criteria

Section 58 of the EP Act requires that, among other matters, the standard criteria listed in Schedule 3 of the EP Act must be considered when preparing an EIS assessment report. EHP has considered the standard criteria in preparing this report.

4 Adequacy of the EIS in addressing the TOR

The following statements are summaries of the assessment of the EIS following the order in which they appeared.

4.1 Introduction

The EIS provided an adequate introduction to the project, its objectives and its scope. The EIS identified a range of regulatory approvals and outlined the relevant assessment and approvals processes.

4.2 Regulatory approvals

The EIS included a summary of applicable approvals subject to stand-alone State legislation or in combination with the *Sustainable Planning Act 2009* (SPA) under the Integrated Development Assessment System (IDAS). These are summarised in Table 2: Approvals required for this project. SPA applies to land outside the PPL.

Table 2: Approvals required for this project

Approval	Legislation (administering authority)
State legislation	
Environmental authority for a Level 1 Chapter 5A activity	*Environmental Protection Act 1994* (Department of Environment and Heritage Protection)
PPL for the construction and operation of a petroleum pipeline	*Petroleum and Gas (Production and Safety) Act 2004* (Department of Natural Resources and Mines)
Preparation of an Indigenous Cultural Heritage Management Plan (CHMP) or native title agreement	*Aboriginal Cultural Heritage Act 2003* (Department of Natural Resources and Mines)
Permit for the handling, storage and manufacture of hazardous materials and dangerous goods	*Dangerous Goods Safety and Management Act 2001* (Department of Community Safety)
Permit for the removal and disposal of contaminated soil	*Environmental Protection Act 1994* (Department of Environment and Heritage Protection)
Licence to use explosives (for rock blasting)	*Explosives Act 1999* (Department of Natural Resources and Mines)
Permit to develop on a reserve, road or unallocated state land and permit for vegetation clearing on state land	*Land Act 1994* (Department of Natural Resource and Mines)
Wildlife rehabilitation permit	*Nature Conservation Act 1992* (Department of Agriculture, Fisheries and Forestry)
Clearing permit (protected plants)	*Nature Conservation Act 1992* (Department of National Parks, Recreation, Sport and Racing)
Licence to utilise radioactive sources for welding activities (potentially required)	*Radiation Safety Act 1999* (Queensland Health)
Development permit for a material change of use (MCU) in the SGIC SDA and the GSDA	*State Development and Public Works Organisation Act 1971* (Department of State Development, Infrastructure and Planning)
Wayleave agreement (written approval to interfere with a railway)	*Transport Infrastructure Act 1994* (Department of Transport and Main Roads)

Approval	Legislation (administering authority)
Riverine protection permit	*Water Act 2000* (Department of Natural Resources and Mines)
Clearing permits for remnant vegetation potentially required for temporary workers camps or other incidental activities outside the PPL	*Vegetation Management Act 1999* (Department of Natural resources and Mines)
Preparation of an Historical Heritage Management Plan	*Queensland Heritage Act 1992* (Department of Environment and Heritage Protection)
Works and roads permit for local roads (for temporary road closures)	*Local Government Act 2009* (relevant local council)
Ancillary works and encroachment approval for state-controlled roads (SCR)—road corridor permit for temporary road closures	*Transport Infrastructure Act 1994* (Department of Transport and Main Roads)
IDAS—*Sustainable Planning Act 2009* and other State legislation	
Development permit for an MCU for temporary worker accommodation camps under a planning scheme	*Sustainable Planning Act 2009*, local planning schemes (relevant local government)
Development permit for operational works under a planning scheme	*Sustainable Planning Act 2009*, local planning schemes (relevant local government)
Development permit for building work associated with temporary workers accommodation camps	*Sustainable Planning Act 2009, Building Act 1975* (relevant local council or private building certifier)
Development permit for operational works for work within a coastal management district, i.e. HDD in the Curtis Coast Coastal Management District at Raglan Creek	*Sustainable Planning Act 2009 , Coastal Protection and Management Act 1995* (relevant local government and Department of Environment and Heritage Protection)
Development permit for a material change of use of premises for environmentally relevant activities (ERAs) associated with temporary worker accommodation camps: ERA 8(3)(a) Chemical storage—storing between 10m^3 and 500m^3 of chemicals of class C1 or C2 combustible liquids under AS1940 or dangerous goods class 3 ERA 14(2) Electricity generation—generating electricity by using fuel (other than gas) at a rated capacity of 10 MW electrical or more ERA 15(1) Fuel burning—using fuel burning equipment that is capable of burning at least 500 kilograms of fuel in an hour ERA 33 Crushing, milling, grinding or screening ERA 63(1)(a); (3)(2)(b) Sewerage treatment—consists of operating 1 or more sewage treatment works at a site, other than no release works, with a total daily peak design of more than 100 to 1500 EP ERA 64 (1)(b); (3)(3) Water treatment—consists of	*Sustainable Planning Act 2009, Environmental Protection Act 1994* (relevant local government and Department of Environment and Heritage Protection)

Approval	Legislation (administering authority)
treating 10 megalitres (ML) or more of raw water in a day	
Development permit for operational works for constructing or raising waterway barrier works	*Sustainable Planning Act 2009, Fisheries Act 1994* (relevant local council and Department of Agriculture, Fisheries and Forestry)
Development permit for operational works for clearing native vegetation	*Sustainable Planning Act 2009, Vegetation Management Act 1999* (relevant local government and Department of Natural Resources and Mines)

The EIS stated that local laws would apply to various matters; e.g. works on local roads or pest management.

The EIS suggested that a development permit would be required where the pipeline route traversed contaminated land. However, PPLs do not require a development permit under SPA. None the less the proponent is advised to contact EHP should contaminated land be traversed by the pipeline.

The EIS stated that all state forests would be avoided and did not include any reference to commercial quarry activities relevant for this project. Consequently no permits under the *Forestry Act 1959* are likely to be required although the EIS stated that such permits would be required under that Act.

The EIS stated that a development permit for registered local heritage places was unlikely to be required, as only one such place had been identified on the Queensland Heritage Register and the pipeline route was unlikely to traverse that place.

The EIS referred to water licences required under the *Water Act 2000*, which are relevant for petroleum tenures. However, this project would require a PPL which is considered a licence, not a petroleum tenure. DNRM pointed out in its submission that a water permit would be required under the *Water Act 2000*, Water Resource (Fitzroy Basin Plan) 2011, Water Resource (Calliope River Basin Plan) 2006 and the Water Resource (Burdekin River Basin Plan) 2007 rather than a water licence.

The EIS provided variously a range of information on the treatment and supply of potable water for temporary workers accommodation camps. It stated that potable water would be trucked in, and that a development permit may be required under SPA for ERA 64(1)(b).

The EIS did not identify the need for approvals under the *Plumbing and Drainage Act 2002* which would be required for temporary workers accommodation camps.

4.3 Project need and alternatives

The EIS described the need for the project, outlined the social, economic and environmental benefits including its significance to the proposed LNG facility in Gladstone and the proposed upstream development in the Bowen Basin. Project alternatives were adequately discussed. The EIS incorporated the principles of ecologically sustainable development. Positive and negative impacts, mitigation and management measures and environmental protection commitments for the project were addressed in the EIS.

4.4 Project description

The description of the project was revised twice after the EIS was initially submitted. In such case the proponent provided details on the components of the project that have changed and the reason for the change. The main changes included a route change to avoid the Gracemere Industrial Estate near Rockhampton and to a large extent utilise the SGIC. A brief outline of the project can be found in section 2 'Project details' of this report.

4.5 Climate

The EIS stated that the climate in the project area was predominantly sub-tropical with warm to hot temperatures in summer and mild to cool temperatures in winter. Rainfall averages indicated a distinct wet and dry season, with the wet period generally between December to March and a dry period between June and September. Mean temperatures indicated that December and January were typically the hottest months whereas July was the coldest. The climate in the project area is influenced by the trade winds, with prevailing winds from the south-east

in Rockhampton and predominantly east in Moranbah. The EIS stated that a preliminary climate change assessment had been conducted, indicating that the project may be affected by hazardous climatic events such as floods, bushfires, cyclones and storms; drought was not considered a risk to the project.

4.5.1 Flooding

The EIS identified areas to be at risk of flooding during construction, especially at water crossings. It was stated that, where the pipeline would traverse flood plains, the pipeline may become buoyant during the operational stage; however buoyancy control measures would be put in place to prevent displacement of the pipe. The EIS stated that the potential for flooding needed to be considered in the design and location of any above ground structures, e.g. pipeline valves and scraper stations.

The EIS included mitigation measures to address potential flood risks. DCS pointed out deficiencies in the provided flood modelling and stated that the EIS contained insufficient evidence on how the 1% AEP as an appropriate level of flood immunity for this project was derived. DCS requested that more detailed flood studies be undertaken. The EIS committed not to locate temporary workers camps in flood prone areas and to undertake a more detailed flood assessment which would inform an emergency response plan which was not provided in the EIS.

The TOR requirements for flooding have not been met in full. However, EHP is satisfied that the residual concerns can be resolved in conjunction with DCS.

Outstanding matters:

Undertake detailed flood modelling following discussions with DCS.

4.5.2 Cyclones and storms

The EIS stated that severe thunderstorms could occur and may result in flash flooding, hail, destructive wind gusts, and potentially tornadoes. Severe storms were considered a potential risk during construction, although they were expected to be relatively short in duration. The EIS provided insufficient mitigation measures for cyclone and storm risks, but committed to developing and implementing and Emergency Response Plan and management strategies. The EIS stated that the pipeline would be underground and consequently operational risks from destructive cyclones were considered low.

The EIS has generally met the TOR requirements for cyclones and storms.

4.5.3 Bushfires

The EIS stated that the majority of the proposed pipeline would traverse areas of low to medium bushfire risk, although small pockets of higher bushfire risk were also identified in the EIS. The EIS considered bushfires a potential risk during construction and included mitigation measures and a commitment to develop fire management strategies. The EIS stated that during construction, the potential for extreme climatic events would be monitored.

The EIS committed to undertaking a detailed safety management study of identified hazardous climatic events and committed to developing a construction emergency response plan, construction safety management plan and a construction fire risk management plan. The plans were not provided in the EIS itself.

The TOR requirements for bushfires have not been met in full. However, EHP is satisfied that the residual concerns can be resolved in conjunction with DCS.

Outstanding matters:

- conduct a detailed safety management study regarding hazardous climatic events
- provide an emergency response plan, a safety management plan, a fire risk management plan and a health, safety and environment plan for construction and operation.

4.5.4 Climate change adaptation

The EIS stated that the project could be affected by long-term changes in annual average temperatures, seasonal average rainfall and annual average potential evaporation, potentially resulting in:

- long term environmental damage, particularly through vegetation loss and soil erosion in dry conditions
- accelerated deterioration of infrastructure due to the projected increases in the number of days of extreme heat (days over 35°C)
- increase of fires and dust storms during dry periods

- increasing wind speeds, which may exacerbate the intensity of fires and dust storms during dry periods
- inundation and erosion of the project infrastructure arising from the higher intensity, frequency and duration of extreme rainfall events.

The EIS included a range of mitigation measures and committed to:

- considering the potential for flooding from extreme weather for location of above ground structures and temporary workers accommodation camps
- promptly completing trenching of watercourse crossings with due regard to the weather
- preparing an emergency response plan and fire risk management strategies as part of a health, safety and environment plan.

The EIS has generally met the TOR requirements for climate change adaption.

Outstanding matters:

Provide an emergency response plan and fire risk management strategies as part of a health, safety and environment plan as part of a revised EM Plan.

4.6 Land

The EIS identified local planning schemes in the Whitsunday Regional Council, Isaac Regional Council, Rockhampton Regional Council and Gladstone Regional Council LGAs that would be traversed by the proposed pipeline. Based on consideration of the identified planning schemes, the EIS stated that approximately 97% of land traversed by the proposed pipeline was designated for rural land, uses, which include grazing and horticulture. The remaining 3% consisted of community uses and 'other' uses. Other uses differ for each planning scheme and can include religious, cultural or educational purposes. Four state reserves would be traversed, including three unnamed ones and one known as Boveys Lookout. The pipeline would commence near Glenden and terminate in the GSDA, which has been created to support industrial development including the processing, storage and export of LNG. Approximately 37km of the proposed pipeline would be located in the GSDA.

The EIS stated that no residential dwellings or areas for community uses would be directly traversed, however, the Gladstone Regional Council stated that the pipeline appeared to impact on the Raglan Refuse Station, the adjacent community controlled racecourse and an access road to an existing boat ramp in that area.

The EIS stated that the existing land use would continue following completion of construction and rehabilitation. Due to the pipeline being underground, previous land use activities within the pipeline easement could be resumed after construction and rehabilitation. The EIS concluded that permanent impacts on future land uses from the project would be limited to within the pipeline easement, where no deep-rooting vegetation would be allowed and no structures or buildings should be built.

A commitment was made in the EIS to manage impacts to ensure that current and future land uses would not be unnecessarily compromised.

The EIS committed to not traversing the Gracemere Industrial Estate.

The TOR requirements for land use have been met.

Outstanding matters:

- liaise with the Gladstone Regional Council to resolve potential impacts to the Raglan Refuse Station and the access road to an existing boat ramp
- liaise with the trustees of the Raglan Racecourse Reserve regarding potential impacts to the racecourse.

4.6.1 Co-location

The EIS stated that an approximately 81km long section of the Stanwell to Gladstone State Development Area (SGIC SDA), which has a total length of approximately 89km, would be utilised. The SGIC SDA is a designated state development area intended to house multiple underground pipelines, including CSG transmission pipelines to minimise any potential impacts of linear infrastructure in the Gladstone/Rockhampton region. The EIS stated that the SGIC section had undergone preliminary flora and fauna assessment, but required more detailed assessment to address environmental, social and economic impacts. The EIS committed to providing detailed environmental and technical information on potential impacts within the SGIC as part of an MCU application required under the *State Development and Public Works Organisation Act 1971* (SDPWO Act), administered by the Office of the Coordinator-General. The proposed CSG transmission pipeline would deviate from the SGIC SDA in 2 locations. The EIS did not provide sufficient information on any potential environmental, social and economic impacts these

deviations may have. However the EIS committed the proponent to providing a detailed engineering report to the Office of the Coordinator-General for discussion and consideration prior to issuing of the EA under the EP Act. The Office of the Coordinator-General stated in its submission that without providing any reasons for the deviations and insufficient assessments of potential impacts, it was unable to comment on the suitability of the proposed CSG transmission pipeline alignment in the SGIC SDA.

The TOR requirements for co-location have not been met in full, however the scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied the residual concerns can be resolved in conjunction with the Office of the Coordinator-General.

Outstanding matters:

Provide detailed information as part of an MCU application under the SDPWO Act to the Office of the Coordinator-General, including:

- potential environmental, social and economic impacts of the proposed pipeline within the SGIC including justification for proposed deviations from the SGIC SDA
- a technical engineering report on the feasibility of the proposed pipeline within the SGIC SDA, also taking into account any proposed deviations.

4.6.2 Soils and land suitability

The EIS stated that a soil survey had been conducted for the proposed pipeline to a maximum depth of 2m below ground level. Approximately 40% of the identified soils consisted of Sodosols with sodic and possibly saline subsoils. The remaining 60% included Vertosols, Dermosols, Kandosols, Rudosols and Tenosols which may occasionally have saline or sodic soil horizons. The EIS identified that the main soil constraints affecting land suitability included sodicity, salinity, limited effective rooting depth (and thus limiting plant available water capacity) and low soil fertility. The EIS concluded that, based on these constraints (following the rehabilitation phase), soils in the project area would be best suited to the grazing of native pastures or left to re-establish as native bushland.

The land traversed by the proposed pipeline consisted of 86% Class C (pasture land) good quality agricultural land (GQAL), 10% Class A (crop land) and 3% Class B (limited crop land). The EIS stated that the proposed pipeline had the potential to degrade some agricultural land, including GQAL. A commitment was made in the EIS not to alienate any GQAL and to reinstate it to its original condition. The EIS did not include any management strategies for the management of GQAL but committed to include these strategies in a soils management plan to avoid and minimise impacts. An outline of the soils management plan was provided in the EIS. No comparison between pipeline depth and cropping depths had been included in the EIS, however the EIS stated that a minimum of 250mm of topsoil would be placed over competent subsoil.

Acid sulfate soils (ASS) may be present in the low-lying coastal area of Bajool/Port Alma, however no conclusive ASS assessment was provided in the EIS. The EIS committed that prior to construction, the presence of ASS or potential ASS (PASS) would be confirmed by field survey. If ASS/PASS was intersected, an acid sulfate soils management plan would be developed in accordance with the State Planning Policy 2/02 Guideline Acid Sulfate Soils.

The EIS stated that approx.145 hectares (ha) of strategic cropping land (SCL) had been identified over a 30m ROW associated with the Dysart lateral, although the EIS stated that the initial ROW would be 40m wide. A commitment was given to manage SCL in accordance with the SCL trigger mapping and legislative requirements. The EIS accepted SCL trigger mapping by the Queensland Government and stated that no further SCL validation would be undertaken for this project. The TOR did not require any information on SCL. Any impacts to SCL would have to be managed in accordance with current legislation administered by DNRM.

The EIS stated that it was necessary to develop a Soils Management Plan to manage potential impact on soils and committed to developing this plan prior to construction of the pipeline.

The EIS has generally met the TOR requirements for soils and land suitability. DNRM made a number of recommendations regarding the management of soil in its submission on the EIS, which need to be addressed as part of a revised EM Plan.

Outstanding matters:

- Provide a soils management plan and an acid sulfate soil management plan as part of a revised EM Plan.
- Address DNRM's recommendations on soil management in a revised EM Plan.

4.6.3 Land disturbance

Land disturbance would consist of clearing activities of the 40m wide ROW and trenching to a maximum excavation

depth of 2m. The total footprint of the pipeline would be approximately 23km^2 based on a 40m wide ROW and a pipeline length of 580km. The expected footprint for the 5 temporary workers accommodation camps would be a combined total of 125ha. Pre-existing cleared areas may be utilised. Potential impacts of clearing are assessed in section 4.12 ‘Ecology’ and excavation and trenching in section 4.8 'Waste' of this assessment report.

4.6.4 Land contamination

The EIS stated that 57 sites had been identified in the project area that may have been used in the past for notifiable activities, such as cattle dip/spray race, landfills and use of hazardous substances. Three sites would be located in or very close to the proposed pipeline easement.

Two sites were recorded on EHP's Environmental Management Register (EMR) for petroleum product/oil storage. One site appeared to also contain a rehabilitated former mine area; the other appeared to contain dumps/stockpiles.

Seven additional sites were identified that may be contaminated. The EIS stated that 2 limited Stage 1 environmental site assessments had been conducted, which were not included in the EIS. The EIS stated that no soil sampling had been conducted to verify the presence of actual contamination. The EIS stated that the notifiable activity 29 Petroleum product and oil storage was likely to be triggered by this project and would require listing on the EMR/CLR. The EIS did not provide any information on potential locations for petroleum product or oil storage.

The EIS acknowledged that the assessment of potentially contaminated land in the EIS was limited and needed to be further investigated, but it committed to:

- undertaking proper assessments of any potentially contaminated land in accordance with the EHP Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland prior to any disturbance
- notifying any new notifiable activities for inclusion on the EMR/CLR
- developing a contaminated land management procedure prior to commencing construction
- undertaking a visual inspection along the full length of the proposed pipeline route as part of the pipeline pre-construction survey.

The EHP Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland have been superseded by EHP’s Guideline for contaminated land professionals, October 2012, and should be used for any further contaminated land assessment work.

The TOR requirements for land contamination have not been met in full. However the overall scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied that the residual concerns can be resolved through the implementation of the relevant recommendations, prior to decisions being made about issuing the relevant environmental authority.

Outstanding matters:

- Conduct an assessment of potentially contaminated land in accordance with EHP’s Guideline for contaminated land professionals, October 2012 for any areas to be disturbed by the project. Include the findings in a revised EM Plan or subordinate management plans.
- Provide a contaminated land management procedure as part of a revised EM Plan.

4.6.5 Visual amenity and lighting

The EIS stated that lighting impacts from the project were expected to be minimal, as construction would be predominantly carried out during daylight hours. It further stated that temporary workers accommodation camps would be operated at night time; however would not be located near towns or sensitive receptors and therefore not impact on existing residents, cause nuisance or be readily visible from populated areas or roads.

Improper management of waste was also identified as having a potential impact on the visual amenity and the landscape character of the project area. Refer to section 4.8 ‘Waste’ of this report.

The TOR requirements for lighting and visual amenity have generally been met.

4.7 Transport

The EIS identified that road, port facilities/rail, airports/airstrips and stock routes would be affected by the project.

4.7.1 Roads

The following state-controlled roads (SCR) would be utilised to access the project site:

- Bruce Highway (Benaraby–Rockhampton)
- Burnett Highway (Biloela–Mount Morgan)
- Capricorn Highway (Rockhampton–Duaringa)
- Duaringa Apis Creek Road
- Fitzroy Development Road (Dingo–Mt Flora)
- Peak Downs Highway (Nebo–Mackay)
- Peak Downs Highway (Clermont–Nebo)
- Suttor Development Road (Nebo–Mt Coolan)
- Collinsville–Elphinstone Road
- Marlborough–Sarina Road.

Insufficient information was provided on the potential impacts on local roads.

The following SCRs would be crossed by the proposed pipeline:

- Suttor Developmental Road and Stock Route
- Peak Downs Highway
- Fitzroy Development Road
- May Downs Road and Stock Route
- Capricorn Highway
- Bruce Highway
- Gladstone–Mount Larcom Road
- Dingo–Mt Flora Road.

Forty-five minor roads and tracks would be crossed by the proposed pipeline. Crossing techniques would include open-cut trenching or HDD methods. Traffic generated by the project would be daily and mainly associated with the haulage of 192,800 tonnes (t) of line pipe, other construction materials/plant and personnel, predominantly during the 15-month construction period. During that time, daily truck movements were estimated at 64 for the haulage of line pipe. Numbers of truck movements for the transport of other materials were not provided. The transport of personnel would occur twice daily between the site and temporary workers accommodation. Insufficient information was provided regarding transport from privately organised accommodation. Temporary road closures would be expected where the pipeline route would intersect a road. The EIS recommended underbore SCR to avoid impacts on traffic but gave no firm commitment. DTMR advised that it would be unlikely to issue road closure permits for active SCRs and underboring would be required. The Gladstone Regional Council advised in a similar manner that road closures would not be allowed for sealed local roads and that underboring would be required.

DTMR and Gladstone Regional Council stated that impacts on roads had been underestimated in the EIS and that further assessment and the development of suitable mitigation measures for SCRs and local roads were required.

QPS recommended that the proponent engage with QPS about managing risks from twice daily peaks in private vehicular movements from the site to places of residence and fly-in, fly-out (FIFO) airports around the commencement and cessation of work rotations.

The EIS committed to providing a traffic management plan (TMP) as required by DTMR and QPS, as well as a road crossing plan prior to the crossing of roads and a road condition report prior to the finalisation of the TMP.

The TOR requirements for transport have not been met in full. However the overall scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied that the residual concerns can be resolved in conjunction with DTMR.

Outstanding matters:

DTMR requested an analysis of the potential impacts on roads in a revised road impact assessment in accordance with the Guidelines of the Assessment of the Road Impacts for:

- the construction and operation of temporary accommodation camps
- at intersections with SCRs
- on the pavements/structures on SCRs.

DTMR also requested the submission of a road-use management plan and a TMP.

4.7.2 Port facilities/rail

The EIS stated that transportation of line pipe via rail had not been assessed, but that rail transportation could possibly occur from Port Alma. Nine railway lines would be crossed by the proposed pipeline. The EIS stated that the rail network could be disrupted but did not discuss the nature of disruption or any mitigation measures. The EIS committed to crossing railway lines utilising a thrust boring technique, micro-tunnelling or alternatively, HDD depending on geotechnical investigations and approval from Queensland Rail Limited and QR National Limited.

The requirements of the TOR for port facilities/rail have not been met. However EHP is satisfied that these matters can be resolved through ongoing liaison with DTMR and other third parties.

Outstanding matters:

DTMR requested an assessment of the potential use of rail networks from the Port of Gladstone and Mackay to stockpile sites, as the delivery of pipe sections of unknown lengths by road from Mackay to a site at Nebo, via the Peak Downs Highway, might be problematic. DTMR records indicate that the Peak Downs corridor was already a constrained route, particularly in the vicinity of Walkerston, with significant volumes of heavy vehicle and over-size over mass movements. Therefore DTMR required the investigation of line pipe transportation via rail from Gladstone and Mackay. Only if the rail option was proven to be unfeasible should pipe section transport occur via road.

4.7.3 Airports/airstrips

Fifty-four airports and airstrips have been identified within 25km of the proposed pipeline route, including Rockhampton and Moranbah Airport. During the construction phase, construction workers would be mostly employed on a FIFO basis. The EIS did not determine the specific airports and airstrips potentially used because the locations of the temporary workers camps had not yet been determined. QPS recommended that the proponent engage with QPS regarding the reduction of risk attributable to large volumes of private vehicular movements prior to the commencement and cessation of work rotations from place of residence and FIFO airports.

The requirements of the TOR for airports/airstrips have not been met. However EHP is satisfied that through ongoing liaison with QPS any risks associated with vehicular movement to and from airports can be resolved.

4.7.4 Stock routes

The temporary impact on 11 stock routes was identified by open cut trenching, generally perpendicular to the stock route. The EM Plan committed to consultation between local government stock route officers and landholders regarding any temporary disturbance to stock mobilisation. Activities near stock routes would be managed in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002*. Fences, gates and access tracks along and across the ROW would be established in consultation with landholders.

The EIS did not sufficiently discuss specific impacts to stock movement or present sufficient mitigation measures to avoid adverse impacts during the construction and operation of the project on travelling stock. It stated that open trenching would occur but that there would be no permanent disruption to the stock route network. No mitigation measures were included to demonstrate that open trenching would result in temporary and acceptable disruptions to travelling stock. The EIS did not consider less invasive crossing techniques such as thrust boring, micro-tunnelling or HDD. No external submission was received on stock routes as they relate to travelling stock.

The TOR requirements for stock routes have not been met in full. However the overall scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied that the residual concerns can be resolved in conjunction with DNRM.

In addition to outstanding matters identified in this section relating to transport, DTMR has recommended conditions relevant to transport under the *Transport Infrastructure Act 1994* and the *Transport Operations (Road Use Management) Act 1995*, which can be found in section 7 'Conditions for regulatory approvals' of this report.

4.8 Waste

The EIS stated that excavated, solid and liquid wastes may impact on the environment.

4.8.1 Excavated waste

The EIS stated that excavated soil would be approximately 1 million m^3 for the entire length of the pipeline trench. A detailed soil assessment was undertaken to determine the soil properties and to derive appropriate management strategies for soils with different physical, chemical and biological characteristics. The EIS stated that some soil types identified would have significant limitations when disturbed and should be managed to minimise any impacts to land, e.g. an excess of 373,000m^3 of sodic (dispersive) clay subsoil which would not be backfilled into the trench. No characterisation was conducted on excavated waste rock. The EIS did not provide detailed information on waste rock characterisation potential impacts associated with waste rock generation, management and mitigation measures.

The EIS committed to further testing of chemical properties and leaching potential of excavated waste as well as ASS investigations. Waste rock would be characterised as part of future detailed geotechnical investigations prior to construction.

The EIS includes an outline of a soils management plan and commits that the proponent would provide a detailed soils management plan, including management of earthworks and an ASS management plan, after the EIS process but prior to commencement of construction. This approach is acceptable to EHP.

Details on waste and mitigation measures would be addressed in a waste management plan after the EIS process.

The requirements of the TOR for excavated waste have generally been met.

Outstanding matters:

- Determine chemical properties and leaching potential of excavated soil.
- Conduct a characterisation of the excavated soil including excavated waste rock.
- Provide a waste management plan, soils management plan and ASS management plan as part of a revised EM Plan.

4.8.2 Liquid waste

Liquid waste would be predominantly associated with hydrotesting of the pipe. Sources of hydrotest water would vary, but may include treated CSG water and freshwater from dams or streams. The total amount of hydrotest water would be 100ML. The EIS provided little information on the sources, characteristics, disposal and management options for hydrotest water. The EIS stated that biocides and oxygen scavengers would be added to the hydrotest water, but no risk assessment had been undertaken nor appropriate management strategies formulated. The EIS committed to:

- no discharge of hydrotest water to watercourses
- no extraction of hydrotest water water from significant aquatic habitat areas
- no disposal via evaporation ponds
- providing a hydrotestwater management plan.

The EIS considered the possibility to provide landholders with hydrotest water or use it for rehabilitation under a beneficial use approval provided it meets relevant water quality guidelines.

The EIS stated that temporary workers accommodation camps would include a self-contained packaged STP to cater for 400 persons at each camp. The EIS committed to treating STP effluent to a standard suitable for disposal to land. STP approval would be sought under SPA.

The TOR requirements for liquid waste have not been met in full. However EHP is satisfied that the residual concerns can be resolved through the implementation of the relevant recommendations, prior to decisions being made about issuing the relevant environmental authority.

Outstanding matters:

Provide a hydrostatic test water management plan.

4.8.3 Solid waste

Solid wastes other than excavated waste would be generated predominantly during the construction phase, such

as packaging materials, drill cuttings, cleared vegetation or chemicals. Scrap metal would be generated during the decommissioning phase. Waste associated with workers camps was not included in the EIS. The EIS committed to minimising and recycling waste or disposed of the waste through licensed contractors at licensed waste facilities.

Generally the requirements of the TOR have been met for solid waste.

Outstanding matters:

Provide a waste management plan as part of a revised EM Plan.

4.9 Water resources

The EIS identified the following matters that could be impacted by the project:

- water sources
- surface water
- stormwater
- groundwater
- erosion.

4.9.1 Water sources

The EIS stated that approximately 64ML of potable water and 250ML of non-potable water were required, predominantly during the construction phase. Non-potable water would be used for dust suppression, welding, joint coating, pipe backfill and vehicular wash-down. Potable water would be required for temporary workers accommodation camps. Water would be provided via water trucks, which would obtain their water from non-potable raw water sources along the proposed pipeline route including bores, dams, watercourses and existing and proposed water pipelines and water supply schemes. The EIS stated that construction during prolonged drought periods may impact on potential water sources and that bore water may have to be used to meet construction demand, which was not further assessed in the EIS. The EIS stated that:

- water sources and exact amounts of water had not yet been determined
- water would not be stored and only sourced on an as-need basis
- the project could be serviced to a large extent via SunWater-controlled infrastructure, however, other non-potable water sources may provide a better servicing outcome for the construction demands due to proximity, cost or phasing
- the construction of new water infrastructure or on-site treatment at workers camps to obtain potable water was unlikely due to the temporary nature and costs. Therefore the preferred option was to provide potable water from external waters sources.

The EIS did not include an assessment of impacts in relation to any water resource plans and resource operation plans nor an assessment of any potential contamination of water sources as required by the TOR.

The TOR requirements for water sources have not been fully met.

Outstanding matters:

- Determine the feasibility of all water sources for potable and non-potable water identified in this EIS. Provide an assessment for each water source and the consequential impacts in relation to any water resource plans and resource operations plans and discuss these with DNRM.
- Undertake a risk analysis of the various water supply options to rank them and to support the negotiation of water allocations. Evaluate risks such as accessibility, quality, ownership and level of water priority required.
- Undertake a financial analysis of the various water supply options to determine their cost-effectiveness rank them accordingly.
- Engage SunWater to discuss the availability, capacity and opportunity for negotiated lease of water allocations within its operational infrastructure supplying raw water.
- Engage with the relevant water resource and allocation owners to secure the required water resources.

4.9.2 Surface water

The EIS identified approximately 55 crossings for major named watercourses, including the Isaac and the Fitzroy Rivers and two unnamed wetlands. According to the EIS, impacts to watercourses may be caused by pipe laying activities and transportation of construction equipment, causing a temporary increase in suspended solids and potentially mobilising contaminants such as metals, pesticides and nutrients. The EIS stated that the risk of these impacts would increase during periods of moderate to high stream flow when disturbed sediments could be mobilised and transported over large distances downstream. The EIS concluded that most watercourses could be crossed via open trenching without any significant impacts on surface water, provided suitable management strategies were put in place, e.g. construction during dry season or reinstatement of the stream bed. The EIS provided a list of stormwater management measures to mitigate potentially contaminated runoff associated with water crossings, earthworks and chemical storage. Suitable crossing techniques had been identified for the majority, but not all of the watercourses to be impacted by the project. The EIS did not identify downstream sensitive receptors associated with water crossings including wetlands, semi-permanent waterholes or ephemeral waterways. The EIS provided insufficient information on existing water quality, quantity and monitoring programs for all crossings but committed to:

- choosing alternative crossings where possible to minimise environmental impacts (i.e. vegetation clearing, bank erosion)
- using HDD to minimise impacts to water flows
- undertaking construction during the dry season, where possible, to minimise impact on watercourses
- maintaining water flow throughout construction so as not to impact on downstream users
- establishing temporary workers camps and maintenance areas in areas known not to flood
- developing an aquatic values management plan (AVMP) for each watercourse crossing prior to undertaking any construction activities
- incorporating any outstanding matters in an AVMP.

The TOR requirements for surface water have not been met in full. However the overall scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied that the residual concerns can be resolved through the implementation of the relevant recommendations, prior to decisions being made about issuing the relevant environmental authority.

Outstanding matters:

- Identify for each watercourse/wetland crossing relevant downstream sensitive receptors, information on existing water quality, quantity and a water monitoring program and include these in the EM Plan.
- Provide an AVMP as part of a revised EM Plan.
- Confirm suitable crossing methods and timing (wet or dry season) for each watercourse crossing in the AVMP.

4.9.3 Stormwater

The EIS stated that stormwater management was mainly associated with construction activities and operation of workers camps. It committed to segregating clean and contaminated stormwater and proposed management strategies to avoid contamination of stormwater or treatment to render it less hazardous. Stormwater mitigation measures have been included in the EM Plan. Stormwater management for temporary workers' accommodation camps would have to be separately addressed under SPA.

The TOR requirements for stormwater have generally been met.

4.9.4 Groundwater

The EIS, without providing any evidence, stated that groundwater was unlikely to be intercepted during the construction of the proposed pipeline as target aquifers for groundwater users were greater than the proposed maximum excavation depth of 2m. However, DNRM suggested that in some cases the bed level of water crossings is lower than the ground level of adjacent properties and bores. The interruption of groundwater needs to be verified through geotechnical assessments. The EIS stated that Ungle Waterhole may be supported by a perched water table which would be further investigated in geotechnical assessments. No information was provided on groundwater dependent ecosystems. However, the EIS committed the proponent to undertaking further geotechnical investigations along the pipeline route to confirm the presence of groundwater systems prior to construction.

The TOR requirements for groundwater have not been met in full, however EHP is satisfied that the residual concerns can be resolved by the proponent through further negations with DNRM.

Outstanding matters:

- Determine the presence of groundwater for each water crossing through additional investigations.
- Identify all aquifers that may be impacted and determine any connections between surface water and groundwater.
- Determine any groundwater bores and their uses that may be affected by altered hydrology.
- Identify groundwater environmental values including groundwater dependent ecosystems.
- Identify potential impacts and mitigation measures for groundwater quality and include them in a revised EM Plan.

4.9.5 Erosion

The EIS stated that erosion was observed at numerous existing watercourse crossings and may become an issue during construction and rehabilitation if not properly managed. Erosion would be associated with construction activities and required the management of excavated soil at water crossings.

The EIS identified a number of mitigation measures and committed to providing an erosion and sediment control plan and a soil management plan to minimise erosion and sediment loss during construction. Although an erosion management plan was not provided in the EIS; an outline of the soil management plan was included.

The requirements of the TOR for erosion have generally been met.

Outstanding matters:

Provide an erosion management plan and a soil management plan as part of a revised EM Plan.

4.10 Air quality

The EIS identified dust and exhaust emissions as the main pollutants (carbon monoxide, nitrogen dioxide and particulate matter) associated with earthworks and fuel burning of vehicles and machinery during the construction phase. The EIS stated that dust would have the potential to exceed air quality objectives in the EPP (Air) and environmental nuisance may occur, but the EIS identified a number of mitigation measures to minimise nuisance. Dust and vehicle exhaust may also be generated during the operations phase as part of maintenance activities or when sections of the pipeline need to be replaced.

Other air emissions would include the release of elemental nitrogen and natural gas during the commissioning process. The EIS stated that the commissioning process would have limited environmental impacts associated with the release of nitrogen, which is a common, naturally occurring constituent of the earth's atmosphere. The release of CSG, which consists primarily of methane, may contribute to the greenhouse gas effect and climate change.

Based on information in the EIS, total greenhouse gas emissions of approximately 54,000t of carbon dioxide equivalent (CO2-e) would be generated during the 15-month construction period caused by emissions from diesel generators, construction equipment, lighting and vehicles. The EIS also stated that approximately 209,280t CO_2-e would be generated over 40 years during the operational stage associated with CSG releases.

Other greenhouse gases would include the release of CO_2 associated with vegetation clearing and temporary workers camps which were not assessed in the EIS. No odorous activities were identified.

Appropriate mitigation measures were provided to limit the release of air emissions and greenhouse gases and a commitment given for continuous improvement.

The EIS did not assess any impacts to air from temporary workers camps, which would be separately assessed under the SPA. The EM Plan did not include sufficient information on management strategies, performance criteria and monitoring activities regarding air emissions. The EIS committed to providing an air quality management plan prior to construction.

The requirements of the TOR for air quality have generally been met.

Outstanding matters:

Provide an air quality management plan and include clear management strategies, performance criteria and monitoring activities as part of a revised EM Plan.

4.11 Noise and vibration

The EIS stated that the project has the potential to cause temporary nuisance noise and vibration, mainly associated with traffic, construction activities (e.g. machinery noise) and possibly rock blasting during the construction period. Construction would occur from 6.00am to 6.00pm with the exception of hydrostatic testing and HDD at watercourses, which would also be carried out at night time. Commissioning of the pipeline would require nitrogen and gas venting, causing an intermittent high-pitched noise. Venting may also occur during an emergency. Operational noise would be minor as it was mainly associated with vehicular movement as part of pipe maintenance activities and therefore not expected to cause nuisance. Vibration was not expected to occur during the operational stage.

142 sensitive receptors (e.g. residential houses) potentially affected by noise and vibration were identified within a 1km corridor centred on the proposed pipeline route. Daytime construction noise levels might be exceeded temporarily at five sensitive receptors located less than 200m from the construction activities. The EIS assumed that noise was unlikely to have a lasting major impact on fauna based on research conducted in the USA, however that potential noise impacts on wildlife were poorly understood.

The EIS stated that blasting may be required however it was unlikely to cause perceivable vibration at sensitive receptors. The EIS committed that the proponent would not exceed airblast overpressure and ground vibration criteria. No sensitive receptors were identified for blasting activities, but the EIS committed to undertaking a survey of properties within 100m of potential blasting locations. Blasting would be carried out in accordance with current best practice and a blast management plan, which would be developed if blasting was required. The EIS included acceptable mitigation measures to achieve compliance with the acoustic quality objectives in the EPP (Air) and for blasting. The EIS included an outline of a noise and vibration management plan and of a blast noise and vibration management plan.

The EIS has generally met the TOR requirements for noise and vibration, however it should be noted that construction activities would occur close to Mount Larcom State School. At that location, EHP strongly recommends either construction outside normal school hours or the use of sound barriers to minimise impacts on Mount Larcom State School. The construction timing should be carried out in agreement with Mount Larcom State School.

The TOR requirements for noise have generally been met.

Outstanding matters:

- Determine the likely locations for blasting and conduct a survey of potential sensitive receptors.
- Commit to implementing suitable mitigation measures so as not to negatively impact on Mount Larcom School and include these in relevant management plans as part of a revised EM Plan.
- Provide a noise and vibration management plan and a blast noise and vibration management plan as part of a revised EM Plan.

4.12 Ecology

4.12.1 Terrestrial ecology – flora

The proposed pipeline route would traverse the Brigalow Belt Bioregion, including approximately 429km of non-remnant vegetation (mostly cropping and grazing land), 28km of high value regrowth and 124km of remnant vegetation comprised of endangered regional ecosystems (REs), 'of concern' REs and 'no concern at present' REs. The EIS identified vegetation clearing as potentially having the most significant impact on flora.

Vegetation that would require clearing within a 40m ROW includes:

- 9ha of endangered ecological communities (endangered Brigalow communities, endangered natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin, semi-evergreen vine thickets of the Brigalow Belt) unless mitigation methods are applied which could reduce that area to 7.4ha
- 2ha of 'endangered' REs unless mitigation methods are applied which could achieve zero clearing of 'endangered' REs
- 105ha of 'of concern' REs unless mitigation measure are implemented which could reduce the impacted area to 101ha
- 351ha 'no concern at present' RE unless mitigation measures are implemented which could reduce the area to 349.3ha.

- 121ha of high value regrowth (HVR) vegetation
- clearing 624ha of bioregional corridors including 475ha considered to have state significance and 149ha of regional significance. The EIS states that 50.8% of those corridors had already been cleared and thus been reduced in their connectivity value
- potential vegetation clearing for temporary workers camps.

Clearing would impact on the habitat of 34 endangered, vulnerable and near threatened (EVNT) flora species.

The draft EM Plan provided with the EIS included mitigation measures for flora, however it did not explicitly commit to implementing the recommended mitigation measures to achieve minimum clearing estimates provided.

The EIS did not provide the potential size of areas to be cleared for temporary workers accommodation camps, but considered the possibility of using pre-existing clearings. As temporary workers camps would likely be located outside the relevant PPL, potential clearing impacts would be assessed under SPA.

Other potential impacts include weeds infestation. Then outline of a weed management plan (WMP) provided makes reference to weed control measures and hygiene protocols.

The EIS has generally met terrestrial ecological flora requirements of the TOR, however did not meet that TOR requirement in relation to cumulative impacts and areas to be cleared outside the ROW.

Outstanding matters:

- Conduct further flora surveys as outlined in the EIS, Appendix 4 – Terrestrial flora assessment.
- Commit to utilising pre-existing cleared areas for temporary workers camps in a revised EM Plan.
- As part of a revised EM Plan, commit to recommended mitigation measures to achieve minimum clearing as outlined in the EIS, Appendix 4 – Terrestrial flora assessment:
    - provide a weed management plan
    - provide a species specific management plan (flora and fauna)
    - provide a pest management plan.

4.12.2 Terrestrial ecology – fauna

The EIS identified the following likely impacts to fauna:

- disturbance of mature vegetation and hollow-bearing trees and therefore loss of perching, foraging and nesting resources
- mostly temporary disturbance to fauna movement corridors and dry season fauna refuge, predominantly associated with creeks and dams
- temporarily impediment of fauna movement
- entrapment of fauna in the open pipeline trench
- disturbance of burrowing fauna species during construction
- impact on several EVNT fauna species recorded within or adjacent to the proposed pipeline route including the powerful owl, grey goshawk and the grey snake
- disturbance to potential habitat for EVNT fauna species including the Capricorn yellow chat, powerful owl, grey snake, ornamental snake, brigalow scaly-foot, yakka skink, common death adder, little pied bat and grey-headed flying fox
- disturbance to riparian vegetation and associated wetland ecosystems providing restricted habitat types for a range of least concern fauna species
- fragmentation of remnant vegetation, particularly in association with hills and ranges north of Moranbah.

The following impacts were identified in the EIS but not included, or not included in such detail, in the draft EM Plan:

- removal of hollow-bearing mature trees with regards to nesting birds, microbats and marsupial gliders
- removal of tree species with abundant decorticating bark which is preferred foraging substrate for a variety of woodlands birds and reptiles

- short-term loss of connectivity and fragmentation during construction
- long-term edge effects for structurally complex vegetation such as vine thickets, Brigalow communities and riparian zones
- permanent movement restrictions for some fauna species because of the cleared ROW.

Mitigation measures have been identified in the EM Plan to minimise impacts to fauna, however a species specific management plan (flora and fauna) and a pest management plan were not provided.

The EIS has generally met terrestrial ecological fauna requirements of the TOR, however did not meet TOR requirements for cumulative impacts and areas to be cleared outside the ROW.

Outstanding matters:

As part of a revised EM Plan:

- Include all commitments made in the EIS, including the ones listed in this section, in a revised EM Plan and subordinate management plans.
- Conduct further investigations into essential breeding and feeding ground habitat for the Capricorn yellow chat, a critically endangered species.
- Provide a species specific management plan (flora and fauna).
- Provide a pest management plan.

4.12.3 Aquatic ecology

The EIS stated that the proposed pipeline would traverse major water bodies such as the Fitzroy River as well as numerous ephemeral or perennial water courses and wetlands. The EIS concluded that the main impact from the proposed project would be temporary adverse impacts on aquatic fauna as a result of changes to water quality in streams having permanent flowing water.

Other potential temporary impacts were identified as:

- loss of riparian and aquatic habitat (such as woody snags and aquatic macrophytes)
- disturbance to the breeding activities of the Fitzroy River turtle and other turtles
- potential indirect impacts on downstream riparian and wetland communities (including wetlands listed in the Directory of Important Wetlands in Australia (DIWA) and referable wetlands), e.g. reduced water quality and altered hydrological flows of water courses and wetlands
- erosion and sedimentation from vegetation clearing, trench spoil, trenching activities and the construction of temporary access tracks
- spread of weeds and pest aquatic fauna
- disruption of natural hydrology and associated impacts to fish passage
- disturbance of approximately 37.5ha of wetlands within the SGIC SDA
- clearing of 37.5ha of wetlands if the entire 40m ROW was cleared, including 26.7ha of remnant wetland REs (1.7ha of marine wetlands, 24ha of riverine wetlands and 1.2ha of non-riverine wetlands) and 10.7ha of non-remnant wetlands
- loss of 20ha of wetlands
- loss of 0.1ha of marine vegetation.

The EIS recommended but did not commit to mitigation measures, which, if implemented, would limit impacts to:

- clearing of a maximum of 23ha of REs containing freshwater wetlands
- clearing of a maximum of 11ha of freshwater wetlands containing non-remnant vegetation
- no clearing of REs containing marine vegetation under the *Fisheries Act 1994*.

The EIS included a commitment to conduct further surveys to minimise impacts on referable wetlands. EHP notes that Scrubby Creek at kilometre point NM24.5 is an important hydrological link to the nearby Duck Pond wetland which is a wetland of high ecological significance and appears to be impacted by the proposed pipeline. EHP recommends that any impacts to this wetland be avoided or appropriately mitigated.

The EIS stated that likely fish habitat had been surveyed and would be subject to further surveys. Specific impacts and mitigation measures associated with additional findings would be included in a revised EM Plan and subordinate management plans.

Management strategies for aquatic ecology committed to in the EIS would include the development of:

- an AVMP
- an erosion and sediment control plan
- a weed management plan
- a rehabilitation program.

The TOR requirements for aquatic ecology have not been met in full. However the overall scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied that the residual concerns can be resolved through the implementation of the relevant recommendations, prior to decisions being made about issuing the relevant environmental authority.

Outstanding matters:

- Provide an AVMP, an erosion and sediment control plan, a weed management plan and a rehabilitation program to manage impacts to aquatic flora and fauna as part of a revised EM Plan.
- Commit to mitigation measures identified in the EIS Appendix A4-13 – Aquatic Ecology Assessment and in the SEIS Appendix 6A – Water Crossing Report and include them in an AVMP.
- Commit to seeking alternative crossing locations or methods to avoid impacts to waterholes and wetlands.
- Commit to avoiding any impact on the Duck Pond wetland or, where it can be demonstrated that this not possible, commit to restoring the wetland after infrastructure establishment.
- Conduct further fish habitat surveys and include impacts and mitigation measures in a revised EM Plan.

4.12.4 Offsets

The EIS stated that offsets may be required for the following areas proposed to be cleared:

- 7.4ha of endangered ecological communities under the EPBC Act
- 110ha of REs with ‘of concern’ biodiversity status assigned by EHP
- 24ha of HVR of ‘endangered’ REs and 43.9ha of HVR of ‘of concern’ REs
- 0.4ha of essential habitat
- 33.4ha of freshwater wetlands.

Those are the areas assumed impacted if mitigation measures are applied and effective. Offsets may be required for a greater area if mitigation is not applied or is ineffective.

The EIS did not include any project-specific offsets but outlined an offsets strategy in Appendix F - Environmental Offset Strategy of the EIS and committed to preparing an Offset Management Plan prior to construction. This approach is generally acceptable to EHP. Although TOR requirements for offsets have not been met, this matter can be regulated through suitable EA conditions which prevented any clearing until offsets have been legally secured. Such an approach would be acceptable to EHP.

The TOR requirements for offsets have not been met in full. However the overall scale, nature and duration of the principal impacts of the project on this value are adequately explained in the EIS. EHP is satisfied that the residual concerns can be resolved through the implementation of the relevant recommendations, prior to decisions being made about issuing the relevant environmental authority.

Outstanding matters:

- Offsets to mitigate any impacts on terrestrial and aquatic ecological values will have to be legally secured under applicable State legislation prior to any clearing.
- Provide an offset management plan.

4.13 Cultural heritage

Potential impacts to Indigenous and non-Indigenous cultural heritage may occur during the construction phase as a

result of land clearance, excavations and the construction of temporary access routes, temporary workers accommodation camps or storage areas.

4.13.1 Indigenous cultural heritage

The EIS identified the following registered native title claims:

- Barada Barna (QC08/11, QUD380/08)
- Birri (QC98/12, QUD6244/98)
- Darumbal People (QC97/21, QUD6131/98)
- Darumbal #2 (QC99/1, QUD6001/99)
- Jangga (QC98/10, QG6230/98)
- Port Curtis Coral Coast (QC01/29, QUD6026/01)
- Wiri People Core Country Claim (QC06/14, QUD372/06).

The EIS identified the following unregistered claims:

- Southern Barada & Kabalbara (QC00/4, Q60004/00)
- Wiri #2 (QC98/11, QG6251/98)
- Barada Barna Kabalbara &Yetimarla People (QC01/13, QUD6011/01).

The EIS stated that a preliminary investigation indicated that 345 sites of Indigenous cultural heritage value were located in the project area, but only 75 within 1km of the proposed pipeline route. One quarry, 3 scarred trees and 2 places of stone artefacts were located within a 100m buffer of the proposed pipeline route. The majority of identified Indigenous cultural heritage values were located in the Moranbah area. The EIS stated that consultation with potentially affected Indigenous third parties was ongoing. The EIS committed to:

- conducting field surveys
- ongoing liaison with affected Indigenous parties
- developing CHMPs or suitable native title agreements to protect and manage Indigenous cultural values.

The EIS has generally met the requirements of the TOR for Indigenous cultural heritage.

Outstanding matters:

Determine if CHMPs or native title agreements would be required and implement as necessary.

4.13.2 Non-Indigenous cultural heritage

The EIS stated that a desktop analysis showed that nine places of cultural heritage significance were located in the project area. The closest one was Raglan Homestead (QHR ID:600389), located approximately 160m southwest of the main pipeline. The EIS stated that the Raglan Homestead would not be impacted and committed to conducting field surveys to identify relevant places of historical heritage value, conduct an assessment under the *Queensland Heritage Act 1992* and to prepare management strategies in consultation with EHP. The EIS included a draft historic heritage management plan (HHMP) to manage any impacts to cultural heritage places and archaeological artefacts. No mitigation measures were included, but a commitment was given to develop these as part of a final HHMP. The EIS further committed to implementing procedures to manage any impacts on fossils prior to construction.

The EIS has generally met the requirements of the TOR for non-Indigenous cultural heritage.

Outstanding matters:

- Provide an HHMP to manage any impacts to cultural heritage places and archaeological artefacts.
- Develop procedures to manage any impacts on fossils prior to finalising the EM Plan.

4.14 Social issues

The EIS identified the following community values that may be impacted by the proposed project:

- property
- population
- housing and accommodation
- employment and training
- local business and industry
- transport and access
- community services and social, cultural, sports and recreational infrastructure
- project workforce.

The EIS noted that there would be cumulative impact to all of the above community values as a consequence of the other existing and future projects in the area.

4.14.1 Property

The proposed pipeline easement would traverse 232 lots, including 205 freehold ones. Potential impacts to landholders were identified in the EIS as:

- temporary disruption of land use in the ROW during construction
- temporary disruption to vehicle and cattle movement in the ROW during construction
- access restrictions for landholders during construction and operation
- permanent building restrictions in the operational ROW, i.e. no construction of structures or buildings and no planting of deep-rooting vegetation.

The EIS stated that landholders were concerned about:

- potential spreading of weeds
- number of people accessing properties
- damaged fences and livestock gates left open
- loss of agricultural land.

It further stated that the rural landscape and amenity offered a quiet lifestyle that was likely to be valued by the community. Refer to section 4.11 ‘Noise and vibration’ of this report for further details.

The EIS committed to implementing the following mitigation measures:

- alternative access for vehicles and cattle movement in consultation with landholders
- compensation payments to directly affected landholders in accordance with relevant legislation
- ongoing communication and consultation with landholders during the construction and operational phase to minimises impacts on farming activities
- weed management.

4.14.2 Population

The EIS identified temporary changes to the existing population through the influx of non-resident workers during the construction phase, predominantly male and in their mid-20s to mid-40s. The EIS did not state how many non-resident workers would be employed. The EIS stated that these changes would not directly influence the existing population as the workers would be living in designated workers accommodation camps.

4.14.3 Housing and accommodation

The EIS stated that FIFO, the use of temporary workers accommodation camps and short-term accommodation, i.e. caravan parks or motels for specialised teams required during construction would minimise demand for housing in the local community. The EIS therefore stated that impacts on housing or rental prices in the project area were

not anticipated. The EIS committed to developing an integrated housing strategy to evaluate potential impacts on housing availability and affordability and to consider the provision of workforce housing, affordable housing, social housing and diversity of housing stock.

4.14.4 Employment and training

The EIS stated that 728 persons would be employed over the life of the project, including construction, commissioning, operation and decommissioning. The project would provide employment for engineers, project managers, labourers, plant and machine operators and transport workers. The peak construction workforce would be approximately 693 persons for a 15-month period.

296 jobs would be allocated for plant operators and labourers. The EIS included census data which identified that unemployment in the project area was 3.8% compared to 5.6% in South East Queensland based on data from the June quarter of 2012. The EIS therefore identified South East Queensland as a potential source for recruiting a FIFO workforce. The EIS stated that the majority of employees would consist of FIFO workers and therefore the impact on the local workforce was expected to be minimal. The EIS committed to sourcing skills and offering training opportunities at local level in areas of relatively high unemployment and for marginal groups such as youth and Indigenous people.

4.14.5 Local business and industry

The EIS identified temporary employment opportunities for local and regional businesses through demand for goods and services during construction, including:

- catering/food services
- transportation
- sub-contract construction skills (e.g. electrical, plumbing, fencing)
- accommodation services (motels, caravan parks for specialised work crews).

The EIS concluded that sourcing local workers during the construction phase may exacerbate existing skill shortages at local level as skilled and semi-skilled workers would be unavailable to service the local community, disadvantage local businesses and result in increasing costs of affected services. The EIS committed to preparing a local industry participation plan in compliance with the requirements of the Local Industry Policy Guidelines.

4.14.6 Transport and access

The EIS stated that the predominant rural landscape was generally considered to be conducive to public safety, which could be impacted by increased traffic during construction, including an increased risk to school bus routes. The EIS committed to:

- including mitigation measures in a TMP prior to construction to manage haulage traffic to avoid clashing with school buses on low level gravel roads in rural areas as requested by the Gladstone Regional Council
- consulting with QPS regarding social impacts and to incorporate a fatigue management policy in the TMP as requested by QPS.

Refer to section 4.7 ‘Transport’ for further information on potential transport-related impacts and access matters discussed under ‘Property’ in this section.

4.14.7 Community services and social, cultural, sports and recreational infrastructure

The EIS stated that workers would generally be accommodated in temporary workers accommodation camps, which would minimise the demand for community services and facilities. The EIS identified the potential short term impact on local health services, but committed to implementing policies to mitigate any strains on local health services including a more detailed assessment of medical providers prior to construction. Noise was identified to potentially impact on sports grounds, racecourses, schools and churches within the project area, which might be impacted by noise. Refer to section 4.11 ‘Noise and vibration’ of this report for further details.

Impacts may be expected to the Raglan racecourse reserve. Refer to section 4.6 ‘Land’ for further details.

4.14.8 Project workforce

The EIS stated that FIFO working arrangements may impact on some workers and their families in the following ways:

- isolation from family and friends and existing social and support networks in other areas
- increased stress for workers and their families due to changes to family functioning where employees are away from their permanent homes for extended periods during the roster
- stress related to shift work and commuting potentially impacting on the general health and well-being of affected workers and their families.

The EIS provided a range of mitigation measures to address these impacts.

4.14.9 Cumulative impacts

The EIS acknowledged the following cumulative social impacts associated with resource development in the Bowen Basin:

- increased rental and housing costs
- increased working age population, primarily male causing an imbalance in the population mix
- strained local government and non-government services and recreational facilities
- skills shortages that are driving the increased use of FIFO workforce
- increased wages in the resource sector that cannot be matched by other industries
- strain on local infrastructure such as roads and transport
- consultation fatigue.

The EIS stated that more than 72 current and planned projects, including mines would be operating in the project area. The EIS stated that it was not possible to qualitatively ascertain the contribution of this project to cumulative impacts. Should the construction of current and planned projects in the project area coincide with the construction phase of this project, the cumulative impact on the local economy could result in a lack of skilled workers, drive prices up for supplies, accommodation, health and transport services. The EIS expected any cumulative contributions from this project to social values to be minor and temporary as they would be expected during the 15 month construction phase only. Refer to section 4.7 ‘Transport’ for further information.

The EIS provided a draft Social Impact Assessment and a Social Impact Management Plan to assess and guide the management of social impacts identified in the EIS.

The EIS has generally met the requirements of the TOR for social matters.

4.15 Economy

The EIS stated that the economy in the project area was dominated by mining in the Isaac Regional Council LGA, which would account for 40% of the workforce. Higher population concentrations in the Rockhampton Regional Council LGA accounted for predominant employment in the service sector, with retail trade comprising approximately 12%. Manufacturing would be the largest employing industry in the Gladstone Regional Council LGA accounting for nearly 20% of total employment.

The EIS estimated the project to generate a total of $627 million in personal income for nearly 3000 jobs in Australia. $128 million would be distributed to employment in the project area, and nearly $35 million in personal income. The EIS stated that the project would inject approximately $891 million into the Australian economy and create a total output impact across Australia of approximately up to $2.9 billion. The project would provide cash flow to the Australian Government as Goods and Services Tax, company tax and personal income tax. The Queensland Government would receive cash flow through royalties and payroll tax.

Despite the EIS stating that the pipeline route had been chosen to avoid sterilisation of any of the state’s coal, mineral petroleum and natural gas/coal seam gas resources and other state-significant resources, external submissions indicated that there was the potential for sterilisation of existing coal reserves. The proponent committed to engaging with affected third parties to resolve this matter. Direct impacts would occur to the agricultural sector during construction; however the EIS stated that any affected landowners would be fully compensated at market value for any potential disruption to agricultural activities.

The EIS stated that given the remote location of the project, the continual movement of construction along the path

of the pipeline, and the fact that almost all of the construction based labour would most likely to come from outside the local area (FIFO), a significant proportion of consumption induced output was likely to leak out of the project area into other areas in the wider economy.

The EIS stated that a temporary trade balance deficit may be expected caused by the import of materials during construction and offshore finance for this project.

The EIS has generally met the TOR requirements for economy, although it did not sufficiently address cost to all levels of government of any additional regulatory function or infrastructure provision, economic impacts on local property values and the economic value of existing resources that could be impacted or sterilised by the project.

Outstanding matters:

The proponent will need to engage with affected third parties to prevent any unnecessary sterilisation of existing coal reserves and other resources.

4.16 Health and safety

The EIS stated that a 1km buffer either side of the proposed pipeline route was adopted to identify community health and safety values, including places of human residences, places of work, recreational features and aged care facilities which may be impacted by the construction, commissioning and operational activities along the ROW. Approximately 100 residences were identified in the project area; 2 were located 80–100m from the proposed pipeline.

The EIS concluded that health and safety values would not be impacted outside the 2km buffer zone given the nature of the project.

Other relevant health and safety matters such as the discharge of contaminants such as dust, odour, extreme meteorological events, floods or other catastrophic events have been addressed in previous chapters in this report. From a health and safety perspective, flooding and hazardous climatic events have not been adequately resolved.

The EIS included an indicative inventory of dangerous goods and hazardous substances, which would be used. The EIS identified appropriate mitigation measures and included an initial safety management study regarding the integrity and safety of the pipeline in accordance with AS2885 and committed to undertaking a more comprehensive assessment during the detailed design phase of the project including:

- confirmation of conditions along the route
- investigation of extent of flood areas
- confirmation of presence and extent of sensitive areas
- further investigation of some major external interference threats in order to determine optimum protection measures.

The EIS stated that an environmental, health and safety management system would be maintained throughout the project to provide a framework for continual review and improvement of the management system and management practices to minimise any adverse environmental, health or safety impacts arising from its activities, services or products.

A commitment to developing the following management plans was included in the EIS:

- safety and operating plan
- pipeline safety plan
- risk management plan
- emergency response plan
- line pipe fracture control plan
- pipeline integrity management plan
- dangerous goods management plan.

The EIS stated that these plans would include appropriate measures to manage health and safety risks during construction and operation.

The general health and safety requirements of the TOR have been met.

Outstanding matters:

- Conduct a detailed safety study in accordance with AS2885.
- Finalise a chemical inventory.
- Provide a safety and operating plan, pipeline safety plan, risk management plan, emergency response plan, line pipe fracture control plan, pipeline integrity management plan and a dangerous goods management plan.

4.17 Hazard and risk

The EIS conducted a risk assessment on people and property from the proposed project and stated that all risks identified were low and could be managed through routine procedures. The highest risks were associated with:

- damage to existing utilities such as water pipes, electricity or telecommunication
- damage of existing gas or oil pipelines
- accidental release of liquid, gaseous or particulate pollutants or other hazardous materials
- wildlife hazards
- damage to the pipeline from third parties
- subsidence associated with mining
- damage to the pipeline at road and rail crossings.

The EIS stated that risks associated with the identified hazards would be mitigated by the implementation of appropriate prevention, detection and protection measures to reduce the probability of risks occurring. The EIS included mitigation measures, including:

- adequate separation distance to other nearby utilities
- pipeline design to be in accordance with AS2885.1. to prevent leakage cause by corrosion and to be of an adequate thickness to prevent third party damage
- security fencing, gates and locks around all major above-ground facilities to inhibit accidental damage or unauthorised tampering
- third party liaison with existing mines.

The EIS committed the proponent to further refining and formulating additional mitigation measures, which would be incorporated into management plans for the construction and operations phase.

Legislation, policies and codes that deal with the safety of pipeline construction and operation have been identified in the EIS and a commitment given to comply with them.

Natural risks such as landslides, liquefaction and earthquakes could occur in the project area. Twelve areas of potential slope instability were identified where the proposed pipeline would cross steep slopes. The EIS stated that 23 earthquakes had been recorded in the project area since 1955; only 2 were classed as ‘significant’ with magnitudes of 3.6 and 4.2. Six earthquakes with magnitudes between 0.8 and 2.9 appeared to have occurred near the proposed pipeline route in the Bajool area near Port Alma. The risk of these natural disasters occurring was considered low. The EIS stated that the pipeline would meet certain design criteria that would minimise impacts from natural geohazards.

The EIS committed to undertaking ground truthing and testing during detailed geotechnical investigations to determine the geological risk of locating the proposed pipeline route in areas of faults, landslides, earthquakes and potential instability. The outcome of additional investigations would assist in further risk determination and the selection of appropriate management or mitigation strategies. The EIS committed the proponent to developing the following management plans:

- line pipe fracture control plan as part of a pipeline safety management study to ensure that residual risks would be reduced to a low level
- emergency response plan for on and off site events
- dangerous goods management plan.

The EIS has generally met the TOR requirements for hazard and risk.

Outstanding matters:

- Conduct a pipeline safety management study.
- Conduct geotechnical assessments to determine the risks of natural geohazards.
- Provide detailed mitigation measures to manage hazards and risks.
- Provide a line pipe fracture control plan, an emergency response plan and a dangerous goods management plan.

4.18 Rehabilitation

The EIS stated that rehabilitation would occur in all areas disturbed during construction, including the ROW, access tracks, banks of watercourses and temporary workers accommodation camp sites. The EIS stated that any rehabilitated or decommissioned land for this project would be:

- safe to humans and wildlife
- non-polluting
- stable
- able to sustain agreed land use.

The EIS stated that rehabilitation would include:

- returning land to its previous productivity as best as possible
- restoring fences and gates
- removing construction materials and waste
- surface contouring
- respreading of topsoil
- respreading of mulched vegetation
- re-seeding of native grass/improved pasture species or passive revegetation.

The EIS stated that watercourse rehabilitation would include the following activities:

- returning the bank profile to its original profile as much as possible
- installing stormwater cut-off diversion drains
- stabilising the banks via a rapidly growing grass species, the use of jute mesh matting, hydromulching or tube stock utilising native species
- retention of trees
- installing rock armour to reduce the potential for scour.

The EIS committed the proponent to developing a sediment and erosion control plan to include measures to promote effective rehabilitation of watercourse crossings. A commitment was given that the hydraulic regimes of any watercourse would not be changed following rehabilitation and that rehabilitation would be undertaken in accordance with best practice.

The EIS stated that disturbed habitats would be recreated; however this was not further explained. In addition to watercourse rehabilitation, the following rehabilitation strategies were also proposed in the EIS:

- rehabilitation of the landscape to pre-existing contours
- protection or restoration of natural drainage lines
- respreading of topsoil
- rehabilitation to occur in consultation with affected landholders
- installing erosion controls (e.g. contour banks) in erosion prone areas
- restoration of disturbed habitats.

The EIS committed the proponent to monitoring the rehabilitation success; post-construction audits would be conducted annually for two years to evaluate revegetation, erosion control, weed control, watercourse integrity and

success of bed and bank re-profiling. Areas of high erodibility would be monitored more regularly. Details of rehabilitation monitoring and performance criteria for restoration and rehabilitation were not provided, however a commitment was given to include these in a final rehabilitation program. The EIS included a draft rehabilitation program and committed to developing a final one prior to construction.

The EIS has generally met the TOR requirements for rehabilitation.

Outstanding matters:

- Provide a rehabilitation program and an erosion and sediment control plan as part of a final EM Plan.
- Address the commitment of recreating disturbed habitat and include suitable management controls to achieve this in a revised EM Plan.

4.18.1 Decommissioning

The EIS discussed 3 decommissioning strategies, i.e. pipeline removal, moth-balling or abandonment. Mothballing would include the preservation of the pipeline for future use, i.e. filling with nitrogen or water containing corrosion prohibiting chemicals and maintaining cathodic protection. Abandonment would mean to let the pipe corrode in-situ. The EIS discounted the removal of the pipeline as being the least environmentally friendly and least commercially viable option. According to the EIS, impacts associated with the removal of the pipeline would be equivalent to impacts caused during construction and would include clearing, rehabilitation and disruption of land use practices. This statement was not supported by sufficient evidence. Currently, EHP requires that pipelines must be decommissioned in accordance with Australian Standard (AS) 2885.

The EIS committed the proponent to:

- removal of all above-ground infrastructure for all 3 decommissioning options (in accordance with current best practice)
- rehabilitation of relevant areas to a condition consistent with the surrounding area
- a maintenance and monitoring program should the pipeline remain in-situ
- development of a decommission program towards the end of the project and in accordance with any applicable legislation or best practice current at that time.

The EIS has generally met the TOR requirements for decommissioning.

Outstanding matters:

Include a commitment in the EM Plan to decommission the pipeline in accordance with AS2885.

5 Adequacy of the environmental management plan

The draft EM Plan submitted as part of this EIS is acceptable for the purposes of the EIS process; however it does not meet the content requirements under section 310D of the EP Act. It is a legislative requirement that environmental commitments and protection objectives be included in an EM Plan including management strategies and measurable indicators to ensure that the environmental objectives will be achieved. Any subordinate management plans identified in the EIS for the management of environmental values should form part of a final EM Plan. A significant number of the outstanding matters identified in this report require either further development for inclusion in a revised EM Plan. A revised EM Plan, incorporating the requirements outlined in this report, should be prepared for the purpose of assessment under the EA process pursuant to Chapter 5A of the EP Act.

6 Recommendations about the suitability of the project

The EIS process has compiled information about the proposed project, the values of the site and the potential impacts to those values. A range of mitigation and management measures (including environmental protection commitments) were set out in the EIS and are summarised in this assessment report. One of the principal tools to implement those mitigation measures and environmental commitments is by way of inclusion in a revised EM Plan, which would set out how each matter is to be managed to deliver acceptable environmental outcome. The EIS discussed a number of subordinate management plans that could generally viewed as being components of the final EM Plan. Importantly, a number of specified subordinate management plans were not developed in the EIS, however the EIS committed to completing and implementing them prior to commencement of construction.

This chapter collates the recommendations from the assessment. Refer to the relevant chapter of this report for full detail regarding outstanding actions, which must be addressed prior to decisions being made about statutory approvals for the project:

- Provide an EM Plan in accordance with section 310D of the EP Act.

Climate

- Undertake detailed flood modelling.
- Conduct a detailed safety management study regarding hazardous climatic events.
- Provide an assessment of climate change adaption and appropriate management strategies where appropriate in a revised EM Plan.

Land

- Liaise with the Gladstone Regional Council regarding potential impacts to the Raglan Refuse Station and the specified access road to an existing boat ramp.
- Liaise with the trustees of the Raglan Racecourse Reserve regarding potential impacts to the specified racecourse.
- Provide detailed information as part of an MCU application under the SDPWO Act to the Office of the Coordinator-General including: potential environmental, social and economic impacts for the SGIC including the proposed deviations and a technical engineering report on the feasibility of the proposed pipeline, also taking into account any proposed deviations.
- Conduct an assessment of potentially contaminated land in accordance with EHP's Guideline for contaminated land professionals (October, 2012) for any areas to be disturbed by the project. Include the findings in a revised EM Plan or subordinate management plans.
- Conduct a characterisation of the excavated soil including excavated waste rock including chemical properties and leaching potential.
- Provide a soils management plan, an acid sulfate soil management plan and a contaminated land management procedure.
- Address environmental aspects of DNRM's recommendations on soil management in a revised EM Plan.

Transport

- Provide an analysis to DTMR of the potential impacts on roads in a revised road impact assessment in accordance with the Guidelines of the Assessment of the Road Impacts for the construction and operation of temporary accommodation camps, at intersections with SCRs and on the pavements/structures on SCRs.
- Provide a road-use management plan and a TMP to DTMR.
- Provide an assessment to DTMR of the potential use of rail networks from the Port of Gladstone and Mackay to stockpile sites.
- Liaise with QPS regarding any risks associated with vehicular movement to and from airports.

Waste

- Provide a waste management plan and a hydrostatic test water management plan.

Water sources

- Determine the feasibility of all water sources for potable and non-potable water identified in this EIS including for each an assessment of the consequential impacts in relation to any relevant water resource plans and resource operations plans.
- Undertake a risk analysis of the various water supply options to rank them accordingly and to support the negotiation of water allocations. Evaluate risks such as accessibility, quality, ownership and level of water priority required.
- Undertake a financial analysis of the various water supply options to determine their cost-effectiveness and rank them accordingly.
- Engage SunWater to discuss the availability, capacity and opportunity for negotiated lease of water allocations within its operational infrastructure supplying raw water.
- Engage with the relevant water resource and allocation owners to secure the required water resources.
- Identify for each watercourse/wetland crossing relevant downstream sensitive receptors, information on existing water quality, quantity and a water monitoring program and include these in the EM Plan.
- Confirm suitable crossing methods and timing (wet or dry season) for each watercourse crossing in the AVMP.
- Determine the presence of groundwater for each water crossing through additional investigations.
- Identify all aquifers that may be impacted and determine any connections between surface water and groundwater.
- Determine any groundwater bores and their uses that may be affected by altered hydrology.
- Identify groundwater environmental values including groundwater dependent ecosystems.
- Identify potential impacts and mitigation measures for groundwater quality and include them in a revised EM Plan.
- Provide an erosion and sediment control plan.

Air quality

- Provide an air quality management plan.

Noise and vibration

- Determine the likely locations for blasting and conduct a survey of potential sensitive receptors.
- Commit to implementing suitable mitigation measures so as not to negatively impact on Mount Larcom School and include these in relevant management plans as part of a revised EM Plan.
- Provide a noise and vibration management plan and a blast noise and vibration management plan.

Ecology

- Conduct further flora surveys as outlined in Appendix 4 – Terrestrial flora assessment.
- Commit to utilising pre-existing cleared areas for temporary workers camps in a revised EM Plan.
- Include recommended mitigation measures to achieve minimum clearing as outlined in Appendix 4 – Terrestrial flora assessment in a revised EM Plan.
- Conduct further investigations into essential, breeding and feeding ground habitat for the yellow chat and the Capricorn yellow chat, a critically endangered species.
- Include mitigation measures identified in the EIS Appendix A4-13 – Aquatic Ecology Assessment in an AVMP and in the SEIS Appendix 6A – Water Crossing Report.
- Commit to seeking alternative crossings for waterholes and wetlands.
- Commit to avoiding any impact on the Duck Pond wetland or, where it can be demonstrated that this not possible, commit to restoring the wetland after infrastructure establishment.
- Conduct further fish habitat surveys and include impacts and mitigation measures in a revised EM Plan.
- Offsets to mitigate any impacts on terrestrial and aquatic ecological values have to be legally secured under applicable State legislation prior to any clearing.

- Provide a weed management plan, species specific management plan (flora and fauna), AVMP, pest management plan and an offset management plan.

Cultural heritage

- Determine if CHMPs or native title agreements would be required and implement them if necessary.
- Provide a historical heritage management plan and procedures to manage any impacts on fossils.

Health and safety

- Conduct a detailed safety study in accordance with AS2885.
- Finalise the chemical inventory.
- Conduct a pipeline safety management study.
- Provide a safety management plan, health, safety and environment plan, safety and operating plan, pipeline safety plan and a pipeline integrity management plan.

Hazards and risks

- Conduct geotechnical assessments to determine the risks of natural geohazards.
- Provide detailed mitigation measures to manage hazards and risks.
- Provide a line pipe fracture control plan, an emergency response plan and a dangerous goods management plan, risk management plan and a fire risk management plan.

Rehabilitation

- Provide a rehabilitation program and sediment control plan.
- Address the commitment of recreating disturbed habitat and include suitable management controls to achieve this. Include a commitment in the EM Plan to decommission the pipeline in accordance with AS2885.

7 Conditions for regulatory approvals

7.1 *Environmental Protection Act 1994*

Amongst other requirements, section 59 of the EP Act states that an EIS assessment report must recommend any conditions on which any approval required for the project may be given. However, section 310D of the EP Act states it is the purpose of the submitted EM Plan to propose environmental protection commitments to help the administering authority prepare the draft environmental authority for the application. In this case, the submitted EM Plan is not adequate and will need to be revised before it can be used as the basis to recommend specific conditions for any draft environmental authority.

7.2 Other legislation

DTMR has put forward the following recommendations in relation to this project:

Recommendation 1: Post-assessment report/pre-construction liaison with the Department of Transport and Main Roads

Once the assessment report is finalised for this Arrow Bowen Pipeline Project and if the proponent decides to proceed with the project, the proponent should contact the Manager (Project Planning & Corridor Management) of the DTMR Central Queensland Region (Rockhampton) office, no less than 9 months prior to the commencement of any project construction works, to liaise over:

- the finalisation of the road impact assessment (RIA)
- preparation of the road-use management plan (RMP)
- preparation of any required TMPs
- required approvals of project accesses ('driveways' from project sites) to state-controlled roads under s62 and 33 of the *Transport Infrastructure Act 1994*
- approvals of pipeline crossings via Road Corridor Permits under s50 of the *Transport Infrastructure Act 1994*.

Liaison about assessing and addressing potential impacts of project traffic on the Port Alma–Bajool Road is a top priority.

Recommendation 2: Finalising the road impact assessment

The proponent should complete the following no later than 6 months prior to the commencement of any significant project construction works: Update and finalise the road impact assessment (RIA) based on the proponent's latest project traffic generation projections, to identify and deal with the transport impacts on the safety and efficiency of state-controlled roads in accordance with Guidelines for Assessment of Road Impacts of Development (2006), in consultation with the Manager of DTMR's Central Queensland Region (Rockhampton) office, submit the updated RIA to the Manager of the DTMR Central Queensland Region (Rockhampton) office for review and approval.

Recommendation 3: Preparing the road-use management plan

The proponent should prepare the following, no later than 6 months prior to the commencement of any significant project construction works: a road-use management plan (RMP) for all use of state-controlled roads for each phase of the project, in consultation with the CQ regional office contact and in accordance with DTMR's Guide to Preparing a Road Use Management Plan (available from the CQ Region contact). The RMP must summarise:

- latest traffic generation (vehicle numbers/routes etc.)
- finalised assessment of impacts on safety, efficiency and condition at intersections, on road links and on pavements etc.; updated impact mitigation strategies both 'hard' (infrastructure, such as adequate project access to state-controlled roads) and 'soft' (such as road safety strategies—dealing with worker/driver fatigue), and any other necessary improvements or contributions towards road maintenance and so on.

The RMP must be approved by DTMR prior to its implementation and prior to commencement of the development project construction work.

Recommendation 4: Finalising detailed drawings and a traffic management plan for any required roadworks prior to commencement of project construction

The proponent should:

- prepare detailed drawings for any works required to mitigate impacts of project traffic for review by DTMR and take account of the reviews
- obtain road corridor permit approvals for any accesses (s62 *Transport Infrastructure Act 1994* for access location and s33 for works approval) in state-controlled roads
- prepare a TMP in accordance with DTMR's Guide to Preparing a Traffic Management Plan (available from the CQ Region contact)
- obtain the necessary permits for any excess mass or over-dimensional loads associated with the project as required under the Transport Operations (Road Use Management) Act (Qld) 1995
- consult with DTMR's Transport Services Division, the Queensland Police Service and the Rockhampton Regional Council to ensure these transport movements are safely undertaken, without damaging infrastructure.

Finalised plans, permits and TMP if required must be approved by DTMR three months prior to commencement of project construction traffic. Any required road works must be completed before commencement of project construction traffic, unless otherwise agreed to in writing with DTMR.

Recommendation 5: Completing any required roadworks before commencement of significant project traffic

Any required road works should be completed before commencement of project construction traffic, unless otherwise agreed to in writing with DTMR.

The proponent should implement the TMP during construction and commissioning of the project and during construction of all accesses, road intersection/s and other works to be undertaken within a SCR corridor.

Recommendation 6: Infrastructure agreement

The proponent should enter into an infrastructure agreement with DTMR about: Undertaking or funding any necessary works, for example upgrading any affected intersections, as determined in an approved RIA and agreed upon with the TMR; access to/from state-controlled roads, such as project accommodation facilities and material stockpile locations; and maintenance contributions associated with project traffic as calculated using the Fitzroy region calculation methodology and agreed upon with DTMR Central Queensland (Rockhampton) office.

The infrastructure agreement between the proponent and DTMR should be concluded prior to commencement of any significant construction works on the project site.

Suitability of the project

EHP has considered the submitted EIS, all submissions and the standard criteria. This EIS is for a 580km long gas transmission pipeline for which information has been provided to quantify the location, width and depth of disturbance and generally about the environment and values within the disturbed areas. Management practices have been provided or committed to that indicate the environmental outcome objectives and specific management actions that will be implemented during the project. Despite the TOR not being fully addressed the project is assessed as being suitable to proceed, provided that the recommendations in this assessment report are fully implemented. As part of any subsequent environmental authority applications, a revised EM Plan should be submitted to EHP that addresses the outstanding environmental matters identified in this report. In considering any application for an environmental authority for this project, suitable conditions should be developed that reflect the project specific environmental protection commitments set out in the EIS and summarised in this EIS assessment report.

8.1 Approved by

Signature	Date
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