SUPPLEMENTARY COMMUNITY CONSULTATION REPORT

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SUPPLEMENTARY REPORT TO THE EIS

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Supplementary Consultation Report
Arrow Bowen Gas Project

November 2013

jta Australia

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GLOSSARY OF TERMS AND ABBREVIATIONS

TERM	MEANING
Arrow	Arrow Energy Pty Ltd
BGP	Bowen Gas Project
CIS	Community information session
CSG	coal seam gas
DIDO	drive in drive out
EHP	Queensland Department of Environment and Heritage Protection
EIS	Environmental Impact Statement
FIFO	fly in fly out
JTA	JTA Australia
LNG	liquefied natural gas
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities

Executive Summary

This supplementary consultation report describes the consultation activities that have occurred subsequent to the completion of the consultation report for the Bowen Gas Project (BGP) Environmental Impact Statement (EIS) in 2012.

Since the consultation report was prepared for the EIS, Arrow Energy Pty Ltd (Arrow) has continued to consult and engage with the community and relevant stakeholders. The third phase of consultation began in January 2013 and continued until April 2013 and included the public display of the EIS.

Following the submission of the EIS to the Queensland Department of Environment and Heritage Protection (EHP), the public exhibition period for the EIS extended from 11 March 2013 to 23 April 2013. The exhibition period was designed to give the public the opportunity to officially comment on the EIS, including the project's potential environmental effects and/or the effectiveness of measures proposed to manage impacts. The EIS was accessible through multiple avenues. An electronic version was available through the Arrow website and hard copies were available for inspection in Arrow's Moranbah Community Information Centre, selected libraries and Government offices. The availability of the EIS was advertised through local newspapers and written notices were given to all interested and affected parties.

Key community-wide activities undertaken by Arrow included a series of community information and drop-in sessions held during the EIS exhibition period in March 2013. The community information sessions were held in Moranbah, Middlemount and Blackwater from 18 to 20 March 2013 respectively. These sessions included a presentation, a question and answer segment and the opportunity to speak one-on-one with project staff. The drop-in sessions were held in Glenden and Dysart on 18 and 19 March 2013 respectively. These sessions were designed to give stakeholders the opportunity to speak one-on-one with representatives from the project team in an informal environment.

Promotion of the sessions occurred through various means, including invitations via letters and emails, newspaper and radio advertisements, posters placed in strategic locations and information on Arrow's website. The issues raised at the sessions related to legislative and regulatory requirements for coal seam gas (CSG) operations, EIS process and approval, water, brine and salt management, health impacts, drilling and operations, impacts on infrastructure, landholder/stakeholder relations, impacts on health and emergency services, and Arrow corporate issues. Information materials were displayed at both the drop-in and community information sessions, including free copies of DVDs containing the EIS and a hard copy of the EIS. In total, more than 57 people attended these sessions. A small number of people who attended did not register, so are not included in the attendance figures.

Subsequent to the consultation for the public display of the EIS, Arrow has continued to engage with stakeholders regarding the BGP through project stakeholder meetings and information activities about Arrow's Brighter Futures program. Arrow has also continued to provide numerous avenues for people to be able to obtain information, ask questions or provide feedback through its freecall 1800 number, project email address and Community Information Centre in Moranbah. Upcoming consultation planned includes continued meetings with stakeholders.

1.0 Introduction

Arrow proposes to develop a combined CSG to liquefied natural gas (LNG) project, including two upstream fields in the Bowen and Surat basins as well as an LNG facility on Curtis Island off the Central Queensland coast near Gladstone. This report provides information on consultation activities that were undertaken in the Bowen Basin, as part of the BGP, which is a component of the larger Arrow LNG Project.

Community consultation and stakeholder engagement have been integral to the EIS process undertaken to assess the impacts of the BGP. A Consultation Report was prepared as part of the EIS and provided detailed information on the consultation and engagement activities undertaken during the first two phases of the consultation process established for the project.

This supplementary consultation report describes the consultation activities and outcomes that have occurred subsequent to the completion of the consultation report for the EIS. This period covers the third phase of the consultation process which includes the public exhibition of the EIS. Information is also included on consultation activities undertaken by Arrow since the third phase of consultation, including future planned consultation activities.

2.0 Phase 3 Consultation – January to April 2013

2.1 Introduction

Phase 3 consultation activities commenced in January 2013 and continued through to April 2013. This phase included the public exhibition period for the BGP EIS.

A range of activities were undertaken to provide information to the community about the results of the EIS, including drop-in sessions and community information sessions.

2.2 Notice of Public Exhibition of Bowen Gas Project Environmental Impact Statement

Following the submission of the EIS to the EHP, the public exhibition period for the BGP EIS extended from 11 March 2013 to 23 April 2013. The exhibition period provided the public with the opportunity to formally comment on the EIS, including the project's potential environmental effects and/or the effectiveness of measures proposed to manage impacts.

The community was able to view the EIS by:

- viewing it online at www.arrowenergy.com.au
    - via a web-based version of the EIS
    - pdf download version
- telephoning 1800 038 856 (freecall) or emailing bowengas@arrowenergy.com.au for a DVD (free copy) or to purchase a printed copy
- viewing a printed copy at:
    - Department of Environment and Heritage Protection (Level 3, 400 George St, Brisbane)
    - Department of Sustainability, Environment, Water, Population and Communities Central Library (Ground Floor, John Gorton Building, King Edward Tce, Parkes, Canberra)
    - Department of Environment and Heritage Protection (22-30 Wood St, Mackay)
    - Department of Environment and Heritage Protection (99 Hospital Rd, Emerald)
    - Arrow Energy Community Information Centre (15 Town Square Ave, Moranbah)
    - Bowen Customer Service Centre (7 Herbert St, Bowen)
    - Collinsville Customer Service Centre (Cnr Stanley and Conway Sts, Collinsville)
    - Proserpine Customer Service Centre (83-85 Main St, Proserpine)
    - Blackwater Library (Wey St, Blackwater)
    - Duaringa Library (Elizabeth St, Duaringa)
    - Middlemount Library (Middlemount Shopping Mall, Middlemount)
    - Bluff Library (6 Church St, Bluff)
    - Dysart Library (Council Premises, Shannon Cres, Dysart)
    - Moranbah Library (Grosvenor Complex, Batchelor Pde, Town Square, Moranbah)
    - Clermont Library (Cnr Karmoo and Herschel Sts, Clermont)
    - Emerald Library (44 Borilla St, Emerald)
    - Nebo Library (10 Reynolds St, Nebo)
    - Glenden Library (Town Centre, Ewan Drive, Glenden).

To assist in promoting the availability of the EIS, an advertisement was placed in local newspapers at the commencement of the official public exhibition period. Table 1 below shows the newspapers in which the public notice was published and the dates they appeared. A copy of the public notice can be found in Appendix A.

Table 1: Public notice publication details

Newspaper	Publication date
Blackwater Herald	Tuesday 5 March 2013
Moranbah & District Advertiser	Wednesday 6 March 2013
Miners Midweek	Wednesday 6 March 2013
Central Queensland News	Wednesday 6 March 2013
Daily Mercury	Saturday 9 March 2013
The Weekend Australian	Saturday 9 March 2013
Courier Mail	Saturday 9 March 2013

In addition to the advertisement, Arrow sent out 1,763 letters to stakeholders who had been identified by Arrow as having an interest in or were potentially affected by the project under sections 38 and 41 of the *Environmental Protection Act 1994* (Qld). This included landholders, elected representatives, government officials, native title groups, tenement holders and community groups. The letter provided details regarding the period the EIS would be on public exhibition, where stakeholders could view the EIS, how they could obtain a copy of the EIS and where they could send any written comments. The letter also provided details about the community information sessions and drop-in sessions being held as part of the public exhibition of the EIS. A copy of the letter can be found in Appendix A.

2.3 Consultation program

2.3.1 Regulator consultation activities

During the public exhibition period of the EIS, Arrow engaged with various state-based regulators, both in group based and one-on-one sessions, in Brisbane, Mackay and Rockhampton. The basis of these sessions was to provide a general project overview with specific focus on areas relating to the group or individuals areas of expertise, followed by a question and answer session. Attendees at these sessions included representatives from EHP, regional councils, Department of Agriculture Fisheries and Forestry, Department of Natural Resources and Minerals, Department of Transport and Main Roads, and the Department of Education Training and Employment.

2.3.2 Community wide consultation activities

Key community-wide consultation activities undertaken during phase 3 included a series of community information sessions and drop-in sessions held during the EIS exhibition period. Three community information sessions were held in Moranbah, Middlemount and Blackwater from 18 to 20 March 2013 respectively and two drop-in sessions were held in Glenden and Dysart on 18-19 March 2013 respectively.

Consultation activities were supported by a communication and awareness program to ensure interested community members and stakeholders were aware of the consultation program and received information about the public display of the EIS.

2.3.3 Promotional activities

Further to the Public Notice letters sent to interested and affected parties, which included an invitation to the community information sessions, an additional 992 invitation letters (Appendix A) were sent on 6 March 2013 to stakeholders listed on Arrow's stakeholder management database. These stakeholders included people who were invited and/or had attended a session during the first two phases of consultation and additional stakeholders who had been added to the database since phase 2. Full details of the community information sessions were provided. Invitations were also sent by email on 7 March 2013 to approximately 283 stakeholders listed on the database.

To publicise the community information sessions, advertisements were also placed in local newspapers over the preceding month. Table 2 below shows the newspapers in which the public notice was published and the dates they appeared. Copies of the advertisement are contained in Appendix A.

Table 2: Community information session publication details

Newspaper	Publication date
Blackwater Herald	Tuesday 5 March 2013
Moranbah & District Advertiser	Wednesday 6 March 2013
Miners Midweek	Wednesday 6 March 2013
Central Queensland News	Friday 8 March 2013
Daily Mercury	Saturday 9 March 2013

Posters were again placed in prominent locations throughout the BGP area. These posters outlined venues, dates and times of the community information sessions. They also included details of how the community could contact the project team through the 1800 freecall service, project email address, reply paid postal address and website.

Radio advertisements were also played on 4RFM Moranbah Community Radio. The advertisements were 60 seconds in length and were played on 10 occasions between11 to 17 March 2013.

2.3.4 Communication management

JTA Australia continued to manage the 1800 freecall service (1800 038 856) and an email information address (bowengas@arrowenergy.com.au) as well as a reply paid postal service. The Arrow stakeholder management database was used to record, manage and track enquiries and action items for the project team. The database played an important role by recording details of individuals and groups with specific interests, influences or triggers that could be impacted by the BGP and those who required additional attention. Actions arising from consultation events were issued via email to the relevant Arrow employee, in order to provide a response to the issue.

2.3.5 Information on the EIS

Copies of the BGP EIS were made available at the community information sessions and drop-in sessions. Members of the public were able to review a hardcopy of the EIS at the session or alternatively printed copies of the Executive Summary which included a DVD containing the entire EIS, were also available to take away. In addition, a documents outlining the key findings of the BGP EIS and information on how to read and respond to the EIS were also made available.

2.3.6 Printed information materials

Information sheets about the BGP and Arrow's activities were available for people to take as they wished. The fact sheets included the following:

- *Arrow Energy*
- *Working at Arrow Energy*
- *Arrow in the Bowen Basin*
- *Arrow Bowen Pipeline*
- *Working with Landholders*
- *Fraccing*
- *Drilling Fluids*
- *Arrow Environmental Policy*
- *BTEX*
- *Salt Management*
- *Understanding Groundwater*
- *Arrow in the Community (Brighter Futures)*
- *Brighter Futures 2012 Report*
- *Contracts and Procurement*
- *Complaints Management*

Fact sheets produced by the Queensland Government on CSG were also available at the community information sessions for people to take.

2.3.7 Banners

For the third phase of consultation, a range of banners were used that were either specific to the BGP EIS or more generally about CSG or Arrow. The banners used included:

- *Arrow EIS Process*
- *Coal Seam Gas Process*
- *Managing Groundwater Impacts*
- *EIS Groundwater Studies*
- *Brighter Futures*
- *Arrow Energy*

2.3.8 Community Information sessions

The consultation sessions undertaken between 18 and 20 March 2013 were open to anyone to attend. The table below shows the number of registered attendees at each of the community information sessions.

Table 3: Phase 3 Community information sessions

Town	Date	Time	Location	Registered Attendees*
Moranbah	Monday 18 March 2013	5.00pm-8.00pm	Moranbah Community Centre	19
Middlemount	Tuesday 19 March 2013	5.00pm-8.00pm	Middlemount Community Hall	9
Blackwater	Wednesday 20 March 2013	5.00pm-8.00pm	Blackwater Civic Centre	21
TOTAL				**49**

**Note that the figures for those attending include only people who registered; at all sessions there are a number of people who do not register.*

The approach for this round of consultation activities was to continue the process adopted in previous rounds where information sessions were open to the whole community. In each location the venue was organised to separate the formal (presentation, question and answer session) and informal elements (one-on-one discussions and display). The presentation, question and answer sessions were set up theatre style and the staffed informal displays were set up near banners placed around the room. A variety of supplementary materials were also made available including the relevant Arrow and government information sheets. Detailed maps showing the BGP development area were also on display as was a copy of the EIS.

Similar to the arrangement used in the first two phases, the community information sessions started with an informal one-on-one session. Following was a formal presentation which gave an overview of the EIS results and a question and answer session. In all locations the question and answer sessions were allowed to continue until the community had no more questions. Appendix A contains a summary of the questions and answers from all sessions in Phase 3.

The formal presentation (Appendix A) made at the community information sessions provided an introduction to Arrow and its operations, an explanation of CSG and LNG, a summary of the overall Arrow LNG project, a summary of Arrow's domestic operations, an outline of Arrow's approach to safety, land access and the role and location of the Moranbah Community Information Centre. The presentation also included information about the purpose of the EIS, the EIS process, assessment of impacts, environmental framework, key environmental impacts of the BGP including groundwater, amenities (noise, air quality), socio-economic impacts and co-development with mining, how to make a submission on the EIS, local content and supplier guidelines and information about the Brighter Futures program.

2.3.9 Drop-in sessions

As part of the consultation activities organised during the BGP EIS public exhibition period, drop-in sessions were held in Glenden and Dysart on 18 and 19 March 2013 respectively. These sessions were designed to give stakeholders the opportunity to speak one-on-one with representatives from Arrow. Sessions ran from 11am-1.30pm in Glenden and 11am-1.30pm in Dysart.

Attendance at these sessions was rather modest with eight attendees in total (see Table 4), however those who did attend expressed the view that they provided a valuable opportunity to ask questions without time constraints being imposed and in an informal setting.

Table 4: Phase 3 Drop-in sessions

Location	Date 2013	Venue	Time	Attendees
Round 1				
Glenden	18 March	Glenden Recreation Centre	11am-1.30pm	2
Dysart	19 March	Dysart Recreation Centre	11am-1.30pm	6
Total				**8**

2.3.10 Key community and stakeholder issues and concerns

Key issues raised across consultation activities are summarised below.

Location	Issues raised
Moranbah	• impact on aquifers including zonal isolation and the use of cement • casing of wells and potential for gas leaks into water supply • health impacts of CSG • increase in traffic volume, impacts on roads and impact on safety • impact on health and emergency services and their ability to cater for the increase in population • tracking population growth including FIFO and DIDO workers to mitigate impacts • EIS process and approval
Glenden	• impacts on the police services, housing and accommodation • worker's camp arrangements (wet or dry camps) • operational enquiries including flaring and fire management plans
Middlemount	• acquisition of easements and Arrow's relations with landholders
Dysart	• local contractor opportunities • project timeframes • staffing requirements • location of infrastructure • road impacts • social impacts - current issues of concern within Dysart include drug and alcohol abuse, domestic violence and other anti-social behaviour • Brighter Futures enquiries • landholder negotiation process • impact of FIFO/DIDO on population statistics and the census and the flow on effects including under-resourcing of police force

Location	Issues raised
Blackwater	• responsibility for rehabilitation of sites and groundwater • issues experienced by CSG and shale gas industries in the USA • difference between QLD and NSW regulations and impacts on the projects • salt and brine management • desalination and beneficial uses of water • recovery of groundwater system post CSG drilling • impact on coal mining and Authorities to Prospect • future of the Bow Energy power station and associated pipeline licence • likelihood of the project going ahead • likelihood of drilling in Blackwater township • water trading process

2.3.11 Summary of information sessions for the EIS

A total of 49 people registered at the community information sessions, with 8 people attending the drop-in sessions. This compares with 77 people who attended consultation activities in Phase 1 and 55 who attended in Phase 2. Note there were also a number of people who did not register at the sessions.

Table 5: Comparison of attendance at Phase 1 to Phase 3 community information and drop-in sessions

Location	Phase 1 (Jun 2012)	Phase 2 (Oct 2012)	Phase 3 (Mar 2013)
Moranbah	22	15	19
Middlemount	11	11	9
Blackwater	34	23	21
Glenden	3	2	2
Dysart	7	4	6
Total	**77**	**55**	**57**

Over the course of consultation activities, there primarily appeared to be acceptance of the BGP, as long as it is managed and monitored appropriately. However concerns were raised about water and salt management, workforce and worker accommodation, impacts on local infrastructure and emergency services, social impacts and benefits, impacts on properties and the rights of property owners, well construction and operation, environmental impacts, overlapping tenure and compatibility with mining and the route of the Arrow Bowen Pipeline.

3.0 Phase 4 Consultation – May to December 2013 (ongoing)

3.1 Stakeholder and community consultation

Following on from the third phase of consultation, Arrow continued to engage with stakeholders about the BGP via meetings, briefings and through the freecall number, project email and reply paid postal services.

3.1.1 Stakeholder meetings and information activities

Between May and December 2013, Arrow held stakeholder meetings with various parties. Arrow held two meetings with the Isaac Regional Council on 17 July 2013 and 29 August 2013, the latter meeting being to discuss the Council's submission on the EIS.

Meetings were also held with the EHP on 25 July 2013 and 9 October 2013 and with the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) on 26 July and 17 October to provide updates on the BGP.

Arrow also had regular contact with the majority of the coal mining companies with which it shares overlapping tenure with. Many of the meetings were held on a monthly basis but Arrow met with some of the larger coal companies more frequently to assist with planning for co-development purposes.

In addition, Arrow also conducted two Local Supplier Briefings on 30 July 2013 in Mackay and 1 August 2013 in Moranbah which attracted 200 attendees representing the local business community. The sessions provided attendees with information on Arrow's commitment to local content, advice on how businesses could register their interest in the BGP and key health, safety, environment and capability development programs that would support capability development.

Arrow has also undertaken the following activities as part of the Brighter Futures promotional strategy which has provided community members with opportunities for access to information about Arrow. These activities have included a display table and participation in the Moranbah, Dysart and Middlemount market days, a Brighter Futures presentation to five key stakeholders at the Middlemount Community School and Brighter Futures stakeholder meetings/presentations to:

- Middlemount C&K Kindergarten
- Middlemount Local Ambulance
- Blackwater North Primary School
- Blackwater State High School
- Blackwater PCYC
- Community Development Officer & Youth Worker, Central Highlands Regional Council.

3.1.2 Communication management

JTA Australia continued to manage the 1800 freecall service (1800 038 856) and the project email address (bowengas@arrowenergy.com.au) as well as a reply paid postal service until July 2013. These communication activities were then transferred to staff of the Community and Sustainable Development team at Arrow.

3.2 Upcoming consultation

Arrow is committed to ongoing engagement with stakeholders and the community throughout the EIS process and beyond.

On 7 November 2013, Arrow will be holding an information session in Moranbah for existing contractors to provide further information about Arrow's requirements and an additional workshop session for local suppliers interested in participating in Arrow's supply chain. Ongoing meetings are also being held with EHP and SEWPaC.

4.0 Conclusion

Through this consultation program, Arrow has continued to ensure that the local communities and other key project stakeholders are kept informed about the BGP and its progress, as well as providing avenues for stakeholders to be able to access further information about the BGP and provide input.

Multiple consultation avenues were utilised in an effort to ensure all interested stakeholders had access to the project team and to the EIS while it was on display. These activities included community information sessions and drop-in sessions which were promoted through a diverse range of communication techniques to expose the widest audience to the intended activities in the region and the findings of the EIS. Access to the EIS was also provided online through the Arrow website, via DVD and through displays in Arrow's Moranbah Community Information Centre, libraries and government offices. Arrow staff were regularly available at the Community Information Centre to assist with enquiries about the EIS or other topics of interest to community members.

Arrow will continue to build and maintain relationships with stakeholders as the BGP progresses, including through its community relations and project staff and its Brighter Futures community investment program.

Through Arrow’s various consultation avenues, the company will continue to seek to address the key concerns of community members and stakeholders.

Appendix A

Public Notice

PUBLIC NOTICE

ENVIRONMENTAL PROTECTION ACT 1994 - Sections 51 and 52

PUBLIC NOTICE OF AN ENVIRONMENTAL IMPACT STATEMENT (EIS)

BOWEN GAS PROJECT

Arrow Energy Pty Ltd (Arrow) proposes to develop coal seam gas (CSG) resources in an area of approximately 8000km2 that extends from approximately 30 km north of Glenden to 10 km south of Blackwater. The Bowen Gas Project is part of the Arrow CSG to liquefied natural gas (LNG) project within Queensland involving a number of other separate but related projects, including the Arrow Bowen Pipeline, Surat Gas Project, Arrow Surat Pipeline, and Arrow LNG Plant on Curtis Island, which are subject to separate environmental assessment processes.

The gas field has been defined as two regions: the northern CSG fields encompassing ATPA 742, ATPA749, ATP1103, part of ATP759, and ATP 1031 running south from Glenden to Middlemount, located mainly within the Isaac Regional Council area with a small section in the Whitsunday Regional Council area; and the southern CSG fields encompassing ATP1025, located near Blackwater, mainly within the Central Highlands Regional Council area, with a small section located within the southern region of the Isaac Regional Council area.

Development of the gas fields would generally involve production wells, gas and water gathering pipelines and access tracks, central gas processing, power generation, water treatment facilities and associated water storage (feed water, treated water, oily water and brine concentrate), with export of the gas through the Arrow Bowen Pipeline.

Up to 6,625 wells are proposed in staged production over the project life of approximately 40 years with each well operating for 15 to 20 years.

Environmental Protection Act 1994 (Queensland)

On 24 April 2012, the proponent applied under sections 70 & 71 of the Environmental Protection Act 1994 (EP Act) for approval to voluntarily prepare an EIS. Under section 72 of the EP Act, the Department of Environment and Heritage Protection approved the application on 2 May 2012.

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

On 18 May 2012, the Department of Sustainability, Environment, Water, Population and Communities determined the proposed project to be a controlled action under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The controlling provisions as stated in decision notice 2012/6377 are sections 18 and 18A (listed threatened species and communities) and 20 and 20A (listed migratory species). The potential impacts of the project on the controlling provisions will be assessed under the bilateral agreement using the EIS prepared under the EP Act.

A copy of the EIS can be inspected at:

Brisbane Department of Environment and Heritage Protection Floor 3, 400 George Street Brisbane, QLD 4000	**Canberra** Department of Sustainability, Environment, Water, Population and Communities Central Library Ground Floor John Gorton Building King Edward Terrace PARKES ACT 2600	**Mackay** Department of Environment and Heritage Protection 22-30 Wood Street Mackay, QLD 4740
Blackwater Blackwater Library Wey Street Blackwater, QLD 4717	**Duaringa** Duaringa Library Elizabeth Street Duaringa, QLD 4712	**Middlemount** Middlemount Library Middlemount Shopping Mall Middlemount, QLD 4746
Bluff Bluff Library 6 Church Street Bluff, QLD 4702	**Dysart** Dysart Library Council Premises Shannon Crescent Dysart, QLD 4745	**Moranbah** Moranbah Library Grosvenor Complex Batchelor Parade, Town Square Moranbah, QLD 4744
Bowen Bowen Customer Service Centre 7 Herbert Street Bowen, QLD 4805	**Emerald** Department of Environment and Heritage Protection 99 Hospital Road Emerald, QLD 4720	**Moranbah** Arrow Energy Community Information Centre 15 Town Square Avenue Moranbah, QLD 4744
Clermont Clermont Library Cnr Karmoo and Herschel Streets Clermont, QLD 4721	**Emerald** Emerald Library 44 Borilla Street Emerald, QLD 4720	**Nebo** Nebo Library 10 Reynolds Street Nebo, QLD 4742
Collinsville Collinsville Customer Service Centre Cnr. Stanley and Conway Streets Collinsville, QLD 4804	**Glenden** Glenden Library Town Centre Ewan Drive, Glenden, QLD 4743	**Proserpine** Proserpine Customer Service Centre 3-85 Main Street Proserpine, QLD 4800

The EIS can also be viewed online at www.arrowenergy.com.au.
DVD copies can also be ordered by phoning 1800 038 856 or emailing bowengas@arrowenergy.com.au

Written submissions on the EIS are invited from any person during the submission period, which starts on **11 March 2013** and ends on **23 April 2013**. Submissions should be mailed to:

The Chief Executive
Department of Environment and Heritage Protection
Attention: The EIS Coordinator (Bowen Gas Project)
GPO Box 2454
Level 9, 400 George Street
Brisbane Qld 4001
or by email to eis@ehp.qld.gov.au

A properly made submission is one that:

- is written
- is signed by or for each person ("signatory") who made the submission
- states the name and address of each signatory
- is made to the chief executive
- is received on or before the last day of the submission period.

Please note that it is a statutory requirement that all submissions will be forwarded to the proponent so that they may consider them and provide a response to the Department of Environment and Heritage Protection.

For further information regarding the EIS process for this proposal, contact the EIS Coordinator on 13QGOV (13 74 68) or email eis@ehp.qld.gov.au

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Public notice letter to interested/affected parties

1 March 2013

«Name1»
«Company_Name»
«Address_1»
«Address_2»
«City» «Postcode»

Dear Sir/Madam

RE: BOWEN GAS PROJECT EIS

The State Department of Environment and Heritage Protection (EHP) has approved the release of Arrow Energy's voluntary Bowen Gas Project Environmental Impact Statement (EIS). The Bowen Gas Project is Arrow's proposed expansion of its coal seam gas (CSG) operations in the Bowen Basin, a part of the Arrow CSG to liquefied natural gas (LNG) project (Arrow LNG) within Queensland.

The EIS will be on public exhibition between 11 March and 23 April 2013. You will be able to view the full Bowen Gas Project EIS on our website (www.arrowenergy.com.au) from 11 March 2013.

Please find attached the Environmental Impact Statement (EIS) notice for the Bowen Gas Project EIS, as required under the *Environmental Protection Act 1994*. The attached EIS notice contains details regarding where you can view the EIS, how to obtain a copy of it and where you can send any written comments. Arrow Energy will also publish this notice in *The Courier-Mail* and selected local papers from Saturday 9 March 2013.

You have been sent this notice because you have been identified as an *Interested or Affected Person* in regard to the project under sections 38 and 41 of the *Environmental Protection Act 1994*. Arrow Energy has identified that you hold an interest in the Bowen Gas Project (BGP) development area, as outlined in the attached map.

During the exhibition period we will be providing opportunities for members of the community to meet with technical experts and Arrow representatives, to better understand the detail of the EIS and to have their questions answered.

Community Information Sessions:

We will be holding a series of EIS information sessions in Moranbah, Middlemount and Blackwater from 18 to 20 March 2013. The sessions will provide a guide to understanding the EIS, how community members can respond to it, and will also provide information on key areas of interest to the community. There will be question and answer sessions following the presentations and each session will end with an opportunity to speak one-on-one with members of the project team.

Drop in sessions:

We will also be holding drop-in sessions in Glenden on 18 March 2013 and Dysart on 19 March 2013 to assist the community to better understand the EIS document. The drop-in sessions are opportunities to meet with technical experts in an informal setting to discuss the EIS and have your questions answered. There are no formal presentations at these sessions, so you can drop-in between 11am and 1.30pm and have a one-on-one discussion about the EIS topics that interests you.

T +61 7 3012 4000 ARROW ENERGY PTY LTD LEVEL 19, AM-60, 42-60 ALBERT STREET GPO BOX 5262 BRISBANE QLD 4001 info@arrowenergy.com.au
F +61 7 3012 4001 ABN 73 078 521 936 BRISBANE QLD 4000 arrowenergy.com.au

Details of the EIS information sessions and drop-in sessions can be found on the attached sheet and are open to the whole community.

If you wish to attend the EIS information sessions, we would greatly appreciate an RSVP to assist with catering. To RSVP or for further information, please contact the project team via email bowengas@arrowenergy.com.au or you can phone free-call 1800 038 856.

If you have any queries regarding the EIS process, please contact the EIS Coordinator at the Department of Environment and Heritage Protection (EHP) by emailing eis@ehp.qld.gov.au or phoning 13 QGOV (13 74 68). Alternatively you can access information regarding the EIS process online through the EHP website http://www.ehp.qld.gov.au/management/impact-assessment/eis-processes/current.html

Please feel free to pass this information on to anyone who may be interested.

Regards

Leisa Elder
Vice President – Community and Sustainable Development

PUBLIC NOTICE

ENVIRONMENTAL PROTECTION ACT 1994 - Sections 51 and 52

PUBLIC NOTICE OF AN ENVIRONMENTAL IMPACT STATEMENT (EIS)

BOWEN GAS PROJECT

Arrow Energy Pty Ltd (Arrow) proposes to develop coal seam gas (CSG) resources in an area of approximately 8000km2 that extends from approximately 30 km north of Glenden to 10 km south of Blackwater. The Bowen Gas Project is part of the Arrow CSG to liquefied natural gas (LNG) project within Queensland involving a number of other separate but related projects, including the Arrow Bowen Pipeline, Surat Gas Project, Arrow Surat Pipeline, and Arrow LNG Plant on Curtis Island, which are subject to separate environmental assessment processes.

The gas field has been defined as two regions: the northern CSG fields encompassing ATPA 742, ATPA749, ATP1103, part of ATP759, and ATP 1031 running south from Glenden to Middlemount, located mainly within the Isaac Regional Council area with a small section in the Whitsunday Regional Council area; and the southern CSG fields encompassing ATP1025, located near Blackwater, mainly within the Central Highlands Regional Council area, with a small section located within the southern region of the Isaac Regional Council area.

Development of the gas fields would generally involve production wells, gas and water gathering pipelines and access tracks, central gas processing, power generation, water treatment facilities and associated water storage (feed water, treated water, oily water and brine concentrate), with export of the gas through the Arrow Bowen Pipeline.

Up to 6,625 wells are proposed in staged production over the project life of approximately 40 years with each well operating for 15 to 20 years.

Environmental Protection Act 1994 (Queensland)

On 24 April 2012, the proponent applied under sections 70 & 71 of the Environmental Protection Act 1994 (EP Act) for approval to voluntarily prepare an EIS. Under section 72 of the EP Act, the Department of Environment and Heritage Protection approved the application on 2 May 2012.

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

On 18 May 2012, the Department of Sustainability, Environment, Water, Population and Communities determined the proposed project to be a controlled action under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The controlling provisions as stated in decision notice 2012/6377 are sections 18 and 18A (listed threatened species and communities) and 20 and 20A (listed migratory species). The potential impacts of the project on the controlling provisions will be assessed under the bilateral agreement using the EIS prepared under the EP Act.

A copy of the EIS can be inspected at:

Brisbane Department of Environment and Heritage Protection Floor 3, 400 George Street Brisbane, QLD 4000	**Canberra** Department of Sustainability, Environment, Water, Population and Communities Central Library Ground Floor John Gorton Building King Edward Terrace PARKES ACT 2600	**Mackay** Department of Environment and Heritage Protection 22-30 Wood Street Mackay, QLD 4740
Blackwater Blackwater Library Wey Street Blackwater, QLD 4717	**Duaringa** Duaringa Library Elizabeth Street Duaringa, QLD 4712	**Middlemount** Middlemount Library Middlemount Shopping Mall Middlemount, QLD 4746
Bluff Bluff Library 6 Church Street Bluff, QLD 4702	**Dysart** Dysart Library Council Premises Shannon Crescent Dysart, QLD 4745	**Moranbah** Moranbah Library Grosvenor Complex Batchelor Parade, Town Square Moranbah, QLD 4744
Bowen Bowen Customer Service Centre 7 Herbert Street Bowen, QLD 4805	**Emerald** Department of Environment and Heritage Protection 99 Hospital Road Emerald, QLD 4720	**Moranbah** Arrow Energy Community Information Centre 15 Town Square Avenue Moranbah, QLD 4744
Clermont Clermont Library Cnr Karmoo and Herschel Streets Clermont, QLD 4721	**Emerald** Emerald Library 44 Borilla Street Emerald, QLD 4720	**Nebo** Nebo Library 10 Reynolds Street Nebo, QLD 4742
Collinsville Collinsville Customer Service Centre Cnr. Stanley and Conway Streets Collinsville, QLD 4804	**Glenden** Glenden Library Town Centre Ewan Drive, Glenden, QLD 4743	**Proserpine** Proserpine Customer Service Centre 3-85 Main Street Proserpine, QLD 4800

The EIS can also be viewed online at www.arrowenergy.com.au.
DVD copies can also be ordered by phoning 1800 038 856 or emailing bowengas@arrowenergy.com.au

Written submissions on the EIS are invited from any person during the submission period, which starts on **11 March 2013** and ends on **23 April 2013**. Submissions should be mailed to:

The Chief Executive
Department of Environment and Heritage Protection
Attention: The EIS Coordinator (Bowen Gas Project)
GPO Box 2454
Level 9, 400 George Street
Brisbane Qld 4001
or by email to eis@ehp.qld.gov.au

A properly made submission is one that:

- is written
- is signed by or for each person ("signatory") who made the submission
- states the name and address of each signatory
- is made to the chief executive
- is received on or before the last day of the submission period.

Please note that it is a statutory requirement that all submissions will be forwarded to the proponent so that they may consider them and provide a response to the Department of Environment and Heritage Protection.

For further information regarding the EIS process for this proposal, contact the EIS Coordinator on 13QGOV (13 74 68) or email eis@ehp.qld.gov.au

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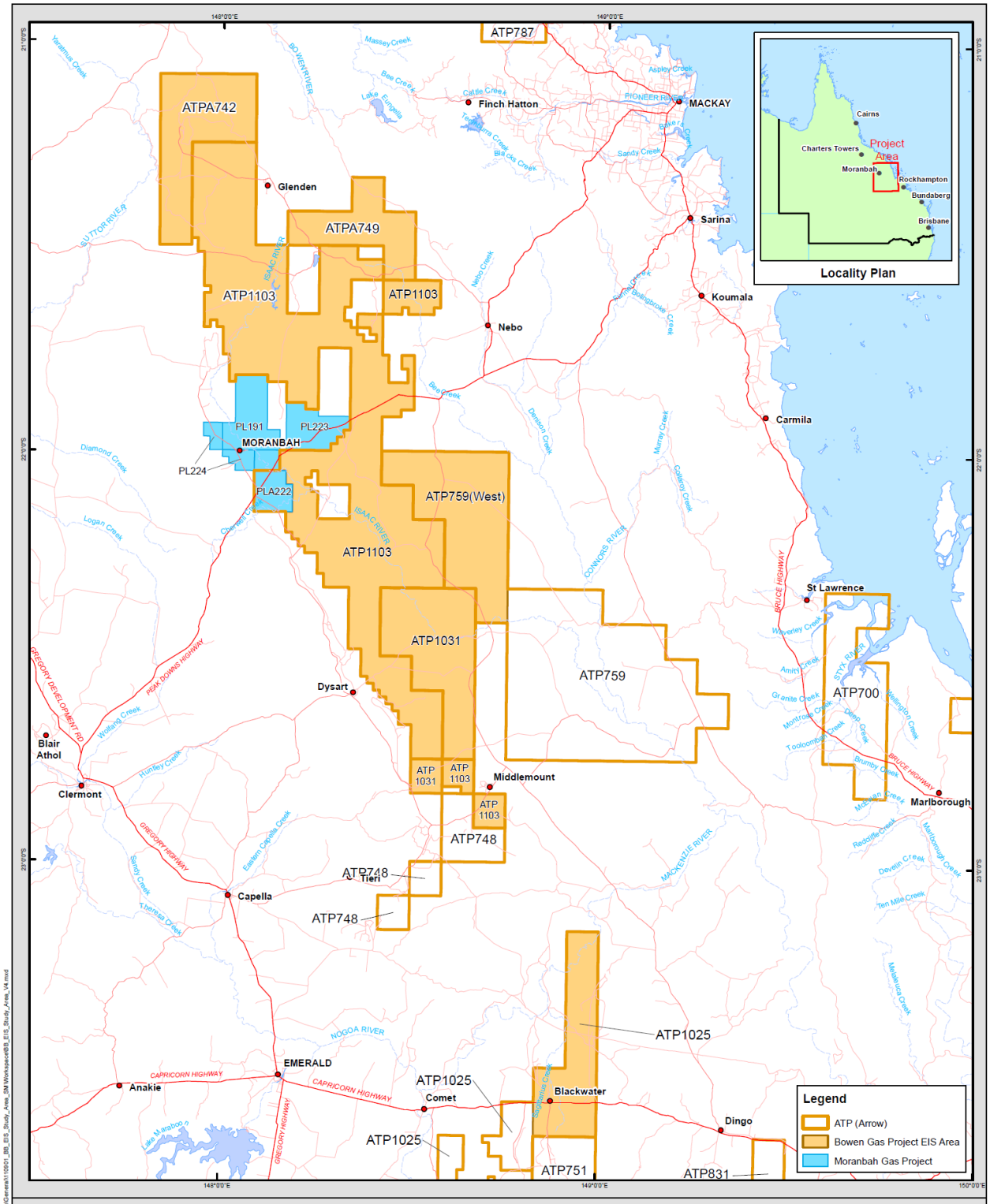
ARROW ENERGY - BOWEN GAS PROJECT



Bowen Gas Project Area

Source: Arrow Energy Pty Ltd
Geosciences Australia
Dept. Envir. and Resource Mgmt.

Date: 11/05/2012
Issued To: Matthew Cosgrove
Author: sallison

0 20 40
Kilometres
Scale: 1:940,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

N

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NOT FOR CONSTRUCTION

Phase 3 Sample invitation letter

1 March 2013

«Title» «First_Name» «Last_Name»
«Role»
«Organisation»
«Address»
«Address_2»
«Suburb» «State» «Postcode»

Dear Sir/Madam

An opportunity to talk with you about the Bowen Gas Project EIS

The State Department of Environment and Heritage Protection (EHP) has approved the release of Arrow Energy's voluntary Bowen Gas Project Environmental Impact Statement (EIS). The Bowen Gas Project is Arrow's proposed expansion of its coal seam gas (CSG) operations in the Bowen Basin, a part of the Arrow CSG to liquefied natural gas (LNG) project (Arrow LNG) within Queensland.

The EIS will be on public exhibition between 11 March and 23 April 2013. You will be able to view the full Bowen Gas Project EIS on our website (www.arrowenergy.com.au) from 11 March 2013.

During the exhibition period we will be providing opportunities for members of the community to meet with technical experts and Arrow representatives, to better understand the details of the EIS and to have their questions answered.

Community Information Sessions:

We will be holding a series of EIS information sessions in Moranbah, Middlemount and Blackwater from 18 to 20 March 2013. The sessions will provide a guide to understanding the EIS, how community members can respond to it, and will also provide information on key areas of interest to the community. There will be question and answer sessions following the presentations and each session will end with an opportunity to speak one-on-one with members of the project team.

Drop in sessions:

We will also be holding drop-in sessions in Glenden on 18 March 2013 and Dysart on 19 March 2013 to assist the community to better understand the EIS document. The drop-in sessions are opportunities to meet with technical experts in an informal setting to discuss the EIS and have your questions answered. There are no formal presentations at these sessions, so you can drop-in between 11am and 1.30pm and have a one-on-one discussion about the EIS topics that interest you.

All of the sessions are open to the whole community and details can be found overleaf.

If you wish to attend the EIS information sessions, we would greatly appreciate an RSVP to assist with catering. To RSVP or for further information about the Bowen Gas Project (BGP), please contact the project team by emailing bowengas@arrowenergy.com.au or by phoning free-call 1800 038 856.

If you require more information about the EIS process, please contact the EIS Coordinator at the Department of Environment and Heritage Protection (EHP) by emailing eis@ehp.qld.gov.au or by phoning 13 QGOV (13 74 68).

Alternatively you can access information regarding the EIS process online through the EHP website:
http://www.ehp.qld.gov.au/management/impact-assessment/eis-processes/current.html

I do hope you will be able to attend one of the sessions. Please feel free to pass this information on to anyone who may be interested.

Regards

Leisa Elder
Vice President, Community and Sustainable Development

Bowen Gas Project
Environmental Impact Statement - Information Sessions
March 2013

Location	Date	Time	Venue
Moranbah	Monday 18 March 2013	5.00pm-8.00pm *Presentation commences at 5.30pm*	Moranbah Community Centre Town Square Avenue, Moranbah
Middlemount	Tuesday 19 March 2013	5.00pm-8.00pm *Presentation commences at 5.30pm*	Middlemount Community Hall 27 James Randall Drive, Middlemount
Blackwater	Wednesday 20 March 2013	5.00pm-8.00pm *Presentation commences at 5.30pm*	Blackwater Civic Centre 20 Blain Street, Blackwater

Bowen Gas Project
Environmental Impact Statement - Drop-in Sessions
March 2013

Location	Date	Time	Venue
Glenden	Monday 18 March 2013	11am – 1.30pm	Glenden Recreation Centre Ewan Drive, Glenden
Dysart	Tuesday 19 March 2013	11am – 1.30pm	Dysart Recreation Centre Queen Elizabeth Road, Dysart

Phase 3 Advertisement

Community Information Sessions

Find out more about Arrow Bowen Gas Project EIS ›

Arrow Energy is planning to expand its existing domestic coal seam gas (CSG) activities in the Bowen Basin as part of a major CSG to liquefied natural gas (LNG) project. As part of our commitment to ongoing community engagement, Arrow will be hosting community information sessions around the release of our Bowen Gas Project (BGP) Environmental Impact Statement (EIS). In addition, attendees will have the opportunity to hear from Arrow's hydrogeologists about groundwater.

Community information sessions and informal drop-in sessions will be held around the Bowen region in March. Technical experts will be available to answer your questions.

Community information sessions

These sessions include formal presentations from technical experts, followed by question time.

Location	Date	Time	Venue
Moranbah	Mon 18 Mar	5pm to 8pm (presentation at 5.30pm)	Moranbah Community Centre, Town Square Avenue, Moranbah
Middlemount	Tues 19 Mar	5pm to 8pm (presentation at 5.30pm)	Middlemount Community Hall, 27 James Randall Dr, Middlemount
Blackwater	Wed 20 Mar	5pm to 8pm (presentation at 5.30pm)	Blackwater Civic Centre, 20 Blain St, Blackwater

Informal drop-in sessions

These are informal sessions where Arrow technical experts will answer your specific questions.

Location	Date	Time	Venue
Glenden	Mon 18 Mar	11am to 1.30pm	Glenden Recreation Centre, Ewan Dr, Glenden
Dysart	Tue 19 Mar	11am to 1.30pm	Dysart Recreation Centre, Queen Elizabeth Dr, Dysart

To RSVP your attendance or find out more, contact the project team at:

Freecall 1800 038 856
Post Arrow Energy, Reply Paid 81 Hamilton Q 4007
Email bowengas@arrowenergy.com.au
Also visit www.arrowenergy.com.au

Find out more online at
www.**arrowenergy**.com.au
BRISBANE DALBY MORANBAH GLADSTONE

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Phase 3 Summary of Question and Answer session

Bowen Gas Project

Community information sessions 18-20 March 2013

Introduction

Arrow is seeking to develop opportunities for the supply of gas to new export markets, including a proposed liquefied natural gas (LNG) development at Curtis Island near Gladstone. As part of this work, Arrow is undertaking an environmental impact statement (EIS) covering the area of its proposed Bowen Gas Project which extends from Glenden in the north, to Blackwater in the south.

In March 2013, Arrow held a series of community information sessions in the Bowen Basin to introduce the community to its Bowen Gas Project. The information sessions were held from 18 to 20 March 2013 at:

- Moranbah - 18 March 2013
- Middlemount - 19 March 2013
- Blackwater - 20 March 2013.

Questions and answers were captured by JTA Australia and are presented in this document. As the questions varied across the three sessions, these notes summarise all of the discussions to ensure that valuable information is shared throughout the communities.

How to read these notes

Questions and comments from the audience are in bold type. The unbolded responses are from Arrow staff.

In some cases, responses have been summarised. At other times, additional information has been included to provide further context or explanation. This information is italicised, following the answer.

If you have any further questions or comments about the project, the meeting notes, or if you would like detailed maps of the exploration areas, please contact the project team:

Freecall: 1800 038 856

Email: bowengas@arrowenergy.com.au

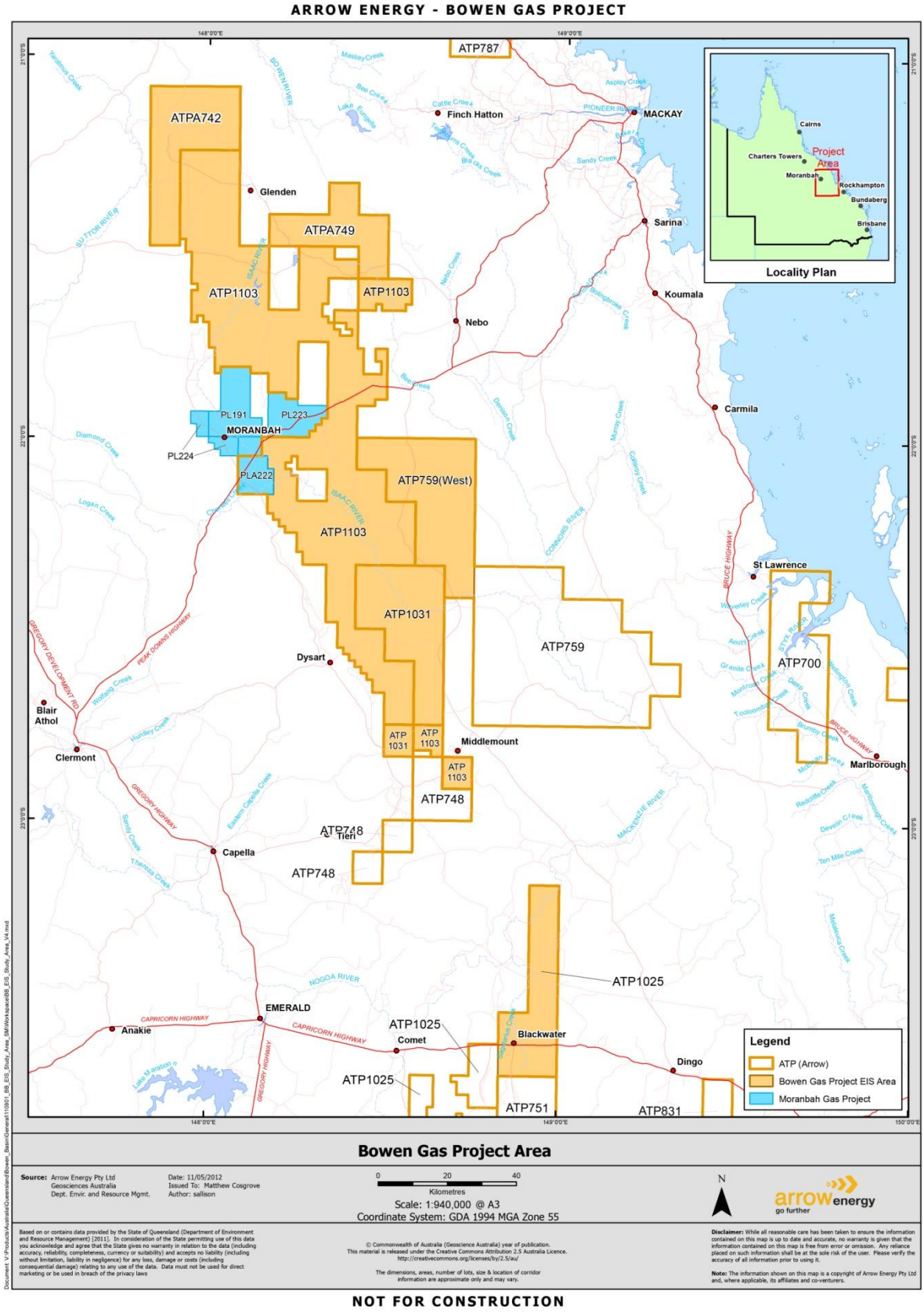
Post: Reply Paid 81 Hamilton QLD 4007

Glossary

ATP	Authority to Prospect
CSG	coal seam gas
DIDO	drive in/drive out
DTMR	Department of Transport and Main Roads
EA	environmental authority
EHP	Department of Environment and Heritage Protection
EIS	environmental impact statement
EPA	Environmental Protection Agency
FIFO	fly in/fly out
IVMS	In-vehicle monitoring system
LNG	liquefied natural gas
PL	petroleum lease

Conversions

1 megalitre (ML) = 1,000,000 litres



Bowen Gas Project EIS Study Area

Moranbah

Date:	18 March 2013	
Venue:	Moranbah Community Centre	
Presenters:	Carey Bradford, Exploration Manager and Authority to Prospect (ATP) Compliance Manager	Arrow Energy
	Fergal Convery, Project Manager Bowen Gas Project EIS	Arrow Energy
	Kavita Prasad, Groundwater Modeller	Arrow Energy
Facilitator:	Jan Taylor, Principal	JTA Australia

1. **You're running through a salty aquifer, a good quality water aquifer, a brackish aquifer; what guarantee is there that when you've drilled through them they're not going to mix together? How do you stop one aquifer mixing with another?**

   There are a number of things that we do. Initially when we're drilling, we use what we call drilling muds or drilling fluids. These act a bit like Gladwrap on the side of the hole. They're biodegradable, generally cellulose-based compounds that actually stop fluid loss to the formation. It's in our best interest not to lose fluid within the hole, and initially we do that using drilling muds. When we drill through the formations we use a set of telescoping casing runs.

   In the top section of the well where we might have sand and gravel, we drill down to the base of the sand, gravel and loose unconsolidated material. We put in what we call a conductor, which is a piece of steel pipe that has cement pumped through the middle of it and up the outside. That cement provides the integrity between the borehole wall and the steel casing. Those cements are specially designed slurries to stop them shrinking, making sure that they retain their integrity. The steel casing gives it tensile strength so it stops any sort of pushing and shoving while we're drilling.

   Once we drill through another set of aquifers, we put in more steel casing and cement using the same method. If the well is designed and executed correctly we believe that effective zonal isolation can be achieved, but it's getting it right with the design of the casing and cementing that is important.

2. **I can understand that when you're going through an alluvium situation, but if you're drilling through rock, you must have a gap coming up the outside of the wall casing. You're not putting cement out there?**

   We have what we call a float shoe or float collar inside the casing. It is basically a restrictor and would be in the bottom, either in the last joint or at the bottom of the casing. On top we install a cement head with a plug. We pump our cement into the inside of the casing, then pump water behind the plug and force the plug down to the bottom of the casing which pushes the cement up the side. Then we can seal the whole system to stop it from U-tubing back inside the casing and let it set. That's how we get the cement from the bottom all the way up the outside of the casing. We pump more cement than we need so we see the cement

return to the surface. When we see it return to the surface in a clean and uncontaminated state, we know it has returned and will seal off all those aquifers.

3. Can you tell us what the life of the cement is going to be?

There is no oxygen in the underground environment so rust isn't a problem. One problem that can occur is bacteria and other bugs. We sterilise the well with a compound to ensure that those bugs aren't present, and then when we're finished, when the well has gone through its lifespan, we fill it to the top with cement. We believe that cement lasts a long time in that environment.

4. I'm concerned about what I saw in the *GasLand* movie about the Environmental Protection Agency (EPA) and the United States (US) Government saying there was no problem at all but these people were lighting fires from the gas in their bathroom taps. The EPA and the US Government didn't want to know anything about it. What sort of guarantees have we got that this can't occur in Australia?

In the Surat Basin in particular where some of the water in the coal seams is quite potable, there are instances dating back 100 years where gas has been coming out of water bores, particularly when the water bores are within the Walloon Coal Measures. Those bores are working exactly the same way as our gas wells are working; they're removing some of the water which is allowing the gas to flow into the well. Also, if there are bacteria present in shallow aquifers, they can break down compounds that are present, particularly carbon compounds, within the aquifer itself.

Within a shallow aquifer that might have been an old stream bed or floodplain, there would be an amount of organic content and these bugs are actually eating that and turning it into gas, called biogenic gas, much like the bugs are turning the coal into gas. One of the ways coal seam gas forms is that if you heat it and crush it up enough, it will naturally form gas. The other way that it forms gas is that bacteria live in the coal seams and they convert the coal seam to gas so you get the same thing. In the US in that area where that particular well was being lit, there were reports going back to the 1700s that troublesome methane had been found.

You would therefore need to look at all the reasons why this may occur. One of the main reasons why you would find it is biogenic gas. There is the possibility that you do have problems with gas travelling up the annulus of the well, but this is where it's important to have a robust regulatory system with monitoring and maintenance involved so you can avoid this happening. If you monitor the well and see that there are issues with the gas, you can take out the casing and reinstall it. We think that with the framework we've got, it is very robust. We do have monitoring programs in place to cover off those things, but it is all about getting it right when you build the well. You've got to design and construct the well properly.

5. Is there anything that we need to be concerned about with general health as a result of coal seam gas?

Occasionally you see things like hydrogen sulphide involved, but if we did see those impurities they're not the sort of thing we want to extract either, so we would abandon those wells. And that is quite rare. Generally you'd only find it around intrusions or things like that.

The groundwater we talk about is like any other groundwater that you see. The water that we extract from coal seams is no different to other groundwater. The gas that comes out is generally 98% methane or better. We don't see a lot of higher hydrocarbons or anything like that so there's very limited scope for there to be health issues.

6. I haven't seen the whole document, but I've flicked through it and my main concern is what's not in the document. I'm concerned about the roads and the impact that this will have on the Peak Downs Highway, the Suttor Development Road and the Beef Road in Middlemount. I can't see that there's great room here for over-sized loads. Eton Range had two crashes on it only yesterday. One was a wide load that collected a truck which couldn't get off the road. I'm just wondering if there's anything like that being considered because it's not only your staff, it's all the tradies and all the ancillaries that go with them.

With the workforce coming, both fly-in fly-out (FIFO) and drive-in drive-out (DIDO), statistically the government doesn't see them as a bum on a seat, for want of a better way of putting it. We're still in the Nebo area and we've got no-one at Coppabella; there's one policeman, one ambulance, it's hard to get State Emergency Services (SES) people and firemen and all the rest of it. Has there ever been any consideration of these factors because I couldn't see it in here?

The road and traffic study that we have developed is based on a modelled scenario. That scenario looks at the construction period and looks at the worst case, which would be constructing maybe three of our major facilities at any one time in the same general area, for example, all in an area that is north of Moranbah. The scenario has a construction period of up to 40 years and it would also have quite a large ramp-up stage of typically five years.

What we'd be looking at employing in terms of workforce for construction is an initial peak of about 1,500 people. To give you an indication, after this initial peak the construction workforce over that 40 year lifespan, and this relates to traffic as well, generally wouldn't go over about 700 people. Over that 40 year life, it's a steady, stable construction, apart from the peak in the first three or four years to get the momentum going for the volume of gas needed.

Likewise with our operations workforce, it's a steady incline up to about 600 personnel starting from around 200. That gives you an indication of the type of traffic volumes, but not everybody is on the one location or one zone; we work in an extensive area. The results of the road and traffic study showed our project would have a negligible impact except for one road on which the impacts were considered low impact. That low impact is on the Suttor Development Road, and that's before we actually put any management measures in place.

Arrow also currently has in place a significant safety culture and that culture is highly focused on traffic and transport. We have what we call an In-Vehicle Monitoring System (IVMS). It's basically 'Big Brother' in the car with you. It is also used by our contractors and it monitors where we are at any time. It also monitors driver behaviour so that if they're speeding, they will be pulled up by their manager. Likewise if a contractor is speeding or misbehaving on the roads, then we know about it and reprimand them appropriately.

7. **But it's the non-Arrow people that are attached just generally to the area, and they'll all use the Peak Downs Highway. I'm sure everyone here knows about the Peak Downs Highway.**

With our IVMS, we can start to see trends with how much traffic we generate. That information then goes to the local council and to the Department of Main Roads (DTMR). There are also a lot of other impact assessment studies done in the interim between now and when we start. There'll be a road use management plan established before we commence construction and start rolling trucks in with equipment. That will outline the conditions that government has given us. It will also include the voluntary things that we're doing such as introducing turning lanes or initiatives and limiting movements on a school bus route near a facility at specific times to avoid any school bus runs. Another similar initiative we have introduced in Dalby is that staff travelling from Brisbane to Dalby, about 20 staff each day for site visits or other work, are not allowed to travel in private vehicles or in hire cars. They actually catch an Arrow bus service.

8. **The infrastructure is not coping now with the existing traffic. We have a road safety campaign at Nebo every year in September, and when we started five years ago we had 2,000 vehicles. It's in excess of 6,000 now. And Main Roads' planning is five years behind so I hope you're aware of that in your planning and take it into account.**

We are directed by the conditions that governments serve on us. It may for example say, 'based on your road use you've got to contribute a certain amount to DTMR or to your local council on specific roads', so there could be conditions similar to that. Likewise, we talk to groups such as the Road Accident Action Group, groups who check up on us to see what initiatives we have introduced to keep the roads safe between here and Mackay and elsewhere.

In addition to working with the Queensland Government and road safety interest groups, Arrow is also working with local councils in its area of operations to mitigate any potential impact to local road infrastructure.

9. **It's not only this project, there are a lot of other people, other mines and projects as well, so it compounds.**

One of the requirements of an environmental impact statement is to look at the cumulative impacts. Road use and traffic numbers are modelled on that basis. For example, for our pipeline project, which is a separate EIS, we look at what information came out of that; we look at who is opening up a mine in the next 10 to 20 years in the area, and feed that into the traffic model to then generate a series of impact results.

10. **Yes, but we're always having trouble with fuel trucks on the road. We have written three or four times to government to see if we can put more freight on trains because the roads just can't stand up to it.**

    We want to minimise the movement of people, goods and deliveries. We are looking at a depot-type setup at our major facilities and those major facilities are going to be away from urban areas.

    At the moment a fuel truck leaves town about every five minutes on the average, so that's a lot of fuel and a lot of trucks on the Peak Downs Highway, plus the wide loads. I know the Queensland Police Service is gearing up for a lot of added over-dimensional wide loads.

11. **I was wondering whether Arrow Energy had given any consideration to tying in with state and federal governments to distribute census forms to its employees on remote sites, making sure they're completed accurately and then collecting the forms so we can get the reporting correct at that level? Secondly, can Arrow tie in with the Bowen Basin/Galilee Basin population report that the Office of Economic and Statistical Research does that's currently based on bed numbers or an accommodation audit so we've got an annual population projection that goes to the Queensland Government. With the correct numbers we can actually begin mitigation on the ground.**

    That is something I'd really have to take back on notice, but it sounds logical. I think last time around we did a little bit when the last census came out, but I think it's something we could look at doing with the current workforce we have on our existing operations.

    Arrow is committed to engaging with the Office of the Coordinator General, State Government agencies and proponents to identify co-operative strategies that address cumulative housing impacts. Arrow facilitates the collection of population data across its operations and will continue to support and provide data to the Office of Economic and Statistical Research.

12. **What are some of the mitigation strategies around the more localised roads? I know that you mentioned the impacts were quite low or somewhat negligible, but I was wondering whether the local road rating system had been taken into consideration within that context? One or two vehicles per day may seem negligible, but for a property or local road that may only be graded once every four years, it actually has quite a significant impact.**

    That's covered through our assumption that when we turn off a major road onto a side road, for example to a facility that may be five kilometres or 10 kilometres further down a dirt road, we need to reinforce that road. We may need to surface it for the long-term or, dependent on the size of the facility, if it was one of our key depots and compressor stations or mainline compressor stations, then chances are it would need a very durable road to take that traffic. If it's a smaller facility, it may be that we retain it as a gravel road, but maintain accordingly. Also, as we get closer to the junction, we'd make sure there are adequate turning lanes and signage to make sure it's safe as well as keeping up the maintenance to any changes that we make.

13. Has Arrow considered, as an example of a mitigation measure, entering into road maintenance agreements to assist local government's road responsibilities for things that aren't necessarily covered by the State Government or included in any part of the royalties program? For example, if the road usage jumped from one category to another, local government would need to be able to cater for the additional cost involved in maintaining that road to a set standard. Local government doesn't necessarily get any additional rate revenue to be able to cover the cost of that additional service, but still has to maintain that standard for our local residents for liveability purposes.

Arrow's road use management plan will be developed pre-construction and will be based on the conditions set out in the EIS. The principles and the philosophies are there in the EIS at the moment; it is open communication with DTMR and the councils, and then we take it from there and develop a management plan that fits around all of those things that you mentioned.

In addition to working with the Queensland Government, Arrow is also working with local councils in its area of operations to mitigate any potential impact to local road infrastructure.

14. Did Arrow Energy run all the environmental impact assessment itself or has it been done by an independent company? Are the results of the EIS approved by government?

We use an independent consultant. It's a global consultant called URS which specialises in environmental work approvals and specifically the preparation of environmental impact statements. URS would conduct typically at least half of the studies internally and then it has got specific specialist sub-consultants to do the remaining studies.

Government undertakes its approvals via a two-stage process. At a high level it looks at the EIS prior to it going on public exhibition. Over the last few months, through the Department of Environment and Heritage Protection (EHP), the Queensland Government has conducted an adequacy review. The Federal Government has done something similar through the Department of Sustainability, Environment, Water, Population and Communities, the agency assessing the EIS; it can give it a tick in the box or ask for more information to ensure Arrow is meeting the terms of reference. Once it is at a level where EHP is happy for it to go on public exhibition, it invites a lot of government agencies such as the Queensland Police Service and the Department of Natural Resources and Mines to make a submission into EHP. That way EHP knows relevant agencies have reviewed the EIS, considered it and had an opportunity to make a submission to ask either for more information or clarification.

15. Does the EIS or the social impact management plan account for the increased numbers of DIDO and FIFO people living in camp and their effects on both emergency services and the hospital and doctors' surgeries?

Yes, the EIS does address that in much the same way as traffic i.e. the principles and suggested ways of managing and mitigating the impacts are included. There is a level of detail there that I can't speak to right now because it's quite a large document. But mitigation and management plans are outlined there to address those impacts. It's recognised especially

with emergency services and police that early notification to help planning is something that was flagged with us a long time ago.

Middlemount

Date:	19 March 2013	
Venue:	Middlemount Community Hall	
Presenters:	Carey Bradford, Exploration and ATP Compliance Manager	Arrow Energy
	Fergal Convery, Project Manager Bowen Gas Project EIS	Arrow Energy
	Kavita Prasad, Groundwater Modeller	Arrow Energy
Facilitator:	Jan Taylor, Principal	JTA Australia

1. **Arrow has not responded to the two drafts of the legal document we have prepared with our legal team regarding acquisition of easement. We gave an inch and let Arrow come through and do its first study, and one of your reps came down and wanted us to sign the agreement there and then. I told him I would go to our legal team to have it checked. We did a draft and sent it to your legal team and we haven't heard anything back since. We have had no acknowledgement from Arrow that they have received anything from us. My solicitor sent off a second draft after checking with me whether I had received any confirmation and I still haven't heard anything. It's been about eight months now. Arrow did say it will pay the legal team within reason, but I've had to pay my legal team in the interim because they were asking questions. Can you help me with this?**

   We will follow that up for you and find out what is happening. If your legal team has sent that back to our legal team, they would be considering it. There are about 250 landholders that we're dealing with along the pipeline route. I'll find out what is happening with it and ask him to give you a call.

   Discussions regarding these matters are ensuing.

Blackwater

Date:	20 March 2013	
Venue:	Blackwater Civic Centre	
Presenters:	Carey Bradford, Exploration and ATP Compliance Manager	Arrow Energy
	Fergal Convery, Project Manager Bowen Gas Project EIS	Arrow Energy
	Kavita Prasad, Groundwater Modeller	Arrow Energy
Facilitator:	Jan Taylor, Principal	JTA Australia

1. **Do you pay insurance to the Queensland Government if it all goes pear-shaped like what happened at Mount Morgan and things can't be rehabilitated? What happens if the groundwater is contaminated and it can't be used for anything? Who cleans it up?**

   There are two mechanisms that come into play. We have our environmental financial assurance where we put up a bond and that would be used to pay for any damage that we didn't clean up. Secondly, there are the 'make good' arrangements for groundwater. If we impact the volume or quality of a landholder's water supply within certain thresholds, we are required to make good. We're required to make good until those elements are fixed and that can go on indefinitely. We're not a fly-by-night operator or a junior company floated on the Australian share market; we are owned by two of the world's largest companies with very, very large financial resources to be able to mitigate those issues.

2. **There seem to be some horror stories coming out of the US where they have been doing this extraction for years, but are only now recognising the impacts.**

   Firstly, just be careful where you get information from. Not all information on the internet has been vetted. We review what comes through the right channels. In Australia we've been fraccing for 50 years out in the Cooper Basin. We haven't seen those kinds of issues. I'm only aware of one case in the US where it's been proven within reasonable doubt that there have been serious interactions between the shale gas industry and groundwater. That's at Pavillion in Wyoming, which has some very unique geological characteristics and where the guys are extracting gas from the same aquifers as where people are extracting water.

   In Australia, we have a very robust regulatory regime; it's one of the tightest in the world, so this industry is strictly regulated. We have a code of practice for constructing and abandoning coal seam gas wells based on the way we construct our wells. But for us it's business as usual. We don't make money by going out and drilling wells that aren't productive and don't do what they're supposed to do, which is produce gas over their lifetime. If we ever did put in a well that ended up being leaky, we would need to remediate that. It's in our best interests to construct these wells in the best way possible and not to have these issues happen. By designing and constructing the well properly in the first place, having engineers design the cements and slurries that go into the well, and using the steel casing, we believe that the potential for impact on groundwater is very minimal.

3. With Metgasco closing down its gas operations in New South Wales (NSW), is there any likelihood of that happening here, or are there any implications for Queensland?

The word out of Metgasco is that it's concerned about the changing regulatory environment in New South Wales which has been playing catch-up to some extent with coal seam gas. In Queensland, the industry's quite a bit more mature and our standards are already very high. All companies look at their projects, particularly projects that have a long lifespan. Big companies want the stability to develop these large projects. They want to comply with the legislation and work within it, but when it changes they need to have a look at how it affects them. Metgasco seems to be saying that it doesn't have the confidence to invest because the NSW regulatory framework is changing without consultation.

If that was happening in any industry, whether it's the coal industry or the coal seam gas industry, where there are regulatory changes without any consultation from government, then you would be somewhat wary about investing tens of billions of dollars. In Queensland, we're in a better position because industry and the legislation have matured together, and I don't see those sorts of things being as much of an issue. We have a reasonable relationship with the government where we bounce ideas back off each other and there's quite a lot of lobbying between government and industry in Queensland, and I think we're getting it right.

4. What are some of the strategies to handle the salt coming out of the wells?

When we're talking about brine, we're talking about salt as well. The brine is the concentrate from our water treatment. When we treat the water that comes out of the well we take it to major facilities, and typically 90% of that water goes to beneficial uses such as urban or agricultural use. The remaining 10% is a volume of brine which eventually, if it's given the chance to dry out, becomes salt. In the Surat Basin, we're looking at options for bringing in mechanical devices, a plant essentially, to generate salt from the brine to speed up that process. The plant would mean that rather than having brine sitting there in evaporation dams, turning from brine to salt over many, many years, it's happening over just a few days. The concentrate may be salt or a form of brine and salt which may still be in a liquid form. Our worst case scenario is that we will take it offsite for disposal to a regulated hazardous waste landfill which could be some distance away if there isn't a beneficial use that can be found in the locality.

5. Any idea how much salt per year would be generated per well if it's an average well?

When we're in full production in the Bowen Basin, around 25,000 tonnes per annum will be produced. I will have to check what it is per well.

Following the presentation, Arrow staff referred to the EIS which states that an average of 33,500 tonnes per annum is forecast, with a peak of 48,800 tonnes per annum expected. Clarification was provided to the attendee who asked this question.

6. **You were saying some of the salt may be used and then you'd have a surplus and then the surplus would be put into landfill, is that right? Hopefully that will stay in the ground wherever it's put and doesn't leach into the surrounding area.**

   Yes, that's right. The idea of a hazardous waste landfill is that it's a protected cell; it's not like your normal landfill that may have a clay liner. The hazardous waste landfill has typically got two plastic liners with good protection and detection devices so that if there ever was a leak, then it's identified and dealt with by the landfill owner.

7. **Would part of the strategy to remove the salt from the water be reverse osmosis?**

   That's correct.

8. **Can you use the water that comes from the desalination to irrigate crops or feed livestock?**

   Absolutely. We have to recondition the water because we clean it up too much. We put some chemicals back into it so that it has its base nutrients.

9. **What class of salt are you talking about?**

   Contrary to popular belief, coal seam gas water is similar to any other groundwater that you'll find. The main constituents are sodium chloride and some carbonates. It can have tiny amounts of other heavy metals, but it's very tiny amounts. It's no different to any other groundwater that you'll find and if we put it through a reverse osmosis plant and reduce the brine stream, the vast majority of that would become something like soda ash or table salt and there would be a very small fraction of other groundwater chemicals involved in that.

10. **What did the 50 year recovery cycle model come up with? Will it recover fully in 50 years? Why did you use this recovery period?**

    The 50 year recovery was an estimate that we used in terms of looking at recovery in the coal measures. I can't give you numbers off the top of my head, but based on our understanding of the Bowen Basin, it will take a very long time for it to fully recover.

    The primary purpose of the 50 year recovery period is to predict how the groundwater system will behave post CSG production. During the planning phase of model development, a review was undertaken to determine groundwater model simulation frequency based on the data available for model calibration, and CSG production. Given that the duration of the transient calibration was for eight years followed by a simulation time of 55 years for CSG production, it was considered reasonable to simulate 50 years for post CSG production ("recovery"). Based on our understanding of the groundwater systems in the Bowen Basin, we anticipate that it will take a long time for the groundwater system to realise the depressurisation impacts. The modelling confirmed this and predicted the drawdown to extend approximately an additional 0 to 4km depending on location, 50 years post operations. It is considered that the groundwater system will readjust over a long period and eventually attain a new equilibrium.

11. You mentioned that you might be able to use the water as drinking water for stock, is that correct?

Yes, it could be used for stock, irrigation, and agricultural uses. Arrow owns a farm in Theten near Dalby and for the last 12 months we've been growing crops from water treated from our Daandine field. It's a successful project that uses centre pivot-type irrigation and Arrow is trying several different crops to establish which ones really grow best with the water.

Arrow has also successfully provided treated water for cattle feedlots in the Surat Basin.

12. All my questions are related to coal mining around Authority to Prospect (ATP)1025. When do you anticipate that you'll have greater infrastructure details available than what you currently have in the EIS so people can better appreciate the pipeline and likely power stations and the type of layout for the areas?

We'd expect within the next one to two years to know and to understand where the first four or five gas fields would be, with the level of detail that you've just suggested i.e. the major flow lines, the facilities such as power generation or power lines coming in as well as compression facilities and water treatment. I would say one to two years from now when we do an environmental authority application that information will go through to government and then they'll take it back to the public and you will see the detail. Subsequent to that, typically every second or third year we'll go back and look for a revised environmental authority for development of subsequent gas fields.

13. When you overlap mining leases, the EIS doesn't distinguish particularly well between the ATP boundary and the petroleum lease application. It looks like it covers the entire area and some of those areas include mining lease areas, not just exploration areas, and they're not excluded from the area. Does it cover the entire ATP1025 boundary? Is there a more detailed map that shows the areas that are excluded or is it just the entire ATP area that's involved?

Where there's mining and there's already a hole in the ground there's no, or limited, potential for us to put a well there. Any work within a mining lease is subject to a co-development agreement, and that will be dealt with through the planning phase. For that first package of work, in the first four or five years of construction, if your mine or your lease was in that area, then certainly we would be talking to you.

14. A little while ago Bow Energy built a power station not far back from Blackwater, just out of town really. My understanding is that Arrow Energy bought that company. What are the plans for that power station?

The last thing I heard regarding the power station was that it was up for sale. It was never connected to the gas pipe coming into it and was never hooked up for high voltage grid connection. Since Arrow took the power station site over, we decided to put it on the market for sale. I know there are a few interested parties, e.g. some mine sites which are looking at taking it onto their mine to run some of their drainage gas through, but I can't tell you if any of those miners have actually been successful in securing it.

(Ross Graham, Arrow's Northern Land Access Manager). The power station has been sold and it will be dismantled and removed from site over the next six to eight months. It's a

commercial-in-confidence agreement so I can't give you any details other than what I've said.

15. I assume that pipeline licence 158 was also going to that power station; is that also to be taken out now that the power station won't be there?

If that pipeline licence was for supply to the power station, then that's off the table at the moment. It's likely the pipeline would have been to gather the gas into the power station. If the power station's not there, there won't be a pipeline.

There are also two other pipeline licences that Arrow acquired with Bow Energy. One was heading directly north into the Arrow Bowen Pipeline, and the other one directly east towards Rockhampton, again towards the Arrow Bowen Pipeline. Similar to Arrow's decision about the power station asset, given that development in Blackwater is not imminent, Arrow is likely to take those pipeline licences off the table as well.

16. It was in the *Australian Financial Review* only last week that Shell has withheld its support of the Arrow project. Where does the project stand at this stage?

The Arrow project is $20 billion and they've already put seven in, so it's almost $30 billion dollars. You can imagine that the *Australian Financial Review* includes a fair bit of gossip. We will be looking at every opportunity to monetise our gas, whether that's through someone else's pipeline or whatever. Behind the scenes when you look at running an LNG project, it's not a matter of trickling gas into it and then building it up, you've got to run the thing flat strap or not at all.

Companies have a lot of issues with what we call ramp gas. You have to drill many, many wells to be able to produce enough gas to run one of these plants. And it's beyond the capability of most companies to meet that ramp on their own so we would be looking at maybe selling ramp gas to Santos or another company. Ramp gas is the gas that you are producing while you're building the capability to run your LNG plant.

There's a lot of speculation and we are entering into talks with other companies about what we do with our ramp gas as we're building our capability to run the plant. At this stage our base case scenario is Arrow building two trains, building a tunnel under Gladstone Harbour, putting in approximately 7,500 wells in each basin and building two 500 kilometre long pipelines and a number of water handling and compression facilities. That's what we're assessing. Obviously we would be looking at all opportunities and how we make the best amount of money out of the project.

17. There won't be any drilling in the Blackwater township itself, will there?

That's correct. There is a setback distance nominated from the township. It's actually a regulation that came through approximately 15 months ago and that's two kilometres back from the town limits which is enforced right across Queensland.

Clarification: The Queensland Government did not finalise the regulation nominating a setback distance of 2km from town limits. However, Arrow does not propose to conduct drilling within Blackwater township, and has made specific commitments nominating a minimum setback distance from houses of 200m. The location of all wells will be agreed in

consultation with the landholders.

18. What does the water trading look like? You're trying to encourage farmers not to use their bore water, but use your water, so what does that look like? What does it cost the farmer?

We're in the funny position that the water is a waste product; we don't actually own it, but we're required to remediate it and get it to a point where it can be used. The way that it works is we would go to the farmer and we would say, 'we'll put a lock on your bore so you won't use your allocation. You use two megalitres per year. We will supply you two megalitres.' We would put in the infrastructure to make that happen. It's in our interest to dispose of the water some way and our preferred hierarchy is to substitute allocations, discharge to streams or re-inject it. The onus is on us to get rid of this water, so it literally doesn't cost the farmer anything.

Phase 6 Community Information Session presentation

BOWEN GAS PROJECT ENVIRONMENTAL IMPACT STATEMENT

COMMUNITY INFORMATION SESSIONS

MARCH 2013

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ACKNOWLEDGEMENT OF TRADITIONAL OWNERS

I acknowledge the Traditional Owners of the land where we gather today and pay my respect to Elders past and present and to emerging community leaders.

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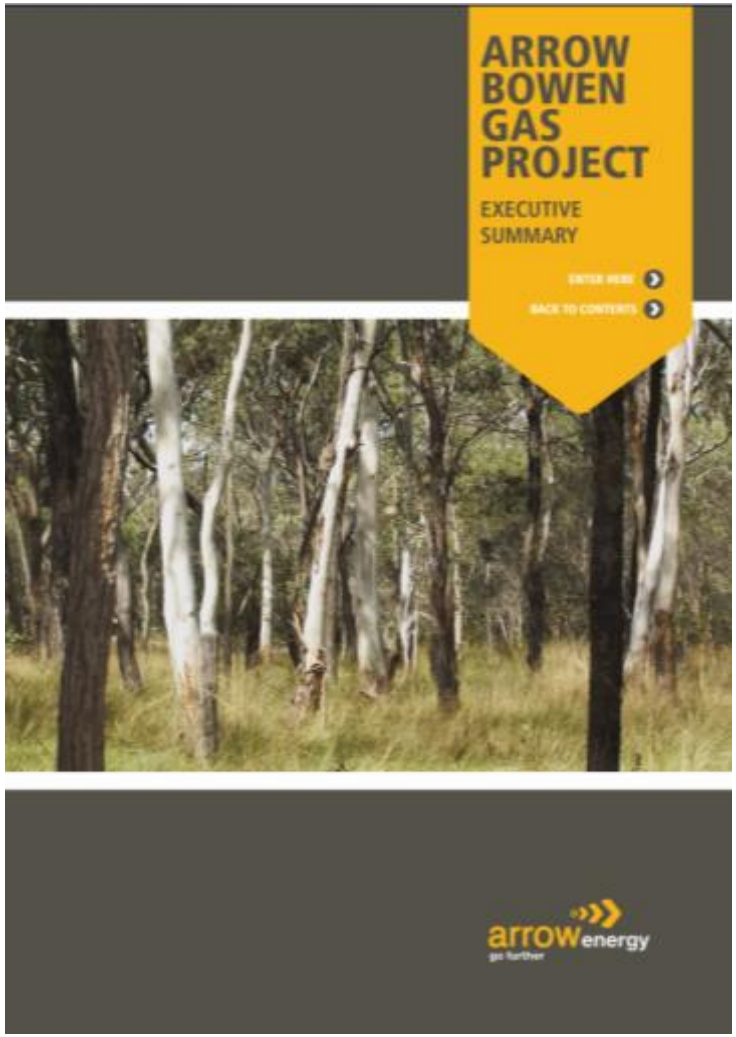
AGENDA

- Arrow Energy overview
- Bowen Gas Project (BGP) Environmental Impact Statement (EIS)
- Bowen EIS groundwater study findings
- Questions and answers



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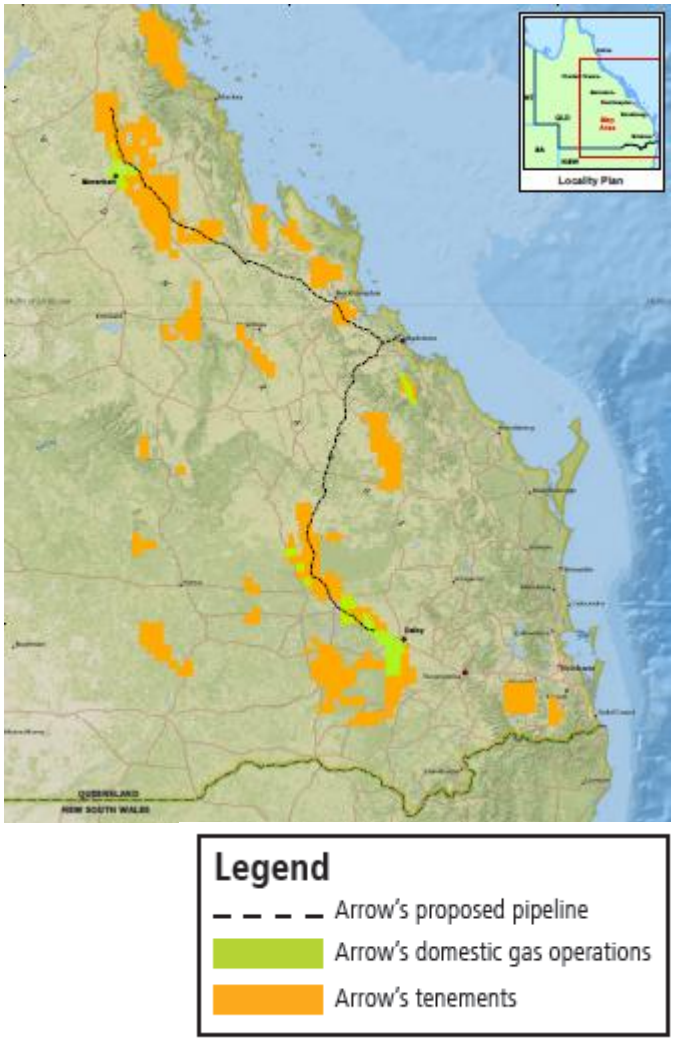
WHO IS ARROW?

Arrow Energy

- owned 50/50 by a joint venture partnership of Shell and PetroChina
- Arrow's head office is in Brisbane, with field operations in Moranbah and Dalby, and an office in Gladstone
- 41,500km^2 exploration acreage
- approximately 300 exploration wells
- approximately 900 production wells
- gas reserves of 9,500 petajoules
- 1200 staff, 2000+ contractors
- more than 200,000 external stakeholders

Power operations

- owns and operates Braemar 2 power station – 450MW
- supplies about 20% of Queensland's gas



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WHAT IS CSG AND LNG?

- CSG is naturally occurring gas trapped in underground coal seams, most commonly methane.
- CSG is extracted by drilling into the coal seam and pumping out water, which lowers the pressure and releases the gas.
- It has been commercially produced in Queensland for more than 12 years.
- CSG is cooled to -161°C, which reduces it to LNG for transport (1/600th of the original volume, not under pressure)
- Arrow is planning an LNG plant in Gladstone that will convert CSG to LNG in preparation for international shipping.

Artist's impression of Arrow LNG Plant

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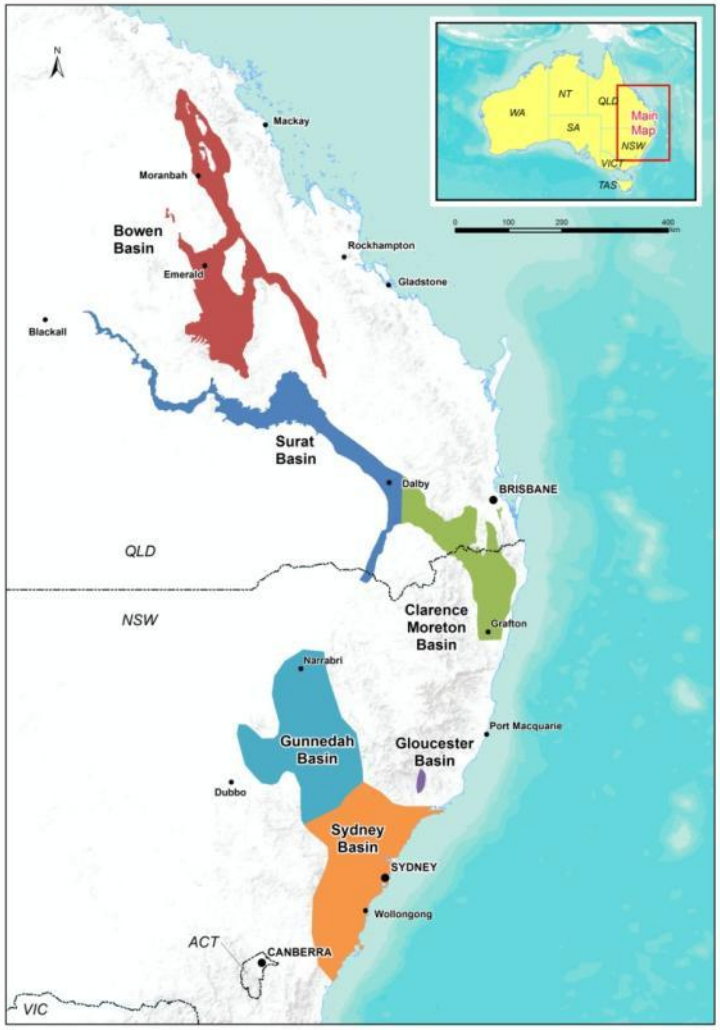
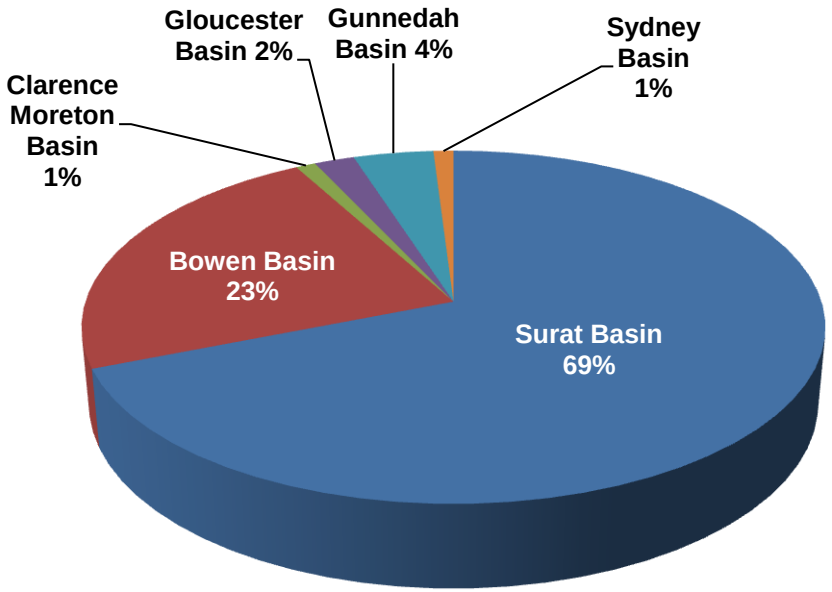
THE FASTEST GROWING SOURCE OF ENERGY IN EASTERN AUSTRALIA





Graph 1: CSG reserves by basin

Graph 1 Source: DEEDI 2012, Geoscience Australia

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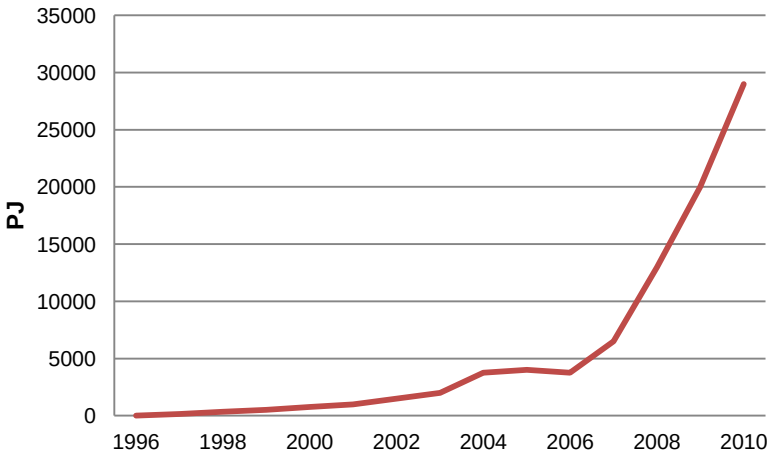
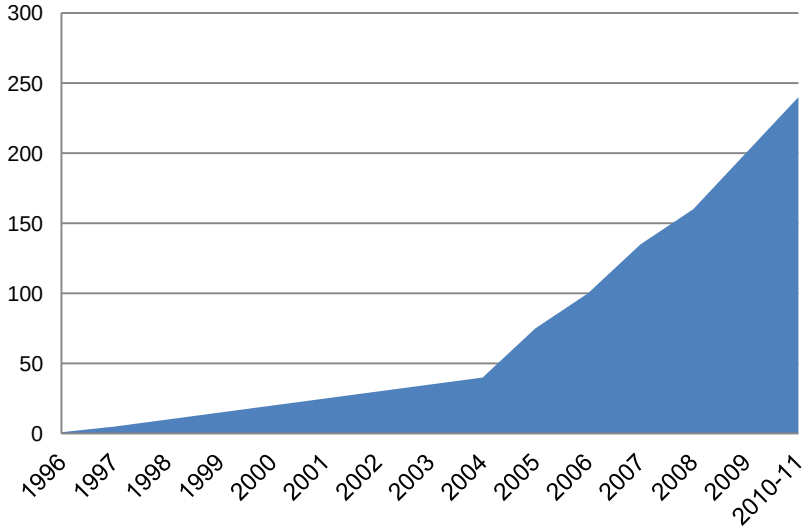
ARROW ENERGY

THE FASTEST GROWING SOURCE OF ENERGY IN EASTERN AUSTRALIA

CSG resources	Petajoules	Trillion cubic feet
Economic demonstrated resources	35,905	33
Sub-economic demonstrated resources	65,529	60
Inferred resources	120,020	111
Total	**223,454**	**203**



Graph 2: CSG 2P reserves since 1996



Graph 3: Australian CSG production

Table 1 Source: DEEDI (2011,2012), AEMO (2012), Geoscience Australia
Graph 2 Source: DEEDI 2012, AEMO 2011, Geoscience Australia
Graph 3 Source: ABARES 2011, BREE 2012b, Geoscience Australia

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ARROW ENERGY

ARROW LNG PROJECT

Upstream | Surat Gas Project
| Bowen Gas Project

- production infrastructure – gathering lines, compression stations, water treatment facilities, power assets
- production wells

Midstream | Arrow Surat Pipeline
| Arrow Bowen Pipeline

- 2 x 500km pipelines from Surat and Bowen basins to Arrow Energy Gas Hub near Gladstone

Downstream | Arrow LNG Plant

- ancillary infrastructure construction, e.g. jetty, 6km tunnel
- located on Curtis Island off Gladstone

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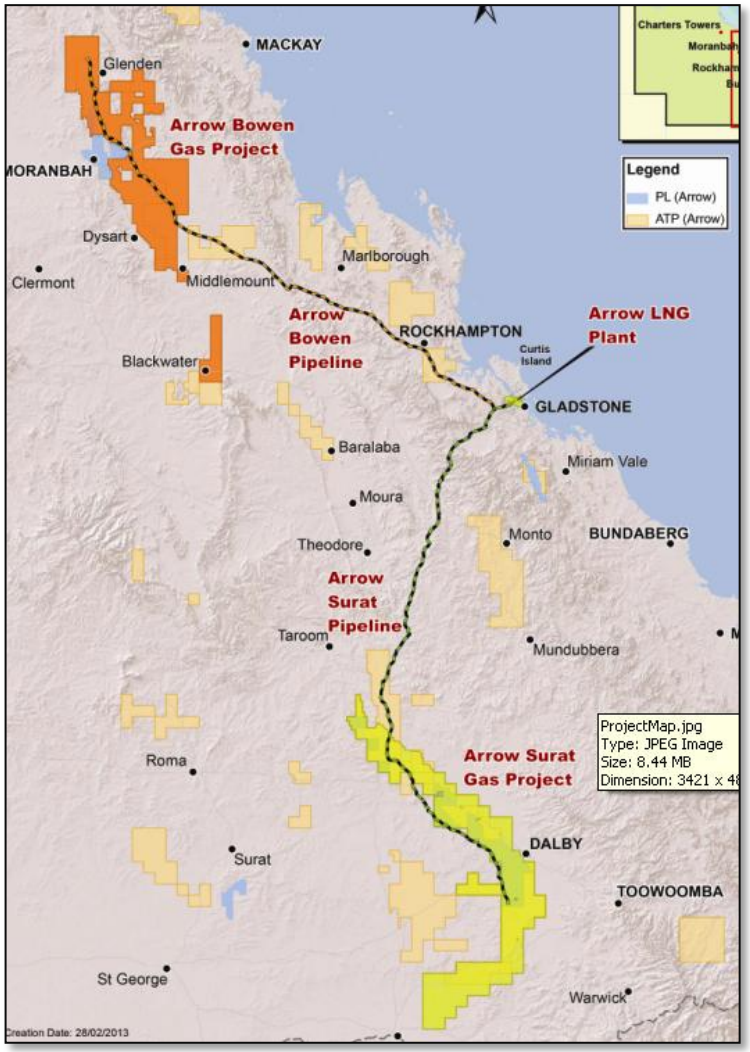
ARROW ENERGY
DOMESTIC OPERATION

Five gas producing fields:

- Moranbah Gas Field (Bowen - largest gas operating field in Australia)
  - supplies power to Townsville Power Station and industry
- Kogan North (Surat)
- Stratheden (Surat)
- Tipton West (Surat)
- Daandine (Surat)
  - supplies power to Dalby and south-east Queensland



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SAFETY - LIFE SAVING RULES

Life-Saving Rules

01 Work with a valid work permit when required

02 Conduct gas tests when required

03 Verify isolation before work begins and use the specified life protecting equipment

04 Obtain authorisation before entering a confined space

05 Obtain authorisation before overriding or disabling safety critical equipment

06 Protect yourself against a fall when working at height

07 Do not walk under a suspended load

08 Do not smoke outside designated areas

09 No alcohol or drugs while working or driving

10 While driving, do not use your phone and do not exceed speed limits

11 Wear your seat belt

12 Follow prescribed Journey Management Plan

target zero
zero incidents ► zero injuries ► zero illnesses

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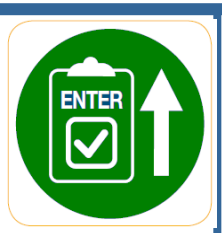
ARROW LAND ACCESS RULES

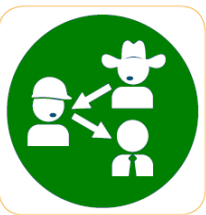
1. Only enter a property with the approval of your supervisor



2. Only conduct activities that are approved within the access conditions

3. Follow the directions of landholders

4. Report landholder discussions to Land Liaison Officer/s

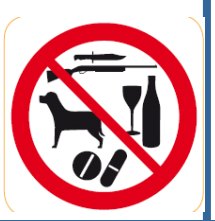


5. Carry personal and vehicle identification

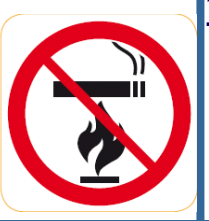
6. Keep sites tidy. Remove all rubbish

7. Do not interfere with landholders' property

8. No alcohol, illicit drugs, firearms, animals, weapons



9. No fires. Smoke only in permitted areas



10. Don't enter during or after wet weather without consent

11. Do not negotiate with landholders. Only LLOs to negotiate

12. Don't threaten or pressure landholders or others

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MORANBAH COMMUNITY INFORMATION CENTRE

- Access information about our operations and long-term plans
- CIC features maps, fact sheets and information on:
  1. Arrow LNG Project
     - Bowen Gas Project
     - Surat Gas Project
     - Arrow Bowen Pipeline
     - Arrow Surat Pipeline
     - LNG Plant.
  2. Domestic operations
     - Moranbah Gas Project
     - Surat Basin (domestic projects).
- Information on managing potential environmental impacts such as groundwater, salt, drilling, land access and exploration.
- There are also opportunities to provide feedback.

Moranbah Community Information Centre
15 Town Square Avenue, Moranbah
Open Monday to Friday, 9am – 5pm

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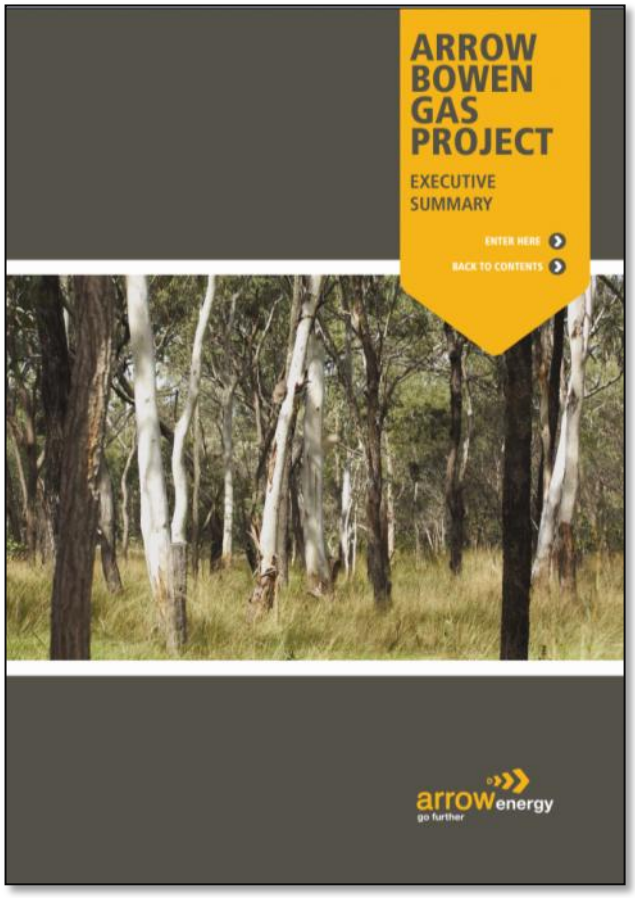
ENVIRONMENTAL IMPACT ASSESSMENT

All projects have impacts. The EIS considers:

- how, where and when will they occur
- if the impacts are significant
- if the impacts can be managed
- the residual impacts (if any).



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ENVIRONMENTAL IMPACT ASSESSMENT METHODS

Compliance

- Do predicted impacts meet or exceed guidelines/limits, e.g. air quality.

Risk management

- Likelihood and consequence, e.g. hazard and risk.

Significance

- Sensitivity and magnitude, e.g. terrestrial and aquatic ecology.

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ARROW ENERGY

ENVIRONMENTAL FRAMEWORK

Constraint	Infrastructure			Applicable framework
	Wells	Flowlines and pipelines	Production facilities	
No Go	No	No	No	No project activities permitted
High	Yes	Yes	No	Project activities permitted only with very strict controls
Moderate	Yes	Yes	Yes	Standard and specific environmental controls
Low	Yes	Yes	Yes	Standard (procedural) environmental controls

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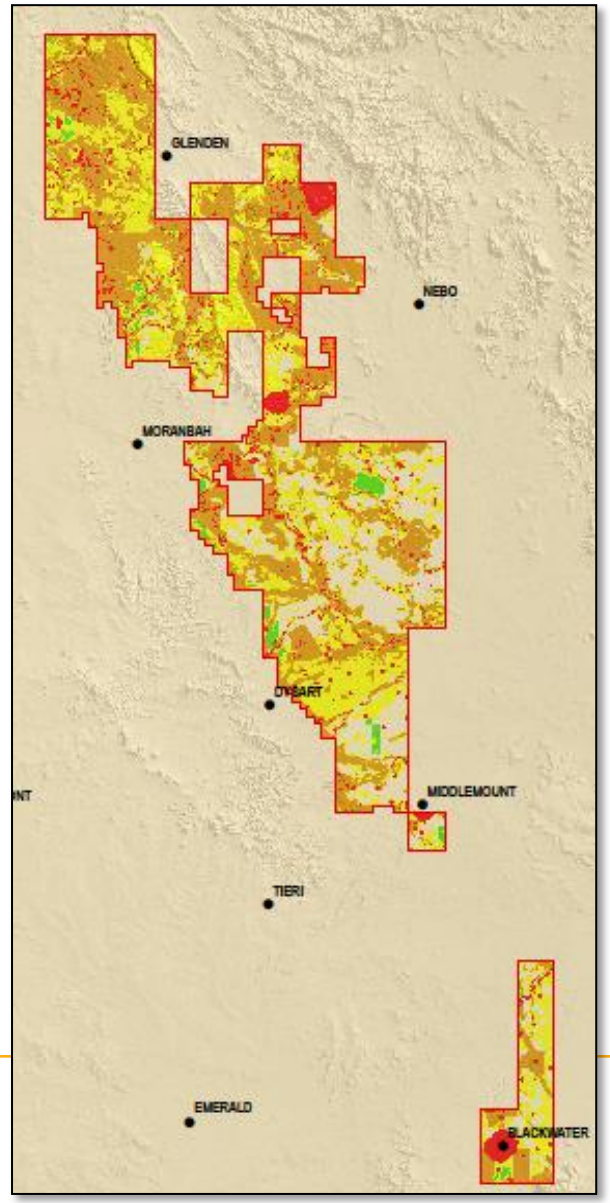
ENVIRONMENTAL FRAMEWORK CONSTRAINTS MAP



- No go zone
- High constraint area
- Moderate constraint area
- Low constraint area

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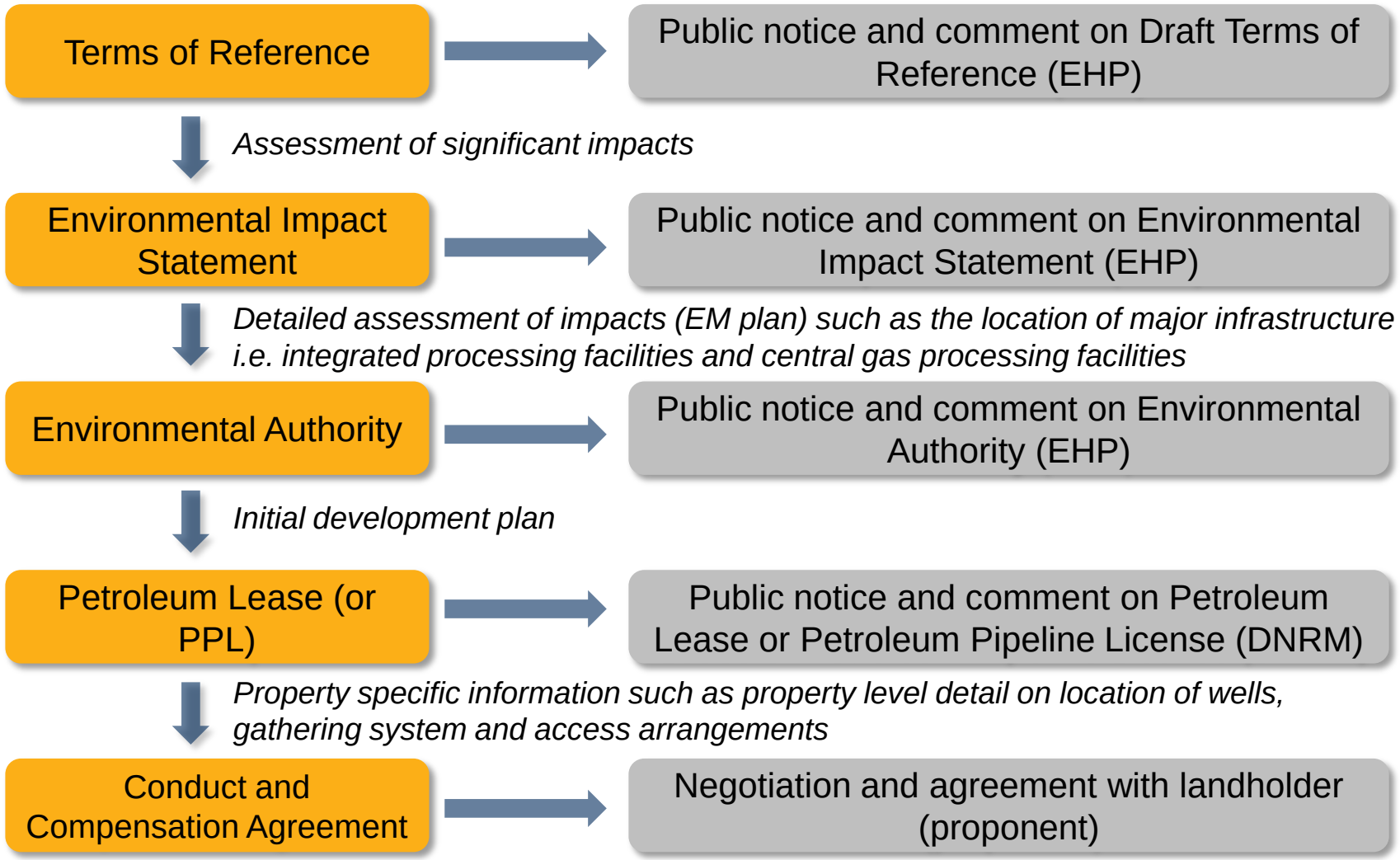
ENVIRONMENTAL STEPS



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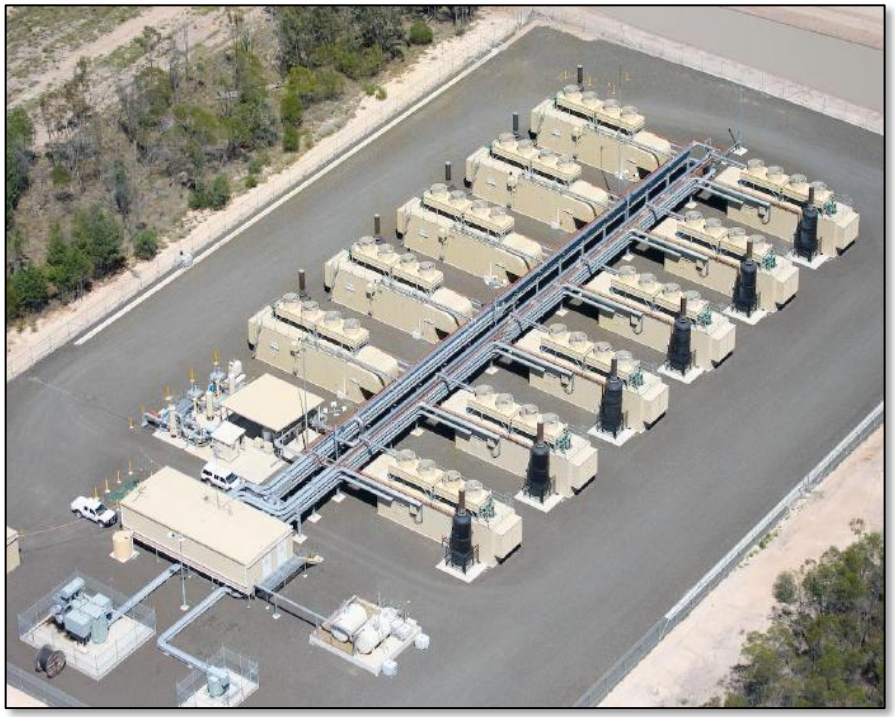
KEY IMPACTS

- Groundwater
- Amenities (noise, air quality)
- Socio-economic
- Co-development with mining



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NOISE CRITERIA FINDINGS

Time period		Short-term noise event	Medium-term noise event	Long-term noise event
7.00am to 6.00pm	Day	45dB(A)	43dB(A)	40dB(A)
6.00pm to 10.00pm	Evening	40dB(A)	38dB(A)	35dB(A)
10.00pm to 6.00am	Night	28dB(A)	28dB(A)	28dB(A)
6.00am to 7.00am	Morning	40dB(A)	38dB(A)	35dB(A)

- Background noise levels typically 19dB(A) to 34dB(A)
- Production wells unmitigated are 300m and mitigated 80m
- Integrated processing facility unmitigated 3-5km and mitigated 1-1.5km
- Vibration below threshold for human detection/no structural damage

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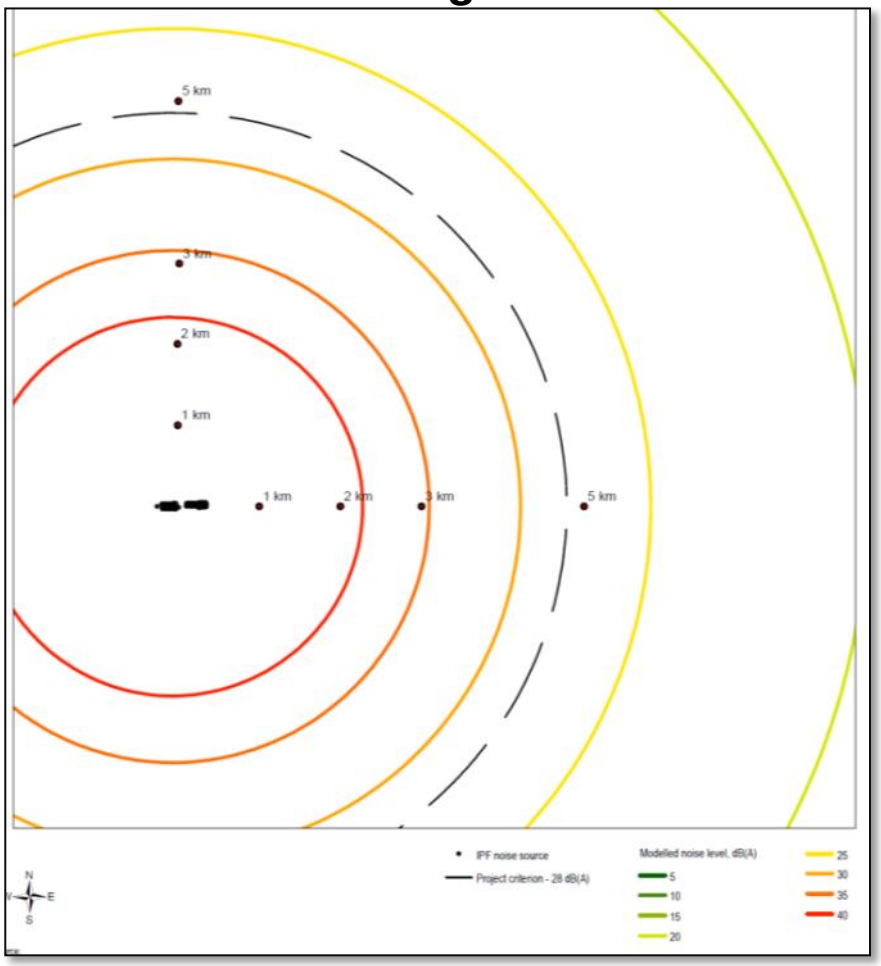
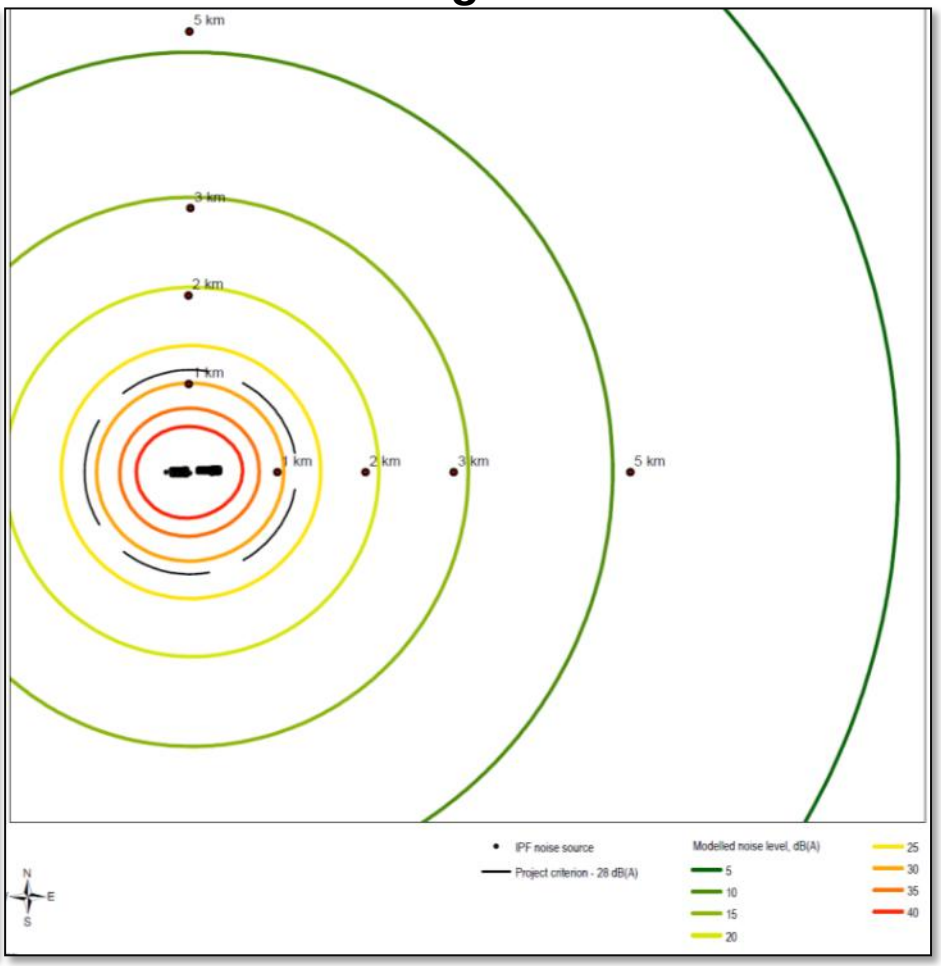
NOISE PROPAGATION CONTOURS (TYPICAL LARGE FACILITY)

Unmitigated



Mitigated



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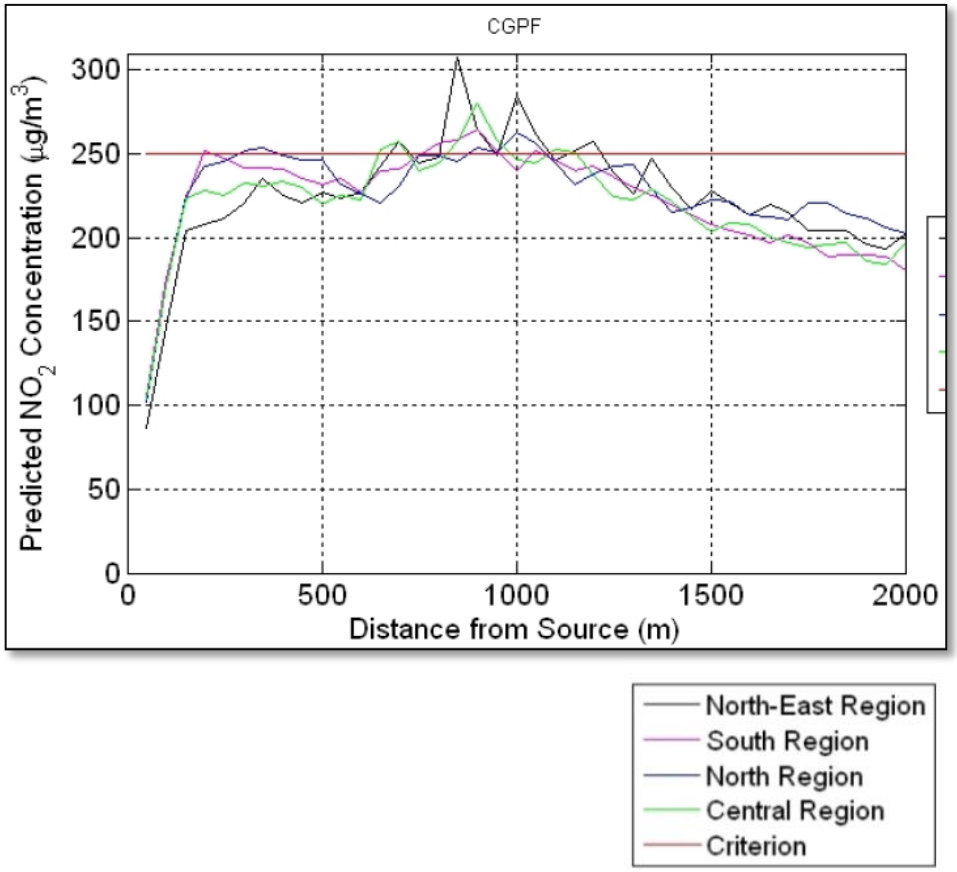
AIR QUALITY ASSESSMENTS

Pollutants:

- key indicators are oxides of nitrogen (NO_x) and ozone (O_3).

Impact assessment:

- peak development year modelled (production facilities and wells)
- worst-case meteorological conditions assumed
- single exceedence at regional level for nitrogen dioxide (NO_2) levels from major facilities at 1400m. Hence a distance constraint on locating facilities.



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SOCIO-ECONOMIC IMPACT

Social Impact Assessment (SIA)

- Reports on the project's social impacts, including benefits
- Identifies, assesses and proposes mitigation measures for social impacts.

Social Impact Management Plan (SIMP)

- Establishes the roles and responsibilities of proponents, government, stakeholders and communities throughout the life of a project
- Mitigates and manages social impacts and opportunities.

Economic Impact Assessment

- Involves analysing the existing economic environment in the Bowen region and the broader economic context for Queensland and Australia.

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SOCIO-ECONOMIC IMPACT

Bowen Gas Project's social and economic impacts and objectives:

- population and demographics
- housing and accommodation
- employment, skills and business
- land use and property
- community values and lifestyles
- community infrastructure and services
- health, safety and environment.

The above are reflected and addressed in the SIMP as part of the EIS.

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CO-DEVELOPMENT WITH MINING

- Arrow has a history of working with mining companies.
- Arrow has 19 agreements with coal companies in the Bowen Basin.
- To avoid impacts, strategies have been implemented to exist, develop and maintain flexibility with both open cut and longwall mining.
- Benefits to miners include:
  - improved health and safety
  - reduced costs.

“Coal and gas sectors have defined a path to work together that will ensure commercial certainty and viable co-development.”

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ARROW'S CSG WATER AND BRINE MANAGEMENT STRATEGY

- Arrow's options for management of CSG water include:
  - beneficial new uses e.g. agriculture, industry and urban
  - discharge to watercourses
  - injection into deep aquifers
  - ocean outfall.

- Arrow's options for management of CSG brine include:
  - production of salt products for industrial use
  - injection into deep aquifers
  - ocean outfall
  - disposal at a suitably licensed facility.

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MAKING A SUBMISSION/MORE INFORMATION AND ENQUIRIES

Content of submission:

- scope of assessment (Terms of Reference)
- adequacy of assessment
- management measures.

Submissions must be:

- in writing and signed with name and address provided
- made to the Chief Executive of the Department of Environment and Heritage Protection (EHP)
  - note that factsheets contain mail/email addresses
- received by EHP no later than 5pm Tuesday 23 April 2013.

Enquiries to Arrow

- Freecall: **1800 038 856**
- Email address: **bowengas@arrowenergy.com.au**
- Website: **www.arrowenergy.com.au**

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ARROW ENERGY

BOWEN EIS GROUNDWATER STUDY FINDINGS

- Groundwater overview
- Environmental impacts
- Predicting impacts
- Mitigation and management measures
- Groundwater monitoring

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WHAT IS GROUNDWATER?

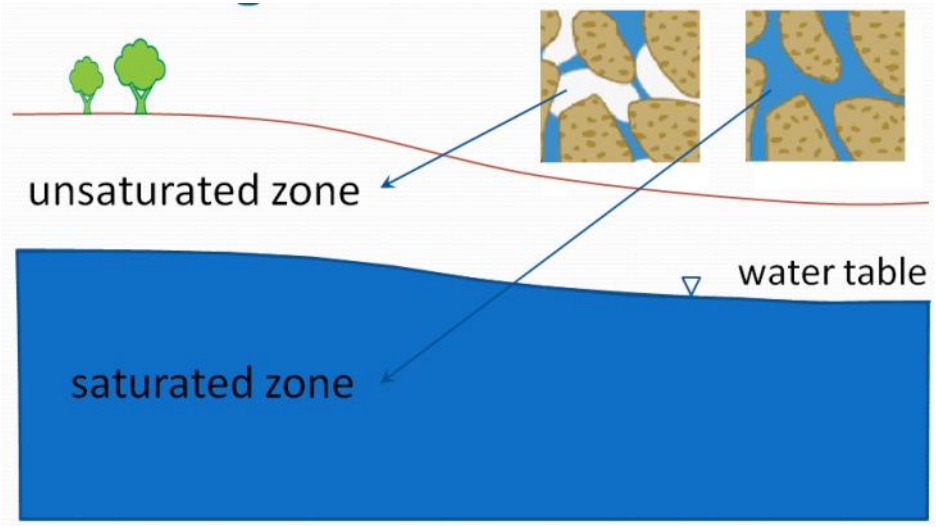
Groundwater is stored below the land surface in:

- pores within sediments
- fractures and micropores within rock.

An **aquifer** is a unit capable of transmitting water and can be:

- unconfined
- semi-confined
- confined.

An **aquitard** is a unit that impedes the flow of groundwater.



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WHY IS GROUNDWATER IMPORTANT?

Groundwater is required for a number of reasons, including:

- consumptive or productive uses (irrigation/town water/mining)
- maintaining biological integrity of groundwater dependent ecosystems (springs)
- support to areas of cultural and spiritual importance (springs/wetlands).

Potential impacts to groundwater systems may arise from:

- other mining and resource activity
- coal seam depressurisation
- coal seam gas field development
- storage management and handling of associated water.

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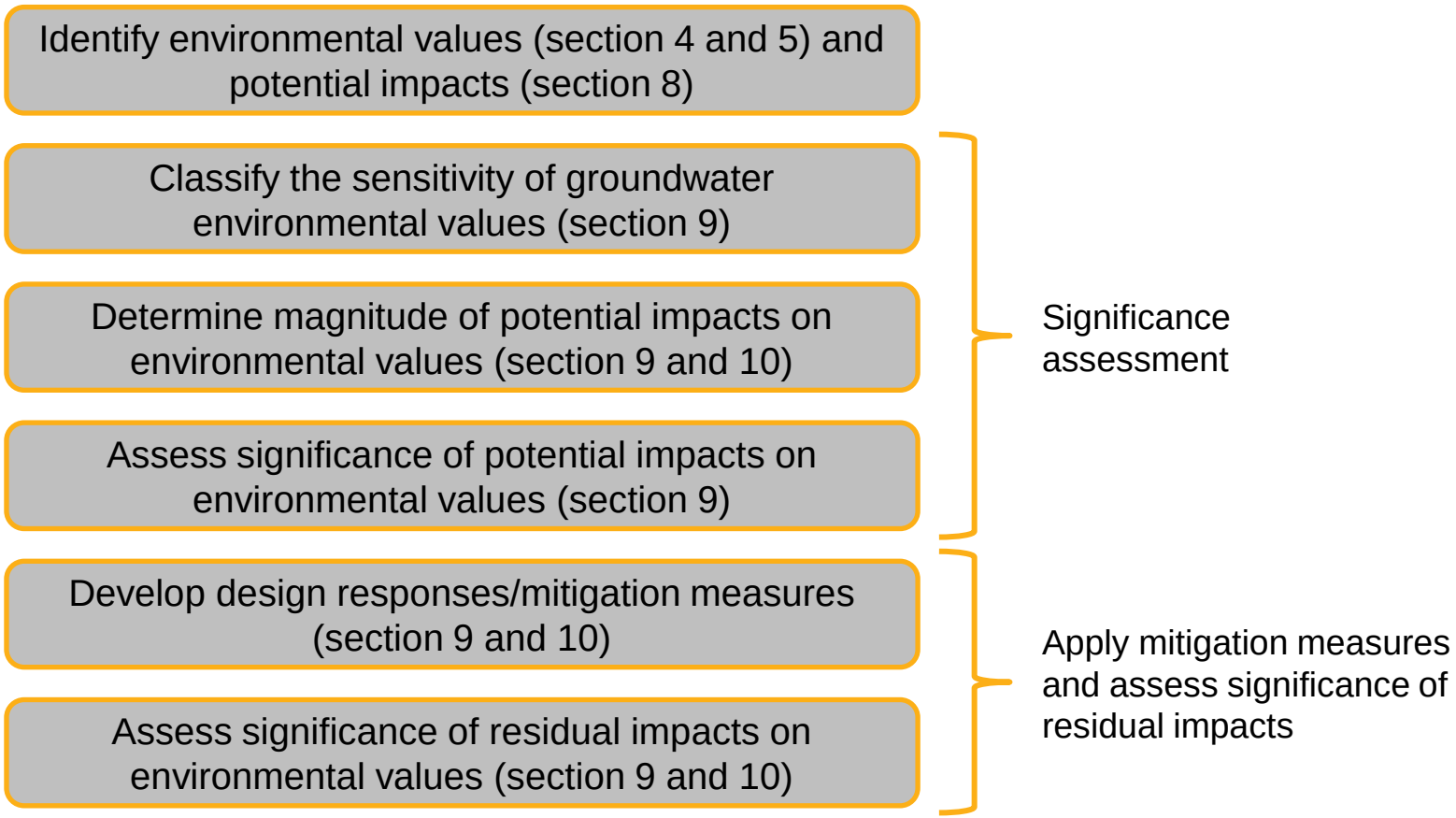
IMPACT ASSESSMENT PROCESS

The significance of the potential groundwater impacts for the EIS were assessed using a Significance Assessment Approach (as shown below).



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ENVIRONMENTAL IMPACTS

Environmental values are defined by the *Environmental Protection (Water) Policy 2009* and aim to enhance or protect Queensland waters.

These values include:

- biological integrity of aquatic ecosystems
- suitability for recreational use (not applicable in the study area)
- suitability for minimal treatment before supply as drinking water
- suitability for use in primary industries
- cultural and spiritual values.

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ENVIRONMENTAL IMPACTS

Shallow groundwater system

- Alluvium (15 - 35m thick) – low sensitivity
- Basalt (0 - 80m thick) – moderate sensitivity

Intermediate groundwater system

- Clematis Sandstone (0 to 300m thick) – moderate sensitivity

Deep groundwater system

- Coal Seam targets (25 to 700m thick) – low sensitivity

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PREDICTING IMPACTS (GROUNDWATER MODELLING)

To inform the BGP EIS, numerical groundwater modelling of the study area was undertaken by Ausenco – Norwest and peer reviewed by CDM Smith.

The following two scenarios were modelled:

1. Bowen Gas Project only (scenario one)
2. Cumulative Impact Representation (scenario two).

The models assumed a 55 year project life and 50 year recovery period. Modelling was calibrated using existing data.

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POTENTIAL IMPACTS

Based on the groundwater modelling, the following potential impacts were identified.

Direct impacts:

- depressurisation of the coal seam gas target formations.

Indirect impacts:

- depressurisation due to induced flow and changes to groundwater quality
- depressurisation causes inter-aquifer flow and reduces groundwater levels and flow to streams, wetlands, riparian zones or sites of cultural/spiritual values.

Other impacts:

- deterioration in groundwater quality (contamination) due to well installation and sub-surface activities
- deterioration in groundwater quality from associated water and waste storage, processing and distribution infrastructure activities.

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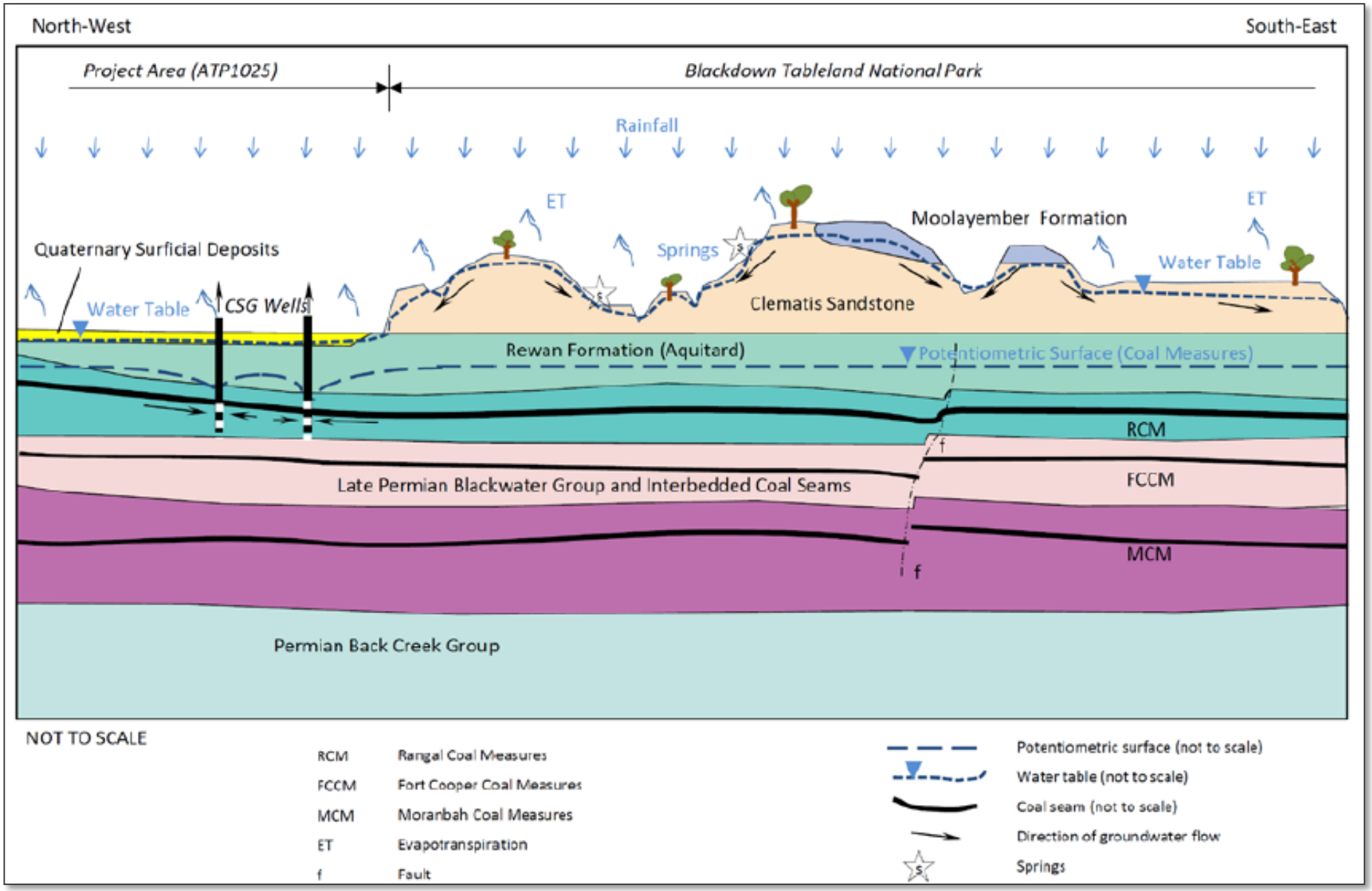
CONCEPTUAL HYDROGEOLOGICAL MODEL



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MITIGATION AND MANAGEMENT MEASURES

- Arrow has statutory obligations to ‘make good’ and to complete baseline assessments.
- Arrow’s proposed management measures include:
  - groundwater monitoring program (connectivity/drawdown/water quality)
  - bore and baseline assessment for third party bores (impaired capacity)
  - well integrity management system identified (*Code of Practice for Constructing and Abandoning Coal Seam Gas Wells in Queensland,* DEEDI, 2011).
- Refinement of groundwater models.

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MITIGATION AND MANAGEMENT MEASURES

Impacts	Unmitigated Impact Significance	Residual (Mitigated) Impact Significance
Depressurisation of CSG formations reduces groundwater supply in the same formation	Moderate	Low
Depressurisation causes possible indirect impacts due to induced flow and changes to groundwater quality	Low to very low	Low to very low
Depressurisation causes inter-aquifer flow and reduces groundwater levels and flow to streams, wetlands, riparian zones or sites of cultural/spiritual values	Moderate to low	Low

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MITIGATION AND MANAGEMENT MEASURES

Impacts	Unmitigated Impact Significance	Residual (Mitigated) Impact Significance
Deterioration in groundwater quality from associated water and waste storage, processing and distribution infrastructure activities	Moderate	Low
Impacts to shallow, intermediate and coal seam groundwater systems from infrastructure footprints	Moderate to very low	Low to very low
Impacts caused by CSG water activities to shallow groundwater systems (alluvium and basalt)	Moderate	Low

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GROUNDWATER MONITORING

Groundwater monitoring network and program will:

- establish background trends
- identify changes in aquifer conditions within and near areas of development
- identify changes in aquifer conditions near environmental values
- reduce model uncertainty in future groundwater flow modelling
- improve understanding of connectivity between aquifers
- develop an ‘early warning system’ that identifies potential impacts and allows early intervention.

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GROUNDWATER MONITORING

Arrow's existing groundwater monitoring program includes:

- Environmental Authority groundwater monitoring bores at the Moranbah Gas Project (MGP):
  - approximately 42 groundwater bores monitoring shallow aquifers have been installed.
- Underground Water Impact Report Groundwater Monitoring Strategy groundwater monitoring bores:
  - four groundwater bores monitoring deep aquifers will be installed in 2013
  - nine groundwater monitoring bores will be installed in 2014.

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LOCAL CONTENT POLICY

Arrow Energy is committed to creating sustainable employment and economic development for local industry.

Arrow Energy will provide *full, fair and reasonable* opportunity for capable and competitive local industry to participate in the procurement of goods, equipment and services.

Arrow has committed to:

- actively seeking local industry participation
- local, i.e. Australia and New Zealand
- regional, i.e. 50km within operating footprint.

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SUPPLIER SELECTION CRITERIA

You must be able to demonstrate:

- commitment to regulatory compliance
- safety and environmental track record
- capability to supply on time
- competitive pricing and robust cost management
- customer focus
- robust supply chain with local content.

These requirements are no different to any major project or government agency.

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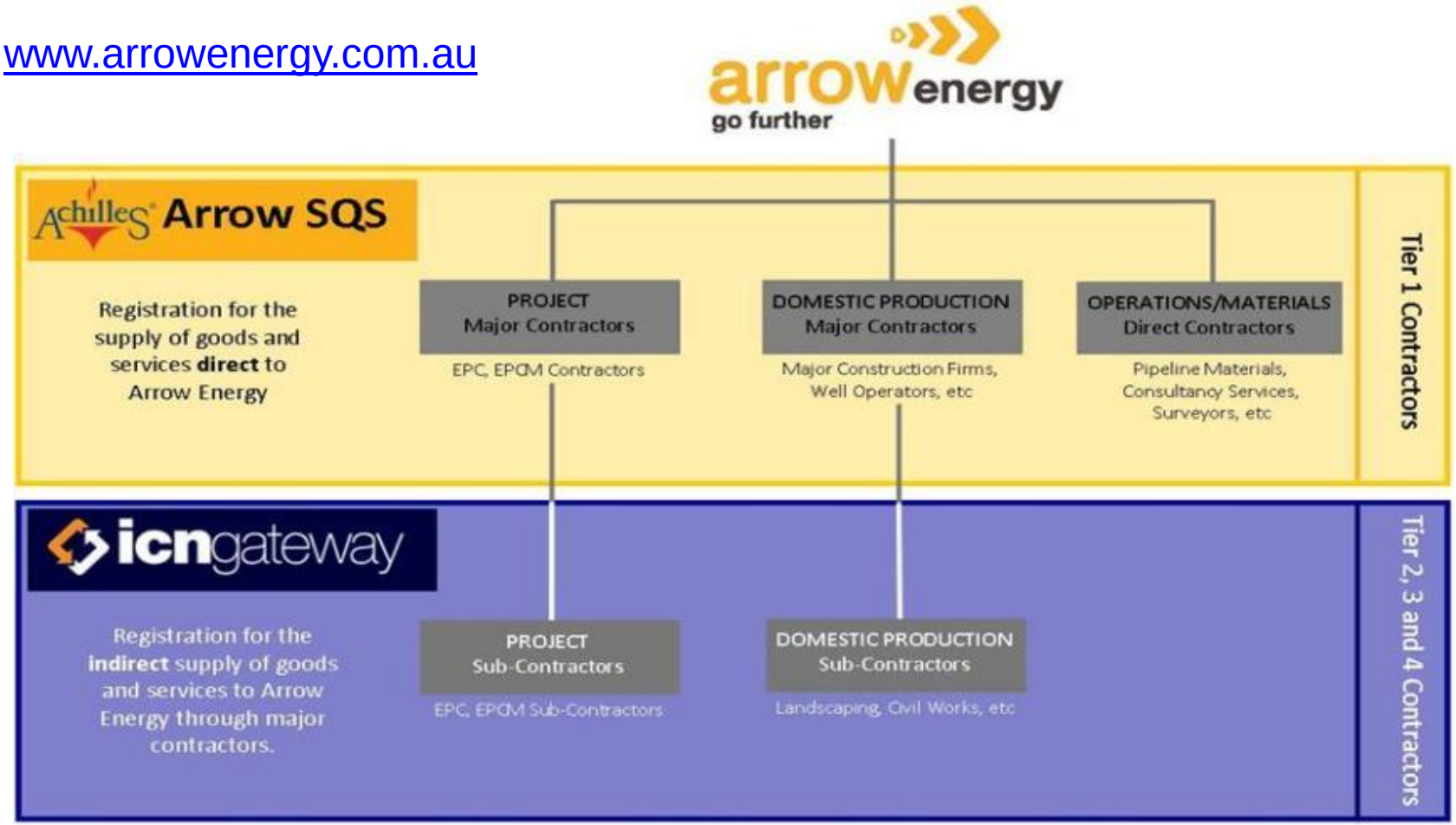
SUPPLIER REGISTRATION

Work for us ⟶ suppliers ⟶ register your interest

www.arrowenergy.com.au



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BRIGHTER FUTURES PROGRAM

In 2012, Arrow invested more than $3.7 million across the Surat and Bowen Basins, Gladstone, Brisbane and several other communities.

- Local employee committees assess applications for donations, sponsorships and partnerships, based on:
  - health and safety
  - education
  - environment.
- Successful applicants in the Bowen Basin include:
  - Moranbah District & Support Services
  - Mackay Community Visitors Association
  - Moranbah State High School
  - Dysart State School P&C Committee
  - Moranbah Athletics Club
  - Middlemount Community Sports Association
  - Wiri Community Limited

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Questions and Answers

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