

Consultation Report Surat Gas Project

August 2011



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Executive Summary

Four phases of consultation have occurred during the Arrow Energy Surat Gas Project environmental impact statement (EIS) between September 2009 and May 2011. All phases have included a round of community information sessions and displays.

The first phase focussed on identification of stakeholders and their issues and an overview of the project and its EIS framework. Phase two provided a project update and began to address the issues and concerns raised previously. Phases three and four presented Arrow Energy's progress on actions it had previously committed to undertake, and provided updates on the EIS and preliminary study results.

Phase one of consultation commenced in early September 2009 and continued until the end of the year. Arrow Energy (Arrow) staff and the project team were introduced to communities throughout the project development area; a two-way dialogue began, enabling key issues to be identified. Activities included one-on-one briefings, 'drop-in' community displays and invitation-only formal information sessions that involved Arrow presentations and questions from the audience. Government agency and Arrow staff briefings also occurred.

Consultation activities were supported by a comprehensive communication and awareness program. Communication and promotional activities ranged from thousands of letters mailed to registered property owners within the project development area to advertisements, media releases, information sheets, and display posters, banners and maps.

The EIS consultation was based on a continuous process of identifying stakeholders and updating and maintaining a comprehensive database. This facilitated broad engagement of the community and key stakeholders in the EIS process.

A number of common themes and issues of concern to the community emerged during this first phase of consultation. There was recognition of the need to provide greater clarity to the community around these issues in order to address people's concerns about the project. The knowledge obtained helped prioritise, schedule and plan the next phase of consultation. It indicated where additional information was needed and the priority areas for Arrow in terms of further work.

Phase two consultation was Arrow's first opportunity to respond to community concerns and demonstrate progress made. Consultation activities commenced in January 2010 and continued through to June that year. The strategic approach for this round of consultation activities changed from phase one as a result of feedback from the community, the higher profile of coal seam gas (CSG), and the bid made for Arrow by Royal Dutch Shell and PetroChina. The two types of events run previously were expanded into open community information sessions incorporating both staffed displays and formal presentations; dependent on the number and interests of attendees at each location a decision was made on the day as to whether a formal presentation was required. Importantly, the presentations included acknowledgement of past omissions and/or errors and commitments on how Arrow intended to improve its work practices and its interaction with the community. The information

sessions were supported by some existing information sheets and banners, as well as newly updated ones.

Those commitments made during phase two set clear guidelines for Arrow in relation to necessary improvements and further technical investigations. The next phase of consultation required transparent and detailed updates to the community on Arrow's progress in these areas.

Phase three consultation activities ran from July to December 2010. This phase included the completion of Arrow's takeover by Royal Dutch Shell and PetroChina on 23 August 2010 which delayed some EIS activities and extended the project timeline. As a result, the outcomes of significant specialist studies were not available. Instead the community was updated on the progress of commitments made in May 2010, advised how Arrow would continue to address key issues and concerns, and provided an update on both the Surat Gas Project and the EIS.

The strategic approach for this round of consultation activities was a continuation of that for phase two where information sessions were open to the whole community. In each locality at least one session was held, including a formal presentation, question and answer time and opportunity for one-on-one discussions with the project team. The presentation provided an update on the project, Arrow's new ownership structure, the EIS and commitments made by Arrow earlier in the year. Changes in legislation and Arrow's practices in relation to land access, water and salt management, its groundwater monitoring and modelling program, and Arrow's approach to compensation were also communicated.

Banners and information sheets were updated to provide the most current information to the community and to reflect changes in the project's ambit since phase one and two. Invitation letters were sent to all affected and interested persons as well as everyone listed on the database. Additional emails were sent to local school principals for distribution to their networks.

This third phase of consultation for the Surat Gas Project had many challenges, particularly due to increased media coverage, greater negative community sentiment, a highly informed and articulate audience and concerns related to the *Gasland* documentary. A particularly high level of interest and concern was expressed by the community in relation to water management issues.

Two community committees were established to allow the community to have an ongoing working relationship with Arrow, as well as a greater insight into the project and its processes. These committees (the Arrow Surat Community Reference Group and the Arrow Intensively Farmed Land Committee) were positively received as was the willingness of the new Chief Executive Officer and his senior management team to address the community information sessions.

The strategy used in phase three allowed for two-way dialogue and clear articulation of community concerns. It directly addressed a diverse and complex range of issues, as well as updated the community on the phase two commitments. It not only demonstrated the

progress Arrow had made but also highlighted where further action was still needed on critical issues.

Phase four consultation activities commenced in February 2011 and continued through to July. In response to the high levels of anxiety on water issues demonstrated in some towns in the second quarter of 2010, water-specific technical sessions were held in Chinchilla, Cecil Plains and Dalby in May 2011 and opportunities for one-on-one discussions with Arrow technical experts at the community information sessions were increased. In addition, although EIS water studies were still incomplete, some interim results were released at the sessions in an attempt to allay concerns. Arrow made a commitment to return in September/October 2011 to explain the results of these studies.

During the this fourth round of information sessions further detail was provided on the activities, and membership, of the Arrow Surat Community Reference group (ASCRG) and the Arrow Intensively Farmed Land Committee (AIFLC). A focussed effort was also made to ensure the community understood that Arrow was some two years behind the other CSG proponents although it was working rapidly towards completion of the numerous EIS studies already in progress. In the past the lack of clarity on this point had expressed itself in frustration that Arrow was unable to provide information readily available from the other major CSG players. During the water technical sessions Dr Lloyd Townley, an independent groundwater specialist gave an "Introduction to Groundwater" presentation.

The consultation sessions held in phase four were widely advertised, and invitations were sent to all interested and affected stakeholders listed on the database. The sessions were supported by a wide range of materials, including a raft of newly developed Arrow information sheets, banners, maps and government fact sheets. The project team also provided the community with a range of additional materials, including salt and water samples, core samples, diagrams, photographs of infrastructure and equipment and, when practically possible, drilling equipment, tanks and a mock well site were put on display.

The focus of the fourth phase of consultation on providing the community with answers to their ongoing concerns and questions led to a greater understanding of issues and the potential for mitigation as well as what Arrow was doing to deal with them as at that time. Feedback was received across the sessions indicating that the community appreciated Arrow's efforts to provide technical information, endorsed the accessibility and expertise of its staff, and enjoyed the opportunity to talk one-on-one with technical members of the project team. There was also an appreciation shown by members of the community in some locations (where operational equipment was able to be displayed) for the opportunity to view the equipment with staff on hand to discuss it.

Arrow's commitment made during phase four to return to the community later in the year to provide the results of Arrow's water modelling program as well as other environmental impact studies.

Glossary of terms and abbreviations

TERM	MEANING
AIFLC	Arrow Intensively Farmed Land Committee
APPEA	Australian Petroleum Production and Exploration Association
ASCRG	Arrow Surat Community Reference Group
ATP	Authority to Prospect
Coffey	Coffey Environments
CM	Consultation Manager – Stakeholder database
CSA	Community service announcement
CSG	Coal seam gas
DEEDI	Department of Employment, Economic Development and Innovation
DERM	Department of Environment and Resource Management
EA	Environmental Authority
EIS	Environmental impact statement
GAB	Great Artesian Basin
JTA	JTA Australia
Landholders	Owners and lessees of properties directly, indirectly or potentially affected by the project
LNG	liquefied natural gas
ML	Megalitre
Mtpa	Million tonnes per annum
PL	Petroleum lease
RO	Reverse osmosis
ToR	Terms of Reference

1.0 Introduction and Background

1.1 Introduction

JTA Australia (JTA) was engaged in September 2009 to provide consultation and engagement support for the development of Arrow Energy's Surat Gas Project, including the environmental impact statement (EIS). Arrow Energy Pty Ltd (Arrow) is being assisted by Coffey Environments (Coffey) in the development of the EIS and JTA is working closely with Coffey Environments and Arrow to develop and deliver the consultation program.

This report provides a detailed account of the methodology, activities and outcomes of the consultation and engagement program during the period in which the EIS has been prepared.

The consultation process was done in six-monthly phases with an additional round planned in September/October 2011 to update communities with respect to the latest results of EIS studies. All phases included a round of public consultation. The first phase focussed on identifying stakeholders and their issues and introducing the project to the community. Phase two provided project updates and addressed in detail the key issues raised by the community and stakeholders during phase one. In response to community concerns, particularly on land access and water and salt management, Arrow articulated a range of commitments on how it intended to improve its work practices and interaction with the community. The most recent phases three and four presented Arrow's progress on actions it had previously committed to undertake and reported on EIS results.

It is important to note that the operating environment for the Surat Gas Project changed significantly after phase one, both within Arrow and externally. A successful offer for Arrow was made by Royal Dutch Shell and PetroChina and its new ownership structure took effect on 23 August 2010. This resulted in a new project scope and a subsequent extension to the EIS timeline. With regard to the latter, the initial timeline was for exhibition of the EIS in Q3 2010; as a result of the new project design the EIS timeline was extended to Q1 2012.

Externally the profile of coal seam gas and Arrow rose considerably from November 2009 to September 2011. This resulted in increased media coverage, an increasingly informed and articulate audience, increased community concerns, greater scrutiny around environmental impacts and community frustration, confusion and misinformation. Expectations increased for Arrow to provide clear and accurate information and demonstrate improvements in processes and activities in the Surat Basin.

The consultation undertaken from phase one to phase four was therefore heavily influenced by these external demands and driven by listening to and understanding community needs, and responding accordingly.

Arrow subsequently implemented a number of engagement strategies outside the EIS consultation to ensure critical issues were being addressed in a timely, constructive and collaborative manner. This is to include a round of targeted information session and displays

in September/October 2011 to ensure the community will be updated on the results of EIS studies.

Another round of public consultation will be held to coincide with the exhibition of the EIS in early 2012. The outcomes and findings of that consultation will be outlined in the supplementary report to the EIS. The activities and outcomes of phases one to four are detailed in this report.

Table 1 EIS consultation phases and activities

Phase	Focus	Consultation activities	Communication tools
Phase 1 Sep-Dec 2009	Issues identification, project introduction and relationship building	Stakeholder identification & briefings Community displays Formal information sessions One-on-one briefings Staff information sessions 1800 freecall Project email	Stakeholder briefings Community displays Formal information sessions One-on-one briefings Information Sheets Banners Maps DVDs Posters/Flyers Staff information sessions 1800 freecall Project email
Phase 2 Jan-Jun 2010	Impact identification and mitigation	Ongoing stakeholder identification One-on-one briefings Community information sessions with formal presentations School briefings Staff information sessions 1800 freecall Project email	Newspaper advertising Media releases Direct mail (postal and email) invitations Website updates Information sheets Information bulletins School newsletters Community service announcements (CSAs) Maps DVDs Posters/flyers Banners

Phase	Focus	Consultation activities	Communication tools
Phase 3 Jul-Dec 2010	Project update, commitments and issues mitigation	Ongoing stakeholder identification One-on-one briefings Community information sessions with formal presentations School briefings Staff information sessions 1800 freecall Project email Stakeholder meetings (especially local government, business and agency representatives)	Newspaper advertising Media releases Direct mail invitations Website updates Information sheets Information bulletins School newsletters CSAs Maps DVDs Posters/flyers Banners
Phase 4 Feb-Jun 2011	Project update, progress on commitments and ongoing mitigation	Ongoing stakeholder identification Database updates Water-specific workshops Community information Sessions in seven towns Informal community barbecue lunches Visits to landholder properties Freecall 1800 number Project email Availability of Arrow technical experts at public events	Newspaper advertising Media releases Direct mail invitations Website updates Information sheets Information bulletins School newsletters CSAs Maps DVDs Posters/flyers Banners Independent groundwater expert Samples of CSG water, treated water and brine Samples of geological strata Samples of salt products Phone call reminders

1.2 Consultation objectives

The consultation objectives for the Surat Gas Project were:

- identification of all relevant stakeholders
- facilitation of an understanding of their key issues
- development and implementation of strategies to address issues where possible
- provision of meaningful opportunities for community input into the development of the EIS and the project more broadly.

These were achieved through a comprehensive program of effective strategies and accessible and relevant activities. Initially, the consultation program was designed to fulfil the requirements of the Final Terms of Reference for the Surat Gas Project EIS. However, because the EIS project development area covers some 8,600km², the EIS process was the first time many community members heard of or came into contact with Arrow. This was particularly the case for the communities of Miles, Wandoan, Millmerran and Goondiwindi.

A generalised objective therefore was to ensure community members and key stakeholders across the region had an opportunity to learn about Arrow's broader work program, its *modus operandi* and its priorities and commitments. To meet this wider objective and ensure the consultation program fulfilled the specific requirements of the Final Terms of Reference, EIS consultation activities ensured there was a better understanding of Arrow Energy as a corporate citizen as well as the Surat Gas Project and EIS requirements. The overriding intent was to facilitate broad engagement and participation in the consultation process.

1.3 Methodology and approach

Consultation was undertaken regularly throughout the development of the EIS. As a reflection of Arrow's determination to actively listen to the community, and heed its views, each phase of consultation was designed to update the community on the project's progress and to respond to specific issues raised at previous consultation sessions or through the 1800 project freecall number and email. In addition, information was presented to the community when it became available from specialist studies (and before these studies were finalised) to limit the community's concern that specialist studies were not progressing. This enabled feedback throughout the process so that issues could be raised and addressed where necessary. This iterative and responsive process ensured that the presentations and information provided at consultation activities were directly relevant to the community, contributing to a two-way sharing of information and knowledge across the community, the EIS project team and Arrow.

Through this approach, the community and other stakeholders were involved in identifying issues that needed to be explored through the EIS and discussing potential mitigation measures for them. The commissioning of the EIS agricultural study is one example of how consultation directly influenced issues investigated in the EIS.

Community members were able to provide important local knowledge for specialist studies through various consultation forums and submissions on the draft Terms of Reference. This approach facilitated regular contact with stakeholders and interested community members to help maintain momentum, interest and involvement.

The consultation approach involved targeted consultation with interest groups, community leaders, opinion influencers, Arrow staff and directly affected landholders. Wider consultation ensured individuals not specifically identified as stakeholders or target audiences were able to identify their interest in the project. Consultation focussed on the communities in the EIS project development area with a specific focus on the communities around Dalby, Cecil Plains, Chinchilla, Goondiwindi, Miles, Millmerran and Wandoan. All stakeholders and landholders were given equal opportunities to provide input.

A combination of consultation techniques was used to enable input from all interested community members, coupled with a fully integrated communication program to ensure optimal project information and awareness. The strategic approach adopted by JTA and Arrow for consultation activities developed and changed over the course of the project in response to community feedback. The initial round of consultations included invitation-only formal information sessions, as well as general display sessions (open to the public), which enabled known stakeholders as well as other interested community and business representatives (further detail is provided at Table 2) to receive information or identify themselves as interested in the process. The approach sought to encourage broad participation of a large and varied group of stakeholders. It was also a critical step in building a database to facilitate effective engagement for the consultation process going forward.

The strategic approach for subsequent consultation sessions was adapted based on the needs of the community, business and potential suppliers and workers. It became imperative not only to deliver a range of information to communities as a whole but also to facilitate opportunities for stakeholders to talk one-on-one with members of the project team about issues and concerns that specifically impacted on them. To meet these requirements, a new approach was adopted. Formal, structured information and display sessions were extended into information sessions which were open to the public and included time for one-on-one discussion as well as formal presentations followed by questions and answers from the audience. The project team adopted a proactive approach to addressing community issues and concerns whereby specialist teams (i.e. water and salt, drilling, community infrastructure) took responsibility for progressing and/or implementing actions which emerged from the community information sessions.

An iterative approach was taken for the consultation process; the information sessions were viewed as an opportunity to feed back to the community Arrow's response to issues raised both at previous consultation sessions and through the 1800 freecall and project email. Importantly, however, the community sessions were just one component of the consultation continuum. Arrow continued to work with the community on an ongoing basis between consultation sessions to find solutions and to provide timely feedback.

Throughout the EIS timeframe Arrow implemented a number of engagement strategies outside the EIS to ensure critical issues were being addressed across the project development area in a timely, constructive and collaborative manner. These included:

- establishment of community relations staff for the Surat Basin in Dalby
- community workshops on water, regulatory requirements and land issues
- establishment of two standing committees (the ASCRG and the AIFLC)
- ongoing government, industry and key stakeholder briefings
- establishment of a formal complaints management system

1.4 Stakeholders and target audiences

A database of stakeholders, landholders, interest groups and individuals has been developed and maintained for the project using web-based management systems Consultation Manager and Mipela database. This included those individuals and groups identified as 'interested and affected' under the EIS provisions of the *Environmental Protection Act 1994* (Qld). The

details of this interested and affected group have been maintained and updated as the project progressed (e.g. changes to property ownership within the project development area).

As new or interested community members or stakeholders were identified, these were added to the database. This included members of the community who were not previously known to the project, but who contacted the project through the email or the freecall number, or by attending a consultation event. A registration form was used to capture contact details and agreement re further contact about the project.

Consultation activities generally targeted the towns and surrounding regions of Dalby, Chinchilla, Millmerran, Goondiwindi, Cecil Plains, Wandoan and Miles. The consultation activities aimed to identify all possible stakeholders and interested groups. In total, 1834 stakeholders and external target audience members were consulted during the period in which the EIS was prepared. A summary of the groups is outlined below in Table 2.

Table 2 Stakeholder groups

Group	Organisations
Internal	Project staff Arrow executive and board Arrow management and employees Arrow’s joint venture partners
Political	Local councillors Local Queensland Members of Parliament Queensland Government Ministers Local Federal Members of Parliament Federal Government Ministers
Government agencies	Local councils <ul style="list-style-type: none"> • Western Downs Regional Council • Goondiwindi Regional Council • Toowoomba Regional Council Queensland Government agencies <ul style="list-style-type: none"> • Department of the Premier and Cabinet • Department of Environment and Resource Management (DERM) • Department of Employment, Economic Development and Innovation (DEEDI) • Department of Transport and Main Roads • Department of Health • Department of Communities • Department of Education Emergency Services (police, ambulance, Qld Fire and Rescue Service, Rural Fire Service Qld) Government Owned Corporations <ul style="list-style-type: none"> • QR Limited • Powerlink Queensland (Queensland Electricity Transmission Corporation Limited) • Energex Ltd • SunWater Commonwealth Government agencies <ul style="list-style-type: none"> • Department of Sustainability, Environment, Water, Population and Communities
Landholders	Directly impacted by upcoming exploration and operational activities In the project development area but they may not be impacted

Group	Organisations
	for some time
Local industry, businesses and industry associations	Chambers of Commerce (Toowoomba, Dalby, Millmerran, Border Rivers, Millmerran, Goondiwindi) Australian Petroleum Production & Exploration Association Ltd (APPEA) Queensland Resources Council (QRC) Australian Chamber of Commerce and Industry (ACCI) Queensland Trucking Association Economic Development Australia (EDA) Queensland Conservation Council (QCC) Local Government Association Qld (LGAQ) Regional Development Australia (RDA) (previously Area Consultative Committees)Local business operators
Agriculture	Qld Farmers Federation AgForce Queensland Growcom Qld Dairyfarmers' Organisation Forestry Plantations Qld Qld Cotton Corporation Darling Downs Cotton Growers Crop Management Services
Environment	Environment and Property Protection Association (EPPA) Friends of Felton Condamine Alliance Greening Australia Murray Darling Basin Authority Condamine Catchment Management World Wildlife Fund Australian Conservation Foundation Queensland Water and Landcarers Field Naturalists Basin Sustainability Alliance Border Rivers Catchment Management and Landcare Chinchilla Landcare Group Condamine Headwaters Landcare Group Millmerran Landcare Group Toowoomba Landcare Group Qld Murray Darling Committee Upper Dawson Branch Wildlife Preservation Society
Communities	Dalby Cecil Plains Goondiwindi Millmerran Chinchilla Wandoan Miles
Indigenous groups	Barunggam Bigambul People Iman People Wulli Wulli People Western Wakka Wakka People
Community and interest groups	CWA, unions, community development, parents and citizens, pastoral, education, farming, tourism and heritage groups, relevant sporting groups, general public, action groups (e.g. Coal 4 Breakfast), service groups, community health and emergency service providers, religious groups
Schools	Bell State School Brigalow State School

Group	Organisations
	Burra Burri State School Cecil Plains State School Chinchilla Christian School Chinchilla State High School Chinchilla State School Dalby Christian School Dalby South State School Dalby State High School Dalby State School Goondiwindi State High School Goondiwindi State School Jandowae State School Jimbour State School Kaimkillenbun State School Kogan State School Lundavra State School Miles State High School Miles State School Millmerran State School Our Lady of the Southern Cross College Pittsworth State High School St Columba's Primary School St Joseph's Catholic School St Joseph's School St Mary's Parish Primary School Wandoan State School Warra State School
Media	Print (<i>Dalby Herald, Surat Basin News, Chinchilla News, Toowoomba Chronicle, Goondiwindi Argus, Pittsworth Sentinel and Queensland Country Life</i>) Broadcast (ABC Southern Queensland, 4AK/4WK, 4GR, Dalby FM 87.6, (Dalby community radio)) Television

2.0 Phase one consultation program and outcomes: September – December 2009

2.1 Introduction and purpose

Phase one of consultation commenced in early September 2009 and continued until the end of the year. It consisted of an intensive period of consultation and information sharing activities supported by awareness-raising of the consultation program and the EIS more generally. Specifically, activities included one-on-one briefings, 'drop-in' community displays and formal information sessions that involved presentations and questions from the audience. In addition, government agency and Arrow staff briefings were conducted.

Consultation activities were supported by a comprehensive communication and awareness program to ensure interested community members and stakeholders were aware of the consultation program and received information about the progress of the EIS. These activities ranged from an 8,000 plus letter mail-out to registered property owners within the project development area (including townships), advertising, promotion, hard copy and electronic information materials and display posters, banners and maps. Further details about these activities are provided in section 2.2.

Approximately 400 community members and stakeholders attended consultation activities. In addition, 27 one-on-one stakeholder briefings were held, and 58 Arrow staff and contractors attended sessions just prior to the community consultation. Many more community members contacted the project with questions, requests for information and to make comments. Some of these came directly to the project team via the freecall number and email address, whereas others came via Arrow staff.

2.2 Consultation program

2.2.1 Stakeholder briefings

JTA and Arrow conducted a number of one-on-one stakeholder briefings across the area with identified key stakeholders (Table 3).

Table 3 Stakeholder briefings phase one

Stakeholder	Role
Ray Hopper MP	Member for Condamine (LNP)
Howard Hobbs MP	Member for Warrego (LNP)
Lawrence Springborg MP	Member for Southern Downs (LNP)
Jeff Seeney MP	Member for Callide (LNP)
Michael Horan MP	Member for Toowoomba South (LNP)
Kerry Shine MP	Member for Toowoomba North (ALP)
John-Paul Langbroek	Leader of the Opposition (Member for Surfers Paradise)
Hon Stephen Robertson MP	Minister for Energy and Water Resources

Stakeholder	Role
Hon Tim Mulherin MP	Minister for Agriculture, Food and Regional Economies
Hon Stirling Hinchliffe MP	Minister for Infrastructure and Planning
Hon Kate Jones MP/Hon Vicky Darling	Minister for Environment and Resource Management
Cr Ray Brown	Mayor, Western Downs Regional Council (RC)
Cr Rob Loughnan	Mayor, Maranoa RC
Cr Peter Taylor	Mayor, Toowoomba RC
Cr Graeme Scheu	Mayor, Goondiwindi RC
Phil Berting	CEO, Western Downs RC
Ed Hoffman	Director, Economic and Community Development Western Downs RC
Cr Paul Antonio	Deputy Mayor, Toowoomba RC
Hon Bruce Scott MP	Electorate Division of Maranoa
Hon Ian Macfarlane MP	Electorate Division of Groom (incl Toowoomba)
Senator Barnaby Joyce	Senator for Queensland
Senator Bill Heffernan	Senator for NSW (Chair - Senate Select Committee on Agriculture and Related Industries)
John Farmer (editor)	<i>Dalby Herald</i> <i>Surat Basin News</i> <i>Chinchilla News</i>
Director General John Bradley	Department of Environment and Resource Management
Director General Ian Fletcher	Department of Employment, Economic Development and Innovation
Director-General Colin Jensen Keith Davies	Department of Infrastructure and Planning
Waanda McCarthy, Deputy Mining Registrar Mines & Energy	Department of Employment, Economic Development & Innovation

Note that in this table and subsequent ones, position titles and incumbents may have changed since the briefings were given

An agency briefing was held for Queensland Government regional officers in Toowoomba on 23 November 2009. Twenty-two agency representatives attended (see Table 4 below).

Table 4 Agency briefing phase one

Agency	Attendees
Department of Environment and Resource Management	Mr Andrew Biggs
	Ms Christine Juergensen
	Mr Ross Krebs, Regional Manager Water Services
	Mr Ed Power, Manager

Agency	Attendees
Department of Employment, Economic Development and Innovation	Mr John Thomas, State Valuation Services
	Mr Craig Rutledge, Acting Regional Director
	Mr Mike Lucy, Manager Regional Development and Trade
	Mr Greg Cumberland
	Mr Mike Jones, Director Regional Services
	Ms Wanita Judge, Regional Development Officer
	Ms Waanda McCarthy, Deputy Mining Registrar, Mines and Energy
	Mr Marc Morain, Senior Regional Development Officer
	Mr Ben Nowack, Employment and Indigenous Initiatives
	Ms Reagan Parle, Business and Industry Officer
	Ms Kristin Rose, Principal Regional Development Officer
	Ms Amanda Thomas, Senior Regional Development Officer
	Mr Nigel Winkler, Senior Employment Adviser
South Queensland Institute of TAFE	Mr Stephen Seymour, Industry Engagement Business Development
Qld Primary Industries and Fisheries	Ms Veronica Slizankiewicz, Senior Regional Development Officer

2.2.2 Information sessions

Formal information sessions were held in Dalby, Chinchilla and Millmerran (Table 5). Appendix 1 contains a sample letter of the invitation and agenda. A total of 721 invitation letters were sent to community and business groups, social service providers, government agencies (local and state) and other interested people.

Table 5 Details of information sessions phase one

Town	Date	Time	Location	Attendees
Dalby	Monday 23 November 2009	5pm - 8pm	Dalby RSL	33
Chinchilla	Tuesday 24 November 2009	5pm – 8pm	Chinchilla State High School	17
Millmerran	Wednesday 25 November 2009	5pm – 8pm	Millmerran Community and Cultural Centre	14
Total				64

In total, 64 people attended these sessions, which were organised and facilitated by JTA. Presentations by Arrow and Coffey (Appendices 2 and 3) provided an overview of the Surat Gas Project, a description of the EIS process, studies and issues, as well as information on how the community could be involved in the project. The presentations were followed by a feedback session including questions from attendees and responses from the project team. Appendix 4 contains a combined summary of all questions and responses from the three

information sessions. This summary was circulated to all invitees to the information sessions. Further detail of the issues raised by attendees is in section 2.2.5.

Attendees were given a suite of information materials including project-specific and government information sheets and ‘have your say’ forms. Large banners, detailed maps and a 3D model of a coal seam gas operation were also on display. Section 2.3 provides more detail of these initiatives.

2.2.3 Community displays

Drop-in community displays were held throughout the project development area (Table 6). The sessions targeted local landholders and community members and were structured to allow in depth one-on-one consultation with project staff. These sessions were attended by JTA staff and project team members from Arrow and Coffey. Each session ran for three to four hours and 332 people registered their attendance.

Table 6 Details of community displays Phase one

Town	Date	Time	Location	Attendees
Chinchilla	Tues 24 November 2009	10am - 2pm	Chinchilla RSL Sub Branch Hall	68
Millmerran	Wed 25 November 2009	10am - 2pm	Millmerran Community and Cultural Centre	58
Goondiwindi	Thur 26 November 2009	10am – 2pm, 4 – 7pm	Goondiwindi-Waggamba Community Cultural Centre	30
Cecil Plains	Fri 27 November 2009	1pm – 5pm	Cecil Plains Hall	45
Dalby	Sat 28 November 2009	10am – 2pm	Dalby RSL	50
Wandoan	Mon 30 November 2009	10am-2pm	Wandoan Community and Cultural Centre	9
Miles	Mon 30 November 2009	4pm – 7pm	Redeemer Lutheran Hall	23
Dalby	Tue 1 December 2009	10am – 2pm	Dalby RSL	49
TOTAL				332

The community displays provided an informal opportunity for any member of the public to ‘drop in’ and ask questions, provide feedback or gain information. The issues raised at these sessions were consistent with those raised at the information sessions as outlined in section 2.2.5.

The displays were well publicised and open to any member of the community to attend. A letter from Arrow’s CEO providing details of the displays was sent to 8,569 landholders in the project development area including people in the townships. In addition, the 721 stakeholders invited to the information sessions were given details of the displays and asked to promote them through their local networks. Some 290 display posters promoting the display details were put up in shops, libraries, and other prominent locations. Advertising and

promotion in the local media was also conducted in the weeks leading up to the displays. Section 2.3 provides more detail on the promotion strategy.

2.2.4 Staff information sessions

Information sessions were held for Arrow staff at the head office in Brisbane and in Dalby (Table 7). These two hour sessions included the same presentations as the information sessions held for the community in Dalby, Chinchilla and Millmerran, and provided an opportunity for staff to learn more about the project, to ask questions of the project team and to have input into the consultation process.

Table 7 Details of staff information sessions phase one

Date	Time	Location	Attendees
Friday 19 November 2009	11:30am – 1.30pm	Arrow Brisbane	27
Monday 23 November 2009	1pm – 3pm	Dalby RSL	31
Total			58

2.2.5 Key community and stakeholder issues and concerns

A high degree of consistency existed on issues and concerns raised across all activities in the consultation program. The issues which resonated most strongly with the community were around water and salt, and Arrow's dealings with landholders. A great deal of concern was expressed about the amount of water produced, potential impacts on groundwater and aquifers, produced water and salt management and potential impacts on fertile agricultural land. This reflects the predominantly agricultural base of the potentially impacted communities and speaks to concerns some in the community have about the impact of the CSG industry. These and other key issues raised during phase one consultation are summarised below.

Groundwater, water management and salt

- potential draw down of regional groundwater aquifers due to extraction of water from coal seams, both in terms of Arrow's project and the cumulative effect from other CSG operators
- CSG water, its treatment as a waste, options for beneficial use, and the need to identify a long term industry-wide solution
- salt production through reverse osmosis water treatment, the disposal of salt, evaporation ponds, the potential for contamination of land and water bores and increased salinity.

Landholder relations

- control of contractors in terms of land access and weed transfer between properties
- poor consultation by Arrow in the past and the need for more consultation
- adequacy of landholder compensation
- pipeline and infrastructure locations
- Arrow's environmental performance
- timelines for responses through the EIS process.

Good quality agricultural land

- impact on productive agricultural land, particularly intensively irrigated farmland, both in terms of loss of productivity, future farming practices and long term impacts to soil (particularly black soil)

Social, environment and community infrastructure

- traffic management and damage to roads
- social amenity/transport and traffic noise and dust
- impact on local infrastructure and services
- housing price inflation
- waste management
- community grants
- impact on critical habitat.

Business and employment opportunities

- workforce impacts, future skills base requirements and employment, training and business opportunities
- Indigenous employment opportunities and policies
- legacies and donations to local towns and communities

These were all issues under further investigation through the EIS and the community was assured that further information would be available about how these issues would be addressed as the project progressed.

2.3 Communication and awareness

The consultation program for phase one was supported by a comprehensive communication and awareness program to ensure interested community members and stakeholders were aware of the consultation program and received information about the proposed project and progress of the EIS. The activities and tools used for this program are summarised below.

2.3.1 Advertising and communication

(a) Newspaper advertising

To publicise the community displays, the EIS consultation program more generally, and the 1800 freecall number, email and website addresses, advertisements were placed in the *Dalby Herald*, *Toowoomba Chronicle*, *Chinchilla News*, *Goondiwindi Argus* and *Queensland Country Life*. Table 8 lists the publication dates. Copies of the advertisements are contained in Appendix 5.

Table 8 Advertising dates phase one

Newspaper	Publication Date
<i>Dalby Herald</i>	13, 17 & 20 November 2009
<i>Toowoomba Chronicle</i>	14 & 21 November 2009
<i>Chinchilla News</i>	12 & 19 November 2009
<i>Goondiwindi Argus</i>	18 & 25 November 2009
<i>Queensland Country Life</i>	19 November 2009

(b) Posters

Approximately 290 A3 sized posters (Appendix 6) were placed in strategic locations throughout Dalby, Chinchilla, Millmerran, Goondiwindi, Cecil Plains, Miles and Wandoan. These posters provided brief details of the project and outlined locations, dates and times of the community displays. They also included details of how the community could contact the project team through the 1800 freecall service, website, project email address and other avenues. In addition, electronic copies of A4 posters were emailed to local schools, business and community networks for inclusion in newsletters or other communication activities. These posters provided the same information as the A3 posters.

(c) Media release and radio community service announcements

A media release and radio community service announcement introducing the project and the EIS process, and giving details of the consultation activities, was prepared by JTA and sent to local radio stations including ABC Southern Queensland, 4AK/4WK, 4GR, and Dalby FM 87.6, (Dalby community radio station). Arrow's Corporate and Community Team sent the media release to local print and television media. The media release and community service announcement generated editorial coverage which proved a useful way to further promote the community displays and the 1800 freecall service.

(d) Invitation letters

Invitation letters (Appendix 1) from the Arrow Chief Executive Officer promoting the community displays were sent to 8,569 landholders in the EIS area. In addition, 721 stakeholders were invited to the formal information sessions as well as the community displays.

(e) Freecall 1800 number, website and project email

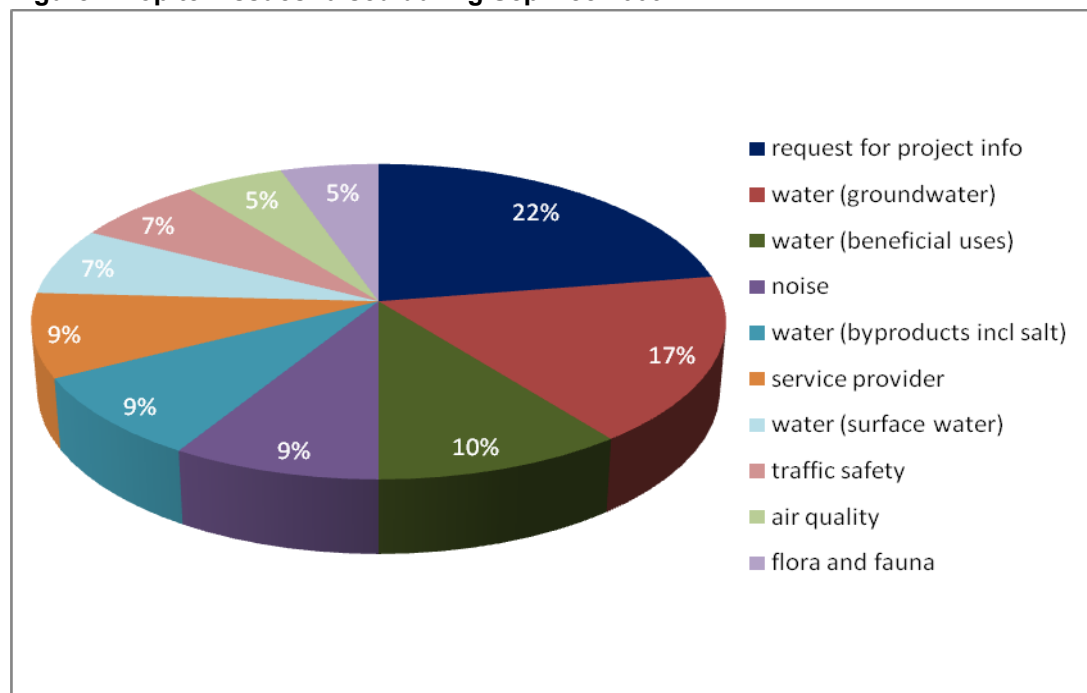
Throughout the EIS period JTA has managed an 1800 freecall service (1800 038 856) and an email information address (suratgas@arrowenergy.com.au) as well as a reply paid postal service. JTA used the Consultation Manager database to record, manage and track enquiries and action items for the project team. The database played an important role by recording details of individuals and groups with specific interests, influences or triggers that may have an impact on or from the project, and those who require additional attention. Actions arising from consultation events were issued via email to the relevant respondent and monitored via monthly *Outstanding Actions* reports.

During phase one, JTA received:

- seven enquiries via project email
- thirty enquiries via the 1800 number
- one letter
- five feedback forms

The top ten issues raised by stakeholders in the period September to December 2009 are shown in Figure 1 below.

Figure 1 Top ten issues raised during Sep-Dec 2009



Arrow managed the Surat Gas Project website at www.arrowenergy.com.au which included information on the project, the EIS process, and provided opportunities for involvement in the engagement and consultation program. Information sheets and details of community displays were also made available on the site. The address was widely advertised on all project materials and in the local media.

2.3.2 Printed information materials

(a) Information sheets

Three information sheets were developed for the program detailing all aspects of the Surat Gas Project. The sheets (Appendix 7) were used at stakeholder briefings, information sessions and community displays. They were displayed on the Arrow website and given to Arrow land agents to hand out during discussions with landholders. Multiple copies were also left in the Dalby and Brisbane offices of Arrow and held at JTA for stakeholder enquiries.

The information sheets included:

- *Overview*: a detailed overview of Arrow, the Surat Gas Project, CSG and the project development area
- *Environmental Impact Statement*: detailed information on the EIS process, studies and community involvement
- *Information for Landholders*: targeted specifically at landholders with pertinent information on the exploration and development process, authorities and permits, how Arrow works with landholders, and frequently asked questions.

(b) Government fact sheets

Government fact sheets on petroleum and gas exploration were also included as part of the suite of materials available to the community. The titles of these fact sheets included:

- *Exploration laws explained*

- *Code of conduct: procedures for sound landowner/explorer relations*
- *Petroleum survey and pipeline licences*
- *A guide for landowners and occupiers*

2.3.3 Banners

A series of three pull-up banners were prepared for use at the community displays (Appendix 8). These display banners included a map of the project development area, a schematic of the EIS, consultation and legislative processes, and a graphic overview of the CSG process. The banners were displayed at information sessions and community displays.

2.3.4 Fridge magnets

To raise awareness of the project and how the community could have input into the EIS process, coloured fridge magnets (Appendix 9) were developed for distribution at consultation events. The magnets contained details of the 1800 freecall service, website and project email addresses.

2.3.5 Coal seam gas DVD

An Australian Petroleum Production and Exploration Association (APPEA) DVD on CSG and LNG was available for viewing at community displays. Copies of the DVD were also available in information packs or for anyone requesting a copy through the 1800 freecall service, website and project email address.

2.4 Outcomes and findings

Phase one of the consultation program produced many valuable outcomes.

Stakeholder identification: interested stakeholders, residents and community members were identified and invited to participate in the consultation process. This enabled these groups to become engaged in the EIS and started an important process of education and awareness. A shared understanding of the project background, rationale and EIS methodology was established.

Introduction of Arrow and its activities: as a significant local business, employer and purchaser of goods, Arrow already had a presence in the area around Dalby. However, phase one of consultation introduced senior Arrow staff and the project team to the community in Dalby and throughout the project development area, helped identify key community issues with the project and commenced a useful two-way dialogue.

Identification of key issues: as outlined in section 2.2.5, a number of common themes and issues emerged during consultation. Arrow recognised the need to provide greater clarity to the community around these issues in order to address people's concerns about the project.

Specialist study input: phase one of the consultation program also provided an opportunity for local knowledge to be included into the EIS specialist studies and helped identify those issues that were of greatest concern to the community. For example, in the month following the sessions a number of community representatives who attended consultations were later invited to participate in focus groups held as part of the social impact assessment. Individual

discussions were also held by Arrow with some community members and businesses that had raised specific issues or impacts.

Platform for ongoing consultation: through the identification of issues and stakeholders in phase one Arrow was able to build a platform for future consultation that was more adaptive to community needs.

Approach to phase two: feedback from phase one helped prioritise, schedule and plan the next phase of consultation. It also indicated where additional information was needed and the priority areas for Arrow in terms of further studies. Phase two consultation was Arrow's first opportunity to respond to community concerns and demonstrate progress made.

3.0 Phase two consultation program and outcomes: January – June 2010

3.1 Introduction and purpose

Phase two consultation activities commenced in January 2010 and continued through to June 2010. One of the challenges of this phase was the offer by Royal Dutch Shell and PetroChina for Arrow Energy in March 2010, which was not finalised until a shareholder vote in July 2010, with completion in August 2010. Changes in the scope of the Surat Gas Project as a result of the takeover resulted in an extension of the initial timeline for the EIS.

The focus of this phase was to update the community on the project's progress, to articulate a set of commitments which outlined how Arrow intended to address key issues and concerns identified during phase one, and to provide an opportunity for interested people to ask questions of the project team.

The strategic approach for this round of consultation activities was subject to rigorous debate and consideration by the project team. The general consensus was to move away from the approach adopted in round one where the more detailed presentation-style events were invitation only and the casual drop in sessions were open to the whole community. The project team responded to the feedback from phase one and recognised the potential tensions created in the community when some people received invitations to the presentation-style events while their neighbours and friends did not.

The operating environment for the project had also changed since phase one. It was apparent that CSG now had a much greater profile in the project development area and increasing concerns about it had given rise to frustration, opposition and confusion within the community about some aspects of the CSG process. The project team recognised the importance of directly addressing key issues and concerns with the community in an open and transparent way. The consultation process was therefore based around community concerns and Arrow's response. The project team's understanding of these issues was informed in part from the previous round of consultation, ongoing feedback, media and various community forums. Being able to deliver information that addressed concerns to everyone who showed an interest in the project was viewed more favourably than only having the opportunity to do this with a smaller 'invited' audience, or on an *ad hoc* basis.

With these considerations in mind, it was decided to expand the two types of events (invitation-only information sessions and open public displays) into an open community information session with the flexibility for the team to do formal presentations depending on the number and interests of attendees. The length of sessions was extended in some locations (e.g. Dalby) to allow additional time for people to participate. The number of information banners was significantly increased to cover key issues and two new information sheets were developed. The aim was to meet the varied information needs of the community. Approximately 3,000 invitation letters were sent to all affected and interested persons as well as everyone listed on the Consultation Manager database. The number of letters sent decreased in number as landholders in each of the main townships were

removed from the database to refine the project development area (i.e. people living on small blocks in the towns would not be affected by the Arrow project).

The project team also recognised the need to have an open and transparent dialogue with the community and to directly address its key concerns, particularly around working with landholders and water and salt management. The displays provided an opportunity for in-depth discussion with the project team around specific circumstances. The presentations, while not to the same level of detail, articulated a range of commitments on how Arrow intended to improve its work practices and its interaction with the community.

3.2 Consultation program

3.2.1 Stakeholder briefings

As in phase one, JTA and Arrow conducted a number of one-on-one stakeholder briefings across the area with identified key stakeholders. These briefings are listed in Table 9 below.

Table 9 Stakeholder briefings phase two

Stakeholder	Role
State Elected Representatives	
Ray Hopper MP	Member for Condamine (LNP)
Howard Hobbs MP	Member for Warrego (LNP)
Lawrence Springborg MP	Member for Southern Downs (LNP)
Jeff Seeney MP	Member for Callide (LNP)
Michael Horan MP	Member for Toowoomba South (LNP)
John-Paul Langbroek	Leader of the Opposition (Member for Surfers Paradise)
Local Council	
Cr Ray Brown	Mayor, Western Downs RC
Phil Berting	CEO, Western Downs RC
Mr Ed Hoffmann	Director, Economic & Community Development
Mr Graham Cook	Director, Engineering Services
Cr Paul Antonio	Deputy Mayor, Toowoomba RC
Cr Graeme Scheu	Mayor, Goondiwindi RC
Cr Rick Kearney	Deputy Mayor, Goondiwindi RC
Cr Rob Loughnan	Mayor, Maranoa RC
Media	
Alistair Silcock	Pittsworth Sentinel
Qld Government departments	
Agency briefing	Approx ten state government agency representatives from Dalby/Toowoomba/Roma

Stakeholder	Role
Deputy Mining Registrar Mines & Energy	Department of Employment, Economic Development & Innovation Waanda McCarthy, Deputy Mining Registrar away. Janet Hogarth acting in position. Briefed at consultation session
Chinchilla State High	Judith Guzzell, Principal
Miles State High	John Searle, Principal
Wandoan State P-10	John Bosward, Principal
Millmerran State P-10	Amy McCulloch, Deputy
Our Lady of the Southern Cross, Dalby	John Hegarty, Principal
Cecil Plains State P-10	Mick Cassidy, Principal
Goondiwindi State High	Brett Hallett, Principal
Arrow Brisbane	Two sessions held with approximately 30 staff members at each
Arrow Dalby	Approximately 40 staff attended; combined with staff awards

3.2.2 Community Information Sessions

Eight information sessions were held at seven locations in the project development area (Table 10). The sessions were well publicised and open to any member of the community to attend. Invitation letters were sent to 3,040 stakeholders listed on the Consultation Manager (CM) database. These stakeholders included people who were invited to and/or had attended phase one consultation and additional stakeholders who had been added to CM since phase one. Appendix 10 contains a sample letter of invitation. Display posters promoting the session details were put up in 128 venues, including shops, libraries, and other prominent locations. Advertising and promotion in the local media was also conducted in the weeks leading up to the sessions. Section 3.3.1 provides more detail on the promotional strategy.

Table 10 Details of community information sessions phase two

Town	Date	Time	Location	Attendees
Chinchilla	Tuesday 15 June 2010	2.00-7.00pm	RSL Sub Branch	68
Miles	Wednesday 16 June 2010	11.00am-2.00pm	Leichhardt Centre	34
Wandoan	Wednesday 16 June 2010	11.00am-2.00pm	Community & Cultural Centre	13
Dalby	Thursday 17 June 2010	10.00am-4.00pm	Showground Pavilion	102
Millmerran	Friday 18 June 2010	10.00am-2.00pm	Community & Cultural Centre	49
Dalby	Monday 21 June 2010	1.00-5.00pm	Showground Pavilion	36

Town	Date	Time	Location	Attendees
Cecil Plains	Tuesday 22 June 2010	10.00am-3.00pm	Cecil Plains Hall	107
Goondiwindi	Wednesday 23 June	9.00am-12.00pm	Training & Technology Centre	36
Total				445

**Note that the figures for those attending include only people who registered; at all sessions there were always some people who did not register.*

Some 445 people registered at the community information sessions as compared with 396 people who attended consultation activities in phase one. As Table 11 shows, fewer people attended the sessions at Chinchilla and Millmerran in phase two and more than double attended the Cecil Plains session.

The marked increase in attendance at Cecil Plains and the increased number of attendees across the sessions might have reflected the rising profile of CSG and community concerns in areas of intensively farmed agricultural land.

Table 11 Comparison of attendance in phases one and two 2010

Location	Phase one (2009)		Total	Phase two (2010)
	Stakeholder briefing session	Community display		Community information session
Dalby	33	99	132	138
Chinchilla	17	68	85	68
Millmerran	14	58	72	49
Cecil Plains		45	45	107
Wandoan		9	9	13
Miles		23	23	34
Goondiwindi		30	30	36
Grand total			396	445

As indicated previously, the project team adopted a different strategic approach to this consultation in response to the need for greater inclusiveness and to convey key information to the community as a whole. The structure of the sessions combined two key elements: an opportunity for interested people to drop in any time and talk one-on-one with the project team and an opportunity for the project team to do presentations to the group as a whole, followed by questions and answers. Formal presentations occurred at all sessions except Millmerran and Wandoan where attendance numbers were limited at any one time. All information sessions allowed ample time for people to talk individually with members of the project team, many of whom were senior technical and management staff.

Presentations by Arrow (Appendix 11) provided an overview of project developments and the EIS process and articulated a range of commitments by Arrow on improvements to work practices and its interactions with the community. The presentations were followed by a feedback session with questions from attendees and responses from the project team.

Appendix 12 contains a combined summary of all questions and responses from the sessions which was circulated to all attendees. Further detail of the issues raised by attendees is in section 3.2.5.

Attendees were given a suite of information materials including project-specific fact sheets, government information sheets and 'have your say' forms. Large banners, detailed maps and a 3D model of a CSG operation were also on display. Section 3.3 provides more detail of these initiatives.

3.2.3 Staff information sessions

Information sessions were held for Arrow staff in Brisbane and in Dalby. These sessions included the same presentations as those held for the community in the subsequent community information sessions, and provided an opportunity for staff to learn more about the project, to ask questions of the project team and to have input into the consultation process.

3.2.4 Key community and stakeholder issues and concerns

The issues raised by attendees were similar to those raised in phase one. The main differences in this round were that attendees demonstrated a greater awareness about the potential environmental impacts of the project, focussed more on Arrow's approach with landholders and asked more questions about the regulatory framework and technical nature of CSG operations, particularly how exploration and production wells are drilled. Again, concerns were expressed about the amount of water produced, impact on groundwater and aquifers, water and salt management and potential environmental and economic impacts on fertile agricultural land.

A number of landholders also expressed concern at the levels of stress that potential CSG operations on their land were introducing to their lives. This manifested itself in anxiety about disruption to amenity and lifestyle and the security of the financial investments in their properties and farming operations. A number of landholders said they felt they 'had no choice' but to engage with CSG companies because of the rights available to petroleum and gas companies under the Petroleum and Gas (Production & Safety) Act to gain access to private land. The process of engagement itself potentially caused more stress to those already concerned about CSG.

Key issues raised across all consultation activities are summarised below.

Groundwater, water management and salt

- Great Artesian Basin Resource Plan, water entitlements and the direct and cumulative impact of the CSG industry on groundwater aquifers, particularly draw down that may occur due to the natural connectivity of aquifers
- water production and transport, use of treated water, evaporation ponds, reinjection, salt production
- water regulation

Landholder relations

- recognition of business and lifestyle impacts on landholders, and the uncertainty CSG operations can introduce for future farm planning and economic investments
- compensation for use of land and impact on its value
- compensation for time spent consulting with CSG operators
- cumulative impacts, compensation for indirect impacts
- land access, easements
- quality of subcontractors and rehabilitation of land
- Arrow's position re development on fewer than five acre blocks

Good quality agricultural land

- impacts on farming land, particularly good quality agricultural land.

Social, environment and community infrastructure

- employment impacts, workers' camps, lighting and noise impacts from operations
- proximity of development to towns and infrastructure
- potential for shared infrastructure amongst other CSG companies.

Business and employment opportunities

- workforce impacts, future skills base requirements and employment, training and business opportunities
- legacies and donations to local towns and communities.

Technical and regulatory

- location of the development area, existing and proposed operations, understanding of rights under Authorities to Prospect (ATP) and Petroleum Leases (PLs)
- well spacing, safety of well construction and gas extraction, life expectancy of well production and plugging wells
- fracking process and why fracking is not required within the Surat Gas Project development area
- conversion of exploration and production wells to groundwater bores
- independent monitoring of project and quality assurance
- subsidence caused by the removal of coal seam water
- impacts from use of chemicals
- alternative drilling methods
- potential gas leaks

3.3 Communication and awareness

The consultation program for phase two was supported by a communication and awareness program, similar to that for phase one. New information materials were developed as a response to concerns expressed by the community during phase one.

3.3.1 Advertising and communication

(a) Newspaper advertising

To publicise the community feedback sessions, advertisements were placed in the *Dalby Herald*, *Toowoomba Chronicle*, *Chinchilla News*, *Northern Downs News*, *Pittsworth Sentinel*, *Queensland Country Life* and *Goondiwindi Argus*. Table 12 outlines the publication dates. Copies of the advertisements are contained in Appendix 13.

Table 12 Schedule of newspaper advertisements June 2010

Newspaper	Placement date
<i>Chinchilla News</i>	Thursday 3 June 2010 Thursday 10 June 2010
<i>Toowoomba Chronicle</i>	Saturday 5 June 2010 Saturday 12 June 2010
<i>Dalby Herald</i>	Tuesday 8 June 2010 Friday 11 June 2010 Tuesday 15 June 2010 Friday 18 June 2010
<i>Northern Downs News</i>	Thursday 3 June 2010 Thursday 10 June 2010
<i>Pittsworth Sentinel</i>	Wednesday 9 June 2010 Wednesday 16 June 2010
<i>Goondiwindi Argus</i>	Wednesday 9 June 2010 Wednesday 16 June 2010
<i>Queensland Country Life</i>	Thursday 10 June 2010

(b) Posters

Approximately 130 A3 sized posters (Appendix 14) were distributed to prominent local venues throughout Dalby, Chinchilla, Millmerran, Goondiwindi, Cecil Plains, Miles and Wandoan. These posters provided brief details of the project and outlined locations, dates and times of the community information sessions. They also included details of how the community could contact the project team including through the 1800 freecall service, website and project email addresses. In addition, electronic copies of A4 posters were emailed to local schools, business and community networks for inclusion in newsletters or other communication avenues. These posters provided the same information as the A3 posters.

(c) Media release and radio community service announcement

A media release and radio community service announcement giving details of the consultation activities was prepared by JTA and sent to local radio stations including ABC Southern Queensland, 4AK/4WK, 4GR, and Dalby FM 87.6 (Dalby community radio station). Arrow sent the media release to local print and television media. The media release and community service announcement generated editorial coverage which proved a useful way to further promote the community displays and the 1800 freecall service.

(d) Invitation letters

Over 3,000 invitation letters (Appendix 10) were sent to stakeholders listed on the CM database. Stakeholders were requested to promote the sessions throughout their networks.

(e) Freecall 1800 number, website and project email

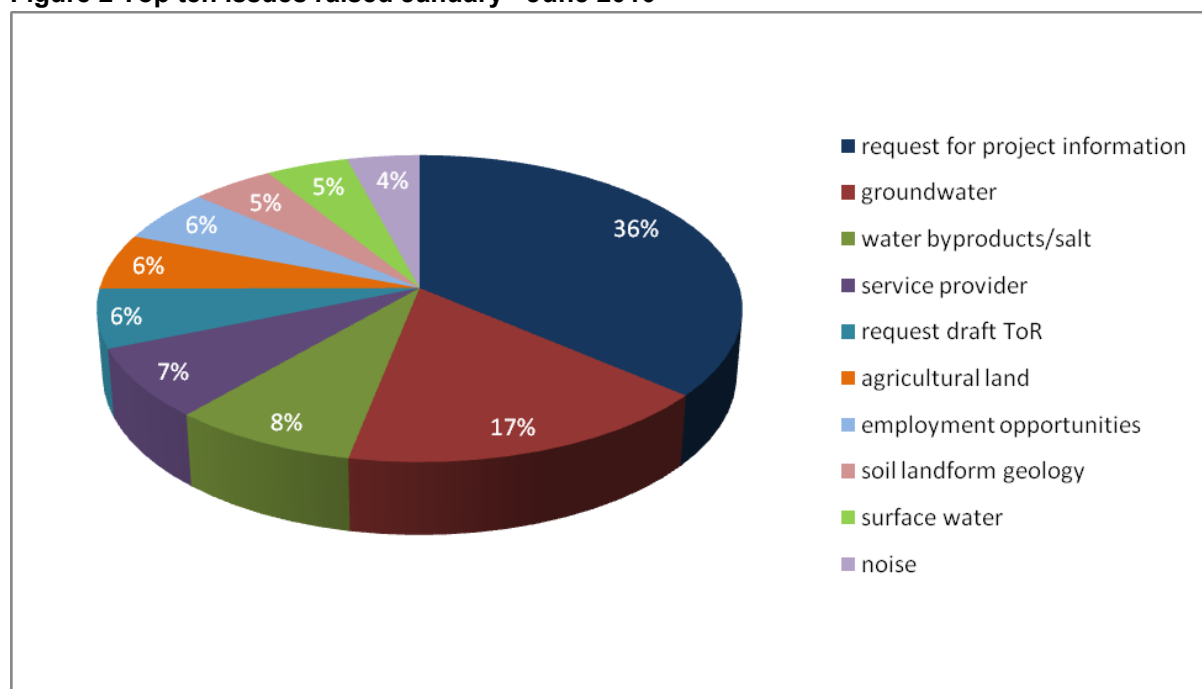
As outlined in section 2.3.1 (f), throughout the duration of the project JTA managed an 1800 freecall service (1800 038 856) and an email address (suratgas@arrowenergy.com.au) as well as a reply paid postal service. Consultation Manager was used to record, manage and track enquiries and action items for the project team. The database played an important role by recording details of individuals and groups with the specific interests, influences or

triggers that may have an impact on or from the project, and those who require additional attention. Actions arising from consultation events were issued via email to the relevant respondent and monitored via monthly *Outstanding Actions* reports.

During phase two, JTA received 125 calls on the 1800 freecall line, 25 project emails and 8 letters.

The top ten issues raised by stakeholders in the period January to June 2010 are shown in Figure 2 below.

Figure 2 Top ten issues raised January - June 2010



Arrow managed the website (www.arrowenergy.com.au) which included information on the project, the EIS process, and provided opportunities for involvement in the engagement and consultation program. Information sheets and details of community feedback sessions were also made available on the site. The address was widely advertised on all project materials and in the local media.

3.3.2 Printed information materials

(a) Information sheets

The three information sheets which were developed for phase one were also distributed during phase two (outlined in Section 2.3.2 and at Appendix 7). Two new information sheets which focussed on water and salt management and fracking were developed in response to the key issues and concerns being raised by the community. In addition, two others were developed which provided information on employment and business opportunities and details on how to contact Arrow. The information sheets are included in Appendix 15.

All the information sheets were assembled into bags and distributed at stakeholder briefings and community sessions. They were displayed on the Arrow website and given to Arrow

land agents to hand out during discussions with landholders. Multiple copies were also left in Arrow's Dalby and Brisbane offices and held at JTA for stakeholder enquiries.

The information sheets included:

- *Water and salt management*: a detailed overview of the CSG extraction process, water and salt management options, water use options, water treatment and regulation
- *Fracking*: detailed information on the hydro-fracture process, fracking fluids and groundwater
- *Employment and business*: information on employment and business opportunities
- *Get involved in the Surat Gas Project*: information on how to contact Arrow and the Queensland Government.

(b) Maps

The overall project map was also available in the information sheets. As part of the drop-in-session, the land team had a series of more detailed maps on display for landholder enquiries. Display banners also included maps of good quality agricultural land and traffic impacts in the project development area.

(c) Government fact sheets

Government fact sheets on petroleum and gas exploration were also made available to the community. Some of these fact sheets included:

- *Exploration laws explained*
- *Code of conduct: procedures for sound landowner/explorer relations*
- *Petroleum survey and pipeline licences*
- *A guide for landowners and occupiers*

3.3.3 Banners

The use of pull-up banners was significantly ramped up in this phase to provide a mechanism for attendees to access condensed and easily digested information about all aspects of the project. In addition to the three pull-up banners which were prepared for phase one (outlined in 2.3.2 and at Appendix 8), an additional thirteen banners were produced (Appendix 16) which focussed on:

- Community investment
- The Surat Gas Project
- What is an Environmental Impact Statement
- EIS Studies
- Traffic and roads
- EIS groundwater study
- Water and Salt Management
- Managing groundwater impacts
- What does 'make good' mean
- Working with landholders
- Good quality agricultural land map
- Good quality agricultural land
- Employment and workforce

The banners were displayed at all community information sessions.

3.3.4 Fridge magnets

The coloured fridge magnets developed for phase one were distributed again during phase two consultation activities. The magnets (Appendix 9) contained details of the 1800 freecall service, website and project email address.

3.3.5 Coal seam gas DVD

A DVD on coal seam gas and liquefied natural gas (produced by the Australian Petroleum Production and Exploration Association) was available for viewing at information sessions. Copies of the DVD also were available for interested people.

3.4 Outcomes and findings

Phase two produced many valuable outcomes.

Expanded consultation strategy: all consultation activities in this phase were open to the public. The project team demonstrated a flexible and open approach, taking on board issues raised by the community and adapting its presentations and responses to improve the information supplied. Stakeholders had the opportunity to talk one-on-one with the project team and also to be part of an audience where senior management representatives of Arrow provided answers to any issues and concerns raised by attendees.

Commitments around key issues of concern: the project team recognised the need to provide greater clarity to the community around a number of critical issues in order to address people's concerns about the project. Arrow's articulation of a set of commitments (Appendix 17) in response to the main areas of concern received positive feedback from the community.

Building an understanding of Arrow and its activities: the project team continued its dialogue with many of the stakeholders already identified in phase one and, as indicated by numbers above, was able to expand this to include many additional community members who did not attend phase one. In addition, the new focus on engaging with local schools provided an opportunity to commence a two-way dialogue with both teaching staff and students on curriculum opportunities that go beyond vocation and include case studies for areas such as geology and the environment.

Specialist study input: this phase continued to emphasise the importance of ensuring local knowledge informed the specialist studies and helped identify those issues of greatest concern to the community (e.g. potential impacts on farming land have informed the agricultural specialist study). No detailed results of specialist studies were presented, as the Shell and PetroChina acquisition of Arrow (in August 2010) led to new project description for the Project and a hold was placed on impact modelling while the new project description was finalised.

Approach to phase three: Arrow's commitments made during phase two set clear guidelines for areas of improvement and further technical investigations. The next phase of consultation required transparent and detailed updates to the community on Arrow's progress in these areas.

4.0 Phase three consultation program and outcomes: July – December 2010

4.1 Introduction and purpose

Phase three consultation activities commenced in July 2010 and continued through to December 2010. This phase included Arrow's takeover by a joint venture between Royal Dutch Shell and PetroChina on 23 August 2010 which delayed some EIS activities and extended the timeline. As a result, significant results from specialist studies were not available to present to the public in full. Rather, the focus of this phase was to update the community on the progress of commitments made in May, the manner in which Arrow intended to continue to address key issues and concerns and to provide an update on the EIS.

Post-June 2010, the profile of CSG and concerns around it continued to increase in the community. Media reports on potential CSG impacts and farmers' concerns were reported almost daily in rural press and the oil shale industry in the United States was also being referenced frequently. In early November 2010, a documentary (*Gasland*) on detrimental effects from the US oil shale industry was released in Queensland, which received significant media and stakeholder interest.

The strategic approach for this round of consultation activities was continuation of the approach adopted in phase two, where information sessions were open to the whole community. A more formalised approach was taken, however, as Arrow now had a greater understanding of the community and its concerns. There was less flexibility in the number, length and type of sessions due to harvest season, school holidays and proximity to the end of year.

In each locality one session was held that included a formal presentation, question and answer time and opportunity for one-on-one discussions with the project team. The presentation provided an update on the project, the EIS and commitments. Changes in legislation and Arrow's practices in relation to land access, compensation and community engagement were also communicated.

In particular, the sessions highlighted to the whole community the steps Arrow had taken in improving land access procedures and the formation of the Arrow Surat Community Reference Group and the Arrow Intensively Farmed Land Committee. Arrow also addressed concerns raised in the *Gasland* documentary as well as concerns regarding BTEX chemicals.

A detailed update was provided in relation to water and salt, particularly legislative changes, Arrow's water monitoring and modelling program, and beneficial use and disposal options.

Banners and information sheets were updated to provide the most current information to the community and reflect changes in the project's ambit since phase one. Approximately 3,130 invitation letters were sent to all affected and interested persons as well as everyone listed

on the Consultation Manager database. Additional emails were sent to local school principals for distribution to their community networks.

Approaches were made to a range of stakeholders to gauge interest in receiving one-on-one briefings (such as the Mayors of the Western Downs and Goondiwindi Regional Councils and the Deputy Mayor of Toowoomba Regional Council). However, all stakeholders contacted declined because they felt they had received adequate information about the project during previous briefings.

Again, a number of landholders and their partners described the levels of anxiety and stress they were experiencing because of coal seam gas operations on their land. This manifested itself in concerns over disruption to amenity and lifestyle and, critically, the security of financial investments in their properties and farming operations.

4.2 Community Committees

Two community committees were formed in phase three as part of the broader engagement strategies to help address local issues.

4.2.1 Arrow Surat Community Reference Group

The Arrow Surat Community Reference Group (ASCRG) was formed to provide a strong consultative forum for community and industry groups as Committee members previously felt their critical (and quite unique) issues were not being addressed in the broader consultation program. The committee meets each alternate month under the auspices of an Arrow Chairman. The Terms of reference for the ASCRG are contained in Appendix 18.

The membership of the ASCRG is as follows:

- Leisa Elder, Vice President, Community and Corporate Affairs, Arrow Energy
- Mike Ward, Vice President, Well Delivery, Arrow Energy
- Feng Jianhua, Chief Operating Officer, Arrow Energy
- Greg Kulawski, General Manager, Access, Approvals & Water, Arrow Energy
- Carolyn Collins, Manager, Environment, Arrow Energy
- Sarah Delahunty, Senior Community Officer, Dalby, Arrow Energy
- Ross Dunn, Director, Australian Petroleum Production and Exploration Association (APPEA)
- Ian Hayllor, Basin Sustainability Alliance
- Geoff Hewitt, Future Food Qld
- Gordon Baker, Cotton Australia
- Cr Mick Cosgrove, Deputy Mayor, Western Downs Regional Council
- Cr Ray Jamison, Western Downs Regional Council
- Cr Paul Antonio, Deputy Mayor, Toowoomba Regional Council
- Stuart Copeland, University of Southern Queensland
- Graeme Clapham, President, Central Downs Irrigators
- Andrew Rushford

During phase three two meeting of the ASCRG were held as follows:

- 6 October 2010
- 8 December 2010

Minutes for the meeting of the ASCRG held during phase three are included in Appendix 19.

4.2.2 Arrow Intensively Farmed Land Committee

The Arrow Intensively Farmed Land Committee (AIFLC) was formed to identify issues of importance to black soil and other intensive farmers in a timely manner, provide feedback immediately, and give informed consideration to procedural and systemic improvements, opportunities and initiatives. This committee meet initially each month now bi-monthly and considers opportunities to co-create a plan for co-existence between CSG and farming. The Terms of Reference of the AIFLC are contained in Appendix 20.

The membership of the AIFLC is as follows:

- Bryan O'Donnell, General Manager, Surat Development
- Darren Stevenson, Asset General Manager (South)
- Caoilin Chestnutt, Exploration Manager (South)
- Jason Schroeder, Production Manager (South)
- Gerard Coggan, EIS Manager
- Andrew Thompson, Operations and Project Support Manager (Environment)
- Glenda Viner, Community Manager
- Jonny Shirley, Field Development Manager (South)
- Julian Leonard, Land Manager
- Dave Armstrong, Landholder
- Graham Clapham, Landholder
- Jamie Grant, Landholder
- Jeff Bidstrup, Landholder
- John Cameron, Landholder
- Paul McVeigh, Landholder
- Wayne Newton, Landholder
- Stuart Armitage, Landholder
- Jan Lafrenz, Landholder
- Charlie Mort, Landholder

During phase three the AIFLC met three times, as follows:

- 6 October 2010
- 4 November 2010
- 9 December 2010

Minutes for the AIFLC meetings held during phase three are included in Appendix 21.

4.3 Consultation program

4.3.1 Stakeholder briefings

A range of stakeholders (such as the Mayors of the Western Downs and Goondiwindi Regional Councils and the Deputy Mayor of Toowoomba Regional Council) were

approached to gauge their interest in receiving one-on-one briefings. However, all stakeholders contacted declined because they felt they had received adequate information about the project during previous briefings.

Many of the key stakeholders attended the information sessions for at least part of the time, and, in addition many became members of the two community committees during phase three.

4.3.2 Community Information Sessions

One community information session was held at each of the seven locations in the project development area (Table 13). The sessions were publicised and open to any member of the community to attend. Invitation letters were sent to 3,130 stakeholders listed on the Consultation Manager (CM) database. These stakeholders included people who were invited and/or had attended phases one and two of consultation, and additional stakeholders who had been added to CM since phase one. Appendix 22 contains a sample letter of invitation.

Display posters promoting the session details were sent to 123 venues, including shops, libraries, and other prominent locations. Advertising and promotion in the local media and community networks was conducted in the weeks leading up to the sessions. Section 4.4.1 provides more detail on the promotional strategy.

Table 13 Details of community information sessions phase three

Town	Date	Time	Location	Attendees
Wandoan	Monday 22 November 2010	5.30pm – 8.30pm *presentation 6pm	Community & Cultural Centre	26
Miles	Tuesday 23 November 2010	10.30am – 1.30pm *presentation 11am	Leichhardt Centre Columboola Function Room	49
Chinchilla	Tuesday 23 November 2010	5.30pm – 8.30pm *presentation 6pm	RSL Sub Branch	65
Dalby	Wednesday 24 November 2010	10.30am – 1.30pm *presentation 11am	Dalby Showground	92
Cecil Plains	Wednesday 24 November 2010	5.00pm – 8.00pm *presentation 5.30pm	Cecil Plains Hall	73
Millmerran	Thursday 25 November 2010	10.30am – 1.30pm *presentation 11am	Community & Cultural Centre	33
Goondiwindi	Friday 26 November 2010	9.00am – 12.00pm *presentation 9.30am	Goondiwindi Waggamba Community Cultural Centre	21
TOTAL				359

**Note that the figures for those attending include only people who registered; at all sessions there were always some people who did not register.*

Some 359 people registered at the sessions. This compares with 396 people who attended consultation activities in phase one and 445 who attended phase two. As Table 14 shows, fewer people attended the sessions at Dalby, Cecil Plains and Millmerran in phase two and more attended Wandoan and Miles.

Table 14 Comparison of attendance in phases one, two and three

Location	Round 1 (Nov 2009)			Round 2 (Jun 2010)	Round 3 (Nov 2010)
	Community information session	Community display	Total	Community information session	Community information session
Dalby	33	99	132	138	92
Chinchilla	17	68	85	68	65
Millmerran	14	58	72	49	33
Cecil Plains	-	45	45	107	73
Wandoan	-	9	9	13	26
Miles	-	23	23	34	49
Goondiwindi	-	30	30	36	21
Grand total			396	445	359

The strategic approach for this round of consultation activities was continuation of the process adopted in phase two, where feedback sessions were open to the whole community. A more formalised approach was taken, however, as Arrow now had a greater understanding of the community and concerns. The sessions included three advertised elements: formal presentation, question and answer time and one-on-one discussions (formerly community displays). The format was consistent in each location.

In each location, the venue was arranged to separate the formal (presentation and question and answer) and informal elements (one-on-one discussions). The room was either divided into two or in some locations a hall and reception area were used. The presentation and question and answer forum were theatre style and the informal discussions were set up as round table discussions with relevant banners and materials and appropriate technical experts. Lead areas for the one-on-one discussions were land and water and specific tables were allocated to these topics.

The presentation (Appendix 23) provided an update on the project, the EIS and commitments. Changes in legislation and Arrow’s practices in relation to land access, compensation and community engagement were also communicated. In particular, the sessions highlighted to the whole community the steps Arrow had taken in improving land access and the formation of the Surat Community Reference Group and the Arrow Intensively Farmed Land Committee (AIFLC). Arrow also addressed concerns raised in the *Gasland* documentary and frequent concerns raised regarding BTEX group of chemicals (Benzene, Toluene, Ethyl-Benzene and Xylene). A detailed update was also given in relation to water and salt. In particular, legislative changes, Arrow’s water monitoring and modelling program and beneficial use and disposal options were covered.

One-on-one discussions were held at the beginning of each session as well as after the question and answer period. The sessions went for as long as community members were in attendance. Attendees were given a suite of information materials including Arrow project-specific information sheets and government fact sheets. Large banners and detailed maps were also on display

4.3.3 Staff information sessions

Information sessions were held for Arrow staff in Brisbane and in Dalby prior to the community information sessions held in the project development area. These sessions included the presentation given at the subsequent community information sessions, and gave staff an opportunity to learn more about the project, to ask questions of the project team and to have input into the consultation process.

4.3.4 Key community and stakeholder issues and concerns

While the issues identified were fairly consistent with phases one and two the level of detail and understanding within the community had significantly increased. This was particularly so in Dalby and Cecil Plains.

Some members of the community expressed frustration with Arrow's past performance (particularly as it related Arrow's current commitments) or make acceptable progress in key areas of concern (such as development of a groundwater monitoring program). Again, concerns around land access and groundwater impacts were prominent. Appendix 24 contains a summary of all questions and responses from the seven consultation sessions; this was circulated to all attendees.

The depth of questioning around water management, groundwater impacts, interconnectivity and salt removal increased from phases one and two as did the requirement for more technical detail around drilling and testing. Concerns around the use of the group of chemicals known as BTEX (benzene, toluene, ethyl-benzene and xylene) also featured.

The issue of impacts on social infrastructure were raised more often in phase three. Concerns were noted around Arrow's consultation (or perceived lack of it) with local councils, road maintenance and community investment. Another area that received more attention was the issue of liability in terms of insurance for landholders (when Arrow contractors were on their land) and Arrow's ability to financially cover potential impacts.

Landholder impacts were a consistent concern. While the Land Access Code was discussed, concerns over disruption to amenity and lifestyle, as well as the security of landholders' financial investments in their properties and farming operations were again prominent. This was most prevalent in Dalby and Cecil Plains where some members of the community asked for a moratorium on CSG and for landholders to 'lock the gate' because of concerns about CSG operations on high value intensively farmed agricultural land.

Key issues raised across all consultation activities are summarised below.

Groundwater, water management and salt

- potential impacts of interconnectivity on the Great Artesian Basin and Walloon Coal Measures
- water entitlements and the direct and cumulative impact of the coal seam gas industry on groundwater aquifers
- water production and transport, use of treated water, evaporation ponds, reinjection, salt production and disposal and integrity of water storage ponds
- irrigation and reinjection
- extent of water monitoring program and third party auditing
- 'make good' provisions and longer term impacts
- BTEX chemicals in the water supply

Landholder relations

- recognition of business and lifestyle impacts on landholders, and the uncertainty coal seam gas operations can introduce for landholders in future farm planning and investments
- compensation for any negative CSG impacts on land use and consequent impact on land value
- compensation for time spent consulting with coal seam gas operators
- cumulative impacts, compensation for indirect impacts
- land access, easements and the Land Access Code
- quality of subcontractors and rehabilitation of land
- Arrow's position on drilling on fewer than five acre blocks
- lack of confidence in the government to protect landholder rights
- devaluation of property
- spread of weeds
- impacts from construction and maintenance of pipelines
- child safety in relation to Arrow workforce on private property
- Land Court

Good quality agricultural land

- impacts on farming land, particularly high value intensively farmed agricultural land
- strategic cropping land

Social, environment and community infrastructure

- employment impacts, workers' camps, lighting and noise impacts from operations
- proximity of development to towns and infrastructure
- potential for shared infrastructure amongst other CSG companies
- road maintenance
- community investment
- workforce limiting accommodation options for tourism
- consultation with local council

Business and employment opportunities

- workforce impacts, future skills base requirements and employment, training and business opportunities
- legacies and donations to local towns and communities

Technical and regulatory

- location of the development area, existing and proposed operations, understanding of rights under Authorities to Prospect (ATP) and Petroleum Leases (PLs)
- well spacing, safety of well construction and gas extraction, life expectancy of well production, and plugging wells

- drilling techniques and testing regime
- chemicals used in drilling
- fracking process and why it is not required within Arrow’s Surat development area
- conversion of exploration and production wells to groundwater bores
- independent monitoring of project activities and quality assurance
- subsidence caused by the removal of coal seam water
- impacts from use of chemicals
- alternative drilling methods
- potential gas leaks
- royalties
- insurance, Arrow’s financial liquidity and landholder liability
- Arrow’s exit strategy for the project and long term impacts on towns

4.4 Communication and awareness

The consultation program for phase three was supported by a communication and awareness program, similar to that used for phases one and two.

4.4.1 Advertising and communication

(a) Newspaper advertising

To publicise the community feedback sessions, advertisements were placed in the *Dalby Herald*, *Toowoomba Chronicle*, *Chinchilla News*, *Northern Downs News*, *Pittsworth Sentinel*, *Queensland Country Life* (Southern Edition) and *Goondiwindi Argus*. Table 15 outlines the publication dates. Copies of the advertisements are contained in Appendix 25.

Table 15 Schedule of newspaper advertisements November 2010

Newspaper	Placement date November 2010
<i>Dalby Herald</i>	Friday 12 November 2010 Tuesday 16 November 2010 Friday 19 November 2010
<i>Toowoomba Chronicle</i>	Saturday 13 November 2010 Monday 15 November 2010 Friday 19 November 2010 Saturday 20 November 2010
<i>Pittsworth Sentinel</i>	Wednesday 17 November 2010
<i>Goondiwindi Argus</i>	Wednesday 17 November 2010 Wednesday 24 November 2010
<i>Queensland Country Life</i>	Thursday 18 November 2010
<i>Chinchilla News</i>	Friday 19 November 2010
<i>Northern Downs News</i>	Friday 19 November 2010

Approximately 260 A3 sized posters (Appendix 26) were distributed to 132 locations throughout Dalby, Chinchilla, Millmerran, Goondiwindi, Cecil Plains, Miles and Wandoan. These posters provided brief details on the project and outlined venues, dates and times of the community information sessions. They also included details of how the community could contact the project team, including through the 1800 freecall service,

website and project email address. In addition, electronic copies of A4 posters were emailed to local schools, for inclusion in newsletters or other communication activities. These posters provided the same information as the A3 posters.

(b) Invitation letters

Approximately 3,130 invitation letters (Appendix 22) were sent to stakeholders listed on the Consultation Manager (CM) database. Stakeholders were requested to promote the sessions through their networks.

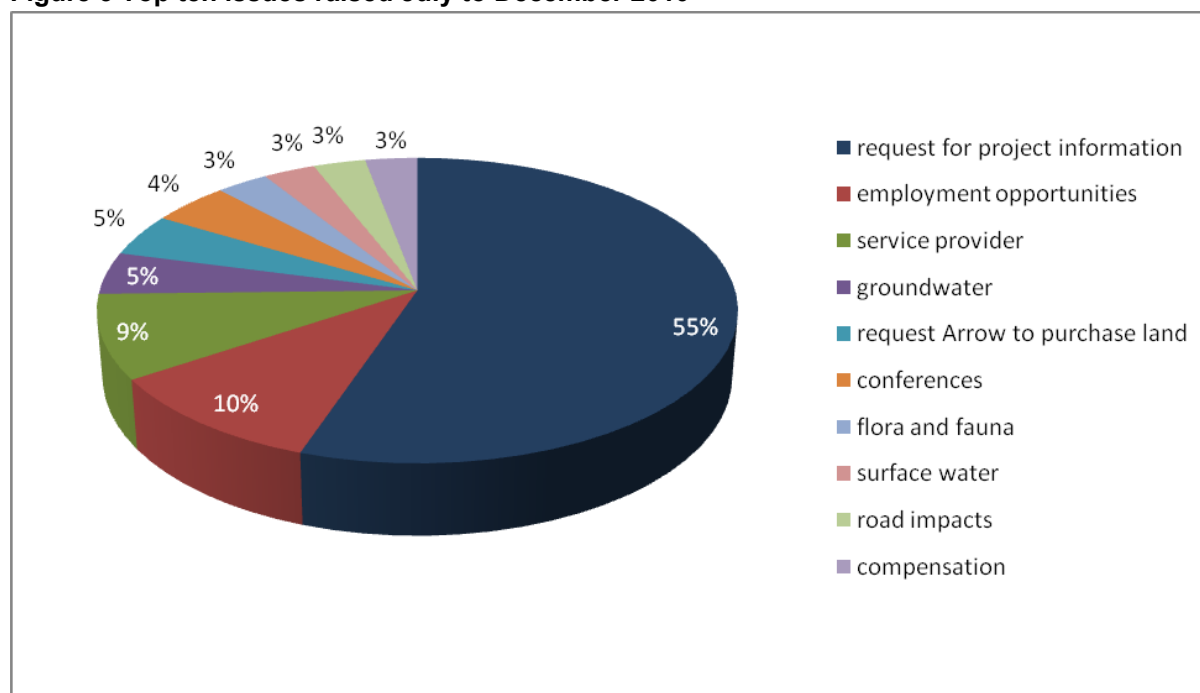
(c) Freecall 1800 number, website and project email

As outlined in section 2.3.1(f), for the duration of the project JTA managed an 1800 freecall service (1800 038 856) and an email information address (suratgas@arrowenergy.com.au) as well as a reply paid postal service. The CM 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 project, and those who required additional attention. Actions arising from consultation events were issued via email to the relevant Arrow employee and monitored via monthly *Outstanding Actions* reports.

During phase three, JTA received 51 calls on the 1800 freecall line, 47 project emails and 2 letters.

The top ten issues raised by stakeholders during the period July to December 2010 are shown in Figure 3 below.

Figure 3 Top ten issues raised July to December 2010



Arrow managed the website (www.arrowenergy.com.au) which included information on the project and the EIS process, and provided opportunities for involvement in the engagement and consultation program. Information sheets and details of community sessions were also

made available on the site. The address was widely advertised on all project materials and in the local media.

4.4.2 Printed information materials

(a) Information sheets

In November 2010 editions of previous information sheets were updated (see Appendix 27).

These included:

- *Surat Gas Project Overview*
- *Environmental Impact Statement*
- *Information for Landholders*
- *Employment and Business*
- *Get Involved in the Surat Gas Project*

In addition, the *Water and Salt Management* and *Fracking* information sheets from phase two were retained (see Appendix 15).

One new information sheet was developed (see Appendix 27):

- *BTEX*: information on BTEX chemicals and levels and chemicals used in the fracking process

All the information sheets were assembled into bags and distributed at community information sessions. They were displayed on the Arrow website and given to Arrow land agents to hand out during discussions with landholders. Multiple copies were also left in the Arrow offices in Dalby and Brisbane and held at JTA for stakeholder enquiries.

(b) Maps

The overall project map was also available in the information sheets. As part of the drop-in-sessions, the land team had a series of more detailed maps on display for landholder enquiries. Display banners also included maps of good quality agricultural land and traffic impacts in the project development area.

(d) Government fact sheets

In response to the Queensland Government's new suite of CSG information, a set of government fact sheets was inserted in the packs and included:

- *Safety in coal seam gas fields/around coal seam gas wells*
- *Flaring in the coal seam gas industry*
- *Salt and brine management in coal seam gas production*
- *Environmental impact statement and the role of the Coordinator-General*
- *Protect your property from weeds, pests and diseases*
- *Hydraulic fracturing (fracking) in CSG wells*
- *Aquifer Impacts and 'Make Good' Arrangements*
- *Petroleum and gas approval process*
- *Petroleum and gas laws – a guide for landholders*
- *Adaptive environmental management regime for the coal seam gas industry*
- *Tips for landholders negotiating with petroleum and gas companies*
- *Rehabilitation of land disturbance and coal seam gas activities*

- *Impacts of CSG extraction on underground water – Managing impacts on the Great Artesian Basin*
- *Coal seam gas water dams*
- *New arrangements to protect groundwater resources in coal seam gas extraction areas*

In addition, government fact sheets specific to land access were made available at the sessions:

- *Guide to Queensland's new land access laws* (November 2010)
- *Tips for landholders negotiating agreements with resource companies* (November 2010)
- *Mediation and negotiation options – How to call a conference for independent alternative dispute resolution (ADR)*
- *Notice of entry to conduct preliminary activities on private land – Information for landholders and occupiers*
- *Negotiation notice for advanced activities on private land – Information for landholders and occupiers*

4.4.3 Banners

Some of the phases one and two banners were updated for phase three (Appendix 28):

- *Surat Gas Project EIS area*
- *Good quality agricultural land*
- *Working with landholders*
- *What does 'make good' mean*
- *Water and salt management*
- *Traffic and roads*

One new banner was also developed (Appendix 28):

- *Land access rules*

Several phase two banners were also retained for the sessions (see Appendix 16):

- *Community investment*
- *What is an environmental impact statement*
- *EIS studies*
- *Managing groundwater impacts*
- *EIS groundwater impacts*

The banners were displayed at all community feedback sessions.

4.4.4 Fridge magnets

The coloured fridge magnets developed for phase one were distributed at phase three consultation activities. The magnets (Appendix 9) contained details of the 1800 freecall service, website and project email address.

4.4.5 Coal seam gas DVD

Copies of the DVD on coal seam gas and liquefied natural gas (produced by APPEA) was once again available for interested people to take a copy.

4.5 Outcomes and findings

The third phase of consultation for the Surat Gas Project had many challenges, particularly due to increased media coverage, greater negative community sentiment, a highly informed and articulate audience and concerns related to the *Gasland* documentary.

The consultation process, however, produced many valuable outcomes.

Targeted consultation strategy: all consultation activities in this phase were open to the public and consistent in format. They provided the community with several engagement avenues through presentations, question and answer sessions and one-on-one discussions. The strategy allowed for two-way dialogue and clear articulation of community concerns.

Attention to community concerns: consultation throughout phase three directly addressed a diverse and complex range of issues. In particular, Arrow was able to address critical concerns related to the *Gasland* documentary, BTEX chemicals, land access, use of the Land Court, drilling and groundwater.

Update on commitments: phase three allowed the project team to update the community on the phase two commitments. It not only demonstrated the progress Arrow had made but also highlighted where further action was still needed on some issues. This demonstrated to the community that the project team had listened to its concerns and were acting on them but especially around Dalby and Cecil Plains it still considered that progress was too slow.

Positive feedback: feedback was received across the sessions on Arrow's activities and progress. Special mention was made of Arrow's attempts to work with the local community to address key environmental concerns. The Surat Community Reference Group and the Arrow Intensively Farmed Land Committee were positively received. Communication of results from these groups will be useful for phase four.

Demonstrated differences in the communities: phase three established that the information and consultation needs of each community in the project development area were quite different. This provided a platform for refining consultation for phase four based on each community's needs.

Approach to phase four: consultation in phase four should continue to demonstrate Arrow's progress in addressing community concerns and delivering the commitments made in phase two. In particular, Arrow should communicate outcomes from the Surat Community Reference Group and the Arrow Intensively Farmed Land Committee, the water monitoring and management programs, and specialist studies. Furthermore, as the needs of each community diversify the project team will be able to adapt accordingly.

5.0 Phase four consultation program and outcomes: January – June 2011

5.1 Introduction and Purpose

Phase four consultation activities commenced in February 2011 and continued through to June 2011. The approach was quite different this time as illustrated by three particular changes to the format. In response to the high levels of anxiety on water issues demonstrated in some towns in the second quarter of 2010, water-specific technical sessions were held in Chinchilla, Cecil Plains and Dalby in May, the formal presentations at the May community information sessions were much shorter and opportunities for one-on-one discussions with Arrow technical experts were increased. In addition, although EIS water studies were still incomplete some interim results were released at the sessions in an attempt to allay concerns.

The environment in which this round of consultation was held differed from previously on two counts. Some weeks earlier tense stand-offs had occurred in relation to the activities of at least one other CSG operator and included two arrests and a demonstration outside Parliament House in Brisbane. There had been intense media coverage of these protest demonstrations. In addition, the day before the first community information session, i.e. 22 May, there was an Arrow well control incident at Daandine outside Dalby. The incident generated significant media coverage at both local and national levels, and on that basis Arrow expected the incident to create significant stakeholder concerns at the community information sessions.

In fact, if anything the level of concern expressed during this round was less than previously. Very few questions were asked anywhere in relation to the Daandine well control incident and this was put down to the approach adopted by Arrow which was very upfront and immediate. The status of the Daandine well control incident was explained early in each of the formal presentations and comprehensive details were provided. Additionally, none of the community information sessions were interrupted by protesters who had been very active in demonstrating against CSG in other forums recently. The audiences were attentive and generally constructive.

The Dalby audience differed from previously in that it was smaller and asked considerably fewer questions than in earlier sessions. Concern was expressed by the older members of the audience at the change in their lifestyles and the fact that the future they had envisaged for themselves and their children had now changed dramatically because of CSG. It was considered that the audience were reluctantly resigned to the CSG industry being present in the Surat Basin, with many landholders still holding concerns about the possibility of co-existence.

This time further detail was provided on the activities, and membership, of the Arrow Surat Community Reference group (ASCRG) and the Arrow Intensively Farmed Land Committee (AIFLC). The existence of the Committees had clearly provided reassurance to a number of

landholders that their concerns were being heard, and (in most cases) acceptable responses provided by Arrow.

The other difference in this phase of consultation was that a focussed effort was made to ensure that the community understood where progress on the Arrow Surat Gas project stood in relation to other CSG projects. While timelines had been explained at previous sessions it was clear there was a lack of clarity as to just how far behind the other CSG projects Arrow was in terms of its program, and EIS studies. In the past this lack of clarity had expressed itself in frustration that Arrow was unable to provide information readily available from the other major CSG players. During this phase of consultation it was made crystal clear that Arrow was some two years behind its competitors and that it was working rapidly towards completion of the numerous EIS studies already in progress.

As indicated previously, communities were given some interim results on groundwater modelling and it was communicated that further results of EIS studies would be presented in specific technical information sessions in September/October 2011. It was clear this was welcome news to landholders and the broader community and provided reassurance that Arrow was not avoiding providing the requested information.

5.2 Community Committees

5.2.1 Arrow Surat Community Reference Group

The ASCRG meets every two months and provides a forum for the open exchange of information amongst Arrow Energy, landholders and broader community representatives. It identifies and provides regular feedback to Arrow Energy on issues and opportunities relating to the general development of Arrow's CSG resources over its tenements in the Surat Basin, including field and operational activities. It also provides advice to Arrow Energy on community development concerns and opportunities to work with landholders and broader communities in the development of a CSG industry in the region. Minutes of the ASCRG meetings for phase four can be found in Appendix 29.

The ASCRG met twice during phase four as follows:

- 10 February 2011
- 7 April 2011

5.2.2 Arrow Intensively Farmed Land Committee

The AIFLC initially met monthly, it now meets every two months. It provides a forum for the open exchange of information between Arrow Energy and its landholders on intensively farmed land (IFL) and identifies issues and opportunities relating to the construction and operation of CSG infrastructure and development of Arrow's CSG resources on IFL within the Surat Basin. The Committee provides advice to Arrow Energy on development concerns and opportunities as part of a case study involving landholders on IFL in the development of Arrow's CSG reserves in the Surat Basin. It is also working on the development of a plan to enable CSG development to co-exist with landholders on intensively farmed land. Minutes of the AIFLC meetings for phase four can be found in Appendix 30.

The AIFLC met twice during phase four as follows:

- 10 February 2011
- 7 April 2011

5.3 Consultation Program

5.3.1 Stakeholder Briefings

Due to the length and complexity of the community information sessions and the technical water sessions in this round, there was not time for many one-on-one briefings held during phase four. Project staff were required to attend the sessions as it was considered important that the community have access to the full breadth of knowledge and understanding available. Key stakeholders were contacted; however as in phase three most did not require further briefings. There was a great deal of time allowed at the sessions for one-on-one discussions.

One-on-one briefings were held with several stakeholders listed in Table 16 who requested briefings.

Table 16 Stakeholder briefings phase four

Stakeholder	Role	Date	Attendee
Kylie Feulling,	Advisor to Ray Hopper MP	26-May-11	Michael Todd
Teresa Robinson	Director of Facility/Nursing Millmerran Hospital	27-May-11	Glenda Viner

5.3.2 Technical Water Sessions

Following phase three it was determined that there was a need for more technical information to be made available to the community, particularly around water issues. Three technical water sessions were held in Chinchilla, Cecil Plains and Dalby (Table 17). The details for these sessions were included in the general invitation which was sent to approximately 3,260 stakeholders in the Consultation Manager database, as well as the email invitation sent to approximately 784 people in the database. Appendix 31 contains a sample letter of invitation. Display posters promoting the session details were put up in 53 prominent locations in the region. Advertising and promotion in the local media and community networks was conducted in the weeks leading up to the sessions. Section 5.4.1 provides more detail on the promotion strategy.

Table 17 Details of water technical sessions phase four 2011

Town	Date	Time	Location	Attendees
Chinchilla	Tuesday 24 May 2011	9.00am-11.00am presentation 9am	Bulldog Park	38
Cecil Plains	Wednesday 25 May 2011	9.00am-11.00am presentation 9am	Cecil Plains Hall	59
Dalby	Thursday 26 May 2011	9.00am-11.00am presentation 9am	Dalby Showground Pavilion	47
TOTAL				144

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

Some 144 people registered at the water technical sessions which were held in the morning, before the community information sessions.

The sessions consisted of a groundwater educational presentation (Appendix 32) by Dr Lloyd Townley (an independent third party water specialist from Western Australia – Dr Townley’s CV is attached in Appendix 33) as well as an update by Arrow. Following this there was an open display session during which Arrow’s water team were available to speak with the community one-on-one.

The presentation provided a basic overview of how groundwater systems work, explained the concept of head, and discussed the idea of connectivity of underground water systems. There was a question and answer period at the end of the presentation for the community to ask questions about water issues relating to the presentation. The questions and answers are summarised in Appendix 34.

The venue was organised in such a way that there were four discrete areas relating to specific water issues. These were *Substitution/Reinjection, Salt Management, Modelling/Monitoring and Interconnectivity*. Each section was manned by the relevant technical staff, and had a selection of supplementary materials including the relevant Arrow and government information sheets, the substitution/reinjection animation (Appendix 35), the modelling fly-through, salt samples core samples and the geostrata poster (Appendix 36). Section 5.4.2 provides more detail on the information and materials used; the written feedback received from the audience at all three sessions was unequivocally positive.

5.3.3 Community Information Sessions

One community information session was held at each of the seven locations in the project development area (Table 18 refers). The sessions were publicised and open to any member of the community to attend. Invitation letters were sent to 3,260 stakeholders listed on Consultation Manager (CM) database. These stakeholders included people who were invited and/or had attended phases one, two and three of consultation, and additional stakeholders who had been added to the CM database since phase one. Appendix 31 contains a sample letter of invitation. Display posters promoting the session details were placed in 53 venues, including shops, libraries, and other prominent locations. Advertising and promotion through the local media and community networks was conducted in the weeks leading up to the sessions. Section 5.4.1 provides more detail on the promotion strategy.

Table 18 Details of community information sessions phase four 2011

Town	Date	Time	Location	Registered Attendees
Miles	Monday 23 May 2011	10.00am-1.30pm presentation 11.30am	Leichhardt Centre Columboola Function Room	16
Wandoan	Monday 23 May 2011	4.30pm-7.30pm presentation 6pm	Community & Cultural Centre	14

Chinchilla	Tuesday 24 May 2011	1.00pm-4.30pm presentation 2.30pm	Bulldog Park	28
Cecil Plains	Wednesday 25 May 2011	1.00pm-4.30pm presentation 2.30pm	Cecil Plains Hall	44
Dalby	Thursday 26 May 2011	1.00pm-4.30pm presentation 2.30pm	Dalby Showground Pavilion	41
Millmerran	Friday 27 May 2011	10.00am-1.30pm presentation 11.30am	Community & Cultural Centre	23
Goondiwindi	Saturday 28 May 2011	9.00am-12.30pm presentation 10.30am	Goondiwindi Waggamba Community & Cultural Centre	8
TOTAL				174**

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

**Note also the explanation in the next paragraph which offers some explanation why numbers were fewer than previous consultation rounds.

The community information sessions in Chinchilla, Cecil Plains and Dalby were preceded by a barbecue lunch (immediately after the technical water sessions). Attendees were not asked to register again for the community information session so although many people who attended the water sessions remained to participate in the information session in the afternoon, they did not register again; therefore definitive numbers of those who attended the community information sessions are not available.

Some 318 people registered at the sessions (including the water ones). This compares with 396 people who attended consultation activities in phase one, 445 who attended in phase two and 359 who attended in phase three. As Table 19 shows, the numbers who attended in Cecil Plains and Chinchilla increased from phase three, but fewer people attended in Dalby, Millmerran, Wandoan, Miles and Goondiwindi.

Table 19 Comparison of attendance in phases one, two, three and four

Location	Round 1 (Nov 2009)			Round 2 (Jun 2010)	Round 3 (Nov 2010)	Round 4 (May 2011)		
	Community information session	Community display	Total	Community information session	Community information session	Technical water session	Community information session	Combined total
Dalby	33	99	132	138	92	47	41	88
Chinchilla	17	68	85	68	65	38	28	66
Millmerran	14	58	72	49	33	-	23	23
Cecil Plains	-	45	45	107	73	59	44	103
Wandoan	-	9	9	13	26	-	14	14
Miles	-	23	23	34	49	-	16	16
Goondiwindi	-	30	30	36	21	-	8	8
Totals			396	445	359	144	174	318

The strategic 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. The need for more detailed technical information was identified in previous rounds which led to the development of the technical water sessions, as outlined in Section 5.3.2. The sessions included three advertised elements: an open one-on-one display with project staff, a formal presentation and a question and answer time. This format was the same in each location. In Dalby, Chinchilla and Cecil Plains a barbecue was held in between the morning water session and the afternoon community information session for project staff and the community. The barbecues worked very well in providing a relaxed environment in which the community and Arrow staff could mingle positively and where locals were not as reticent in asking pertinent questions.

In each location the venue was organised in such a way as to separate the formal (presentation and question and answer session) and informal elements (one-on-one discussions and display). The presentation and question and answer session were set up theatre style, and the staffed informal displays were set up by subject. i.e. *Water* (two sections were used for water staff, as there was a great deal of available information), *Community and Employment, Land, Environment, Exploration/Subsurface and Development/Surface*. Each section was manned by project staff who specialised in that area and had a selection of supplementary materials including the relevant Arrow and government information sheets as well as large banners. Detailed maps showing the Surat project development area were also on display. In Dalby, Cecil Plains and Chinchilla marquees were erected outside to house some of these sections.

In Dalby, Chinchilla and Cecil Plains Arrow Energy field infrastructure including: a workover rig, tanks, a mock well setup and casing samples, which were set up to illustrate the types of equipment used by Arrow in the exploration and development phases. The mock well site was also taken to Miles and Millmerran; it was not taken to Wandoan and Goondiwindi due to a lack of suitable space near the venues. The workover rig and tanks were taken to Chinchilla, Dalby and Cecil Plains as the other venues did not have sufficient space outside to house this equipment. Core samples were provided by the water team, and were taken to all locations.

The formal presentation (Appendix 37) provided an update on the project as well as Arrow's plans for future development. It updated the community on the activities Arrow had undertaken since phase three regarding development of its groundwater modelling and monitoring program. There were also updates on land access issues, including Arrow's access rules, 'make good' arrangements, salt management, beneficial use and disposal options and Arrow's baseline bore assessment program. There was also an explanation of the community committees and the Arrow community investment program (Brighter Futures).

As indicated above, formal presentations were followed by a question and answer session. These sessions were not concluded at the advertised finishing time but were extended until the community had exhausted the supply of questions. Appendix 34 contains a summary of the questions and answers from all sessions in phase four. A wide range of information sheets were available as well as government fact sheets.

5.3.4 Staff information sessions

Information sessions and briefings were held for Arrow staff in Brisbane and in Dalby. These sessions included the same presentations as those held in the subsequent community information sessions, and provided an opportunity for staff to learn more about the project, to ask questions of the project team and to have input into the consultation process.

5.3.5 Key community and stakeholder issues and concerns

Key issues raised across all consultation activities are summarised below.

Groundwater, water management and salt

- chemicals used in fracking and drilling processes
- the direct and cumulative impacts of the CSG industry on groundwater aquifers
- salt production and disposal options
- potential impacts of interconnectivity on the Great Artesian Basin and the Walloon Coal Measures
- 'make good' provisions and long term impacts, cumulative management
- water beneficial use options, substitution, reinjection, treated water, dams, rehabilitation
- scale and independence of groundwater monitoring program
- transportation of water and salt for beneficial use

Landholder relations

- compensation for different land uses and types
- rehabilitation of land
- exclusion zones around pipelines and gathering lines
- infrastructure footprint on land
- emergency access to well sites
- well fencing
- land access rules
- Arrow's commitments to safety
- spread of weeds
- devaluation of property
- generational planning for farmers

Intensively farmed land

- Arrow's approach to activities on intensively farmed land
- Arrow's commitments regarding development on intensively farmed land

Social, environment and community infrastructure

- Community investment
- Road maintenance
- Consultation with local council
- Employment impacts on local economy, lack of access to labour for farmers

Technical and regulatory

- Location of development area, existing and proposed operations

- Chemicals used in drilling
- Arrow’s liquidity, ongoing corporate liability of parent companies
- Gas leaks
- Independent monitoring of project, particularly water testing and bore assessment program
- Drilling processes
- Arrow’s substitution program, technical aspects
- Regulation governing coal seam gas industry
- Cumulative management framework

5.4 Communication and awareness

The consultation program for phase four was supported by a communication and awareness program, similar to that used for phases one and two.

5.4.1 Advertising and communication

(a) Newspaper advertising

To publicise the community information sessions and technical water sessions, advertisements were placed in the *Dalby Herald*, *Toowoomba Chronicle*, *Pittsworth Sentinel*, *Goondiwindi Argus*, *Chinchilla News*, *The Northern Downs News* and *Queensland Country Life (Southern Edition)*. Table 20 outlines the publication dates. Copies of the advertisement are contained in Appendix 38.

Table 20 Schedule of newspaper advertisements May 2011

Newspaper	Placement Date
<i>Dalby Herald</i>	Friday 13 May 2011 Tuesday 17 May 2011 Friday 20 May 2011 Tuesday 24 May 2011
<i>Toowoomba Chronicle</i>	Sunday 14 May 2011 Sunday 21 May 2011
<i>Pittsworth Sentinel</i>	Wednesday 11 May 2011 Wednesday 18 May 2011
<i>Goondiwindi Argus</i>	Wednesday 18 May 2011 Wednesday 25 May 2011
<i>Queensland Country Life Southern Edition</i>	Thursday 12 May 2011 Thursday 19 May 2011
<i>Chinchilla News</i>	Thursday 12 May 2011 Thursday 19 May 2011
<i>Northern Downs News</i>	Thursday 12 May 2011 Thursday 19 May 2011

Approximately 53 A3 and A4 posters (Appendix 39) were distributed to prominent locations throughout Wandoan, Dalby, Goondiwindi, Millmerran and Miles by locally based Arrow staff. These posters outlined venues, dates and times of the community information sessions and water technical 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.

(b) Invitation letters and emails

3,260 invitation letters (Appendix 31) were sent to stakeholders listed on the Consultation Manager (CM) database. Full details of both the technical water sessions and community information sessions were provided.

Invitations were also sent by email to approximately 784 stakeholders listed on the CM database.

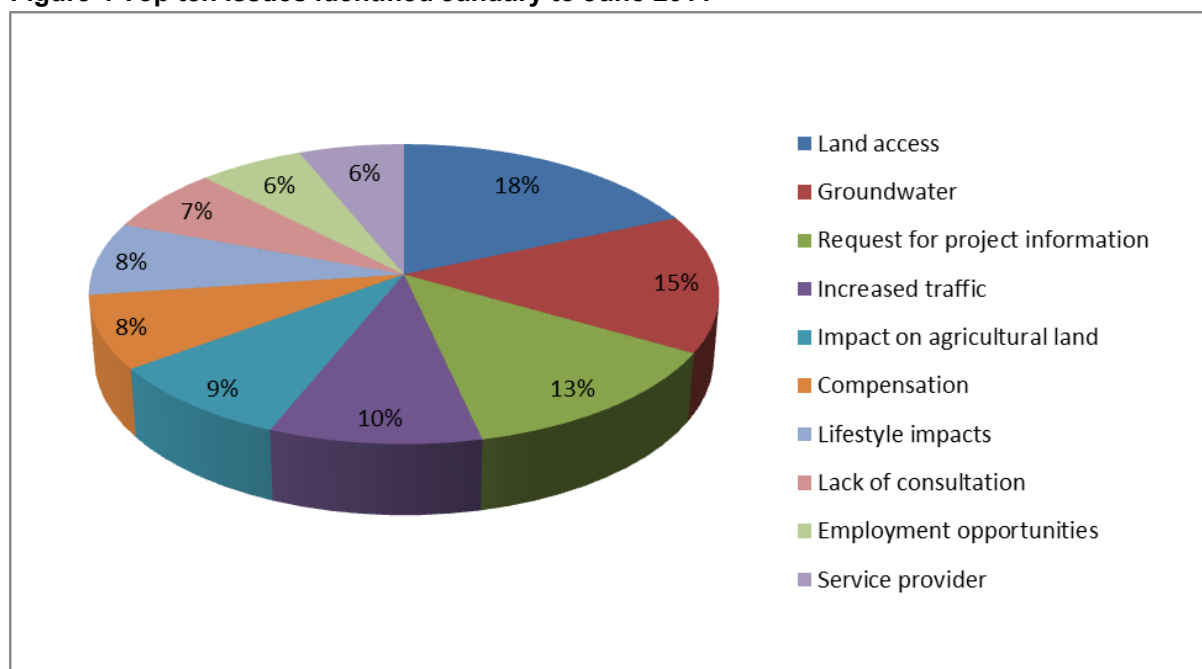
(c) Freecall 1800 number, website and project email

As outlined in section 2.3.1(f), for the duration of the project JTA managed an 1800 freecall service (1800 038 856) and project email address suratgas@arrowenergy.com.au, as well as a reply paid postal service. CM 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 the specific interests, influences or triggers that may have an impact on or from the project, and those who require additional attention. Actions arising from consultation events were issued via email to the relevant respondent and monitored via monthly *Outstanding Actions* reports.

During phase four, JTA received 50 calls on the 1800 freecall line and 17 project emails.

The top ten issues raised by stakeholders during the period January to June 2011 are shown in **Figure 4** below.

Figure 4 Top ten issues identified January to June 2011



Arrow updated its website (www.arrowenergy.com.au) during phase four. Information sheets and details of community information sessions were made available on the site. Minutes of

the community committee meetings have also been listed on it. The website address was widely advertised on all project materials, on invitation letters and in local media.

5.4.2 Printed information materials

(a) Information sheets

Some previous information sheets were updated for phase four (Appendix 40). These included:

- *What is BTEX*
- *Information for Landholders*
- *Fracking*

In addition the following information sheets were developed during phase four (Appendix 40):

- *Arrow Energy*
- *Well Integrity*
- *Zonal Isolation*
- *Working at Arrow Energy*
- *Drilling Fluids*
- *Understanding Groundwater*
- *Salt Management*

All the information sheets were available at community information sessions. They were not pre-packed into bags as in previous sessions, but instead were laid out for people to take as they wished. As the community display sessions were divided into subject areas, the applicable information sheets were available in each area. This meant that the specialist technical staff in each area could direct stakeholders to the appropriate and relevant information.

(b) Maps and other visual aides

As part of the drop-in display session the land team had a series of detailed maps available showing Arrow's tenure for landholders to examine. A large poster of a regional cross section of the Great Artesian basin in Southern Queensland was also available for the water team to use to illustrate their explanations to community members (Appendix 30).

There were a range of laminated pictures showing the types of infrastructure used by Arrow in the drilling and production processes. These pictures were placed in the relevant subject areas.

An animation was produced which showed the processes of substitution and reinjection (Appendix 34). This animation was shown at all technical water sessions and information sessions. In addition a fly-through 3D animation showing the geology and hydrology of the region of Arrow's tenure in the Surat basin was produced for Arrow by QUT using Arrow's modelling data. This 3D fly-through showed all registered bore holes in the region, and highlighted Arrow's bores.

(c) Government fact sheets

The set of Queensland Government CSG fact sheets was updated since the previous phase, and these new and updated versions were available at the technical and community information sessions for people to take. They included:

- *Salt and brine management in coal seam gas production*
- *Aquifer Impacts and 'Make Good' Arrangements*
- *Impacts of CSG extraction on underground water – Managing impacts on the Great Artesian Basin*
- *Coal seam gas water dams*
- *Coal seam gas water feasibility study*
- *Coal seam gas water*
- *Baseline assessment plans*
- *Commencement of the Water and Other Legislation Amendment Act 2010*
- *New arrangements to Protect Groundwater Resources in coal seam gas extraction areas*
- *Bore assessment*
- *Make good obligations*
- *Underground water impact report*
- *Underground water management framework*
- *Complete hydraulic fracture activities*
- *Intended hydraulic fracture activities*
- *Tips for landholders negotiating with petroleum and gas companies*
- *Petroleum and gas laws – a guide for landholders*
- *Protect your property from weeds, pests and diseases*
- *Rehabilitation of land disturbance and coal seam gas activities*
- *Environmental assessment and management of coal seam gas developments*
- *Environmental impact statement and the role of the Coordinator-General*
- *Adaptive environmental management regime for the coal seam gas industry*
- *Petroleum and gas approval process*
- *Hydraulic fracturing (fracking) in CSG wells*
- *Flaring in the coal seam gas industry*
- *Safety in coal seam gas fields/around coal seam gas wells.*

In addition, as in the previous round, government fact sheets specific to land access were made available at the sessions:

- *Guide to Queensland's new land access laws*
- *Tips for landholders negotiating agreements with resource companies*
- *Mediation and negotiation options – How to call a conference for independent alternative dispute resolution (ADR)*
- *Notice of entry to conduct preliminary activities on private land – Information for landholders and occupiers*
- *Negotiation notice for advanced activities on private land – Information for landholders and occupiers*

5.4.3 Banners

Some of the Arrow banners used in previous phases were used again in phase four (Appendices 16 and 28):

- *EIS Groundwater Study*
- *Water and Salt Management*
- *Managing Groundwater Impacts*
- *Working with Landholders*
- *Good Quality Agricultural Land*
- *Good Quality Agricultural Land Map*
- *Land Access Rules*
- *What is an Environmental Impact Statement?*
- *EIS Studies*
- *Surat Gas Project EIS Area*
- *Land Access Rules*

Some previous banners were updated from earlier rounds and others were developed for phase four (Appendix 41):

- *What does 'make good' mean?*
- *Water and Salt*
- *Strategic Cropping Land Map*
- *Co-existence with Strategic Cropping Land*
- *Brighter Futures*
- *Careers*
- *Our Commitments to You*
- *Business Opportunities*
- *Drilling Process*
- *Exploring for a cleaner source of energy.*

5.4.4 Fridge magnets

The coloured fridge magnets developed for phase one were available at phase four consultation activities. The magnets (Appendix 7) contained details of the 1800 freecall service, the website and project email address.

5.5 Outcomes and findings

The main focus of the fourth phase of consultation for the Surat Gas project was on providing the community with answers to their ongoing concerns and questions. This led to a greater focus on providing technical information at the sessions, particularly in regards to water issues and providing greater opportunities for one-on-one discussion with technical staff.

Focussed consultation strategy: the format of the community information sessions was consistent in all locations so all community members had the chance to access Arrow's technical specialists. These sessions provided the public with a range of engagement avenues through one-on-one discussions, formal presentations and question and answer sessions.

The new technical water sessions were developed based on the need identified for more information in this area. Again the format was split between the formal presentation and

question and answer session, and the one-on-one discussion time. This new format provided a valuable opportunity for technical staff and the community to interact, which promoted understanding, respect and relationships on both sides.

Response to community concern: consultation throughout phase four directly responded to the communities' expressed concerns, particularly in relation to water management issues. The focus was on providing answers to these concerns, including interim results from Arrow's modelling program, with a commitment to follow up with more information later in the year once more analysis has been done on these results.

Update on commitments: phase four allowed the project team to update the community on the commitments made during previous phases, and to reinforce those commitments. The team was able to update the community on where they are in terms of their research and field trials, and to show them their interim results.

Feedback: feedback was received across the sessions indicating the community appreciated Arrow's efforts to provide technical information, and the opportunity to talk one-on-one with technical members of the project team. There was also an appreciation shown by members of the community in locations (where operational equipment was able to be displayed) for the opportunity to view the equipment with staff on hand to discuss it.

Approach to ongoing consultation: consultation in phase four continued to demonstrate Arrow's focus on answering community and landholder concerns, and delivering the commitments made in phase two.

The project team made a commitment during phase four to return to the community later in the year (around October 2011) to provide the results of Arrow's water modelling program as well as other environmental impact studies.

6.0 Ongoing consultation program

6.1 Ongoing consultation

During the phase four community information sessions considerable effort was made to provide greater clarity regarding the timelines for the various CSG projects in the Surat Basin. The purpose of this was to ensure better understanding by landholders and the broader community that the Arrow project was approximately two years behind the other CSG proponents in completion of our EIS process.

The result of this timeline difference was that Arrow was not always in a position to provide detailed responses to some issues and concerns. It was communicated that further results of the groundwater modelling and the EIS studies would be presented in specific technical information sessions in September/October 2011.

7.0 Conclusions and outcomes

The consultation done for this environmental impact statement (EIS) has differed to similar work done by JTA Australia on other EISs in a number of ways. The consultation for the Arrow Surat Gas Project began on a small scale initially (invitation-only as opposed to public meetings) and at a time when the community (and landholders, to a lesser extent) were less concerned about the advent of coal seam gas (CSG) exploration and production in the Surat Basin, and were not fully aware of the potential impacts of CSG development.

Inevitably, the consultation environment changed as an increasing number of proponents raised their profile locally, the media provided more opportunities for CSG opponents to express their views, and the effects of highly organised and sophisticated opposition to CSG in Northern New South Wales and the Hunter Valley negatively influenced landholders in the Surat Basin. As the consultation environment changed, so did the consultation program. A diverse range of additional stakeholders was identified and briefed, information sessions and displays became open to everyone, and consultation strategies were extended to include activities outside the formal information sessions. The willingness of the proponent, Arrow Energy, not only to respond and adapt to feedback received from the community and landholders but also to place extraordinarily large numbers of senior management and technical staff at the disposal of the community consultants for the benefit of stakeholders and communities was unprecedented.

The level of community and landholder angst continued to increase until arguably it peaked in phase three of consultation in November 2010 when strong feelings of outrage were clearly in evidence at some information sessions. However, it should be noted that in spite of obvious opposition to the proposed project by some landholders, the community information sessions were productive in educating and informing local communities. .

JTA is of the view that relationship improvements were obvious by phase four (in May 2011) and Arrow's willingness to respond to water concerns (as evinced by the technical water sessions) and the release of interim releases on groundwater modelling were well-received in the Surat Basin. Notwithstanding this, there are a number of critical areas requiring further attention and discussion with relevant stakeholders, particularly in regard to water (including groundwater, produced-water, salt management and contamination), land access, impacts on intensively farmed agricultural land, diminution of land value, compensation and environmental and social impacts.

These and other important issues have undergone extensive research and investigation as part of the EIS process. Arrow elected to communicate the early indicators of these studies to landholders and the community at large before submission to the Department of Environment and Resource Management. It also established and resourced two committees (the Arrow Surat Community Reference Group and the Arrow Intensively Farmed Land Committee) in response to concerns expressed in the initial rounds of consultation. The membership of the committees is testimony to the willingness of stakeholders to lend their time and expertise to the interests and information needs of their communities.

In terms of genuine community engagement, consultation and development JTA believes that Arrow has demonstrated its short and long term commitment to the Surat Basin not only in allocating senior management (including the Chief Executive Officer) and expert technical staff to consultation activities but also in establishing a well-resourced internal community relations group, including staff from the group based in Dalby.

Feedback to JTA from the affected communities has been very positive on two counts; firstly, Arrow's willingness to make its technical experts available (instead of only community relations or public relations staff) and secondly the level of accessibility, expertise, and openness those technical staff have demonstrated.

JTA is satisfied Arrow is further demonstrating its commitment to ensure longer term community wellbeing and sustainability in the following ways:

- Arrow staff and independent technical experts will revisit communities after the public release of the EIS report to communicate the findings and follow up on outstanding issues
- it has increased its community relations staff both in Brisbane and Dalby
- Arrow has displayed a willingness to answer all questions asked during community information sessions and respond to stakeholders by providing further information to communities as it has become available in the development of the project and
- Arrow has responded positively to rigorous evaluation done by JTA after each consultation round and has changed or adapted its processes when required.

Appendices

Phase 1

1. Invitation letter and agenda
2. Arrow presentation – Phase 1
3. Coffey presentation – Phase 1
4. Summary of Q&A sessions
5. Advertisements and advertorial
6. Poster
7. Information Sheets – Phase 1
8. Banners – Phase 1
9. Fridge Magnets

Phase 2

10. Invitation letter
11. Arrow presentation – Phase 2
12. Summary of Q&A sessions
13. Advertisement
14. Poster
15. Information Sheets – Phase 2
16. Banners – Phase 2
17. Arrow's commitments to the community

Phase 3

18. Arrow Surat community reference group terms of reference
19. Minutes of ASCRG meetings phase 3
20. Arrow Intensively Farmed Land committee terms of reference
21. Minutes of AIFLC meetings phase 3
22. Invitation letter
23. Arrow presentation – Phase 3
24. Summary of Q&A sessions
25. Advertisement
26. Poster
27. Information Sheets – Phase 3
28. Banners – Phase 3

Phase 4

29. Minutes of ASCRG meetings phase four
30. Minutes of AIFLC meetings phase four
31. Invitation letter
32. Introduction to groundwater presentation by Dr Lloyd Townley
33. Dr Lloyd Townley CV
34. Summary of Q&A sessions
35. ReInjection/Substitution animation
36. Geostrata poster
37. Arrow presentation – Phase 4
38. Advertisement
39. Poster
40. Information Sheets – Phase 4
41. Banners – Phase 4

Appendix 1

Phase 1 Invitation letters and agenda



11 November, 2009

Ref: COR09-24/SS:ce

Dear Property Owner

Subject: Invitation to Community Displays about the Surat Gas Project

Arrow Energy is planning its largest gas exploration and development program in the Surat Basin. The project involves continued exploration in the Basin to identify the most economic and environmentally acceptable areas for future gas production. The areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration (refer to map overleaf).

Planning and investigation for the proposed project is underway and we are preparing an Environmental Impact Statement (EIS) over the entire project development area. An EIS is a comprehensive study of all environmental, economic and social issues and potential impacts and benefits associated with development of major projects. The results of the EIS studies will be made available when the EIS is published.

Public input is an important part of an EIS and Arrow is committed to consulting with local communities and stakeholders throughout the process. We are commencing the first consultation sessions on the Surat Gas Project in late November.

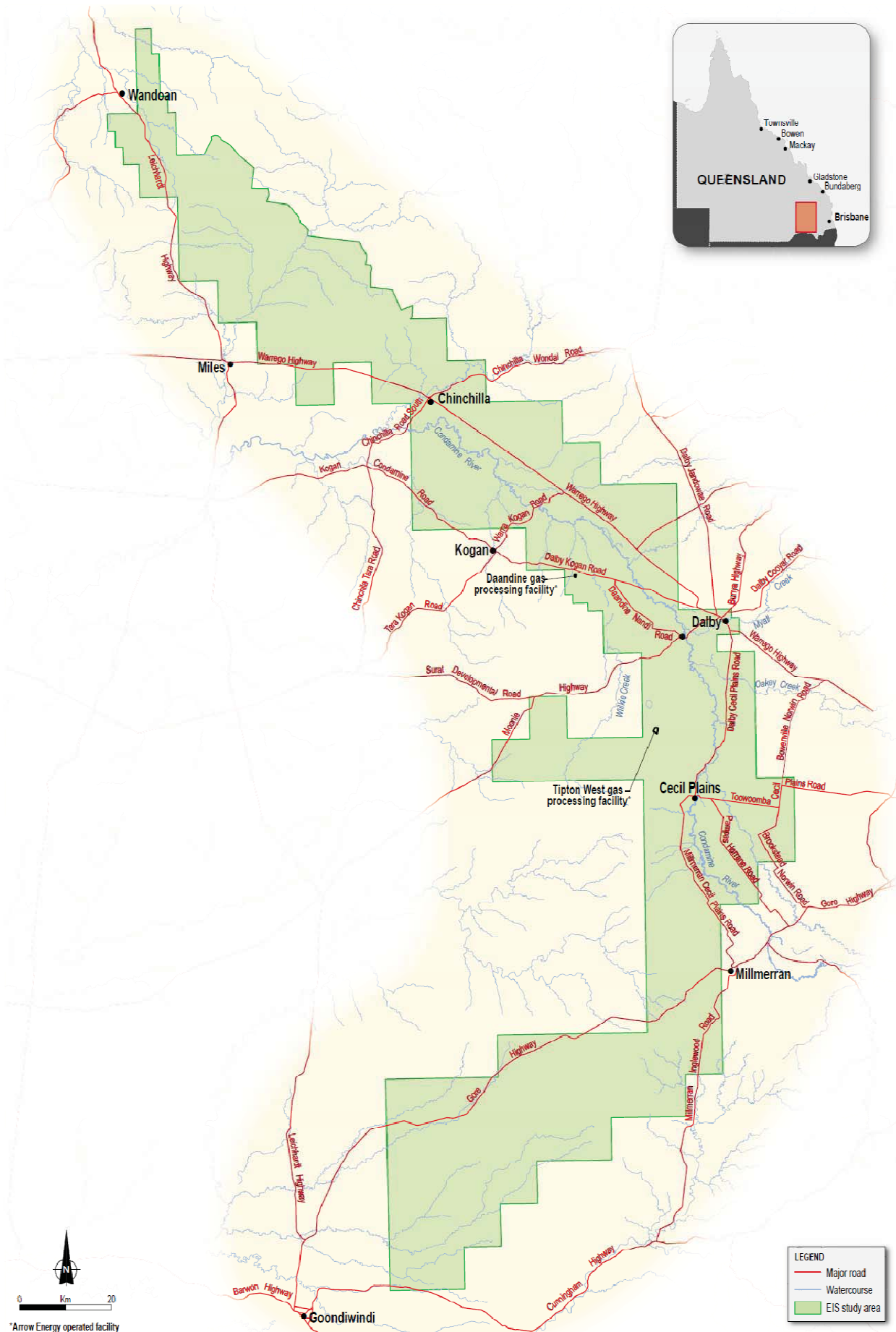
You are invited to attend one of the nine Community Displays being conducted in the local EIS area. These displays provide an opportunity for interested people to drop in any time during the display and speak face to face with the project team about any aspect of the project. Full details about these displays are on the enclosed flyer. If you know anyone who may be interested in these sessions feel free to pass this information on to them also.

Your views are very important to the EIS process and we look forward to meeting you at one of these sessions; please contact the EIS project team on freecall **1800 038 856** or email suratgas@arrowenergy.com.au if you require any information beforehand. Further opportunities for input will also be provided over the coming months.

Regards,



Shaun Scott
Chief Executive Officer (Australia)



0 Km 20
*Arrow Energy operated facility

LEGEND
Major road
Watercourse
EIS study area

11 November 2009

«Title» «First_Name» «Surname»
«Property»
«Postal_Address_1»
«Postal_Address_2»
«Suburb» «State» «Pcode»

Dear «Title» «Surname»

Re invitation to sessions about the Surat Gas Project

Arrow Energy is planning its largest gas exploration and development program in the Surat Basin. The project involves continued exploration in the Basin to identify the most economic and environmentally acceptable areas for future gas production. The areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration.

Planning and investigation for the proposed project is now underway with Arrow preparing an Environmental Impact Statement (EIS) over the entire project development area. An EIS is a comprehensive study of all environmental, economic and social issues and potential impacts and benefits associated with development of major projects. The results of the studies will be made available when the EIS is placed on public display.

Community input is an important part of an EIS; Arrow is committed to consulting with local communities and stakeholders throughout the process. The first consultation sessions on the project commence in late November with community displays in your area for anyone interested in the project. Feel free to pass on the attached details of the displays to friends and colleagues.

Three information sessions are also being held and you are invited to attend whichever one of the following is convenient.

Dalby	Monday 23 November	5.00-8.00 pm	Dalby RSL, Anzac Room, 69 Drayton St
Chinchilla	Tuesday 24 November	5.00-8.00 pm	Chinchilla State High School, 7 Tara Road
Millmerran	Wednesday 25 November	5.00-8.00 pm	Community and Cultural Centre, Walpole St

These sessions are targeted at key stakeholders with an identified interest in the project. They are an opportunity for you to meet the project team and hear more about the project and the EIS process. Each session will be addressed by senior project staff from Arrow and environmental consultants from Coffey Natural Systems which is preparing the EIS. The team from JTA Australia is independently facilitating the consultation process and warmly extends this invitation.

Light refreshments will be provided so your RSVP to your preferred information session is important to assist with catering. Please freecall **1800 038 856** or email suratgas_arrowenergy.com.au by Thursday 19 November to register for one of the sessions.

Your views are very important to the EIS process so I look forward to meeting you at one of the sessions; feel free to make contact if you require any information beforehand. Further opportunities for input will be provided over the coming months.

Yours sincerely

Jan Taylor
Principal

**Information Session
Monday 23 November 2009, 5.00-8.00pm
Dalby RSL, Anzac Room**

Agenda

- 5.00pm Arrivals and registration
- 5.10pm Welcome and Introduction
Jan Taylor, JTA Australia
- 5.15pm Project overview
Shaun Scott CEO, Arrow Energy
- 5.40pm EIS overview
Barton Napier, Coffey Natural Systems
- 6.10pm Supper
- 6.30pm Questions and discussion
- 8.00pm Session closes



Information Session
Tuesday 24 November 2009, 5.00-8.00pm
Chinchilla State High School, 7 Tara Road

Agenda

- 5.00pm Arrivals and registration
- 5.10pm Welcome and Introduction
Jan Taylor, JTA Australia
- 5.15pm Project overview
Robbert de Weijer Chief Operating Officer, Arrow Energy
- 5.40pm EIS overview
Barton Napier, Coffey Natural Systems
- 6.10pm Supper
- 6.30pm Questions and discussion
- 8.00pm Session closes



Information Session
Wednesday 25 November 2009, 5.00-8.00pm
Millmerran Community Cultural Centre

Agenda

- 5.00pm Arrivals and registration
- 5.10pm Welcome and Introduction
Jan Taylor, JTA Australia
- 5.15pm Project overview
Al Mueller, Vice President Operating Services
- 5.40pm EIS overview
Barton Napier, Coffey Natural Systems
- 6.10pm Supper
- 6.30pm Questions and discussion
- 8.00pm Session closes



Appendix 2

Arrow Presentation - Phase 1





Surat Gas Project

**Environmental Impact Statement
Stakeholder Information Session 1**

23-25 November 2009

Outline

- About Arrow Energy
- About the Surat Gas Project
- Coal seam gas development

- Project approvals
- Environmental impact assessment
- Key environmental issues
- Consultation

ABOUT ARROW ENERGY



Arrow Energy



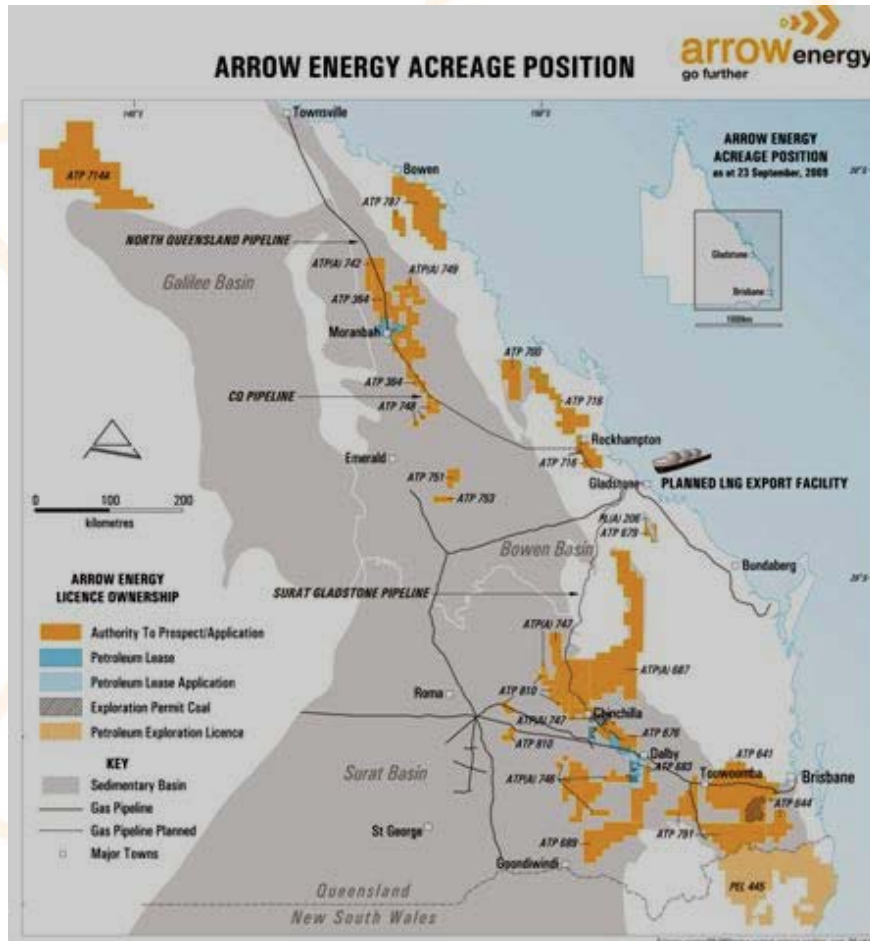
- Queensland company
- Listed on ASX in 2000
- First gas sales in 2004
- Currently provides >20% of Queensland's overall gas consumption
- Market capitalisation of \$3 billion, from a \$20 million beginning
- Portfolio includes:
 - Domestic gas supply
 - Gas transmission pipelines
 - Electricity generation
 - Interests in LNG production
 - Overseas coal seam gas leases
- Vision to become the first global Coal Seam Gas (CSG) company



Offshore coal seam gas interests



Queensland CSG reserves



- 65,000 km² of tenements (Qld/NSW)
- Current Gross Reserves
 - Proven (1P): 703 PJ / <1 tcf
 - Probable (2P): 4,094 PJ / 4 tcf
 - Possible (3P): 9,312 PJ / 9 tcf
- 10% of tenements explored
- Ongoing exploration
 - 1,000 PJ/annum 2P target
- Greatest focus to date:
 - Surat Basin
 - Bowen Basin

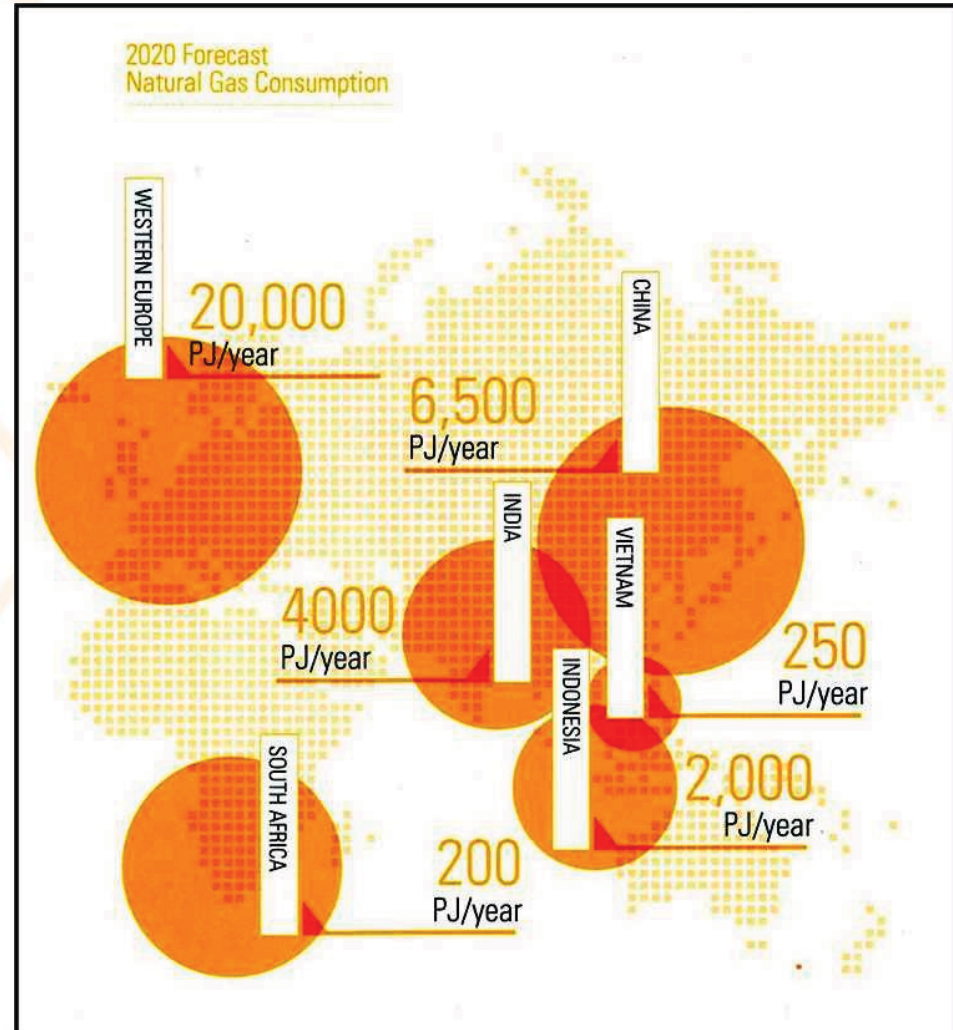
Electricity generation and sale



- Traditionally, most of Arrow's gas has been sold for electricity generation
- Arrow has interests in electricity sales from power stations:
 - Daandine (33 MW)
 - Townsville (235 MW)
 - Braemar 2 (450 MW)

Market opportunities

- Rising global energy demand
- Increasing demand for less greenhouse gas intensive energy sources
- Government policies promote increased use of gas



Domestic sales

Increase production to meet growing demand for energy – gas sales and electricity generation

Example project:
Braemar 2 Power Station



Export markets

Realise opportunity provided by global demand for energy – liquefied natural gas

New opportunities:
Gladstone LNG Project at
Fisherman's Landing

Shell Australia LNG Project
on Curtis Island



Arrow on Environment

- Arrow will:
 - operate in a manner that protects the environment
 - minimise the release of any harmful substances to the environment
 - actively protect ecological values
 - strive to produce benefits that extend beyond our environmental responsibilities



Arrow on Land Access

- Arrow recognises that every piece of land or property is unique and that our operations will need to take account of land use and capability
- Arrow will work with landowners to site infrastructure and time activities to minimise disruption to farming
- Arrow will conduct land access negotiations in a considerate and open manner allowing time to address landowner issues



Arrow on Safety

- Arrow believes nothing less than zero harm is acceptable
- Target Zero is a system that focuses on integration of safety into all business practices
- Target Zero is continually reviewed by senior management to ensure the continued suitability, adequacy, and effectiveness of its safety systems



SURAT GAS PROJECT

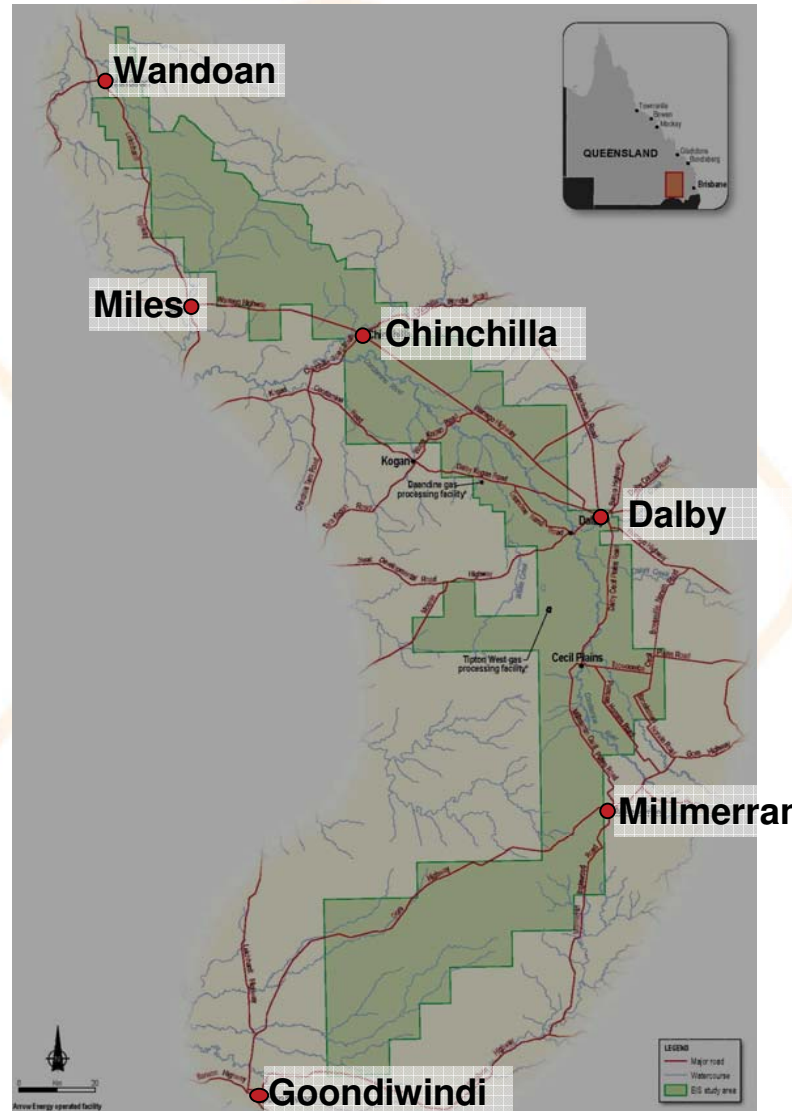


Current activities

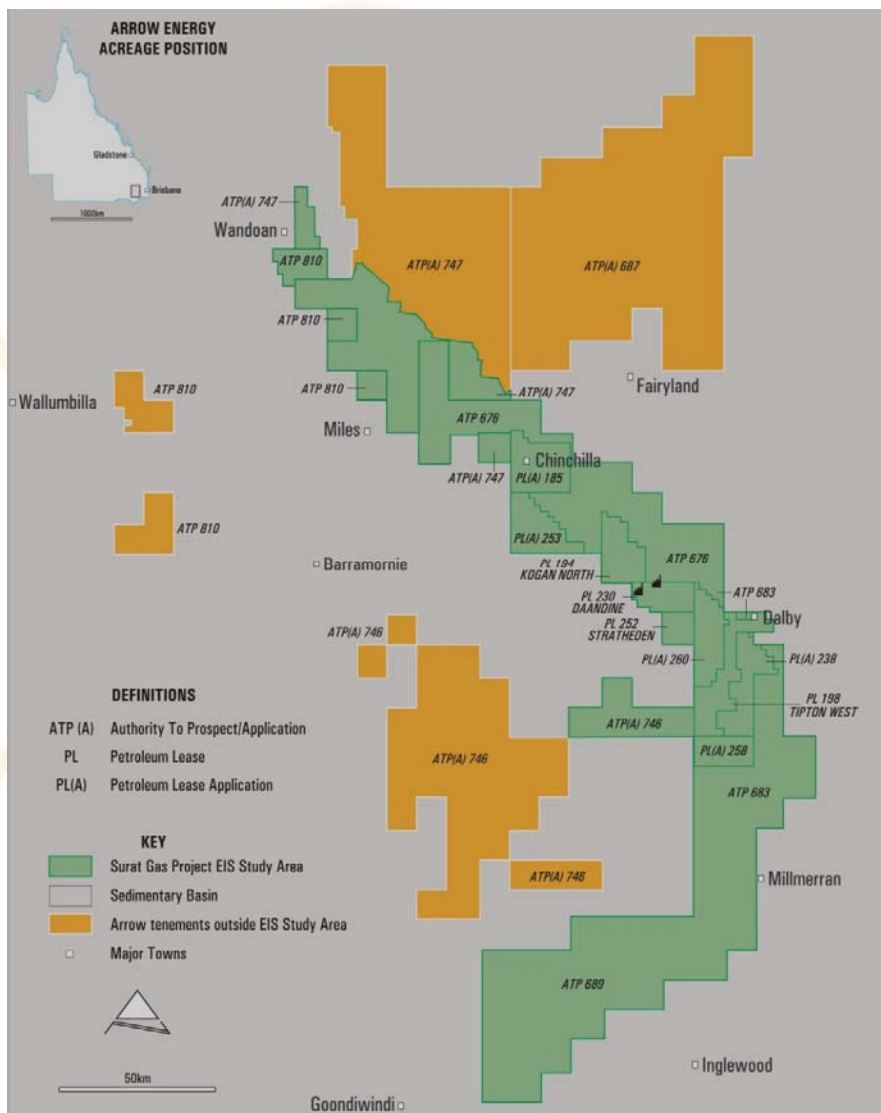
- To maintain existing gas supply contracts
 - Domestic gas supply
 - Power generation
- To confirm a viable gas supply for LNG production
- Expansion of existing field near Dalby
 - Production wells
 - Gathering, compression and water treatment facilities
- Approved by amendment of existing Environmental Authorities



Surat Gas Project area



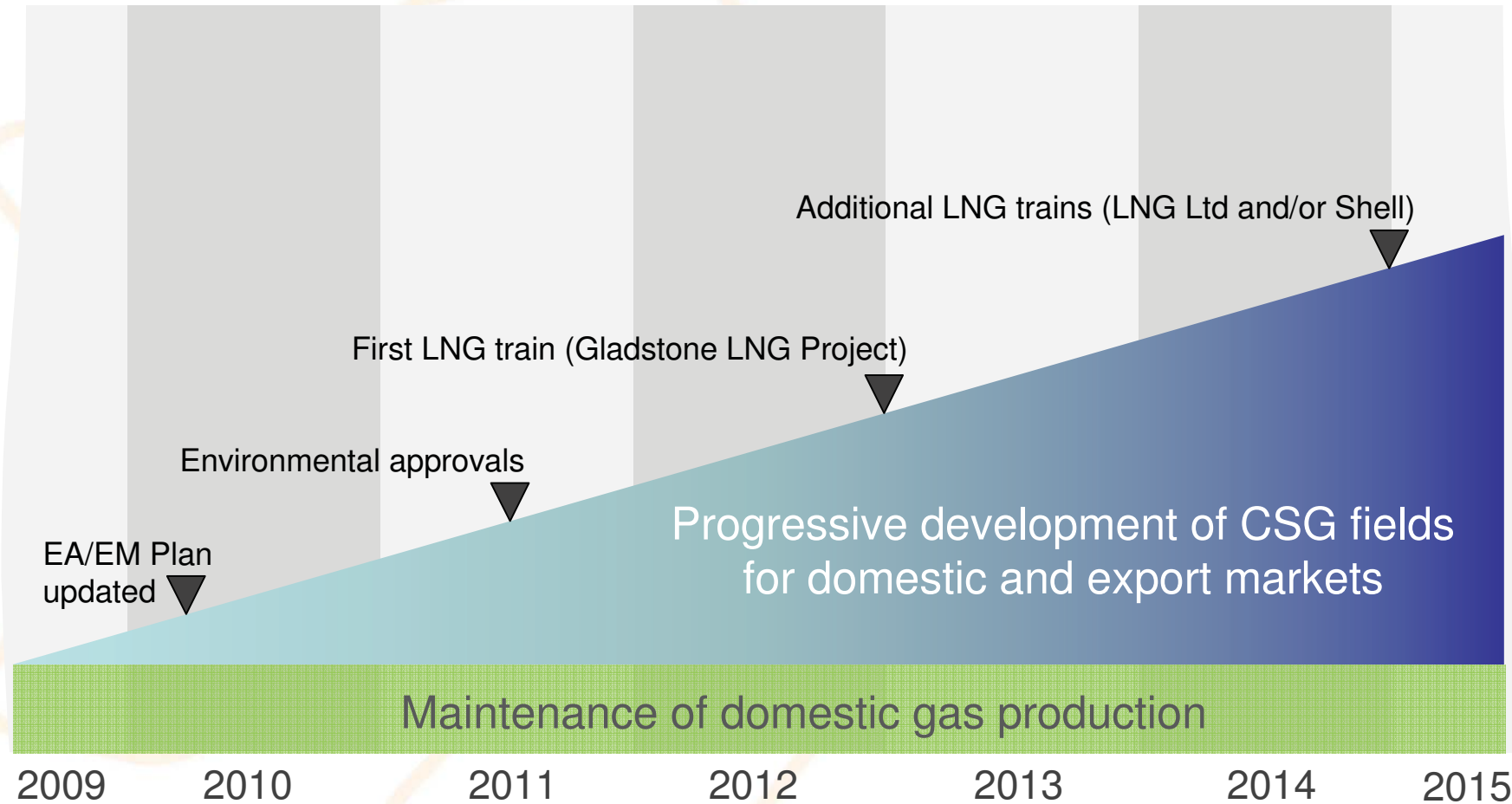
Surat Basin tenements & project area



Surat Gas Project

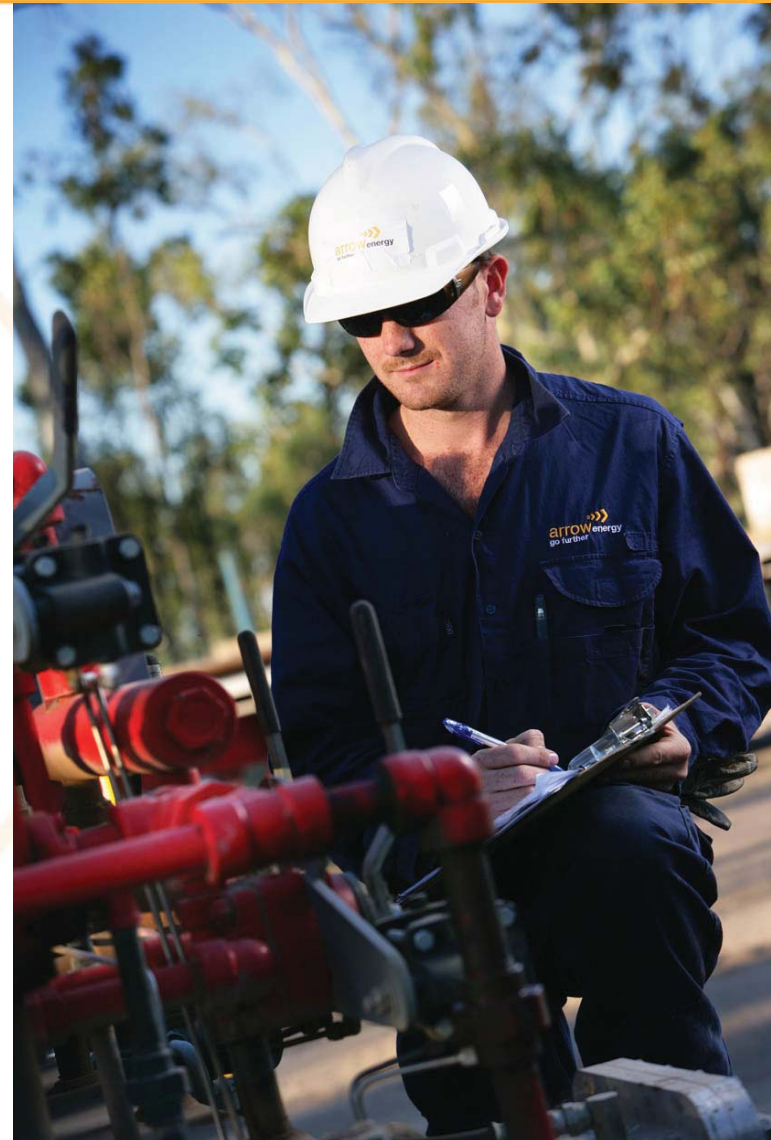
Market	Opportunity	Overview
Domestic	Existing gas supply contracts	<ul style="list-style-type: none">• Braemar 1 Power Station• Braemar 2 Power Station• Daandine Power Station
	Future gas supply contracts	As they arise in energy market
Export	Gladstone LNG Project at Fisherman's Landing	<ul style="list-style-type: none">• Up to 1.5 Mtpa / 1 LNG train• Arrow to supply feed gas to first train• Second train planned
	Shell Australia LNG Project on Curtis Island	<ul style="list-style-type: none">• Up to 16 Mtpa / 4 LNG trains• Arrow to supply gas to trains
	Other opportunities	As they arise in energy market

Project timeframes



Development considerations

- Successful exploration
- Proven, viable gas resource
- Domestic and export markets
- Economic and commercial risks
 - long term gas sales contracts
- Proximity to existing infrastructure
- Conversion of petroleum tenements
- Environmental and social constraints
- Stakeholder issues



COAL SEAM GAS DEVELOPMENT



Development activities

- Exploration
 - Seismic surveys
 - Core holes
 - Pilot well programs
- Production
 - Well and gathering infrastructure
 - Integrated production facilities
- Integrated production facilities
 - Gas compression and dehydration
 - Water treatment
 - Power generation

Coal seam gas development



Summary

- Arrow currently provides >20% of Queensland's overall gas consumption
- Arrow has substantial tenements in Qld and confidence in resources
- Global energy demand and gas market opportunities are rising
- Surat Gas Project aims to develop reserves to meet these emerging opportunities



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PowerPoint 2007 St

Appendix 3

Coffey Presentation - Phase 1





coffey  **natural systems**
SPECIALISTS IN PEOPLE AND PLACE

ARROW ENERGY

**SURAT GAS PROJECT EIS
STAKEHOLDER INFORMATION SESSION 1**

23-25 NOVEMBER 2009



Outline

- Project approvals
- Environmental impact assessment
- Key environmental issues
- Consultation

Project approvals - petroleum permits

Petroleum and Gas (Production & Safety) Act 2004 (Qld) (governs petroleum activities in Queensland)

Authority to Prospect (ATP)

Exploration activities including:

- Seismic surveys
- Core holes
- Pilot well programs

Petroleum Lease (PL)

Installation of infrastructure:

- Production wells
- Gas and water gathering systems
- Gas compressors
- Water treatment plants

Project approvals – environmental authority

Environment Protection Act 1994 (Qld)

- Environmental Authorities (EA) held for current operations
- Environmental Authorities required before ATPs/ PLs granted
- Environmental assessment required before EA granted
- EM Plan and/or Environmental Impact Statement (EIS)

Environment Protection and Biodiversity Conservation Act 1993 (Cwlth)

- Referral to Commonwealth Government
- Determine significance of potential impacts to matters of national environmental significance
- Endorse Queensland approvals process

Project approvals – other requirements

Queensland and Commonwealth Government requirements

Associated water management	Petroleum & Gas (Production & Safety) Act 2004 (Qld) Environment Protection Act 1994 (Qld)
Land access and landholder compensation	Petroleum & Gas (Production & Safety) Act 2004 (Qld)
Cultural heritage management plan	Aboriginal Cultural Heritage Act 2003 (Qld)
Development application	Integrated Planning Act 1997 (Qld) (if proposing activities outside ATP/PL)
Water licences Beneficial use licences	Water Act 2000 (Qld)
Native title	Native Title Act 1993 (Cwlth)

Environmental impact statement

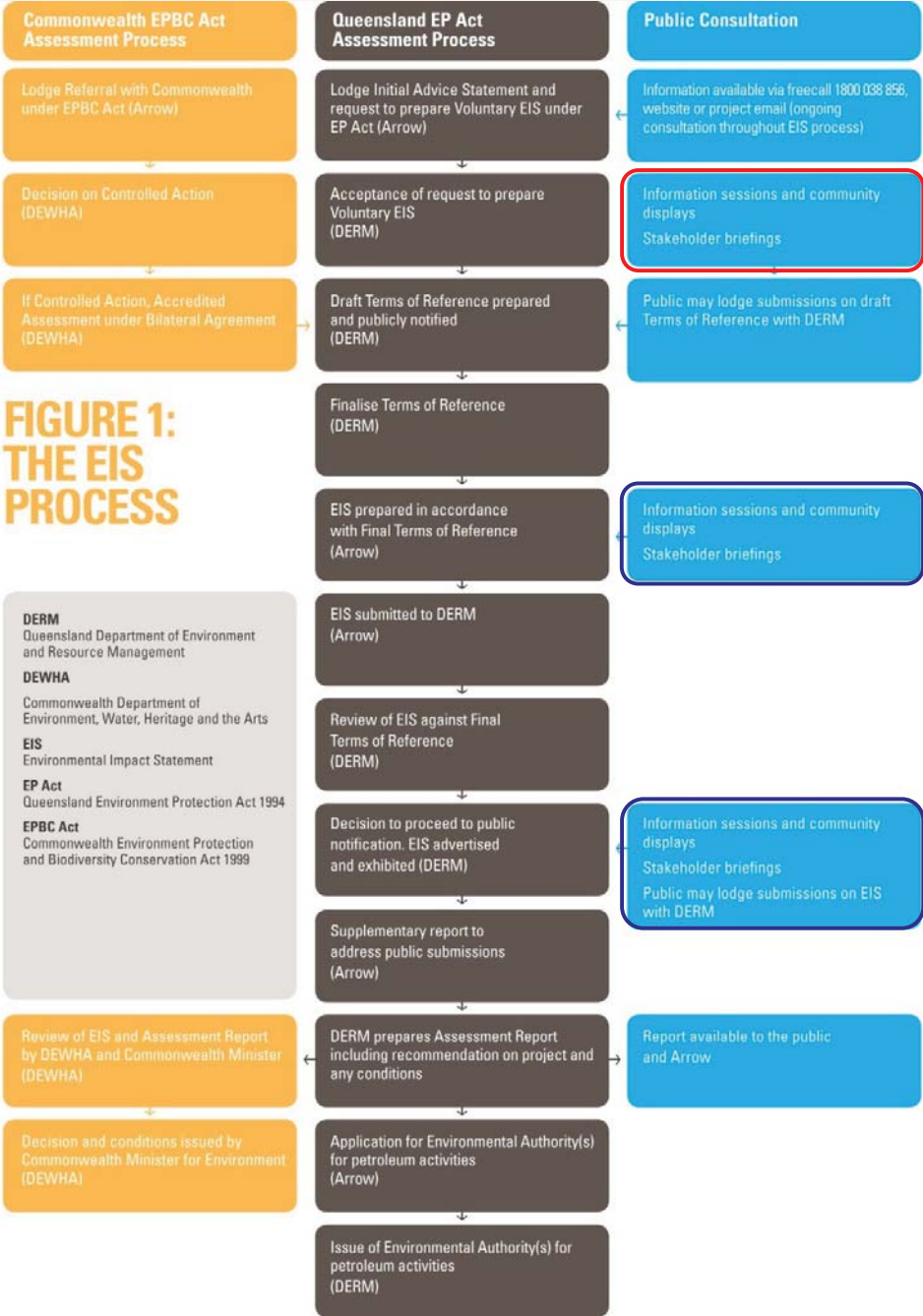
Arrow is preparing a

voluntary Environmental Impact Statement

over the entire project development area, to be assessed by

***Chief Executive
Department of Environment and Resource Management (DERM)***

Queensland and Commonwealth approvals processes



Environmental impact assessment

Environmental impact assessment (EIA) is a comprehensive study of environmental, economic and social issues, and potential impacts and benefits of a proposed development



Environmental impact assessment cont'd

- What is going to be done
- Where, when and how

- We know what is going to be done
- We know how it is going to be done

- We are uncertain about where and when
- Framework approach to be applied to EIA

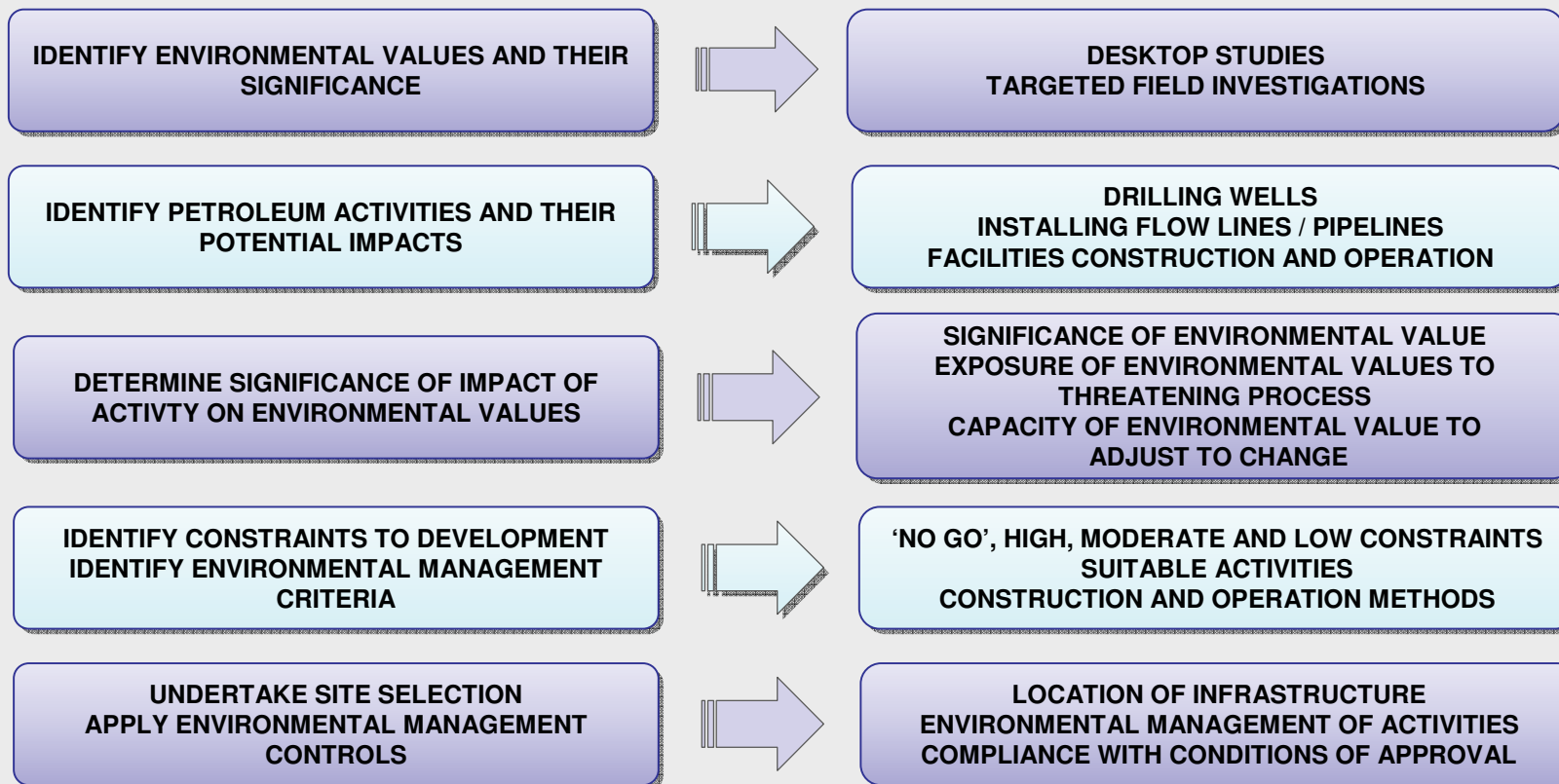
Approach to environmental impact assessment

A ***framework approach*** will be applied to site selection and the protection of environmental values

Identify where we are not going vs where we are going

The approach recognises Arrow's responsibility to ***protect the environmental values*** of the area and apply appropriate environmental management procedures to its activities

Environmental framework



Environmental framework cont'd

Constraint	Project Infrastructure			Applicable Framework
	Wells	Flowlines & Pipelines	Integrated Facilities	
No Go	N	N	N	No activity is permitted. Procedural and behavioural controls will be applied to ensure all staff and contractors observe the constraint
High	Y	Y	N	Very strict controls will be applied e.g., narrowing of pipeline right of way, certain types of construction methods prohibited, specific adjacent areas protected etc.
Moderate	Y	Y	Y	Standard construction/mitigation measures will be applied to minimise impact to acceptable levels (variability may arise when operating on different soil or land uses e.g., grazing, irrigation)
Low	Y	Y	Y	Generic requirements will be applied to activity. Procedures to deal with emergencies and incidents must be implemented



Key environmental issues

- Associated water
- Noise
- Biodiversity conservation
- Land use
- Socio-economic
- Cumulative effects



Associated water

- Water trapped in the coal beds by pressure
- Water must be released from the coal for gas to flow
- Once released, it is pumped to the surface as 'associated water'
- Associated water typically contains salt concentrations and may contain hydrocarbon compounds
- Volumes and quality of associated water will vary over life of gas well

Queensland Government policy

- Why is there a policy?
 - Significant quantities of associated water from multiple projects
 - Potential for land degradation
- What does the policy say?
 - Discontinued use of evaporation ponds as a primary means of disposal
 - Remediation of existing evaporation ponds to occur within three years
 - CSG producers responsible for treatment and disposal of associated water
 - Associated water treated to standard defined by DERM

Associated water issues

- Significant volumes of water
 - Multiple producers
 - Variable quality
- Raw water ponds
 - Storage capacity
 - Emergency storage/management
- Disposal options
 - Beneficial use
 - Reinjection



Associated water issues cont'd

- Treatment required for beneficial use
 - Beneficial uses determine water quality
 - Primary treatment using reverse osmosis
- Brine and reverse osmosis rejects disposal
 - Beneficial uses of salt
- Groundwater drawdown
 - Regional aquifers
 - Great Artesian Basin
- Long-term solution required
- Complex approvals
- Legislative changes required



Associated water management

- Arrow investigating long-term industry-wide solution
- Committed to removal and appropriate disposal of brine (salt) concentrate
- Arrow would like to remove the salt for beneficial use either during the project or at the end of project life

Noise

- Sources
 - Compressors, power generating plant, well facilities
 - Water treatment plant
 - Vehicles and equipment
- Disturbance
 - Noise (sound power) level
 - Time and duration
 - Separation distance
- Potential issues
 - Sleep disturbance, loss of amenity



Noise cont'd

- Sensitive receivers (e.g. residences) mapped
- Noise modelling of facilities
- Noise contours inform site selection
- Noise mitigation options investigated and applied
 - Equipment selection
 - Acoustic barriers
 - Inlet/outlet attenuation (baffles)
 - Pipe lagging/burial

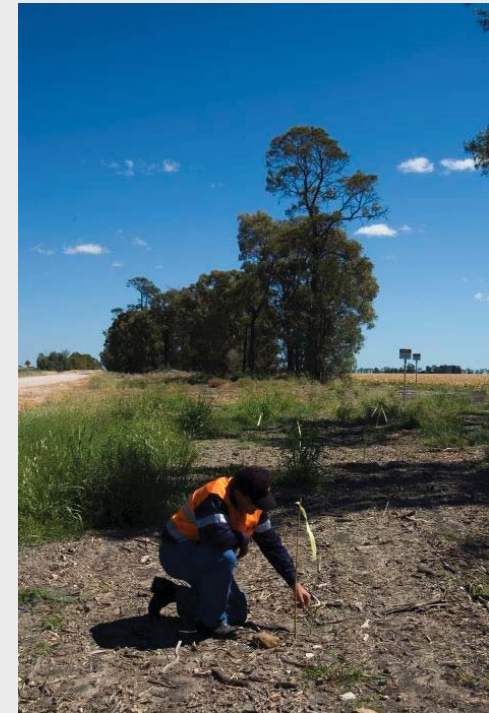
Biodiversity conservation issues

- Clearing of native vegetation
 - Viability of habitat
- Conservation significance of remnant vegetation
 - Elevated by extent of clearing and existing threats
- Wildlife corridors
 - Linkages between remnants
 - Riparian (river/creek) corridors
- Ecosystem function and health
 - Threatening processes



Biodiversity conservation – potential impacts

- Loss of habitat
- Habitat fragmentation
- Loss of endangered, rare or threatened flora and fauna species
- Diversity of remnant vegetation
- Depletion of gene pool
- Weed infestations
- Introduction of pest plants and animals



Land use

- Extent of development
 - Integrated facilities
 - Well spacing
 - Gathering lines
- Development activities
 - Disruption to farming activities
 - Loss of productivity
 - Timing of activities
- Operation activities
 - Ongoing access for maintenance activities
 - Rehabilitation



Land use cont'd

- Arrow commits to working with landholders:
 - Planning and timing of activities
 - Access requirements
 - Rehabilitation
- Flexibility in siting infrastructure
 - Farming practices considered
 - Well sites can be moved
 - Use existing access tracks
 - Gathering lines can be located along fencelines

Socio-economic

- Employment
 - Competition for skilled labour and technical personnel
 - Availability of skilled labour to rural sector
 - Impact on salaries and wages
- Influx of workers
 - Demand for local goods and services
 - Demand for housing
 - Potential inflationary effects on local economy
 - Increased demand for community services
 - Increased demand for health services

Socio-economic cont'd

- Road infrastructure
 - Impact on rural road network
- Economic benefits
 - Employment opportunities
 - Investment in local economy
 - Diversification of economic base (agriculture, mining, CSG)
 - Improved community facilities and services

Cumulative effects

- Multiple projects occurring in similar timeframes
- CSG and mining developments
- Associated water management
- Regional social and economic impacts
- Biodiversity and ecosystem function



Approvals timeframe

EIS Process	Target Date
Lodge Voluntary EIS Application Lodge Initial Advice Statement	Q4 2009
Exhibit Draft Terms of Reference for public comment	Q1 2010
Undertake technical studies Prepare EIS	Q3 2009 - Q2 2010
Submit EIS to DERM for adequacy review	Q3 2010
Exhibit EIS for public comment	Q3 2010
Qld / Cwlth Government decision on project	Q4 2010 – Q1 2011

Technical studies

Physical environment

- Landform, geology and soils
- Surface water and hydrology
- Groundwater
- Terrestrial ecology
- Aquatic ecology
- Greenhouse gas

Social environment

- Air quality
- Noise
- Aboriginal cultural heritage
- Non-Aboriginal cultural heritage
- Traffic and roads
- Landscape and visual
- Socio-economic

Consultation

Stakeholder engagement is a key part of any environmental and social impact assessment

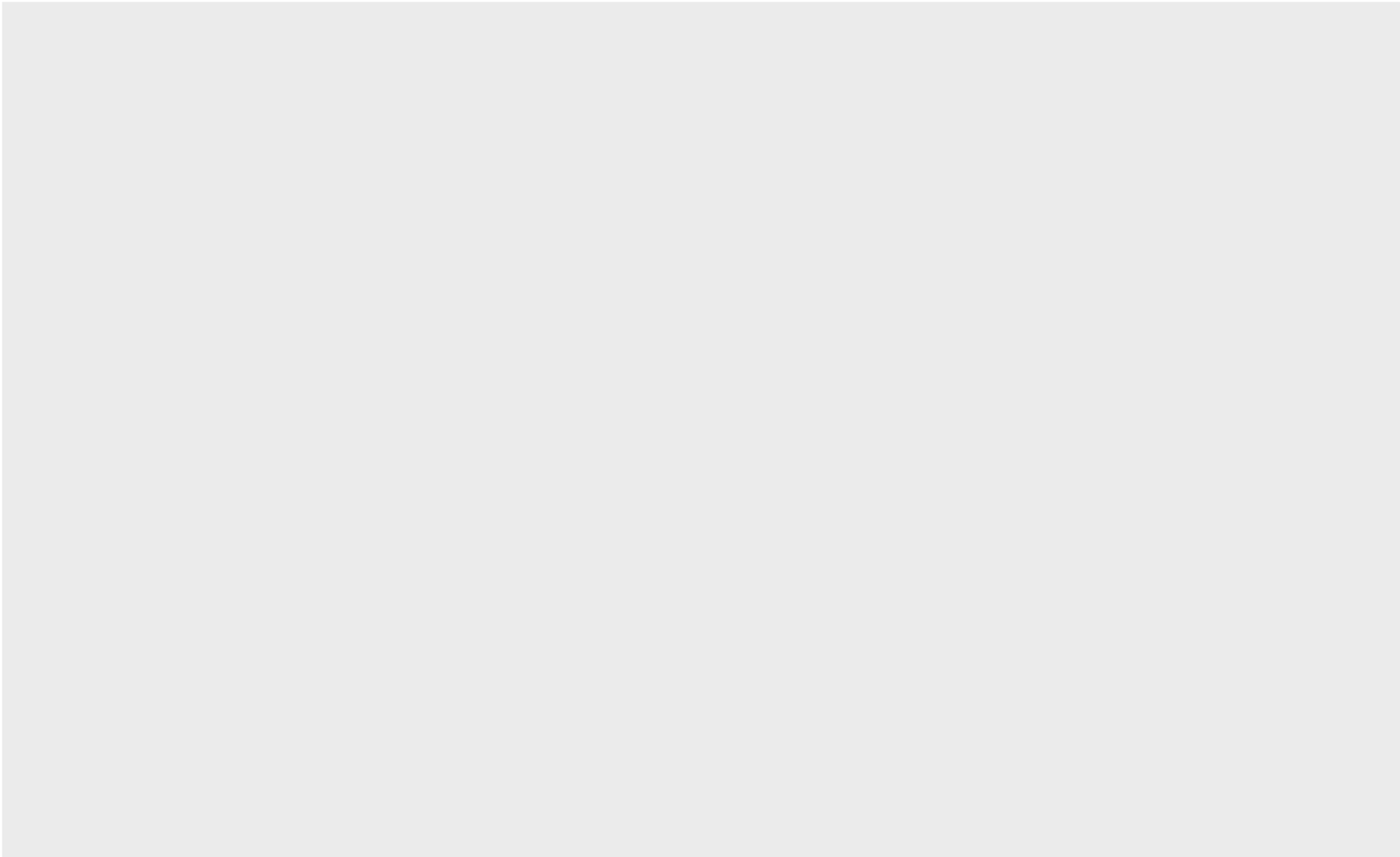
- Landholders
- Indigenous community
- Traditional Owners
- Commonwealth, state and local government
- Local communities
- Local interest groups
- Industry and representative bodies
- Arrow Energy staff

Contact details

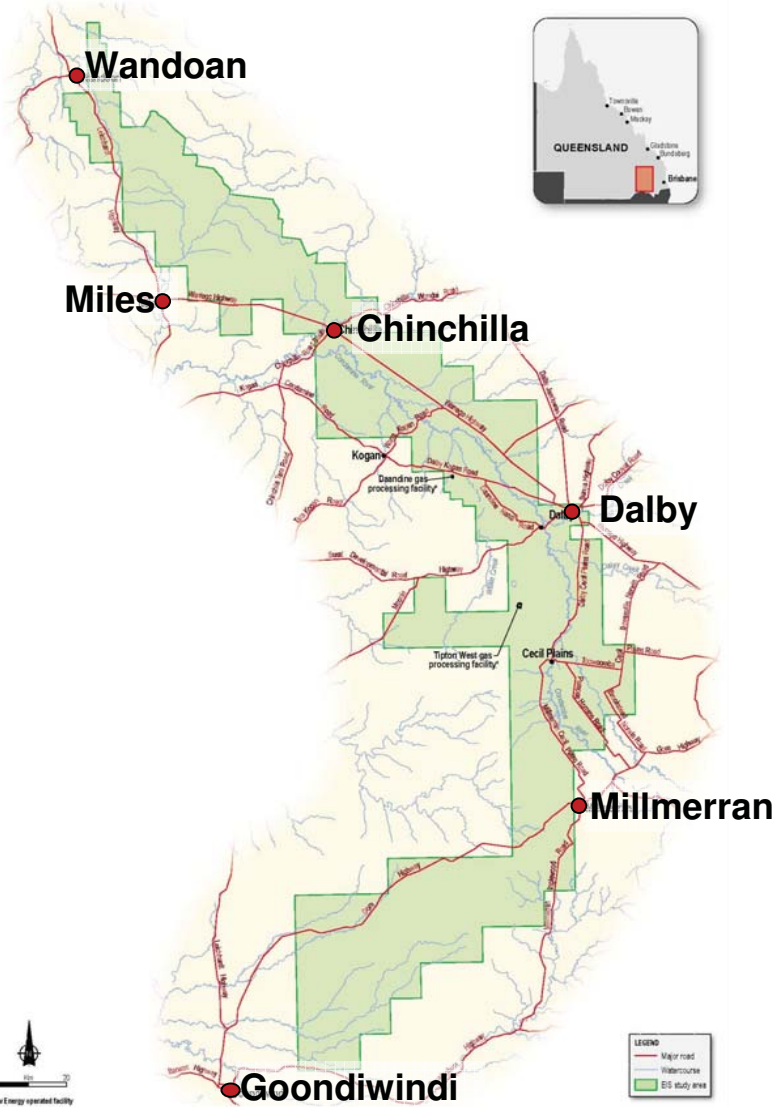
- Hotline freecall **1800 038 856**
- Email address: suratgas@arrowenergy.com.au
- Website www.arrowenergy.com.au

Questions

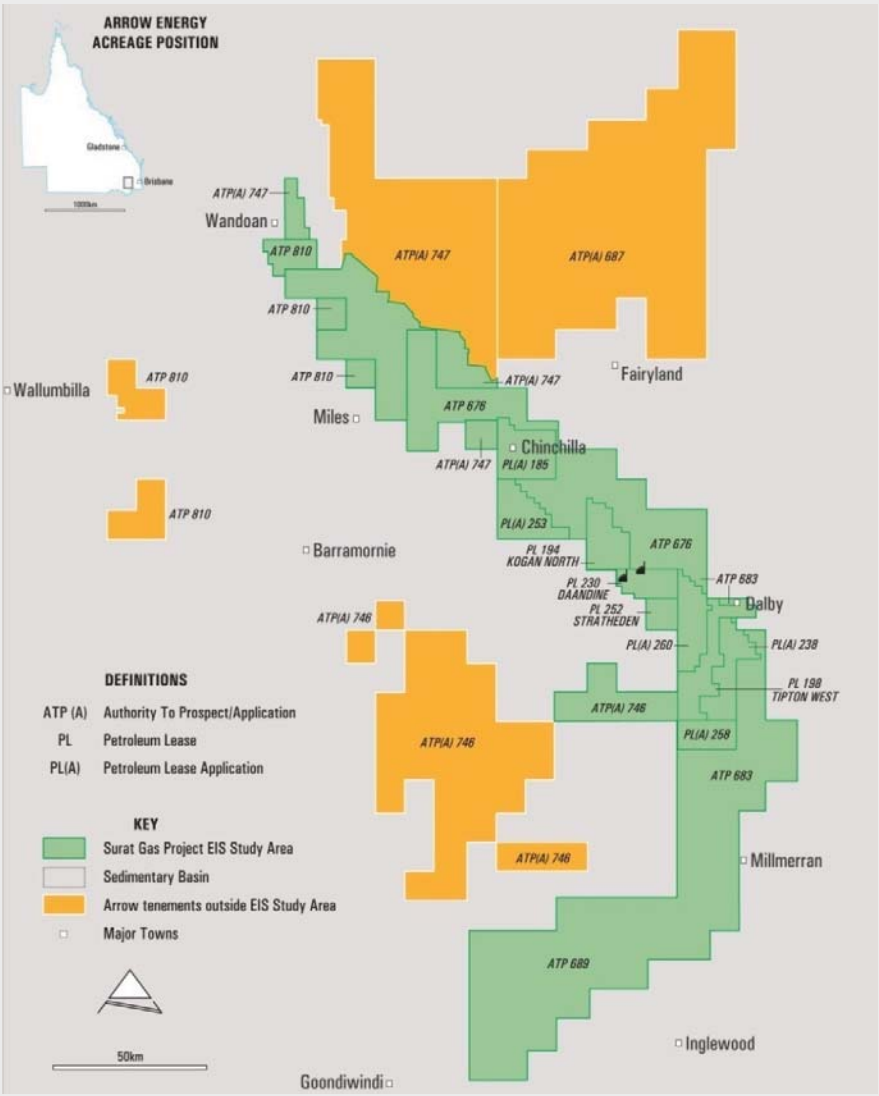




Surat Gas Project area



Surat Basin tenements and project area



Appendix 4

Summary of Q&A sessions



Meeting Notes

The purpose of these meeting notes is to reflect the questions asked and answers provided during the Surat Gas Project EIS Community Information Session in Dalby.

Date:	Monday 23 November 2009 5.00-8.00pm	
Venue:	Dalby RSL, Anzac Room, 69 Drayton Street	
Attendance:	32 registered attendees (some attendees did not register)	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Shaun Scott, CEO	Arrow Energy
	Barton Napier, Senior Principal	Coffey Natural Systems
Other speakers:	Carolyn Collins, Environment Manager	Arrow Energy
	Will Barker, General Manager LNG	Arrow Energy
	Gareth Quinn, PR & External Affairs Manager	Arrow Energy
	Greg Smith, Environment Coordinator	Arrow Energy

Note: This session was not audio recorded by JTA Australia; the meeting notes are based on a written record of the questions raised and will include some paraphrasing. The following sections in bold type are questions and comments from the audience. Those unbolded responses are from Arrow Energy and Surat Gas Project representatives.

In some cases, additional information has been added following the Environmental Impact Statement presentations to give further context to some answers; this information is in brackets within text or italicised following the answer.

- In the past, we have had bad experiences with Arrow, especially with the Tipton to Daandine pipeline. Trees were knocked down and brigalow trees cleared, with no consideration for the wildlife corridors. The process was incorrect and there was no community consultation. There were also problems with easement registrations.***

Arrow acknowledges that there have been historical issues. Hopefully we can get feedback upfront and move forward. Incremental approval processes have been carried out in the past and these have been piecemeal rather than holistic. There is a lot of work currently being undertaken to introduce tools to deal with planning deficiencies. Unfortunately, it can't be applied retrospectively.

- What work is currently being done by Arrow?***

There is some ongoing activity under existing Environmental Authorities. Arrow is also presently updating the current Environmental Management Plan (EM Plan).

- When does the use of evaporation ponds cease?***

Queensland Government policy is still being drafted. Policy now indicates raw water dams should be sized for two months storage. Companies have to have remediation plans for the evaporation ponds in place by 2011 but the policy is not definitive at the moment.

- How are you dealing with the impact on community services, especially emergency services and the risk of fire? These are voluntary organisations that are already stretched.***

Arrow is certainly considering this, and the bigger picture plan for coal seam gas in the region. Arrow is working to develop a plan with Government and other proponents in the area like Origin Energy to upgrade services where required.

5. What does Arrow intend to do with the 50 million tonnes of salt that will be produced over the approximate 30 years of the project? How does Arrow intend to safely store, contain and dispose of it?

Note: Arrow estimates 4 to 5 million tonnes of salt over the next 5 to 10 years for the Surat Gas Project; however these are still estimates.

The brine (salt) will be concentrated in storage dams and Arrow is looking at the long-term beneficial use of the salt e.g. supplying chemical industries. Arrow is currently carrying out studies evaluating future options over time. As a base case, Arrow will remove salt it produces from the landscape to an approved landfill site. Arrow is currently collaborating with other companies about the removal of the salt.

Further information: disposal options Arrow is currently considering include transportation, crystallisation for industrial use and reinjection.

6. Moving salt to landfill is an inadequate response; it should be 100m underground. In the USA, it is deposited back underground.

Arrow and other CSG proponents are looking at many studies. A whole range of issues and options are being looked at.

Further information: Reinjection of brine would depend on studies into the aquifer characteristics in the area and may not prove a viable option in the Surat Basin.

7. The government blueprint quotes very significant volumes of salt and you are talking about putting that into landfill?

Note: various Government reports on the coal seam gas and liquefied natural gas industry can be found at <http://www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=14123>. A Blueprint for Queensland's LNG Industry is referenced here.

We will remove the salt we produce from this area and find an appropriate area to place it, for example; an approved landfill.

8. With regard to the production of salt, you mentioned assessing the cumulative impact in the Environmental Impact Statement. Does Arrow have to consider other companies' salt production? I'm concerned about different companies having inconsistent methods of salt disposal.

Arrow can't comment on how the other proponents are proposing to deal with issues. Arrow cannot dictate solutions to other organisations, but will be trying to work together with them. Through the EIS, we will be looking at the cumulative effects of environmental issues.

9. Does that mean the environmental impact is not being recognised if salt is not looked at as a whole (across the industry)?

In looking at the cumulative effect, Arrow will examine publicly available environmental impact studies carried out by other companies. Arrow has to look at cumulative effect in the context of ensuring that Arrow's response to the issue does not tip the environmental impact over the edge. All EIS terms of reference require companies to look at cumulative effects.

10. With the banning of evaporation ponds how will the salt be stored?

No evaporation dams are envisaged for the area long term. Arrow is looking at beneficial ways to use the water. Some other dams will be needed to store raw water prior to treatment and to store production water from the brine stream. Evaporation will occur (naturally from these dams but their function is not primarily for evaporation).

11. Will dams be lined?

Yes.

12. Dalby sits above the Condamine alluvial and we are talking about 60 ML per year. The EIS will study potential impact on the aquifers. How confident are you that Arrow will get that right and what percentage damage do you predict to the aquifers? With the lowering of pressure, cracks and fissures could develop in the aquifers over the years. The Condamine alluvial could be drained of water in 20 years time. How confident are you about the impacts?

At this point we don't know, this needs to be investigated. Arrow will carry out groundwater modelling for the whole of the region to understand how groundwater behaves utilising Department of Natural Resources and Water monitoring data, and also install its own monitoring bores. The company will look at whether activities impact recharge zones, the interconnectivity of the aquifers and geology of the landscape as well as ground modelling bores.

The level of certainty of modelling improves over time with more modelling data. Arrow will also be working with the state government who have their own models to do cross-comparisons. The groundwater report prepared for the EIS will be a public document.

Reinjection was raised in the discussion

We are dealing with complex groundwater systems and reinjection may not be considered a viable option until such time as the groundwater modelling has been completed to ensure salt is not reinjected into aquifers that support local communities.

13. How will Arrow limit damage to shallow aquifers if they do start draining? There is natural and associated mining interconnectivity and if the unlikely happens how will Arrow make good? The state government assumes mining companies will make good but look at the American experience.

Arrow will be required by legislation to make good impacts on existing bore users. There is no one answer to how Arrow may manage all possible impacts on bore users, however as a last resort the wells can be decommissioned and sealed. Arrow is still conducting ongoing discussions with government about the trigger levels that would enact the Governments make-good provisions. The government does monitoring in terms of companies meeting environmental management standards.

Further information: The government is also continuing to develop its monitoring network which will assist to monitor cumulative impacts on groundwater users.

14. As there is so much gas in the area and you will be drilling near the river and don't know the possible impacts that might occur, why don't you give some assurance that you will stay away from intensively farmed areas until sufficient environmental investigations are carried out?

I feel uncomfortable about taking compensation from Arrow and then becoming a beneficiary of salt production. Why rush? Instead leave fertile ground alone until you have all the answers.

The process we are undertaking is an opportunity for you to raise your concerns and for us to listen to and work through the issues. Through the EIS studies, mitigation strategies will be put forward. We are looking into the farming areas as part of this.

15. Will Arrow look at lobbying government to improve poor roads, inadequate health services etc? How many millions of dollars will be leaving the region to government (by virtue of royalties) because it is a safe National Party seat? What will Arrow specifically do to partner with the community to improve the region?

Arrow is already investigating education and training programs and will be assessing roads and health services. Arrow can put forward views to government but will be more influential uniting with other companies and looking at what the coal seam gas industry as a whole can do for the region. Arrow is committed to working within the community and is keen not to replicate other companies that operate on a fly in / fly out basis.

16. Can Arrow forecast the size of future work camps and the population increase, which may impact on community policing?

The EIS will study population growth as part of the social impact assessment. It will identify estimated peaks in workforce numbers as the field develops over time.

17. The prime agricultural lands are also alluvial floodplains. Over the last 20-30 years farmers have learned much and have hugely changed farming practices so as not to interfere with natural systems and to improve water flow. I would like to reinforce that something as simple as a black soil track will affect water flow on our farm.

We currently have no access roads on a lot of farms. It is extremely critical from a land care point of view that Arrow Energy's infrastructure must be critically developed with the landowner to minimise effects to farms. As an organisation Arrow must become aware of constraints. A fence can cause soil erosion of one metre deep.

The coal seam gas industry is not compatible with modern day farming. I suggest you get out onto the farms with a farmer to understand modern day farming. If you put an obstruction on the land it will hold water back until it finds the lowest point and it will get washed away.

The pipes will need to be buried properly so that farmers can carry out normal operational farming over the top. Wells cannot be seen when farming with tractors at 2.00 am. Pipelines will be the biggest problem with heavy machinery and there cannot be obstructions on the surface. There can be no 30 metre exclusion zone or obstructions.

You need to get real about compensation and your interference with intensive farming land.

We are surprised to hear about exclusion zones (exclusion zones are not normally imposed for low-pressure systems). In terms of high-pressure gas pipelines, yes, these generally have easement conditions attached.

Pipeline risk assessments (Hazard Identifications) will identify requirements for burying pipe taking into consideration boring, deep water ploughs etc.

Further information: Arrow will be installing low-pressure gas and water gather systems (pipelines) from wells to an Integrated Production Facility, where gas is compressed to higher pressure then distributed and water is treated. In comparison, high-pressure systems would include connections to the proposed Surat to Gladstone Pipeline, or the Roma to Brisbane pipeline.

Meeting Notes

The purpose of these meeting notes is to reflect the questions asked and answers provided during the Surat Gas Project EIS Community Information Session in Chinchilla.

Date:	Tuesday 24 November 2009 5.00-8.00 pm	
Venue:	Chinchilla State High School, 7 Tara Road	
Attendance:	21 registered attendees (some attendees did not register)	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Robbert De Weijer, Chief Operating Officer	Arrow Energy
	Barton Napier, Senior Principal	Coffey Natural Systems
Other speakers:	Carolyn Collins, Environment Manager	Arrow Energy
	Jason Schroder, Production Manager (South)	Arrow Energy
	Gareth Quinn, PR & External Affairs Manager	Arrow Energy

Note: This session was not audio recorded by JTA Australia; the meeting notes are based on a written record of the questions raised and will include some paraphrasing. The following sections in bold type are questions and comments from the audience. Those responses that are unbolded are from Arrow Energy and Surat Gas Project representatives.

In some cases, additional information has been added following the Environmental Impact Statement presentations to give further context to some answers: this information is in brackets within text or italicised following the answer.

1. **Arrow Energy mentioned that salt might have other industrial uses, what are these and how will Arrow transport the salt out of the area?**

Arrow is looking at purifying the salt for industrial use. Crystallised salt can be used for chemical manufacturing, such as caustic soda.

Final transportation options for salt are yet to be decided and options are being explored as part of the Environmental Impact Statement (EIS), and may consider pipelines or trucking salt. Arrow has not identified a final end use but the base case for salt is disposal to an approved landfill.

2. **How much salt will Arrow produce?**

Arrow will possibly produce four to five million tonnes over the next five to ten years. As a base case, Arrow has made a commitment to remove the salt it produces to an approved landfill.

3. **A representative of the Western Downs Regional Council commented:**

- **council would like to be informed of truck movements in the region; it is concerned about increased traffic, road maintenance and upgrades and safety issues with school buses etc**
- **beneficial use of water is very important. Council is interested in urban uses of water, as well as its agricultural and industrial uses**
- **training and employment for local residents is important. Council is against fly in/fly out operators, it would like the employees to be living in the area and be part of the local community**

Arrow is committed to local employment. The company intends to train local residents as operators and build up expertise and competence within our operational business. There will be certain areas of expertise required which are not available in the local region, where workers will need to be sourced from elsewhere, for example specialist drilling and construction.

4. With regard to employment, will Arrow bring in its own unskilled labour to Chinchilla? If Arrow employs subcontractors rather than employing directly, will Arrow be able to keep these promises? (Subcontractors often bring their own staff from other jobs outside the region) Is Arrow going to ensure that this will happen?

Arrow will be employing a range of contractors. Arrow will be working with contractors to maximise local employment. It is important to recognise that during construction specialist workers will need to be utilised from outside the region.

Arrow is committed to having its operational workforce live in the area. Arrow has approximately 35 field people employed at present around Dalby and avoids fly in/fly out employment.

5. Will you employ local people?

Local employment makes sense from a community and business sense. In the future, there may be labour shortage associated with all the projects in the area. Arrow is working with TAFE to develop future training opportunities.

6. There are older people in the area e.g., in their 40s, looking for employment who are not attending TAFE.

Arrow is interested in people willing to retrain and who wish to live in the area. We have staff studying whilst working.

7. We have a property 40 km outside Chinchilla and have five small bores which were monitored six months ago. Is the gas operation affecting those bores because we had to pump sand out of them? Can you guarantee that the water to the bores will not be cut off?

Arrow is targeting coal seams about 300 to 500 metres below ground level. Most stock and domestic bores draw water from aquifers above that. Coal seam gas wells are sleeved so as to prevent the bores causing interconnection between aquifers. Studies are currently being undertaken to monitor aquifers and to look at interconnection issues. If there are issues, regional aquifers can be sealed off.

Further information: the groundwater study is currently being undertaken to understand how aquifers relate and behave to the work Arrow is doing, including interconnection issues.

8. Why are some bores in the area becoming dry? We heard from drilling contractors that gas is coming up the bores?

We're not sure of the history of your bores. Bores can dry up for many reasons, for example, pumping of water (upstream) by other users, or groundwater recharge areas not receiving normal recharge due to lack of rain and climatic conditions. Through studies and monitoring, more accurate groundwater models can be built. The longer the monitoring, the more information can be collected to understand how the groundwater system responds to weather patterns and patterns of use.

9. Senior figures in the Department of Natural Resources have serious concerns about the potential interconnectivity of aquifers. Can you say that Arrow's activities will have no impact? I am seriously concerned about the potential damage to groundwater aquifers and salt water being introduced into the headwaters of the Murray-Darling Basin.

There is currently a lot of speculation and modelling needs to be carried out. There can be more than one type of interconnectivity between aquifers. For example, the way other landowners use bore water, and natural fractures and faults in the geological strata.

10. You do not have a final disposal method for the salt but you expect the community to have faith in these processes?

Arrow is proposing and developing a risk-based approach for environmental management in the future that will address these types of concerns. The approach will be updated regularly. On the salt issue, Arrow's base-case plan is to remove produced salt to an approved landfill, however we are also undertaking studies to see if there is a beneficial uses of salt available, such as from an industrial perspective.

11. If (groundwater) monitoring demonstrates that there are interconnectivity issues, such as 15 years into your project, what's your plan then? How will you mitigate that?

It is difficult to say at this point. If monitoring clearly demonstrates issues, then Arrow may have to cap and seal wells in particular areas.

Under the Water Act, Arrow is required to make good impacts on other users. Our task through the EIS process is to alert the state government to potential issues.

12. Four to five million tonnes of salt is a lot to dry out? Will it be left to blow around into the air and local environment?

Concern about salt being left in dams has also been introduced in draft Government policy. The brine concentrate will initially be held in holding dams. Arrow may pipe slurry solution and is investigating crystallisation (for industry purposes).

Collapse of the existing salt market was raised in the crystallisation discussion

We do have to consider other issues, such as collapsing the existing salt market if it is sold.

13. Can the salt be reinjected into the ground?

Arrow is looking at trials for reinjection and may seek approval from government through the EIS process. However, present Government policy is that reinjection is not preferred.

One consideration in a reinjection trial is that Government would require brine to be put back into an aquifer which is *worse than* the reinjected brine. It's also important that reinjection does not sterilize any resources (e.g. gas or other resources).

14. Bores abandoned after Arrow has finished with them may continue to emit methane rich gas, which is a very bad greenhouse gas (23% more powerful) in the atmosphere. How is coal seam gas a cleaner source of energy than coal when so much methane is produced?

With regard to methane percolating to the surface, Arrow will properly plug and cap its abandoned wells to prevent migration of methane to the surface. Regarding the clean gas issue, the comparison is made to coal and oil. Coal seam gas is a cleaner fossil fuel than either coal or oil, and there is environmental sense in using it for electricity generation and global Liquefied Natural Gas.

15. You would need to shut down the coal production to get the (greenhouse gas) advantage out of producing coal seam gas; however you are still increasing the number of global power stations and increasing pollution? You are really saying you are increasing pollution less with gas, than you otherwise would be with coal.

Absolutely true, the global demand for energy is continuing to rise. The benefit obtained is from filling global demand for energy by using gas rather than coal or oil.

16. Why risk rich farmland when there is a global food shortage and there is no evidence of a lack of gas or oil, the USA has a large supply? Do people want food or energy?

People want both food and energy. Arrow is committed to not jeopardizing agriculture and not compromising good quality agricultural land. This needs to be taken into account and assessed during the EIS process and all stages of the project.

17. With regard to water, it is important that Council does not become reliant on coal seam gas water because it is only a short term solution with a limited life of approximately thirty years.

Response by a Western Downs Regional Council representative: Council is aware of the limited life of the coal seam gas water supply, but is looking at a variety of water sources available to Council to take the strain off the Great Artesian Basin and the weirs. We are not talking about taking a lot of water from coal seam gas, approximately 10ML.

We anticipate new water technology and are hoping for an overall improvement of the situation.

18. With regard to land access you mentioned that you are here for the long term (i.e. 25-30 years) but in farming terms that is short term. Farming is a long term intergenerational business. Arrow is starting from a low base here because your predecessors took an unhelpful attitude and alienated the local community and it will be a challenge for Arrow to change that attitude.

We are aware of the legislation enabling Arrow to enter our properties, The vast majority of landholders would prefer you not to be there. Most people wouldn't be happy with someone camping on their couch, just because the government said they could do so. How do you propose to manage landowner interface moving forward?

A good relationship with landowners is Arrow's priority and we apologise for what has happened in the past. We are committed to doing a good job moving forward. In the future we will need to have:

- open constructive dialogue with landholders and community
- an appropriate compensation scheme
- informed discussions about how to best work together

19. Further issues raised by Western Downs Regional Council representative:

- **Council opposes reinjection of saline water into aquifers**
- **opposes growing trees on farmland for beneficial use**
- **weed control (especially concerned about parthenium)**
- **washdown facility at Wandoan and ones proposed for Chinchilla and Dalby**
- **work camps to be placed in positions that do not cause concern to community**
- **Council requires ongoing consultation**
- **concerned about additional pressure on local infrastructure such as sewage treatment plants, refuse tips which are quite small (Council would like Arrow to dispose of its own rubbish) and**
- **water supply**

20. About six months ago Arrow was undertaking exploration activities at the Dundee field. When will that area be developed? In five or ten years?

We do not know the specific detail of development plans at this time, however we do know that development will commence south of Dalby in the first instance.

We can check with the exploration staff in Brisbane regarding specific plans for Dundee.

Further information: Arrow plans to install pilot testing bores in the Dundee area in the next 1-2 years. A Petroleum Lease application (PLA) has been lodged with the Department of Employment, Economic Development and Innovation (DEEDI) and has yet to be granted.

21. How do you manage gas wells on floodplains?

We can use remote telemetry, which means wells can be visited less often and that we do not require all weather access to these wells.

22. What about access to wells and the potential for roads to obstruct the floodplains? Any disturbance to floodplain soil can have serious consequences to farming. Other companies have built up roads.

We can use remote telemetry, which means wells can be visited less often and that we do not require all weather access to these wells. Arrow has avoided in building up roads across floodplains.

23. Is there any obligation to remove the polypipes once Arrow has finished in the area, or do they stay in the ground?

The pipes must be buried deep enough for landholders to cultivate or operate over. The minimum requirement is for pipes to be decommissioned *in situ*. In some areas, Arrow may remove the polypipe. The company is still deciding specific areas where this might apply.

24. What is the closest well spacing you would envisage? We hear 500 or 750 metres?

About 900 metres is the default, or one well approximately every 160 acres. If this can be extended it will be; fewer wells are better for everyone.

25. Are you carrying out horizontal drilling?

Not in the Surat Basin.

26. The blade on the end of the drill that shattered the coal seam, is it an alternative to fracking?

No, it's not an alternative.

Further information: Fracking is a typical CSG industry method which uses pressure to create localised fractures in the target coal seam to facilitate gas flow. The presentation showed a different method called reaming.

27. Will you still use fracking?

Yes; dependent on the well.

Further information: Arrow intends to use fracking only on a trial basis in the Surat Basin where coal seam characteristics usually allow gas flow.

Meeting Notes

The purpose of these meeting notes is to reflect the questions asked and answers provided during the Surat Gas Project EIS Community Information Session in Millmerran.

Date:	Wednesday 25 November 2009 5.00-8.00pm	
Venue:	Millmerran Community and Cultural Centre, Walpole Street	
Attendance:	14 registered attendees (some attendees did not register)	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice President Operating Services	Arrow Energy
	Barton Napier, Senior Principal	Coffey Natural Systems
Other speakers:	Carolyn Collins, Environment Manager	Arrow Energy
	Gareth Quinn, PR & External Affairs Manager	Arrow Energy

Note: This session was not audio recorded by JTA Australia; the meeting notes are based on a written record of the questions raised and will include some paraphrasing. The following sections in bold type are questions and comments from the audience. Those responses that are unbolded are from Arrow Energy and Surat Gas Project representatives.

In some cases, additional information has been added following the Environmental Impact Statement presentations to give further context to some answers; this information is in brackets within text or italicised following the answer.

1. A representative of Toowoomba Regional Council raised the following questions and concerns about road traffic and infrastructure impacts:
 - **the location required for drilling rigs, where they will be coming from and moving to**
 - **the roads are not built to deal with increased traffic and complaints are received from landowners**
 - **a direct contact number needed of Arrow representative to discuss**
i) long term issues and ii) current traffic flows
 - **ongoing maintenance and watering roads**

Arrow understands there is a need to communicate more about the location of drilling rigs and will establish a contact for Council as part of the project.

Cardno Eppell Olsen will be conducting a traffic study as part of the Environmental Impact Statement (EIS) process and will contact Council to discuss this further. As part of this study, roads in the region will be classified according to their threshold capacities.

Further Information: Arrow has established a process for maintaining contact with Regional Councils

2. **You mentioned the cumulative effects. Does each company look at the proposals of other companies?**

Arrow will look at Environmental Impact Statements already published and will use this public information to assess what cumulative effects Arrow's operations could have on the Environment.

3. **Who makes the final assessment on the project? Is it DERM (Department of Environment and Resource Management)?**

DERM and DEWHA (Commonwealth Department of Environment, Water, Heritage and the Arts) will make independent assessments after Arrow lodges its EIS.

4. What specific impact will the project have on the Millmerran area?

In the short term there will be ongoing exploration. The next stage will include pilot wells followed by development if productivity looks promising. The timing and location of development is currently uncertain at this stage.

5. Does the pilot stage take place before or after the government review?

There is some ongoing activity under existing Environmental Authorities. Arrow is also presently updating the current Environmental Management Plan (EM Plan).

Arrow already has approval to carry out pilot exploration as part of its exploration tenures. No new petroleum leases can be granted until the completion of the EIS process.

6. You have three years to find an alternative to using evaporation ponds for associated water and I have heard about portable reverse osmosis plants. However, in the meantime if it floods you risk the water pouring out of the storage ponds. Do you have an answer yet for this issue?

Arrow is looking at the beneficial use of the water for agriculture purposes. We are discussing with Western Downs Regional Council the possibility of providing the Council with water. We are also making an application to DERM to conduct a reinjection trial.

7. What about the brine, the rubbish? Will it be pumped to sea, pumped into the ground, into holding ponds?

Arrow is looking at minimising the brine stream and using it beneficially for industrial processing. However, at this stage, the base case is to concentrate the brine in dams and remove it to an approved landfill.

Further information: Arrow would like to develop a solution that involves beneficial use, such as crystallisation and selling to industry.

8. Have you considered the impact of pipeline construction crossing other infrastructure? Will there be conditions on pipeline construction, such as prohibiting use of rollers during road works because of vibration?

The gathering systems are typically buried 750 mm underground. Gathering systems are constructed of high density polyethylene pipe and we don't expect these types of restrictions. Your comments may be related to high-pressure steel gas pipelines which must be constructed and operated to Australian standards (AS2885). We are not at the point of understanding where the final locations of all high-pressure systems may go. Low pressure gathering lines do not have the same issues.

9. Will construction camps be set up?

Yes, for peak construction activities. The preference is for camps to be situated in the vicinity of construction.

10. Have you considered emergency response units, as there is no Queensland Ambulance Service based at Cecil Plains and waste management because our wastewater treatment plants cannot take additional loads?

Arrow will be working with the community to identify where the camps can be placed. We have our own internal emergency management plans.

Further information: Arrow is considering onsite sewerage treatment plants.

11. Will the camps be located in or out of the towns and will they be self-contained?

Arrow would like camps to be located as close as possible to the facility sites to minimise unsafe travel. There will be services at the camp, which potentially could be contracted to local companies.

12. The Bora Creek gas well was drilled in September 2001 on my property and I had an unhappy experience with that borehole. I have reports here from the EPA (Environmental Protection Agency). It took Arrow three years to clean up the mess they made, they killed approx 300 of my fish with the water that washed out of the bore holes and the carcinogenic by-product should not have been left on my property. I had no response from Arrow and no apologies. It would however be a benefit to have a power plant built at the back of Captains Mountain to supply power to that area.

It sounds like a terrible experience and Arrow sincerely apologise for putting you through that episode. We would like to think this couldn't happen in the future. Our intention is to respect everyone, as we are guests on your property. We aspire to be perfect but know that we are not there yet; but are committed to improvement going forward.

Further information: An Arrow representative visited the site the next day

13. Will Arrow leave something behind in the smaller towns? Contractors offer services, companies come and go, but will they leave something of benefit to the town?

Arrow is committed to use local contractors and businesses, to contribute as much as possible to local communities.

14. Perhaps Arrow could support local community groups such as sporting groups?

Arrow will develop a plan with the community and decide what activities it will support, such as local sport and community groups.

Arrow currently runs a Brighter Futures Program, which is aimed at improving the quality of life for communities. Currently it has activities in Dalby, Moranbah and Brisbane. As Arrow expands its activities into new areas, it will expand the program to the communities in these areas.

15. We have lived through the power station construction. How many people in this area is Arrow expecting as construction workers? What timeframe? Do you use contractors or have your own drillers?

We use contractors for drilling. With regard to the camps, it is hard to say how many integrated production facilities (IPFs) will be needed overall for the overall development of the Surat Gas Project at this stage. It takes approximately 400 people to construct one of these facilities. For the first LNG train there will be three IPFs in the Dalby area.

Further information: an LNG train is the sequence of equipment in the LNG plant, to purify and refrigerate gas into Liquefied Natural Gas.

16. How long will construction take... two years? When construction is finished how many people are left as field staff?

Construction of each integrated production facilities could take up to two years; this is the major draw for labour. For operations, Arrow will definitely seek to employ local people; we want local

people rather than a fly-in fly-out workforce. There is approximately 40 operations staff working at Tipton West and Daandine facilities currently (across the field, compression facilities and office). The majority of these people are from the Dalby area. We not only employ skilled personnel but also train up personnel as gas field operators.

Appendix 5

Advertisement - Phase 1



GET INVOLVED IN THE SURAT GAS PROJECT

All interested people are invited to attend a local community display to learn about Arrow Energy's plans for a major coal seam gas (CSG) exploration and development program in the Surat Basin.

Arrow Energy has engaged independent consultants to conduct an Environmental Impact Statement (EIS) for the proposed Surat Gas Project. All public input is welcome.

The project proposes to meet growing demand for gas both in Australia and potential export markets. It plans to develop known gas reserves near Arrow Energy's existing production fields around Dalby, and further reserves in a broader area of the Surat Basin extending to Wandoan, Chinchilla and Goondiwindi. The EIS will ensure that any potential environmental and social impacts of the project are identified and addressed.

Come to a community display at one of the following locations, or contact the project team for more information about the project and EIS studies to be carried out in your area:

Chinchilla	Tuesday 24 November 2009: 10am-2pm at Chinchilla RSL Sub Branch Hall, Heeney Street
Millmerran	Wednesday 25 November 2009: 10am-2pm at Millmerran Community and Cultural Centre, Walpole Street
Goondiwindi	Thursday 26 November 2009: 10am-2pm and 4-7pm at Meeting Rooms, Goondiwindi Waggamba Community Cultural Centre, Russell and Short Streets
Cecil Plains	Friday 27 November 2009: 1-5pm at Cecil Plains Hall, Geraghty Street
Dalby	Saturday 28 November and Tuesday 1 December 2009: 10am-2pm at Anzac Room, Dalby RSL, 68 Drayton Street
Wandoan	Monday 30 November 2009: 10am-2pm at Wandoan Community and Cultural Centre, 6 Henderson Street
Miles	Monday 30 November 2009: 4-7pm at Redeemer Lutheran Church Hall, 114 Murilla Street

Find out more about the Surat Gas Project and get involved in the EIS by contacting the project team at **freecall** 1800 038 856, **email** suratgas@arrowenergy.com.au, or **post** Surat Gas Project, Reply Paid 81 Hamilton Q 4007.

Also visit www.arrowenergy.com.au



Appendix 6

Poster - phase 1



GET INVOLVED IN THE SURAT GAS PROJECT

Arrow Energy has engaged independent consultants to conduct an Environmental Impact Statement (EIS) on a major coal seam gas exploration, development and production project proposed for your area. All public input into the EIS is welcome.

The Surat Gas Project proposes to meet growing demand for gas both in Australia and potential export markets. It plans to develop known gas reserves near Arrow Energy's existing production fields around Dalby, and further reserves in a broader area of the Surat Basin extending to Wandoan, Chinchilla and Goondiwindi. The EIS will ensure that any potential environmental and social impacts of the project are identified and addressed.

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Chinchilla

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Wednesday 25 November 2009, 10am-2pm
Millmerran Community and Cultural Centre, Walpole Street

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Meeting Rooms, Goondiwindi Waggamba Community Cultural Centre, Russell and Short Streets

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Appendix 7

Information sheets - Phase 1



THE SURAT GAS PROJECT

Arrow is planning its largest gas exploration and development program in the Surat Basin called the Surat Gas Project.

The project involves ongoing exploration in the Surat Basin to identify the most economic and environmentally acceptable areas for future gas production. The exploration program will be focused in an area extending from Wandoo to Dalby and south to Millmerran and Goondiwindi where the company currently holds exploration tenures and environmental approvals to conduct exploration activities. Field development and gas production will be undertaken based on the results of the exploration.

The Surat Gas Project will meet the ongoing gas supply opportunities arising from domestic and export markets. Presently, Arrow's interests include ongoing and increased supply to the Queensland gas market, and potential supply to the Liquefied Natural Gas (LNG) plants proposed for Fisherman's Landing at Gladstone and the Shell Australia LNG Project on Curtis Island.

The Surat Gas Project will see ongoing gas exploration, and the development of production wells and associated infrastructure for gas production (including gas compression and water treatment facilities and pipelines), progressively conducted across different geographic areas within the project area over time.

Initially, the project will involve the staged development of approximately 1,500 wells and infrastructure to support production, in an area with known gas reserves adjacent to Arrow's existing Surat fields. Further development will occur as domestic and export expansion opportunities arise in the energy market.

Before the project can proceed, Arrow must gain approval from the Queensland Government and the Commonwealth Government. Regulatory authorities must be satisfied our activities have been properly assessed, and that appropriate measures are in place to avoid or minimise environmental impacts. To do this, we will prepare an Environmental Impact Statement (EIS) which will examine the entire development.

An EIS is a comprehensive study of all environmental, economic and social issues and potential impacts associated with development of major projects. The EIS for the Surat Gas Project will set environmental controls to govern the project's exploration, development and production activities.

Public input is an important part of an EIS and Arrow is committed to consulting with Surat Basin communities and stakeholders throughout the process. Activities such as consultation sessions will be extensively advertised in local media. For more information about the EIS process, please read the Information Sheet: *Surat Gas Project: Environmental Impact Statement*.

ARROW'S EXISTING OPERATIONS

Arrow has four producing gas projects in the Surat Basin near Dalby, and one project in the Bowen Basin, near Moranbah. These projects currently account for more than 20 percent of Queensland's overall natural gas consumption.

Arrow has over 300 operating wells in its Tipton West, Daandine, Kogan North and Stratheden gas fields near Dalby. Gas from these wells is contracted to electricity generators. The company also has interests in three gas-fired power stations which utilise the gas to generate electricity.

As part of existing operations, Arrow is planning the expansion of its current field development through Environmental Authority applications lodged with the Department of Environment and Resource Management (DERM). This will involve the drilling of production wells and associated compression and water treatment facilities around Arrow's existing area of operations. This gas will allow the company to meet its existing domestic contracts and continue gas supply growth over the next two years.

COAL SEAM GAS

Coal Seam Gas (CSG) is a naturally occurring gas which has been trapped in coal beds by water and ground pressure. Queensland has rich reserves of CSG, especially in the Surat Basin where its formation began during the Early Jurassic period some 200 million years ago. As the environment changed from forests, rivers and lakes to swamps, then to rock and landform, organic sediment was left and compressed over millions of years to form the coal beds that now lie under the Surat Basin.

When extracted, CSG is just like conventional natural gas and can be used for the same purposes, such as home cooking. One of the most common uses of CSG is for electricity generation. Gas-fired power stations produce up to 50 percent lower emissions than equivalent-sized conventional coal-fired power stations.

PROJECT ACTIVITIES

The Surat Gas Project will expand Arrow's exploration and production activities in the Surat Basin. This will include new field and facility development.

Exploration for gas typically begins with desktop research (drilling records, topographic data). Seismic data may then be collected or a series of small core holes (160mm diameter) may be drilled to collect coal samples which are analysed for prospective gas content.

A pilot well program is drilled in areas where prospective gas is identified. This usually comprises five to six well clusters with a small temporary dam for storing water. Pilot wells that prove unviable are shut down and drilling sites rehabilitated to their original state. Where a pilot program is successful and shows viable amounts of gas, Arrow will seek field development approval under the Queensland *Petroleum and Gas (Production and Safety) Act 2004*.

Field development involves drilling production wells (generally 700m to 1,000m apart), installing wellhead facilities (e.g. metering and control valves) and establishing gas and water gathering systems. High density underground polyethylene pipes connect wellheads to central gas processing and water treatment facilities.

Central gas processing facilities are constructed to compress and dehydrate the gas ready for transportation via pipeline to domestic and export markets.

Arrow is currently examining beneficial use options for water associated with gas field development. This issue will be further investigated through the EIS process.

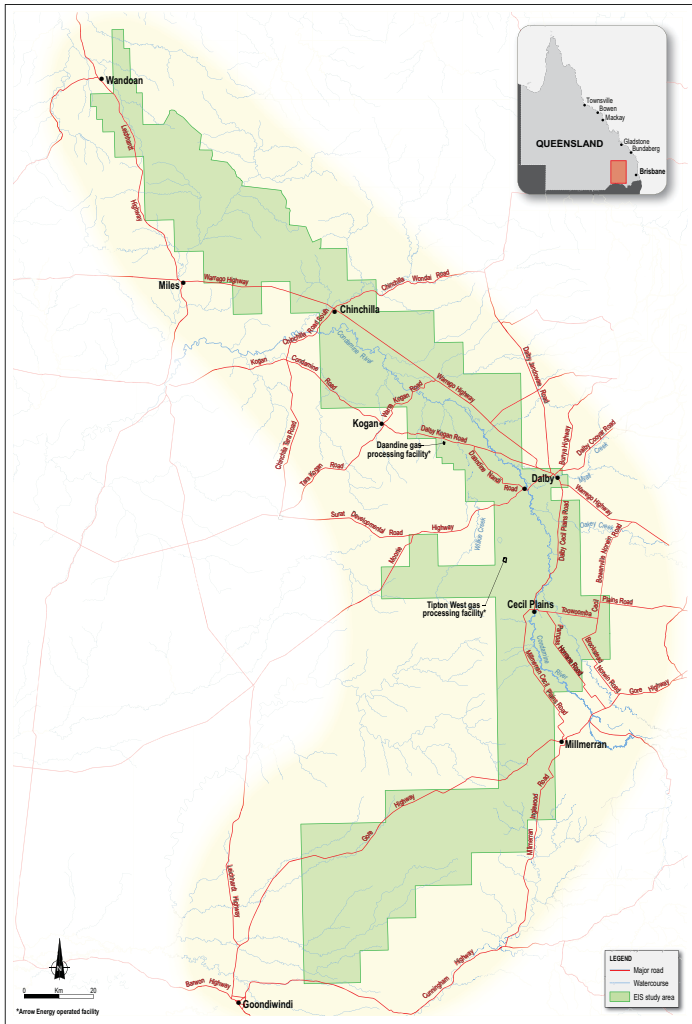
WORKING WITH LANDHOLDERS

Arrow recognises every piece of land as unique. The company is committed to working closely with landholders to ensure work practices minimise impacts on land and existing agricultural activities.

Prior to undertaking any activities on private property, including environmental investigations, Arrow communicates with landholders. When determining temporary and/or permanent locations for plant and equipment, all aspects of the property are considered in consultation with the landholder. Agricultural activities, stock considerations, seasonal conditions, topography, drainage lines, service corridors and vegetation and fauna communities are all taken into account.

Landholders who would like more information about the type of activities that may take place on their properties can read the Information Sheet: *Surat Gas Project: Information for Landholders*.





FOR FURTHER INFORMATION ABOUT THE SURAT GAS PROJECT

Telephone: freecall 1800 038 856
 Email: suratgas@arrowenergy.com.au
 Visit: www.arrowenergy.com.au

RELATED PROJECT INFORMATION

Information Sheet: Surat Gas Project: Environmental Impact Statement
 Information Sheet: Surat Gas Project: Information for Landholders
 Coal Seam Fact Sheet / Coal Seam Gas Video
 www.arrowenergy.com.au/page/Our_Company/Coal_Seam_Gas/

FOR FURTHER INFORMATION ABOUT CSG OR RELEVANT LEGISLATION

Visit the following websites

Coal Seam Gas in Queensland
 Queensland Mines and Energy
 www.dme.qld.gov.au/mines/coal_seam_gas.cfm
Queensland Regulation of the Petroleum Industry
 Queensland Mines and Energy
 www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm
 Department of Environment and Resource Management
 www.epa.qld.gov.au/environmental_management/land/petroleum/guidelines.html
 www.epa.qld.gov.au/environmental_management/impact_assessment/index.html

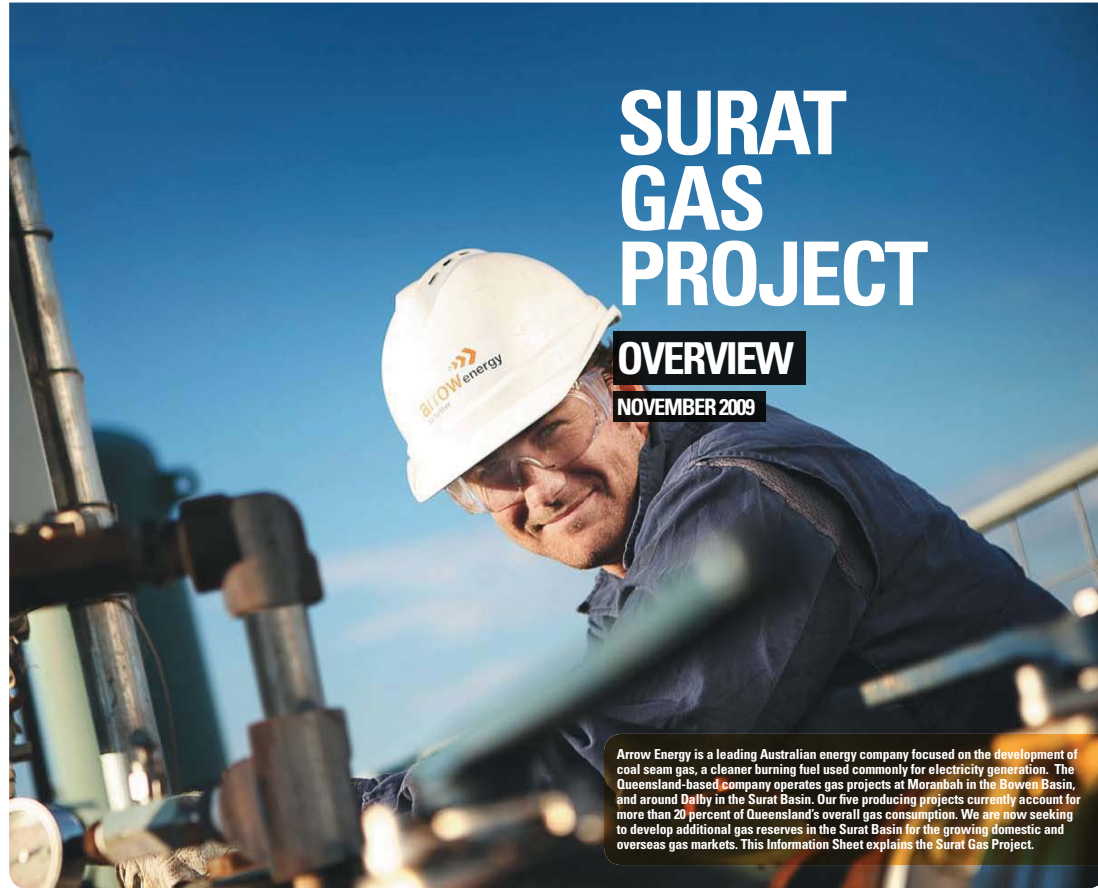
Commonwealth Government Environmental Assessment
 Department of Environment, Water, Heritage and the Arts
 www.environment.gov.au/epbc/assessments/index.html

Information for Landholders

Queensland Mines and Energy: *Petroleum and gas exploration: Exploration laws explained*
 www.dme.qld.gov.au/zone_files/legislation_pdf/p&g_exploration_laws_explained.pdf
 Queensland Mines and Energy: *Petroleum and gas exploration: A guide for landowners and occupiers*
 www.dme.qld.gov.au/zone_files/legislation_pdf/p&g_exploration_guide_for_landholders.pdf
 Queensland Mines and Energy: *Statement of the Rights and Obligations of Holders, Owners and Occupiers relating to the entry of land*
 www.energy.qld.gov.au/zone_files/land_tenure_forms/pa23aa_entry_of_land.pdf

➤ www.arrowenergy.com.au

BRISBANE DALBY MORANBAH SINGAPORE BEIJING NEW DELHI JAKARTA HANOI



SURAT GAS PROJECT

OVERVIEW

NOVEMBER 2009

Arrow Energy is a leading Australian energy company focused on the development of coal seam gas, a cleaner burning fuel used commonly for electricity generation. The Queensland-based company operates gas projects at Moranbah in the Bowen Basin, and around Dalby in the Surat Basin. Our five producing projects currently account for more than 20 percent of Queensland's overall gas consumption. We are now seeking to develop additional gas reserves in the Surat Basin for the growing domestic and overseas gas markets. This Information Sheet explains the Surat Gas Project.

arrowenergy
go further

THE SURAT GAS PROJECT

Arrow is planning its largest gas exploration and development program in the Surat Basin called the Surat Gas Project.

The project involves ongoing exploration in the Surat Basin to identify the most economic and environmentally acceptable areas for future gas production. The exploration program will be focused in an area extending from Wandoo to Dalby and south to Millmerran and Goondiwindi where the company currently holds exploration tenures and environmental approvals to conduct exploration activities. Field development and gas production will be undertaken based on the results of the exploration.

The Surat Gas Project will meet the ongoing gas supply opportunities arising from domestic and export markets. Presently, Arrow's interests include ongoing and increased supply to the Queensland gas market, and potential supply to the Liquefied Natural Gas (LNG) plants proposed for Fisherman's Landing at Gladstone and the Shell Australia LNG Project on Curtis Island.

The Surat Gas Project will see ongoing gas exploration, and the development of production wells and associated infrastructure for gas production (including gas compression and water treatment facilities and pipelines), progressively conducted across different geographic areas within the project area over time.

Initially, the project will involve the staged development of approximately 1,500 wells and infrastructure to support production, in an area with known gas reserves adjacent to Arrow's existing Surat fields. Further development will occur as domestic and export expansion opportunities arise in the energy market.

Before the project can proceed, Arrow must gain approval from the Queensland Government and the Commonwealth Government. To do this, we will prepare an **Environmental Impact Statement (EIS)** which will examine the entire exploration footprint.



WHY PREPARE AN EIS?

Arrow has a legal responsibility to assess the environmental, social and economic impacts of its proposed activities.

Regulatory authorities must be satisfied that our activities have been properly assessed and that appropriate measures are in place to avoid or minimise environmental, social and economic impacts.

For major development projects such as the Surat Gas Project, preparing an EIS is generally considered the most appropriate assessment method.

The Surat Gas Project EIS will:

- > identify potential adverse and beneficial impacts of the project
- > ensure Arrow finds practical and workable solutions to protect environmental, social and economic values that may be affected by the project
- > identify environmental management measures for the project
- > ensure community and stakeholder views are heard in the EIS assessment process.

The EIS will also examine ways to mitigate or minimise some impacts and maximise benefits for both the community and environment.

Arrow's activities are governed by the Queensland *Petroleum & Gas (Production and Safety) Act 2004* and the *Environmental Protection Act 1994*. The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* also requires Arrow to demonstrate its activities will not significantly affect matters of national environmental significance.

WHAT WILL THE EIS INVOLVE?

Figure 1: The EIS Process shows the approvals process for the Surat Gas Project EIS and the interaction amongst Arrow, the Queensland and Commonwealth Governments, and the public at various stages of the approvals process.

A wide range of environmental, social and economic studies will be conducted for the EIS, and Arrow will consult with the community throughout the process.

THE EIS STUDIES

As part of the EIS studies, various community members and groups may be contacted about matters such as:

- > social and economic impacts on communities and businesses
- > flora and fauna
- > river and stream health
- > surface water and groundwater management
- > cumulative impacts of gas and energy projects on the region
- > traffic and road conditions and
- > historic places or items that hold heritage significance.

Prior to undertaking any environmental studies/investigations on land or property, Arrow will contact landholders to discuss access and technical components of the studies. Studies on private property may involve taking water samples, setting up noise monitors for a period of time, soil sampling and recording flora and fauna.

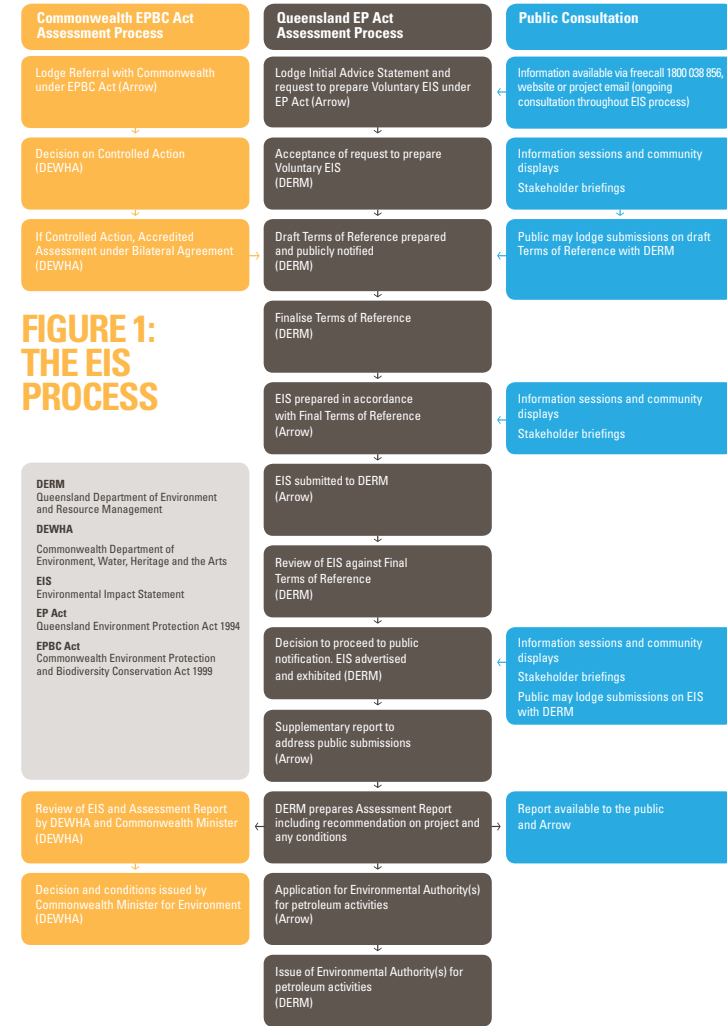
COMMUNITY INVOLVEMENT IN THE EIS

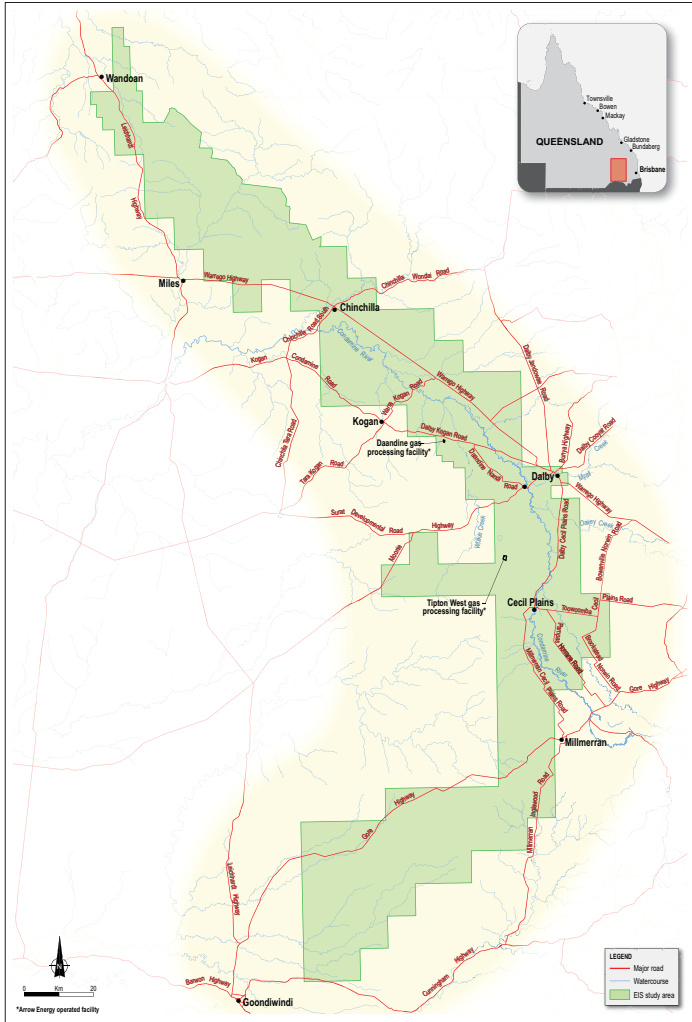
Public input is an important part of an EIS and Arrow is committed to consulting with Surat Basin communities and stakeholders throughout the process. Public feedback provides valuable information and understanding of potential impacts of the project.

Arrow is planning a community engagement program. The program will include meetings with key stakeholders, community forums and public displays, the distribution of information materials, and opportunities for public input, including written submissions. These activities will take place throughout the EIS process. All opportunities for the community to be involved will be promoted in local media.

Prior to making a decision on the project, regulators must be satisfied that the company has appropriately responded to issues raised by the community and stakeholders.

If you have questions about the EIS or information to share, call Arrow's freecall information line on 1800 038 856 or email suratgas@arrowenergy.com.au.





FOR FURTHER INFORMATION ABOUT THE SURAT GAS PROJECT

Telephone: freecall 1800 038 856
 Email: suratgas@arrowenergy.com.au
 Visit: www.arrowenergy.com.au

RELATED PROJECT INFORMATION

Information Sheet: The Surat Gas Project Overview
 Information Sheet: Surat Gas Project: Information for Landholders
 Coal Seam Fact Sheet / Coal Seam Gas Video
 www.arrowenergy.com.au/page/Dur_Company/Coal_Seam_Gas/

FOR FURTHER INFORMATION ABOUT CSG OR RELEVANT LEGISLATION

Visit the following websites

Coal Seam Gas in Queensland
 Queensland Mines and Energy
 www.dme.qld.gov.au/mines/coal_seam_gas.cfm
Queensland Regulation of the Petroleum Industry
 Queensland Mines and Energy
 www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm
 Department of Environment and Resource Management
 www.epa.qld.gov.au/environmental_management/land/petroleum/guidelines.html
 www.epa.qld.gov.au/environmental_management/impact_assessment/index.html

Commonwealth Government Environmental Assessment
 Department of Environment, Water, Heritage and the Arts
 www.environment.gov.au/epbc/assessments/index.html

Information for Landholders

Queensland Mines and Energy: *Petroleum and gas exploration: Exploration laws explained*
 www.dme.qld.gov.au/zone_files/legislation_pdf/p&g_exploration_laws_explained.pdf
 Queensland Mines and Energy: *Petroleum and gas exploration: A guide for landowners and occupiers*
 www.dme.qld.gov.au/zone_files/legislation_pdf/p&g_exploration_guide_for_landholders.pdf
 Queensland Mines and Energy: *Statement of the Rights and Obligations of Holders, Owners and Occupiers relating to the entry of land*
 www.energy.qld.gov.au/zone_files/land_tenure_forms/pa23a8_entry_of_land.pdf

➤ www.arrowenergy.com.au

BRISBANE DALBY MORANBAH SINGAPORE BEIJING NEW DELHI JAKARTA HANOI

SURAT GAS PROJECT

ENVIRONMENTAL IMPACT STATEMENT

NOVEMBER 2009

Arrow Energy is a leading Australian energy company focused on the development of coal seam gas, a cleaner burning fuel used commonly for electricity generation. The Queensland-based company operates gas projects at Moranbah in the Bowen Basin, and around Dalby in the Surat Basin. Our five producing projects currently account for more than 20 percent of Queensland's overall gas consumption. We are now seeking to develop additional gas reserves in the Surat Basin for the growing domestic and overseas gas markets. This Information Sheet is to inform you about the Environmental Impact Statement (EIS) for the proposed project, and to invite your participation in the process.



THE SURAT GAS PROJECT

Arrow is planning its largest gas exploration and development program in the Surat Basin called the Surat Gas Project.

The project involves ongoing exploration in the Surat Basin to identify the most economic and environmentally acceptable areas for future gas production. The exploration program will be focused in an area extending from Wandoan to Dalby and south to Millmerran and Glendivine where the company currently holds exploration tenures and environmental approvals to conduct exploration activities. Field development and gas production will be undertaken based on the results of the exploration.

The Surat Gas Project will meet the ongoing gas supply opportunities arising from domestic and export markets. Presently, Arrow's interests include ongoing and increased supply to the Queensland gas market, and potential supply to the Liquefied Natural Gas (LNG) plants proposed for Fisherman's Landing at Gladstone and the Shell Australia LNG Project on Curtis Island.

The Surat Gas Project will see ongoing gas exploration, and the development of production wells and associated infrastructure for gas production (including gas compression and water treatment facilities and pipelines) progressively conducted across different geographic areas within the project area over time.

Initially, the project will involve the staged development of approximately 1,500 wells and infrastructure to support production, in an area with known gas reserves adjacent to Arrow's existing Surat fields. Further development will occur as domestic and export expansion opportunities arise in the energy market.

Before the project can proceed, Arrow must gain approval from the Queensland Government and the Commonwealth Government. Regulatory authorities must be satisfied our activities have been properly assessed, and that appropriate measures are in place to avoid or minimise environmental impacts. To do this, we will prepare an Environmental Impact Statement (EIS) which will examine the entire exploration development.

THE SURAT GAS PROJECT EIS

Arrow has a legal responsibility to assess the environmental, social and economic impacts of its proposed activities. For major development projects such as the Surat Gas Project, preparing an EIS is generally considered the most appropriate assessment method.

A wide range of environmental, social and economic studies will be conducted for the EIS.

Prior to undertaking any environmental studies or investigations on private property, Arrow will contact landholders to discuss access and technical components of the studies. Studies on private property may involve taking water samples, setting up noise monitors for a period of time, soil sampling and recording flora and fauna.

For more information about the EIS, please read the Information Sheet: *Surat Gas Project: Environmental Impact Statement*.

WORKING WITH LANDHOLDERS

Arrow recognises every piece of land as unique. The company is committed to working closely with landholders to ensure work practices minimise impacts on land and existing agricultural activities.

Prior to undertaking any activities on private property, including environmental investigations, Arrow communicates with landholders. When determining temporary and permanent locations for plant and equipment, all aspects of the property are considered in consultation with the landholder. Agricultural activities, stock considerations, seasonal conditions, topography, drainage lines, service corridors and vegetation and fauna communities are all taken into account.

Our preference is to develop working relationships with landholders on whose properties we would like to operate, and work together with landholders to resolve concerns. We prefer to work with landholders to gain voluntary access agreements.

AUTHORITIES AND PERMITS

Arrow's activities are governed by the *Queensland Petroleum & Gas (Production and Safety) Act 2004* and the *Environmental Protection Act 1994*.

Under the *Petroleum & Gas (Production and Safety) Act 2004*, there are two types of Petroleum Authorities:

1. *Authority to Prospect (ATP)* – used for exploration activities
2. *Petroleum Lease (PL)* – used for the development and commercialisation of proven gas reserves.

Under the legislation, companies like Arrow have a set of rights and obligations with respect to the accessing of the resource and the land under which the resources are located. More details can be found at www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm.

GAS EXPLORATION AND PETROLEUM FIELD DEVELOPMENT

The Surat Gas Project will expand Arrow's exploration and production activities in the Surat Basin. These project phases are described below.

EXPLORATION

Exploration for gas typically involves:

- ▶ desktop research (review of drilling records, topographic data, existing seismic data and geological modelling) to determine the depth and thickness of underground coal seams
- ▶ drilling of exploration wells (similar to water boreholes) to confirm that the geology is as shown by desktop and seismic studies and to test coal seams for the presence of gas
- ▶ the drilling of pilot wells (usually comprising feet to six wells per pilot) to test gas flow rates in areas where potentially economic supplies of gas are identified.

Pilot wells that do not prove viable are shut down and properly abandoned, and drilling sites are rehabilitated to their original state. Where a pilot program is successful and shows viable amounts of gas, Arrow will seek field development approval under the *Queensland Petroleum and Gas (Production and Safety) Act 2004*.

FIELD DEVELOPMENT

Field development typically involves the installation and operation of:

- ▶ production wells including wellhead controls (e.g. metering and control valves)
- ▶ gas and water gathering systems (underground high-density polyethylene pipes to connect wellheads to central gas processing and water treatment facilities)
- ▶ central gas processing facilities (where gas is compressed and dehydrated, ready for transportation via pipeline to domestic and/or export markets)
- ▶ water treatment facilities to treat water to a suitable quality for beneficial use.

Production wells and gathering systems

Arrow works with landholders to determine the best locations for plant, equipment and wells. The process that we apply when installing wells and associated equipment is described below.

Wherever possible, wells are set out in grid spacing between approximately 70m and 1,000m. Prior to drilling a well, a temporary drilling site is prepared. Preparation generally involves vegetation clearance or trimming, and constructing temporary pits to hold the fluids used for drilling. To ensure safe operation of the drilling rig and associated equipment, normal drilling site dimensions are up to 60m by 70m. Once the well is installed, the area is reduced to approximately 10m by 10m. This is sufficient to house the wellhead and associated equipment. The larger drilling site is rehabilitated to its original state.

Temporary access is required to production wells every few years for down well maintenance activities, which typically require one to three weeks access. During down well maintenance, an area of up to the original drilling area of 60m by 70m may be required. This area is then returned to a 10m by 10m area.

Each well also requires the construction of water and gas gathering lines, access tracks and electrical connection to link the well back to a central facility. Lines are constructed of small diameter, high-density polyethylene pipes that are buried at a minimum depth of 0.2m. To minimise the disruption to farmland, Arrow works with landholders wherever possible to locate infrastructure within or adjacent to existing farm tracks and cultivation lines.

Once installed, producing wells generally operate for at least 10 to 20 years. Farming and grazing activities can continue as normal around established well sites.

Central gas processing and water treatment facilities

Arrow will locate all central gas processing and water treatment facilities on company-owned land. In siting these facilities, we will consider a range of constraints, including environmental, site access, technical design, construction issues and proximity to dwellings.

Management of associated water

Coal seam water is an unavoidable by-product of gas extraction. The quality of the associated water varies, however typically contains levels of salt that limit the water's use without treatment.

Water produced from each well is pumped to centralised storage and treatment facilities. Arrow is currently exploring options for treatment and beneficial use of the associated water, which will be presented in the EIS.

Gas field operation and maintenance

Wellhead engines and pumps may require daily field maintenance during initial commissioning of the well site, however once the well is established, most monitoring of well operation can be carried out remotely via telemetry or installed communication lines leading back to the central gas processing facility.

Arrow will physically visit the well between once a week and once a month to complete scheduled maintenance. Additional visits may be required for maintenance or intervention work on the well or wellhead surface equipment.

Decommissioning and rehabilitation of well sites

When wells reach the end of their useful life, they are decommissioned. During decommissioning all surface equipment is removed from the well site, the well is plugged with concrete, and the well casing is cut off 1.5m underground.

The well site is then rehabilitated to its previous land use in consultation with the landholder. Rehabilitation typically involves resurfacing ground levels, ensuring erosion controls are in place, and re-establishing drainage lines and pasture species.



COMMON QUESTIONS ANSWERED

Do I get a say in what happens on my land?

Yes, you are involved in the development of exploration and production plans on your land. The final plans are flexible to suit landform, existing agricultural terrain and seasonal harvesting conditions.

Can I refuse access to my property?

Arrow's preference is to develop working relationships with landholders on whose properties we would like to operate, and work together with landholders to resolve concerns. We prefer to work with landholders to gain voluntary access agreements.

However, under the *Petroleum and Gas (Production and Safety) Act 2004* and the *Petroleum Act 1923*, Arrow has legal rights to access your land providing it has a current *Authority to Prospect (ATP)* or *Petroleum Lease (PL)* and you have received a current notice of entry.

While Arrow has legal rights to enter your property under the Act, it also recognises the responsibilities to you and your property. For instance, appropriate compensation should be developed to occur; duty of care with respect to fencing, stock and weed control; and flexible work practices that minimise impacts on current land use activities.

What if I do not agree with what is proposed on my land?

The *Petroleum and Gas (Production and Safety) Act 2004* does not provide for objection to tenures being granted over private property because resources below ground are the property of the state on behalf of the people of Queensland.

Arrow will consult with all landholders about any issues and seek to reach an agreement on all matters concerning the proposed development. If agreement cannot be reached, the matter may be referred to the Land Court for a determination.

Will I receive compensation for access to my property or any activities carried out on my land? If so, how much?

Compensation is discussed in confidence with individual landholders. The amount of compensation depends on the level of activity to be conducted on a property and any impacting factors, for example:

- loss of crop or income-producing land
- reduction in land value
- restrictions on use of adjacent land.

What effect will the project have on aquifers and groundwater?

Studies have shown that there is little or no linkage between the water in the coal seams and overlying or underlying aquifers (Queensland Department of Natural Resources, Mines and Energy and Parsons Brinkerhoff 2004). Because of uncertainty around the effect of extracting large volumes of coal seam water across the Surat Basin, this will be the subject of additional study by Arrow. The results of additional studies will be reported in the EIS.

Will salt affect the land or damage agricultural areas?

Arrow will be required by environmental authority licence issued under the *Environmental Protection Act (1994)* to ensure that the potential impacts of salt from associated water are appropriately managed and mitigated.

Arrow is currently investigating the best ways to deal with the salt arising from their operations.

Can I use the excess water for agriculture?

Not at the moment, although Arrow is investigating treatment and beneficial uses for water.

Can I still use the surrounding land for grazing or farming?

Yes, surrounding land can be used for grazing or farming.

Can I plant crops above the gathering lines?

All farming machinery can be used over gathering lines. As a general rule, gathering lines are buried about 0.75m under the ground.

Are the well sites safe for stock? Will they be fenced?

Well sites will be bounded by strong stock fence panels to prevent stock access.

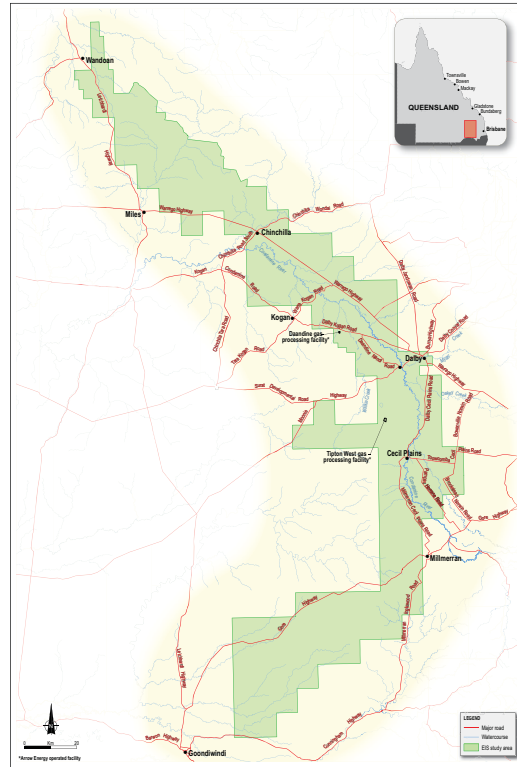
How much noise will be generated?

Arrow considers the emission of noise in the selection and design of equipment to be used at wellheads and on facility plant and equipment. Where sensitive areas are likely to be affected by generated noise, the company will take all reasonable measures to minimise the noise to acceptable levels. Should a noise issue be reported, we will investigate and take appropriate measures.

What will be done to stop the spread of weeds?

Arrow is committed to working with landholders to manage the potential spread of weeds from our operations.

The company operates a weed inspection process and, where required, a wash down process to manage the potential spread of weed seed.



FOR FURTHER INFORMATION ABOUT THE SURAT GAS PROJECT

Telephone: free call 1800 038 856
Email: suratgas@arrowenergy.com.au
Visit: www.arrowenergy.com.au

RELATED PROJECT INFORMATION

Information Sheet: The Surat Gas Project Overview
Information Sheet: Surat Gas Project Environmental Impact Statement
Coal Seam Fact Sheet / Coal Seam Gas Video
www.arrowenergy.com.au/page/Our_Company/Coal_Seam_Gas/

FOR FURTHER INFORMATION ABOUT CSG OR RELEVANT LEGISLATION

Visit the following websites
Coal Seam Gas in Queensland
Queensland Mines and Energy
www.dme.qld.gov.au/mines/coal_seam_gas.cfm
Queensland Regulation of the Petroleum Industry
Queensland Mines and Energy
www.dme.qld.gov.au/petroleum_gas_exploration.cfm
Department of Environment and Resource Management
www.epa.qld.gov.au/environmental_management/land/petroleum/guidelines.html
www.epa.qld.gov.au/environmental_management/impact_assessment/index.html
Commonwealth Government Environmental Assessment
Department of Environment, Water, Heritage and the Arts
www.environment.gov.au/epbc/assessments/index.html
Information for Landholders
Queensland Mines and Energy: Petroleum and gas exploration:
Exploration laws explained
www.dme.qld.gov.au/zone_files/legislation_pdf/p&g_exploration_laws_explained.pdf
Queensland Mines and Energy: Petroleum and gas exploration:
A guide for landowners and occupiers
www.dme.qld.gov.au/zone_files/legislation_pdf/p&g_exploration_guide_for_landholders.pdf
Queensland Mines and Energy: Statement of the Rights and Obligations of Holders, Owners and Occupiers relating to the entry of land
www.energy.qld.gov.au/zone_files/land_tenure_forms/pa23aa_entry_of_land.pdf

www.arrowenergy.com.au

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SURAT GAS PROJECT

INFORMATION FOR LANDHOLDERS

NOVEMBER 2009



Arrow Energy is a leading Australian energy company focused on the development of coal seam gas, a cleaner burning fuel used commonly for electricity generation. The Queensland-based company operates gas projects at Moranbah in the Bowen Basin, and around Dalby in the Surat Basin. Our love producing projects currently account for more than 20 percent of Queensland's overall gas consumption. We are now seeking to develop additional gas reserves in the Surat Basin for the growing domestic and overseas gas markets. This Information Sheet provides information to landholders on how Arrow conducts petroleum activities on private land.

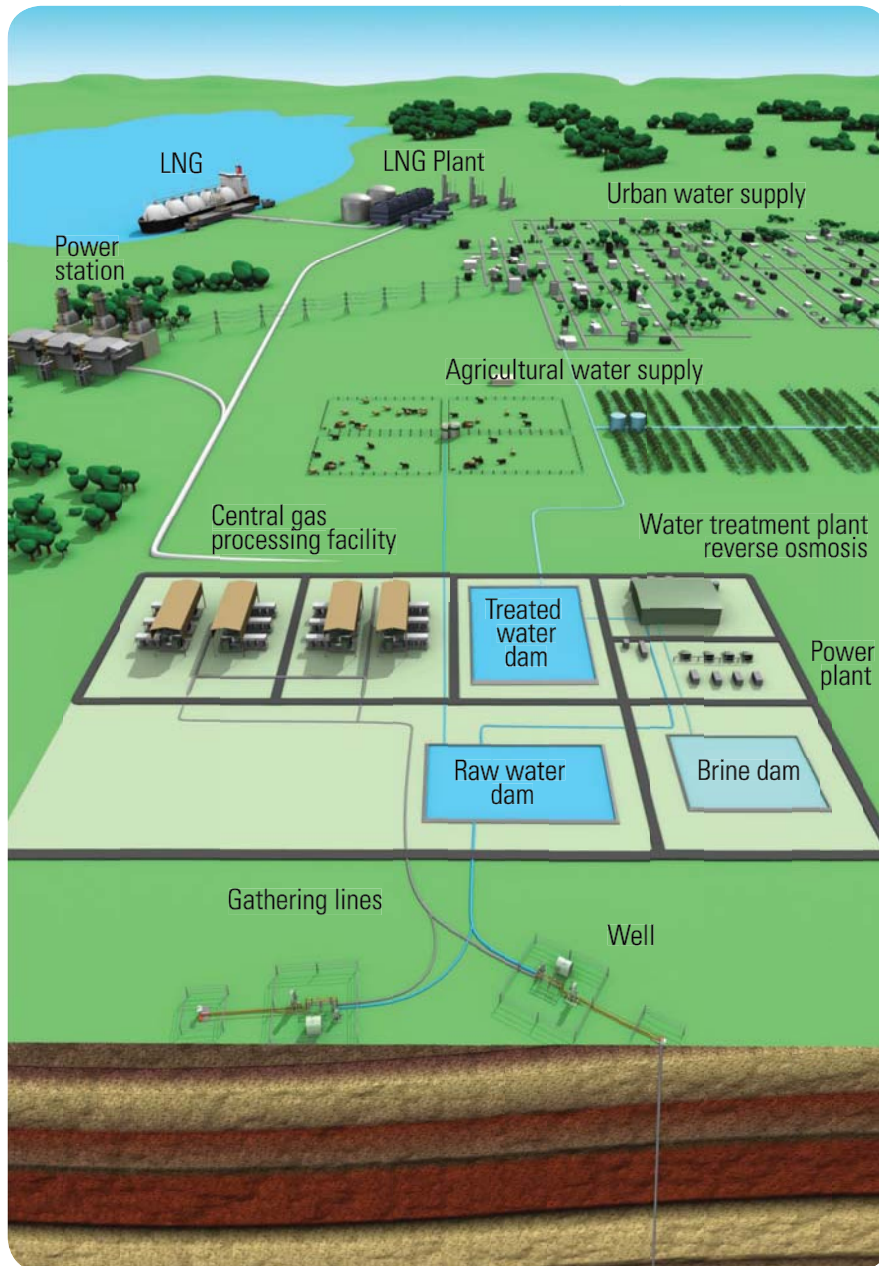
arrow energy
go further

Appendix 8

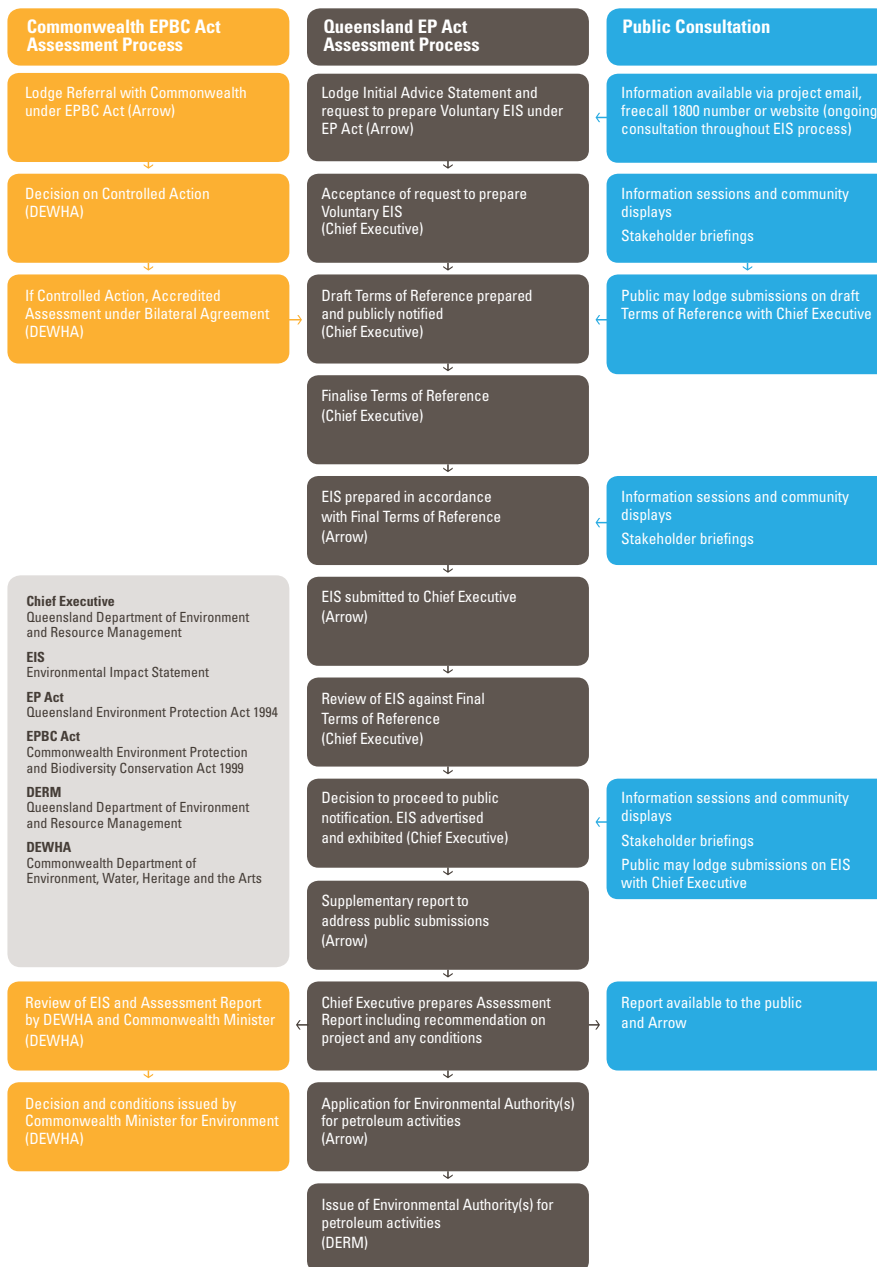
Banners - Phase 1



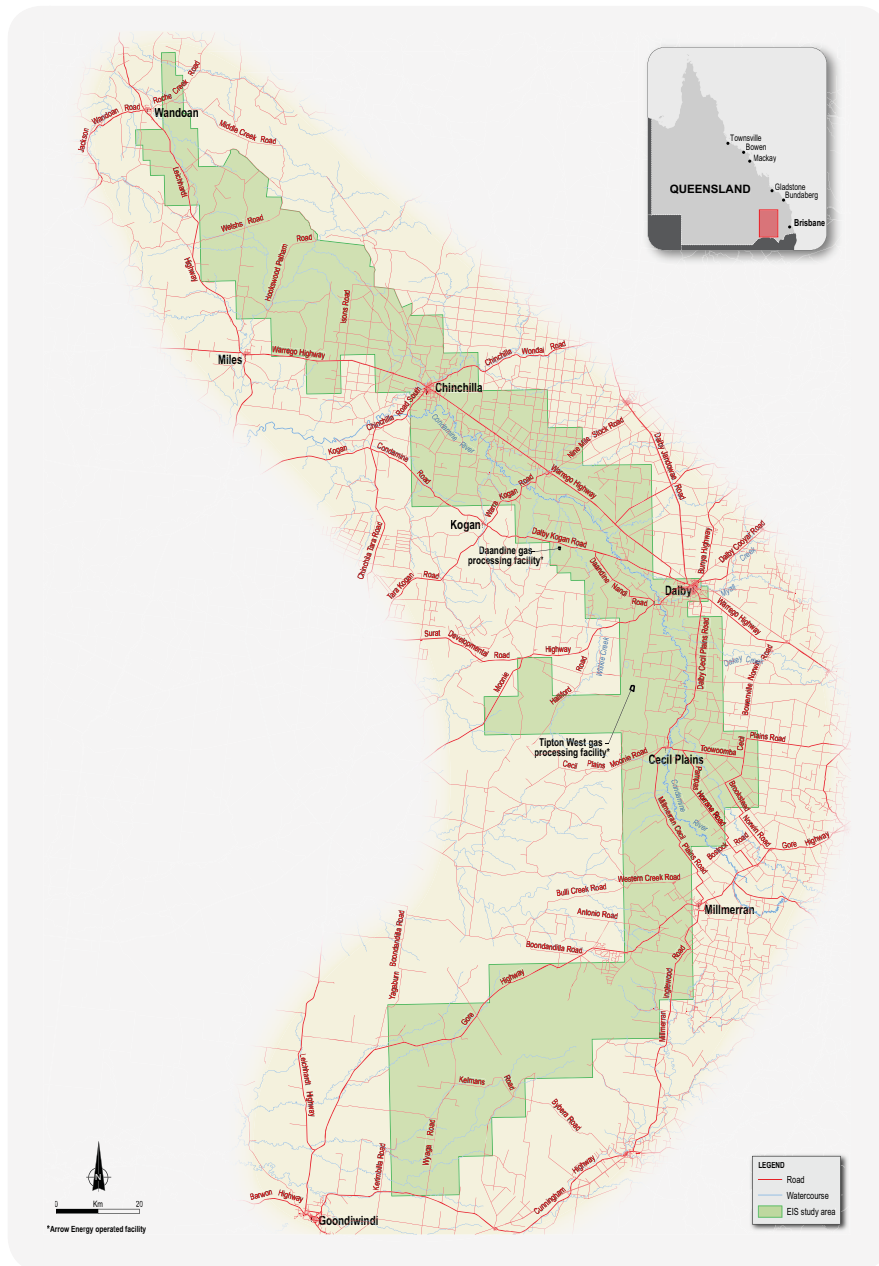
Coal Seam Gas Process



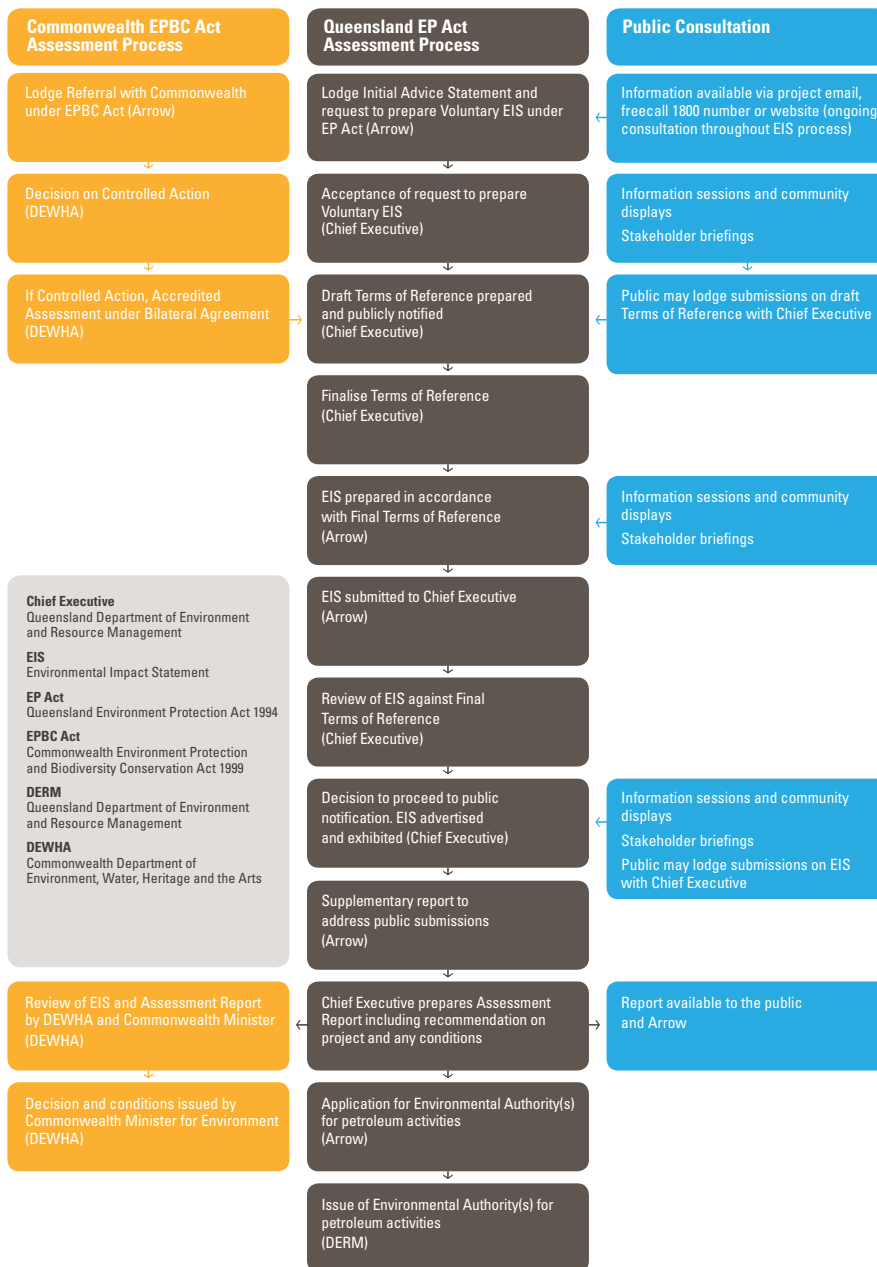
Surat Gas Project The EIS Process



Surat Gas Project Study Area



Surat Gas Project The EIS Process



Appendix 9

Fridge magnets



SURAT GAS PROJECT

freecall number: 1800 038 856
email: suratgas@arrowenergy.com.au
arrowenergy.com.au



SURAT GAS PROJECT

freecall number: 1800 038 856
email: suratgas@arrowenergy.com.au
arrowenergy.com.au



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arrowenergy.com.au



Appendix 10

Invitation letter - Phase 2



1 June 2010

Invitation to Surat Gas Project community feedback sessions

You may recall that Arrow Energy (Arrow) hosted a series of community feedback sessions in your area late last year. Those events were an opportunity for us to talk to the community about the Surat Gas Project, our proposed coal seam gas exploration and development program in the Surat Basin.

Our project team spoke to many people about the Surat Gas Project and gathered a great deal of information during its first round of community consultation. Since then Arrow has been continuing to prepare its Environmental Impact Statement (EIS) for the Surat Gas Project, which covers an area from near Wandoan to Dalby, south to Millmerran and near Goondiwindi. This EIS will examine all environmental, economic and social issues, plus potential impacts and benefits associated with the project.

I am now writing to extend an invitation to you to attend our next round of community consultation sessions which will be held from **15 to 23 June 2010**. Details of the sessions are overleaf.

These informal sessions are open to the whole community and will provide people the chance to obtain information on Arrow's Surat Gas Project, coal seam gas in general and on the EIS for the project, and for the Project Team to address questions you may have. Light refreshments will be available and no RSVP is required.

Your views are very important to the EIS process and we look forward to meeting you at one of these sessions. Please contact the EIS project team on freecall **1800 038 856** or email suratgas@arrowenergy.com.au if you require any information beforehand.

Feel free to pass this information onto anyone who may be interested in the Surat Gas Project so they are able to attend.

Yours sincerely



Leisa Elder
General Manager, Government and Community Relations

Surat Gas Project community feedback sessions June 2010

Location	Date	Any time between	venue
Chinchilla	Tuesday 15 June	2pm – 7pm	RSL Sub Branch Heeney Street
Wandoan	Wednesday 16 June	11am – 2pm	Community & Cultural Centre 6 Henderson Street
Miles	Wednesday 16 June	11am – 2pm	Leichhardt Centre Columboola Function Room Cnr Marian & Dawson Streets
Dalby	Thursday 17 June	10am – 4pm	Dalby Showground Pavilion Nicholson Street
	Monday 21 June	1pm – 5pm	Dalby Showground Pavilion Nicholson Street
Millmerran	Friday 18 June	10am – 2pm	Community & Cultural Centre Walpole Street
Cecil Plains	Tuesday 22 June	10am – 3pm	Cecil Plains Hall Geraghty Street
Goondiwindi	Wednesday 23 June	9am – 12pm	Goondiwindi Training and Technology Centre Conference Room 15-21 Russell Street

Appendix 11

Arrow Presentation - Phase 2



Community Consultation

June 2010



Arrow Energy - Presenters

- Robbert de Weijer – Chief Operating Officer
- Tony Knight – General Manager, Exploration
- Darren Stevenson – General Manager, Asset South
- Carolyn Collins – Environment and Water Manager

Presentation Outline

- What today is about
- An update on Arrow Energy
- How Arrow operates: Arrow's plans and timeframes
- Your concerns and Arrow's responses
- Potential benefits for the community
- Questions and Answers

We are here today to:

- Respond to your concerns about the CSG industry and Arrow's projects
- Provide new information on the Surat Gas Project and EIS
- Work towards an Arrow, community and landholder win-win
- Answer your questions
- Listen to, and understand any additional community concerns

About Arrow Energy



Coal Seam Gas

- The Surat Basin has been known as a source of gas from as early as 1916
- Since 2000 companies have developed a way to extract this gas
- Low demand for gas in Queensland but a growing international demand
- By liquefying, gas can be shipped to international markets



Arrow Energy - Update

- Queensland based company providing >20% of the state's domestic gas needs
- 500 staff in Dalby, Moranbah and Brisbane
- Arrow is the subject of a takeover bid by Royal Dutch Shell and PetroChina
- **Arrow Energy** would have two large, stable owners committed to safety, environment and to the long term with stakeholders
- Activities would expand to include LNG



Update on the Surat Gas Project

The Surat Gas Project was planned to supply gas to the growing domestic and LNG export markets:

- Fisherman's Landing LNG Project at Gladstone
- Shell Australia LNG Project on Curtis Island
- Other market opportunities as they arose

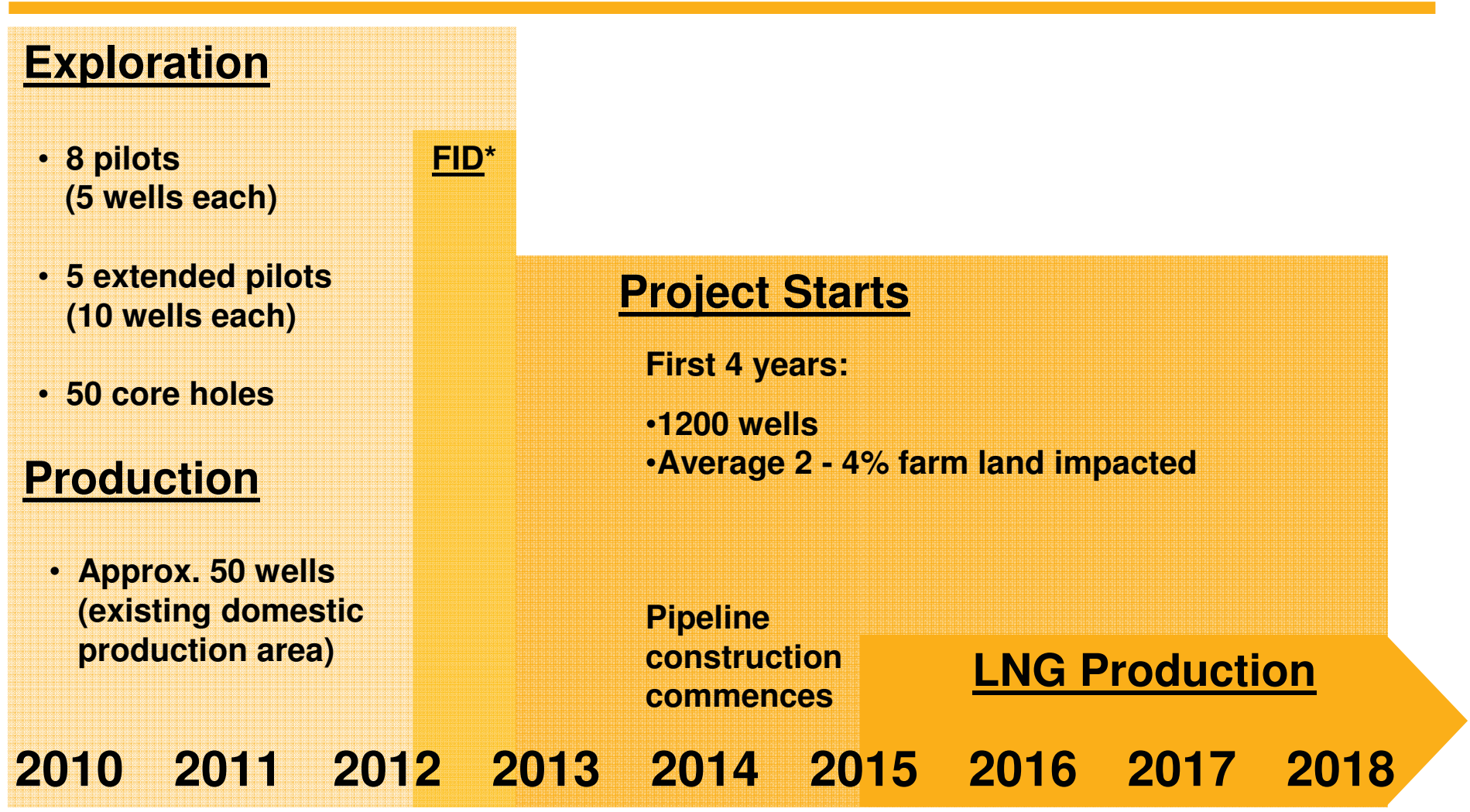
What happens under a Shell/PetroChina takeover?

- The Project would supply the domestic market and an **Arrow Energy** LNG Project on Curtis Island
- The agreement to supply gas to Fisherman's Landing LNG Project is currently on hold



Approx. 3 years from now until large scale drilling for LNG and associated infrastructure

Proposed Surat Gas Project - Look Ahead



Exploration

- 8 pilots (5 wells each)
- 5 extended pilots (10 wells each)
- 50 core holes

FID*

Production

- Approx. 50 wells (existing domestic production area)

Project Starts

First 4 years:

- 1200 wells
- Average 2 - 4% farm land impacted

Pipeline construction commences

LNG Production

* FID = Final Investment Decision



Surat Gas Project - EIS Update

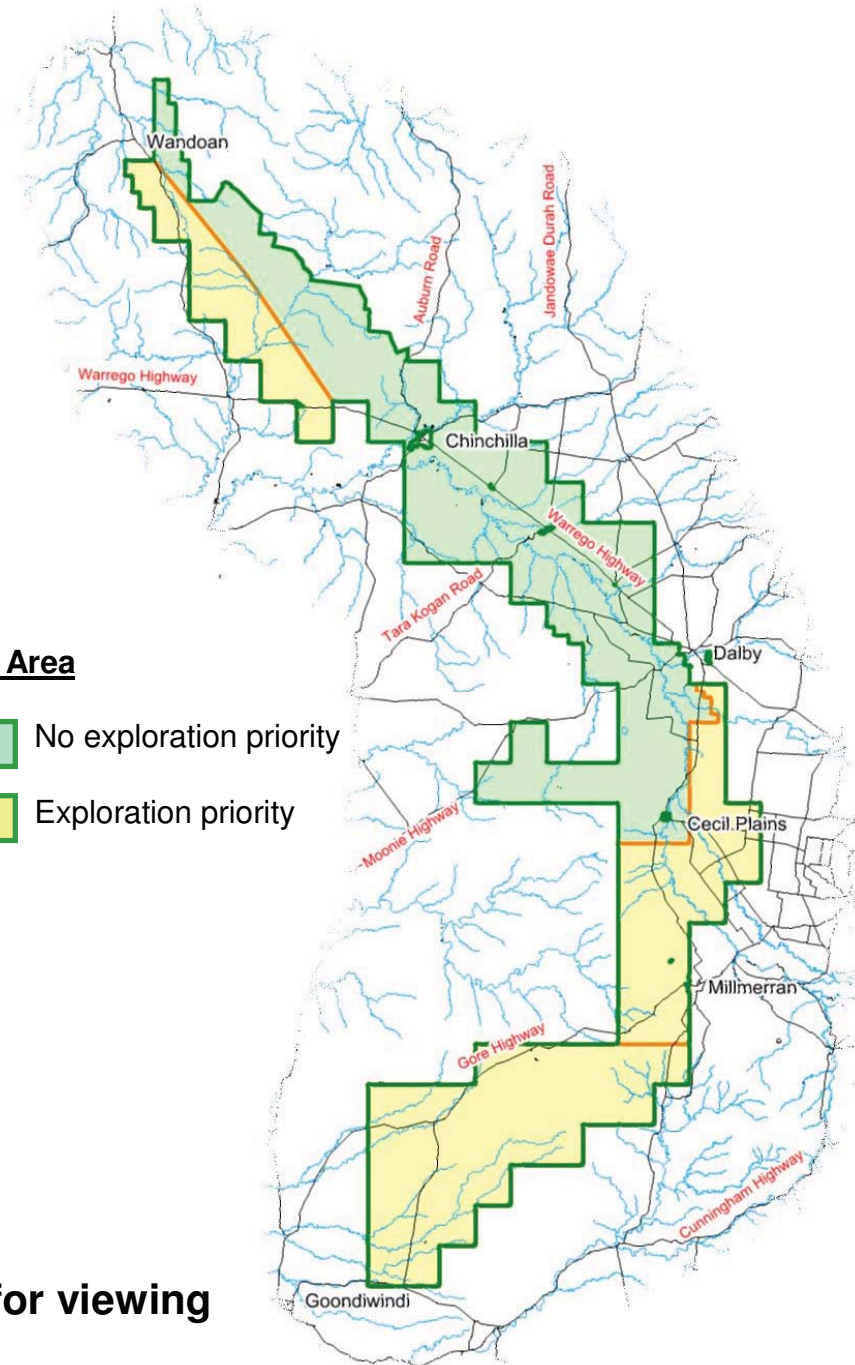
EIS Process	Expected Timeframes
Lodge Voluntary EIS Application	Completed
Lodge Initial Advice Statement	Completed
Project determined a 'controlled action' under the Federal Act	Completed March 2010
Exhibit Draft Terms of Reference for <i>public comment</i>	Comments Closed May 2010
Arrow to provide response to submissions to government	August 2010
Final Terms of Reference from QLD environment department	Q3 2010
Undertake technical studies	Commenced Q3 2009
Prepare EIS	Expect to complete Q4 2010
Exhibit EIS for <i>public comment</i>	Q2 2011
Qld / Commonwealth Government decision on project	Q3/Q4 2011

Exploration - Surat Basin

Exploration activities to confirm a viable gas supply for LNG production

EIS Area

-  No exploration priority
-  Exploration priority




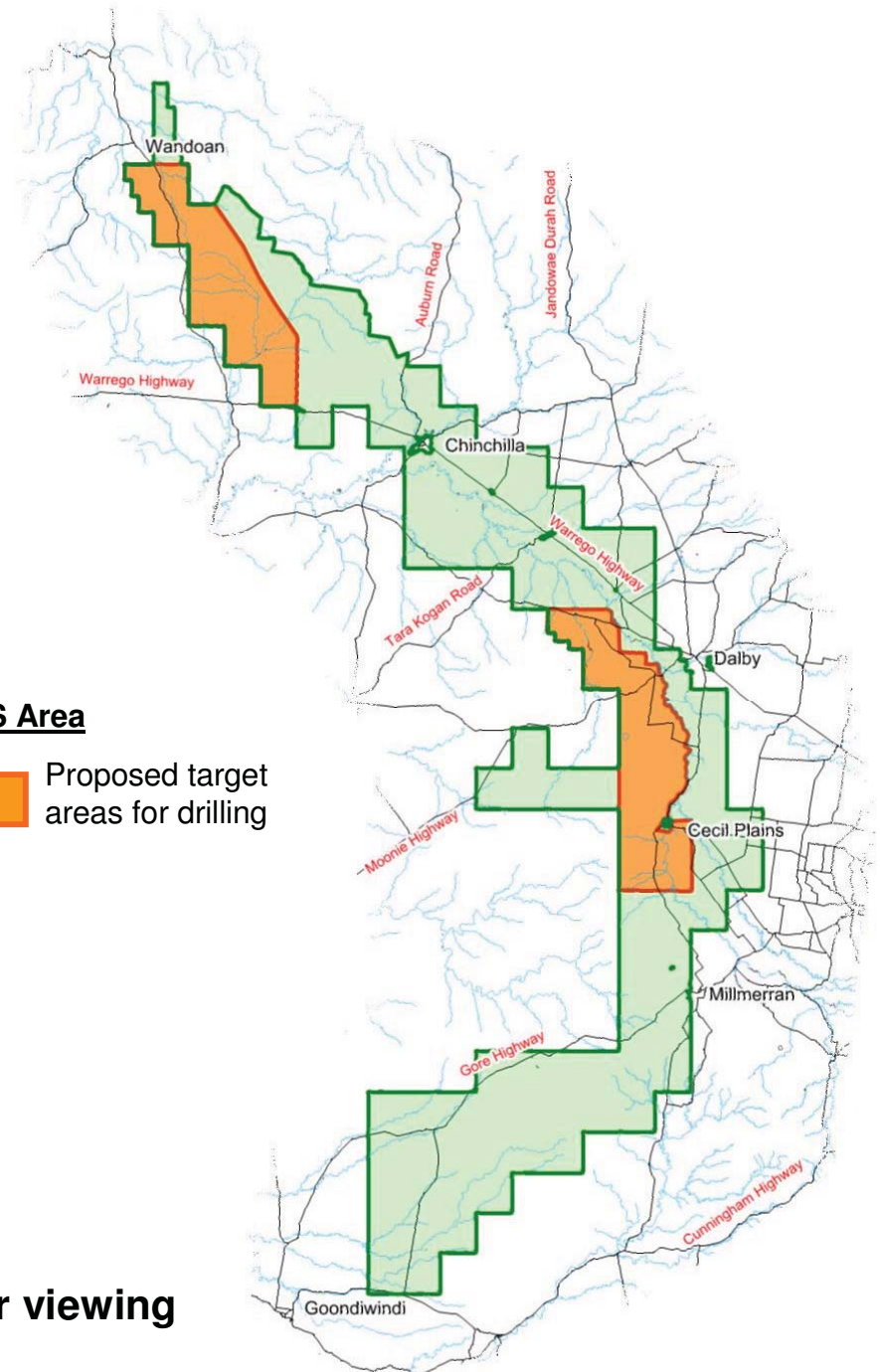
Detailed maps available for viewing

Surat Gas Project Development

Target area for development between
2013 and 2023
(approximately 2,000 wells)

EIS Area

 Proposed target
areas for drilling



Detailed maps available for viewing

Proposed Arrow LNG Project

Typical infrastructure layout

Well Site Footprint

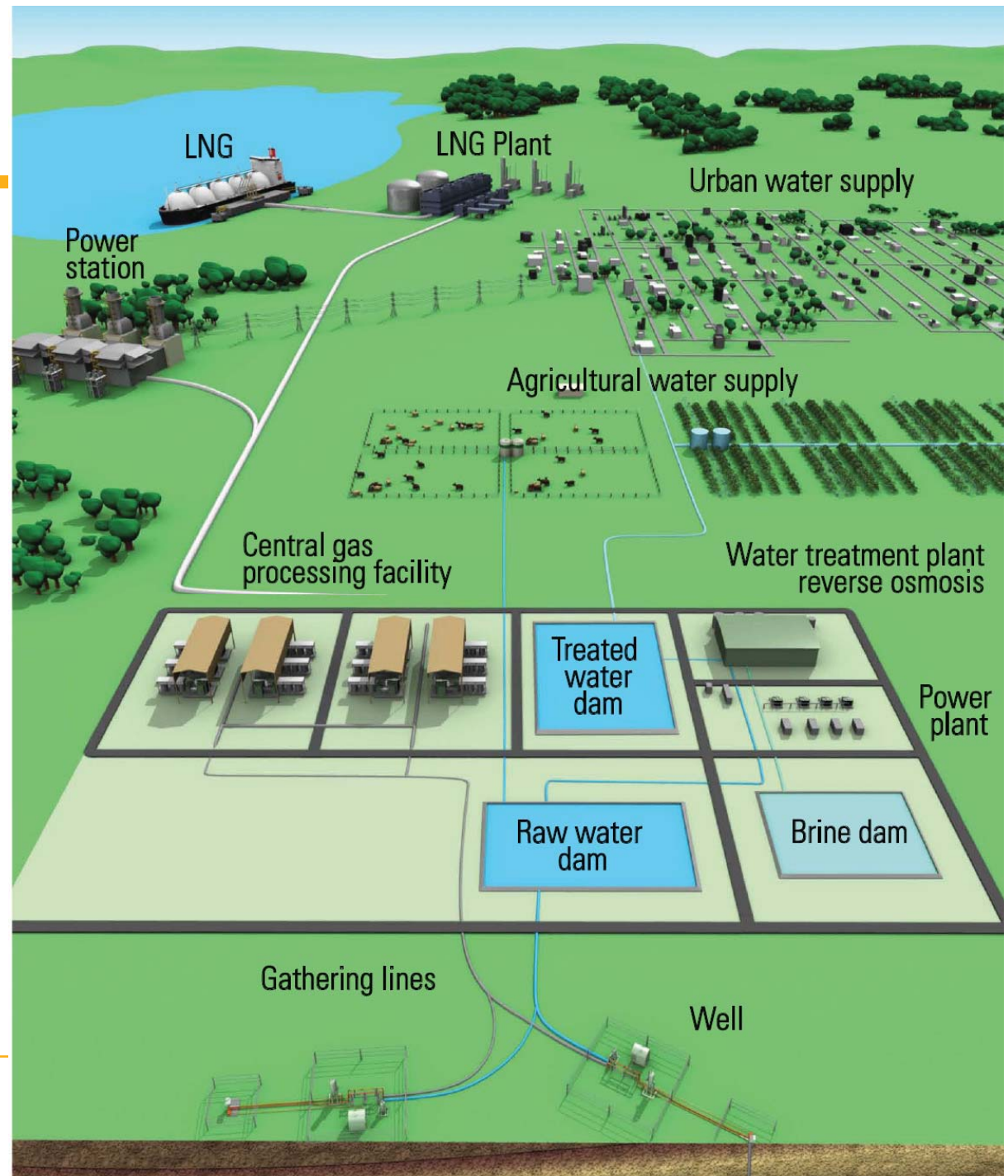
- 70m x 60m for drilling
- Rehabilitated to 10m x 10m

Well Spacing

- Between 700 and 1200 metres (approx 1 per square km)

Gathering system - pipelines

- Buried to 750mm in grazing land
- Burial depth agreed with the landholder in intensively farmed areas (nominal 1200mm)



Your Concerns and Our Responses



Your Concerns and Our Responses

- We recognise there are key concerns that we must address, and consult with the community on:
 1. Working with landholders & others to minimise impacts
 2. Fair terms and process for access and development
 3. Property valuations
 4. Intensively farmed agricultural land
 5. Impact on groundwater
 6. Produced water management
 7. Salt management
 8. Social and economic impacts

- Arrow recognises as we work through these concerns, we need to improve our interaction with the community and our work practices

Concerns 1 - 3

Working with Landholders

Fact: Arrow has not always worked well with landholders in the past

Commitments:

- Arrow will:
 - Treat landholders and their property with **respect**
 - Engage with and **learn from** landholders
 - Negotiate **fair terms** and processes for accessing land
 - **Recognise** impact of our operations on property valuation
 - Support an **industry standard** compensation agreement and land access code



Concerns 1 - 3

Working with Landholders and the Community

Fact: Arrow has not always engaged well with landholders and the community in the past

Commitments:

- Arrow will engage:
 - On key issues with:
 - Regional **communities**;
 - **Individual** landholders; and
 - Potentially affected **neighbours**

 - At least **6 to 12 months before** commencing production drilling or construction activities



Concern 4

Intensively Farmed Agricultural Land

Fact: Arrow's project sits over some intensively farmed areas

Commitments:

- Arrow will:
 - NOT **commence development** until stakeholder concerns are properly addressed
 - NOT **construct dams** for the storage of untreated coal seam water or brine
 - **Use surface tanks** instead of pits to contain drilling fluids
 - Commence a **development case study** on an intensively farmed property with landholder assistance
 - Subject to approval, **conduct a trial** of developing both CSG infrastructure and intensive agriculture on a farm owned by Arrow



Concern 5

Impact on Groundwater Quantity

Fact: A new regulatory framework is being introduced in August to protect existing water bore users. The regime will:

- Set **trigger levels** for springs and aquifers
- Introduce a regional **groundwater monitoring** program
- Provide a **groundwater model** to support decision making and predict potential drawdown
- Protect existing water entitlements - **“make good”** obligations

Commitments:

- Arrow will:
 - Maintain a **regional groundwater model**
 - Expand our **groundwater monitoring program** to monitor changes in groundwater quality and quantity and update the model
 - **Promptly address claims** from water bore owners of reduced water supply
 - Participate in government/industry **cooperative** efforts to model and understand cumulative groundwater impacts

“Make Good”

Examples:

- Deepening a bore
- Reconditioning a bore
- Changing a pump
- Adding a rising main to lower pump depth
- Drilling a new bore
- Alternative supply
- Other forms of compensation

Concern 5

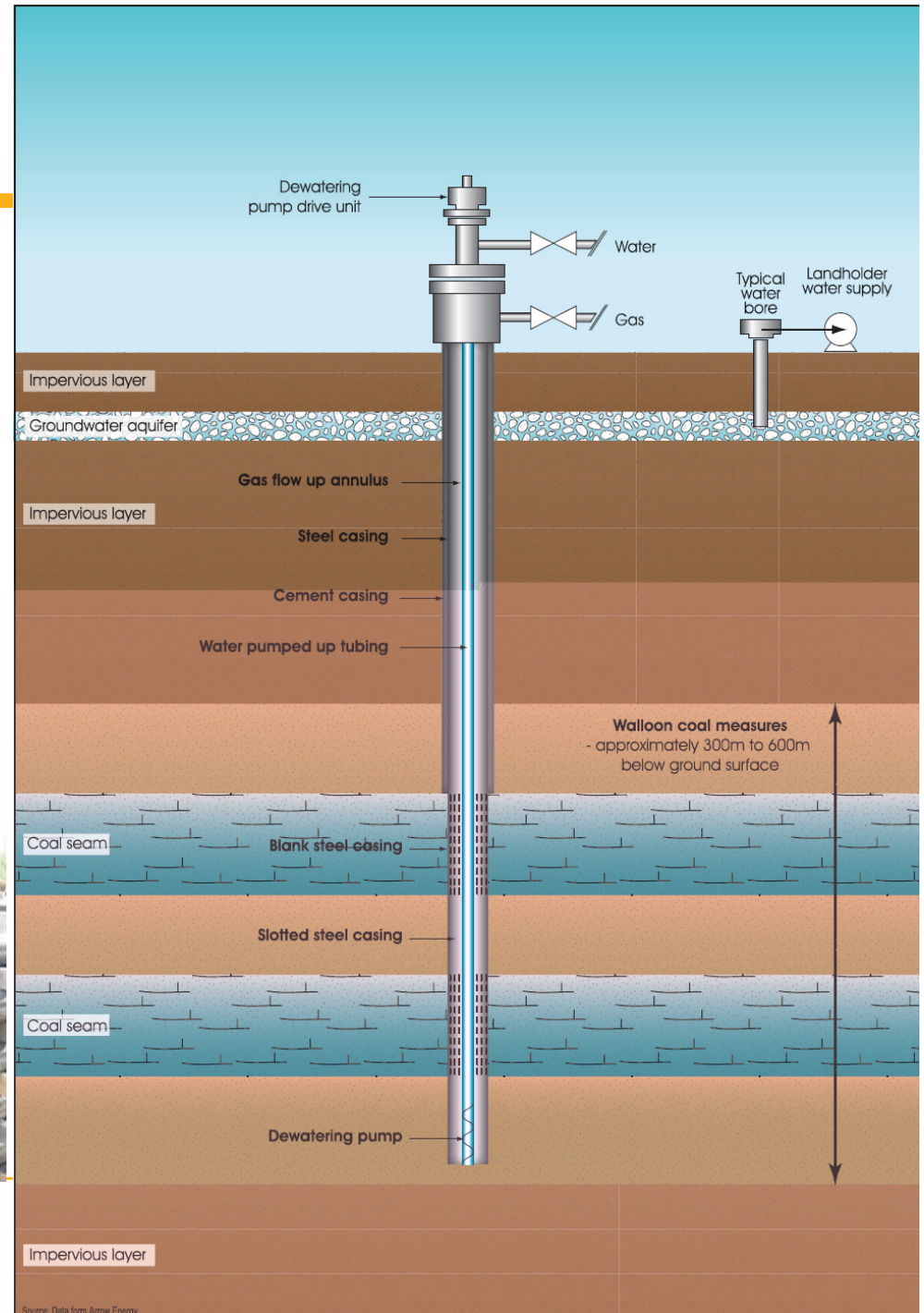
Impact on Groundwater Quality

Fact: Prevention of groundwater contamination is regulated for CSG activities:

- **New** dam standards
- **Prescriptive** drilling standards

Commitments:

- Arrow will:
 - **Line** all dams, install additional **leak detection**
 - Use licensed drillers
 - Ensure wells are **isolated** from formations other than the coal seam
 - Rehabilitate wells
- Arrow will **not use** oil or synthetic based drilling fluids



Concern 5 Fracking and Groundwater

Fact: Arrow does not currently use the fracking technique in the Surat Basin

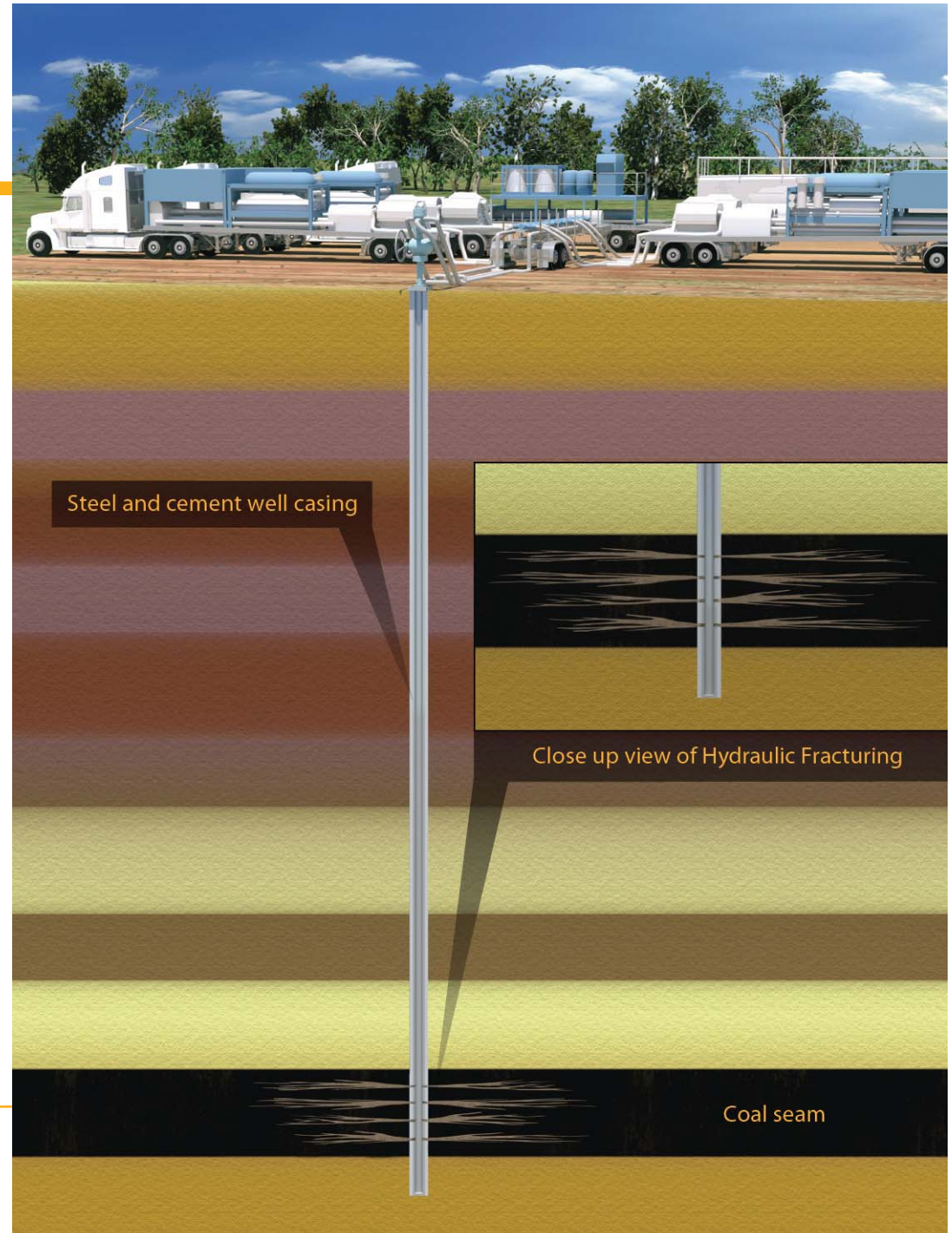
Commitments:

✓ **99.5%** water and sand

✓ **0.5%** additives
(also used in households)

- **No** Napthalene
- **No** Benzene
- **No** Phenantherenes

Detailed information sheet available



Concern 6

Produced Water Management – Treatment and Storage

Fact: Management of produced coal seam water is regulated by the Department of Environment and Resource Management, including:

- **New** dam standards (*Licensed Regulated Waste Disposal Facility*)
- **Treatment** of water

Commitments:

- Arrow will:
 - Conduct **3rd party** audits
 - Ensure dams meet **current** standards
 - **Integrate existing** dams into a network of treatment facilities
- Arrow will not construct evaporation dams

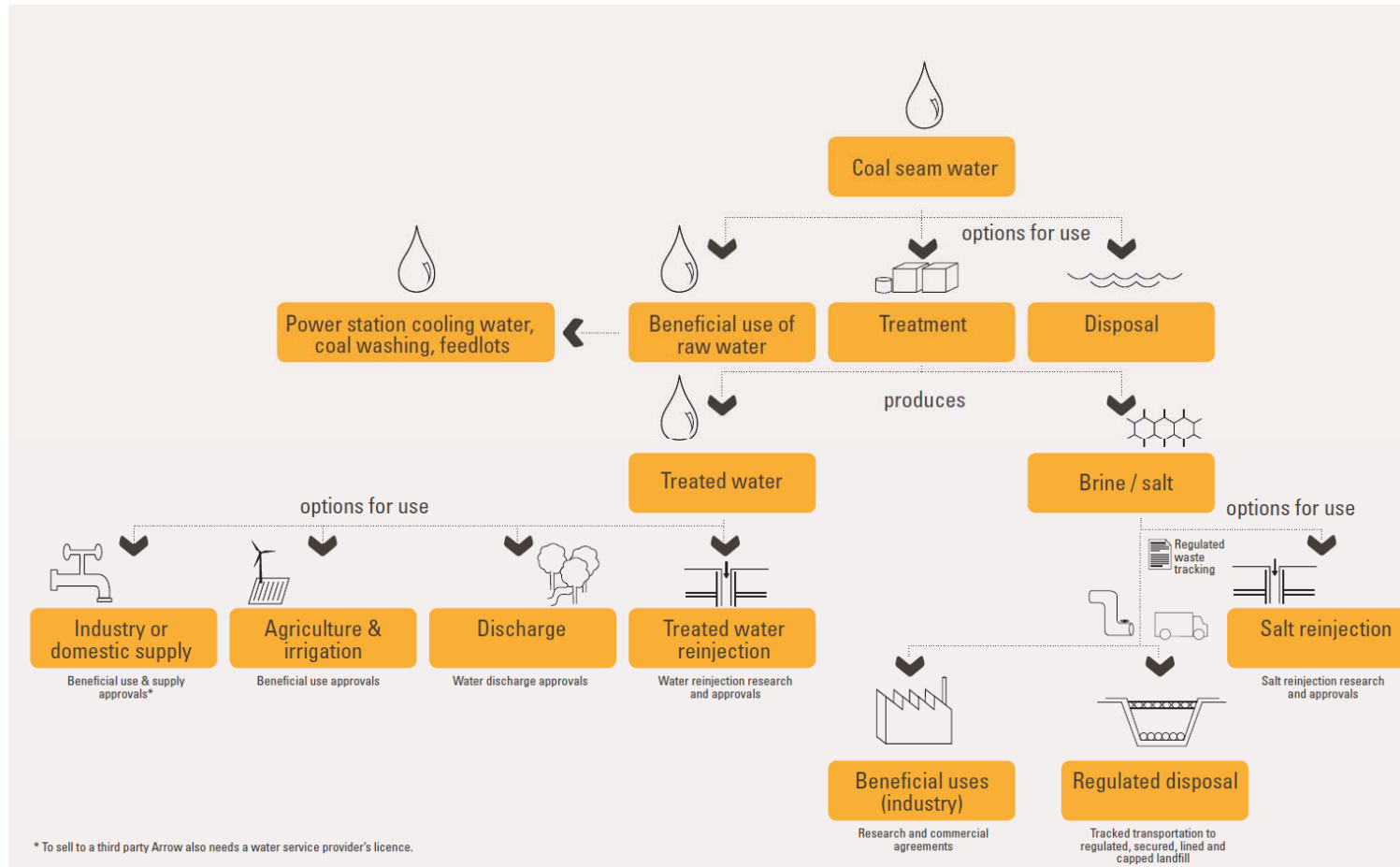


Detailed information sheet available

Concern 6

Produced Water Management – Supply and Beneficial Use

Fact: Management of the supply of coal seam water is regulated by DERM. Arrow has made changes to the way we manage our water.



Detailed information sheet available

Concern 7

Salt Management

Fact: The amount of salt is dependent on the location and age of the coal seam
Arrow's experience in the Surat and Bowen Basins shows an average of:

COAL SEAM WATER		SALT
1 megalitre		5-8 tonnes (5000-8000 kg)
OR	=	OR
1 million litres		3-4 cubic metres

Commitments:

- Arrow will:
 - **Remove** produced salt from the landscape
 - Investigate potential **beneficial uses** for the salt including:
 - Crystallisation for use in industrial processes
 - Use of brine in the chemicals industry
 - Research the viability of **reinjecting brine** into aquifers with high salinity

**At a minimum, Arrow will remove the salt
and dispose to an approved and regulated landfill**

Detailed information sheet available

Concern 8

Social and Economic Impacts & Benefits

Fact: Arrow's project will deliver significant social and economic benefits to the region

Commitments:

- Arrow will:
 - Create more than **1,000 construction jobs**; and
 - Create up to **400 operational jobs** for the project
 - **Recruit locally** as a priority
 - Accommodate all operational staff in the **region**
 - Provide large scale **skills training** opportunities in regional Queensland, including Indigenous programs
 - Jointly fund a 24/7 **emergency helicopter** service, including **doctors**, to service both industry and the community in the Surat Basin
 - Facilitate pre-qualification of **local suppliers** to participate in tenders
 - Supply treated **water** to local communities, where approved

Arrow's Key Commitments

- **Improved** community and landholder **engagement**
- An **open and honest dialogue** about issues and opportunities with our stakeholders
- Adoption of a **standard approach** to compensation and land access
- **No development** in intensely farmed areas until **concerns are properly addressed**
- **No** construction of **dams** for coal seam water on **intensively farmed** areas
- Use of surface **tanks not pits** on black soil
- Development of a robust **groundwater monitoring** regime
- **Prompt response** to bore owners who report a reduced water supply
- Construction of '**fit for purpose**' dams to **government standards**
- **Remove** produced **salt** from the landscape
- **Benefits** delivered to the community

Questions and Answers

Appendix 12

Summary of Q&A sessions - Phase 2



Surat Gas Project

Community Feedback Sessions 15-23 June 2010

In June 2010, Arrow Energy held a series of community feedback sessions to discuss the Surat Gas Project.

Questions and answers from those sessions were captured by JTA Australia and are presented in this document.

Questions varied across the six sessions. To ensure that valuable information is shared throughout the communities of the Surat Basin, these notes summarise questions and answers asked across all sessions, and are grouped under topics for easy reference. The notes are based on written records and include paraphrasing.

The Surat Gas Project community feedback sessions were held from 15 to 23 June 2010 at:

- Chinchilla 15 June 2010
- Miles 16 June 2010
- Dalby 17 June 2010
- Dalby 21 June 2010
- Cecil Plains 22 June 2010
- Goondiwindi 23 June 2010

While feedback sessions were also held in Wandoan and Millmerran, questions and answers were not captured because no formal presentations were held due to lower attendance numbers.

The Surat Gas Project is Arrow's largest gas exploration and development program in the Surat Basin. The proposed project involves continued exploration in the Basin to identify the most economic and environmentally acceptable areas for future gas production. The areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration.

How to read these notes

(1) Topics are listed as:

- general queries
- environmental impact statement (EIS)
- exploration and operations
- land
- environment and water.

Questions listed under the topics were asked at one or more of the community feedback sessions. Where possible, questions relating to a specific issue have been grouped together.

(2) Questions and comments from the audience are in bold type. The unbolded responses are from Arrow's Surat Gas Project representatives.

(3) In some cases, responses have been summarised. Where one response to a commonly-asked question was more comprehensive at one session than another, the response has been used in the interests of better understanding. In some cases, additional information is included to provide further context or explanation; this information is in brackets within text, or italicised following the answer.

Arrow will hold another round of consultation sessions in November 2010 to update the community on its progress on the various issues raised. Arrow will release further information closer to the time. If you have any further questions or comments about the project or the meeting notes, please contact the project team during working hours on:

Freecall 1800 038 856

Email: suratgas@arrowenergy.com.au

Post: Surat Gas Project, Reply Paid 81 Hamilton QLD 4007

Commonly used acronyms

APPEA	Australian Petroleum Production and Exploration Association
ATP	Authority to Prospect
CSG	coal seam gas
DEEDI	Department of Employment, Economic Development and Innovation
DERM	Department of Environment and Resource Management
EA	Environmental Authority
EIS	Environmental Impact Statement
GAB	Great Artesian Basin
LNG	liquefied natural gas
MSDS	Material safety data sheets
PL	Petroleum Lease
PSI	Pounds per square inch (unit of pressure)
QGC	Queensland Gas Company
QRC	Queensland Resources Council
QWC	Queensland Water Commission
RO	Reverse Osmosis
ToR	Terms of Reference

Queensland Government Acts mentioned:

Petroleum and Gas (Production and Safety) Act 2004

Mineral Resources Act 1989

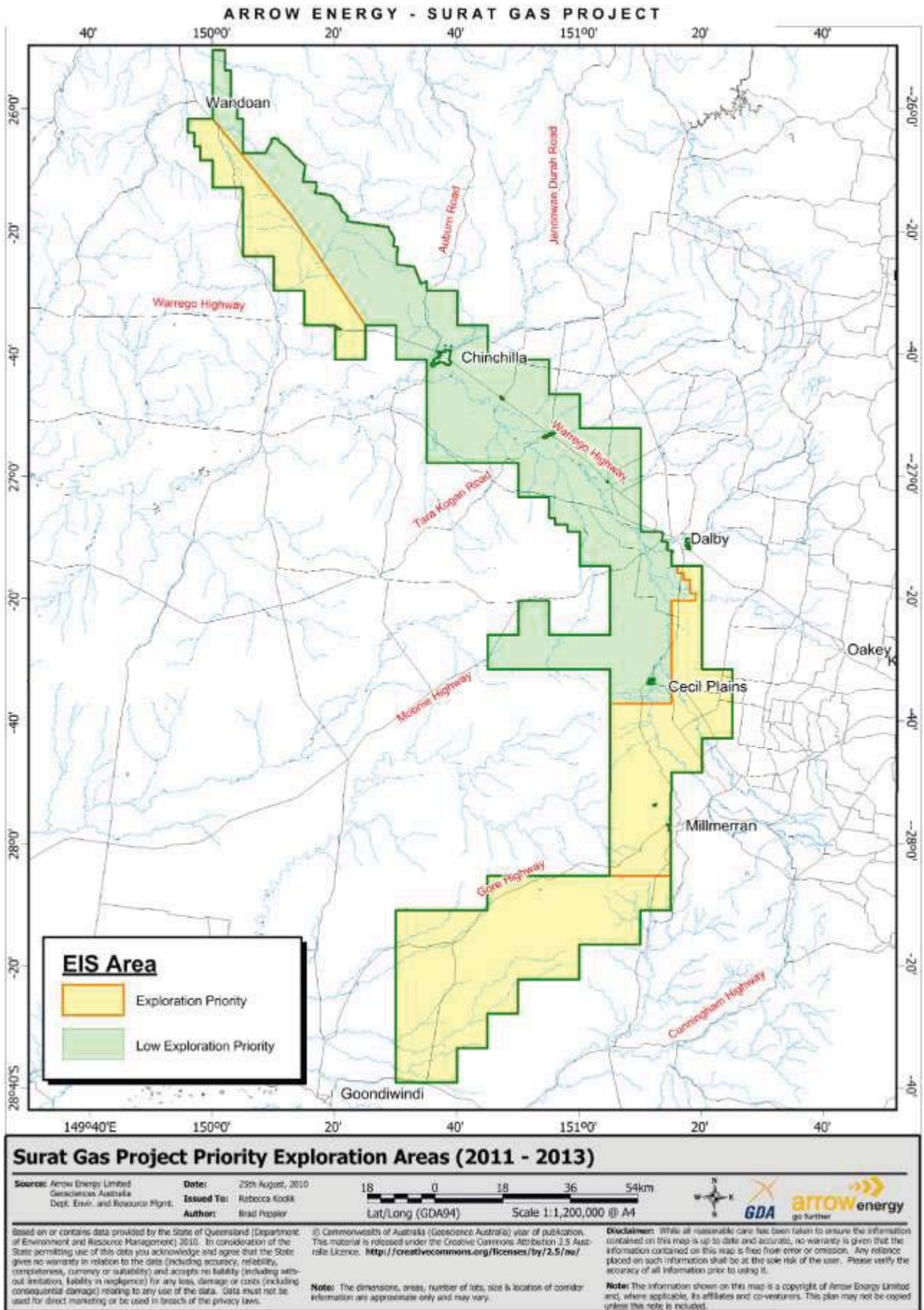
Water Act 2000

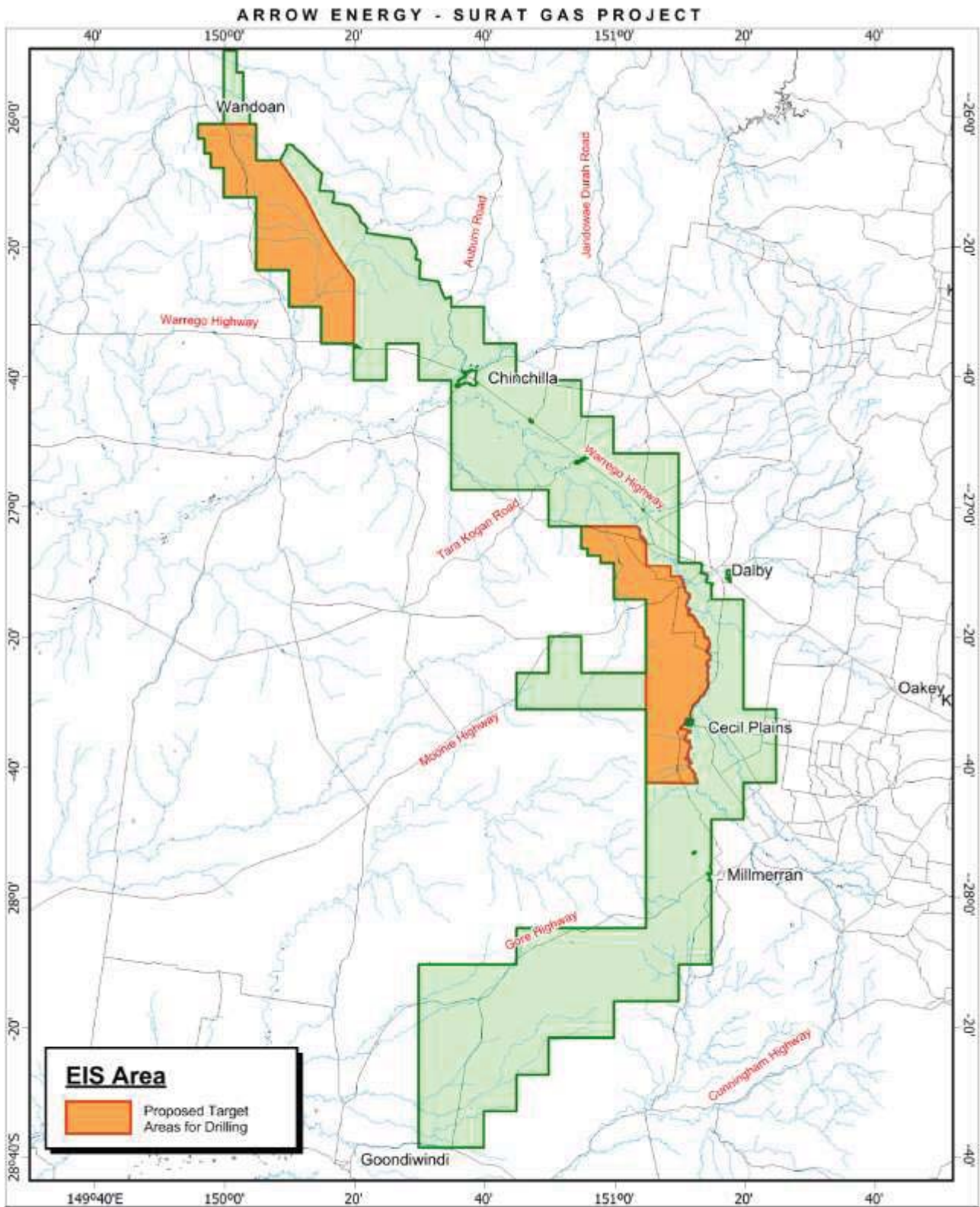
Water Safety (Reliability and Supply) Act 2008

Maps

Map 1: Exploration priority

Map 2: Production priority





Surat Gas Project Target Areas for Production Development - (approx. 2013 - 2023)

Source: Arrow Energy Limited Geosciences Australia Dept. Env. and Resource Mgmt.	Date: 25th August, 2010	18 0 18 36 54km	
Issued To: Rebecca Kozicki	Author: Brad Poppler	Lat/Long (GDA94) Scale 1:1,200,000 @ A4	

Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2010. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.

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Note: The dimensions, areas, number of lots, size & location of corridor information are approximate only and may vary.

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up-to-date and accurate, no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it.

Note: The information shown on this map is a copyright of Arrow Energy Limited and, where applicable, its affiliates and co-venturers. This plan may not be copied unless this note is included.

Details of community feedback sessions

Chinchilla community feedback session		
Date:	Tuesday 15 June 2010	
Venue:	RSL Sub-branch, Heeney Street	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Robbert de Weijer, Chief Operating Officer	Arrow Energy
	Tony Knight, General Manager Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Gerard Coggan, EIS Project Manager	Arrow Energy
Miles community feedback session		
Date:	Wednesday 16 June 2010	
Venue:	Leichhardt Centre, Columboola Function Room	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Robbert de Weijer, Chief Operating Officer	Arrow Energy
	Will Barker, General Manager LNG	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Jason Schroder, Production Manager (South)	Arrow Energy
	Leisa Elder, General Manager Government and Community Relations	Arrow Energy
	Iain Burgess, Surat Gas Pipeline Project Manager	Arrow Energy
Dalby community feedback session (1)		
Date:	Thursday 17 June 2010	
Venue:	Showground Pavilion	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Robbert de Weijer, Chief Operating Officer	Arrow Energy
	Tony Knight, General Manager Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Dalby community feedback session (2)		
Date:	Monday 21 June 2010	
Venue:	Showground Pavilion	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice President, Operating Services	Arrow Energy
	Tony Knight, General Manager Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Gerard Coggan, EIS Project Manager	Arrow Energy
Cecil Plains community feedback session		
Date:	Tuesday 22 June 2010	
Venue:	Cecil Plains Hall	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice President Operating Services	Arrow Energy
	Tony Knight, General Manager Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Gerard Coggan, EIS Project Manager	Arrow Energy

Goondiwindi community feedback session		
Date:	Wednesday 23 June 2010	
Venue:	Conference Room, Goondiwindi Training and Technology Centre	
Facilitator:	Louise McCosker	JTA Australia
Presenters:	Al Mueller, Vice President Operating Services	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Campbell McKerrow	Arrow Energy

SUMMARISED QUESTIONS AND RESPONSES (compiled from all sessions)

GENERAL

1. Do all coal seams have gas? What about open cut mining? Why don't companies take gas out before mining?

Yes, all coal seams have gas. With shallow cut mining, the gas (generally lying in shallow coal seams) has already escaped over time. Underground coal mining requires the removal of the gas (for safety purposes); and gas removal/capture is likely to be encouraged if a carbon tax or emissions trading scheme eventuates.

2. Is there a mechanical effect on the coal by taking out water and gas?

There will be some form of shrinkage but this won't result in a mechanical impact on the coal. In most cases there will be zero effect at surface level.

Additional information: Arrow is investigating the geomechanical properties of the coal seam, including whether the removal of gas results in shrinkage and a corresponding impact at the land surface. Water removed is only a minor part of the whole seam and accounts for about 4% shrinkage; a lot will be absorbed by the above layers.

3. What is the depth of the coal seams?

The Surat Basin is huge. In the areas where Arrow operates (on the Surat Basin's eastern edge), gas occurs from around 200m below ground level. The deepest Arrow target is about 600m.

4. How thick are the coal seams?

Within the Walloon Coal Measures, there are about seven different seams of coal within 300m. Each seam is in the order of 10 to 20m thick.

5. How long does it take for gas to build up in the coal seam again after it has been removed?

The supply of gas effectively finishes once it has all been pumped out.

6. This is a stable region as far as seismic activity goes. What is the effect of an earthquake on CSG infrastructure?

Negligible...there are gas wells close to mines around Moura, about 1km from mine blast areas. This gives an indication of how they can withstand ground vibration.

7. The project development area is a long narrow strip. Did Arrow design it that way?

The government issued the petroleum tenures that form the project development area between seven and ten years ago. Arrow didn't pick the shape; however, the petroleum tenures follow the eastern edge of the Surat Basin.

8. Where do you intend to sell gas? You are talking about putting in a pipeline to Port Curtis?

We already sell gas locally to power stations. Arrow proposes to construct a pipeline to Curtis Island for liquefied natural gas (LNG) export.

9. Will the Arrow pipeline be shared with QGC and Origin?

Each proponent will construct its own pipeline; different pipelines start in different areas. In some areas the pipes run parallel for 200 to 300km, and QGC's pipeline joins up with us later on.

We talk to the other proponents to ensure that pipelines do not criss-cross each other. The pipelines vary in size. QGC and Origin use 42 inch pipes; and Arrow uses pipes greater than 32 inches but less than 42 inches. A common pipeline would not be big enough.

10. If you construct a facility, do you only take gas produced by Arrow?

Arrow intends to undertake an independent project, and currently only takes gas from Arrow's fields. Other CSG companies have commercial gas contracts with each other.

11. Do you propose having infrastructure workshops (depots) in communities like this or in the field?

Arrow does not have any detailed plans yet. We have a depot in Dalby and can perhaps do something in Miles. The central hub is Dalby, but we can have small silos on sites and the Dalby office could be made bigger. Distance could be a problem.

12. Arrow had three 200 man camps (planned) a few months ago. Is that now on the back burner?

That proposal related to construction. We are talking about more permanent employment for production operations.

13. Have the (above mentioned) camps gone on hold because of the takeover of Arrow (by Shell)?

Yes. Effectively, the requirement, sizing and timing of any camps will be part of the study for the larger integrated LNG project.

Additional information: Shell and PetroChina officially took over Arrow Energy on 23 August 2010.

14. You have relayed your concerns to us on key issues such as groundwater. Are you relaying those same concerns to your shareholders?

The potential new owners, Shell and PetroChina, are in the Surat Basin for the long term. They know they can only undertake this project if it is sustainable. Arrow regularly goes through assurance reviews that identify project risks. Water and management of salt are recognised as critical issues.

15. Arrow is in the process of a takeover by Shell. Shell's reputation in Nigeria is abysmal. As for PetroChina, China's workplace, health and safety standards are also terrible. If the takeover occurs, will critical standards be maintained?

Shell does not compromise on standards. Shell and PetroChina are committed to environmentally and socially sustainable operations around the world. Shell has a top ranking in environmental and sustainability standards, and its future lies in its reputation.

16. Shell's operations in Nigeria do not paint a pretty picture.

Many factors play a part in the environmental situation in Nigeria. It is very complicated; involving sabotage and a very tenuous situation in that country.

17. What happens with the Shell takeover? What guarantee is there that the commitments made thus far will be honoured when the takeover goes through?

The last thing that Arrow, Shell or PetroChina want to create is a huge impact and environmental burden. If the project proves not to be sustainable, development will not proceed.

18. What impact will you have on Cecil Plains? What about construction camps?

Before the Shell and PetroChina takeover proposal, Arrow was developing a mid-scale project for an LNG facility on Fisherman's Landing at Gladstone. That work was focused on Arrow's existing petroleum leases south and west of Dalby.

Under the Fisherman's Landing project, Arrow planned to construct three integrated production facilities which would have had associated construction camps. Our preference was to establish the camps at the work site, to minimise traffic on roads, etc. We need to look at these things again in light of designing a project for Shell's Curtis Island LNG project.

In terms of a longer-term workforce of drilling contractors, our preference is to use locally based companies. We have recently had four drilling rigs operating and we expect to need five or six at the peak of the project.

19. Comment from the audience at Cecil Plains session: earlier in the presentation you made 'warm and fuzzy' comments about improved medical facilities and recruiting labour from the local area. That is not as warm and fuzzy as you make out. We have adequate medical facilities already and the agricultural industry in the local area has had a critical supply of labour for the past ten years. You are going to exacerbate the problem.

20. Shouldn't Arrow consult with communities who don't want the development to proceed?

Yes, this is what Arrow plans to do and why we are here today.

21. Why can't you just leave this area alone and go elsewhere?

Arrow makes plans based on the available geology. There is a huge gas resource to be explored underneath the ground.

22. Is there a mining ombudsman? If we disagree with you, can we approach an independent body?

Waanda McCarthy (based at Roma) from the Department of Mines and Energy can provide information. The Queensland Government has set up a new hotline for complaints, and any complaints will be forwarded to us. All our licences are public documents; in future we will provide copies to landholders.

Additional information: the Surat Basin Office (Deputy Mining Registrar) contact details are: (07) 4624 1512, minesCLO@dme.qld.gov.au.

The Queensland Government realises that retaining access to good quality groundwater supplies is vital for agricultural production in many areas. New laws will apply to current and future coal seam gas (CSG) projects and will require stringent evaluation and management of

impacts of water extraction from the process on bores, aquifers and springs. In addition to protecting water resources, strong rules have been issued for all aspects of CSG environmental management to protect soils, vegetation and wildlife. Projects will be required to meet these standards prior to receiving regulatory approval.

More industry-specific information about CSG and liquefied natural gas (LNG) is available from the LNG industry website. For enquiries relating to CSG, please contact the CSG and LNG hotline on 13 25 23. [Source: Department of Environment and Resource Management DERM]

23. What is the timeframe on the helicopter service?

The tender has gone out. We aim to award the contract by October and have the service available shortly thereafter. The main aim of this service is to cater for any emergencies that occur as part of CSG operations. This service will also be available to support remote communities in case of emergencies that require immediate medical care in hospital.

24. Will the helicopter service be like CareFlight?

Yes, certain companies tender for these operations. We are in the bidding selection process at the moment and expect an appointment in the third quarter. The service involves Origin, Santos, QGC and Arrow and it will be operational 365 days per year so the community will benefit.

25. Is there a minimum distance you need to be from a proposed township (Goondiwindi specifically)? And what about future town expansion?

There is no minimum distance. The distances are driven more by the impacts. There is an area near towns where block sizes become too small for activities to be practical. For a production well, we need an area of 60m by 70m. It is hard for us to know which way Goondiwindi will develop. We are having similar conversations with other rural townships where people have large paddocks they may wish to subdivide. For wells, we only need an offset of a few hundred metres but production facilities are different. If we are looking to put facilities in the immediate area, Arrow will buy land at the market value. We wouldn't seek to put a facility on land that is suitable for subdivision.

Part of the EIS process is to assess the impacts on towns and how far sensitive receptors need to be to establish appropriate placement of wells and facilities.

26. My parents own a one acre rural residential block. They received a letter from Arrow that distressed them greatly.

Arrow will not seek to conduct any development on one acre blocks. Arrow has committed to provide another letter that explains the situation to the people (on the outskirts of Dalby) who received those letters.

Essentially, it is a statutory requirement of the EIS process to provide written notification to people who own property within the EIS area – and this was determined by local government zoning data. While Arrow will not seek to undertake any works on that land, those people need to understand that we will have to send more letters in future because of the statutory requirement.

Additional information: Arrow will try to explain the contents of statutory EIS notices more clearly in future.

27. What is the status of Arrow's current Environmental Authority (EA) application?

The EA does not detail the scope of activities, but it does place conditions on how Arrow carries out activities. The proposed activities are included in the development plans which are submitted to the Department of Environment and Resource Management (DERM) to help government understand the potential level of impacts.

Additional information: Arrow currently has an application with DERM for the Dalby Expansion Project which proposes 300 wells.

28. How close are you to reaching the limit of your current work program in terms of production well numbers?

If you are asking whether we need an Environmental Impact Statement (EIS) to deliver gas under our existing domestic gas contracts the answer is no. A number of wells have already been drilled and will be brought online as required to expand operations. Our worst-case scenario is about 50 additional production wells before 2013. We say worst-case because some of the wells we have brought on recently have produced more than we thought they would.

29. Has Arrow considered compensating people for their time to consult?

Arrow has made that offer in the past; we want to understand how CSG and agricultural activities might work together. We may pay consulting fees to people prepared to assist us in working through these issues. Some members of the community do not wish to be paid.

30. *Comment from the audience at Dalby session 1: the Coordinator-General's office has recognised the fact that community participation, e.g. in social impact planning, involves a lot of time. The department is now charging companies for all those people's time to attend.*

31. Can we obtain copies of the presentation provided at these community meetings?

The presentation will be available on the Arrow Energy website.

32. You talk about consistency. I look around this room and see few of the same faces that represented Arrow at consultation last November. Does Arrow have a large staff turnover?

The Arrow representatives attending today are largely the same group as last November. We have been successful in attracting staff and it is very important for us to retain staff. Arrow does not have high staff turnover.

33. You need a consistent contact person.

We can relate to what you are saying. We want to have a one-stop shop; that is what we are constantly working towards. A low attrition rate is the key to helping us achieve this.

34. Arrow's current EIS is for waste storage facilities; 51% of the tenement is on intensively farmed agricultural land, and erosion and biological hazards have been marked as not a concern. The Authority to Prospect (ATP) document has very little information in terms of why impacts are not of concern.

Arrow has an EA application for ATP 683 currently with government for its domestic supplies (not an EIS). The residual risk assessment of those areas has been determined with mitigation measures put in place and those risks that are not significant are evaluated on that basis. It is certainly not that we do not care about them.

We recognise that the level of detail supplied for an EA application to government does not provide enough detail to landholders for forward planning but that is not the purpose of this document.

35. If Arrow is committed, shouldn't the company ask for a moratorium on activities until the project impacts are understood?

Arrow's development activities in the next few years will be fairly minimal and time will be spent to investigate concerns. Hopefully when we are back for the next round of consultation we will be able to present more answers than we can today.

36. It seems like Arrow is the only company trying to get feedback from the community. Should Arrow be more proactive toward the rest of the industry?

All CSG companies are doing similar studies. We are working with the other CSG companies to understand impacts and make sure we do this right.

37. A number of strategic government planning forums are being held in the region, addressing a broad range of development issues. We can't say we have seen Arrow represented at any of these forums. We believe it is appropriate for Arrow to become more involved.

We are currently undertaking recruitment to build our community relations and government department. We will then be able to bring more resources to the table and get involved in these forums.

38. I want to see proper science, not you-beaut TV advertisements. You can style things how you want, but I want substance. I want real sustainability, and to see businesses that are honest. If this project is not sustainable, will your chief environmental officer stand up and say that the project should not proceed?

If research suggests that the project is not sustainable, then Shell and PetroChina would not proceed.

39. These projects focus on the extraction of CSG. Is there a natural progression (or commercial evolution) to gasification or other alternatives after the gas is extracted to use the coal for another purpose?

Arrow can't automatically progress to some other use. We don't have the technology or legal rights; we would need to have a mining lease for mining or coal gasification. We can't say definitively that a mining lease won't be granted over your property but it wouldn't be an Arrow lease.

40. Does Arrow plan to buy out other companies in the area?

Note: This question was asked after the presentation had finished, and taken on notice.

Arrow has no plans in that regard at the present time.

ENVIRONMENTAL IMPACT STATEMENT (EIS)

41. Given the different land characteristics throughout the project area, why hasn't Arrow considered doing more than one EIS?

Arrow needs to investigate all the impacts in a cumulative manner. The Queensland Government expects the whole project area to be assessed as one.

42. You have spoken about the social and economic benefits to local people. What about the disadvantages? Have you been looking at those?

Arrow is very aware that this is a project with big impacts. Right now, we don't have all the answers. The EIS process has to identify and deal with those impacts. The EIS will discuss all the positive and negative issues associated with Arrow's development.

43. Will the Terms of Reference (ToR) be adjusted to take into account the upscaling of the operations?

The ToR are for the entire project and do not need to change. The scope of studies needs to be expanded, but the ToR identifies issues that must be addressed for the whole of the project area so they will not change.

44. Will you be breaking the EIS down to land use areas? What is Arrow doing to understand the issues associated with working on different soil types?

There is a huge variety of land and soil types across the project area, and EIS work will identify these. Sources being considered are government soils mapping and policy documents (such as good quality agricultural land and the yet-to-be-finalised strategic cropping policy) as well as field surveys. The EIS will take this to a practical level, consider project activities and farming methods, and how to work on different types of land and soils.

45. Does Arrow have knowledge of soil conservation issues, and the effect of these on well site footprints?

We are expanding our knowledge in this area through the EIS process. There are also restrictions on us operating within certain distances from watercourses. Arrow is working on procedures to deal with these issues.

46. All the CSG producers, Origin Energy, Arrow, Santos, QGC, are looking at doing similar projects. What work is being done to look at the impacts of multiple projects? How is Arrow engaging with the other companies to monitor cumulative effects?

Arrow is in a good position because the other major CSG projects have their EIS documents in the public domain. When Santos began, the information on the other projects wasn't available. We will be considering the other CSG projects in the Surat Gas Project EIS assessment of cumulative effects. Also, Arrow is a member of the Australian Petroleum Production and Exploration Association (APPEA) and Queensland Resources Council (QRC). Through those forums we are jointly looking at a range of issues, such as social impact management, cultural heritage and groundwater. There are also common issue forums, and some have focused on how to improve government policy.

47. How many EISs have not received approval from government?

Some have not been approved. Others have been approved, but were so heavily conditioned by government that projects have never gone ahead. Extensive mitigation measures and conditions can be costly to implement and this can result in projects becoming uneconomic.

48. I am concerned by the use of the word 'should' in the EIS document. This sort of language does not make a person confident.

If you are referring to the draft Terms of Reference for the Surat Gas Project, this is a document that is owned by DERM and sets out the scope the EIS needs to look at. The EIS document produced by Arrow will rarely use the word 'should'.

EXPLORATION AND OPERATIONS

49. Does Arrow plan to explore east of the defined project area?

Arrow will only explore or develop where we have tenure; this is certainly not to the immediate east of the project area.

50. A commitment was made that Arrow will not drill north of the Warrego (Highway); however the presentation indicated that the area had already been drilled.

Arrow has not conducted much exploration in the area indicated on the exploration priority map (see map 1). In other areas, including our existing operations around Dalby, Arrow has been exploring for the last ten years and already has considerable information. The areas shown in orange on the production map (see map 2) indicate Arrow's production priority based on current information.

Additional information: the colour of the exploration and production priority zones was altered after the initial community session at Chinchilla to ensure greater clarity and differentiation of the areas.

51. With regard to your exploration and production maps (in the presentation), why are you drilling in areas when they are not an exploration priority?

We do not need to explore in areas where we have production data or have done exploration work because a lot of data already exists. The development work will initially spread out from the existing area west of Dalby.

52. The maps are quite confusing. Surely you have more detailed maps?

The maps in the presentation are representative only. More detailed maps are available here today and our staff can talk about them to you.

53. Do you know where you seek to develop next (i.e. after the initial proposed development west of Dalby and to the north between Chinchilla and Wandoan)? Can Arrow make a commitment that at the next round of meetings, you will say where you are going next?

We do not have specific plans for the next stage in the Surat Gas Project area. Being open and transparent is our only sustainable way of moving forward and we are very committed to this. Plans are being developed continually; we have shared some already and hope in the next four to five months we can be more concrete with our development plans. We can commit to sharing our plans with you as the information becomes available, but keep in mind that certain plans will change over time for various reasons.

54. Arrow conducted a pilot well program at Dundee. Could you please advise what you have in mind for the Dundee site?

The Dundee area is one of the areas that Arrow has been exploring. At present, Arrow hasn't received all the appraisal data back from the pilot well program. Without that data, it is not possible to answer all the community's questions about the site. However, Dundee doesn't feature in Arrow's initial development area plans and has been dropped down the priority list.

55. What was the initial proposal for Dundee?

The appraisal work included strat (stratification) drilling, core hole drilling, a pilot of five wells and pumping to produce gas. Land agents have visited the landholder.

Additional information: the existing dam has been decommissioned and will be rehabilitated. The existing pilot wells will be closed. The planned second pilot has been suspended until a more suitable site is located. The planned expansion to the existing dam will not be carried out.

56. A recent newspaper article (*Queensland Country Life* 23/03/10, p3) shows a high concentration of wells. How close are wells placed to one another?

Well spacing depends on whether it is the exploration or production phase. For the exploration phase, wells are usually spaced kilometres apart. We then typically undertake a pilot well appraisal. Five pilot wells are tightly spaced in a diamond shape. We aim to pump the wells and obtain gas quickly to minimise the impact of the pilot. If we get a good show of gas from the pilot wells, then we seek to develop further. If the gas rate is disappointing, then we may reconsider whether to develop the area.

57. If a pilot is successful, how many more wells would you expect?

It is usually 160 acres per well (about 800m between each well). This varies by property depending on its size and constraints such as sensitive receptors. On average we aim for a grid spacing of 1km by 1km.

58. How many pilot programs are you proposing to put in ATP 683? How long do you expect a pilot to last?

Five pilots (five groups of about five wells each) are proposed for the area. A pilot can run for two years, depending on whether you find things you didn't expect to find. One purpose of the pilot is to rule out whether there are unique characteristics in an area that affect how you design a project.

59. What is the status of the pilot planned in the area east of Cecil Plains?

Arrow has suspended that pilot well program. We need to resolve a number of challenges before doing a pilot in that location. We are looking for a more suitable location, and an alternative site for that dam.

However, Arrow does need to do pilot programs. Exploration works involve understanding (1) if you have coal; (2) if you have gas; (3) whether you can produce that gas. The last stage (the pilot well stage) involves a higher level of impact than the first two stages. For a pilot, we typically drill five wells on tight spacing. We do that so the water in the central well can be pumped off quite quickly and we can get an idea about production rates. We need to do pilot wells in order to gather data to produce our development plans. We will be drilling pilot wells across the exploration area.

60. You are talking about a significant amount of water in that area for a two year program. Why pump so much water? Is there technology available to draw gas without water?

There is currently no technology to extract the gas without pumping water. The water pressure keeps the gas stuck to the faces of the coal. We have to unstuck the gas. The technology of production is to reduce the pressure by pumping the water off the coal, and then gas production starts. The amount of water required to be pumped out drops significantly once the pressure is reduced.

61. What is the life expectancy of an average well?

Not every well is the same. The coal lenses (i.e. it thins and thickens) in and out and there are other subsurface features that affect individual well performance. Current modelling suggests an average well will drain gas from the area it services in 15 years. We typically think a well life is in the 12 to 15 year range.

62. What is the lifespan of the project?

Gas sales contracts are likely to be for a period of 25 to 40 years or more. When production from the initial wells declines, new wells are drilled to replace them.

63. Grassdale is pumping now. What is its life expectancy?

The expected production life of wells at Grassdale is of the order of 15 years.

64. Is it possible to congregate the wells on public land and use curves and horizontal drilling to minimise the impact?

We have trialled a horizontal well and it may be a good alternative solution. We are looking into it.

65. What if gas leaks from a well? We have heard horror stories.

Polypipe is buried 750 to 1,200mm and can be farmed over the top. By law, the polypipe must be underground, and steel transmission is used to the wellhead. Arrow aims to reduce the impact on the land by combining gathering lines in some access tracks to wells on boundaries of the property.

66. Will telemetry indicate whether a well is leaking gas, or do you check?

Telemetry lets us know if the well is operating. However, we have a monitoring system to check for leaking gas. We actually use soapy water, which helps detect leaks smaller than those identified by a gas detector. Checking for gas leaks is a standard maintenance activity.

67. What measures are in place to stop the gas from escaping outside the casing?

There is a continuous string of casing. The casing can hold 1500 psi (pounds per square inch) of pressure. It is very strong and cemented with a tube all the way to the surface. The top of the well is normally set with 200m of concrete through which the gas cannot migrate. We recently surveyed 300 production wells and there are no leaks. This work was under the supervision of the safety unit at DEEDI.

When we cement a well, we push the cement into the well under pressure. It needs to be pushed down the full length of the casing until we get returns at the surface through the annular gap between the drilled hole and the casing. We put down 150% of the volume of concrete required to make up for any irregularities because when we drill wells the holes aren't perfectly cylindrical.

68. I am aware of some work you have done recently regarding gas leaks. Have there been other leaks?

When we recently surveyed all our wells we found very small leaks on some of the seals (not the well itself). Leaks were so small that we could not detect them with a gas detector so we

used soapy water. Checking for gas leaks is a standard maintenance activity. The leaks were all repaired on the spot or shortly afterwards.

69. How do you separate the water and gas in the well? Is there a hazardous area around the well outside the contained well site?

At the moment, wells are designed to separate water and gas down the hole. That captures most of the water coming up with the gas. Then we have an additional separator on the water stream which removes the residual gas. The hazardous area is contained within the secured well compound.

70. How are the aquifers sealed off when you drill wells? How do you ensure wells are isolated from formations other than the coal seam? What are the specifications of the concrete casing, and will you provide us with the specifications?

We want to remove water from the coal seam. We don't want water seeping into the well from above (because it affects gas flow up the well). We use steel casing and cement to ensure water from other formations doesn't enter the well. The cement we use is more like grout.

We cement from the bottom, by first pumping the cement inside the casing and forcing it up to the surface through the annular gap between the drill hole and the casing. To check the integrity, thickness and quality of the seal, we use a special tool. We can provide the cement specification.

71. Can wells collapse? Who monitors how Arrow constructs wells?

The only time a well would collapse is prior to installing the steel casing. As to monitoring construction, there is a requirement to submit a well proposal (including the cementing program) to government. We notify the government (Queensland Mines and Energy) of the well proposal. We then advise them when we complete it. In terms of training drillers, there have been some problems with this in the past; however, a training system has been introduced, with a formal process to attain accreditation. What has happened in the past is not a guide to the future.

72. So the government gets a report from you to say you have complied?

The government has a spot audit approach. Representatives from different government departments have come to inspect different aspects of our activities.

73. What percentage of the wells does the government test?

There is a lot of drilling undertaken. The government doesn't have the resources to monitor and inspect every well. It has to ensure that our equipment and processes meet industry standards. We put well proposals into government and lodge completion reports. There is a physical practicality to how much the government can do.

74. Can you guarantee that the casing stays in place?

We have a process to check the cement for integrity. The average thickness of the cement casing is a few inches, and centralisers are fitted to the casing to hold it in the centre. However, it is important to remember that the casing also acts 'in height'. From a height perspective, the casing is a couple of hundred metres thick. The technology is very robust. In terms of what can go wrong...not a lot in the same sense as the well in the Gulf of Mexico. If there are any issues with well stability, the well can be shut in.

75. In earlier discussions, cement grouting distances were quoted at ¾ inch either side (of the casing). The suggestion now is two inches. Is there a casing structural standard?

There is no casing standard; the appropriate casing is chosen to fit the coal size. However, wells are designed to the American Petroleum Institute standard.

76. Where are you getting your expertise in concreting? Can you guarantee that none of the wells will leak?

Local companies supply the concrete to the specification that Arrow determines. To get cement into the well, there are a number of products and equipment specifically designed for that process. We can provide further details on that process and the specifications used.

77. You mentioned licensed drillers. Where do you find them and what quality assurance is there on people doing work? What is the licensing process?

The Australian Drilling Industry Training Committee provides training to the industry. In terms of numbers of drillers required, it is possible to break this down. It normally takes a week to drill a well. We may have six or so drilling rigs operating. We already have four rigs operating in the area, so it is not a huge increase in numbers. Arrow does not want its drillers to do a bad job. We have a vested interest in ensuring good quality wells are constructed from a financial, social and environmental point of view.

78. Will you use fracking?

Arrow has not fraced in the Surat Basin and has no plans to do so for the Surat Gas Project. The permeability of the coal means we don't need to frac. There are areas in the Surat Basin (outside the project area) where the coal is very deep, where we may have to think about fracking in the long-term future.

Additional information: fracking is a process that involves pumping water down a well at pressures high enough to fracture the coal in a radius of up to 100m or so around the well. Once the fractures are created, they are held open by sand which is pumped down the well.

The decision to 'frac' a well is made before drilling commences as it requires additional considerations in well construction and procedures. The main points of difference are that the well is fully cased from top to bottom, and then the casing is perforated at the specific intervals where the frac is to be conducted. Once the perforation is complete, the fracking process is conducted. The fraced zones are limited to coal seams, and are designed and controlled so they are limited to coal seams only and do not extend either above or below the coal seam.

Fracking can only work where there is significant ground pressure so is not conducted at coal seam depths less than about 300m. It is important to note that fracking is not used in all instances. For example, in Arrow's Surat Basin fields the production wells currently do not need to be fraced.

79. We were informed that fracking is used for CSG. When used in the United States, the chemicals were found up to five states away.

Some gas extraction processes do require fracking. We do import some products for fracking in the Bowen Basin (where fracking is being trialled) e.g. mostly vegetable gums and detergents. We do not use the chemicals you may have heard about for shale gas in the US which needs to be fraced to get the gas out. The coal seams we use do not require it.

80. What independent body monitors the chemicals used during fracking?

Fracking is not relevant to the Surat Gas Project but in Queensland DERM regulates it.

81. Will Arrow make available material safety data sheets (MSDS) for the chemicals the company uses on properties?

An MSDS sets out the details of a chemical and its correct use, as well as how to respond in an emergency. Yes, we can share that information with you. In terms of chemicals used, the fracking process uses vegetable gums and detergent, and drilling uses potassium chloride to stop clay swelling but very few chemicals are used in the CSG extraction process.

82. Are there chemicals used in other CSG production processes?

When we drill production wells, we extract coal seam water which may contain other components; however, it is mostly salts that naturally occur in the coal seams. There are few heavy metals. The only other chemicals we use in our operations are in the water treatment facilities, and oil for gas compression.

83. With Arrow not using nasty fracking chemicals, would Arrow like to support us in calling for a ban on nasty chemicals? Would you provide industry support on that? There are a lot of chemical supply trucks around Dalby these days – they must be going to CSG companies.

The chemicals may be used for a variety of reasons (and industries), not just fracking. We recognise the issue of particular chemicals in fracking as a serious concern. We are happy to work to find a way to allay those fears.

84. Is there any way to do fracking without using so much water?

While we do not plan to frac in the Surat Gas Project area, there is currently no technology to extract gas without pumping water.

85. Arrow pumps the water out for the gas to flow. Is the gas under pressure or does it also need pumping?

Arrow only needs to pump the water out. Because the CSG reservoir is under pressure, once the water is removed the gas flows out on its own accord.

86. How many wells have you sealed up so far? How many have collapsed?

We have 300 wells in production at the moment. The earliest commenced in 2005, and we expect most to run for 15 years. We haven't had any wells collapse.

87. How can a person get a proposed pipeline easement changed? If a pipeline is proposed to go past a person's house, how can a landholder get the route moved, for example by a couple of kilometres?

It can be a challenge to move a pipeline a couple of kilometres. Typically, pipelines can be moved by a couple of hundred metres.

It is important to note that Arrow doesn't seek easements for gathering lines (low pressure high density polyethylene pipes that connect production wells). Gathering lines are addressed through compensation agreements. We do seek easements for export or transmission pipelines (buried high pressure steel pipelines) that take gas from compression facilities to market.

There is more flexibility with the construction of gathering lines. They can be designed to fit around land constraints. Transmission pipelines have less flexibility as they can't have tight-radius bends; they need to have gradual bends. The key drivers for their placement are safety and cost. In bush country, we generally take pipelines in the straightest possible line. However, in more highly cultivated areas we would seek to go along the edges of roads, vegetation barriers, etc.

LAND

88. Is there a way for Arrow to provide landholders with information more quickly? Uncertainty about the company's plans makes life very difficult for landholders.

One of the reasons Arrow is here today is to provide more information about the company's plans. This includes locations where Arrow will be busy and where we will not be exploring or developing for some time.

89. How is it possible for Arrow Energy and QGC to have rights on the same landholder's property?

The government awards petroleum tenures (Authority to Prospect (ATPs) and Petroleum Leases (PLs)) along latitudes and longitudes, not by property boundaries. In some cases, it is possible for these boundaries to run down the middle of a person's property, which is why two companies might want to enter the same property.

Note: A commitment was made by Arrow to follow up with the landholder with a map of the Arrow and QGC tenements.

90. Have you considered compensation?

Yes, we have to compensate landholders for any impact our operations have on their land, the effect of our facilities, and impact on productivity and land value based on specific land use.

91. How are you arriving at those factors?

We use valuers in regard to the value of cropping activities and we work with landholders to agree on a compensation level. The level is tailored to each landholder. The government is currently putting in place a standardised approach across the industry which we see as positive in providing a base level of guaranteed revenue as compensation.

92. What about openness in relation to compensation? Companies isolate individuals through confidentiality clauses in compensation agreements.

Future access agreements won't have confidentiality clauses in them. The government's new standard form for compensation agreements will help ensure consistency of the legal agreements across the companies operating in the Surat Basin.

Although the confidentiality clause will be removed from the industry standard, this does not mean the amount of compensation will be the same for everyone; rather the clauses in the agreement will be consistent across the industry.

We agree that landholders who cooperate with Arrow early should not get a lesser deal than those less interested in cooperating. We have an example of a landholder in the Bowen Basin who reached agreement with Arrow early. When we subsequently changed our compensation

payment structure, we went back to him and paid compensation according to the new principles because that was fair.

93. You said that the terms and conditions of the agreements will be the same, but the individual compensation will be appropriate?

Yes, there are many different combinations of land valuation that we need to look at, but the terms and conditions and values on impacts would be the same.

94. You can't just look at compensation for that piece of land. There is dust, livestock etc.

We do not just look at the 10m x 10m piece of land needed for the well site. We look at loss of cropping, lifestyle and so forth. We feed back access conditions from landholders, where trucks travel, public holidays, hours of business and the general 'hassle factor'. We try to minimise time on the land and work in an agreed way with the landholder. Monitoring wells is a lot less intense. Once the well is drilled, we can reduce impact on the landholder by using telemetry. From our office we can remotely access wells and monitor functioning. Arrow only visits a well to service it or if a difficulty is identified.

95. The project impacts on many people within our community. Will we be compensated for the loss of value of our farms?

If you have a question about your particular circumstances, Arrow's land team is here and can talk to you specifically.

96. It sounds like it is in people's interests to have an up-to-date property valuation.

Yes, it is certainly important to get current property valuations to have reasonable discussions around compensation.

97. In your compensation agreements, do you consider landholder plans for the future that can no longer be done because of incompatibility with CSG activities?

The further the plans lie in the future, the more difficult it is to determine if the plans will actually reach fruition. When our activities reach production stage, the first question we have to ask is what your plans are for the property. If you have advanced plans, then we have to take these into account. We have to work with you to determine what the appropriate parameters are.

98. How would you compensate the loss of groundwater supply for feedlots?

We will have to address these issues over time. We can supply water to feedlots. We should have a robust groundwater model, and based on that we will have to make a decision on whether or not we will proceed with the project.

99. What monetary provisions has Arrow made? Have you set aside a sum of money in case you have to compensate people under the *make good* provisions? Will Shell and PetroChina be subject to the same provisions?

Shell and PetroChina are two of the largest companies in the world. They will be responsible and will have to comply with the same government regulations that Arrow does now. We are not aware of a sum of money being set aside, however the solvency of the company depends on managing potential impacts very closely, and not creating a substantial legal liability.

100. Will compensation provisions be joint (between Arrow, Shell and PetroChina) or separate responsibilities to *make good*?

The company would be Arrow Energy, owned by Shell and PetroChina, and compensation would be the joint responsibility of all parties.

101. There is a lot said about compensating people for CSG activities on properties. You have also said that you may buy land. What about the neighbour who is one property removed, who doesn't share the money but may still be impacted? How far out do you have to go to address impacts?

We have a responsibility to compensate as far as we have an impact, whether there are wells on the property or not (e.g. noise impacts, groundwater *make good* obligations). Just to clarify, we principally buy properties for the purpose of constructing a facility and to create a buffer zone between facilities and residences.

102. If you are not operating on a person's property which is not located on Arrow's petroleum tenure, yet it is impacted by your activities, such as an impact on the water table and drop in water bores, is the landholder compensated for the impact?

Yes, it is possible that such activities will be included.

103. There is a fundamental difference between the business interests of the agricultural industry and CSG industry. Can you confirm whether you pay compensation for agricultural production losses caused by loss of access to groundwater?

The answer to your question has two parts. We have two statutory responsibilities. One is to compensate for our activities; that is absolute. The second part is if our activities affect your bore. We are responsible for making good on this impact. That does not automatically mean that the solution is to provide financial compensation.

104. We want a guarantee that Arrow won't go to the Land Court if we refuse the company entry to intensively farmed agricultural land.

We will not go to the Land Court of Queensland for our first entry on intensively farmed agricultural land. We will not start the process off in the Land Court. Arrow wants technical rather than legal solutions.

105. I asked the following question at Dalby last week but didn't get a satisfactory answer. If Arrow fails to come to an agreement with a landholder, will you go to the Land Court to obtain access to intensively farmed land?

What I was trying to explain last week was that Arrow currently does not have all the information and answers the company needs in order to satisfy itself of what it needs to do to develop that land (i.e. gas reservoir data and measures to manage surface impacts). Arrow won't be using the Land Court as a way to commence development on intensively farmed agricultural land. If we go to the court, we have to demonstrate that we have negotiated reasonably and in good faith.

CSG operators don't have compulsory acquisition rights. Arrow will seek to enter intensively farmed agricultural land when there is general consensus that we can manage people's concerns. At the moment, there is general consensus that we can't. Arrow has gone to the Land Court before, however that was after a substantial period trying to negotiate. It is worth clarifying that we don't expect to need to access intensively farmed agricultural land till around 2023.

The map in the presentation indicates where we expect to operate between 2013 and 2023 on current information. We expect the green areas to be developed after that. We haven't got that

plan worked out yet. We hope to have more information in six months when we come back for more community consultation.

106. If you choose to access farms, will you be in contact with law enforcement agencies to gain access?

No, Arrow does not intend to force entry onto properties.

107. What do you mean by your commitment 'you won't go on intensively farmed agricultural land until you can get it right'?

We mean that we will not seek to work on intensively farmed agricultural land until we can repeatedly and consistently manage the issues that might result from working on that type of land. We are drawing a line on the map until we have established how to deal with those issues and can manage impacts on a broad scale.

108. Are you stating that you won't be drilling over the alluvium before 2023?

The commitment we have made is that we won't go on intensively farmed areas until we have satisfactorily addressed concerns.

109. How have you come up with the definition of 'intensively farmed agricultural land'? Is it an Arrow or government term?

It is Arrow's description. The Strategic Cropping Policy (currently under development by the Queensland Government) will feed into it, but right now we are using our eyes and ears to make that decision. We have not done a formal survey yet to establish a 'line' or definite areas, and the map in our presentation is a representation.

110. What is the point of doing exploration wells on intensively farmed agricultural land if you don't plan to go on the land?

We need to explore to improve information on the permeability of the coal seams. This information will guide Arrow on whether it should develop in the areas or not, and could also provide background on the groundwater regime.

Part of what we are talking about today is 'how' we might develop on that land, subject to managing the impacts that people are concerned about. Our challenge over the next couple of years is to figure out how we can develop on that land.

111. What gas exploration will be done on intensively farmed agricultural land? Your map suggests those areas will not be an exploration priority.

There is plenty of exploration area (marked in yellow on map) that comprises scrub or grazing land. Some exploration wells will need to be drilled on intensively farmed agricultural land.

112. You have stated that you do not intend to enter intensively farmed land until issues are properly addressed. I don't think you can address my concern. What will be your response to individual landowners who don't agree with your activities?

The compensation process is voluntary and requires an agreement to proceed. If we found ourselves in the position of having addressed 95% of people's concerns (for example), then we might seek to commence development. We don't have the answers yet, and Arrow's owners are intent on getting answers before we proceed. There will be many more community sessions before we reach the project's financial investment decision (nominally 2013), and then we will have a number of years of operation before we seek entry to intensively farmed areas.

113. You may find that 95% of people still oppose your activities. Then what will you do?

We have a lot of time, and work to be done, before we are in a position to make that decision.

114. The CSG industry will be significant if developed, and we know that CSG in Queensland is a massive resource. We also know that there are four major companies who propose LNG projects. On the balance of probabilities, not all of them will get up. Arrow has come today and made some small commitments. There has certainly been some progress, yet you have talked around intensively farmed land. However, I put to you as a 'big picture' question, why on earth would the communities of Queensland want CSG development to occur on the 1 to 2% of strategic cropping land that we have in the state, when clearly the gas resource is available from other parts of the state? You still want to test drill on intensive cropping land; I say save that money and monitor the Condamine alluvium. You are not being 'fair dinkum'.

We have made a commitment today not to conduct development activity on intensively farmed land until the community concerns that have come out of the conversations we have had with the community are satisfied. This includes pilot wells. That means we will work out those plans before we propose development on that land. However, literature cannot beat hard evidence; and some testing is required on intensively farmed areas so we can satisfactorily answer those questions.

115. What is the depth of the pipeline (or gathering line)? Seven hundred millimetres under the surface is insufficient for blacksoil.

In grazing country, this depth is often around 750mm. In black soil country, there are a number of reasons to install pipes deeper. Firstly, there is the stability of the earth around the pipe. Secondly, there is the safety of the pipe with loads from farm machinery over the top. Thirdly, the depth has to allow for potential cultivation. All of the requirements are more than 700mm.

116. *Comment from the audience at Cecil Plains:* it is heartening to see the research so far from Arrow. This is certainly a change from previous experiences. I acknowledge that CSG could potentially be a good industry. There is lots of concern about our black soil country. By world standards, the quality of our black soil is at the very, very top. My gut feeling is that our prime agricultural land should be left completely alone for the production of food and fibre for generations to come.

117. It is fairly obvious that a large percentage of the people here today are concerned about Arrow undertaking activities on black soil (in Cecil Plains area). Is Arrow experiencing the same level of resistance elsewhere in the project area?

Communities that have a similar make-up have the same types of concerns. There are also areas where people see CSG activities as a useful supplement to farm income.

118. I am an owner of an organic farm. Where would you put a well on a farm like that?

That is a good question. We understand it is not easy and may not be possible. That is why we want to see over the next few years whether it is possible or not. We recognise your concern and we are working hard to see if it is possible.

119. There are properties where both CSG producers and coal miners want entry. You indicated CSG wells are spaced about one well for every 160 acres (one well per square kilometre). I had a coal miner come on and drill 12 holes in 250 acres. Why are boundaries through the middle of a block instead of along road easements? What kind of deals do CSG companies make with the mining companies over tenements?

The tenements for CSG and mining are laid down by the Queensland Government. The boundaries are determined by what the government releases; companies don't have a choice about that or how it relates to the land. This is why coal mining and CSG tenement boundaries cut across the middle of some properties (boundaries relate to latitude and longitude rather than property boundaries).

CSG companies operate under the *Petroleum and Gas (Production and Safety) Act 2004* and the coal miners (and coal gasification companies) operate under the *Mineral Resources Act 1989*. We have to reach a 'coordination agreement' with the coal miners/coal gasification companies where we have an overlap – the coordination agreements are generally about safety. As to the number and spacing of wells, the coal companies in the Surat Basin drill shallow drill holes, while our wells are usually drilled much deeper. In the Surat Basin, we are investigating the Walloon Coal Measures.

120. Do I have a right to refuse access to you? I have been told by mining companies since 2000 that I have no rights?

Arrow prefers access by agreement, and new land access arrangements are coming into place. Entry by force is not the way we want to operate. (Arrow's preference is to develop working relationships with landholders and gain voluntary access agreements which involve fair compensation.)

Mining companies are not required by law to pay compensation for exploration unless asked for by the landholder. However, gas companies have always had, and will continue, to pay compensation for exploration activities.

121. Drilling was carried out in a neighbour's paddock within 100m of his house. He had no say and they used floodlights.

That's not how Arrow wants to operate. We will go as far away from a home as possible and we are committed to doing that. Indirectly impacted landholders will also be considered. We will ensure we meet and discuss with neighbours and bring them up to speed as well.

122. How close can you construct wells to people's residences?

There is a range of criteria that we need to consider. For safety, it can be as close as five metres. However, that is not an acceptable approach. There are also noise and air emission considerations. Around Tipton, that caused a noise complaint because the prevailing winds take noise in the direction of the house. We have fitted lower noise equipment which solved the problem. In that case, the well is about 200m from the house.

123. So you can legally put a well within a few hundred metres of a house?

Legally, yes. However, Arrow has made a commitment that next time we are out here for consultation we will have an absolute answer as to what the minimum distance from residences will be. If a landholder is not supportive of the proposed placement, we would accommodate those concerns.

Additional information: industry has since agreed to a minimum distance of 250m between a residence and a well.

124. A neighbour has three wells and a compressor station near his house.

Noise is associated with generators so we try to position them away from a homestead. Arrow uses hospital grade generators and silencers to produce as little noise as possible. We are very aware of this issue.

125. Why can't Arrow stick to council or railway properties instead of coming onto farming land?

This really depends on what is available. In some areas landholders are quite happy for gas production. The task for us is to understand how we can co-exist with different land uses.

126. On the map (for ATP 683) which shows where you are going to explore, why did you only show a certain number of houses?

We are required to use the map and wording preferred by DEEDI. We sent out a broad map but acknowledge that it was difficult for people to understand the location of activities. In future, we will send additional information and more detailed mapping to relevant people.

127. I have had dealings with Surat Gas Pipeline Pty Ltd, which is a subsidiary of Arrow. I have had discussions with Arrow management about the behaviour of Arrow staff and contractors on my property. I had a case recently where I believe Arrow field staff lied to me about access and vehicles entering my property. I don't believe what you say.

If you have had a bad experience, this is not acceptable; we apologise for that. No-one is pretending that mistakes haven't been made. Arrow is absolutely committed to improving its systems and putting in place rules and regulations to ensure better practice moving forward.

128. Without evaporation ponds, I am concerned about the amount of infrastructure and pipelines now required. With the beneficial use of coal seam water and CSG activities, there will be a greater network of pipelines in the region. Each pipeline will have an easement. The easement allows your people to travel across the properties without any washdown process. This can lead to weed transfer from one property to another, and within properties. There is an uncontrolled movement of traffic.

The decision to beneficially use water rather than construct evaporation ponds does potentially introduce more pipelines. However, the only pipelines that will have easements are high-pressure, buried steel gas pipelines. Gathering lines, which are the majority of the lines, are covered under compensation agreements with landholders. Under those agreements, Arrow will agree access requirements with landholders. We do not expect unfettered access and fully expect that we will be doing vehicle washdowns and managing biological agents. This will be built into the formal agreement between Arrow and landholders.

129. I have a property near Tipton Bridge. How long until drilling occurs here?

We are happy to discuss individual land questions with detailed maps afterwards. We do not currently plan to drill east of the Condamine River near Tipton before 2033.

130. Comment from the audience at Cecil Plains: you have already affected 100% of the resale value of properties.

131. Why do Arrow tenements and areas have different company numbers?

Arrow has acquired a number of its petroleum tenures from smaller companies. There is a range of company names out there for this reason.

132. What is the situation with plugging wells if they are not successful? Can they be converted to water bores?

If we drill an exploration well and we don't want to convert it to a monitoring bore, then we will pour cement down the hole, cut off the cap several feet underground, then rehabilitate the land surface. In terms of converting an exploration well to a water bore, this could be done quite easily a few years ago. The government has changed this now. It can still be done but exploration wells have to be re-certified to comply with water bore drilling standards (despite CSG wells having higher construction criteria). Landholders would also need to apply for a water allocation licence.

133. Would Arrow put in the time to help landholders convert unwanted wells to water bores?

Because of the change in legislation, Arrow hasn't done this to date. If it is doable, we are happy to talk to landholders about it. Importantly, we talk about water matters separately to landholder compensation for CSG activities.

134. I spoke to Blue Energy about converting an exploration well to a water bore and they indicated the well could not be converted because it did not meet the correct design width requirements.

Exploration holes normally have a 4.5 inch diameter, which is industry standard. We understand water bores usually have 6 inch casing? (We would have to confirm that number). Conversion therefore could be a problem. It is a matter that landholders and Arrow would need to discuss upfront; it would be too late once the hole was drilled. If it were a pilot well, safety issues need to be considered such as the flow of gas in the well.

ENVIRONMENT AND WATER

135. How much water per day will be produced from CSG operations?

Wells can vary quite a bit. Water production is greatest at the beginning of the well life, then it tapers off quickly as the water nearest the well is pumped out. Typically there are initially about 1,000 to 1,500 barrels per day before this tapers off quickly to around 300 to 500 barrels per day (one barrel equals approximately 160 litres, so about 160,000 to 240,000 litres per day down to around 48,000 to 80,000 litres per day). Normal production is in the tens of thousands of litres per day.

136. How much water is produced relative to the gas?

In one field, where we are currently selling around 12 terajoules/day of gas, we are producing around two megalitres of water across the whole gas field.

137. How much water does a pilot well program produce?

The amount of water produced is part of the data that we seek to collect from the pilot program. The quantity could initially be in the order of 1,000 barrels per day per well (less than one megalitre per day per pilot), which will taper off quickly.

138. Is CSG around 600m deep (800 to 2,500 feet)?

Yes, it is deep to the west of the project area. On the eastern side, the depth is around 150 to 250m and the western sections are around 650m.

139. What is the shallowest aquifer that Arrow has drilled?

Around 250m.

140. Have you done work to identify the different aquifers and their water quality?

Yes, we have and it will be part of the groundwater assessment study in the EIS.

141. Will the number of wells being drilled in the area make every aquifer the same? Will it cause a mix of the good and bad aquifers?

This is certainly not what we expect to happen. Part of the groundwater management study is to determine the likelihood of this.

142. What about faults? Is there a risk of cross-contamination of the Artesian and the coal seam?

The Surat Basin is generally benign and free of faults compared with the Bowen Basin. However, we take this on board and seek to understand any faults. Part of the EIS is to understand connectivity.

143. Some bores are within the same depth and you will be draining enormous amounts of water from them.

We have information on about 1,900 bores within the area and about 160 wells in the Walloon Coal Measures. These wells have been producing gas since the 1960s. There will be significant impact on those bores, and we will work closely with landholders. Shallower bores should not be significantly affected.

144. Can you personally guarantee that development will not affect drinking water supplies?

We cannot say yes or no until the investigations have been done.

145. How long will it take for the water to move through the different groundwater aquifers? We draw stock water from an aquifer above the coal seam. We want a guarantee that you will not have an impact.

We want to understand the rate of any interconnectivity as soon as we can. Right now, we cannot guarantee there will be no impact, but we take on board your concerns.

146. You are removing significant quantities of groundwater from the coal measures. Will the land sink or collapse when the water is removed?

The coal seams that are being targeted are quite deep. However, we are looking at whether there is potential for subsidence.

Additional information: Arrow is investigating the geomechanical properties of the coal seam, including any shrinking or impacts at the land surface from the removal of gas. The water removed is only a minor part of the whole seam and accounts for about 4% shrinkage; a lot will be absorbed by the overlying layers.

147. Will there be some compensation?

There are *make good* provisions, and we would have to meet these.

- 148. I have heard that the *make good* provisions for groundwater bore impacts don't include water quality.**

The *make good* provisions will address quantity and quality for existing and future bore users.

- 149. You talk about the *make good* obligations, and one of the options is the alternative supply of water. Water entitlements from other aquifers have already reached their limit. What happens if there is no water entitlement to source water from elsewhere? Has Arrow tried to secure water rights from other aquifers in the event they have to *make good*?**

We have not secured water rights elsewhere. We do not have an answer today as to where an alternative water supply could come from. However, we will have that answer by the time we reach the financial investment decision on the project (targeted for 2013). We have started to talk to government about what the alternatives are to the Walloon Coal Measures.

- 150. How many of the Arrow staff present today live in the local area? Arrow, you need to understand how this works. You are operating in our backyards. I have evaporation ponds over the fence, 300m from my house. I have a coal mine that lies along two boundaries of my property. I want to know how this is going to be fixed after you leave. How can you possibly put the land back to the way it was? There are generations to come; how can you possibly *make good*? You are already having a significant impact on the lives of people here. These impacts are already happening.**

Through our decommissioning process, we have to bring the land back as close as possible to its original state before operations commenced. This is a condition placed on us by government. We hope that the gas industry, run properly, can have less impact than mining. That does not answer the personal and emotional issues that you raise; Arrow genuinely wishes to do what it can to minimise impacts. Others in the audience likely want to express the sentiments you have raised. Thank you for being so forthright and sharing these concerns.

- 151. I know of an exploration well that Arrow has put down and it has taken you two years to fix, plug and abandon it.**

Note: Arrow followed up with the attendee with details of the well in question.

- 152. I am worried because the *make good* obligations are going to be impossible for landholders because we will have to prove you are having an impact on our bores. You can say impacts aren't from CSG and then where will we be?**

We don't think it will work that way. Landholders will need to advise the Queensland Water Commission (QWC) or Arrow if there is a material change to the productivity of their bores. Arrow will need to investigate. A lot of information will be known. This will include results of our modelling (and QWC modelling) that will indicate where groundwater impacts may be occurring or are predicted to occur. As part of this process, we would seek details of landholder bores which they usually keep.

- 153. While we could debate the timeframe, there may be a major impact on the Condamine alluvium. What if this aquifer is still affected generations down the track – who is responsible?**

The company will be responsible. If there is a huge financial liability associated with the project, we wouldn't make a decision to proceed.

- 154. What happens if you have impacts on neighbouring bores to those on which you are operating?**

Groundwater monitoring programs must extend outside the immediate area in which we are operating. As far as impacts go, each of the CSG proponents is responsible for preparing underground water impact reports.

Modelling by various proponents will contribute to the government's cumulative groundwater model. The cumulative model will help resolve the issue of multiple companies who may be responsible.

155. There are numerous reports indicating that the Walloon Coal Measures are part of the Great Artesian Basin (GAB). In an earlier conversation, you said that the Walloon Coal Measures were not part of the GAB. We have difficulty believing you are being open and frank. If you have information, then give it to us please.

The Surat Basin is a very large area. Depending upon where you are, the Walloon Coal Measures are not strictly part of the GAB from a geological perspective. We are happy to provide information about the GAB.

Additional information: while the GAB is comprised of the Eromanga, Surat and Carpentaria Basins, and parts of the Bowen and Galilee (including all geological formations in those basins such as the Walloon Coal Measures), Arrow's statements are based on defining the main aquifers of the GAB.

This is also discussed in technical papers published by the Great Artesian Basin Coordinating Committee, found at <http://www.gabcc.org.au/public/content/ViewCategory.aspx?id=41>. Figure 15 of the GAB Resource Study 1 provides background to the Great Artesian Basin and the key GAB aquifer units. These aquifers are the major sandstone units that are porous and permeable, and hold water, whereas the coal measures are confining beds that store but do not transmit significant amounts of water.

The issue of hydraulic connection between sources of groundwater and the main aquifers is a complex hydrogeological matter, subject to the scientific uncertainties that go with trying to understand these processes in both a temporal and spatial sense. We fully understand the importance of demonstrating a clear understanding of the hydrogeology of the GAB as it relates to our proposed project area, and this will form a key part of our studies, and engagement with relevant and concerned groups such as the Basin Sustainability Alliance, as well as government.

156. You have said you will not go on intensively farmed agricultural land for production but what about entry for exploration activities? Why don't you address the GAB and aquifer interconnectivity questions before putting down test wells on intensively farmed agricultural land?

There are a number of exploration stages. We may need to undertake a few exploration wells because we need to determine if there is a gas resource present. We also have to gather data to better understand the groundwater and aquifers, such as alluvial thickness, whether the Walloon Coal Measures is part of the Great Artesian Basin in that location, and what is happening geologically beneath the ground. However, we will not undertake any pilot testing on intensively farmed agricultural land until we understand how to undertake activities to minimise impact on this type of land.

157. The Great Artesian Basin has been in decline since the 1880s. What do you think will happen to the sustainability of farmers if we lose all the water?

We don't know that answer at this time. We need to model, monitor and look for any early signs of impact.

- 158. Under the Great Artesian Basin Resource Plan, water from the Walloon Coal Measures is not available and the aquifer is considered part of the Great Artesian Basin. We are very unhappy that CSG operations are exempt under the plan. The industry is going to suck water out of the aquifer. The only place for that water is back in the ground where it came from. What work is Arrow doing with reinjection? We will only support the CSG industry if it does not have long-term environmental issues.**

Arrow is presently seeking approval to undertake a reinjection trial and is negotiating the conditions for approval with DERM. Arrow would like to see reinjection as part of the solution for managing water. However, there are issues around the timing of reinjection.

Because we have to remove water to depressurise the coal seam and allow gas to flow, we cannot put water back in the Walloon Coal Measures immediately. We would need to consider timing of reinjection and how to store the water in the interim until the aquifer is available. Arrow is also looking at alternative aquifers that we can reinject into permanently. We need to undertake further investigations, and the government is in the process of setting standards.

- 159. As a farmer in the area, I had to shrink our water entitlement. The government says to assume connectivity. What gives you the right to take large quantities of water without long term research? We are considering generational issues, whereas CSG is a 20 to 30 year industry. Where is the compensation for generations down the track? Many irrigators' bores are already losing water. Why drill more?**

As an industry, we don't want to create an impact. We can inform you of the processes that we have in place. We will be undertaking extensive groundwater monitoring of the area. We will be researching interconnectivity, and options for reinjection of water. It is very difficult to do a lot of research without drilling holes to understand the geology.

We are looking in detail at our project and our particular impacts, and we are gathering a variety of information that will be part of the EIS. We have said previously that if significant impacts are shown, we might not develop in some areas. If studies show that the project is not sustainable, then Shell would not develop the area. Shell would not want to create a huge financial burden on the company.

- 160. How can Arrow, in the space of three years (between now and 2013), determine what will happen in the next twenty years?**

We will model the expected behaviour of the aquifers and adapt plans for monitoring accordingly. It is important to ensure we have the appropriate checks and balances in place. We need early detection systems and appropriate response mechanisms.

- 161. We need a licence to take water as do all allocated water users. How is Arrow able to take water if operating under the same rules as landholders?**

The *Petroleum and Gas Act* gives industry the right to take water 'in the process of extracting CSG', and that authority remains in place. To produce gas, we have to remove water. We don't want the water; it already costs us and we don't want more. We operate under the same rules as landholders in terms of water quality.

- 162. The Surat Basin is a huge area and the aquifers are all connected. You are already having an impact, so why have more?**

The monitoring we are undertaking for our existing gas fields has not shown an impact on other aquifers (besides the Walloon Coal Measures) to date. We are doing more studies and monitoring activities to understand the relationship between the aquifers.

163. Is Arrow saying the company has seen no groundwater impacts since production commenced in 2005?

In terms of the results we have, Arrow's current activities have not had an impact as Arrow has not removed enough water. Independent studies by DERM are also showing the same thing. Of course, we need to understand what may happen in the future, hence the monitoring.

164. You stated that should significant damage to the groundwater levels occur, you would shut down wells. What does that mean?

It is very early days for us to know precisely. We are still collecting information for our groundwater model, and we are working with other CSG companies to understand the cumulative impacts on a regional scale.

Companies are providing lots of resources to work with government to make sure that information will be available to the public and that appropriate research is conducted. If there is evidence for potentially significant damage, we would stop dewatering. We fully accept that we need to be cautious in how we move forward, and we need to manage that.

165. How are we supposed to know when you are having a significant impact?

The Queensland Government is putting new processes in place. The QWC will have regulatory responsibilities and will prepare a cumulative model of groundwater across the region. Information will be placed on the QWC website and will be accessible to everyone. Arrow will make information available and will be working with various people to make sure they understand what is going on.

166. While good in principle, I have a lack of confidence in the *make good* provisions for groundwater. The requirement will be to prove the impact is from the CSG industry. Some of the statements in the information you have provided are general and, to me, don't add up. I would like more information.

The information we have provided today is general by intent because it is a framework being finalised by government and industry. It provides an indication of the 'rules' to deal with a case, rather than a specific decision. We haven't yet been faced with a case study where we have had an impact. People concerned that the company is having an impact on their properties have contacted Arrow; some of those properties lie over 20km from where Arrow operates. The onus of proof won't necessarily lie with the landholder. We will be combining our modelling information with information about how your bores are performing. The process we hope to achieve is to work closely together with landholders to monitor and assess supply before any significant impacts. If anyone claims they have less supply, we will have a standard form (which will be produced by the government) requesting information and advice that we need to investigate the case. DERM and the QWC will be involved. Investigation costs are unlikely to be borne by the landholder.

167. You mentioned that you have groundwater monitoring bores in the area, but you haven't yet completed an underground water impact report? What impacts are you having in the aquifers above the coal seams (Walloon Coal Measures)?

Current monitoring is not demonstrating an impact to aquifers above or below the coal seam. The impact is restricted to the Walloon Coal Measures.

168. Has Arrow lodged any underground water impact reports as required under the *Petroleum and Gas Act*?

Arrow has not yet submitted an underground water impact report. We have been working with DERM on this for the last 18 months. The Act states that we must lodge the reports; however, it does not deal with what needs to be included or the process for lodging these reports. The new QWC will have responsibility to regulate reporting in future. We do have information that will feed into the report, and we have to update the government in July as to our progress.

We do report the quantities of water we presently pump to the Department of Employment, Economic Development and Innovation (DEEDI) which they publish. We submit six monthly reports to DEEDI for every well that we have; the reports detail the amount and quality of water we are producing.

169. Did you do any groundwater baseline data collection before you drilled your current wells? Do you know what the groundwater was like before you commenced operations in the area in 2005?

We are going through the process of establishing the baseline now. We have a bore inventory from 2007, and we have historical details from a number of government bores in the area. There is a lot of information out there. We are currently doing more baseline work in areas where we plan to operate and for *make good* provisions around material impacts on landholders.

170. What does the groundwater assessment study mean? When will it be available and what assurances are there that it is independent?

Coffey Environments is the independent sub-consultant conducting the EIS baseline assessment now. We hope to have that information in the public domain during the first half of next year, as part of the EIS. The release of the EIS will be advertised.

171. Do you believe the trigger levels for groundwater drawdown the government has set are sufficient?

We believe the trigger levels are irrelevant. They act as a warning to trigger closer monitoring and consultation with a landholder. Impact could occur prior to, or after, the trigger being reached, depending on the type of aquifer. The CSG industry, in discussions with government, proposed more specific trigger levels on an aquifer-by-aquifer basis. The government did not wish to take that approach. Trigger levels show the potential for impact and highlight the need to monitor; they do not indicate an impact itself.

172. We commend Arrow on its policy of openness and acknowledgement of past wrongs. Does Arrow commit to publicly revealing water reports?

Yes, we will share well data about our water production. We don't think that is private information.

Arrow is working with industry, government and the QWC for online interaction. One avenue through which the public will have access to information is the QWC. We understand they will place reports online. Arrow does not have its own system in place yet but we are committed to making the information available and will speak to individual landholders if our modelling shows there could be an impact on their bores.

173. What is the quality of the water coming up? How transparent is the water quality monitoring process?

Both water levels and water quality are part of the groundwater monitoring process. Arrow is very open about what is contained in the water. It is predominately carbonates and salt. Arrow has already supplied water samples to DERM for testing and is awaiting results.

The CSG production process is not new technology in many respects, and farmers have been pumping from gas seams for hundreds of years. People may have seen the *60 Minutes* report that showed a water bore producing gas. That water bore was taking water from the Walloon Coal Measures, which is the same aquifer Arrow is targeting for gas; and the quality of the water is the same. Essentially, the water bore had pumped water for long enough that it had started to produce gas.

174. The farmer on that program (60 Minutes) was getting more gas than water from his bore. How will Arrow make good?

That farmer's bore is on Arrow's petroleum tenure, but it is about 20km from our nearest well. We have visited that bore. It is essentially a gas well; the owner has drilled a water bore into a gas seam. The bore is cased but not cemented. Like normal farm bores, it doesn't have a wellhead. However, because the farmer has been using it for some time, he has drawn enough water out of the bore to create a gas well. It is exactly the same principle we use. Gas has been coming out of water bores prior to the CSG industry. That bore is about 180m deep, which is the same level as the shallow Walloon Coal Measures.

175. We have concerns about changes in water quality long term. Is the water tested initially and monitored? Are there baseline studies?

Yes, this forms part of the EIS and technical studies are carried out on surface and groundwater quality. With respect to making water test results available to landholders, that can be done.

176. We are pleased to hear that the government supports reinjection trials and the setting of standards. That is a positive step for the industry.

We share your concerns and we would like to see this move forward quickly.

177. How is monitoring of reinjection conducted? Who regulates the monitoring process?

When we apply to undertake reinjection, we provide information about the water quality and the aquifers themselves to the Queensland Government. There will be reporting requirements. The government is still resourcing up so that it can audit and monitor performance.

178. How will the community know if the water being reinjected is contaminated or not?

Generally, untreated coal seam water will be salty but not contaminated. If the water is treated, any salt or contaminants will be removed before reinjection.

179. How can you reinject water if you propose to use the water for irrigation?

There are timing restrictions around reinjection. We can't inject water back into the coal seam while we are trying to produce gas from it. Across our petroleum tenures, there are aquifers both above and below the Walloon Coal Measures. The government has a preference for us to reinject into the alluvium. We are scoping out what good receiving aquifers might be (other than the Walloon Coal Measures). Reinjection would be an alternative to irrigation for that particular water.

180. You spoke about reinjection, and that coal seam water quality is typically around five thousand to eight thousand parts per million (ppm) of salt per megalitre of water. Where would you reinject the water?

We don't currently have a target reservoir that could take that quality water. For any aquifer, the water will probably need to be cleaned up through reverse osmosis treatment beforehand. We are working with government and industry to produce guidelines and standards for reinjection. Any aquifer we reinject would need to have poorer quality water than the coal seam water. We need to do more exploration work to find aquifers that might be suitable. We haven't found one yet.

181. What is the cost balance between reinjection and irrigation?

Reinjection of treated water is very expensive (it requires water treatment and high energy intensive costs). Hence, reinjection of untreated water is the preferred option economically. Current government thinking is not to allow reinjection without treatment. As mentioned, there are challenges with the timeframe and storage for reinjection. The same can be said for salt reinjection.

182. What will Arrow do to make the water suitable for irrigation purposes? I understand that the water quality that comes from reverse osmosis treatment is quite pure and not suitable for water supply, river systems and irrigation?

Yes, this water is very pure. For the Arrow irrigation project, we have been investigating various soil types and looking at various additives for the water to ensure its sustainable use. We want to do the irrigation trial in order to show how the coal seam water will perform over time.

183. How long will it be before you can trial coal seam water for irrigation on Arrow land?

We have submitted our development plans to DEEDI (farm plan, monitoring plan, etc). Hopefully, in three to six months we will have approval to begin the irrigation trial.

184. The recent conditions of the Santos EIS concluded that treated water could not be used for beneficial use on good quality agricultural land.

Regarding beneficial use approvals, the government has developed a draft 'general' beneficial use approval document during the past 15 months; however, the conditions of the draft keep changing. If a company seeks a general beneficial use approval, it will have to satisfy this set of conditions. That does not prevent any company applying for a specific beneficial use approval; however, the company will need to understand the impacts of the alternative proposed use.

185. Quite some time ago, the Queensland Government was considering supplying recycled water to irrigators but this did not go ahead. How will the CSG industry be any different?

Changes to the *Water Act 2000* will be introduced around August 2010. The Queensland Government is also looking to change the approvals around treated water and discharge into waterways in order to make the requirements similar to those for water treatment processes. The regulatory framework around supply of CSG water for beneficial use is still being developed.

186. Underground water in the Lockyer Valley is exhausted. What is to say that won't happen here if vast amounts of water are pumped out? Some parts of the state are desperate for water.

We are required to find beneficial uses for coal seam water. We know water is an issue and work is being done to address this.

187. You have indicated that you will not have surface dams on black soil; this is basically Chinchilla to Dalby on the north of the Warrego Highway and on the north side of the river. If you do not have dams, how will you transport the water?

During the EIS process and over the next three years, Arrow will find answers to water transportation which are acceptable to the community.

188. You have stated that you will not be using evaporation ponds but aren't these already in use at Grassdale?

In the early days of the CSG industry, we were allowed to use evaporation ponds. There are two evaporation ponds at Tipton (near the Grassdale feedlot), and one at Kogan.

We have converted the Daandine evaporation pond into the new Daandine water treatment scheme. We are currently undertaking an evaluation process to decide what to do with the dams at the Tipton field. A lot of water produced at Tipton goes to beneficial use (Grassdale feedlot) while the remainder currently goes to evaporation.

We have a small reverse osmosis (RO) plant up north in the Tipton field and we are trialling treatment technology and seek to establish an irrigation trial there. By July next year (2011), we must roll out a program of work to convert the remaining evaporation ponds.

189. Do the evaporation dams at Grassdale still have sprinklers?

Sprinklers to enhance evaporation were being trialled at the Grassdale pilot; however, they are no longer being used. There were a number of technical problems such as salt in the mist and they were not considered suitable. Tipton currently has no enhanced evaporation systems and is purely passive solar evaporation.

190. You said that storage dams will be lined but they are still open at the top. Whether something is an 'evaporation pond' or a 'treatment dam' is just semantics.

All dams will experience some degree of evaporation unless covered. Under new government policy, dams can no longer be constructed as evaporation ponds for the primary purpose of disposal. New legislation will mean we cannot sit water in a dam for more than 12 months.

The policy intent is not for nil evaporation, but rather to avoid having evaporation ponds concentrating salt over long periods of time. Arrow will and has used water held in storage dams for beneficial use.

191. Who provides third party quality assurance monitoring of Arrow's dams?

We presently use an engineering firm from Toowoomba, Stafford Adamson, to audit dam stability. In the past, Arrow has had various firms involved in water monitoring (e.g. AECOM and Golders).

192. What provisions will Arrow put in place to protect brine dams in the event of a major flood?

Our dams need to be designed to withstand flood events. Dams must be third party certified.

193. You mentioned the potential of discharging water in a flood event?

We believe it is very unlikely that we would need to discharge water in a flood event. However, we need to environmentally assess this option for emergency circumstances and address the requirements with the regulator. We are talking about treated water only. For us, emergency

release is a way to balance water should extreme weather make it impossible for us to irrigate and yet for dam integrity we need to release water. We would only release water when the system is already flooding which would further dilute the released water. We also need an additional licence under the *Water Safety (Reliability and Supply) Act 2008*, and thorough investigation into the environmental impacts on stream water quality and supply.

194. What about structures that might affect overland flow?

We have to take these factors into account for any facilities we build, particularly dams. We have to perform a flood analysis that is incorporated into our planning.

195. Where will the salt end up? Does Arrow have any contracts for this?

As a base case, Arrow is committed to removing the salt to a regulated landfill site for waste that needs to be fully contained. The salt will be pumped off the land and onto trucks for transportation.

Arrow currently does not have agreements with anyone for the salt but we are looking into this. We also don't think that landfill is the only option and we are investigating other options such as crystallisation where there is a ready market.

196. Who will regulate water matters, the state or federal government? The Condamine alluvium is part of the Murray Darling Basin and measures being taken to address salt issues at the other end will be affected by what we do this end.

The state government has to account for any salt inputs to the Murray-Darling system. The state has an obligation to pay compensation to other downstream stakeholders they affect. The federal government does not directly regulate this process, but the Queensland Government does provide water reports to the federal government

197. *Comment from the audience at Dalby session 1:* I would like to offer some feedback to Arrow. I attended the November 2009 consultation session in Chinchilla. There was a great deal of concern at the meeting. I felt that the record of the meeting that was sent out later was not representative of the level of angst, scepticism and concern of the community towards Arrow and the project. You tell us that each megalitre of water will produce five to eight million tonnes of salt; that amounts to several million tonnes of salt. You are asking for a hell of a lot of community faith. You tell us you are not going to frac at all within the Surat Gas Project area. That is a good thing; it will help ease some of the community concerns. Arrow has an enormous challenge ahead of it. The company has very low public credibility in the region and Arrow has brought that upon itself.

198. It's difficult to find proper scientific work done on the basins or, for example, data on existing water tables. Shouldn't this be understood first? While I acknowledge there are differences between Australia and the USA, Pennsylvania has had many legal problems over oil and CSG operations. Where is the peer-reviewed scientific evidence?

This is a fair comment. We don't have all the answers; however, the Queensland Government and companies are establishing the proper regime. We are seeking to involve people on the land. We can't wait for a major impact. If there is potential for a significant impact, we will alter or cease operations.

199. Look at the situation in the Caribbean with BP. It is a much larger company than Arrow, and it can't cap a well! We need to get the science right before people go mucking about. This is new technology, certainly for this area's geology and infrastructure. This area depends on underground water and we need serious scientific

evidence. The Queensland Government doesn't have the runs on the board to deal with a significant environmental disaster.

The project timeline has slowed down dramatically. Arrow will have more time to address these concerns.

200. You are not 100% sure of the impacts. How can you think to do a project that will have a long-term impact on the community in 50 years? You should not go ahead with something as important as this if you do not understand the impacts.

By the end of 2012, we aim to reach a major investment decision point. What happens at that decision point depends on the work we do in the next few years. We have time to understand those things better.

201. We all know that the government sets the rules but doesn't necessarily ensure solutions. The environmental impacts (from the CSG industry) could be bigger than the Murray-Darling problem. There needs to be more control. Your statement about having Shell as an umbrella doesn't give comfort.

Shell needs to make sure it gets the upstream business right so it can supply LNG. Shell is a company with a long-term outlook.

202. *Comment from the audience at Cecil Plains session:* We don't want a lasting impact on water. Take it slowly and work out what will happen to the water. It could take hundreds of years to replenish the water. I would like to raise a point that is attached to this whole debate. Our comments are not a personal attack on Arrow staff. We have a point of difference with the job description that you have. We have a possibly larger issue with your Queensland Government business partner. It is your proposition to extract the gas. The Queensland Government provides you with the framework to do the activities. Our comments need to be equally directed toward the government in Brisbane.

Appendix 13

Advertisement - Phase 2



FIND OUT MORE ABOUT THE SURAT GAS PROJECT

Arrow Energy invites you to attend a **community information session** about its plans for a coal seam gas exploration and development project in the Surat Basin. We're holding a series of informal drop in sessions to update the community on the project and work to date on the Environmental Impact Statement (EIS). You are welcome to drop in any time, receive and view information materials about the project, and talk one-on-one with the project team.

Sessions in your area include:

Chinchilla	Tuesday 15 June 2010: 2pm – 7pm, RSL Sub Branch, Heeney Street
Wandoan	Wednesday 16 June 2010: 11am – 2pm, Community & Cultural Centre, 6 Henderson Street
Miles	Wednesday 16 June 2010: 11am – 2pm, Leichhardt Centre, Columboola Function Room Cnr Marian and Dawson Streets
Dalby	Thursday 17 June 2010: 10am - 4pm, Showground Pavilion, Nicholson Street Monday 21 June 2010: 1pm - 5pm, Showground Pavilion, Nicholson Street
Millmerran	Friday 18 June 2010: 10am – 2pm, Community & Cultural Centre, Walpole Street
Cecil Plains	Tuesday 22 June 2010: 10am - 3pm, Cecil Plains Hall, Geraghty Street
Goondiwindi	Wednesday 23 June 2010: 9am -12pm, Conference Room - Goondiwindi Training and Technology Centre, 15 – 21 Russell Street

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Also visit arrowenergy.com.au



Appendix 14

Poster - Phase 2



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Appendix 15

Information sheets - Phase 2



ARROW ENERGY

WATER AND SALT MANAGEMENT

JUNE 2010

Arrow Energy is a leading Australian producer of coal seam gas (CSG); it is currently planning some of its largest gas exploration and development programs in Queensland.

Responsible management of water and salt associated with CSG production is one of the most significant challenges currently facing the industry.

This Information Sheet details Arrow's commitment to the responsible management of water and salt in its operations and ways the company is investigating water and salt issues.

COAL SEAM GAS EXTRACTION PROCESS

Coal seams are like sponges that store both gas and water. The gas occurs naturally as a by-product of coal formation, and is held in place within the coal seam by the pressure of water, also present in the seam. The water pressure is created because of the depths at which coal seams occur. If this pressure is reduced, then the gas is gradually released.

The gas wells drilled by Arrow use proven construction procedures and processes, and qualified and experienced personnel. They are conducted within strict regulatory and environmental management measures. The fundamental aim of the process is to ensure that the gas well is totally isolated and secure from overlying strata and aquifers, and that no water or gas can either enter or escape from the well. The design and operation of the wells are such that coal seam water and gas are separated at the coal seam level and are contained throughout the extraction process.

Well construction is a staged process:

- 1) drilling through surface soil and alluvium to firm ground, with careful placement of steel casing and cement lining over this entire depth to isolate the well from overlying aquifers
- 2) deepening the well to fresh hard rock and inserting further steel casing and cement lining of a narrower diameter than the first

- 3) further drilling to the coal seam, placing steel casing and cement lining to the top of the coal seam.

The section through the target coal seam is cased with perforated steel to allow gas and water flow. In some cases there may be a need to stimulate the coal seam to enhance the flow of gas (see 'Fracking' Information Sheet).

Once the drilling process is complete a submersible pump and pump string are installed and water is pumped from the coal seam. The water is brought to the surface via the pump string and the gas is allowed to flow up in the space between the pump string and the casing, so the gas and water are separated at the coal seam level. At surface, the gas and water are then transported to central facilities via separate buried pipelines.

Water released from the coal is called associated water or coal seam water. It is generally brackish to salty, or about one-sixth the concentration of sea water. This is caused by various minerals dissolving into the water over time.

The volume and quality of coal seam water vary between and across different coal basins and over the life of an individual well.

COAL SEAM WATER MANAGEMENT

Queensland Government policy requires that all coal seam water be treated if it cannot be directly reinjected back into the ground or used in its untreated form for environmentally-acceptable beneficial uses.

Historically, coal seam water has been stored in evaporation dams. However, the use of dams as the primary means of disposal is no longer preferred industry practice and steps are underway to integrate older dams into water management systems, including treatment and beneficial use.

WATER USE OPTIONS

The following water use options are being considered by Arrow as part of the coal seam water management strategy:

- > **power station cooling water:** using untreated coal seam water for electric generation cooling processes
- > **coal washing:** using untreated coal seam water to wash coal in mines, such as Wilkie Creek Mine
- > **feedlots:** using untreated coal seam water and treated water (to maximise consumption) for watering stock, such as the Grassdale Cattle Feedlot
- > **urban use:** possible supplementation of drinking water supplies to local towns using treated water
- > **irrigation:** using treated coal seam water to irrigate crops, such as an 80ha plantation of broadleaf crops at Theten
- > **creek discharge:** discharging treated water to natural waterways under licence
- > **reinjection:** reinjecting treated water or untreated coal seam water into aquifers including coal seams drained of gas.

WATER TREATMENT

The CSG industry is intensively examining water treatment processes.

Arrow currently treats coal seam water through a process of micro filtration and reverse osmosis. During filtration the water passes through very fine filters that remove sediment and organic matter. During reverse osmosis an even finer filter removes salts.

Arrow initially installed trial reverse osmosis plants at Daandine and Glenelg in the Surat Basin. The experience of operating these plants allows Arrow to employ this technology on a greater scale.

Arrow is continuing investigations of long-term industry-wide solutions and alternative technologies for efficient water treatment capacity.

SALT MANAGEMENT

An average of 5-8 tonnes (5000-8000kg) of salt are expected to be produced for each megalitre (1 million litres) of coal seam water. The amount of salt is dependent on the location and age of the coal seam.

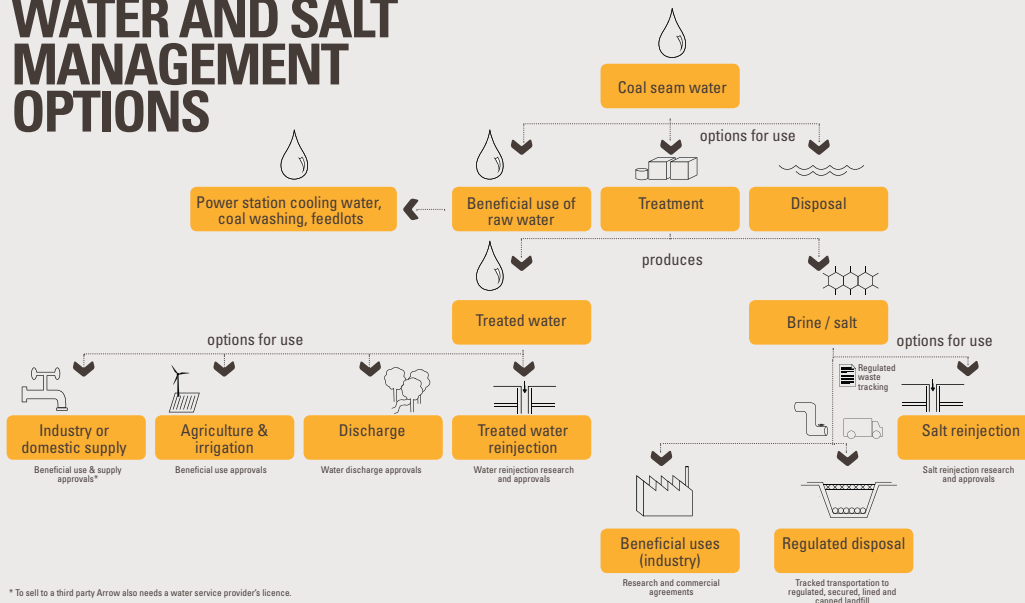
Arrow is committed to the removal of produced salt from the local landscape. Arrow's preference is to identify a beneficial use for the salt produced from its operations and is currently investigating:

- > crystallisation for use in industrial processes
- > use of brine in the chemicals industry.

As a minimum standard, Arrow will remove the salt it produces and dispose of it in an approved and regulated landfill outside the operational area.

Arrow is investigating other disposal options for produced salt including reinjection into poorer quality aquifers.

WATER AND SALT MANAGEMENT OPTIONS



* To sell to a third party Arrow also needs a water service provider's licence.



REGULATION OF COAL SEAM WATER

The Department of Environment and Resource Management (DERM) implements regulations and guidelines for all aspects of CSG environmental management, including water and salt management.

These include:

- **dams:** dam design guidelines, leak detection and third party dam audit requirements for dam design, construction, and management
- **groundwater:** modelling, monitoring, quality, trigger level thresholds, reporting and regional groundwater modelling requirements to protect bore owners' water supplies
- **water quality:** guidelines and minimum standards on water quality for water use or discharge
- **beneficial use:** beneficial use approvals are required for CSG companies to use treated or untreated water; companies may also need water supply licences to provide water to third parties.



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FREQUENTLY ASKED QUESTIONS ABOUT WATER AND SALT

Can temporary CSG exploration dams be converted into permanent dams for landholders?

It is possible to convert exploration dams into permanent dams on a case-by-case basis. Arrow is required to obtain approval from the government to hand over a dam to a landholder to operate. The landholder would be responsible for any other regulatory approvals relating to water entitlements.

Can the CSG well drilling process result in contamination of aquifers?

The petroleum legislation imposes strict standards for drilling oil and gas wells in order to minimise the risk of contaminating aquifers. The standards require CSG wells to be cased with steel which is held in place by cement. The well is drilled, casing is inserted into the well, then concrete is pumped into the centre of the well and extruded up the outside of the casing to fill the space between the casing and the strata all the way to the surface.

Does casing really seal upper aquifers?

CSG well casing is specifically designed and installed to prevent aquifers mixing. The careful design and placement of casing are fundamental to the success and efficiency of CSG wells. Government regulations have specific design and installation requirements for CSG well casing.

How long does CSG well casing maintain its integrity?

CSG wells are designed and installed for a life of at least 20 to 25 years. Wells are a sealed system with only the outside of the top of the steel casing exposed to the air; otherwise the subsurface, encased in cement in a non oxidising environment, is not vulnerable to rust.

When production has ceased the well casing is plugged with cement. The top few metres of the solid casing is cut off and backfilled with soil to allow the well site to integrate with surrounding land use.

ARROW ENERGY

FRACGING

JUNE 2010

Arrow Energy is a leading Australian producer of coal seam gas (CSG) and is currently planning a major gas exploration and development program in Queensland.

This Information Sheet provides general information about the safe fracking process used by Arrow in Australia. Arrow does not currently use fracking in the Surat Basin.

WHAT IS FRACGING?

Fracging is a safe and environmentally responsible process used in areas where the character of a coal seam impedes gas flowing readily into a gas well. In these areas, the coal may need to be stimulated to enhance the flow of gas.

Fracging (also known as hydro-fracture) is the most common method used to increase the permeability of the coal seam.

In fracging, a fluid comprising 99.5 percent water and sand (0.5 percent of other additives, as outlined below) is pumped at high pressure down the cased well and into the coal seam. This creates fractures in the coal seam up to 100 metres or so around the well, which are then held open by sand.

The decision to frac a well is made before drilling commences because the process requires additional considerations in well design and construction procedures. The well must be fully cased from top to bottom and then the casing is perforated at specific intervals where the frac is to be conducted. Once the perforation is complete, the fracging process is conducted.

Fluids used during fracging are flushed from the coal seam and pumped to lined containment pits or tanks. From here they are taken for disposal at an appropriate off-site location.

Fracging operations are undertaken on the ground surface within the existing drilling footprint. In sensitive areas, pitless drilling techniques can be used.

The fracged zones are designed and controlled so they are limited to coal seams and do not extend either above or below the targeted seam. Arrow is trialling microseismic technology which provides a close-up view of the fracture while it is occurring. This allows improved monitoring of the location of the fracging.

Fracging is used only where there is significant ground pressure, it is not conducted at coal seam depths less than about 300 metres.

Fracging is a long established and widely used practice in the oil and gas industry. The process has attracted some media coverage in the USA where extensive programs of fracging for shale gas, not CSG, are underway and different chemical methods are being trialled by industry.

FRACGING IN THE SURAT BASIN

Not all gas wells require fracging. Generally only wells that intersect low permeability coal seams require fracging and these are usually very deep. Since most of Arrow's tenements in the Surat Basin cover areas where the coal is relatively shallow (down to 600 metres), Arrow has not used fracging in any wells in the Surat Basin. However it is possible that in some deeper portions of the Surat Basin, where coal seams are below about 600 metres, it may be necessary to use fracging in the future.

FRACGING FLUIDS

About 99.5 percent of the material pumped into a frac well comprises water and sand. The remaining 0.5 percent is made up of minor quantities of additives used to:

- › enhance fracture initiation
- › help lubricate the flow of the sand into the fractures
- › prevent microbial or chemical reactions following introduction of surface water
- › prevent formation of scale deposits that may affect the well or pumps.

Different additives may be used in different wells depending on the local conditions. In general, the additives used in fracging fluids are made of substances in common use, including those found in many household products.

The products which make up approximately 0.5 percent of Arrow's fracging fluid are:

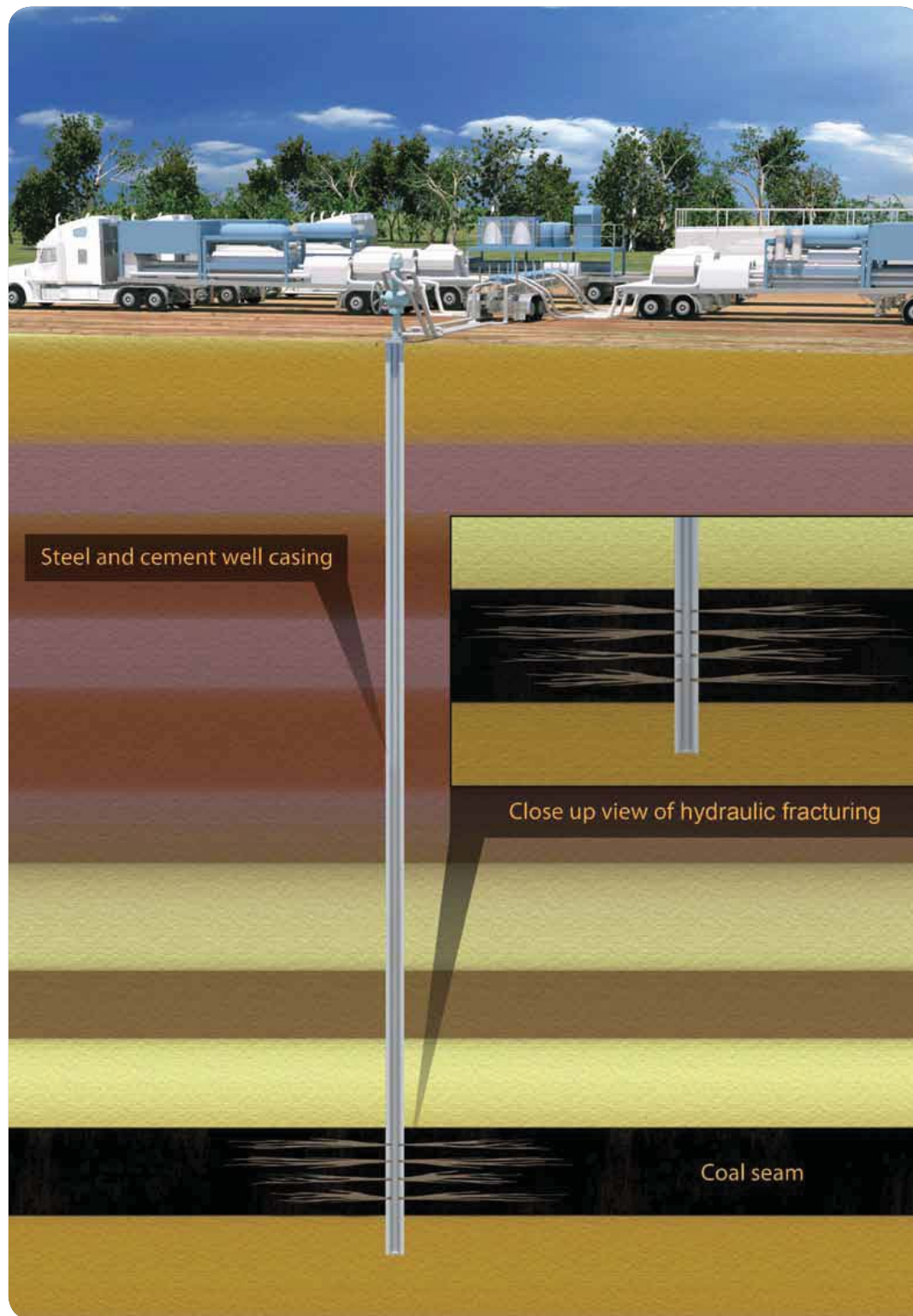
- › acetic acid, food grade (the basis of vinegar, also used in herbicides)
- › glutaraldehyde (used to disinfect medical and dental equipment)
- › surfactants (used in soaps and toothpaste)
- › cellulose (used in wallpaper paste and paper)
- › bactericides (to inhibit the formation of bacteria that may corrode steel and cement well casing, also used in agricultural treatment of crops)
- › guar gum (from the guar bean, vegetable gum used in ice cream, also fed to cattle).

Like many common household products, these additives require careful use, and are toxic only in highly concentrated forms. However the additives used in fracging fluids are heavily diluted and present minimal risk. All additives used for fracging are handled in accordance with the appropriate legislation covering health, safety and environmental management.

Arrow does not use chemicals during fracging that contain:

- › naphthalene
- › benzene
- › phenanthrenes.

Arrow uses fracging because it believes that the safety, technical and environmental controls applied ensures this is a safe and environmentally benign technique. Work is ongoing, within Arrow and the gas industry in general, to improve the fracging technique, particularly in relation to the chemicals used.



FRACING AND GROUNDWATER

Fracing is specifically designed and executed to create fractures in a target coal seam. Coal seams typically comprise weak and brittle strata that readily fracture in comparison to the rock layers above and below the coal seam. This contrast in strength properties, together with the precise positioning of fracing perforations made in the gas well casing, ensure that fracturing is confined to the coal seam. CSG wells are fully lined with steel casing, which is securely cemented in place to isolate all aquifers overlying the target coal seam.

Before fracing is conducted, Arrow confirms (via a cement bond log) the integrity of the cement bond between the casing and rock. This ensures there is no leakage of high pressure fracture fluids.

The extent of fracturing can be accurately measured at the time of fracing via microseismic monitoring. To do this, highly sensitive geophones placed at ground surface detect the fracturing as it progresses through the coal seam.

The water and additives injected into the coal seam (the fracing fluids) are flushed from the coal seam soon after fracing operations are completed. These fluids are brought to the surface inside the steel casing, so they are isolated from overlying strata and aquifers. Consequently the frac fluids are not able to mix with groundwater.



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SURAT GAS PROJECT

Employment and business

Surat Gas Project Employment opportunities

- Expressions of interest** – interested job seekers are able to register their interest for employment opportunities with Arrow and provide resume details on the company's website at: arrowenergy.com.au, under 'Careers' link. When a job is advertised on our site that matches your job alert profile, you will be notified via email.
- Recruitment websites** – Arrow vacancies are advertised on www.seek.com.au and www.careerone.com.au and arrow.com.au
- Local advertising** – some field-based jobs are advertised in local newspapers.

Surat Gas Project Business opportunities

- Business vendor register** – interested suppliers, subcontractors or service providers are invited to register their interest and provide detailed company profiles by obtaining a Vendor Approval and Evaluation Form from the company's website at: arrowenergy.com.au under 'Contact_Us' and 'Supply_Enquiries' Link.

Arrow will supply successful construction contractors with details of prequalified Australian and local area suppliers, subcontractors or service providers on the Arrow business vendor register.

- Industry Capability Network Queensland** – assists Australian businesses to maximise opportunities that arise from purchasing requirements from both Government and private sectors, particularly in major project infrastructure and industrial projects. ICN Queensland allows businesses to register their services. Arrow refers to the ICN database for potential suppliers in the area. Further information is available at: www.icnqld.org.au
- Specific local area business assistance** – during the detailed planning phase of the Surat Gas Project Arrow's supply department will proactively engage with the local business community to ensure opportunities to supply goods and services are effectively communicated to the local business communities.

Arrow's supply department will also organise specific information sessions to inform the local business community details required to complete tender requirements such as safety management and quality management plans, insurances and demonstration of capacity.

How can I find out more?

Freecall number: 1800 038 856
Email: suratgas@arrowenergy.com.au
Website: arrowenergy.com.au

GET INVOLVED IN THE SURAT GAS PROJECT

Environmental Impact Statement

Arrow Energy is planning gas exploration and development in the Surat Basin. Areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration and/or production activities.

Arrow is preparing an Environmental Impact Statement (EIS) for the project. The EIS will examine environmental, economic and social issues, as well as potential impacts and benefits associated with the project. Public input is an important part of the EIS and Arrow encourages you to have your say.

General feedback and questions

Arrow encourages queries, feedback and public input into the project at any stage; this can be done via the freecall number, email or post.

Freecall 1800 038 856

Email suratgas@arrowenergy.com.au

Post Surat Gas Project Reply Paid 81 Hamilton QLD 4007

Website arrowenergy.com.au

The EIS approval process is managed by the Queensland Department of Environment and Resource Management (DERM). To find out more about DERM's Surat Gas Project EIS process and the Terms of Reference for the project visit:

Website www.derm.qld.gov.au/environmental_management/impact_assessment/eis-processes/surat-gas-project.html

Feedback on the EIS

Once Arrow has completed its investigations, a draft copy of the EIS will be on display for public input. DERM and Arrow will notify the community of when and where the draft EIS is on display and how you can obtain a copy.

Formal submissions on the draft EIS may then be made to DERM as coordinator of the project's approvals process.



Appendix 16

Banners - Phase 2



INVESTING IN OUR SHARED FUTURE



Proud supporter of C&K Kindergartens in Dalby since 2007

Arrow Energy's community investment program *Brighter Futures* is enhancing the quality of life for people in our host communities.

www.arrowenergy.com.au/community



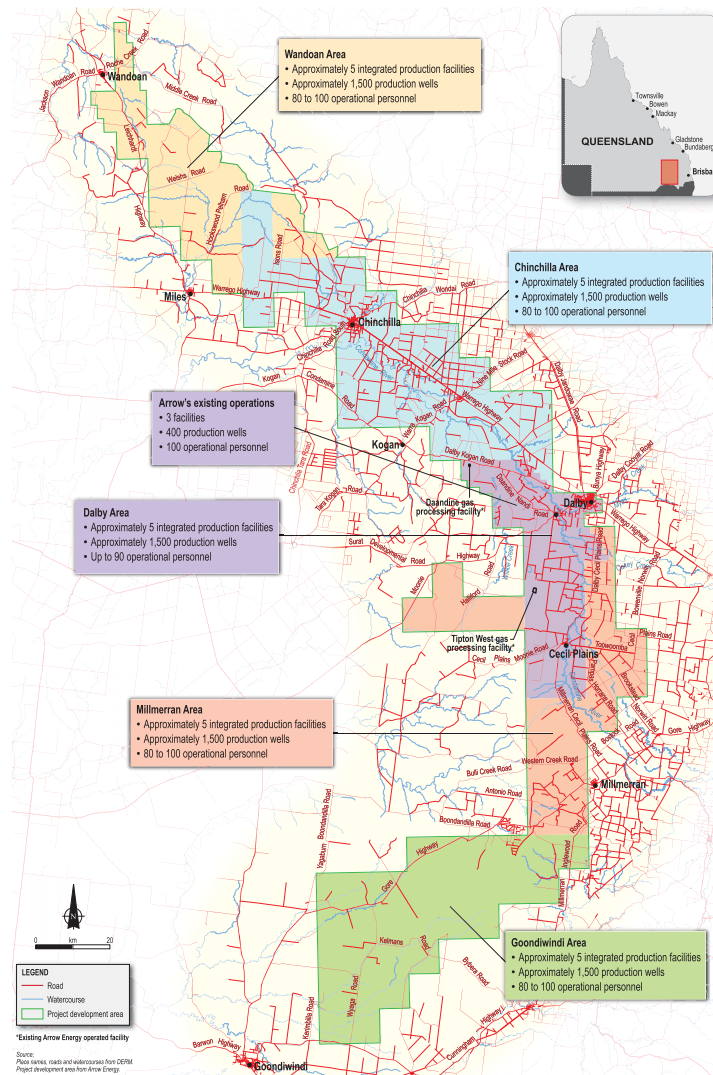
THE SURAT GAS PROJECT

Arrow Energy is planning a gas exploration and development program in the Surat Basin called the Surat Gas Project. Conceptually, the project will involve five "resource areas" around Wandoan, Chinchilla, Dalby, Millmerran and Goondiwindi. Each resource area will include ongoing gas exploration and the development of approximately 1,500 production wells and 5 integrated production facilities. An integrated production facility may include a combination of the following:

- › gas compression facility
- › power generation facility
- › water treatment and storage facilities.

Arrow's existing operations in the Dalby resource area consist of 3 facilities and approximately 400 production wells.

Arrow expects the Surat Gas Project development will be staged and conducted progressively across the resource areas. The rate and extent of development will be determined by information gained from Arrow's ongoing exploration program and the level of demand in domestic and export gas markets.



WHAT IS AN ENVIRONMENTAL IMPACT STATEMENT?

Environmental Impact Statements (EIS) are prepared for major development projects, such as Arrow Energy's coal seam gas developments. An EIS assesses the environmental, social and economic impacts of the proposed activities.

Prior to Government issuing approval for major development projects, regulatory authorities must be satisfied that the potential impacts of these projects have been properly assessed and that appropriate measures are in place to avoid or minimise environmental, social and economic impacts. Preparing an EIS is generally considered the most appropriate assessment method.

Arrow's activities are governed by the 'Queensland Petroleum & Gas (Production and Safety) Act 2004' and the 'Environmental Protection Act 1994'. The Commonwealth's 'Environment Protection and Biodiversity Conservation Act 1999' also requires Arrow to demonstrate that activities will not significantly affect matters of national environmental significance.

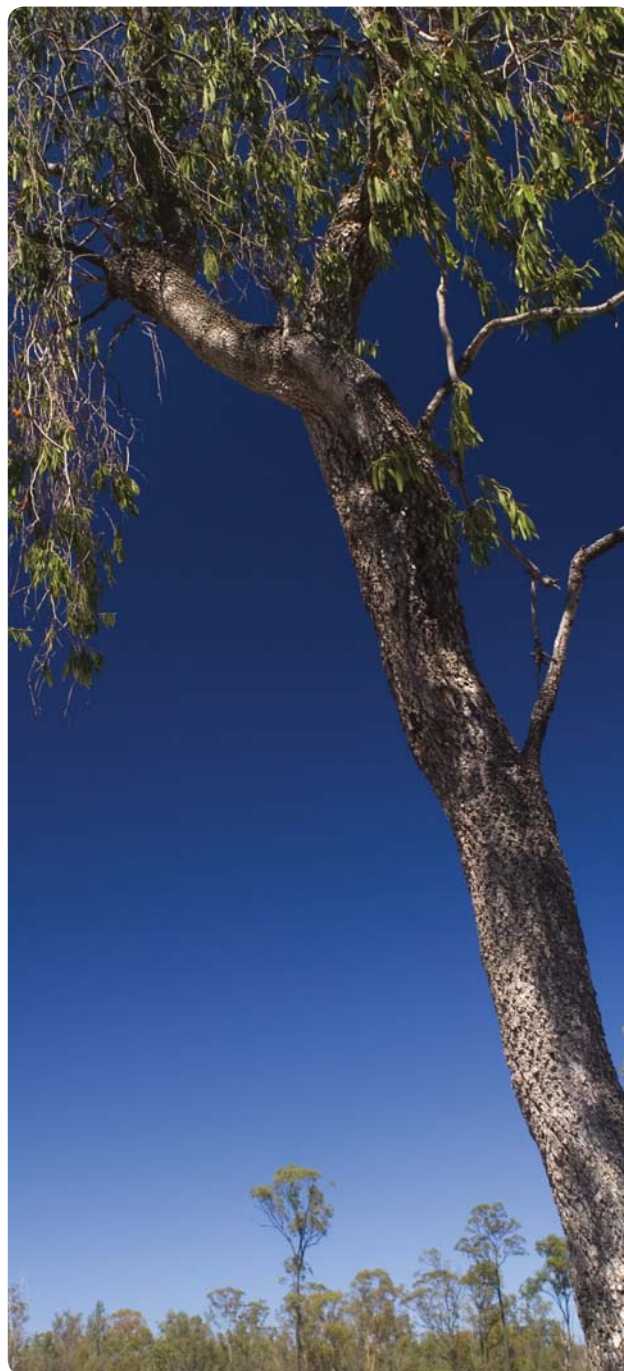
An EIS will:

- › identify potential adverse and beneficial impacts of a project
- › ensure Arrow finds practical and workable solutions to protect environmental, social and economic values that may be affected by a project
- › identify environmental management measures for a project
- › ensure community and stakeholder issues are taken in account in the EIS assessment process.

An EIS will also identify ways to mitigate or minimise some impacts and maximise benefits for both the community and environment.

A wide range of environmental, social and economic studies will be conducted for an EIS including:

- › social and economic impacts on local communities and the region
- › flora and fauna
- › river and stream health
- › water and groundwater management
- › cumulative impacts of projects on the region (including gas and energy projects)
- › traffic and road conditions
- › historic places or items that hold heritage significance.



EIS STUDIES

Environmental and social studies

Agricultural impact management
Air quality
Aquatic ecology
Economic
Greenhouse gas emissions
Groundwater
Indigenous cultural heritage
Local planning policies
Noise
Non-Indigenous cultural heritage
Preliminary hazard and risk
Road traffic
Social
Soils and geomorphology
Surface water geomorphology and hydrology
Surface water quality
Terrestrial ecology
Visual and landscape.

Desktop assessment



Field investigations and consultation



Modelling and impact assessment



Conclusions and recommendations

Scope of studies

Identify relevant policies, legislation and standards

Identify environmental values

Review proposed activities and determine potential impacts on environmental values

Recommend mitigation measures to minimise potential impacts

Identify residual impacts.

The recommendations of our EIS studies will be implemented through an environment management plan (EMP)

Site selection process

Study results will assist Arrow to develop high level mapping to ensure infrastructure is located with minimal impact on the community and environment.

The site selection procedures will enable identification of:

- › highly sensitive areas that should be avoided where possible
- › areas of low impact
- › the level of additional environmental protection required for each of the above areas.

Environmental management procedures

Study recommendations will inform how we manage our potential impacts on the environment. In some cases, very strict procedures will be applied to some sites.

Environmental management considerations during development include:

- › cultural heritage
- › hazardous materials
- › noise management
- › traffic and transport
- › waste
- › weeds and pathogens
- › wildlife and stock.

TRAFFIC AND ROADS

Arrow Energy's Surat Gas Environmental Impact Statement (EIS) includes a traffic study to examine potential impacts on:

- › road networks: intersection geometry and control, road links and road hierarchy
- › infrastructure: road surfaces, bridges and cattle grids
- › safety: intersections, school bus routes, rail crossings, traffic composition and vehicle mix, and driver fatigue.

Key project access roads classified significant include:

- › Leichhardt Highway from Wandoan to Miles
- › Warrego Highway from Miles to Warra
- › Moonie Highway near Dalby
- › Dalby Cecil Plains Road
- › Millmerran Cecil Plains Road
- › Gore Highway near Millmerran and Goondiwindi.

The traffic study will inform project design and field management activities to minimise traffic impacts.

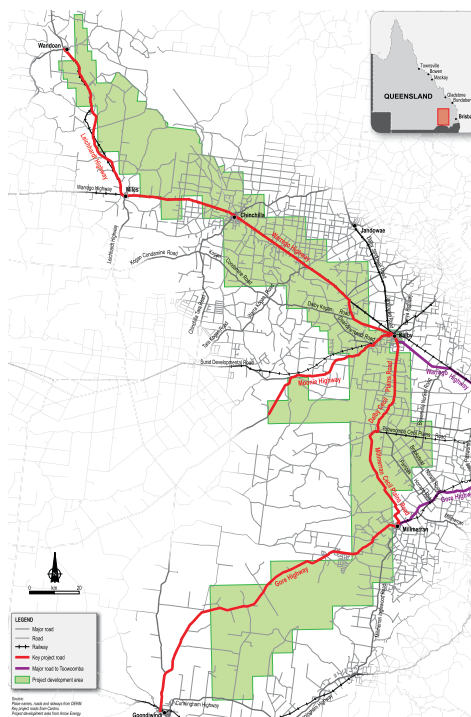
How will potential traffic impacts be managed?

Arrow is committed to working with local communities, regional councils and road authorities to identify opportunities to minimise Arrow's transport related impacts, and to communicate impacts to the community.

Potential road and traffic impacts will be managed through implementation of Arrow's environmental management procedures, and site specific traffic management planning for large construction sites, such as integrated production facilities.

Arrow's environmental management procedures will address requirements such as:

- › preferred transport routes for construction traffic, heavy goods vehicles (i.e. to avoid built up areas and town centres, where possible)
- › ensuring preferred transport routes for construction traffic and heavy goods vehicles are fit for purpose
- › transport schedules for construction and heavy goods vehicle traffic to minimise significant road use conflicts and impacts on other road users, for example:
 - avoid peak traffic times and use of school bus routes
 - schedule vehicle deliveries to avoid disruption to neighbours
 - schedule around seasonal activities to minimise road use conflict (e.g. crop harvesting times)
- › stagger vehicles to prevent queuing on access roads and maintain free flowing traffic (i.e. avoid convoys that prevent safe overtaking)
- › conduct all transport activities with appropriate permit and control requirements (i.e. police escorts and support vehicles)
- › minimising traffic through the use of staff buses and car pooling.



Detailed traffic management planning

Specific traffic management plans will be developed in consultation with regional councils and road authorities, to ensure that potential traffic impacts associated with large construction sites, such as integrated production facilities, are planned and controls are implemented to minimise and manage potential impacts of the road surface and other road users. Traffic management plans will be required to consider the cumulative impacts of other projects on traffic and roads, at that time.

Road use notifications

Arrow will ensure that its environmental management procedures and detailed traffic management plans will facilitate effective notifications to regional council's and road authorities, to allow them to effectively plan current and future road maintenance and upgrade requirements.

EIS GROUNDWATER STUDY

The groundwater study aims to identify:

- › groundwater use within the study area
- › baseline data from existing groundwater bores in the study area
- › the extent of the groundwater resource that may be affected by the project
- › any potential impacts to local groundwater aquifers over time and after the project is complete
- › management options to monitor and mitigate effects.

The study will further inform Arrow's groundwater management strategy.

What is the status of the groundwater study?

- › baseline data has been collected
- › the current project development scenario has been established to inform the impact assessment
- › the study is in the final stages of generating a groundwater model.

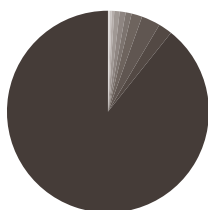
The groundwater study will be included in the EIS submission.

Groundwater geological layers

This cross-section shows the geological layers found in the project development area from youngest (shallowest layer) to oldest. The number of registered bores that access each geological layer is labelled as well as the type of groundwater aquifer. Arrow's production wells will target the Walloon Coal Measures, the thickest formation reaching down to 600m in places.

Confined aquifers are usually found deeper underground than unconfined aquifers and are overlain by impermeable rock or clay that limits movement of groundwater in or out of the confined aquifer. Unconfined aquifers contain no restricting layer between the water table and the ground surface where water is able to freely rise and fall as water is added or discharged to the system. Arrow's wells are designed to exclude water from any other aquifer than the targeted coal seams.

Licensed bore use in the project development area*



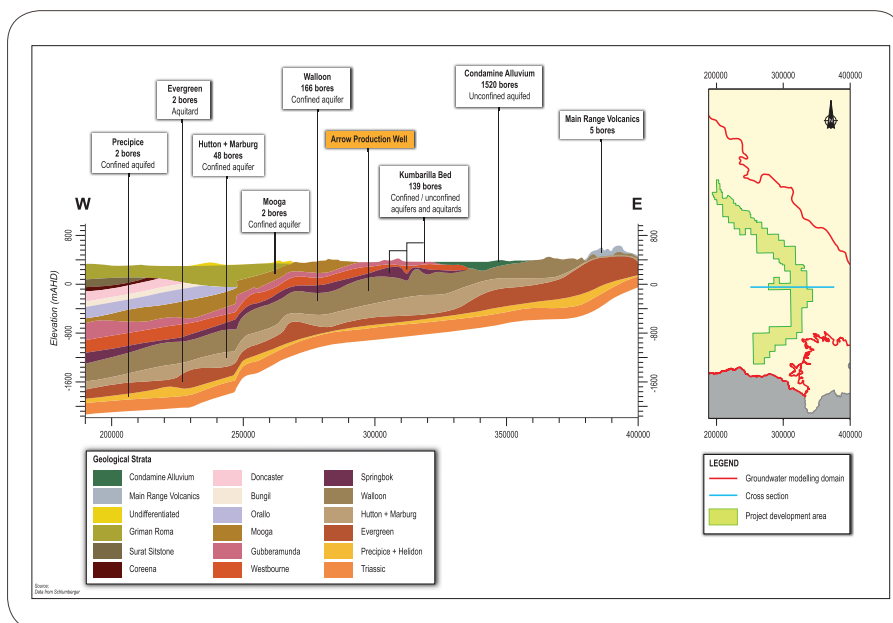
Approximate number of licenced users

6	Agriculture
6	Aquaculture
8	Stock
17	Education
19	Other
19	Domestic supply
34	Town supply
44	Water harvesting
60	Industrial
1,772	Irrigation

**Total number of licenced users
1,985**

*licenced users recorded on Water Entitlements Registration Database (WERD)

Geological cross-section and registered bores*



*registered users recorded on Department of Environment and Resource Management (DERM) database

WATER AND SALT MANAGEMENT

Responsible management of water and salt associated with coal seam gas (CSG) production is one of the most significant challenges currently facing the industry.

Associated water or coal seam water is pumped from coal seam gas wells, lowering the water pressure in the coal seam and allowing the gas to separate from the coal and flow into the well.

The volume and quality of coal seam water varies between and across different coal basins and over the life of an individual well. For example, for similar volumes of gas production in the Bowen Basin in Central Queensland is producing 1/10th the volume of water compared to the Surat Basin.

Coal seam water in the Surat Basin has been shown to range between brackish to salty, and on average is about 1/6th the concentration of sea water.

Coal seam water management

Queensland Government policy requires all coal seam water to be treated if it cannot be directly reinjected or used in its untreated form for environmentally acceptable beneficial uses.

The following beneficial use options are being considered by Arrow:

Untreated coal seam water beneficial uses (already in use)

- › power station cooling water
- › coal washing
- › feedlots.

Treated coal seam water beneficial uses

- › urban use
- › agriculture
- › irrigation
- › reinjection.

Arrow currently treats coal seam water through a process of micro filtration and reverse osmosis.

The CSG industry is intensively examining water treatment processes.

Salt management

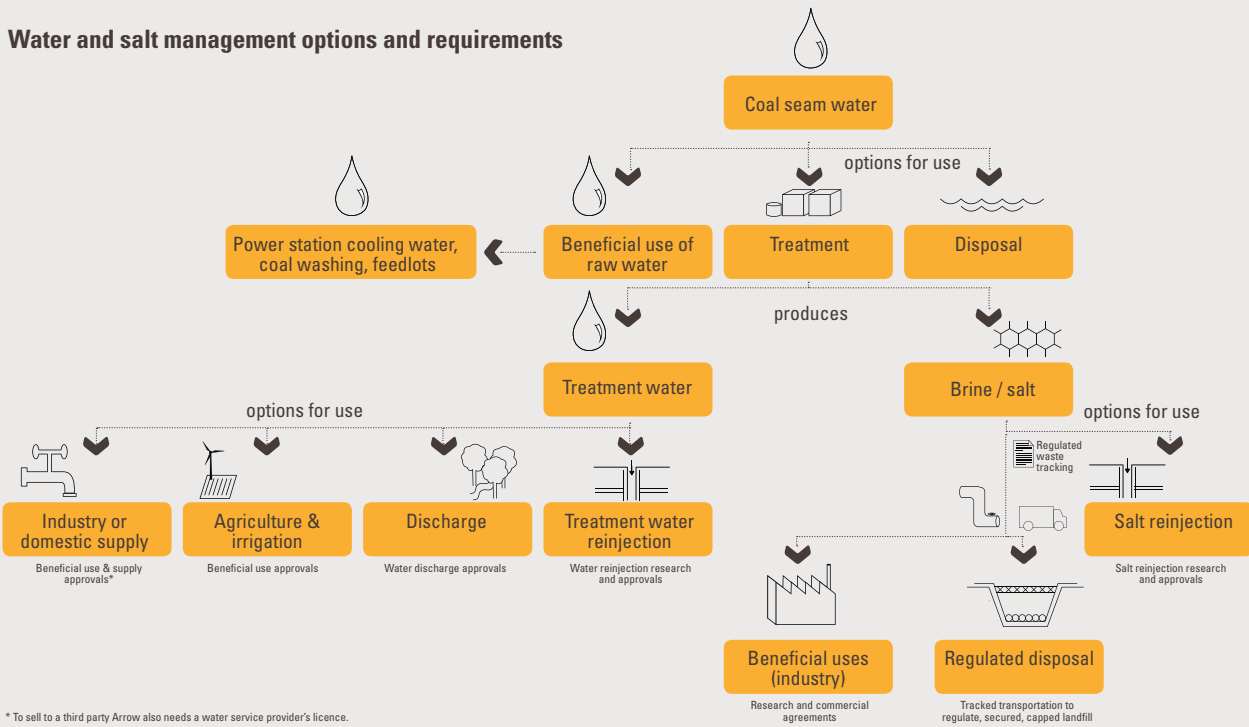
The amount of salt produced is dependent on the location and age of the coal seam.

1 megalitre coal seam gas water (1 megalitre = 1 million litres) → **5-8 tonnes salt on average** (5,000 – 8,000kg)

Arrow's preference is to identify a beneficial use for produced salt. It is investigating opportunities for use in chemical industries and industrial processes. Arrow is also considering other disposal options including reinjection of salt into aquifers with at least the same salinity.

Arrow is committed to the removal of produced salt from the local landscape to regulated disposal facilities, as a minimum standard.

Water and salt management options and requirements



MANAGING GROUNDWATER IMPACTS

Arrow understands the importance of groundwater resources, which are extensively used throughout Australia to meet both agricultural and domestic supply needs. The removal of groundwater from a coal seam is an essential requirement to allow the release of gas stored in the coal seam. For this reason Petroleum Lease (PL) holders, including coal seam gas (CSG) producers, are given authorisation under the 'Petroleum & Gas Act 2004' to take underground water as a necessary activity in the process of extracting CSG.

Both Arrow and the Queensland Government appreciate that there is concern from other users of groundwater, whose rights and entitlements are determined by the 'Water Act 2000', about the possible impacts arising from CSG activities. For that reason the Queensland Government has announced that it will enhance the existing groundwater management regime under the 'Water Act 2000' by:

- › managing impacts of coal seam water extraction on water supply bores and springs by a detailed investigation process prompted by exceeding trigger levels, or significant reduction in bore water supply
- › establishing 'make good' provisions if a significant reduction and/or a material impact on bore supply is found to have been caused by CSG operations
- › requiring underground water impact reports to be submitted to the Government for approval
- › managing cumulative impacts via Queensland Water Commission (QWC) as an independent body responsible for modelling and assessment of cumulative management areas.

Trigger levels for impacts on bores have been set by the Queensland Government

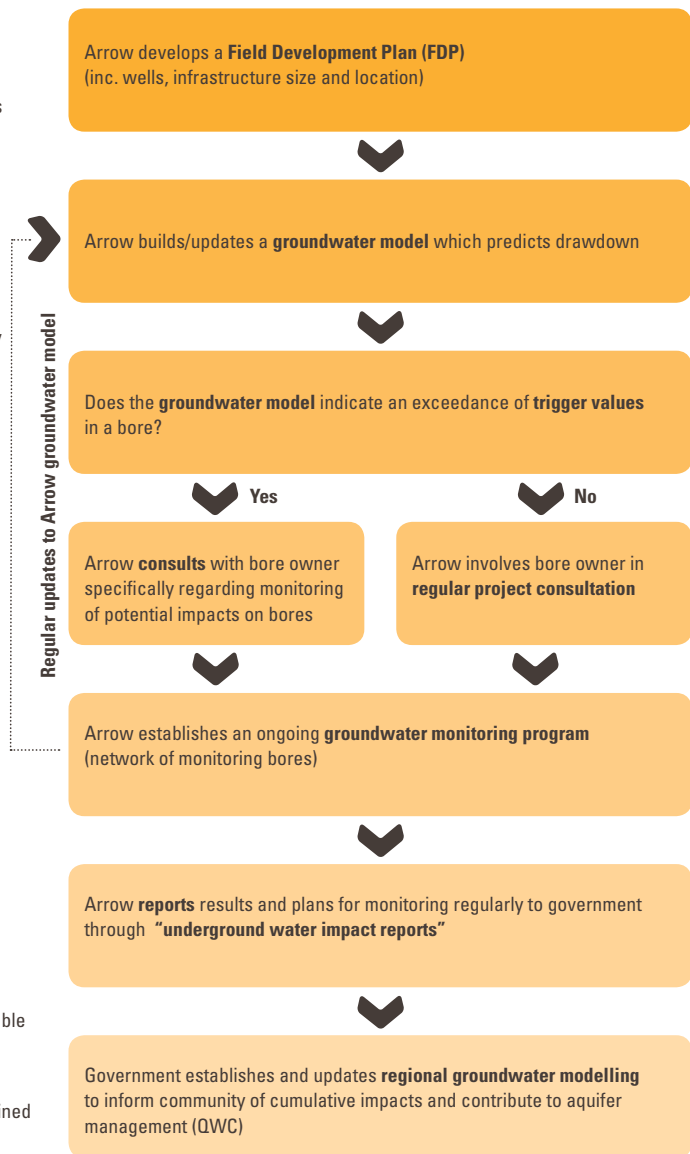
- › 0.2m for springs
- › 2m for alluvial unconfined aquifers
- › 5m for confined aquifers.

Springs, unconfined aquifers and confined aquifers:

- › springs are a natural point of groundwater discharge to the ground surface
- › unconfined aquifers contain no restricting layer between the water table and the ground surface where water is able to freely rise and fall as water is added or discharged to the system
- › confined aquifers are usually found deeper underground than unconfined aquifers and are overlain by impermeable rock or clay that limits movement of groundwater in or out of the confined aquifer.

Groundwater modelling, monitoring and consultation

Arrow will use the following process to model how groundwater may be impacted, monitor what happens, consult with bore owners and report to Government.



WHAT DOES 'MAKE GOOD' MEAN?

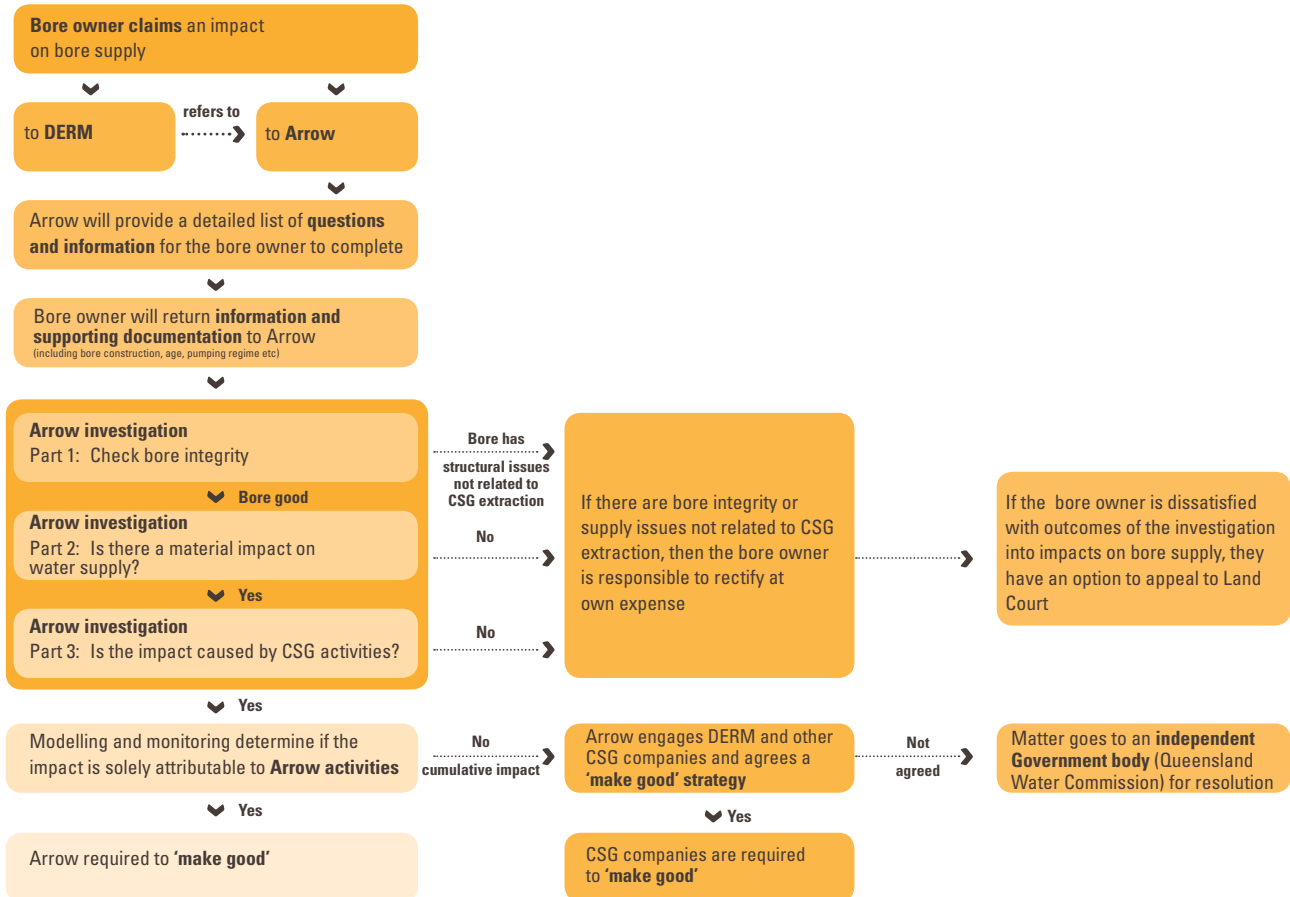
The following 'make good' options may be employed by Arrow Energy should there be a reduction in the capacity of a water bore to supply water for its intended purpose. These are some options:

- › deepening a bore
- › adding rising mains to lower the pump depth, thereby improving available pumping head
- › changing a pump
- › reconditioning a bore
- › drilling a new bore
- › providing an alternative water supply
- › other forms of compensation.

'Make good' arrangements will be agreed between Arrow and the owner of an affected water bore.

Bore impact investigation process

Arrow use the following process to investigate any claim of material impact on water supply.



WORKING WITH LANDHOLDERS

Arrow Energy recognises and respects the business interests of all landholders, and that the land is their livelihood. Arrow is committed to working closely with landholders to understand their concerns and work together to ensure our work practices minimise impacts on land and existing agricultural activities.

Prior to undertaking any activities on private property, Arrow will engage with landholders to consider all aspects of the property, including the landholder's business activities.

When determining temporary or permanent locations for plant and equipment, the following issues are taken into account:

- › agricultural and stock activities
- › seasonal conditions and plans
- › topography
- › drainage lines
- › service corridors
- › vegetation and fauna communities
- › location of residences and other sensitive receptors
- › current and future landholder plans
- › irrigation systems.

Arrow's priority is to establish good long term working relationships with landholders of properties on which we would like to operate, and work together to resolve concerns. Arrow is committed to working with landholders to gain voluntary access agreements and to reach agreement on compensation arrangements.

Planning with landholders

This is a 'case study' example of how coal seam gas wells and infrastructure have been designed on an operating farm owned by Arrow in the Surat Basin.

1. Aerial photograph of property

The landholder and Arrow land team examine a property, including topography, drainage lines, existing services and infrastructure.

2. Farming plan

The landholder and Arrow land team discuss the landholder's existing operations and current enterprise plans, including seasonal planning and future expansion.

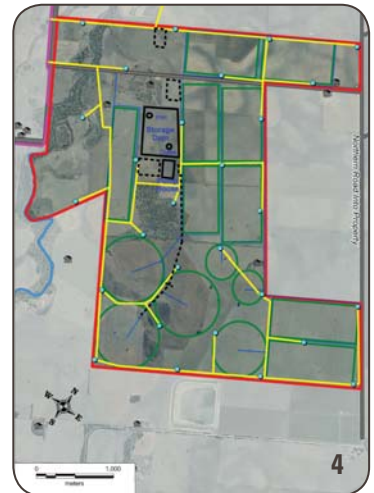
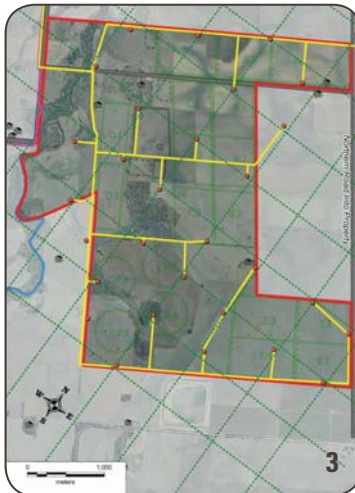
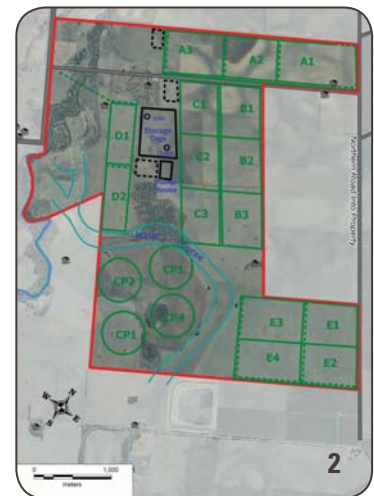
3. Preliminary plan for engineering estimates

Preliminary plans may apply a basic grid in order to carry out initial estimates of system pressures and infrastructure costs. However, these layouts are only for indicative planning purposes and are not intended to be strictly implemented on the ground.

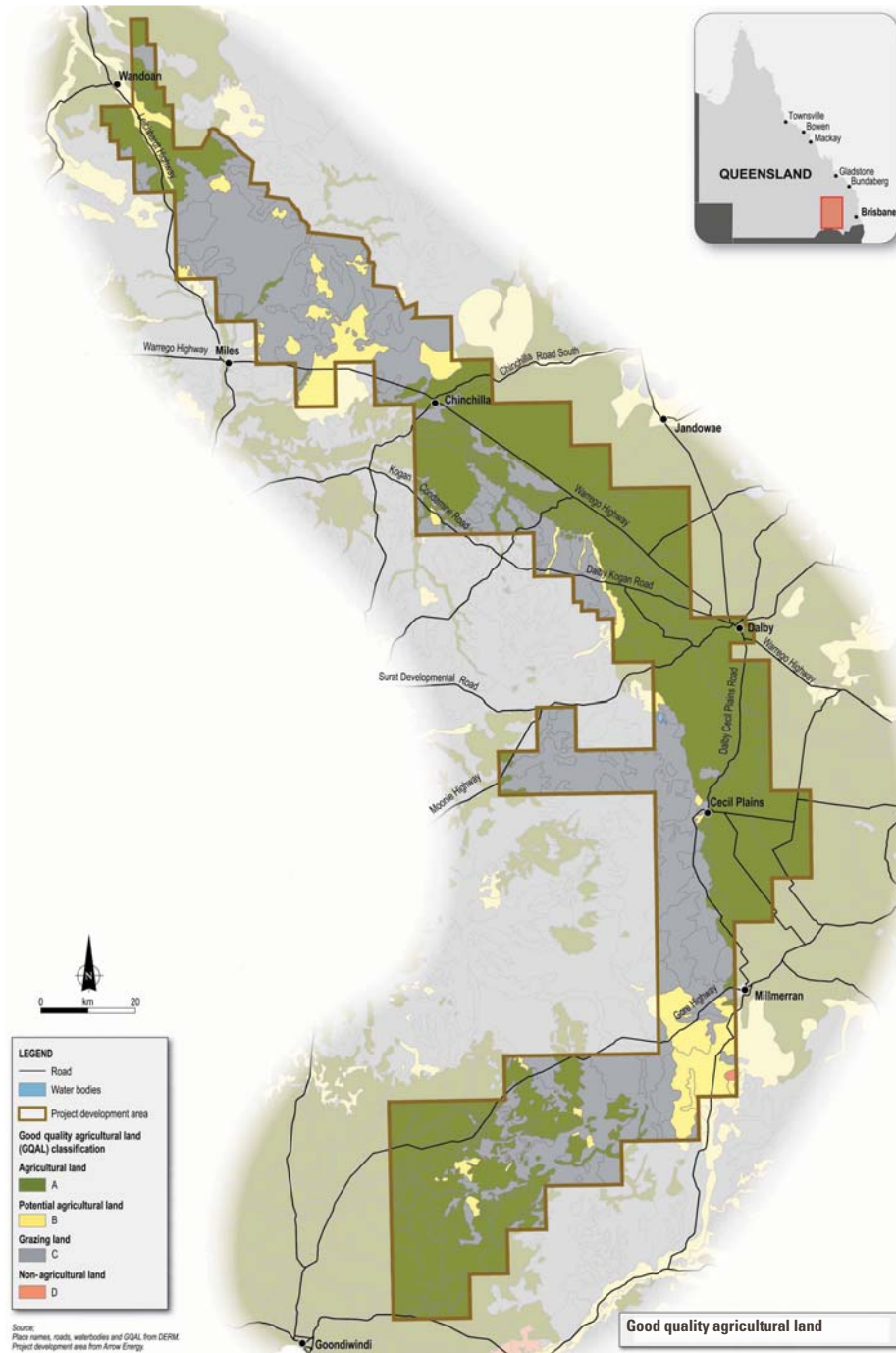
4. Collaborative plan developed

The landholder and Arrow's land team combine the current and future farm plans, property's characteristics and engineering layout to jointly produce a customised system of wells and infrastructure that endeavours to satisfy both parties.

Some areas may prove incompatible with the current land use, topography, or environmental factors.



GOOD QUALITY AGRICULTURAL LAND



GOOD QUALITY AGRICULTURAL LAND

The Queensland Government's 'State Planning Policy (SPP1/92)' on good quality agricultural land (GQAL) must be considered in approving developments. GQAL is mapped by local Governments and administered through local planning schemes. This mapping identifies areas which may or may not be presently used for intensive agriculture, such as cropping.

The Queensland Government is presently developing a new policy on Strategic Cropping Land which will focus on minimising impacts on Queensland's most productive cropping land.

Good quality agricultural land and the Surat Gas Project

Approximately 60 percent of the project development area is categorised as Class A and B GQAL.

Agricultural Land Class	Area (km ²)	% of Project Development Area	Description
Class A Cropland	4,387	51	Crop land – land suitable for current and potential crops with limitations to production, ranging from none to moderate levels.
Class B Limited cropland	704	8	Limited crop land – land that is marginal for current and potential crops due to severe limitations but suitable for pastures.
Class C Pasture land	3,564	41	Pasture land – land that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production. Some areas may tolerate a short period of ground disturbance for pasture establishment.
Class D Non-agricultural land	4	Negligible	Non-agricultural land – land not suitable for agricultural uses due to extreme limitations. This may be undisturbed land with significant habitat, conservation and/or catchment values or land that may be unsuitable because of steep slopes, shallow soils, rock outcrop or poor drainage.

Agricultural land class description taken from Guideline1 for Spp1/92: The Identification of Good Quality Agricultural Land 1.0, Queensland Government, 1993.

Mitigation and management

Arrow Energy is committed to working closely with landholders to avoid or minimise impacts on land and agricultural enterprises (refer to 'Working with Landholders' poster).

Findings from the Environmental Impact Statement (EIS) in relation to GQAL will help further refine Arrow's operational practices. We are committed to minimising impacts on GQAL through development of Arrow's environmental management procedures which address:

- › reduction of land degradation (erosion and dust control measures)
- › the timing of project activities to minimise disturbance (e.g. avoid construction works during wet periods)
- › avoidance of topographic constraints (steep slopes, dissecting gullies)
- › appropriate handling of soil resources including topsoil, topsoil and spoil storage and topsoil stripping depths
- › appropriate restoration and rehabilitation procedures
- › management of water and salt.

Arrow is committed to not constructing dams for the storage of untreated coal seam water or brine on intensively farmed black soils.

Arrow acknowledges community concerns about impacts to agricultural activities. We believe that CSG field operations and agricultural activities can coexist when management controls are applied and we are committed to working with landholders to achieve this.

EMPLOYMENT AND WORKFORCE

For the Surat Gas Project, Arrow Energy plans to prioritise recruitment from the local area, with all operational staff based in the region.

Construction workforce requirements

- › the number of construction personnel will depend on the rate of project development
- › each resource area expects a peak workforce of approximately 500 personnel.

Construction workforce will include:

- › management staff (project managers, engineers, supervisors)
- › earthmoving equipment operators
- › builders, fitters, electricians, supervisors and labourers
- › specialist technicians associated with the installation of compression, power generation and water treatment equipment.

Up to 70 personnel for drilling crews may also be required for 10+ years.

Operational workforce requirements

Each resource area will require 80 to 100 personnel (between 335 and 415 personnel across all five resources areas). Positions will include:

- › administration and stores
- › engineering and production
- › integrated production facility operation
- › drilling.

Approximately 60 percent of positions will relate to field operations.

Arrow staff training and development programs

The following training and development initiatives by Arrow aim to maximise local recruitment:

- › competency-based training for field-based personnel
- › high school-based program in process plant operations
- › process plant operations certificates (through TAFE and competency-based training)
- › Indigenous traineeships
- › graduate development and vacation employment programs.



Appendix 17

Arrow's commitments to the community



WE'VE MADE SOME COMMITMENTS TO YOU.

Arrow Energy has recently consulted communities in Chinchilla, Miles, Wandoan, Dalby, Cecil Plains, Goondiwindi and Milmerran about its plans to explore and develop coal seam gas operations in those regions.

For those people who were unable to attend, Arrow has made a number of commitments in response to genuine community concern. We wanted to give our host communities, including landholders, certainty over how and where we plan to explore over the next three years and how we plan to develop our fields over the first 10 years.

Some of our key commitments included:

- › Improved community and landholder engagement.
- › An open and honest dialogue about issues and opportunities with our stakeholders.
- › Engage with landholders at least six to 12 months prior to production drilling.
- › Adoption of a standard approach to compensation and land access.
- › No development in intensely farmed agricultural areas until concerns are properly addressed.
- › No construction of dams for coal seam gas water or brine on intensely farmed areas.
- › Use of surface tanks not pits when drilling production wells on black soil.
- › Development of a robust groundwater monitoring regime.
- › Prompt response to bore owners who report a reduced water supply.
- › Construction of "fit for purpose" dams to government standards.
- › Remove produced salt from the landscape.
- › Work with regional communities to maximise community benefits and opportunities for local businesses.
- › Locate wells and infrastructure away from homes in consultation with landholders (minimum 200 metres).
- › No hydraulic fracturing (fracking) in the area of the Surat Gas Project.

All the information provided at our recent community sessions, including our presentation and fact sheets, is available on our website. Alternatively, please call or email us to receive hard copies.

The staff of Arrow Energy would like to thank the hundreds of people who have consulted with us over the last month to provide valuable feedback. We look forward to continuing to build on our relationships with you.

Free feedback hotline **1800 038 856**
www.arrowenergy.com.au/community
Email: suratgas@arrowenergy.com.au



Appendix 18

**Arrow Surat community reference group (ASCRG)
Terms of Reference**



Arrow Surat Community Reference Group

Terms of Reference

1. TITLE

The name of the Committee shall be the *Arrow Surat Community Reference Group (ASCRG)*.

2. PURPOSE

To provide a consultative forum that, with regard to Arrow Energy's development of a coal seam gas resource within its tenements in the Surat Basin, can:

- (1) Effectively identify issues
- (2) Provide feedback
- (3) Consider improvement opportunities and initiatives

3. MEMBERSHIP

3.1 Representatives will be appointed by Arrow Energy. The composition of Committee representation shall be:

- Leisa Elder Vice President, Community and Corporate Affairs
- Mike Ward Vice President, Well Delivery
- Feng Jianhua Chief Operating Officer
- Greg Kulawski General Manager, Access, Approvals & Water
- Carolyn Collins Manager, Environment
- Sarah Delahunty Senior Community Officer, Dalby
- Ross Dunn Director, Australian Petroleum Production and Exploration Association (APPEA)

- Ian Hayllor Basin Sustainability Alliance
- Geoff Hewitt Future Food Qld
- Gordon Baker Cotton Australia
- Mick Cosgrove Deputy Mayor, Western Downs Regional Council
- Ray Jamison Western Downs Regional Council
- Paul Antonio Deputy Mayor, Toowoomba Regional Council
- Stuart Copeland University of Southern Queensland
- Graeme Clapham President, Central Downs Irrigators
- Andrew Rushford

3.1 A quorum of members must be present before a meeting can proceed. At least three (3) Arrow Energy representatives and three (3) other Committee representatives must be present for the meeting to proceed.

3.2 Committee members may elect a delegate to attend a particular meeting in their absence. Delegates would be decided in the inaugural meeting of the Committee. The Chairperson must be notified in advance of the attendance of a Delegate.

3.4 Internal (Arrow) or external subject matter experts may be invited to attend the meetings as required, at the request of the Chairperson on behalf of the committee to provide advice and assistance where necessary. They have no

decision making rights and may be requested to leave the meeting at any time by the Chairperson.

- 3.5 The ASCRG is an advisory group to Arrow Energy, and as such does not hold the authority to make financial decisions without the consent of the Arrow Executive Leadership Team (ELT) and internal processes by which those employees are bound.

While ASCRG decisions will be made by consensus of 75% of members present, Arrow is represented by at least four ELT members, signaling the company's intent that the Committee be used as a primary vehicle to involve, educate and recommend initiatives and opportunities for the improvement in matters which impact relevant communities.

- 3.6 Committee members will be appointed for a period of 12 months to October 2011, before which time Arrow will call for nominations for membership thereafter.

- 3.7 Committee members will cease to be a member if they:

- resign from the Committee
- fail to attend 3 consecutive meetings without providing apologies to the Chairperson
- resign from their employment, or from the group they represent
- breach confidentiality

4. VACANT POSITIONS

Any vacant positions will be filled on a casual basis until the term of office has expired.

5. CHAIRPERSON

The Chairperson shall be an Arrow Energy employee, namely Leisa Elder, Vice President of Community and Corporate Affairs for a period of 12 months. Their responsibilities include:

- Scheduling meetings and notifying committee members
- Inviting subject matter experts to attend meetings when required by the Committee
- Guiding the meeting according to the agenda and time available
- Ensuring all discussion items, where relevant, end with a decision or action
- Review and approve the draft minutes before distribution

6. SECRETARY

The role of the Secretary is to:

- Prepare agendas and issue notices for meetings, and ensure all necessary documents requiring discussion or comment are attached to the agenda
- Distribute the Agenda one week prior to the meeting
- Take notes of proceedings and prepare minutes of meeting
- Distribute the minutes to all committee members within one week after the meeting and be made available to all staff

- The minutes shall be checked by the Chairperson and accepted by committee members as a true and accurate record at the start of the next meeting
- Complete any other administrative duties as directed by the Chairperson

7. DURATION OF MEETINGS

Meetings shall be held on the first Wednesday of every second month, commencing October 6, for the period from 9.30am until 12.00pm at the University of Southern Queensland (or other venue as decided by the Committee). A special or extraordinary meeting may be called by Arrow Energy in consultation with other Committee members.

8. FUNCTIONS

- 8.1 Provide a forum for the open exchange of information between Arrow Energy, landholders and broader community representatives
- 8.2 Identify and provide regular feedback to Arrow Energy with regard to issues and opportunities relating to the general development of Arrow's coal seam gas resources over its tenements in the Surat Basin, including field and operational activities
- 8.3 Provide advice to Arrow Energy on community development concerns and opportunities to work with landholders and broader communities in the development of a coal seam gas industry in the region
- 8.4 Contribute to the development of indicators for monitoring and reporting on Arrow Energy's sustainability performance

9. LIMITATIONS

- 9.1 The Committee is an advisory board to Arrow Energy. It does not hold decision making powers on behalf of the Company and cannot commit to activities requiring expenditure that must be approved by the Company

10. AMENDMENTS

The Terms of Reference shall be reviewed at the inaugural meeting of the Arrow Energy Surat Basin Reference Group and thereafter, annually from the date of approval. They may be altered to meet the current needs of all committee members, by agreement of the majority (75%) of Arrow and Community representatives.

11. PRIVACY

In the spirit of open communication, Members must be allowed the right to express their individual views on a particular matter. The Committee will protect the privacy of individual Members' views, by ensuring that no Member may represent or communicate another Member's opinions from these Committee meetings to an external party.

General updates for communication to other relevant parties, including those groups for which Members represent, will be encouraged as determined by the Committee as part of each meeting Agenda.

Appendix 19

**Minutes of Arrow Surat community reference
group meetings phase 3**



MINUTES



MEETING:	Arrow Surat Community Reference Group
DATE:	Wednesday, 6 October 2010, 09.30am
ATTENDEES:	<p>Leisa Elder, Vice President Community and Corporate Affairs Al Mueller, Vice President, Operating Services Carolyn Collins, Manager, Environment. Tony Knight, Vice President Exploration Sarah Delahunty, Senior Community Officer, Dalby Ross Dunn, Director APPEA Ian Hayllor, Basin Sustainability Alliance Gordon Baker, Cotton Australia Stuart Copeland, University of Southern Queensland</p>
APOLOGIES:	<p>Geoff Hewitt, Future Food Qld Cr Mick Cosgrove, Deputy Mayor Western Downs Regional Council Cr Paul Antonio, Deputy Mayor Toowoomba Regional Council Feng Jianhua, Chief Operating Officer Greg Kulawski, General Manager, Access, Approvals and Water</p>
DURATION:	Meeting Close 12.05pm

Presenter	Agenda Item	Discussion	Agreed Action
	Item 1	No previous minutes	
Leisa Elder	Item 2 – introduction and meeting overview	<ul style="list-style-type: none"> Welcome and thankyou Intent of the Committee is to work with key members of the Community on issues and opportunities as a result of the emerging CSG industry in the Surat Basin 	
Al Mueller	Item 3- Safety Moment	<ul style="list-style-type: none"> Discussed Arrow's 12 Life Saving Rules Discussed Arrow's draft Land Access Rules <p>Motion to amend the Land rules as follows:</p> <ul style="list-style-type: none"> Rule no 1- include words that identify the landholder as the person who clears access, ie: Only enter a property with the approval of your supervisor <i>who has cleared access with the landholder</i>. Agreed. Rule no 10 – include that it is at the landholders discretion ie: Do not enter a site during or after wet weather without a land liaison Officer's consent (<i>who has cleared access with the landholder</i>) unless in the case of a declared emergency. Agreed In regard to Rule no 5 - discussed the opportunity for Arrow vehicles to be 	<p>LE to amend the Land Access Rules to include changes</p> <p>AM to investigate flags for Arrow vehicles</p>

		<p>identifiable from a distance – ie by using a flag.</p> <ul style="list-style-type: none"> Discussed Best Management Practice in the cotton industry with regard to chemical spraying and biosecurity and the need to ensure this is covered in the detail communicated to staff in Rule no 01 regarding entry to a property. Suggestion to also review entry requirements regularly with the landholder in regards to spraying Request made to the group for a presenter for next meeting's Safety Moment. 	<p>AM to update at the next meeting</p> <p>IH to present the safety moment at the next meeting</p>
<p>Leisa Elder</p>	<p>Item 4 - Role of Committee</p>	<p>Members –</p> <ul style="list-style-type: none"> Discussed a request from landholder Stewart Armitage to the Chair to include a representative from the Darling Downs Irrigators Group. Agreed by the Committee Discussion of potential representation by Ag Force and the grazing and/or feedlot industry. Suggestions included Andrew Rushford (BSA). <p>Deputy Chair Person -</p> <ul style="list-style-type: none"> Chair requested this position be a non-Arrow member <p>Appointment of Secretary</p> <ul style="list-style-type: none"> Ross Dunn nominated Sarah Delahunty 2nd Gordon Accepted <p>Terms of Reference</p> <ul style="list-style-type: none"> 3.5 – suggestion that the 75% is 'weighted' in Arrow's favour. The Chair explained that the intent of the Committee was an advisory group to Arrow, and not a group with the authority to make decisions on behalf of Arrow. However, it was noted that the four Vice Presidents on the Committee would have considerable weight in discussions within Arrow. Agreed to change wording to reflect group's 'intent'. 3.2 – Delegates Ian Hayllor - Andrew Rushford, Vice President BSA Stuart Copeland - Gary Brady. <p>Agenda</p> <ul style="list-style-type: none"> Item 5: Arrow Update Request to the Committee for Standing Items and items of interest for discussion at the next meeting 	<p>LE to follow up and extend invitations</p> <p>All non Arrow members to discuss and notify at next meeting</p> <p>LE to reword 3.5</p> <p>All members to recommend delegates at next meeting</p> <p>Members to email suggestions to Sarah at least a week before meetings.</p>

Tony Knight	Item 5 – Arrow Update	<p>(reference to a map supplied)</p> <ul style="list-style-type: none"> • Currently a low level of activity due to the recent company takeover and poor weather. • Focus on 'tidy up' activity – working through older sites to provide an audit on activities • IFL – desk top study underway to identify what is needed to have in place before Arrow can begin effective work on this land type. • Plans to have the latest maps and more detailed boundaries in regard the two major areas of exploration work for the Nov 22 round of community consultations • Fact sheet underway into the integrity of how Arrow caps wells and carries out drilling • IH raised that with Arrow activity close to Wandoan, the Committee should have a rep from this area - suggestion Ray Jamison (Cr for planning WDRC, landholder in the area) 	SD to send invitation
AI Mueller left meeting at 11:13am			
Carolyn Collins		<ul style="list-style-type: none"> • Arrow recruiting for a 'water team' to look at impacts, disposal, and monitoring of water. • QWC appointed as independent body to look at water and impacts. • Application currently with DERM to use treated water on Theten property, to look at impacts and research. • Undertaking a dam upgrade program – annual inspection. • Planning the re-injection trial to go into the Hutton • Patrick O'Flaherty on team to work with DERM to work solution with Water Balance and keeping the water in the same area that it is taken from. 	
Leisa Elder	Item 6 – Update Community Consultation and Engagement	<ul style="list-style-type: none"> • Surat Basin Community Consultation – 3rd round will begin the week of the 22nd November. • IH requested some more technical information for those landholders wanting more detail in the next round of consultations. 	LE/TK to organise site visit for the Committee post the Nov 22 round of consultations
Leisa Elder	Item 7 – General Business	<ul style="list-style-type: none"> • Strategic Cropping land – Committee discussed the need for clearer definitions and details on how Government intends to implement. This group should also work together in parallel with landholders to address concerns and identify direction. 	
Leisa Elder	Item 8 - Communication	<ul style="list-style-type: none"> • IH raised that upon the second meeting, the media should be notified of the two groups (Arrow Surat Community Reference Group and Arrow Intensively Farmed Land Committee) and what the activities and purposes are. Agreed • Circulate contact details for all members. 	<p>LE to organise draft release</p> <p>SD to email a form to complete</p>

MINUTES



MEETING:	Arrow Surat Community Reference Group
DATE:	Wednesday, 8th December 2010, 09.30am
ATTENDEES:	<p>Leisa Elder, Vice President Community and Corporate Affairs Al Mueller, Vice President, Operating Services Carolyn Collins, Manager, Environment. Tony Knight, Vice President Exploration Sarah Delahunty, Senior Community Officer, Dalby Ian Hayllor, Basin Sustainability Alliance Gordon Baker, Cotton Australia Stuart Copeland, University of Southern Queensland Geoff Hewitt, Future Food Qld Cr Mick Cosgrove, Deputy Mayor Western Downs Regional Council Cr Ray Jamieson, Western Downs Regional Council Greg Kulawski, General Manager, Access, Approvals and Water Scott Sheriff, Manager, Water Sustainability (GUEST) Patrick O'Flaherty, Senior, Water & Ground Water Co-ordinator (GUEST)</p>
APOLOGIES:	<p>Ross Dunn, Director APPEA Cr Paul Antonio, Toowoomba Regional Council</p>
DURATION:	Meeting Close 12.50pm

Presenter	Agenda Item	Discussion	Agreed Action
Ian Hayllor	Item 1	<p>Safety Moment : Safety on farms</p> <ul style="list-style-type: none"> Time taken to induct new farm employees on farm activities, safety and standards. With the increase of CSG operations onto farms, increasing health and safety concerns with non-rural workers operating in a rural environment. The increase in traffic on rural roads and concerns with drivers not driving to conditions, school busses on the roads with increased traffic a concern. 	<p>Group: establish an understanding of issues/concerns for non-rural workers operating in a rural setting. AM to follow up with VP HSE</p> <p>Arrow tol raise the issue of road maintenance when speaking with State Govt.</p> <p>SD to indentify and incorporate school bus times and routes in times of high traffic.</p> <p>AM to present Arrow safety package to group.</p>
Leisa Elder	Item 2 –Previous meeting	<p>Outstanding Actions</p> <ul style="list-style-type: none"> Grazing industry representation 	<p>SD to invite Andrew Rushford to represent Graziers</p>

		<ul style="list-style-type: none"> • Deputy Chair – Ian Hayllor nominated 2nd Stuart Copeland Carried • TOR rewording – 3.5 (see note in file) Motion: Geoff Hewitt 2nd Mick Cosgrove. Carried. <ul style="list-style-type: none"> • Arrow flags for vehicles on land holder properties – flags have been costed and will be ready late Jan/early Feb. Vehicles that are not full time land vehicles (ie hire vehicles) will carry Arrow metallic signs on each side of the vehicle for identification • Nominated delegates • Site tour 	<p>All members to email SD</p> <p>Members to email SD with suggestions</p>
<p>Carolyn Collins</p>	<p>Item 3- Update Water Management</p>	<p>see presentation in file</p> <ul style="list-style-type: none"> • Arrow will consider both company and independent testing of groundwater monitoring bores • Baseline bore assessments will be undertaken in 2011, commencing in the first half of the year. Baseline assessments will be undertaken in accordance with government guidelines when finalised. • CSIRO's 3D model of Condamine alluvium may be a good source of information to feed into groundwater modelling. • Need to clearly articulate why baseline data is being collected on landholder bores. • GH: Irrigators would be in favour of water substitution as long as no impact is seen on their existing water allocations and water quality is of a usable standard. • Agreement that the long term solution/mitigation measure for groundwater impacts from CSG activities must involve a combination of irrigation trials to facilitate supply of water to landholders in lieu of water entitlements, formal substitution arrangements that ensure entitlements are protected, and reinjection trials. • Further engagement on location of groundwater monitoring bore locations • Open sharing of groundwater 	<p>P O'F contact regional based drilling contractors regarding existing data on water bores</p> <p>CC to bring guidelines on baseline data collection for group to look at.</p>

		information.	
Greg Kulawski	Item 3 - Update Land Access	<p>See presentation in file</p> <ul style="list-style-type: none"> • Land agents will have 4 day training course. • Spread of weeds (?) • RJ: WDRC wash down facilities to be built and could be considered to be used by Arrow. • GH: Agreement should be seen as bringing value to landholder as opposed to being a “compensation” agreement • GH: What is appropriate compensation for impact not yet known ie: change in farming practices • IH: Do we revisit landholders who have signed a contract to see if they are still happy over time? 	
Gordon Baker	Item 4 - Best Mgt Practice	<ul style="list-style-type: none"> • BMP accreditation for farmers <ul style="list-style-type: none"> • OHS – duty of care • Biosecurity - disease <ul style="list-style-type: none"> - pest control - exotic pest management <p>Expected that the end of 2011 20% of growers should be accredited. GB raised that Arrow staff will need to be trained on these standards prior to accessing these properties.</p>	GB to advise the group on any follow up actions
Leisa Elder	Item 6 – Update Community Consultation and Engagement	<ul style="list-style-type: none"> • Over 600 people attended the community consultation sessions in the recent Surat Basin consultation sessions • Arrow will seek to include physical examples of its work in future consultations (ie well development, core samples) . • IH: congratulated Arrow on having a large number of Arrow (especially Senior) staff available at the community consultation sessions available to answer questions and engage with attendees. 	LE will circulate issues raised at Cecil Plains for follow-up at the next meeting.
Leisa Elder	Item 7 – General Business	<p>MC: Wed meetings are difficult to attend due to Council obligations- can day be changed RJ: is it possible to change meetings to Dalby Motion: Leisa move to hold every 2nd meeting in Dalby. 2nd Gordon carried</p>	

Appendix 20

**Arrow Intensively Farmed Land committee (AIFLC)
Terms of Reference**



Arrow Intensively Farmed Land Committee

Terms of Reference

1. TITLE

The name of the Committee shall be the *Arrow Intensively Farmed Land Committee (AIFLC)*.

2. PURPOSE

To provide a consultative forum that, with regard to Arrow Energy's development of a coal seam gas resource on intensively farmed land within its tenements in the Surat Basin, can:

- (1) Effectively identify issues
- (2) Provide feedback
- (3) Consider improvement opportunities and initiatives

3. MEMBERSHIP

3.1 Representatives will be appointed by Arrow Energy. The composition of Committee representation shall be:

- Bryan O'Donnell General Manager, Surat Development
- Darren Stevenson Asset General Manager (South)
- Caoilin Chestnutt Exploration Manager (South)
- Jason Schroeder Production Manager (South)
- Gerard Coggan EIS Manager
- Andrew Thompson Senior Environment Coordinator (Operations)
- Glenda Viner Community Manager
- Jonny Shirley Field Development Manager (South)
- Julian Leonard Land Manager

- Dave Armstrong Landholder
- Graham Clapham Landholder
- Jamie Grant Landholder
- Jeff Bidstrup Landholder
- John Cameron Landholder
- Paul McVeigh Landholder
- Wayne Newton Landholder
- Stuart ArmitageLandholder
- Jan Lafrenz Landholder
- Charlie Mort Landholder

3.1 A quorum of members must be present before a meeting can proceed. At least three (3) Arrow Energy representatives and three (3) other Committee representatives must be present for the meeting to proceed.

3.2 Committee members may elect a delegate to attend a particular meeting in their absence. Delegates would be decided in the inaugural meeting of the Committee. The Chairperson must be notified in advance of the attendance of a Delegate.

- 3.4 Internal (Arrow) or external subject matter experts may be invited to attend the meetings as required, at the request of the Chairperson on behalf of the committee to provide advice and assistance where necessary. They have no decision making rights and may be requested to leave the meeting at any time by the Chairperson.
- 3.5 Committee members will be appointed for a period of 12 months to October 2011, before which time Arrow will call for nominations for membership thereafter.
- 3.5 Decisions must have the support of the majority (75%) of each of the Arrow members and Landholder members.
- 3.6 Committee members will cease to be a member if they:
- resign from the Committee
 - fail to attend 3 consecutive meetings without providing apologies to the Chairperson
 - resign from their employment, or cease being an area landholder
 - breach confidentiality

4. VACANT POSITIONS

Any vacant positions will be filled on a casual basis until the term of office has expired.

5. CHAIRPERSON

The Chairperson shall be an Arrow Energy employee, namely Bryan O'Donnell, General Manager, Surat Development, for a period of 12 months. Their responsibilities include:

- Scheduling meetings and notifying committee members
- Inviting subject matter experts to attend meetings when required by the Committee
- Guiding the meeting according to the agenda and time available
- Ensuring all discussion items, where relevant, end with a decision or action
- Review and approve the draft minutes before distribution

6. SECRETARY

The role of the Secretary is to:

- Prepare agendas and issuing notices for meetings, and ensuring all necessary documents requiring discussion or comment are attached to the agenda
- Distribute the Agenda one week prior to the meeting
- Take notes of proceedings and preparing minutes of meeting
- Distribute the minutes to all committee members within one week after the meeting and be made available to all staff
- The minutes shall be checked by the chairperson and accepted by committee members as a true and accurate record at the commencement of the next meeting
- Complete any other administrative duties as directed by the Chairperson

7. DURATION OF MEETINGS

Meetings shall be held on the first Wednesday of every month, commencing October 6, for the period from 9.30am until 12.00pm at the University of Southern Queensland. A special or extraordinary meeting may be called by Arrow Energy in consultation with other Committee members.

8. FUNCTIONS

- 8.1 Provide a forum for the open exchange of information between Arrow Energy and its landholders on intensively farmed land
- 8.2 Identify and provide regular feedback to Arrow Energy with regard to issues and opportunities relating to the construction and operation of coal seam gas infrastructure and development of Arrow's coal seam gas resources in intensively farmed land within the Surat Basin
- 8.3 Provide advice to Arrow Energy on development concerns and opportunities as part of a case study involving landholders on intensively farmed land in the Surat Basin, in the development of Arrow's coal seam gas reserves
- 8.4 Co-create a plan which allows coal seam gas development to co-exist on intensively farmed land

9. LIMITATIONS

- 9.1 The Committee is an advisory board to Arrow Energy. It does not hold decision making powers on behalf of the Company and cannot commit the Company to activities, including those requiring expenditure, that must be approved by the Company in line with its internal decision making process.

10. AMENDMENTS

The Terms of Reference shall be reviewed at the inaugural meeting of the Arrow Energy Surat Basin Reference Group and thereafter, annually from the date of approval. They may be altered to meet the current needs of all committee members, by agreement of both the majority (75%) of each of the Arrow and Landholder representatives.

11. PRIVACY AND CONFIDENTIALITY

In the spirit of open communication, Members must be allowed the right to express their individual views on a particular matter. The Committee will protect the privacy of individual Members' views, by ensuring that no Member may represent or communicate another Member's opinions from these Committee meetings to an external party.

General updates for communication to other relevant parties, including those groups for which Members represent, will be encouraged as determined by the Committee as part of each meeting Agenda.

The Committee may consider "confidential" items in closed session. There must be a resolution to move 'In Committee' stating the reasons why

the matter(s) need to be considered in this way. . Once 'In Committee' discussions and debate have concluded, a further resolution to resume open Committee is required.

Appendix 21

**Minutes of Arrow Intensively Farmed Land
committee meetings - Phase 3**



MEETING MINUTES



Intensively Farmed Land Committee Meeting

November 4, 2010 – 12:30pm to 2:30pm

PRESENT:		Dave Armstrong, Jamie Grant, John Cameron, Paul McVeigh, Stuart Armitage, Wayne Newton, Bryan O'Donnell, Darren Stevenson, Glenda Viner, Julian Leonard, Jonny Shirley, Andrew D Thompson, Gerard Coggan, Coailin Chestnutt.
		MINUTES: Gerard Coggan, Jonny Shirley and Andrew D Thompson
APOLOGIES:		Graham Claplan, Jan Lafrenz and Jeff Bidstrip
ITEM	DETAILS	ACTION
	Welcome and Thank you for attending	
ITEM 1	Safety Moment – Bryan O'Donnell Reversing vehicles near young children and toddlers	
ITEM 2	Minutes of Previous Meeting – Intensively Farmed Land Committee Meeting Of October 6, 2010 No comment from previous minutes of meeting October 6 2010 Decision: Committee accepted previous meeting minutes It was requested that the previous month's meeting minutes be sent to Committee members with the agenda for the next meeting.	Bryan O'Donnell Minutes of previous meeting to be provided with agenda for next meeting.
ITEM 3	Updated AIFLC Terms of Reference No comments were received Decision: Committee accepted updated AIFLC Terms of Reference	
ITEM 4	Arrow Surat Community Reference Group MOM An update on the Arrow Surat Community Reference Group meeting from 6 October 2010, and a copy of the meeting minutes were provided to the Committee; Committee members welcome to review minutes and notify the chair of any issues relating to IFL that would like to put onto next month's agenda.	All
ITEM 5	Potential additional AIFL Committee Members A proposal was tabled to include an additional Committee member. Issues were discussed relating to the size of the Committee and that the current Committee membership provided a good representation of IFL enterprises. Decision: The Committee agreed not to accept the proposal.	
ITEM 6	Update – Arrow Activities	
ITEM 6.1	Overview of Surat Exploration Activities: Budgeted program for 2011-12 discussed, well numbers and locations (refer to Attachment A) Explanation of the three stepped approach to exploration: <ol style="list-style-type: none"> 1. Understanding extent and depth (chipholes and seismic) overview. 2. Determining gas content (coreholes and desorption) 3. Demonstrating producibility of the gas (pilot wells) It was requested that Arrow provide a summary of frequently used terms in the Coal Seam Gas industry to the Committee. Arrow agreed to provide this information to the Committee at the next meeting. Queries were raised by Committee members on the integrity of wells and Arrow's cementing requirements.	Coailin Chestnutt Provide factsheet on drilling muds Coailin Chestnutt provide summary of terms Coailin Chestnutt Well proposal template

	<p>Arrow committed to providing the Committee with further information relating to well integrity. A Well proposal Template indicating multiple casing strings to be distributed prior to next meeting.</p> <p>Arrow is currently trying to define IFL within black soil areas and will potential present at next meeting if this work has been completed.</p> <p>Tenure update: Arrow overviewed the process of tenure retention, from ATP to PL. Arrow further mentioned its requirement to place PL applications over ATP683 to progress the retention of this tenure</p>	<p>Caoilin Chestnutt Provide factsheet on well integrity.</p> <p>Gerard Coggin</p>
ITEM 6.2	<p>Proposed Way of Managing Core and Chip Holes Arrow presented the proposed approach to carrying out Exploration Activities on IFL (Refer to Attachment B) The Committee walked through approach followed to develop list of activities, associated concerns and potential mitigation strategies. The physical exploration activities (core hole or chip hole) were discussed in the order in which they occur and grouped as follows:</p> <ol style="list-style-type: none"> 1. Initial Consultation 2. Well Placement 3. Clear well site and prepare for rig 4. Fence Lease 5. Dig Flare Pit 6. Dig Sumps 7. Dig Cellar 8. Mobilise Rig 9. Set up rig and drill 10. Demobilise Rig 11. Rehab Well <p>Pitless drilling was agreed as the preferred method of drilling on black soil to remove the need for flare and sump pits.</p> <p>Further potential concerns and mitigation from committee representatives were recorded</p> <p>Communication with landowners was discussed. Group agreed the onus on communication should be on Arrow to communicate with the Landowner. A communication plan will need to be developed to work through the detail of how this will occur.</p> <p>The importance of wash downs and prevention of weed and pathogen spread was emphasised.</p>	<p>Caoilin Chetnutt Review the timeframe for pitless drilling</p> <p>Jonny Shirley Update potential concerns and mitigation table</p> <p>Julian Leonard Provide updated Land Access Rules</p>
ITEMS 7	<p>Review of IFL Issues for access during Wet Weather To be carried forward to next meeting</p>	
ITEM 8	<p>Pilot Wells and there potential impact on IFL enterprise To be carried forward to next meeting</p>	
ITEM 9	<p>Next meeting – Wednesday 1st December 2010</p>	
	<p>Meeting Closed</p>	

There being no further business, the meeting was closed at 2:30pm

CONFIRMED AS A TRUE AND CORRECT RECORD.

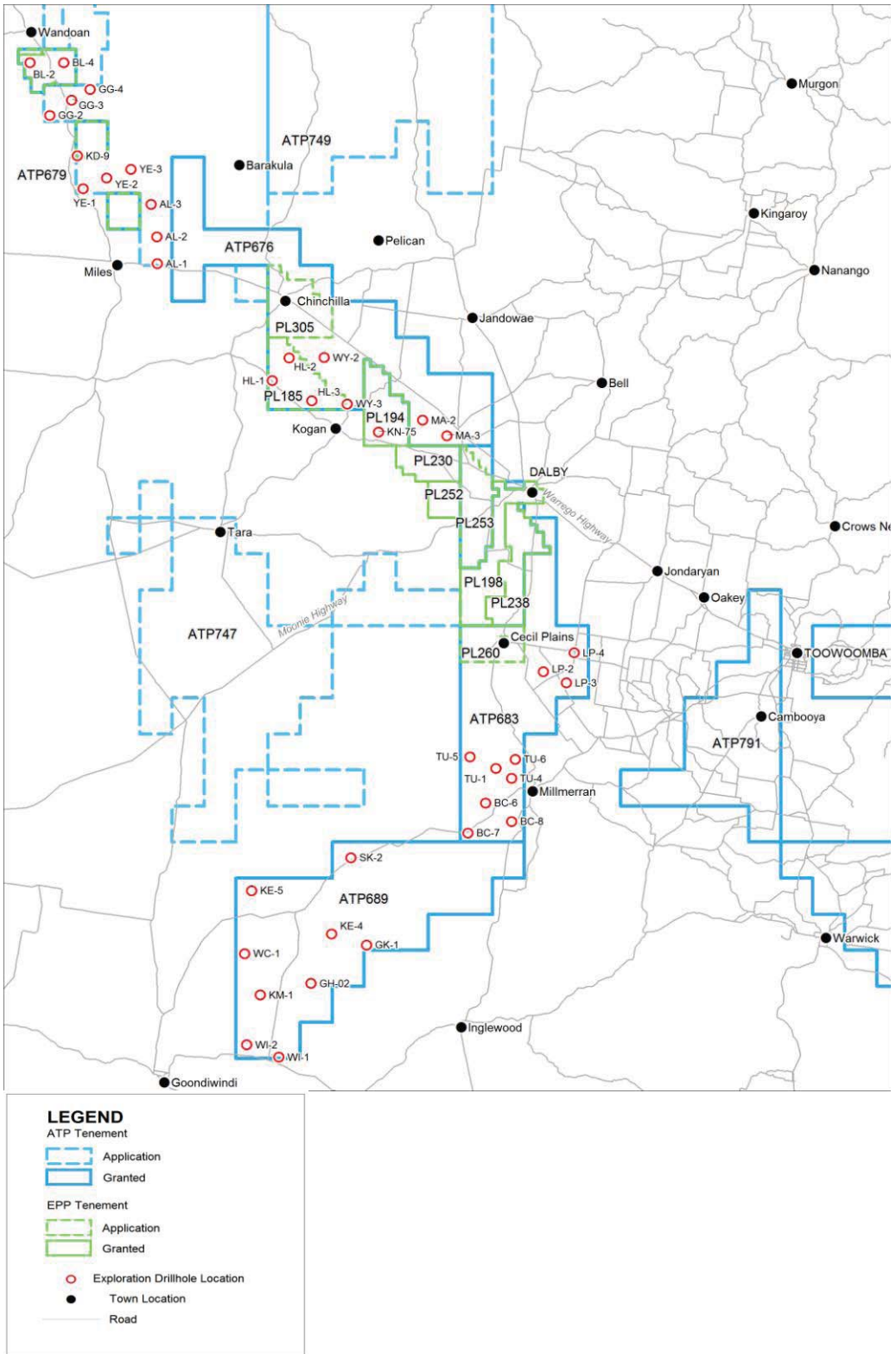
Bryan O'Donnell

Chairman of the AIFLC

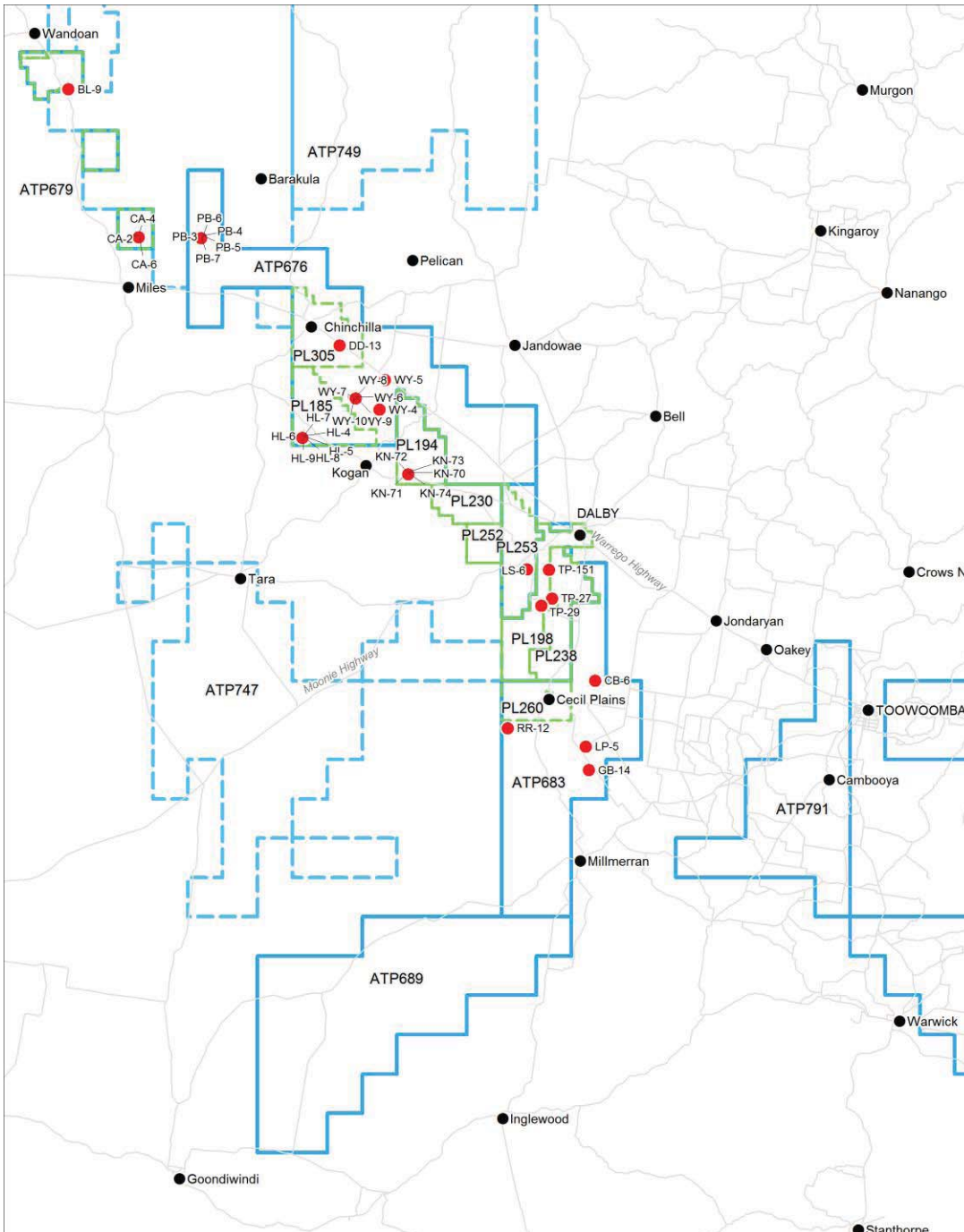
Attachment A - Exploration/Appraisal Look ahead

Permit	Area	2010 revised			2011 revised			2012 revised		
		Strat	Core	pilots	Strat	Core	pilots	Strat	Core	pilots
PL 252	Stratheden				0	1		0	0	
PL 230	Daandine				0	1		0	0	
ATP 676 (CS JV)	Macalister				0	4			2	
PL 194	Kogan North				0	1				1
ATP 676P (Arrow/	Hopelands/Whyall				0	3	1		2	1
676, Arrow/Shell	DD/PB/BB				0	3			2	
ATP 687P (Appn)	Mulgildie									
ATP 746P C (Appn)	Moonie North				0	0			0	
ATP 747P C (Appn)	Guluguba/YR/AD				0	0			10	1
ATP 810P	Talinga		2	2	0	4	1		4	
ATP 683P B	Bowenville				0	5			5	2
PL 185 (Appn)	Dundee				0	0			2	
ATP 689P	Goondiwindi					4			3	4
ATP 683P Dalby	Dalby									
ATP 683P Dalby S	Dalby South		12		2	16	3		10	4
ATP 683P Millmerran	Millmerran									
PL 198	Tipton West				0	4		0	2	
PL 238	Plainview				0	1		0	0	
PL 258 (Appn)	Tipton West							0	0	
PL 260 (Appn)	Tipton West							0	0	
EPC1031						1				
EPC1037						1				
EPC1148						1				
EPC961						1				
			14	2	2	51	5	0	42	13

Proposed Exploration Sites – Chip and Core Holes



Proposed Appraisal Sites 2011/12



LEGEND

- ATP Tenement
 - Application (dashed blue line)
 - Granted (solid blue line)
- EPP Tenement
 - Application (dashed green line)
 - Granted (solid green line)
- Pilot Drillhole Location (red dot)
- Town Location (black dot)
- Road (grey line)

MEETING MINUTES



MINUTES OF: Arrow Intensively Farmed Land Committee
 HELD AT: University of Southern Queensland, Faculty of Business Board Room –
 Room 452, West Street, Toowoomba
 DATE: October 6, 2010
 COMMENCEMENT TIME: 10:11am

PRESENT:	ATTENDEES: Bryan O'Donnell, Darren Stevenson, Caoilin Chestnutt, Gerard Coggan, Andrew D Thompson, Glenda Viner, Jonny Shirley, Julian Leonard, Jan Lafrenz, Stuart Armitage, Jamie Grant, Dave Armstrong, Graham Clapman
	MINUTES: Tamika Glazier
	APOLOGIES: Jeff Bidstrup, John Cameron, Paul McVeigh, Wayne Newton, Roy Fleet, Charlie Mort
CHAIRMAN:	Bryan O'Donnell
DISCLOSURES	

		ACTION
ITEM 1	First Committee meeting – no previous minutes	
ITEM 2	Introductions of all attendees	
ITEM 3	Safety Moment – Jonny Shirley Arrow Life Saving Rules Overview	
ITEM 4	Overview of Terms of Reference – Bryan O'Donnell	
ITEM 4.1	Wording of section 2.3 Wording on section 2.3 was discussed. Amendment to read “consider opportunities to co-create a plan for co-existence for coal seam gas development on intensively farmed land” Decision: Committee agreed	
ITEM 4.2	Wording of section 3.4 The committee proposed to amend section 3.4 to allow land holders to nominate subject matter experts. Decision: Committee agreed Correct Stuart Armitage's name in the ToR	Bryan O'Donnell Tamika Glazier
ITEM 4.3	Wording on section 8.4 The committee proposed the wording to read “co-create a plan for areas which could allow coal seam gas development to co-exist on intensively farmed land” Decision: Committee agreed	Bryan O'Donnell
ITEM 4.4	Confidentiality and closed committee The committee discussed the subject of how to manage confidentiality. The use of a closed committee was proposed where if a subject is identified as being confidential it will be discussed in a closed committee, in a confidential manner where separate confidential minutes are taken. Members of the committee who feel conflicted and do not wish to participate in the confidential matter may nominate to leave the room. Action: Arrow to draft a closed committee section to be reviewed at the next AIFL Committee meeting	Glenda Viner

ITEM 5	Update of Arrow Activities – Bryan O'Donnell	
ITEM 5.1	<p>Land Access Rules Rollout – Julian Leonard The land access rules are currently in rollout across Arrow. There may be minor adjustments made to the rules as part of a continuous improvement process. The Land Access Rules are designed to apply to all Arrow employees and contractors to ensure the importance of sustainable and positive relationships with land holders.</p> <p>Action: Arrow to review vehicle identification options as well as the types and issues of identification cards.</p>	Darren Stevenson
ITEM 5.2	<p>Land Access Rule 10 Definition of wet weather for different land types</p> <p>Action: This will be an agenda item for next committee meeting</p>	Bryan O'Donnell Tamika Glazier
ITEM 5.3	<p>EIS Agricultural Study – Gerard Coggan (bullet points to be entered by Gerard)</p>	Gerard Coggan
ITEM 5.4	<p>Exploration Activities Review – Caoilin Chestnutt Action: Arrow to include a presentation on the exploration activities. Including summary of next 3 year plan including this year's pilots.</p>	Caoilin Chestnutt
ITEM 6	Land Holder Key Issues	
ITEM 6.1	<p>Discussion around the future plans of Arrow, and that the farms will look different in 20 years time. Land holders are constantly adapting to changes. The plans that Arrow develop and put in place will need to be revisited as the farms change over the years. Any development plans would need to be adaptable.</p>	All
ITEM 7	General Business	
ITEM 7.1	<p>Time commitment of land holders It was recognized that land holders would be required to invest a significant amount to the AIFL committee. The land holders noted that they did not want to be directly compensated for their time but would consider how the valuable contribution could be recognised.</p> <p>Action: Arrow to review expected time commitments and potential to address for the land holders prior to next AIFL committee meeting</p>	Arrow Energy
ITEM 7.2	<p>Farming enterprise visiting It was suggested there would be benefit in visiting different farming enterprises. Committee agreed that these visits would take place in association with future meetings.</p> <p>Action: Liaising with Jamie Grant</p>	Tamika Glazier
ITEM 8	<p>Next Meeting 3 November 2010, at Dalby RSL (To be confirmed)</p>	Tamika Glazier

There being no further business, the meeting was closed at 12:24pm

CONFIRMED AS A TRUE AND CORRECT RECORD.

Chairman

Intensively Farmed Land Committee Meeting December 09, 2010 – 09:30pm to 12:30pm

ATTENDEES:	Jamie Grant, John Cameron, Paul McVeigh, Stuart Armitage, Wayne Newton, Charlie Mort, Jeff Bidstrup, Bryan O'Donnell, Glenda Viner, Jonny Shirley, Andrew D Thompson, Gerard Coggan, Caoilin Chestnutt, Jason Schroder
	MINUTES: Glenda Viner, Gerard Coggan and Jonny Shirley
APOLOGIES:	Dave Armstrong; Julian Leonard; Darren Stevenson; Graeme Clapham

ITEM	DETAILS	ACTION
ITEM 1	Welcome and Thank you for attending	
	Safety Moment – Gerard Coggan Drive to conditions. Recent rain has contributed to 2 vehicle rollovers in the Dalby region.	
ITEM 2	Minutes of Previous Meeting No comment from previous minutes of meeting November 4 2010 Decision: Committee accepted previous meeting minutes	
ITEM 2.1	Outstanding Items from Previous Meeting Committee agreed to have to reorder agenda with Land Owner Issues to be item 4 and then continue as per the agenda.	
ITEM 3	Time Commitment by AIFLC member landowners Closed Session	
ITEM 4	<p>Landholder issues:</p> <p>Definition of wet weather Wet weather access was discussed as needing to be decided on a case by case basis. Some areas now may not be dry enough to access for up to 12 months. New crops will be required to draw moisture out of the soil.</p> <p>Review of IFL issues for access during wet weather Jamie Grant tabled photographs of his property and surrounds after recent heavy rains demonstrating levels of water lying on paddocks.</p> <p>Temporary gravel roads were discussed as a poor option for accessing IFL land as they could not be rehabilitated properly. Arrow noted its preference to use existing access tracks, however Arrow proposed that access roads, if built, would be either new permanent or modified existing access roads constructed in consultation with the landowner.</p> <p>Arrow advised that there are investigations ongoing on the potential to space production wells further apart to lessen areas impacted.</p> <p>Landowners pointed out that exploration and development phases both require heavy vehicles on paddocks. It was advised that exploration and appraisal phase should avoid sensitive areas and sensitive times of year. Cropping Tramlines were discussed as an option for access – which may require modification of construction and drilling equipment.</p> <p>Landowners pointed out that development agreements may need to be region based as a drainage change on a property can affect properties up to 12-15 km away.</p> <p>Arrow explained certain current operational wet weather contingencies:</p> <ul style="list-style-type: none"> • Spare capacity of wells to make up for lack of access to certain areas during wet 	

	<p>weather.</p> <ul style="list-style-type: none"> • Workover rigs only active in appropriate conditions and with landowner agreement. <p>Pipeline installation and placement discussed as being at least as significant an impact as access roads with the potential to affect drainage and introduce subsidence and mix soil layers. Spacing, alignment and ploughing in of pipelines were discussed as methods of minimising impact.</p> <p>Arrow indicated that a development would last 15-20 years. At this time wells are cemented and rehabilitated and the pipelines were decommissioned and left in place.</p> <p>An issue was raised concerning the Braemar 1 pipeline easement that affected the entrances into some of the wider community's properties. Subsidence has occurred and repairs are required.</p> <p>Any potential subsidence of the land due to any changes in the coal seams was discussed as having potential to affect overland flow on the floodplain.</p> <p>Questions were posed, and taken on notice, about what procedures are in place for a rig when they need to stop due to weather in the middle of a drilling operation.</p> <p>Compensation Compensation was discussed as needing to be a standard approach, however it was recognised that each enterprise may have unique aspects to be considered as part of the compensation agreement. The landowners advised the process should be clearer.</p>	<p>Jason Schroder Contact OSD (operator of easement) and inform them of the condition of the Braemar 1 pipeline route.</p> <p>Bryan O'Donnell Provide update at next meeting on what is being planned with subsidence.</p> <p>Jonny Shirley What is the procedure followed in the case of wet weather during drilling.</p>
<p>ITEM 5</p>	<p>Review of proposed management of core and chip holes on IFL Discussion around previous months' agenda item where the approach and mitigation strategies were identified and discussed in detail.</p> <p>On review, a number of necessary changes were identified as needing to be incorporated in exploration activity flow chart and it was proposed a new document detailing approach rather than mitigations would be beneficial to avoid confusion with non-IFL land practices.</p> <p>Arrow discussed the potential for a trial exploration hole on black soil (not IFL) which would be evaluated.</p> <p>It was agreed that the Committee would provide any further comments on the proposed management of core and chip holes to the Chair by Thursday 16 December 2010. Arrow will then update proposed management information and provide a final document for the committee to review for next Committee meeting.</p> <p>It was agreed that the committee can sign off on endorsement of proposal only, once approach is amended.</p>	<p>Jonny Shirley Document approach to carrying out exploration on Blacksoil to reflect mitigation measures already identified.</p> <p>Caolin Chestnutt Provide details of proposed trial to next meeting.</p> <p>All Provide comments on management of chip and core holes by Thursday 16 December 2010.</p>
<p>ITEM 6</p>	<p>Update on water management options</p> <p>The landowners raised the issue of what the long term water objectives were, how the information was progressing through the Arrow Community Reference Group (ACRG) to the IFL group and how input could be provided.</p> <p>Arrow discussed an overview of the information that had been presented to the Central Downs Irrigators meeting on Tuesday 7th December 2010. This covered the expanded water focused team in the Environment Department and its focus on:</p> <ul style="list-style-type: none"> • The water strategy and planning to keep water balance local with potential offset against other local sources. • New regulations and legislative requirements. • Water trials (irrigation, re-injection, groundwater monitoring) <p>It was noted that the Central Downs Irrigators had suggested that Cotton Australia should be involved in the monitoring of the Arrow trials and be able to visit the trials.</p> <p>Arrow has accepted that it needs to be part of the local water balance discussion and the ACRG has this as part of its Terms of Reference.</p> <p>Stuart Armitage made note that it was not the preferred option for discussion to occur at the ACRG group alone. It was discussed that the IFL committee will be informed by the ACRG committee. Stuart made a commitment to come to one more meeting and then reevaluate the</p>	

	<p>success or otherwise of the water issue being progressed.</p> <p>Further discussion centred on the IFLs role being to cover surface issues and the other committee to examine the local community including water balance issues.</p> <p>A water presentation was talked through by Andrew D. Thomson, Arrow. This was prompted discussion about:</p> <ul style="list-style-type: none"> • Brine, salt and Arrow's plan to dispose of or use in industry. • The reinjection trial. • Irrigation trial at Glenelg <p>The footprint of an RO plant was noted as being approximately 1 container with support equipment for 1 ML a day processing capacity.</p>	
ITEM 7	<p>Pilot wells and their potential impact on IFL enterprise</p> <p>Carried over to next meeting</p>	
ITEM 8	<p>General Business</p> <p>Jan Lafrenz thanked Arrow for the opportunity to participate in the AIFL Committee. Jan Lafrenz tendered his resignation from the committee stating that he had recently discovered Arrow Energy has no monitoring bores in the Condamine Alluvium adjacent it's Tipton West gas field. Therefore, no baseline data exists and no groundwater reports have been lodged after some 5 years of operation. He stated his alarm at this breach of community trust and legislative obligation. He also stated that the discussion around operations on Intensively Farmed Lands was of importance, yet could not be supported by himself while there was no action evident at this stage by Arrow Energy to disprove the landholders primary concern about negative effects on the Condamine Alluvium users. He closed by stating his preparedness to re-join this Committee once the relevant monitoring bores were in place, and twelve months of data from these was available".</p>	
	<p>Graeme Clapham has requested to be transferred to the ACRGC. Motion to support move tabled.</p> <p>Decision: Unanimously accepted by the AIFL committee</p>	<p>Bryan O'Donnell Terms of Reference to be modified to reflect reduction of committee members</p>
ITEM 9	<p>Next Meeting – 10 February 2011</p>	

Appendix 22

Invitation letter - Phase 3



5 November 2010

Dear Resident

Invitation to Surat Gas Project community consultation sessions 22 to 26 November 2010

Arrow Energy is hosting another series of community consultation sessions in your area for the Surat Gas Project. Our June sessions provided a great opportunity to discuss the community's key concerns and questions about the project and present Arrow's key commitments to you, including proposed areas and timing for our development over the next three to ten years.

Since then Arrow has been continuing its work on the Environmental Impact Statement (EIS) for the project. This EIS is examining all environmental, economic and social issues, plus potential impacts and benefits associated with the project.

I am writing to extend an invitation to you to attend this next round of community consultation sessions which will be held from 22 to 26 November 2010. Details of the sessions are overleaf; they will provide an update on the progress that Arrow has made over the last four months in addressing your questions and key concerns.

The sessions will include a short formal presentation of thirty minutes followed by question and answer time. There will also be opportunity for one-on-one discussion with the project team. The sessions are open to the whole community and refreshments will be available.

If you require any further information, and to assist with catering, please RSVP by contacting the project team on freecall **1800 038 856** or email suratgas@arrowenergy.com.au. Feel free to pass this information to anyone who may be interested in knowing the latest information about the Surat Gas Project.

Yours sincerely



Leisa Elder
Vice President Community and Corporate Affairs

Surat Gas Project community consultation sessions November 2010

Location	Date	Time	Venue
Wandoan	Monday 22 November	5.30pm – 8.30pm *presentation 6pm	Community & Cultural Centre 6 Henderson Road
Miles	Tuesday 23 November	10.30am – 1.30pm *presentation 11am	Leichhardt Centre Columboola Function Room Cnr Marian & Dawson Streets
Chinchilla	Tuesday 23 November	5.30pm – 8.30pm *presentation 6pm	RSL Sub Branch Heeney Street
Dalby	Wednesday 24 November	10.30am – 1.30pm *presentation 11am	Dalby Showground Pavilion Nicholson Street
Cecil Plains	Wednesday 24 November	5.00pm – 8.00pm *presentation 5.30pm	Cecil Plains Hall Geraghty Street
Millmerran	Thursday 25 November	10.30am – 1.30pm *presentation 11am	Community & Cultural Centre Walpole Street
Goondiwindi	Friday 26 November	9.00am – 12.00pm *presentation 9.30am	Goondiwindi Waggamba Community Cultural Centre Cnr Russell & Short Streets

Appendix 23

Arrow Presentation - Phase 3



Community Consultation Surat

November 2010



ARROW ENERGY

A QUEENSLAND SUCCESS STORY

- Queensland based company - Started in 2000, first gas sales in 2004
- Currently provides >20% of gas consumed in Queensland
- 50/50 Shell and Petrochina – 2 stable owners committed to safety, environment and long term relationships with stakeholders
- 500 staff in Dalby, Moranbah and Brisbane

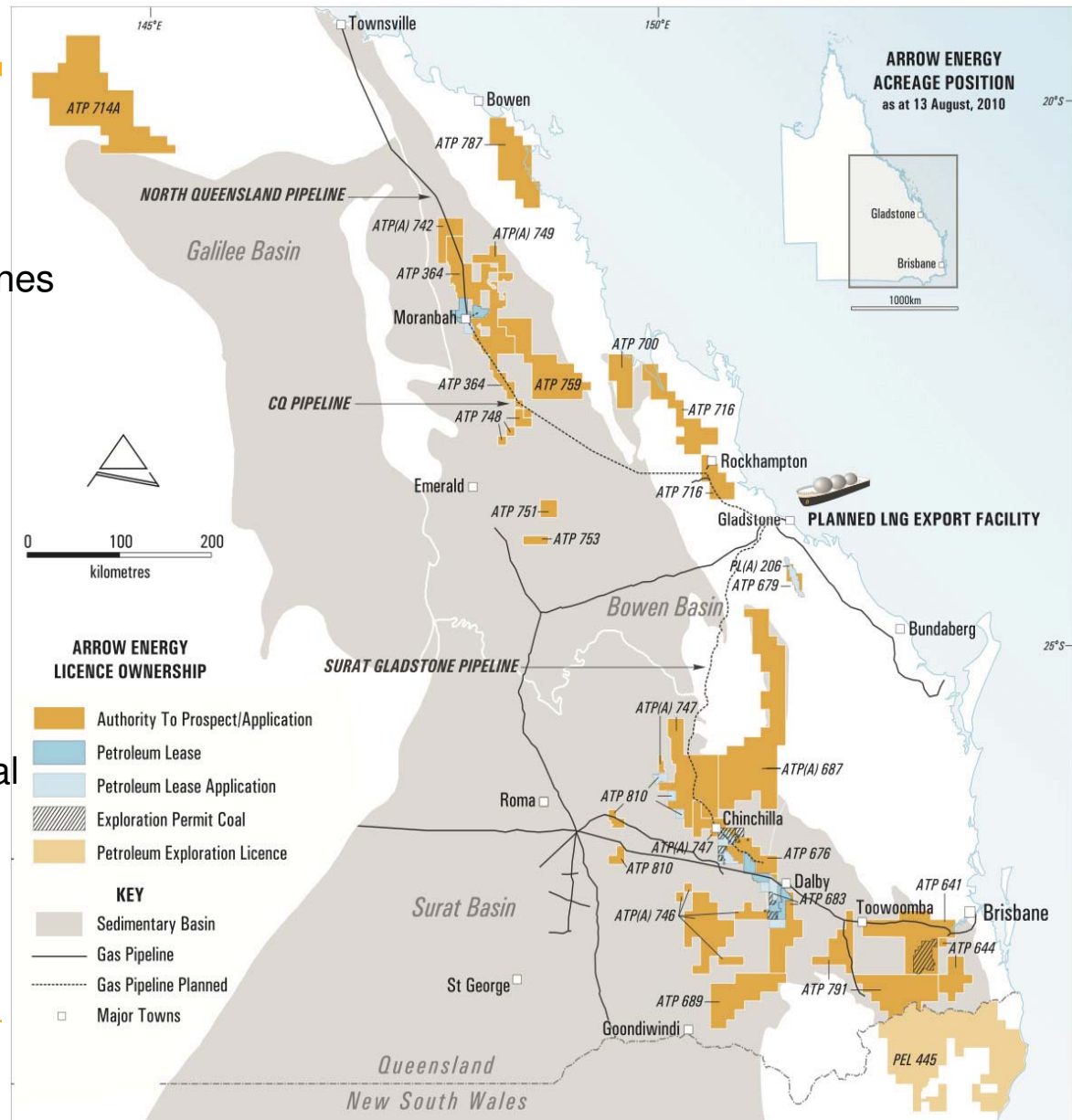
ARROW ENERGY

ARROW ENERGY ACREAGE POSITION



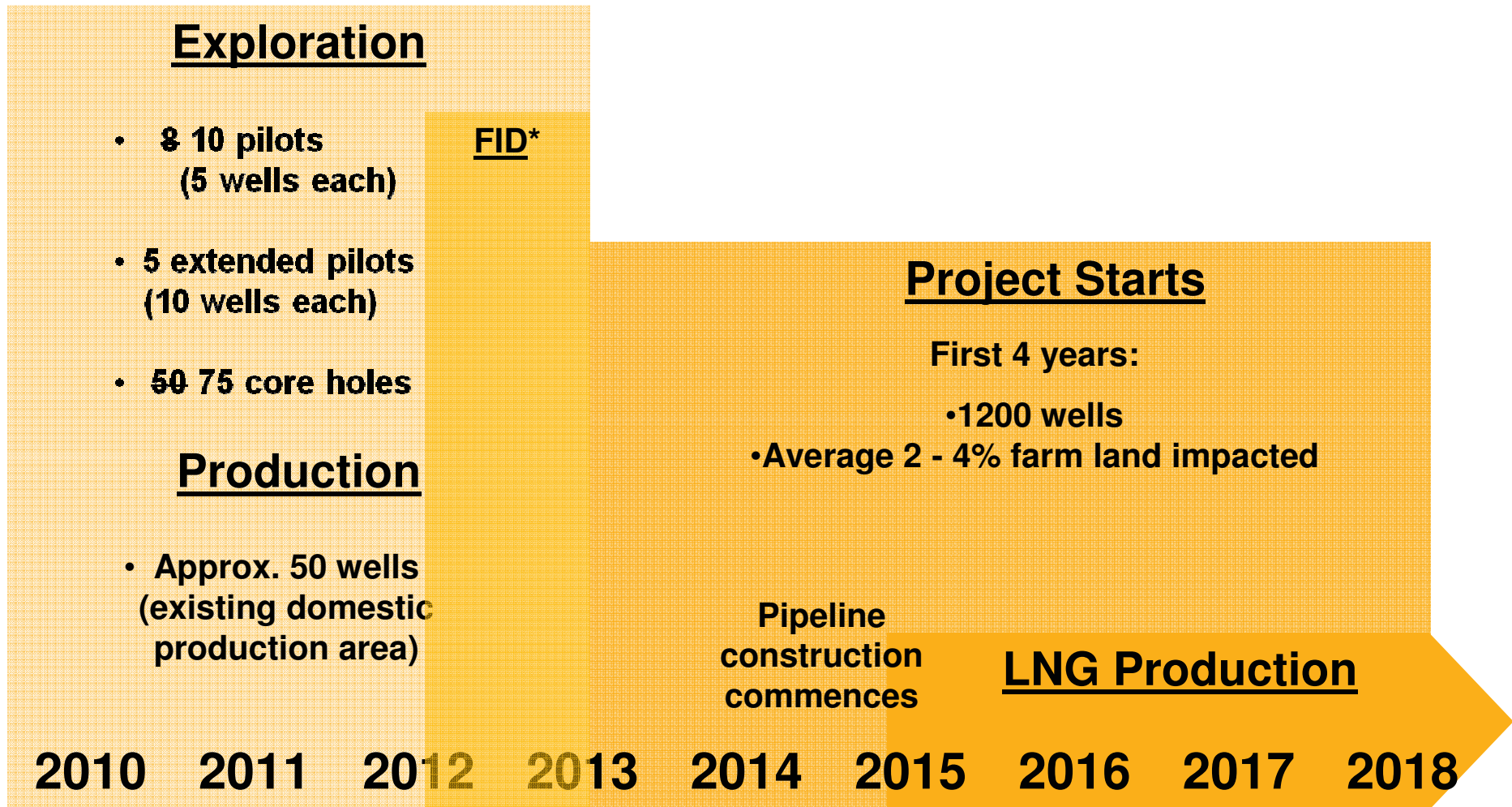
- Portfolio includes:
 - Domestic gas supply
 - Gas transmission pipelines
 - Electricity generation

- Future projects
 - Domestic consolidation
 - Export supply of gas (LNG technology has enabled access to global markets)



PROJECT UPDATE

CSG TO LNG PROJECT



* FID = Final Investment Decision

PROJECT LOOK AHEAD

SURAT GAS PROJECT EIS

EIS Process	Expected Timeframes
Lodged Voluntary EIS Application	Completed
Lodged Initial Advice Statement	Completed
Project determined a 'controlled action' under the Federal Act	Completed March 2010
Exhibited Draft Terms of Reference for <i>public comment</i>	Comments Closed May 2010
Arrow provided response to submissions to Government	August 2010
Final Terms of Reference from Qld Government	September 2010
Undertake impact assessment	Underway
Prepare EIS	Expect to complete Q4 2011
Exhibit EIS for <i>public comment</i>	Q4 2011
Qld / Commonwealth Government decision on project	Q2/Q3 2012

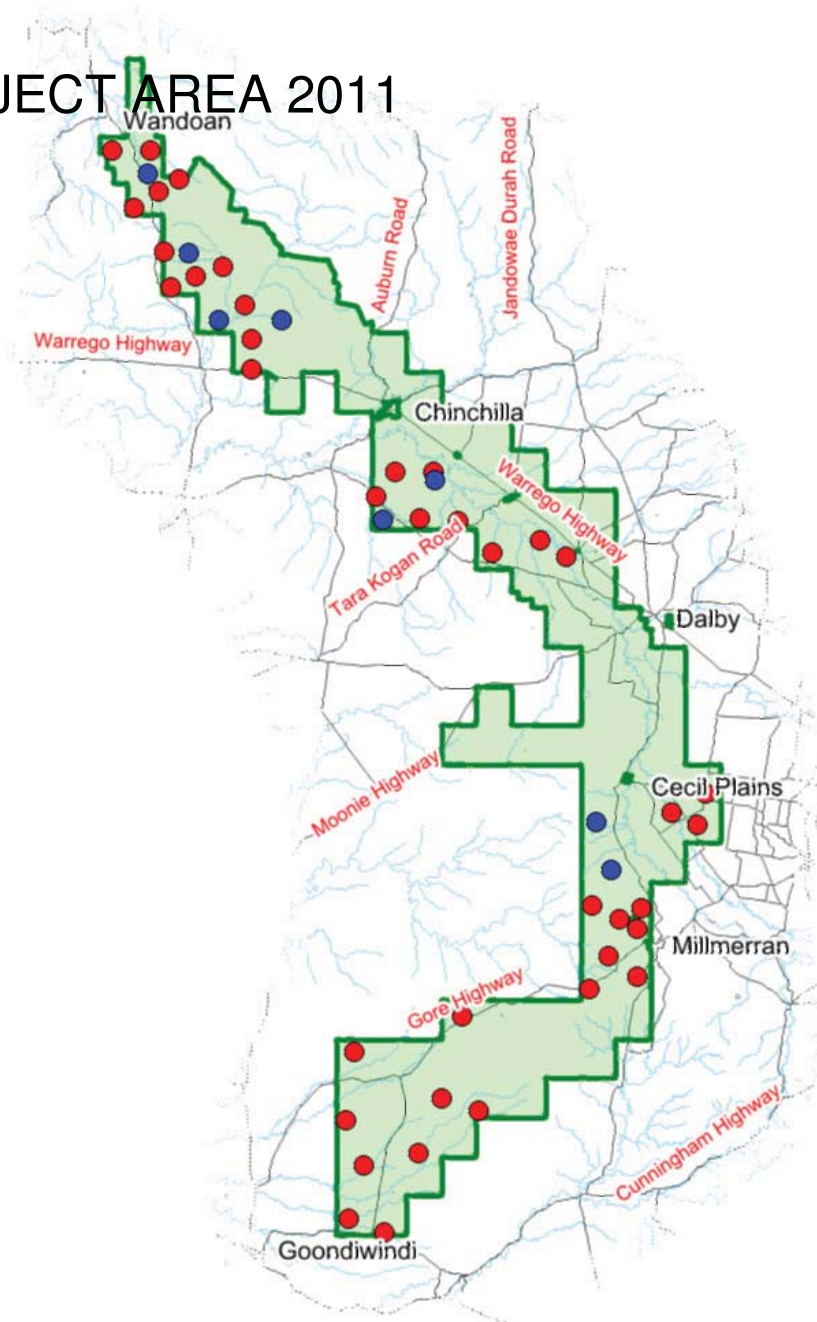
UPCOMING ACTIVITIES

EXPLORATION – SURAT GAS PROJECT AREA 2011

Exploration activities to confirm a viable gas supply for LNG production

Exploration involves identifying:

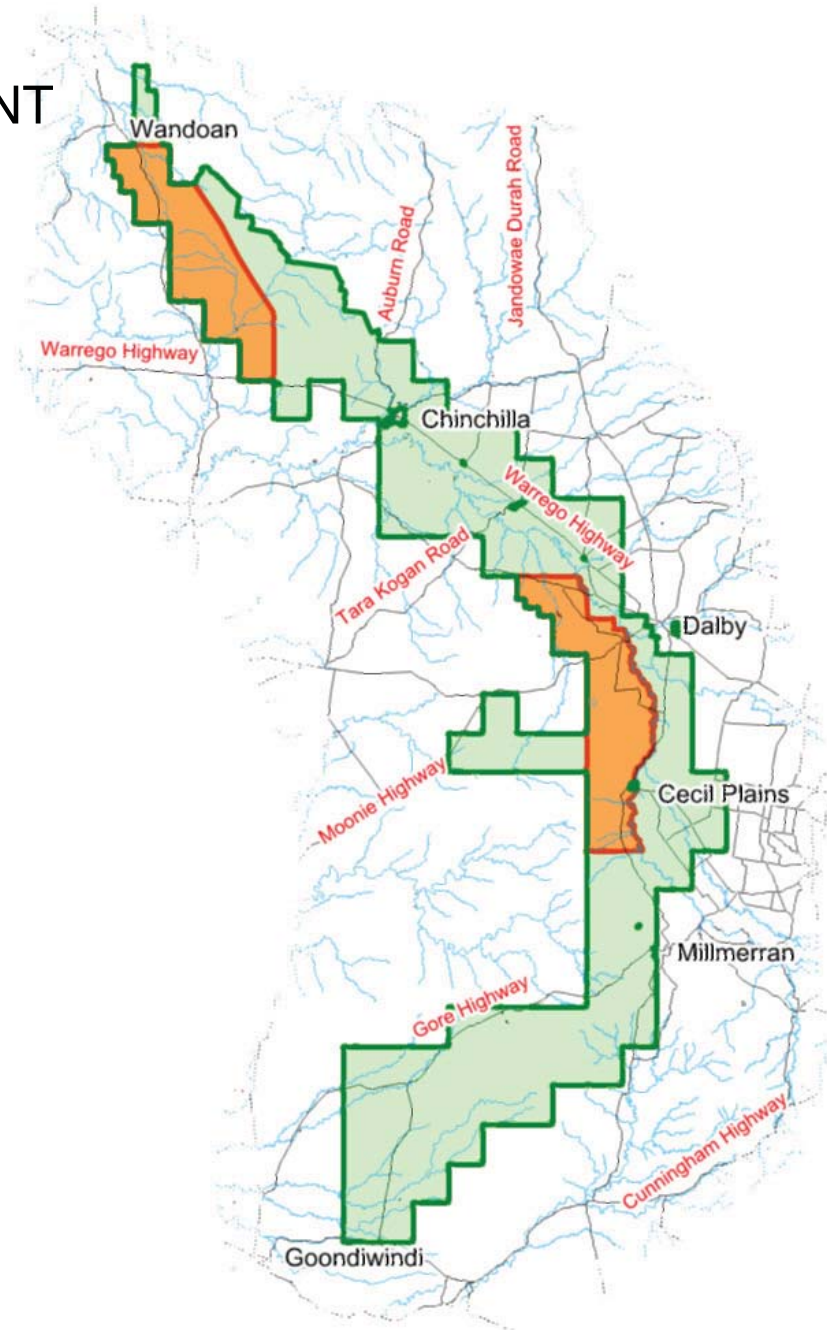
1. Presence, depth and extent of coal seams
2. Whether coals seams contain gas – core holes ●
3. Whether gas can be produced (brought to the surface) – pilots ●



UPCOMING ACTIVITIES

SURAT GAS PROJECT DEVELOPMENT

- Target area for development between 2013 and 2023:
 - approximately 2,000 wells
- Domestic wells (existing PLs):
 - About 15 wells over next 12 months



We've made some commitments to you.

- **Improved community and landholder engagement**
- **An open and honest dialogue about issues and opportunities with our stakeholders**
- Engage with landholders at least six to 12 months prior to production drilling
- **Adoption of a standard approach to compensation and land access**
- **No development on intensively farmed agricultural areas until concerns are properly addressed**
- **No construction of dams for coal seam gas water or brine on intensively farmed areas**
- Use of surface tanks not pits when drilling production wells on black soil
- **Development of a robust groundwater monitoring regime**
- **Prompt response to bore owners who report a reduced water supply**
- Construction of “fit for purpose” dams to government standards
- **Remove produced salt from the landscape**
- Work with regional communities to maximise community benefits & opportunities for local businesses
- Locate wells and infrastructure away from homes in consultation with landholders (minimum 200m)
- No hydraulic fracturing (fracking) in the area of the Surat Gas Project

LAND ACCESS

COMMITMENT: ADOPTION OF STANDARD APPROACH

- New Land Access **Code**

- We have adopted the standard **Conduct and Compensation agreement**
- **Best practice** guidelines for **communication**
- Imposes **mandatory conditions** regarding the **conduct** of activities on **private land**

- Current status of land access activities:

- Completed agreements in Surat approx. 130
- Agreements in negotiation approx. 40
- Cases before Land Court zero

- Arrow believes **good relationships** make good business sense.

LAND ACCESS

COMMITMENT: ADOPTION OF STANDARD APPROACH

- We accept our activities have an impact on landholders – we understand that your land is both your home and your livelihood.

- We recognise that development on land needs to consider:
 - **Where?** – we place our infrastructure
 - **When** and for how long? – amount and timing of site access
 - **How?** – we conduct our drilling and construction activities

- Our compensation is based on:
 - Landowners' time
 - Impact on operations and amenity (eg disturbance, loss of profit)
 - Change in value and or/use of land
 - Legal, valuation and accountant advice

LAND ACCESS

COMMITMENT: IMPROVED ENGAGEMENT

	<p>01</p> <p>Only enter a property with the approval of your supervisor, who has cleared access with the landholder.</p>		<p>07</p> <p>Do not interfere with the landholder's property, equipment or operations. Use approved tracks and laydown areas. Drive at less than 10kph within 200m of buildings. Leave gates as signed or found.</p>
	<p>02</p> <p>Only conduct activities that are approved within the access conditions.</p>		<p>08</p> <p>Do not take firearms, weapons, animals, illicit drugs or alcohol onto the property.</p>
	<p>03</p> <p>Follow the directions of the landholders. Report any directions that are not within the access conditions.</p>		<p>09</p> <p>Do not light fires unless authorised. Smoking is only permitted in the designated locations.</p>
	<p>04</p> <p>Report landholder discussions, complaints or incidents to your supervisor or Land Liaison Officer.</p>		<p>10</p> <p>Do not enter a site during or after wet weather without consent of the Land Liaison Officer (who has cleared access with the landholder) except in the case of a declared emergency.</p>
	<p>05</p> <p>Carry personal and vehicle identification showing that you are an employee or contractor of Arrow.</p>		<p>11</p> <p>Do not negotiate with landholders. Only Land Liaison Officers are permitted to negotiate activities and access conditions.</p>
	<p>06</p> <p>Keep sites tidy, ensure all rubbish is removed from site.</p>		<p>12</p> <p>Do not threaten or pressure landholders or other people on the property.</p>

- Established 12 **clear, concise and non-negotiable rules** for our staff and contractors
- **Mandatory compliance** for work-related activities
- Each reported **non-compliance** will be **investigated**
- **Failure to comply** may result in disciplinary action, up to and including termination of employment, or discharge in case of contractors
- **Supervisors are held accountable** to communicate and ensure compliance
- We will continue to improve based on feedback from the community

COMMUNITY ENGAGEMENT

COMMITMENT: OPEN & HONEST DIALOGUE WITH STAKEHOLDERS

- Arrow Surat Community Reference Group

 - Arrow Intensively Farmed Land (AIFL) Committee
 - *Purpose: To provide a consultative forum that, with regard to Arrow Energy's development of a coal seam gas resource on intensively farmed land within its tenements in the Surat Basin, can:*
 - *Effectively identify issues*
 - *Provide feedback*
 - *Consider opportunities to co-create a plan for co-existence for coal seam gas development on intensively farmed land*

 - EIS Agricultural Study to assess:
 - Current land uses and agricultural practices
 - CSG methodologies
 - what impacts and mitigations mean to agricultural activities

 - Development of formal complaints management system
-

CSG vs UCG

THE KEY DIFFERENCES

Coal Seam Gas

- CSG – naturally occurring gas
- 95-98% methane, trace amounts of Nitrogen and Carbon Dioxide
- Petroleum Activity
- Water and gas pumped *from* the well
- CSG has been commercially produced in Qld for 15 years

Underground Coal Gasification

- Ø UCG – synthetic gas
- Ø Composed of (in decreasing order) Hydrogen, Carbon Dioxide, Carbon Monoxide, Methane and possibly Nitrogen
- Ø Mineral Extraction activity
- Ø Oxidants pumped into well to sustain insitu combustion
- Ø Under trial to determine viability

ADDRESSING YOUR CONCERNS

DRILLING

- Arrow understands you may have concerns that drilling of numerous gas wells could interconnect aquifers or pollute them with chemicals.

 - Arrow's **safeguards** to prevent this from occurring include:
 - Well **construction** – wells drilled to a detailed plan with strong focus on quality of casing and cementing aspects

 - Drilling **fluid management** – proper management and use of drilling fluids and non-BTEX products

 - “Zonal **isolation**” – ensures aquifers remain separate, and do not allow cross-contamination

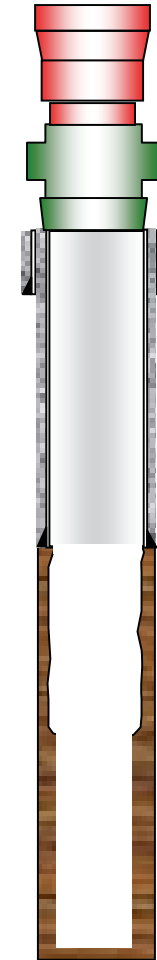
 - Well **integrity** – systems to keep check on the wells over their life

 - **Qualified** drilling personnel – required to hold accreditation from Australian Drilling Industry Training Committee
-

ADDRESSING YOUR CONCERNS

EXPLORATION WELL CONSTRUCTION

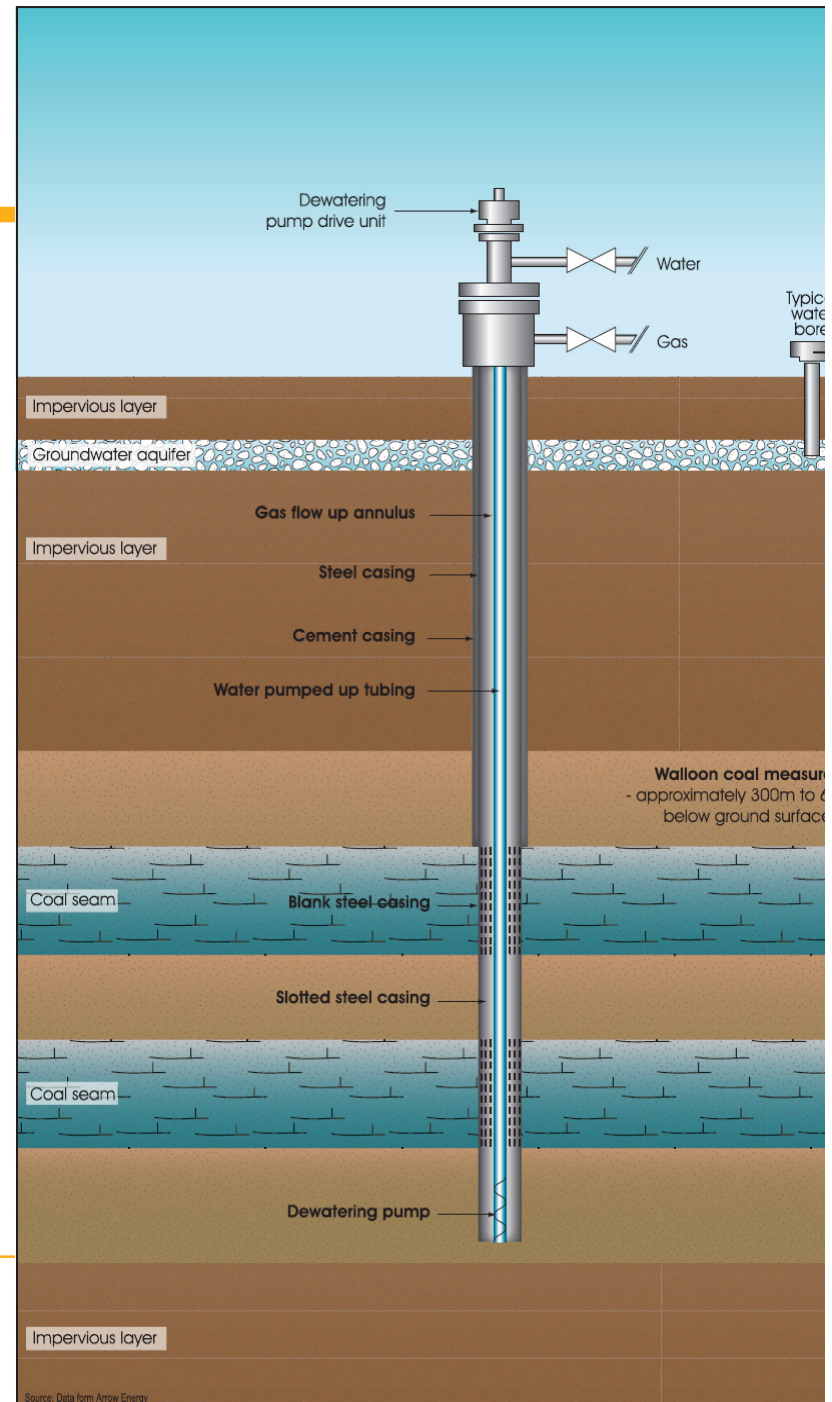
Section	Depth	Hole Size	Casing Size
Conductor	Base of gravel & alluvium	7 7/8"	6 5/8"
Surface	Into competent rock	5 1/2"	4 1/2"
Drill	200 m	4"	
Core	600 m	4"	



ADDRESSING YOUR CONCERNS

WELL CONSTRUCTION

- Wells drilled to a detailed plan
- Casing and cementing are extremely important
- Well must be water and gas tight
- At end of well life, well is plugged and rehabilitated to requirements set out in Petroleum Regulations (Schedule 3)
- Details of decommissioning recorded in report submitted to Government



ADDRESSING YOUR CONCERNS

BENZENE

- 8 November: minute traces of benzene detected in three of 60 water samples from Arrow Energy gas wells in northern Bowen Basin
- Relevant authorities and neighbours were immediately notified
- Further independent testing confirmed initial results
- More research is being conducted to determine if the benzene detected is naturally occurring or introduced by other means
- Benzene is one of the group of BTEX* chemicals, recently banned by the Government in CSG processes
- Arrow does not use chemicals containing benzene (or other members of the BTEX group of chemicals in its fracking fluids

* BTEX = acronym for chemicals group including benzene, toluene, ethylbenzene & xylene

ADDRESSING YOUR CONCERNS

GASLAND MOVIE

Key points of difference:

- Movie based on extraction of gas from shale in the USA – not gas from coal seams
- Australian CSG industry is subject to strict Government regulation with regards to environmental impacts, including water
- Coal seam gas is almost pure methane and does not contain ‘condensate’ which are lighter hydrocarbons (like butane, propane and ethane) found in conventional gas or shale gas
- Where Arrow uses fracking, we have historically used a range of 22 chemicals – no BTEX suite of chemicals – most recent frac wells use only two different types of chemicals;
 - Sodium hypochlorite (pool chlorine)
 - Acetic acid (vinegar)

GROUNDWATER

LEGISLATIVE CHANGES

- **Independent regulator** – Queensland Water Commission (QWC)
 - Arrow regional groundwater model
 - Groundwater **impact report**
- QWC **cumulative** groundwater model
 - **Impact report** – immediately impacted areas
 - Bore supply ***Impact Agreements***
- **Baseline** bore assessments
- Bore inventory
- Claims on reduced supply
 - Investigation
 - **Make Good Agreements**

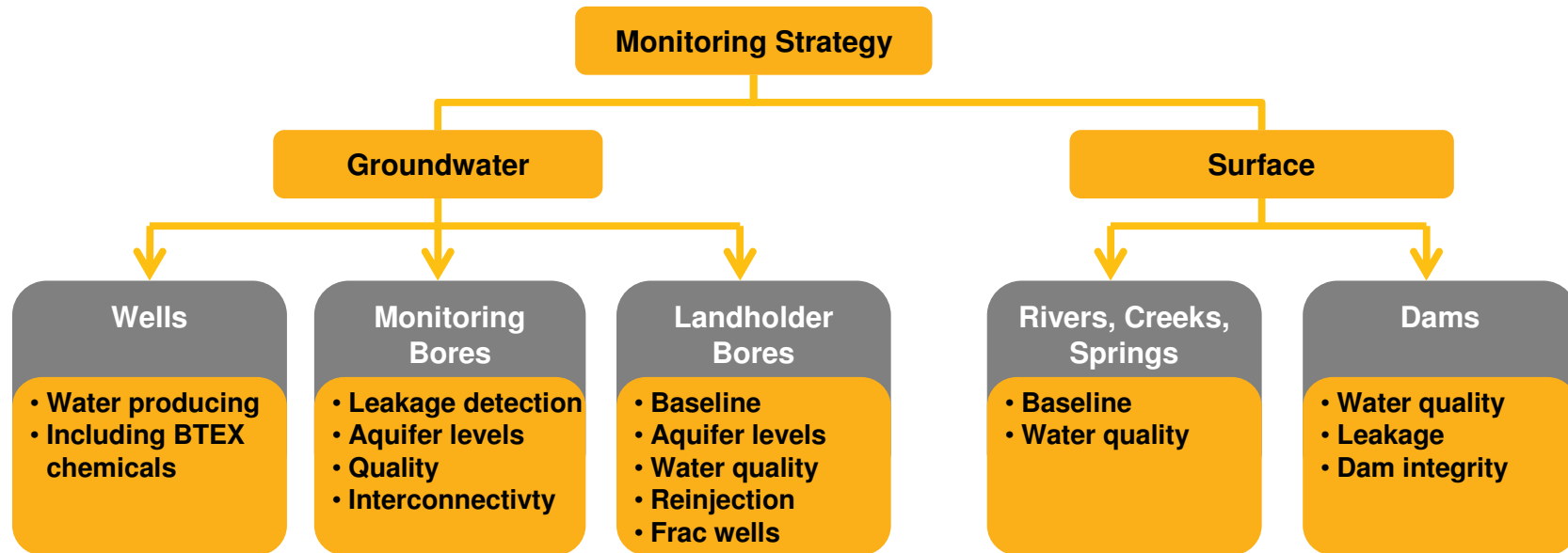
WATER AND SALT

LEGISLATIVE CHANGES

- Coal seam water **use and disposal**
 - Specific **approvals**
 - Injection, discharge, irrigation
 - **Recycled** water management scheme
 - Queensland **Health** water quality
 - **Risk assessment** apply for exclusion
- **Brine/salt** disposal
 - Commonwealth Government requires:
 - Injection
 - Commercial beneficial use
 - Disposal into a regulated landfill
 - Arrow has previously **committed** to the removal of salt

WATER MANAGEMENT PROJECTS

MONITORING & MODELLING



Monitoring Program

- **Leakage detection** systems for dams
- Developed a field layout for **new bores**
- Land access and **approvals**
- **Resources** for the extended program

Groundwater Model

- **Review** of model developed early this year
- **Scenarios** for Arrow Energy LNG Project
- **Collaboration**
- QWC **cumulative** groundwater model

WATER MANAGEMENT PROJECTS

SURFACE INFRASTRUCTURE

- Tipton Reverse Osmosis water treatment plant
 - **Concept** study complete
 - **Design and construction** of water treatment system
- River Road/Glenburnie Pipeline
 - **20km** water pipeline to join 2 pilots to the Tipton RO plant
 - Aim to locate along road easements wherever possible

Daandine dam liner installation



- Dam upgrades
 - Dam **specifications** for Arrow operations
 - Work program for **upgrade** of existing dams
 - Work to commence in **2011**

WATER MANAGEMENT PROJECTS

BENEFICIAL USE & DISPOSAL

- Injection
 - Seeking approval for **trial**
 - **Treated** water
 - Into **Precipice** at Glenelg
- Irrigation Trials
 - Theten, Glenelg and Moranbah
 - **Research** to understand **sustainable** application
- Water balance
 - Objective to keep water **within the local area**
 - Exploring opportunities and approvals necessary to **substitute entitlements**
 - Dependent on:
- **Injection** trial
- **Irrigation** trial
- **Approval** framework



Questions & Answers

CONTACT DETAILS

- Freecall: 1800 038 856
- Email: suratgas@arrowenergy.com.au

Appendix 24

Summary of Q&A sessions - Phase 3



Surat Gas Project

Community information sessions 22-26 November 2010

In November 2010 Arrow Energy held a series of community information sessions to discuss the Surat Gas Project. Questions and answers from those sessions were captured by JTA Australia and are presented in this document.

The purpose of these meeting notes is to reflect the questions asked and answers provided during the community meetings. The notes are based on a written record of the questions raised and include some paraphrasing and summarising; every effort has been made to preserve the integrity of discussions. Where the same or a similar question has been asked in other sessions, the most complete answer has been provided.

Questions varied across the seven sessions. To ensure that valuable information is shared throughout the communities of the Surat Basin, these notes summarise questions and answers asked across all sessions.

The Surat Gas Project community information sessions were held from 22 to 26 November 2010 at:

- Wandoan 22 November 2010
- Miles 23 November 2010
- Chinchilla 23 November 2010
- Dalby 24 November 2010
- Cecil Plains 24 November 2010
- Millmerran 25 November 2010
- Goondiwindi 26 November 2010.

The project is Arrow's largest gas exploration and development program in the Surat Basin. The proposed project involves continued exploration in the Basin to identify the most economic and environmentally acceptable areas for future gas production. The areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration.

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. Where one response to a commonly-asked question was more comprehensive at one session than another, the more detailed response has been used in the interests of better understanding. In some cases, additional information is included to provide further context or explanation; this information is in brackets within text, or italicised following the answer.

Arrow will hold another round of consultation sessions in the first half of 2011 to update the community re progress on the various issues raised. Arrow will release further information closer to the time. If you have questions or comments about the project, the meeting notes or you would like detailed maps, please contact the project team during working hours on:

freecall 1800 038 856

email: suratgas@arrowenergy.com.au

post: Surat Gas Project, Reply Paid 81 Hamilton QLD 4000

Acronyms

BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CSG	coal seam gas
DERM	Department of Environment and Resource Management
EA	environmental authority
EIS	environmental impact statement
LNG	liquefied natural gas
QGC	Queensland Gas Company
QWC	Queensland Water Commission

Conversions

1 kilolitre = 1,000 litres

1 megalitre = 1,000,000 litres

1 gigalitre = 1,000,000,000 litres

Queensland Government Acts mentioned:

Petroleum and Gas (Production and Safety) Act 2004

Mineral Resources Act 1989

Water Act 2000

Water Safety (Reliability and Supply) Act 2008

Wandoan

Date:	22 November 2010	
Venue:	RSL Sub-branch, Heeney Street	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice-President Operating Services	Arrow Energy
	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Leisa Elder, Vice-President Community and Corporate Affairs	Arrow Energy

1. I was interested in the result of the water tests from the Origin Talinga Environmental Authorities (EA) and the effect on the Condamine. The list included mercury, lead, uranium and BTEX (Benzene, Toluene, Ethylbenzene and Xylene) chemicals. Are these found in coal seam gas (CSG) water in your areas?

Mercury, lead and uranium are naturally occurring elements and are found in trace amounts in most parts of the earth, including the sea. Modern testing techniques can pick up incredibly minute amounts of these elements. However, its concentration level is most important. Apart from natural occurrences, in many areas there will be a legacy of the introduction of such elements into the environment via human activities.

In the past we haven't normally conducted detailed chemical testing of coal seam water samples; however, we are moving to that stage given the amount of water that is likely to be produced, and recognition that it is a matter of concern to the community. Our approach to date has been along the lines that since coal seam water has been used in this region for many years before CSG came along surely its effects would have already been seen if there were any.

The BTEX issue is somewhat similar, in that in spite of recent media attention in relation to fracking in the USA Arrow has not fraced in the Surat Basin so we haven't tested for its presence. We are now conducting testing for BTEX as a matter of routine, and would point out that benzene, for example, can be naturally occurring in hydrocarbons. Benzene is present in high concentrations in exhaust from petrol combustion, and is also present in, or produced during manufacture of, many man-made products.

2. Do you test each bore when you drill a well?

We have tested most of our wells as we drilled them. However, the extent of analysis has changed and in the future we will test more than previously. The testing is more focussed on usability of water i.e. salt and other elements in the water. With regard to BTEX chemicals, Arrow hasn't fraced in the Surat Basin therefore we haven't tested for these chemicals. Benzene was found in the Bowen Basin and the sources of benzene can be natural or from the drilling process e.g. the grease used. With regard to water testing, Arrow is expanding its program on producing areas at the moment. The Department of Environment and Resource Management (DERM) has taken samples from dams and reverse osmosis plants and a lot of people take water from the Walloon Coal measures as we do and the water isn't particularly nasty.

3. 'Make good' is a great concern if it is decided that CSG has impacted the water supply over a period of 15 to 105 years. If a bore deteriorates after the incursion of gas activity, how will you make good? A DERM representative in Wandoan said government will not guarantee to issue a licence from the Artesian Basin on the basis of make good arrangements. Who decides? What do you have in mind to make good?

The onus is on Arrow to investigate such matters as:

- testing the bore to see if it is functioning
- understanding the regional area through modelling
- determining if any impact is from the CSG industry as it may be seasonal, drawn down over time and from other industries
- satisfying the Queensland Water Commission (QWC) that we've met our obligations.

There are a number of options for 'make good' e.g. domestic or stock supply where you don't need an allocation. Finally, if you are unhappy with a decision it can be appealed through the QWC and the Land Court.

The specific answer to 'who decides' is the Queensland Water Commission. 'Make good' includes various means to replace, restore, supplement, substitute or otherwise maintain a groundwater water supply and/or associated infrastructure.

4. But you must have a licence, there are no volumetric allocations?

No entitlements will be forthcoming. It is important for us to look at the water balance model. Reinjection is an option and substituting some supplies would mean less strain on other aquifers. We are looking at a number of mitigation measures.

'Water balance' refers to the concept of maintaining the gross amount of water in a region, i.e. water both above and below ground in that same region over the long term. Put another way, it does not consider 'disposal' of water in terms of deliberate evaporation or transport to other regions. The distribution of water in the region may change temporarily while we are pumping it from coal seams, but the amount of water will not.

Pumping of CSG water is not managed by a licence in the same way that irrigation entitlements may need a licence, but is still very heavily regulated and controlled by government.

5. What happens if the bores go down, do cattle die?

We are fully conscious of the absolute importance of water to agriculture and grazing activities. If our activities were creating conditions that would lead to such dire circumstances then, apart from putting in place preventative measures in the first place, we would stop and then work out how and/or if we could resume works without causing harm.

6. You don't monitor our bores daily comment

7. If I sell my property, who is responsible for informing the new purchaser of any agreements I have with Arrow?

The transmission pipeline will be an easement on a land title. Compensation is not be listed on a title but the petroleum tenure is. A solicitor will find that information when doing searches for the purchase of the land, or you could contact Arrow directly.

8. Does Arrow contribute to the local council for road maintenance?

Yes we contribute to the Western Downs Regional Council for a road maintenance program.

9. How do you differentiate between intensively farmed land and legume land?

The difference between well-managed pasture and intensively farmed land is not about what effort goes in to farming the land but the impact of the CSG industry. A floodplain is the biggest indicator of intensively farmed land and has the biggest impact. Other lands are not as fragile as floodplains.

10. There's no irrigated land in this area (Wandoan) at all, but wheat land is still good farm land.

We agree, and recognise the value of all the differing forms of land use across this district. We think that our proposed developments can be planned and managed in such a way that they cause minimal lasting impact on the land.

- 11. The contractors laying the export pipeline of Queensland Gas Company (QGC) are proposing double jointing 18 inch pipes which require the pipe to be moved along the pipeline easement rather than local roads. If this was the case with Arrow will you go back and renegotiate with the landholders who have compensation agreements with you and compensate them commensurate with the extra traffic that will be required to allow that process to happen?**

Yes, if there is change to the disturbance on a particular property such as double jointing Arrow will revisit the landholder and compensation will match the increasing impacts.

- 12. Does Arrow have a community investment program? If not, why not? If so, how does it work and how do we get in contact with it?**

Yes, Arrow has a program in Dalby which is being extended to Moranbah; it will be on a much larger scale in 2011 and will be made public in the New Year. You can call 1800 038 856, email communityinvest@arrowenergy.com.au or visit the Arrow website http://www.arrowenergy.com.au/page/Community_Information/Community/ to find out more. It includes the Brighter Futures program which looks at health and education and other matters. We invite people to put forward their plans for consideration.

- 13. I live on an 80 acre piece of land near Chinchilla and Tara. In regard to what's in the water that comes up with the gas, and extraction and drilling processes, how long have you been in the industry?**

Eight years in the CSG gas industry and seventeen years in the coal mining industry (response from the speaker, Tony Knight).

- 14. When did you realise in those seventeen years that BTEX was carried in coal?**

A couple of weeks ago when we did some recent testing in Moranbah.

Arrow suggested that the profile of the BTEX group of chemicals has been raised very quickly in recent times, stemming from concerns raised overseas. The time lag between recognition of its potential presence in Queensland, measures to check for its presence, and a ban on those products which may contain it, has been very short and a credit to the government agencies involved.

- 15. When you plug a well after it has finished its production life and you cement it, does the cement last forever?**

It's certainly long-lasting cement but as for forever, it's hard to say because the industry hasn't been around for that long. However, it certainly lasts decades if not more than that. The cement is underground and not in an oxidising environment so that once the well is sealed and backfilled oxygen cannot get in. Degradation of that material will therefore take a very long time.

- 16. In 2516 will it still be plugged up nicely?**

I can't profess to know that, no one can.

- 17. It's taken millions of years to get to this point where human beings can extract water from the aquifers, and if we are going to compromise that in the next 50 years, without knowing what it's going to be like for the next 1000 years, it doesn't make sense to use this cement that you don't know will last 50 years.**

Structures that people have created such as Pompeii, the Pyramids etc. are thousands of years old; some of those contain cement and are still standing today.

18. At what point will humans not need aquifers?

We will need aquifers. What we are putting into the ground is solid material, it can't go anywhere, it's a plug that will sit there.

Today on the radio, Mr Henry, the (*then*) Treasury head asked why we are rushing to get all this coal and gas out of the ground because in 100 years' time it will be gone? Why doesn't the coal and gas industry stagger extraction to prolong the life of the resource?

Australia has huge coal and gas resources which will last hundreds of years. That is not the case around the world. Countries like China, India and other developing countries have growing populations and they have a demand for this energy which is the driving factor. We will see a transition to other fuel sources, perhaps ten, twenty or forty years away. We will have to cover supply until then until we have a better system in place.

19. Reading from your publication *Water and Salt Management* as a minimum standard, Arrow will remove the salt it produces and dispose of it in an approved and regulated landfill outside the operational area. Where is there a regulated landfill, I haven't heard of one? It wouldn't make me happier to know that Arrow is taking that landfill and putting it on our next door neighbour's land or taking it out of the area or even into NSW. Outside the operational area would seem to be irrelevant. The other calculation that concerns me is that there is 5,000-8,000 kg of salt per megalitre of coal seam water. The amount of salt is a very large amount, a 15 hole pilot plant is expected to produce between one to three megalitres per day of actual outflow. The calculation of between 5-24 tonnes of salt per day from 15 holes means we are talking thousands of holes. Where will we have regulated landfills with sufficient capacity to store the salt generated by any or all of the CSG companies, and will there be enough that are big enough?

In answer to the question about 'where is a regulated landfill' the regulator (DERM) has a process to review and approve applications for waste disposal sites. An example of a non-regulated waste disposal site can be found at <http://www.derm.qld.gov.au/register/p01312aa.pdf>. It follows that a site could be established at a suitable place, provided it met regulatory requirements.

Arrow's preference is not disposal but beneficial use of the salt. We are looking at a commercial market for the salt, and are working with other companies to attract a suitable chemical company to establish an industry based on use of the salt. Clearly the management of salt will be critical, and there will be times when salt may need to go in temporary landfills that can be accessed in the future.

20. How can we have confidence in the safe storage of the salt knowing that it may take a lot longer and there may be more salt?

For the period of time it is in our dams we have strict requirements for construction of the brine storage dams. This includes secondary containment systems, leak detection and seepage return systems if there is a leak. Annual audits must be done by third parties and the integrity of dams are assessed and certified at that particular point in time. There are strict requirements on regulated landfill, similar to agricultural chemical waste and we need to meet the same design standards as those particular landfills so that salt is contained. There are some industries closer to Brisbane that currently take salt but they wouldn't have the capacity yet for what is required by the CSG industry.

21. Our generation has been in trouble for mass tree clearing and we have learned through land care to have better management and cannot legally cut down trees. Why does the gas and coal industry get away with it?

We are in the same situation when it comes to vegetation clearing, we are not exempt. We have to get approvals as you do.. The *Nature Conservation Act* and protected plants

regulations all apply to us. We need specific approvals if we do need to clear some vegetation, whether an endangered regional ecosystem or some other protected species; in those circumstances we are required to enter into an offset arrangement. We have hired a team of botanists and ecologists who are sent out to each site before we clear any well sites, gathering line sites, and any pads for any construction we want to do. We need a record of that clearance and we need a licence.

22. I'm concerned about plastic lined ponds as we have found with QGC's ponds that animals have been sliding down and drowning. The ponds should be well fenced and materials put over the plastic to allow animals to get out.

We fence our ponds both when in use and during construction of the dams as well. It's a requirement of the Environmental Authority (EA) that they must be safe for livestock and native wildlife. We install 'critter' mats to enable them to get out of the dam.

23. In this week's *Country Life* farmers are very nervous about CSG and the water situation. I believe the Environmental Protection Authority (EPA) doesn't have any teeth to fine the companies who pollute or make mistakes or bugger up the water system.

That is something the government has to deal with. The government has been recruiting more compliance people. The risks for us in being found guilty of causing environmental harm are very serious, and consequently something we take very seriously. The impacts on our business can include fines, loss of tenure, difficulty or inability to obtain new tenure, reputational damage for lenders etc. All these make running our business difficult if not impossible. It is not something we want or choose to do.

24. In Mt Isa there is a situation with raised lead levels in the kids' blood. Originally it was stated it was probably not caused by the mine but now the doctors have said it is linked to the mines and the company concerned says it has complied with government regulations. In years to come, if it is the same situation with Arrow, will you take the moral high ground and stop doing something you are allowed to because it will cause harm, or will you hide behind government regulations? Will you take steps above and beyond what you have to do to ensure public safety?

Yes, if we are having an impact on people's health we will stop that activity.

Miles

Date:	23 November 2010	
Venue:	Leichhardt Centre, Columboola Function Room	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice-President Operating Services	Arrow Energy
	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Leisa Elder, Vice-President Community and Corporate Affairs	Arrow Energy
	Iain Burgess Project Manager Central Qld Pipeline	Arrow Energy

1. You mentioned compensation for landholder's time, is that prior to the Land Access Compensation Agreement being signed? Can you elaborate please?

We do make provision for the time involved in discussing and agreeing the terms of access as part of our compensation agreements

2. Is it a standard procedure that Arrow uses?

Yes, we recognise that it is essential to discuss various matters when talking about compensation.

3. With the disposal of salt and brine, where will you take it if you can't sell it? It's your responsibility not to contaminate the river systems.

In answer to the first part of the question, Arrow would take it to a regulated landfill site. There is a process to work through with DERM that would allow different sites to be considered as potential landfill sites. So it may be the case that the site doesn't exist yet, but Arrow could, with the right environmental considerations, develop one in future. Re the second comment, we do not plan to dump salt in a river as a solution.

4. The water pipeline will go down stock routes and road reserves and this can be detrimental to the environment. There are some very good stock routes in Taroom Shire which we don't want plugged up with pipelines. What is Arrow's plan?

It is very unlikely that we would simply choose to follow stock routes and road reserves as the normal situation is to try to make the pipeline as short and direct as possible. The plan with pipeline locations is to select a route that causes the least impact while maintaining the most direct line. Don't forget pipelines are buried so it is possible for cattle to graze above them.

5. The dams, and dam reconstructions, aren't evaporation ponds are they...because they have been phased out?

Correct. The government is forcing the CSG industry to a water solution that favours 'beneficial use', and to find ways that maintain the overall balance of water in a region, rather than removing it from the region. Evaporation, because it effectively 'removes' water from a region, is not preferred and large evaporation dams are being phased out.

6. What amount of gas needs to be extracted from a hole for it to be commercial and how much water is extracted at the same time?

The simple answer is that there needs to be enough gas extracted to cover the capital investment and operating cost of the well; in the same way that any investment needs to return a profit. We work on a rule of thumb that each well should return at least one to two

petajoules of gas. Most of the gas from a well is recovered in the first seven years or so of its life although gas will continue to be produced for up to fifteen or twenty years.

The amount of water extracted will vary over time. The peak water production period is early in the well life, and it declines quite rapidly over its lifetime. In the Surat Basin some wells can produce 1,000 barrels of water a day or more (one barrel is about 160 litres), although this drops down to about 100 barrels a day or even less after a fairly short period.

- 7. When negotiating agreements with your company, you have a whole lot of power but individual landholders don't have the same capacity as your company. We don't want to go to dispute so this will push us towards settlement. When you set up in an area couldn't you get all the farmers/growers together and provide the names of all the farmers in our area and negotiate group agreements? You labour the point that the government is involved but it is nothing but a facilitator to the gas industry. We don't think government is on our side. We would have financial support if we could gather together; we don't want to see the Great Artesian Basin destroyed.**

We most certainly try to use a standard approach to negotiation and compensation so in effect we do treat landholders who use their land in a certain way (e.g. cropping vs grazing) on the same basis. We wouldn't be against the idea of collective negotiation, just as long as people understood that, depending on various matters such as the degree of impact on land, the land use etc, that different amounts would be payable.

Re the comment about government, you can be assured that it takes very seriously its duty to represent the interests of both industry and community. It is trying to find a solution that provides a 'win-win' situation, where both sides can get on with their business without stopping or harming the other.

Re the Great Artesian Basin, we need to keep in context the size and complexity of it, and not simply assume that the actions of the CSG industry can destroy it. The GAB covers most of Queensland, and extends into the N.T and S.A. It has all sorts of inputs, and suffers all sorts of impacts, and it is unfair to say that the CSG industry alone will somehow destroy it.

- 8. If you drill where there is surface water or bores, does your company propose testing the water? Would you pay for independent testing?**

Yes, we clearly recognise the importance of, and concern for, groundwater and will make sure that we gather information about it from all sources. The whole debate about water needs facts and good science, and part of that is sampling and testing.

We will pay for testing that links into our broader program of understanding and studying the groundwater system. We won't just test bores in isolation, since random points will be meaningless unless we also understand the history, water use regime, seasonal fluctuations and other relevant considerations.

- 9. Will you give results prior to drilling? I would like to know the quality prior to you entering my property. If I would like a series of tests prior to you undertaking drilling, will you do independent testing?**

We will talk to you about that at the time of discussing access and compensation. We are required to obtain certain information from landholders about bores, and the information is then shared with the government (via DERM and the QWC). We are also obliged to do water sampling if you believe we have impacted your water bore.

- 10. With compensation for time given by a landholder, do you have a fee structure, an agreed rate, a standard format in train?**

This will be built into the compensation agreement. It's not *carte blanche* where one landholder contributes 1000 hours and another 10 hours; there is a standard amount of time for the preparatory work.

11. We have 400 megalitres of storage and some of the catchment is outside our property boundaries but is bore-driven. My concern is if we don't have testing in place prior to development what proof do we have that there is any impact?

Those baseline assessments will be done prior to drilling and the ongoing monitoring should give you comfort. If there is a change in the waterline or an indication of some impact then we will undertake more sampling. We will sample if you think we have affected your dam. The difficulty is the number of dams and water courses out there. We don't need to carry out additional monitoring for each landholder.

12. Therefore there is nothing in train at the moment?

There are very few areas we operate in at the moment. As we expand, the same program of testing will be implemented.

Arrow is still very much in the exploration and environmental investigation stage of its works. We don't have widespread production just yet, and our works at this stage are mainly about setting in place the right testing and monitoring systems.

13. Our water supply is stored perfectly safely but I get the feeling that as the CSG process goes on, the artesian water will decline. You are offering treatment of the water coming out and infrastructure will be established. However, I think there will be no compensation as the government thinks the water belongs to it. I don't think you could replace it. You could truck it in but what are the alternatives? We know it will drop and water quality will deteriorate, it's just part of the deal.

Our aim is to preserve the overall balance of water in the region, both surface and groundwater. The challenge we are currently investigating is how we can conduct our activities and not have a detrimental impact on current land use. If our works, or our future monitoring, showed that we are having an impact (or could do so), then we either would not start or would stop.

I would ask that people give us the chance to complete our studies of how the water balance can be managed, and then decide on the basis of facts. Arrow is not rushing this process, and is taking the time to get the right information, and the right answers.

14. All landholders should be met and negotiated with as one entity. You pick us off one at a time, we should stick together. Legislation is drawn up by the state government which is broke and errs on the side of the gas company. Arrow was on our property eight months ago and cleared 50 acres of prime timber. If I'd cleared half an acre I would have been in the Magistrates Court. The state government wants every cent it can get. There's one rule for you and one for us. The Surat Basin project will end in tears for everyone. Companies will get into deep strife and will go into liquidation.

We understand your concerns. With regard to one rule for us and one rule for the community, we are burdened with lots of legislation. We don't get special treatment. We have to go through a rigorous process to clear land and engage botanists, cultural heritage experts etc. We have to look at environmental impacts and we consult independent groups. We are bound by the *Nature Conservation Act*. The government is trying to balance the needs of the community with trying to create wealth for the state. The issue is that the industry has grown faster than the wheels of government can turn. Different CSG groups meet government regularly here. You should give government some credit; it has resourcing issues, money issues. There shouldn't be a negative view of government as it tries to balance the interests of all parties, including those trying to develop new industries.

In addition to government requirements, we have a very rigorous internal process before a financial investment decision is made. For example with groundwater there is a detailed plan for flow monitoring and what we would do if we see changes. We would put mitigation measures in place to maintain the water balance. Regardless of government requirements, we won't take that risk. We have to be confident that we can manage the impacts.

With Shell and Petrochina, reputation is a big deal. They have all sorts of projects they could spend money on and they wouldn't take the environmental risk. You should have some confidence in the company; it wouldn't make sense for Arrow to take that risk.

15. There's a risk that the company could go belly up?

I can't imagine any scenario where these companies could go belly up, since Shell and Petrochina are in the top ten biggest companies in the world. They can't just run away from an issue, as it would prevent them from being trusted or allowed to undertake new projects, either elsewhere in Australia or internationally. Big companies do not run away from problems. As an example, BP in the Gulf of Mexico cleaned up and compensated for the effects of its oil spill. BP is paying out billions to get the community back on track.

16. A number of years ago we freeholded our properties which gave us rights and responsibilities. Since then we have seen our rights eroded by government; why is it that CSG prospecting rights can't be eroded? Why can't we receive compensation too for prospecting and receive royalties?

The Crown owns the gas or mineral rights under the land, and is the only party able to demand a royalty. We only have a right to explore or produce subject to government approval.

CSG prospecting rights are eroded. The right to explore is bound by very strict conditions to relinquish ground on a regular basis, and production leases have a finite life. Also government can take away the right to explore or produce if we are found to do the wrong thing.

In terms of compensation, we do compensate for coming on to your land, whether it be to explore or produce gas. We are familiar with the 'royalties for regions' campaign, but it is outside our control and we can't influence it.

17. Nobody wants to buy our properties because they have been devalued. Why can't there be some royalty payments that would increase the property value?

The royalty issue is for government to address. In terms of property value impacts, in the Bowen Basin some properties are advertised with gas wells as another source of revenue, and this is used as a selling point. In those cases there is a compensation payment every year so there is a benefit which can carry people through hard times.

18. I have two gas pipelines through my property and the lack of maintenance is shocking. The APA Group (APA) own the pipeline and have caused erosion and introduced noxious pests without compensation. We end up having to clean up their rubbish and get nothing in return.

As a pipeline owner we have responsibility to maintain the pipeline and our own integrity management system requires this. Erosion caused by the pipeline would be our problem to rectify.

The pipeline is the key asset linking our fields with the liquefied natural gas (LNG) plant. The integrity of the pipeline is very important to us. Employing the landholder to monitor it is something we would consider and we could enter into an agreement to compensate you for fixing it (if that suited both parties). With regard to noxious weeds, our plan is to start pre-emptively, spraying weeds before construction to stop the spread, not least because it only

causes maintenance problems for us. We also take routine measures such as washdown and inspection of vehicles before they enter properties.

19. Will you wash down your vehicles?

Yes, we wash down our vehicles. This topic is discussed in the Land Access Code developed by government, industry and landholder representatives.

20. As part of the Land Access Code, it is your duty of care to stop the spread of weeds so the landholder has the right to ask for proof. Where do you access your water for washdown?

We either bring water in or else establish an arrangement with the landholder for access to water. A special washdown facility is created, including temporary washdown facilities. We use various means to minimise vehicle traffic onto properties too in order to reduce the chances of spreading weeds.

21. You will need drillers. Will you import skilled workers or will they come from the community?

The preference is to use local workers but it is a social issue about where Australians want to live. We can encourage people to live in certain towns but we can't force them. We can provide encouragement and endorsements. In the Bowen Basin a lot live in Moranbah and in Dalby a majority are locally based and live in the town e.g. diesel fitters, farmers' sons, main drillers and we also have hired staff to live locally. Key contractors have encouraged staff to live in town. For development in the future we would look at the most suitable base; this could be Miles or Wandoan as they have the necessary facilities.

22. Legislation requires that the landholder has to prove the company intended harm before compensation is paid?

Under the *Petroleum and Gas Act* the basic principle is that the landholder cannot be worse off. The burden of proof is not on the landholder. We agree up front what the compensation will be before works commence.

23. It's been in the rural press.

We will check on that, but would also point out that the media does not always properly research and report the facts of every matter, which I am sure will come as no surprise to many people.

24. The first thing that APA did on pastures was to grade the land where the pipeline went through.

This is one of the reasons why we like to hire locally because locals understand land use.

25. Shonky contractors have been employed for maintenance work; they cut chains on gates when they don't bother to get the key to open it.

There is a selection process for Arrow contractors as we do not want that sort of behaviour. If there is a breach of one of our land access rules we would investigate and it could result in dismissal. We are aware of the contractors you are talking about. Those are culled out at the first point. This is a \$2 billion project and is very important to us so we don't want contractors of that nature.

26. With regard to royalties for the 300,000-500,000 cubic feet, how much do you pay to the government?

We pay 10% of what is termed the 'wellhead' value of gas produced. This allows for deduction of the costs of establishing the well, in the same way that most businesses can claim against income in some form.

27. Benzene might be in coal, is that right?

Benzene can occur naturally in hydrocarbons, and coal is a hydrocarbon. The amounts are likely to be very low. It is worth noting that research has shown that some soft drinks contain benzene, and that most of us will be exposed to benzene each time we are exposed to exhaust fumes.

28. You are saying it won't be a big thing; if you bring up water, how contaminated will it be?

People have been using water from coal seam aquifers for a long time so we believe that the real test has already been conducted. If there was naturally occurring benzene at levels that harmed people or the environment then the problem would have well and truly been evident in the Surat Basin by now, and certainly well before the CSG industry started.

Apart from the fact that we believe the contamination will be either zero or extremely low, we isolate the water and monitor the chemistry of that water and it is contained, treated and managed. We would not release contaminated water.

29. With regard to insurance, what happens if someone gets injured on our property?

The liability is with us. If people are on your property on our behalf the responsibility is on us. We are bound by government regulations and the responsibilities are under our tenure. It extends to injuries whether environmental or to people. It's not linked to the landholder.

30. We had an environmental man drilling through a neighbour's fence; lights were shining day and night.

We do not intend to drill on small one acre blocks but away from homes at a minimum distance. If it is outside our boundary zone we would look at the impacts and have barriers around drill sites.

31. I can't get any information from anyone about burning coal seam gas. What is the procedure and how long do you burn gas to see if the well is viable?

There is no specific answer because it depends on the behaviour and results from the individual pilot wells. As a guide, the pilot testing phase typically takes one to two years and therefore it would be burning for that length of time.

Chinchilla

Date:	23 November 2010	
Venue:	RSL Sub-branch	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice-President Operating Services	Arrow Energy
	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Andrew Faulkner, CEO	Arrow Energy

1. How many people here tonight have been compensated for their time?

We do build in compensation for time given in discussing land access agreements but not for community consultation events.

2. What is put in with the water used for drilling? If you ruin the underground water supply either by polluting it or diminishing the supply, how will you make good?

The drilling additives we use are natural products, e.g. cellulose and bentonite which are naturally occurring plant products. We will put them onto our website and show what the products are.

With regard to making good, that depends where you are in relation to the activities and the extent of the activities. We are trying to understand how the aquifers respond to our activities and are monitoring their behaviour. We want to understand the changes over various aquifers before there is a significant impact. If the impact is too great then we won't continue our activities; we must prevent this from occurring.

3. You mention that contractors have been dismissed, shouldn't you have an up to date mapping system? (This question referred to previous information provided by Arrow to the community).

We have publicly said we have made mistakes before; we are upgrading our geographic information system at the moment.

4. Lie number 1 was that more than one vehicle entered my property and washdown wasn't done? (This question refers to a long standing incident with one particular landholder. The matter has been raised and addressed both directly and in previous consultation sessions)

We have written and apologised to you and have donated monies to the school of your choice. You have spoken to the CEO of Arrow and it wasn't appropriate the way you spoke to him. We have had many discussions and I thought we had closed this issue off.

5. With regard to overlapping ATPs , how can we find out who else has ATPs over our property?

You can't have overlapping Authorities to Prospect (ATPs), but there can be overlapping petroleum and mineral tenures, since they are provided for under two different Acts. Coal companies such as Cockatoo and Xstrata can have mineral tenures over your property, and at the same time there can be petroleum tenures. You can find this information on what was previously the DME (Department of Mines and Energy) website and now is DEEDI (Department of Environment, Economic Development and Innovation): http://www.dme.qld.gov.au/mines/tenure_maps.cfm ; this is an interactive mapping system. The websites are also on the fact sheets. The Department will carry out property searches.

You can also contact the Department of Mines in Dalby, 07 4624 1512 (Janet Hogarth, Mining Registrar) janet.hogarth@deedi.qld.gov.au.

6. Because there is no legal distance required for you to be away from a residence, is there any legal framework stopping you from putting a drilling rig in the car park here?

We need to comply with the safety provisions of legislation based on minimising risks to as 'low as reasonably practicable'. On the grounds of safety alone we would not choose to drill in an area such as a carpark.

7. Do you make tens of millions of dollars per year out of each well?

No, absolutely not. Coal seam gas wells do not produce a huge amount of gas per well, which is why we need so many. However, this means that the amount it costs to drill the well versus how much we get for the gas in return only provides a fairly slim margin. We certainly don't make tens of millions per well.

8. We have a common interest in underground aquifers, especially in agricultural areas and you can't be surprised people are very concerned. The drawdown on accessible aquifers is well known. There will be a pin cushion of 40,000 wells and you can't believe every aquifer is cemented off from the drawdown of CSG water. How do we know about the interdependence, how much do we know about the sediments and contamination. There are real concerns about the succession of aquifers and that the Great Artesian Basin will never be reinstated.

We are very aware of the importance and sensitivity about water and the Great Artesian Basin. We strongly believe that the way we design and construct our wells ensures that they will not allow connectivity for water.

We are also very conscious of the need for good science and facts in understanding water, and things like connectivity of aquifers. We are doing this work now as part of our EIS studies. However, due to the sheer size and complexity of groundwater regimes and the GAB, no one can ever be 100 percent sure about how they will act over time which is why we are committed to putting in place monitoring systems. That way, we can check and adapt our activities based on real findings.

As a company, we fully understand that we need to get this right, and that if we don't, or we stuff it up, then we don't have a project or a business. We are sure that we can get the necessary answers.

9. With regard to tenure, access and compensation, some landholders don't own leasehold land. For a million dollars and upwards there is a contribution to the Crown for tenure security. If compensation was realistic landholders would be encouraging companies onto their land; clearly we are not being compensated enough. As you convert to freehold tenure all rights are taken away by the Crown and you only have interest in the topographic layer. Our tenure doesn't have mineral or mining rights. There is a community obligation to pay \$1,000,000 for security of our tenure.

It is clear that ownership of minerals and the rights of the Crown are not things within our control. The Crown has ownership of the minerals and petroleum, and Arrow pays the Queensland Government for the right to explore for petroleum. We can't pay landholders royalties on gas we produce, but we do pay compensation.

In terms of the amount of compensation, we are running a business like many people here do. We can only pay a certain amount, and we use independent valuations to work out what is a fair price for the impacts we have on the land or business. Our aim is to achieve a fair balance between the interests of landholders, who as you say own the top of the land, and

the interests of the government which wants the economic and social benefit that comes from extracting valuable mineral and petroleum resources. We believe that with good planning and conduct, and with a long term view of 15 – 25 years, that we can come in, recover the gas that society wants, and then leave the land in much the same way as we found it.

10. Have you as much ready access to state forests, stock routes, roadways, national parks etc as you do to freehold land?

No, not in these areas. National parks are off limits and roadways present safety hazards. Stock routes are normally subject to native title so provided we can reach agreement with relevant native title claimant groups it may be possible to develop on stock routes. We would note though that our developments are not necessarily huge in terms of impact e.g. one well in a stock route will take up only a fairly small area.

State forests are also subject to native title in most cases, or they may be earmarked for conversion to National Parks so we may or may not be able to develop in them.

There is not one rule for us and one for you. The government plays an even hand in trying to manage the interests of both the community and business.

11. In a 100% cropping area, how can we not be worse off with wells and gravel roads through our cultivation land? We have spent hundreds of thousands of dollars on machinery.

That's a challenge that we have. We have set up the intensive farming committee and we have twelve landholders as members who grow cotton and other crops. We are trying to work together to see how that can be done.

We 100% acknowledge that there will be some impacts. A couple of per cent of your land would need to be taken up by infrastructure, tracks etc, and we would have to compensate for loss of land use.

12. It's not just compensation, gravel roads are impossible for us to farm around.

We understand the particular issues around cropping land, with laser levelling, overland flows and so on. We are trying to find a way to make our developments work in those areas, and we don't underestimate the challenge. We are still working on ways that might work, so can't give specific answers just yet. We will work with the Intensively Farmed Land Committee to check whether any solutions are viable.

13. The property next to me has wells and it is 100% cultivated land.

14. The EIS is pathetically weak and no one does checks and balances. Invertebrates aren't included and since the clearing of land for mining in this country, 200 flora and 23 fauna species have been endangered. Will mining companies take note of our fauna and flora?

Invertebrates are definitely part of the EIS process. We will be looking at ecosystem types, habitats and different species. In terms of other mining companies it is difficult for us to comment. Our activities are tightly controlled under the *Nature Conservation Act* and we are required to have offset agreements on impacted land at fewer than one for one.

15. That's not true as was proved with QGC with three endangered species. Mining companies don't respect the EIS. We need more checks and balances. Australia has the highest rate of extinction in the world. Mining companies need to take note of flora and fauna, especially with regard to road kill.

We can't comment on other companies but Arrow is committed to the issues you raised. We are happy to add you to our consultation process and can give you access to the technical studies.

16. Can anyone explain Section 804 of the *Petroleum and Gas Act*?

We will take that on notice.

Section 804 (Duty to avoid interference in carrying out authorised activities) of the Petroleum and Gas (Production and Safety) Act 2004 stipulates that a petroleum authority cannot interfere with another person undertaking lawful activities. It states:

a person who carries out an authorised activity for a petroleum authority must carry out the activity in a way that does not unreasonably interfere with anyone else carrying out a lawful activity.

Maximum penalty 500 penalty units.

17. Have you ever thought of using a silicon lining inside the drill casings to prevent gas leaks when the ground moves? It's used overseas.

We are always looking at new technology and are open to ideas from relevant applications overseas. We will investigate this further.

18. I'm talking about the upside of the casing where there is ground movement.

We are confident that with correct construction our wells can withstand the normal range of ground movement due to saturation and drying or swelling of soils etc.

19. You need to research better on coal gasification, some of the facts you said aren't true.

20. You said a wellhead safety program has been initiated by government. Can you give me the number of wells that have leaks around them?

We have had three leaks. The leaks occurred above ground, and caused only very minor gas leaks that we have since repaired

21. From your knowledge, there are no leaking wells now?

No, we have had three leaking wells. Our position is that since the above ground section of wells is constructed of items that need maintenance and replacement from time to time, then there is a chance that they will leak. That is why we inspect our wells on a regular basis, and 'work them over' to replace the moving parts that operate below ground.

We have not had any leaks evident from sources below ground. We cannot speak for other companies.

Dalby

Date:	24 November 2010	
Venue:	Showground Pavilion	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice-President Operating Services	Arrow Energy
	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
	Other speakers:	Andrew Faulkner, CEO

- 1. We live 12 km west of Dalby and have 12 wells on our property which aren't hooked up yet. We had three gas leaks but didn't know we had them as you can't smell the gas. You must tell people that you can't smell it. The direction came from Brisbane not to tell the landholder. Everyone in this room needs a licence and you won't answer the government's question about the registered waste water. You say you are changing your spots, why not be honest?**

Yes we did have some leaks; these occurred above ground and were fixed very easily. We accepted the feedback and developed a program of awareness for gas safety which we are rolling out for all landholders before gas is produced.

- 2. You won't answer the government's question. You have registered waste and a petroleum lease over our property; there is no requirement for Arrow to take that waste and there are no coordinated arrangements between leases. People need to be aware you are doing this and getting away with it. There are different leases and pipes going through it which is illegal.**

The water produced from coal seams is considered a registered waste, even though it is a natural product that has been produced from many water bores for years. The law around CSG water and its handling, transportation and disposal is changing, and more regulation is being put in place. In the instance you refer to we erred in regard to a legal technicality, whereby we believed that we could transfer water between two adjoining tenements without the need for a coordination arrangement. This was shown not to be the case; it was inadvertent, and we would argue was an understandably easy problem to create.

- 3. What about PL194, you don't own that?**

All water at Kogan (PL194) goes to Wilke Creek mine. Under 'beneficial use' approval arrangements with government and coal companies, the water is used for coal washing and the government allows for a change from CSG to mining use.

- 4. Will that water ever be used for irrigation?**

The current plan is not to do so.

- 5. The Water Group Advice on EPBC (Environment Protection and Biodiversity Conservation) Act Referrals states that the management and sustainability of the Great Artesian Basin is a serious concern. The best case scenario for total water extraction is 307,000 megalitres or approximately 45,000GL (gigalitres) which is more than predicted by the proponents.**

- 6. Both the proponents (QGC and Santos-Petronas) intend to lower groundwater pressure in the Walloon Coal Measures by at least 400 metres over most of the area to approximately 30-35m above the top coal seam in the Walloon Coal Measures. I am**

concerned how confident you are about the amount of water involved. Can you please address concerns about subsidence and other issues and government approvals of your industry?

The EIS process is the mechanism we use for the government to judge us, to gather and analyse information that will then be used to assess the project, and ultimately determine if it should proceed, or else be modified to proceed on certain conditions.

We are still in the investigation phase, and well behind QGC and Santos in terms of project approval. We are currently studying aquifers, and carrying out groundwater monitoring to see how the aquifers will behave.

Our preferred approach is to put in place systems that maintain the regional 'water balance' whereby water we extract is returned to the environment, whether at surface or below ground, so that overall there is no net loss of water. There may be short term impacts on some aquifers, but we would hope that in overall terms we can maintain the balance.

The government is putting in place better systems and regulations all the time. Its knowledge is growing, just like ours, and by being the last proponent then we will likely wear the highest level of regulation and control.

7. I'm worried about the devaluation of properties on your map of the development area. If you are in the orange area shown are you going to talk to the individual landholders regarding wells and infrastructure on their property?

We are definitely interested in, and committed to, talking to those landholders. We are talking to both landholders and financial institutions about the impacts. We haven't had an assessment yet of potential land devaluation and have seen some strong sale prices in the Bowen Basin. Some people there have been selling their properties and advertising them with gas wells because it enhances their income stream.

8. Can you tell me this method of CSG extraction is safe? *This question was addressed to the CEO of Arrow*

Safety is an Arrow priority. Our intent is that the processes for CSG extraction meet all property safety requirements; it is our objective and priority.

9. QGC's environmental application stipulated 100m x 100m for drilling and, if fracking, a further hectare of land. Do you envisage you require a similar amount of land?

No, we don't frac. We have already trimmed the well footprint to 70m x 70m at the time of drilling and the well closure is around 8m x 12m when we've finished drilling the well.

10. Will you give a written guarantee that you will not frac?

Yes. Note too that a commitment not to frac in the Surat Gas Project area has previously been publicised.

11. Have the properties in the orange area on your map seen how BP handled things in the Gulf of Mexico, Shell in Africa. We also know the impacts in China and PNG and a lady from India was saying how the industry was affecting that country. You say safety is your main priority, whose integrity is it, yours or do other people check? How does your company really provide a guarantee that the work is done with integrity when you know that contractors will do whatever to get the job done? Who monitors them?

There is independent checking with integrity safeguards when the wells are drilled. Gas wells are an absolutely fundamental part of our business so if the cement is not installed correctly and the well leaks then it's a waste of money. We take a strong interest in managing the drilling and well construction process, and careful management of our drilling contractors is a crucial part of the business. It is fundamental e.g. pre-drilling and pre-cement

job meetings are held before a well is drilled, cased and cemented. Once a well is drilled our crews check them on a regular basis.

(From Andrew Faulkner (CEO) How do you get confidence we operate safely? I've spent four to five years in Nigeria and have twenty-eight years experience in the oil and gas industry and my first role at Arrow was to strengthen the health, safety and environment standards with corporate safety strategy and procedures, independent checks, audit plans, audit competence and better management of contractors.

12. How will you power the wells...from the electricity grid?

We use either of two methods. One is a gas-fuelled generator which sits on a pad next to the well site, and runs on the gas produced from the well. The other method is to bring electricity to the well by overhead lines. The benefit of the electric drive is that it is quiet, whereas the generator does not have powerlines.

13. Does the Queensland Government do any onsite auditing of the well drilling process?

The government has the right to conduct audits. Today the government established a new department which includes an enforcement unit with conditions they are required to work to (see extract from DERM website below)

**14. Minister for Natural Resources, Mines and Energy and Minister for Trade
The Honourable Stephen Robertson**

Groundwater resources protected by new CSG laws

25 November 2010

New legislation passed in State Parliament tonight strengthens the protection of Queensland's water bores and natural springs near coal seam gas projects, Natural Resources, Mines and Energy Minister Stephen Robertson said.

The new provisions, contained in the Water and Other Legislation Amendment Bill 2010, will sustainably manage the impacts of groundwater extraction, the Minister said.

'The amendments deliver on our Blueprint for Queensland's Liquefied Natural Gas Industry, and are part of our commitments to protect groundwater resources,' Mr Robertson said.

'These amendments assist in achieving a balance between the development of the coal seam gas industry and environmental sustainability.'

Mr Robertson said the Bill amends the Water Act 2000 to require resource companies to ensure that landholders in the vicinity of any extraction operation continue to have access to a reasonable supply of water.

'These companies are required to mitigate or manage the predicted impacts on both existing and new water supply bores as a result of groundwater extraction by entering into 'make good' agreements with bore owners prior to these impacts occurring,' Mr Robertson said.

'The amendments also provide a dispute resolution process and establish offences for petroleum tenure holders who fail to comply with their obligations.'

Mr Robertson said the changes introduced a strong groundwater management regime to manage any possible impacts on water supply bores and natural spring ecosystems from the extraction of underground water by gas companies.

'These companies are now required to produce an underground water impact report at least every three years, which will be subject to public consultation,' he said.

Mr Robertson said the amendments give a new role to the Queensland Water Commission, as an independent management body, to oversee the monitoring, regional modelling and reporting of impacts on underground water for a declared cumulative management area.

The Bill also includes amendments to the Water Supply (Safety and Reliability) Act 2008 to ensure recycled water from the coal seam gas process is subject to the stringent requirements of Queensland's recycled water legislation.

'Companies involved in CSG extraction are now required to develop an approved recycled water management plan if they propose to release water into a watercourse, aquifer or town drinking water supply,' Mr Robertson said.

Other conditions imposed on the companies include internal and third party audits of their recycling operations and a requirement to make water quality information publicly available.

The introduction of the new laws today follows the announcement yesterday by the Premier Anna Bligh of a 36-strong new LNG Enforcement Unit based in local communities as an integrated one stop monitoring and enforcement service.

The Premier also announced \$3.5 million in funding over the next three years to AgForce to help landholders effectively negotiate with the CSG industry.

Other Government initiatives to monitor possible affects on water from the CSG industry include:

·A \$5 million Healthy Headwaters program to assess the opportunities and risks associated with using CSG water.

·The independent QWC is developing a regional groundwater model for the Surat Basin

·A new land access framework which outlines rules and compensation guidelines for negotiations between resource companies and landowners.

15. When you carry out the bore monitoring, does that include the many unregistered but legal bores?

Yes, there are thousands of wells and we are required to look at them all.

16. You say you are not allowed to frac as part of the EA so do you anticipate that well spacings will be closer and if so at what distance?

It's not a matter of not being allowed to frac, the geology just makes it unnecessary. We only frac if we have to, where the permeability is low and it is difficult to extract the gas.

Well spacings depend on the permeability. At the shallow points the wells are further apart at 800-1200m. As the permeability decreases, the well spacings decrease.

17. Therefore it's somewhere between 800-1200m?

Yes, that's what we are working on at the moment.

18. The state government has not legislated a minimum distance from homesteads?

We have put in place a minimum distance of 200m but that's under consideration because of a whole lot of factors. It depends on the conditions, hours of work etc. When the wells are

near houses in the Bowen Basin we use barriers such as sugar cane; there is no light or noise and the impact of the drilling process is minimised.

19. Closer than 200m?

No.

20. You mention making good and trigger thresholds for areas of domestic use and irrigation but how do you differentiate your impacts from other sources?

We are investigating through third parties such as hydrogeologists who are monitoring groundwater flows. This will help us understand. 'Make good' is not just at trigger levels but a warning bell that the whole objective is to keep water in the Basin to minimise impacts. So far we haven't had any impacts on the bores.

21. Dumping water into watercourses in an emergency...what constitutes an emergency and is it raw or treated?

An emergency would be a major flood event where our dams were either filled by rainfall, or else over-run by floodwaters. We plan for a certain contingency level on our dam design and operation, to allow for the seasonal ups and downs that occur.

22. The state government talks about billions of dollars, how much is going back into the community and not-for-profit organisations?

Yes the consolidated revenue goes to government and it doesn't go back to the community in a transparent way. We can't ask government to return those royalties but Arrow has its own social investment program. What Arrow will commit to the community is being considered through the EIS process i.e. the social impacts, roads, transport studies etc and how we will mitigate those impacts. Arrow directly contributes money to the Western Downs Regional Council for the upkeep and maintenance of the roads.

23. Most of the wells are on crappy clay soils and the concrete will deteriorate rapidly. The salt water will also have an impact, what sort of steel do you use? You say the wells will last 20-30 years but how can you do that without cracking or leaking?

We use robust fit-for-purpose products and carry out well-integrity checks, and check for corrosion. If the well loses integrity and it's a significant concern we would decommission the well.

24. Comment: with regard to the Great Artesian Basin and making good *Humpty Dumpty sat on the wall, Humpty Dumpty had a great fall, all the King's horses and all the King's men couldn't put Humpty together again!*

25. The make good arrangements for the 2000 bores in the coal Walloons, I assume the modelling will indicate the impacts. What process is there for Arrow to ensure that landholders have a future water supply?

When we take water from the Walloon Coal Measures there will be impacts, that is clear. We are working on the process to ensure landholders have a future water supply. Obviously this is a complex matter, and needs to look at the existing state of aquifers, the overall demand on them, the rate of water production etc. We will present the 'make good' process at a future consultation session.

26. The Huttons (Hutton Sandstone aquifer) sit below the Walloons, and we have a major problem if the Walloons are drained. The government may need to change the legislation to access that aquifer. If there is no other aquifer in the area would pumping water from elsewhere be possible as a long term strategy to remedy the problem?

Yes. Aquifers will recover in time, so we just need to find a solution that works until the natural state is restored. We can look to things like pumping water from elsewhere, or else

replacing allocations with treated water, or producing water from different horizons and so on. We are confident that long term solutions will be found, and we are working on them now.

27. I understand that there will be significant access required for your staff to our property. I have five children so what screening process do you have in relation to child safety?

That's a good question and I don't have the answer. We will get back to you on that.

The issue of requiring staff and contractors to qualify for blue cards is being investigated.

28. Most farmers are interested in compensation. The concern of many is just related to roads and access etc. In contrast, the wind farming industry made friends with the farmers so why can't companies like Arrow act more generously to farmers with compensation. That would be a benefit to your industry? Question directed to the CEO

The fundamental principle behind our compensation is to make good for our impacts. Your idea is to be more profitable, but the challenge will be to make an economical project.

29. Comment: I can't see how Arrow will have any liability if the water becomes a resource.

30. The map indicates the tenure goes over the town of Dalby, how close is it to the town and have you consulted with the local council?

Yes we have, we learned six months ago the practical edge of the development. The town is removed from the project area in the EIS so it has been removed from our application for a Petroleum Licence.

(Dalby ends)

Cecil Plains

Date:	24 November 2010	
Venue:	Cecil Plains Hall	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Al Mueller, Vice- President Operating Services	Arrow Energy
	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:		Arrow Energy

1. Can you please provide an explanation of the drilling process and the integrity of holes? The Hillier Report states that there is interconnectivity in the Walloon Coal Measures. If there is interconnectivity it won't matter how good the integrity of the holes are as it will still connect?

We stand by the safeguards included in the design and construction of our wells. The casing and cementing procedures have been developed and tested around the world for decades so we can be sure that the design is correct. Also, we monitor the well during its life, and will be able to determine if the well integrity is lost, and be able to simply plug and abandon the well to prevent any problems.

The real issue here is the potential for connectivity which is something that can occur on a broader scale due to the difference in pressure between formations and aquifers. It is an area we are still studying to understand the nature of the shallow and deep aquifers and the nature or potential of any natural faults and pathways that might exist between aquifers. We also need to understand the timeframes over which these things happen. Part of the work we are doing in our exploration and EIS programs is to gather and analyse information that will help us better understand this issue. We don't deny the potential, but believe that with good science and knowledge impacts can either be avoided or managed so as to maintain the productive value of the land.

2. If you are confident about your construction technologies and you use words like integrity, would your company provide a written guarantee to landholders that they won't suffer any losses?

We can guarantee that if our wells are found to be causing or contributing to losses of water, causing adverse impact on landholders, then we would either stop or modify the activity. The challenge will be to distinguish between the normal or current state of aquifers versus the impacts caused by our activities. For example, in long periods of drought it is logical that recharge of shallow aquifers will be slowed or stopped.

Our guarantee will be broad, and reflect our awareness of the duty imposed on us as part of our licence to operate. If we are causing significant environmental harm that in turn impacts upon the livelihoods of members of the local community; we must take action to address the problem.

3. So you stand by your point that if there is potential interconnectivity or loss it will be as a result of water loss from other avenues?

For clarity, we say that our wells will not allow direct connectivity between shallow (e.g. Condamine) and deep (e.g. Walloon Coal Measure) aquifers. The potential mechanism to drive connectivity could be creation of a pressure difference between aquifers by the withdrawal of water from the coal measures. We don't understand the hydrogeology of how that system works yet, and we need to get more information so that we can understand it.

4. In terms of baseline monitoring, will every well be monitored in the tenement?

In time we would like to get basic information from every water bore across our tenements in terms of things like depth, pumping rates, bore design, water quality etc. Given that there are so many bores we will establish a priority to do this, since the timeframes for our development are very long, and it will be many years before we develop into more distant portions of the tenements.

In terms of active monitoring, we will focus on those bores within a radius around our development areas. If we detected movement attributable to our activities, we could then extend the monitoring even further afield. We would use a representative selection of bores for this purpose.

5. So part of the baseline data won't include existing water levels? With pre-existing wells used for agriculture the landholders would have to get an independent person to take these measurements? The landholder wouldn't have a basis to argue if they didn't have this information.

We will test bores within a reasonable proximity to our development areas, and then monitor enough bores so that we can pick up, over a wide area, any potential impact created by our activities. There is no need to test every well immediately, since some areas will be well away from development areas for many years.

We could also discuss any specific requests to test bores and baseline water levels as part of our land access and compensation negotiation process. Furthermore, the results of our monitoring program design and implementation plan may end up calling for testing over wider areas than we had anticipated, and if that was the case then we would certainly broaden our baseline data-gathering program accordingly.

6. I would like to observe that Arrow has made a significant change in its use of language around water and the project's potential effects. Today you have spoken of the Walloon Coal Measures as part of the Great Artesian Basin. To carry on from the previous question, is Arrow looking for areas with natural connectivity between different groundwater aquifers? What will Arrow do if areas of natural connectivity are confirmed?

The Surat Basin is part of the Great Artesian Basin. We are certainly looking at the potential for interconnectivity, and part of that work is to understand how the different stratigraphic elements of the Basin behave. For example, the movement of water through the Walloon Coal Measures will be quite different to movement of water in the known sandstone aquifers such as the Springbok and Precipice. We are certainly looking to understand the hydrogeology of the entire region, with particular focus on things like potential connectivity.

In terms of what we will do about connectivity, the steps are to explore the area to understand the geology and stratigraphy, the second is to put in place a good monitoring system that can detect changes over time (since these things don't happen overnight, so we need to watch them constantly over time). Finally, if connectivity is confirmed, and Arrow's activities were causing a detrimental effect, then we would look at our options and if necessary stop the activity.

Our concern is that monitoring has to be done over a long period of time to detect groundwater changes, and by then you'll have already had the impact. That is why we believe in a moratorium on coal seam gas activities.

A moratorium is not the answer. There are two key issues that we need to consider here. The first is the need for good science based on real information and monitoring, plus good design and operational practices. We need to be able to keep doing work, including exploration and trials of different development methods, to get that information.

The second is to look at mitigation measures. Our aim is to maintain the water balance in the region. If we can effectively substitute water by re-introducing it back into the sub-surface or surface environment, then the overall impact can be mitigated. There is clearly no way we can say that we will not affect water levels in an aquifer such as a coal seam, since we must reduce the water level in order to release the gas. However, while we may impact one area at some point, our aim would be to ensure that on a gross scale we maintain the overall integrity and balance of the groundwater systems that exist in the Surat and Condamine aquifers.

7. **The horizontal transfer of water in the Walloon Coal Measures is very slow, and the Arrow petroleum acreage is very large, so you will have screwed up the whole area before an impact is seen. It is inappropriate and insensitive of Arrow to refer to the area 'west of the river (Condamine)'. Your maps show broad scale industrialisation of the area within the next 10-15 years. As part of the EA the original application showed ATP683 as having only 30 homes.**
8. **As part of the submission on the original application people indicated the maps were inaccurate, and miscalculated the number of homes in the ATP. The holder of the EA resubmitted those applications to show the number of homesteads as 500-640 sensitive receptors (i.e. homes, businesses, grandkids' play areas) which was 2000% more than listed in the series of maps in application one. Disclaimer reads Please verify the accuracy of this information which is copyright of Arrow Energy Limited.**
9. **The area east i.e. Horrane Trough Lot 334030 is a sensitive receptor and has not been recorded on the amended map. How can we as a community trust your company?**
While Arrow's acreage is very large, we only develop certain portions at any one time, and the timeframes over which we extend our fields is very long, measured in decades. There will be time to see the impacts from one area and to take corrective action, or else to stop an activity, long before it affected the whole area of our tenement holdings.

We refer to the area 'west of the Condamine' river only in the context of discussing the very important shallow aquifer that is the Condamine Alluvium. It is not to say that we somehow treat this area differently in terms of our interaction with landholders, or concern for relevant environmental matters. It is merely a geographic division.

On the matter of what the government calls 'sensitive receptors', but which in reality refer to local residences, we don't take this issue lightly. The information in the EA application was produced from existing DERM maps and information. Clearly this information was in error, but to put this issue in context, we are still at the exploration stage of our investigations in the ATP683 area. This involves fairly limited works over wide areas, and we need to go through a lot of processes before we start developing any fields on a commercial scale. We also ground truth areas before we start works, and can make sure that any activities are not located too close to residences. An administrative error is not cause for loss of faith in our ability to do works on the ground with due regard to the community.

10. **The idea that the Australian CSG industry is subject to strict environmental impacts, including water, is a nonsense.**
11. **The community is relying on authorised officers who do not ground truth. Billions of dollars worth of projects are based on maps that are very inaccurate. People who review those maps have stated they don't come out here. You think our homes are changing in five years' time? We don't care whether you produced the map, or if the Cecil Plain's kindergarten produced the map, but we dislike the fact that you come out here without ground truthing your maps. We don't give a monkey's about**

amendments to legislation because all the government is doing is facilitating your industry.

- 12. Some people have children who will be inheriting their farms in 50 years. Who is responsible for any problems that arise from your activities down the track after you have gone?**

The accuracy of maps used during an administrative process is not an indictment on the overall level of regulation across the CSG industry. The EA sets in place conditions that we must adhere to, and that the government audits. It is essentially a set of rules that we must follow and apply to wherever we go. The EA is just the first step in the process that then lets us come and ground truth an area.

In terms of who is liable for problems that arise, the answer is quite simply that we are. The liability remains with us even after we have completed the activities and surrendered the tenements. The government also keeps very substantial securities during the term of our tenure, and we must demonstrate that we have not breached our operating conditions in order to have the security refunded.

- 13. What you (i.e all Arrow people) need to realise is that you have nothing this community requires. You offer no value to my business but grief and if you want community acceptance, you can't win it by doing things like producing that inaccurate map of ATP 683, for instance. You must bring something of value to us, add value to us as a community including landholders and businesses. Until you do, you will meet resistance among landholders.**

We understand your statement. It is a difficult situation; a classic clash between geography and geology. You are farming above the surface and there is gas below the surface. You have great farming land, and there is also a worldwide demand for energy. However, we want to have good relationships with the communities in which we operate; we most assuredly want to look after the people who are here. There won't be a gas business if we don't take that approach.

- 14. In the first presentation you talked about the Land Court and that you have no cases in the Land Court therefore you are managing compensation properly. I would like to see that Arrow will publicly remove itself from the Land Court.**

As you know the CEO has already responded. We don't want to go to Land Court but there are cases where it may happen. Just as in a marriage, you don't want it to happen but it can.

- 15. Do you stand by your comment that you will not use law enforcement to gain access to farms?**

Arrow will not use force to enter properties. We will not use police or any type of enforcement to get onto land. That is not the way Arrow does things. We want to maintain a good relationship with the landholder and the community, and we know we must get that right. There is energy at stake but business is secondary to getting it right for the community.

- 16. You talk about your long experience with coal seam gas; presumably you mean through experience gained at other companies. Most people here talk about the experience (on the land) that they gained from their grandparents. ATP 683 is approximately 1,700 square kilometres. Do you know the market value of that agricultural land?**

No, we haven't done the sums. It does cover a large area, some intensively farmed land and mixed farming land.

- 17. I imagine it is close to \$1 billion. If we experience a loss of value of 30%, that is equivalent to \$300 million. How much did you have to pay Anna Bligh for the rights to the tenure?**

We pay an annual rental for the ATP. The payments are calculated according to the number of blocks in the ATP; it is about \$1,000 per block per year so it is not comparable to the numbers you are talking about.

18. Arrow sold to a Chinese and Dutch company and we have invested close to a billion dollars in our agriculture. We want a level footing. If it is stuffed up it will be for the benefit of a foreign company, you haven't done anything for us. You haven't put a lot in but turned it into a big capital gain. Without you, our industry could go on forever.

19. You speak of the relationships you want to build with us. We don't want to build a relationship with you. We don't want you on our land, we can't co-exist with you. We have long established farming systems (on intensively farmed agricultural land). There is extensive knowledge of land management on black soil among our community. If you listened to us, you would understand our activities and yours cannot co-exist. We can tell you that now. Is there any possible situation where you could reach a decision that your project on intensively farmed agricultural land is not feasible?

We have no intention between now and 2023 to develop on intensively farmed agricultural land. In the meantime, we have the opportunity to work with you to understand if it can be done. We realise that is a very large challenge. At this point in time we are not prepared to say it can't be done.

20. Your presentation showed the differences between coal seam gas and underground coal gasification industries but failed to talk about one large similarity. That similarity negates your efforts to distance yourself from underground coal gasification as you both have the same government regulator. The same people watching ingaroy are watching you guys. There has already been coal seam gas-related industrial accidents and other stuff ups within the industry and concern about interconnectivity and fracking. The government clearly can't regulate a chook raffle. You mention the Queensland Water Commission. The Commission is trying to retrain people who are used to reading water meters. In relation to your comments on the movie *GasLand*, I will also make a comment on that. You all have the same parent companies, technologies, and issues of access therefore you can't distance yourself from the US experience. You only have 2000 wells now and industrial screw ups have already happened. Seven to eight multinational companies are basically behind all the coal seam gas and liquefied natural gas projects in Queensland. How can we as a community have any faith that we have a strict regulatory authority?

We can't answer that question on behalf of the government. We are bound by regulations and controls, but it is true that unless the government has in place the right checks and measures, there are questions. The industry has moved ahead quickly and the government is trying to keep up. There is work going on as we speak; only today the government announced funding for a new team of enforcement inspectors for coal seam gas. They are putting a stronger regime in place now.

21. With respect, the government also announced today a budget of \$5.4 million to sort out the pay debacle for nursing and they are not expecting an outcome for two years. We don't have any faith. If you want to develop in highly sensitive areas, you will need to change tack with the government. You will need to seek changes in legislation to allow you on our land. With the exception of engineering, your company is not being proactive. You talk about pilot studies but there is nothing proactive in that area.

22. I commiserate with the black soil farmers. I hold the view that unfortunately no matter how much anguish they go through, the state government will determine what happens. If the project proceeds, Arrow may have construction camps to the northwest of Cecil Plains, and those camps will house many people. Down the track,

there may be 40-50 people based permanently in the area. What guarantee do we have that some of those people will reside here and help the Cecil Plains community?

There are people associated with the industry who work in the region now. Dalby is a good example of how workforce housing works for Arrow. We do encourage our staff to live locally, we appreciate that this has housing and employment market implications. We like to recruit locally because people from the area have local values. Some of our employees own farms locally, e.g. at Jimbour Plains, and they understand and care about community issues.

23. I mean local, I mean Cecil Plains, not Jimbour or Dalby.

We are using Dalby as an example. We would look to do that in all of the townships where we operate.

24. Contractors as well as your staff work on land they don't own. Who carries the public risk related to Arrow staff or contractors operating on private land?

The petroleum activities conducted by Arrow as a right of our tenure are Arrow's full and sole concern and responsibility. That responsibility includes contractors, and basically anyone who does any form of work for us. There is no linkage to the owner or holder of private property. If there is a legal dispute between Arrow and a contractor, liability does not lead back to the landholder.

25. This acceptance of responsibility is limited to petroleum activities, and obviously we are all bound by the same civil and criminal laws relating to other matters.

26. Arrow proposes to conduct operations on the western side of the Condamine River. Where will the water and salt go?

We are doing various studies and preparing plans to manage the water and salt. Our basic aim is to maintain the water balance in the region, and to ensure that any salt is disposed of in an environmentally appropriate way, or else put to beneficial use.

27. Will you do that before the wells go in?

Yes

28. With regard to the Land Court and compulsory access, I have asked this question of Michael Roche (Chief Executive, Queensland Resources Council) previously. What makes Arrow think the coal seam gas industry is so important in the state that its powers should exceed those of any other business? Many industries have a requirement to access land, including my business. However, I do not have the right to compulsorily enter land. What makes you so important that you can come onto my land without checks and balances, at whatever rate, for whatever period? We find that offensive. You would relinquish that right if you were genuine in your attempt to engage landholders. Relinquishing that right would immediately take the heat out of the situation, particularly on ATP 683 which is over the floodplain and where the value of business and land is so much greater.

The Land Court process has been laid out and matters can be taken before it. Arrow does not want to go down that path. However, we are not going to relinquish that right. We want to work with the community. I can't say we would never use that right in certain circumstances, but that is not what we want. It is in no one's interest to end up in court.

We don't think our rights exceed those of others. We negotiate terms and compensation for our activities. Those negotiations are commercially based. Ownership of the gas resources belongs to the state government, and it reserves the right to allow extraction of that gas. Obviously it (and Arrow) is aware that in order to do that we need to access private property, but we don't over-ride the rights of landholders in order to do so.

The right to minerals and petroleum, being reserved to the Crown, is not ours to relinquish. If Arrow wasn't here, another company could come in and try again, and again, since while there is gas here that people want, there will always be people trying to get it out.

We understand the unique features of the floodplain land, and the correspondingly higher value of that land. We are trying to find ways to work together, so that our businesses can co-exist. When we seek to enter your land, we are not trying to offend anyone, but simply to conduct our business. We are happy to talk commercial terms.

29. At the last meeting in Cecil Plains (June 2010), an Arrow representative said that if you had 95% objection to petroleum activities on the intensively farmed agricultural areas, you would not pursue your operations there. It is pretty clear from this meeting that you have more than 95% objection?

That still stands and is consistent with what was said. We are not so insensitive as to think we could force our way onto land with that level of community opposition. We are working on how activities on intensively farmed agricultural land can be done, in order to change the perception that farming and coal seam gas activities cannot co-exist.

30. Every farmer in this room is prepared to lock the gate on you. There is nothing new that has come from this meeting tonight.

31. Out towards Roma, it is impossible to get motel rooms and the condition of roads is disgusting. Do you contribute to new roads and social infrastructure?

Arrow makes direct contributions to the Western Downs Regional Council on a project basis. That way we can be sure that our contributions are going to specific roads that are affected by our operations.

32. What about accommodation?

Chinchilla is an example of a town that has constructed four new motels and we have company people stay there.

33. I went to a sale in Blackall and couldn't get accommodation anywhere.

As part of the social impact assessment for the EIS, we have to assess the impact we will have on temporary accommodation such as motels and hotels.

34. Shouldn't the study be done before you get there?

Initially the bulk of our workers will be accommodated in construction camps. This will transition to local housing as we shift from construction to operational activities.

35. We have some of the best farming country in Australia if not the world. You bastards want to take the risk of coming here and stuffing it up. Stuff ups are already happening all around the world even though those projects are 'regulated' by government too.

36. I sympathise with other community members who can't get motel accommodation. This is a major issue. Recently I tried to get accommodation in Roma when I travelled to Charters Towers and couldn't, then Injune, and had to travel all the way to Emerald where I went to 12 hotels before I finally found a room I was a mess by then. I am concerned that CSG development will have a negative economic effect on Cecil Plains. You need to make commitments regarding equipment sourcing, catering, etc. Going back to the previous question about devaluation of land, one of your former land access officers went to great lengths to say how much money Petrochina and Shell have and the possibility of 30% (\$300 million) depreciation was discussed. My question to Arrow is whether the company is prepared to evenly divide \$300 million in

a bond over every square metre of ATP 683 and lodge that with landholders' bankers as an equity bond?

That was a comment Robbert made about Shell and PetroChina having a lot of financial strength, and their ability to take responsibility in case something goes wrong. Putting the government aside for a second, when Arrow goes to make its financial investment decision on the project, we have to assure ourselves that the project can be done without significant adverse impacts e.g. drawdown of groundwater. We have a lot of work to undertake before we can make that investment decision. If this project were to have a significant adverse impact it is not good for the community or Shell and PetroChina.

In terms of an equity bond, there is no need for a site-specific bond. We already are bound to lodge environmental securities with the government, and even if they are exhausted we are still liable for damages. Shell and PetroChina can't just pack up and run away if someone goes wrong. They have to face up to, and sort out, problems.

37. The current bond you have with the state government wouldn't be enough to cover screw ups on two farms, let alone across the whole ATP.

Regardless of the bond lodged with government, Arrow would be liable should any damage occur from its activities.

38. Impacts of the project are already here. You have affected us already and it will only get worse. You don't bring anything to the table except when you are forced to by an upset community. We only get snippets of improvement in legislation. Who is looking after rural Queensland? We are already affected and you want us to take more risk. These are the issues that Arrow has to understand before we unlock the gate. The land access meeting in Dalby (run by the Queensland Government) was a public debacle and disgrace. Now, the game has changed.

I have the dubious luxury of living in the middle of the QGC development and this is my fifth session in the last three days. A young man who lived near me is now dead from a traffic accident on a deteriorated road. We hear they will fix those roads but the reality is it doesn't happen despite being told it will. Arrow is better than QGC but it hasn't walked the walk yet.

We have seen fracking where it shouldn't be at the moment. We dragged the vice president of QGC around our farms recently and showed him a problem of water running from well pits across the paddocks. His response was that it might not be a QGC well, but we were in the middle of its tenement. Eventually he admitted it was a QGC well. It's good to see that you're alert, awake, watching. We have watched rents go up and people move away. My message to the community is that you really have to be on your guard.

I am going to talk as a mother who lives in this community. These projects are having an impact on our mental health, and what we are going through will only get worse. Every time I sit down to have a cup of tea with my husband, guess what we are talking about? CSG Then the phone rings and it's a neighbour. Guess what we are talking about? When we go down the street and see other people we know, guess what we are talking about? Please think about the personal impact you are having. I have four children. My eldest is studying agriculture at Gatton. Is he a fool? The farm is the children's future, but right now it is their playground. I don't know where all the Arrow people here tonight live. Can you imagine, on a relative scale, having a gas well by your clothesline?

I attended the Dalby session earlier today. The information given at Dalby was that you don't have your final plan. Compensation is not an issue because we are shutting

the gate and it won't get to compensation. The interpretation was that Arrow was interested in making money for Arrow and not providing it to the landholders. People need to know whether they will be compensated. Is it going to be adequate? Is it going to be a business proposition? Compensation should be a healthy business decision for landholders; it should be financially profitable. You can't compensate for ruining an aquifer. There's no financial gain for us. I realise this is negotiated one-on-one with landholders, however I want Arrow to take home the message loud and clear: we don't have confidence in the state government or Arrow Energy or DERM. We will end up with land problems, dust, salt, water, noise problems.

Arrow's CEO Andrew Faulkner spoke at Dalby. Andrew discussed how Arrow compensates for impact and how it can add a level of value to landholders beyond that. We have heard many things tonight that we have taken onboard. We will digest these things inside Arrow and will respond in future consultation.

39. You need to lobby government to change the policy and legislation if you want to be on our side. You have all the power, all the rights and we have nothing.

We hear what you say about government.

40. Are you happy with the legislation?

We have a commitment to good relations and good business. What you are saying in relation to compensation is an aspect of that. We have to look at that.

41. You provide compensation for future activities but what about current activities. You won't provide a bond to the same capital value. In the period between now and when you want to operate on black soil, there will be people who want to sell their land. Who do I ring to negotiate with, because there is a reduction (in value) in the market?

Arrow can only respond to impacts on property value that can be verified. We can't respond to a perception of loss of value as a result of Arrow's activities in the region. We hear the message but we are not seeing the proof at the moment.

42. I raised questions at the government meeting in Dalby that the government couldn't respond to. Would new legislation force gas companies to compensate for loss of capital value and artificially raised costs of doing business? In other words, the people who wrote the legislation don't know the answer. If I were a gas company, I wouldn't stick my neck out beyond the requirements of the legislation. It doesn't cut it to say you can only have the discussion about impacts (decreased property values/ impacts to groundwater) when proof presents. There is proof now. We have heard nothing new from Arrow tonight.

I can't give you an answer tonight.

43. Did Darren say something wrong, that you would compensate for loss of capital value?

44. We asked these questions in June, where are your answers?

45. About land value, the powerpoint said the changing value or use of land will be compensated for. Did that mean nothing?

Change of value will be looked at as part of the compensation we offer.

46. You stated you are looking into a number of issues with regard to conducting activities on black soil and even suggested a period of up to 10 to 15 years before you would do any activities on that type of land. That's 10 to 15 years of uncertainty. What do we do with our businesses in the meantime? Arrow will damage soils and we lack faith that you can rehabilitate. What process do you have to rehabilitate black soil?

Examining the issue of operating on black soil is part of the work that will be done by the Arrow Intensive Farming Land Committee. We will look at all activities from exploration through to construction, operation and decommissioning.

- 47. We have a wealth of community knowledge about how to work on black soil that collectively exceeds 15 years. With that combined community knowledge, I don't think any farmer would consider it possible to conduct petroleum activities on black soil. Why don't you leave us alone and accept our knowledge about the land?**

Arrow will take that as a comment.

- 48. I don't think you understand the damage you did in this hall tonight when you said you won't seek to operate on intensively farmed agricultural land until 2023. You have condemned the community to uncertainty. You are effectively the market. You have affected every decision people here make related to using their land. You are not getting the point; I know you are engaging us through various committees. Our family has raised questions you can't answer. Some of us are simply saying we won't discuss land access until you start answering questions.**

- 49. For many people in this community, their farm is their superannuation. What happens if they want to sell out in one year, or five years, or ten years... and can't find a buyer because there is uncertainty whether coal seam gas will happen on their property? What do you say to those people?**

When I said that we wouldn't seek to develop on intensively farmed agricultural land until around 2023 I didn't mean to imply that our investigations wouldn't be finished by that time. We expect to know the answers to the questions we are working through (how to manage petroleum activities on intensively farmed agricultural land) before that time.

- 50. What about those who can't realise their super funds?**

- 51. Can you please supply us with the twelve ingredients in your drilling muds?**

Yes, we can supply that.

These will be posted on the Arrow website, together with details of our drilling fluid management processes.

- 52. If I proceed with independent bore analyses, can I send Arrow the bill? I have no other reason to do an investigation that could cost thousands of dollars, except for Arrow coming onto my land.**

Like any business we can only pay for works that we agree to beforehand. We have explained that we are developing a program of bore investigation and monitoring. Once that plan identifies when and where we should test bores that may be affected, then we can talk about testing. To do anything before then is not necessary from our perspective.

There is also an issue of timing here. At the moment we are working in other areas of the Basin and not affecting your water bores. It will be more appropriate to discuss this with you once there are firm plans for production. When we know the potential area of groundwater influence (determined by modelling our field plan), it is more appropriate to discuss it with you and we can target particular bores for investigations.

- 53. Will you foot the bill down the track, whenever it is?**

We will deal with it on a case by case basis, in each area. If it is necessary that testing is done in order to better understand the hydrogeology, or to obtain baseline data, and it forms part of our plan, then yes we would pay.

54. When the draft EIS comes out in 2012 and the Terms of Reference, can we have a copy?

Yes, the Terms of Reference will be available on our website.

55. Prior to 2023 can Arrow provide us with more detailed maps of your future plans, particularly in ATP 683 and more specifically the Horrane Trough maps. The maps you have are still vague, we are not idiots. Other companies are presenting more detailed information and we need more science.

We are still doing that work and we are happy to put a package of information together when we have those plans. We agree that we have presented a broad brush of information. The discussion is now reaching the point where we can bring in more technical detail. However, Arrow is behind the other coal seam gas companies in terms of its project design. Arrow will be undertaking its detailed planning over the course of the next 18 months. We will continue to give as much information as possible when we can.

56. I am a farmer. I love being a farmer. I would like to ask on a personal note if all the Arrow people here love their job? If they don't, then all you are doing is screwing people for money.

This was a farmers' refusal meeting tonight so best you leave town. One benefit of the project is that we might get some decent police in town

Millmerran

Date:	25 November 2010	
Venue:	Millmerran Community & Cultural Centre	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:		Arrow Energy

1. If you are in the back paddock and it's a fizzer, do we have access to the drilling log if we want to drill a bore on the property?

Yes. For every well that we drill, we must submit a report to government which details all of the information about the well and what we found. This information is publicly available on the DEEDI website.

2. Do you test the water as you drill through it?

Yes. If we strike water we will test the volume by flowing it for a short period as part of the drilling process. We use compressed air to lift the water to surface, and by doing this for a while can get a reasonable idea of the volume and rate of water that can be produced from an aquifer.

3. The issue of compensation agreements seems open and is a difficult issue to resolve. For a landholder, it will be difficult for him to know what inconvenience you will create on his land in the future. Is it standard for each individual? How do you build this into the agreement?

There are standard compensation and access agreements, which make it easier for all involved by knowing that there are common terms. The actual amount of compensation will vary depending on a number of things, like the activity we are conducting, the time we are on your land, the type of land and its use and so on. We have developed a standard way and rates to calculate compensation.

As a guide, the compensation we pay is less for an exploration well than for a production well, since an exploration well is short term.

4. If I have a bore operating at the moment at 40 or 50 feet, it has been operating that way for many years, and then it drops, do you automatically get the blame for that? Who do we contact about that?

CSG companies do not automatically get the blame; there is a process of investigation to determine if CSG activities were responsible for the drop in pressure. To explain, our tenements cover a very large area although at the moment we are only working in a fairly small portion of that area. So if a bore well away from our fields is affected, then it is clear that it is unlikely to be due to our activities. We are happy to check, and certainly if a bore is in proximity to our fields or wells, and is affected, we will certainly take action.

5. Who do you contact?

There are three avenues in which to lodge your concern: Arrow directly, DERM, freecall 1300 130 372, and the Queensland Water Commission. Your concern will ultimately be directed to Arrow for investigation so we are quite happy if you contact us in the first instance.

- 6. Earlier you spoke about the differences between CSG and underground coal gasification. However, with CSG you have to bring the water up to the surface which poses large risks. Underground coal gasification leaves water underground which is not much different to open cut mining. Is that a fair comparison?**

It sounds reasonable. We are confident that the water we pump out for CSG operations is quite safe; people in the Surat Basin have been using water from bores in the Walloon Coal Measures for 100 years or so. With regard to underground coal gasification, we do not wish to comment extensively on another industry but as we understand it there are two problems with UCG, one is the trouble they have with the mixture of gases created by the combustion process, and being able to maintain a consistent quality of product, and the second is that a by product of the combustion process can leave chemical residues which can include benzene and toluene (BTEX group chemicals) etc like Kingaroy.

By way of analogy, some people may have heard of 'town gas' which was commonly used in many cities 50 years or more ago, before widespread use of oil and gas. This gas was derived by a process somewhat similar to UCG, although the conversion process occurred above ground rather than below. In Brisbane, at the site of an old town gas site at Teneriffe, there has been a long legal battle between developers and contractors regarding the clean up of the chemical residues that were produced from this process. As we said, UCG uses a somewhat similar process, burning the coal *in situ* in the ground, but possibly leaving behind coal tar which could eventually pose a problem.

- 7. How does underground coal gasification differ from depositing ash from coal fired power stations underground? Power station ash also contains nasty things like silicon.**

In underground coal gasification the residues and combustion products such as ash are left underground. By comparison, in an above ground power station, the ash accumulates in the boilers and must be removed and disposed of by some means. I am not sure what the ash contains, but clearly the thought of spreading it around the surface is not appealing, which may actually favour UCG.

- 8. Has it only been mandatory to cap them in the last twenty years?**

Yes

- 9.**

This question refers to water bores in the Great Artesian Basin, which have been the focus of a program of capping and piping of bores in order to save and make use of the water, rather than waste it.

- 10. Can you clarify that you are taking the same water farmers have used for the past century?**

Yes. There are 700 or so registered water bores licensed to take water from the Walloon Water Measures which is exactly the same formation that we target for gas extraction. People have been using CSG water for many years.

- 11. So they have a certain amount of gas coming up with their water?**

Yes they can do. If anyone drills a bore into a coal seam, and then pumps water from that bore, there is a good chance that they will see gas eventually. At very shallow depths the gas in the coal is already gone, but if you drill down below about 100m (300ft) or so, then you are likely to find gas as well as water.

- 12. I am curious about the difference between exploration and production wells. How many exploration wells has Arrow drilled? If exploration wells produce gas, what's happening to the gas? What happens with regard to the well lining? Are they sealed to the same standard as production wells? How are they rehabilitated?**

All wells are sealed the same way; cemented from bottom to the top with cement slurry.

Exploration wells don't produce gas, they are for sampling coal and have a short life. Once we have the sample, they are sealed and decommissioned, which means filling them with cement.

Production wells are the same concept but their life is much longer...up to fifteen years or more. Following exploration, we drill pilot or appraisal wells in a cluster of five to test gas production. The gas can't be put into the pipeline so we flare the gas that is produced by pilot wells and the government regulates the period of time for which we are allowed to flare the gas.

Wells are rehabilitated in a process we call 'plug and abandonment'. This involves removing all equipment such as pumps from the well, filling it with cement, then cutting off casing below ground, and finally covering the well with topsoil so that it is not evident at surface.

- 13. With regard to land access, AgForce and the Queensland Farmers Federation (QFF) have been talking to the Queensland Government for a couple of years and in the last few months the government has changed the laws. Compensation has changed with land access agreements. Landholders have twenty days to talk to the company, then another twenty days for mediation, then another ten days to go to the Land Court but the Land Court has a six month backlog. At the end of fifty days, the company can come on and drill. We've actually got no further, and AgForce pulled out of the working group.**

We work with government as part of the Land Access Working Group. We want to achieve a fair and reasonable outcome. When there are many different parties, it can take time to resolve. Our fundamental belief is that we must have a good relationship with private property owners. If we come on to the property after 50 days and simply say let's go to court, then that's not a good basis for a relationship. During our presentation, we showed the figure of 130 land access agreements that we have in place, with a further 40 under negotiation, and zero in the Land Court. The Land Court can be damaging and time consuming and not good business. For Arrow, it is absolutely the last resort.

- 14. All the gas companies (four) are drilling into the Walloon Coal Measures; I think 2,000 Arrow wells, 6,000 BG, Origin, I'm not sure and 4,000-5,000 for Santos further to the west. When you take that much water from the Walloon Coal Measures, which is just below the Condamine alluvium, what happens then? No one seems to know how the interconnectivity works. The water moves so slowly, in 100 years time the pressure in the Condamine alluvium could be significantly reduced.**

In answer to the question about the connectivity between the Condamine Alluvium and Walloon Coal Measures, this is a very critical part of our investigations at the moment. It may be the case that this can occur, and we certainly need to understand both the mechanism and the timeframe over which these changes and impacts will occur. That is why we are exploring the area, to obtain more information about the nature of the formations and the potential for connectivity, as well as putting in place monitoring programs to check whether there are real impacts.

Our overall approach to water management in the Surat Basin is to maintain the 'water balance'. This is to say that while we may impact one area for a short time we balance that impact by introducing water elsewhere so that on a gross scale we don't remove water from the system. This may include things like us using the water we treat to supply users of surface water or shallow aquifers (such as the Condamine) so that they in turn reduce their pressure on those sources. Likewise, we can seek to return water directly back to Surat Basin aquifers by injection.

15. In the presentation you spoke about the film *GasLand*. Did you say there was no coal seam gas in the US?

No, there is. The CBM industry, as the coal seam gas industry there is known, is very large, and certainly uses fracking. However, the shale gas industry there is very large, and possibly exceeding the CBM industry in terms of size and area impact, and it is the subject of much attention in the movie.

16. Hundreds of thousands, it's not all shale? A bloke from QGC told me that there were lots of problems with the coal seam gas industry in the US as well as oil shale.

You're right. There is a large coal bed methane or coal seam gas industry in the US, and also more recently shale gas in New York and Pennsylvania. In recent years, there has been a huge upsurge in drilling and fracking in those shales which is what *GasLand* talks about. *GasLand* is not directly relevant to Queensland. We have strict government regulations and safeguards, different geology and techniques used, and products containing the controversial BTEX chemicals are banned in Queensland.

17. The methane you are taking out of holes, if production is good enough will you liquefy and export it?

Yes, there will be an LNG plant in Gladstone and the gas will be pumped from the Surat and Bowen Basins to Gladstone.

18. If you had three adjoining properties and good production, would you build a plant there?

No, the LNG plant in Gladstone is a big deal and costs billions of dollars. We would not have local plants in the Surat to make LNG.

19. You will therefore pipe the gas to Gladstone, send it in a gaseous form to be liquefied?

Yes, we will compress it and pipe it.

20. You have to extract a lot of gas and also provide power to your gas facilities. Why can't we install a gas turbine and feed the town with cheap electricity?

Part of the field development plan is power generation.

Australia already has cheap electricity since most of it is sourced from coal-fired power stations. However, with the uncertainty about carbon taxes, no one is investing in new power stations, even though demand for power is growing. The problem for gas fired electricity generation is that gas-fired power stations must compete in the electricity pool that operates on the east coast. Gas-fired power is more expensive than coal, in the absence of a carbon price, so as it stands the local market for electricity is very low value, and not an economically viable proposition for companies like Arrow to continue to expand into. We certainly remain committed to the Australian market, and already supply a lot of gas to power Queensland's energy needs, but until the price improves then it is just not viable to invest in it further.

21. What do you think will be the impact on the local and rural workforce when Arrow rolls out its project?

We use Arrow's Dalby operations as a case study for that issue. When we initially undertake exploration we have small crews of six to twelve people who typically stay in motels or drilling camps. As we move into construction and operations, we set up a base in town. We will not have fly-in, fly-out operations, but source employees locally. A benefit for us is that by hiring people with local values, they appreciate landholder issues and have respect for their land. It can also help stem the migration of young people away from smaller towns like Millmerran. We acknowledge that this has impacts on other local businesses.

22. History has seen a lot of poaching of workers by the CSG industry that exacerbates employment shortages in other industries.

There is no simple answer to that issue. It is human nature to pursue jobs that pay the most money so that people can look after their family so in a way it is a social issue. We would hope that by bringing prosperity and development to the regions that we make them more attractive places to live, which can then in turn attract different sorts of people who may prefer to work in rural and local industries.

One benefit of developments like ours is that it provides opportunities for young people to stay in the local area. We often hear stories of how young people must leave rural areas as there are few jobs, and at least we are bringing jobs back to the region.

Goondiwindi

Date:	26 November 2010	
Venue:	Goondiwindi-Waggamba Community Cultural Centre	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	Nigel Koolik	Arrow Energy
	Jonny Shirley	Arrow Energy

1. We have heard that 2-4% of farmland will be impacted. Can you please give an indication in terms of salt, heavy metals and topsoil?

Some 2-4% of the area of land will be disturbed during the production process i.e. the building of pipelines, clearing of the 70m by 70m area to create the site for drilling (although this reduces to 10m by 10m once the drilling phase is finished). The ground above a pipeline then goes back to almost virgin condition and the amount of permanent impact is quite small.

With regard to salt and contaminants the water doesn't touch the ground until it enters the ponds. The water is piped to aggregation dams through gathering lines as raw unprocessed water then it travels to treatment plants and is discharged as 80-90% clear water. The 10-20% brine stream is stored in high integrity, double lined, lead detection ponds. We are converting all our ponds to this standard. The brine will be transported to approved land fill, or else crystallised for commercial use.

With regard to topsoil disturbance, the standard operating procedure is to cut the topsoil, reserve it and put the subsoil back into the hole and then respread the topsoil. This is a routine requirement now for most resource industry activities.

2. This is at the pipeline development stage but what about the pilot stage?

In the pilot stage there are five wells and we build a lined dam and the production water goes from the pilot wells into the dam. When enough gas is produced, which could be from a few months to a couple of years to get the data, the well might go to a production well or if not it is plugged (i.e. filled with cement) and abandoned (i.e. casing cut off below ground level and the site rehabilitated).

3. When going onto properties to do test holes is the access situation working better with these landholders e.g. not using five gates etc?

We like to work with landholders to figure out the best way to access a property. This may mean taking a certain route, or avoiding certain areas etc. We are used to doing this, and as long as the requests are reasonable then we are happy to comply.

4. People are very worried about access.

We understand the change in operating environment that comes with allowing people onto your property. This goes against the norm for most landholders, and we put a lot of effort into making sure our people do the right thing. For example, we have in place Land Access Rules that set out clear boundaries of behaviour that we will not tolerate. We have sacked people and contractors for doing the wrong thing on people's property.

5. A lot of landholders would like you to enter perhaps through the rear of the property and install new gates instead of going through their paddocks and opening five gates.

That is fine with us. We can discuss this sort of thing with the landholder, and we accept that we may need to put in place special measures to minimise our impact.

6. What is the situation with easements near homesteads in the Wandoan area, it affects the value of properties and rent decreases. Can you move the alignment?

At Wandoan the easement is for a high pressure pipeline and therefore we can't move it too far. However, we pick a path beforehand that minimises constraints. It has to go somewhere, and we do try to select the route that avoids creating the biggest impact on landholders. With low pressure gathering pipelines we are very flexible.

7. The core holes north of Goondiwindi, how far away from the town are they and have you got consent from the landholders?

The holes are very widespread, and we drill about one exploration well every 200 sq. km to start with. We are working to get the consent of landholders, and obviously won't start drilling until we have that. We expect to start work there in 2011.

8. With regard to the exploration maps, we requested these previously and gave our names and information for the maps (No. 11) but we never received them and to my knowledge no one has those maps?

We will sort that out. The maps won't have the actual well sites on them. We don't usually send maps because the locations haven't been finalised and we haven't confirmed them with the landholders.

9. Most of us know where the points are, we've never received lot and portion number maps?

We'll send them to you. Please call the freecall number 1800 038 856 or email suratgas@arrowenergy.com.au if you need any maps or information.

10. With regard to land access agreements, the landholders have been addressed but local government has been neglected in the process. We have a program for grading roads to someone's place and it is pointless us coming back later after land access has happened. We need to know months in advance for road maintenance.

We are in the process of improving our standard notification process for moving big gear or rigs around. It is regulated under the Gas Act to notify Council with ten days notice. In Dalby we sit down on a regular basis for discussions.

We are planning to meet with Toowoomba Regional Council in the near future to discuss roads with them too.

11. Two weeks is the problem, we need more notice. We look like idiots when we grade a road and you come along for access. There is no compensation for that.

It is obviously hard for us to know what has happened in an area before we arrive. We would like to think that people can contact us and tell us these things, and to give us the chance to fix them at the time.

12. Does Arrow intend to base anyone in Goondiwindi?

It is too early to say really. We are still exploring the area, and while our drilling crews will stay here, we just don't know if there will be anything more substantial in the area until we finish our exploration works.

13. How soon will the council know that?

We want to improve our communication with all local government authorities in areas where we work. Part of that communication would be on things like roads, and the other on things like our longer term development plans.

14. Are you intending to use council landfills for your salt disposal?

We are aware there are no landfills here and we prefer not to use landfills at all. We would like to have a commercial option, or else creation of dedicated landfill sites suitable to accept salt.

15. You said you were working with Dalby Council but the roads off the Moonie Highway aroundogan haven't seen a grader on them for some time. What's the situation about keeping those roads in order?

There are regular talks with Western Downs Regional Council to determine what needs to happen to keep the roads in a safe condition. We are conscious that we do affect the roads and that we need to talk with Council, and fix what we damage. Western Downs Council recently graded some roads and we contributed to the cost. We've also provided maps to council of our main traffic routes, and if the project goes ahead we will have to factor in road maintenance as part of managing our impacts. In terms of the Moonie Highway, this is also partly QGC 's territory, so it will also be required to work with council.

16. You said 80-90% of treated/clean water goes into storage. How is it treated?

At the first stage of treatment it is reverse osmosis to basically separate the salt from the water. We also look at the sodium absorption ratio, and other chemical properties of the water to make sure it is suitable for use. Water in the environment naturally contains some chemicals, so we just need to make sure that the water we treat ends up about the same.

17. This is on site, the production site?

Yes. We currently have two reverse osmosis plants in the field working at the moment, at our central gas and water processing facilities. The water is treated before being released for beneficial use.

Water travels through the gathering systems to the aggregation dams and at that stage reverse osmosis is performed. It goes through a membrane prior to that.

18. Does reverse osmosis remove heavy metals other than salt?

The water produced from the reverse osmosis process is extremely clean. The water is not showing a great presence of heavy metals, with iron being the main chemical we find.

19. With the dam upgrades for saline concentrate, what preparation is done? You say double lined but what do you do to rehabilitate it first as brine is already there?

Because water is already in the dams at the moment we will build new dams and take the existing water from the existing dams via the reverse osmosis process and then add it to the new dam. We are planning rehabilitation of our first significant dam now. We have spent a large amount of money on studies to determine salt penetration, we've looked at the soil and how to treat that soil and how best to rehabilitate it.

20. With regard to monitoring water quality, how often is it done, where is it done and is the information publicly available?

It depends on the particular activity. We monitor where we are currently working at the moment. The frequency varies and the data is not publicly available at the moment but will be in the future. The information is provided to QWC and is on its website. Groundwater information is available as well as the amounts of water.

21. Are you independently checked?

Yes, there are site visits by DERM which takes its own water samples and concentrations in dams etc.

22. You have impacts on local communities e.g. rent and severe impacts on the cost of living.

Part of the EIS is looking at those issues through the social impact studies. We will have an investment program and mitigation measures. The program will look at those things down the track.

We try to use local people so that we bring benefit to local communities. If our workers are local they have local values and understand how things work. When you use fly-in fly-out workers they don't have the same understanding. However, there is no escaping that we do have an impact on local labour available, although that is also a sign of progress and opportunity for people.

We know too that we can have an impact on housing prices. Dalby prices have increased as well as the rents, but ultimately this is the sign of a healthy and vibrant town. Money brings new business and opportunities to towns.

Arrow employs about 100 people in Dalby, and when fully developed it will be approximately 200 at the operational phase. We do use camps during peak construction phases, when it is simply not practical or possible to accommodate a large workforce in town.

23. You employ locally?

It is certainly our preference to do so as much as possible.

24. Would you be conversing with our Chamber of Commerce? We don't want some businesses squeezed out.

We will and do engage with local government and other agencies. We want to see economic development and prosperity in town, and we need local businesses for all sorts of things, so we don't want to lose them.

25. There are three other gas companies in Dalby, if each is hiring 100 multiplied by four that's 400 and their respective families, that's 2,000 people, it does have a huge impact, a cumulative impact.

We are responsible for looking at cumulative impacts of all the social studies and groundwater. All the gas companies need to study cumulative impacts.

26. Arrow is using local government roads in Cecil Plains, some of which are gravel/forestry roads and those roads cannot handle the traffic. I don't know if you are contributing to the Toowoomba Regional Council because you didn't answer the question very well. The council needs years of notice.

When the project goes ahead we will put money into those roads, it's about two to five years ahead and probably five years behind the level of work being carried out closer to Dalby. Jonny [Arrow staff member] meets regularly with Western Downs and Toowoomba Regional Councils. We are not contributing to Toowoomba Regional Council at the moment.

27. You are using Toowoomba Regional Council roads now.

We meet Toowoomba Regional Council every two months and will meet our obligations in the future. At the moment our activities in the Toowoomba area are very limited and sporadic. However, despite that, we will work with it to make sure that we pay our share.

28. We've lived in several places with mining in Tara and Chinchilla and the traffic associated with mines is very dangerous. There are accommodation impacts, motels etc and it's happening in Chinchilla now. You will affect the tourism in the area.

Traffic safety is our number one recognised risk. We are trying to work out what to do. We recognise those risks and we have adjusted working hours to before peak hour and later in the afternoon to avoid peak hour traffic.

29. With this development there is uncertainty and risk for local communities, how can we benefit from what's happening? You have to select and train staff and we have the Goondiwindi Technical and Training College, do you use local facilities?

In Dalby we have twelve trainees in high school and Arrow has a relationship with TAFE. There is course work and field work and they leave school with Certificate 2 which is formally recognised and will help with the drain on human resources and help prevent kids from leaving town. Arrow sponsors mechanics and other business apprenticeships.

30. With regard to the Broadwater scheme, how far away are you from utilising water on the lateral and pivots? Have the studies and tests shown the performance out of those, is it promising and if so how far away?

We haven't done those studies yet. We are doing field work for Broadwater before we put in an application. Daandine is complete and under investigation by the state government but the rules for the use of beneficial water have changed. Blackwater, Grassdale and Glenelg are six months plus away. Fresh water is not available yet.

31. Today's *Courier Mail* said CSG could have a potential impact on local aquifers, surface water and springs. How does it affect your company and how do you alleviate concerns?

We recognise that concerns about water, both groundwater and the water we pump from coal seams, is of major concern to the community. We are trialling various methods to deal with the water, and our aim is to maintain the overall balance of water in a region. By balance, we mean the gross amount above and below ground in a region. Our trials include substitution of water supplies, where we pump water to irrigators' dams so they don't have to draw down groundwater supplies, as well as re-injection trials, where we seek to put the water back into underground aquifers.

32. You are putting wells down before you monitor therefore the damage could be done?

You must have the wells before you can monitor. There is current information available and we are adding to that. The well integrity is very good and we are confident about the way we do our wells.

33. With the water bore monitoring, is there a trigger for government? 80%?

Triggers are set but they are not related to the volume of flow but to levels, five metres for consolidated aquifers and two metres for unconsolidated and springs. Impact reports and cumulative impact reports from government will monitor that.

34. Isn't the government protecting all valuable farming land? Won't that affect you?

Government is working on the Strategic Cropping Land policy to protect valuable cropping farming areas. We support that approach, and believe that our activities can be done in a way that preserves and maintains SCL for the future.

35. Potentially it can?

Yes, it most certainly could, depending on the types of constraints that were placed on us.

36. Is the minimum depth of a pipe 700mm? 700mm is not enough.

The depth depends on the land use. With grazing land the depth is 750mm and roadways 1200mm, and could be deeper if required. We are required to do a risk assessment with landholders based on how you use your lands.

37. What is the minimum distance the wells will be from houses and dams? 250m for wells is way too close for a residence, especially with kids.

250m is our minimum standard based on environmental impacts. We modify security of a well to account for activities on the land. If you are concerned about your kids we have to protect the well. We erect high security mesh fencing around wells in public areas. We

carried out a risk assessment about six months ago when we were concerned about vandalism. We can use a range of different measures.

38. What is the average size of dams?

The dam size is site specific. The northern dams are smaller than the Surat Basin. At Tipton the brine dam is around 1000 megalitres, the aggregation dam and treated water dam around 400 megalitres each, transfer dam 400 megalitres, therefore between 400-1000 megalitres depending on the site.

39. That's a hell of a lot more work for council for town planning, with minimum distance from town for gas wells, gathering pipes, dams etc.

True, our tenure covers towns like Dalby and Chinchilla but Arrow has met with council and drawn a line around towns and the boundary has excluded towns and taken those areas out of the EIS.

40. What is the radius?

There is no simple answer since we need to work with council on its future development plans. In some instances there is no problem with putting infrastructure close to towns, whereas in others, perhaps due to noise or traffic etc, it is not appropriate. These sorts of things are normally considered in the EIS process.

41. What is the expected cost of water for irrigation, I heard it was \$16 per kilolitre?

We don't have a price for water, and even if we did it is not our expectation to make a profit from it.

42. If the core holes are successful in Goondiwindi which way would you take the gas and power?

It would travel north to Gladstone if successful.

43. Would you have a power station here?

Not sure about the power solution, whether we build a little power station or one big one with transmission lines or we take power from the grid and then the feeders will need upgrading.

We don't have a development plan yet; after that we will look at the power station, we are two years away from that.

44. Will there be further development of the Logan Power Station over the next 24 months?

Not by us but potentially other companies. There are companies ahead of us who are producing more gas and will need to ramp up over time. They are using the power station as a place to consume gas to manage ramp up.

45. You said 100 people were employed in Dalby, how many live in Dalby?

About 80% of our staff who run the field live in Dalby. Obviously we have people who come and go, such as the exploration drilling crews.

46. With regard to loss of water in the wells, if you don't measure pressure, how do you know when you reach a two to five metre drop in aquifers?

It is part of the monitoring program. We have a number of monitoring bores at the moment which are separate to production wells. The information is available on the QWC website. We will soon be measuring adjacent aquifers and monitoring the drop over time. Modelling will tell us what the drop is likely to be and will indicate areas immediately affected and then we will intensify studies of landholder bores.

47. If you don't have wells parallel to the pilot wells upfront, by the time the wells drop it may be too late. Reinjection could be too late?

Monitoring wells goes in parallel to pilot and production wells but not before exploration wells. Wells are designed not to leak. We don't monitor wells at the time of exploration.

48. Bores go down to different levels across the district. How do you know you are monitoring the aquifer that is supplying the water?

That is part of the monitoring program. We are working with DERM to identify the areas that are affected. We have a program of 100 monitoring bores over the next 12 months. The government has not put in pressure thresholds; we will be measuring other things.

49. What about the pressure, if we don't have the right level we don't have the pressure.

50. Is there compensation?

Yes, we are liable beyond the life of the project. We are aware of the three major issues, we need to give people certainty, concerns about land access and compensation.

51. What is the benchmark for monitoring? I'm worried about water. We have flowing bores. We have tested dozens of bores in our area.

We have an obligation to use that information as our baseline.

52. I'd like to see landscape protection on your list of issues and very high on the list, e.g. soil conservation, weeds and feral weeds. Investigations have been carried out by government on natural resource management and we are pretty protective about our landscape. CSG is covered under other legislation and has different standards to some sections of the community.

Thanks for the feedback. Landscape, flora and fauna and all those issues are being studied as part of the EIS.

53. How many other gas projects are in our area? Do you liaise with them and how soon do they start?

This area forms part of the Surat Basin, and we know that the Surat Basin contains coal and gas. It is more a matter of when, not if, someone wants to come along and extract that gas to use as energy. We all use energy, and the world is hungry for it. We don't work with other companies, but undoubtedly one day one of them will want to do something in this area.

54. Of the water that is taken out of the ground, what is the annual volume that comes out of the Great Artesian Basin? How much is treated and re-used and what happens to the rest?

At the Daandine field there is enough gas to feed 50,000 homes and it produces 2ML/day of water to produce the gas. That reduces over time. It has a full water treatment facility but that water hasn't been used for irrigation yet. We are storing the water until we receive government approval. Currently we use the water for beneficial use for feedlots, cooling power stations and coal washing.

55. Is there any exit strategy for when production finishes in a region from a landscape and community sense? These types of industries come, use resources and leave and we are impoverished afterwards.

With regard to the landscape, we are obliged to clean it up and a bond is held with government.

From a social perspective we need to do planning. We have to look at the end of the life of the project, it's not like a power station with a few operational staff; infrastructure has to be built which is the most intensive part.

We are looking at a 20 year model and we try to have a consistent level of workforce to satisfy the workload.

- 56. Comment: It is not an attack on Arrow about council and CSG companies. Not all CSG companies contribute to roadworks but Arrow does. I am pointing out that the state government doesn't allocate royalties to local government and we need to get our fair share to contribute to local roads.**

Appendix 25

Advertisement - Phase 3



ARROW ENERGY SURAT GAS PROJECT COMMUNITY CONSULTATION SESSIONS

FIND OUT MORE

Arrow Energy is hosting another series of community consultation sessions about its plans for coal seam gas exploration and development in the Surat Basin.

The next round of sessions will provide an update on the Surat Gas Project and progress on the Environmental Impact Statement (EIS).

The sessions will include a formal presentation half an hour in, followed by question and answer time. There will also be opportunity for one-on-one discussion with the project team. The sessions are open to the whole community and refreshments will be available.

Sessions in your area include:

Location	Date	Time	Venue
Wandoan	Monday 22 November	5.30pm – 8.30pm *presentation 6pm	Community & Cultural Centre 6 Henderson Road
Miles	Tuesday 23 November	10.30am – 1.30pm *presentation 11am	Leichhardt Centre Columboola Function Room Cnr Marian & Dawson Streets
Chinchilla	Tuesday 23 November	5.30pm – 8.30pm *presentation 6pm	RSL Sub Branch Heeney Street
Dalby	Wednesday 24 November	10.30am – 1.30pm *presentation 11am	Dalby Showground Pavilion Nicholson Street
Cecil Plains	Wednesday 24 November	5.00pm – 8.00pm *presentation 5.30pm	Cecil Plains Hall Geraghty Street
Millmerran	Thursday 25 November	10.30am – 1.30pm *presentation 11am	Community & Cultural Centre Walpole Street
Goondiwindi	Friday 26 November	9.00am – 12:00pm *presentation 9.30am	Goondiwindi Waggamba Community Cultural Centre Cnr Russell & Short Streets

To RSVP for a session, find out more about the Surat Gas Project or get involved in the EIS contact the project team at **freecall** 1800 038 856, **email** suratgas@arrowenergy.com.au, or **post** Surat Gas Project, Reply Paid 81 Hamilton Q 4007

Also visit www.arrowenergy.com.au/community



Appendix 26

Poster - Phase 3



ARROW ENERGY SURAT GAS PROJECT COMMUNITY CONSULTATION SESSIONS

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Appendix 27

Information sheets - Phase 3



THE SURAT GAS PROJECT

The Surat Gas Project has the potential to be Arrow's largest CSG project. The works required to make the project a success will be many, with a need to balance and address the social, environmental and economic impacts and benefits, now and into the future.

The Surat Gas Project area covers a large arc that traces the eastern boundary of the Surat Basin, and extends from Goondiwindi in the south to Wandoan in the north. There is enough gas in this large area to support production for many decades, hence only parts of the area will need to be developed at any one time. Arrow holds various petroleum exploration titles across this area, and is currently investigating both the sub-surface and surface characteristics of the area in order to identify areas for initial gas field development.

Arrow's knowledge of the sub-surface aspects of the Surat Gas Project area is based on information derived from exploration and appraisal works. These works have been going on since 2000, but the intensity and breadth of investigation is now being increased. Exploration works will be conducted across the entire project area, and should be completed in 2013. The exploration works will collect data on the gas resources, and provide invaluable information on related issues such as aquifer characteristics, groundwater regime and geological structure. The results of exploration drilling are also critical in designing appropriate well construction procedures to ensure the future production wells can be guaranteed to maintain their integrity.

In parallel with the sub-surface investigations, Arrow has commenced preparation of an environmental impact statement (EIS) that covers the entire area of the Surat Gas Project. The EIS is an essential requirement for the project to proceed, and is subject to approval by the Queensland and Commonwealth Governments.

An EIS is a comprehensive study of all environmental, economic and social issues arising from a proposed development such as the Surat Gas Project. It requires identification and consideration of all potential impacts, together with means to minimise those impacts. The EIS for the Surat Gas Project will set in place strict environmental controls to govern all aspects of the project's operations throughout its entire life.

Public input is an important part of an EIS and Arrow is committed to consulting with Surat Basin communities and stakeholders throughout the process. For more information about the EIS process, please read the *Surat Gas Project: Environmental Impact Statement Information Sheet*.

ARROW'S EXISTING OPERATIONS

Arrow already has four producing gas fields operating within the Surat Gas Project area. Since 2005, Arrow has drilled over 300 operating wells in its Tipton West, Daandine, Kogan North and Stratheden gas fields near Dalby. Gas from these wells is contracted to electricity generators and forms an important part of the state's gas and electricity supply requirements. The experience gained from developing and operating these fields has provided learnings that Arrow will apply to future developments.

These existing fields are contracted to supply gas for periods of up to 20 years or more, hence part of the work Arrow is undertaking in the region is to maintain gas supply by expanding these fields. In this regard, Arrow has lodged applications for revised Environmental Authorities with the Department of Environment and Resource Management (DERM). These authorities, once granted, will regulate the drilling of new wells and development of associated gas and water gathering and treatment facilities around the existing fields.

COAL SEAM GAS

Coal seam gas (CSG) is a naturally occurring gas formed as a by-product of the coal formation process. CSG is relatively pure at 95% to 98% methane (chemical formula CH₄), with trace amounts of nitrogen (N₂) and, in some areas, carbon dioxide (CO₂). In the Surat Basin it does not contain lighter hydrocarbons that could form gas condensate.

CSG is a natural gas that can be used for various purposes, both domestic (e.g. home supply) and industrial. One of the most common industrial uses of CSG is for electricity generation. Gas-fired power stations produce up to 50% fewer CO₂ emissions than equivalent-sized conventional coal-fired power stations. CSG can also be used for other industrial purposes such as fertiliser (ammonium nitrate) production.

The drilling of CSG wells, both for gas exploration and production, uses proven construction procedures and processes, and qualified and experienced personnel. Drilling is conducted within strict regulatory and environmental management measures. The fundamental aim of the drilling process is to ensure that the gas well is totally isolated and secure from overlying strata and aquifers, and that no water or gas can leak into or from the well.

SURAT GAS PROJECT ACTIVITIES

Arrow is fully aware of the sensitivity of seeking to develop a world scale CSG project across a large area of the Surat Basin. The need to operate respectfully on private property, and to ensure that any environmental impact is properly managed, will drive the appropriate engineering design of the final Field Development Plan. This integrated plan sets out the location and timing of the development of wells, gas and water gathering and treatment facilities, transmission pipelines and other surface infrastructure.

In the last 12 months, Arrow has continually worked towards improving community and landholder engagement through a variety of measures. The development of community reference groups will enable Arrow to better understand and respond to concerns. Likewise, a commitment to working collaboratively with landholders has led to the development and implementation of the Land Access Rules. The Rules provide a mutually respectful platform for Arrow and landholders to engage.

Arrow will continue to explore all opportunities for environmental improvement including options for sustainable water and salt management. Farm practice and irrigation trials at Thetan continue with positive preliminary results.

While the EIS process will investigate and consider all environmental and social impacts arising from the project, some of the avenues that Arrow is actively exploring as possible options for the safe removal and/or re-use of CSG water and salt are discussed below.

Water: the removal of water from coal seams is an integral part of the CSG production process. Coal seams can be likened to sponges that store both gas and water. The gas in the coal is held in place under pressure of the water. This pressure can be reduced, and the gas released, by removing the water. The water taken from coal seams as a function of the CSG process is called 'produced water', and is treated as a waste product because it is saline and therefore unacceptable for introduction to the environment in an untreated form.

The following options are being considered by Arrow as part of the coal seam water management strategy:

- power station cooling water
- coal washing
- feedlots
- urban use
- irrigation
- discharge to natural waterways under licence
- reinjection

Salt: water stored in coal seams is typically saline, and contains on average 5000-8000ppm salt, translating to 5000-8000kg of salt per million litres (i.e. a megalitre) of produced water.

Arrow is committed to preventing the release of salt to the environment, and is investigating means to either use the salt beneficially (e.g. for industrial purposes) or secure storage in a dedicated waste facility. For further information about water and salt, please read the *Arrow Energy: Water and Salt Management Information Sheet*.

WORKING WITH LANDHOLDERS

Arrow respects private property rights and recognises that landholdings are both the home and livelihood for many people. Arrow is committed to working with landholders to inform them of its proposed activities, to minimise potential impacts on their land, to consider both existing or future use, and to agree fair terms and compensation for access.

Prior to commencing any activities on private property, including EIS investigations, Arrow follows a protocol that involves communication well in advance, discussion on, and means of minimising potential impacts, and agreement on terms for access. Arrow has significant flexibility in locating its proposed infrastructure such as wells and can adjust plans to suit agricultural planning timeframes, stock considerations, seasonal conditions, topography and other relevant considerations.

Landholders who would like more information about the type of activities that may take place on their properties can read the *Arrow Energy: Information for Landholders Information Sheet*.





FOR FURTHER INFORMATION ABOUT THE SURAT GAS PROJECT

Telephone: freecall 1800 038 856
 Email: suratgas@arrowenergy.com.au
 Visit: www.arrowenergy.com.au

RELATED PROJECT INFORMATION

Surat Gas Project: Environmental Impact Statement
Surat Gas Project: Information for Landholders
Coal Seam Fact Sheet / Coal Seam Gas Video
http://www.arrowenergy.com.au/page/Dur_Company/Coal_Seam_Gas/

FOR FURTHER INFORMATION ABOUT CSG OR RELEVANT LEGISLATION

Visit the following websites
Coal Seam Gas in Queensland
www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=14123

Queensland Regulation of the Petroleum Industry
 Department of Employment, Economic Development and Innovation -
 Queensland Mines and Energy
www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm
 Department of Environment and Resource Management
www.derm.qld.gov.au/environmental_management/land/petroleum/guidelines.html
www.derm.qld.gov.au/environmental_management/impact_assessment/index.html

Commonwealth Government Environmental Assessment
 Department of Sustainability, Environment, Water, Population and Communities
www.environment.gov.au/epbc/assessments/index.html

Information for Landholders
www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=14123

> www.arrowenergy.com.au

BRISBANE DALBY MORANBAH GLADSTONE



SURAT GAS PROJECT

OVERVIEW

NOVEMBER 2010

Queensland is richly endowed with natural resources. Its mineral resources, particularly coal, have long supported a strong and highly valuable mining industry focused on export markets. In recent years, companies such as Arrow Energy have unlocked the potential of a previously unrecognised source of energy that occurs naturally in coal seams and is known as coal seam gas (CSG). CSG is a suitable energy source for various uses, including domestic supply, and is most commonly used for electricity generation. It is a cleaner burning fuel in terms of carbon emissions and well placed to support transition from a high to local carbon emission environment.

Arrow Energy is a Queensland-based company that operates five CSG projects in the Bowen and Surat Basins. This business is well established and now accounts for more than 20% of Queensland's overall gas production, and is well placed to continue to do so for many years. The vast scale of Queensland's gas resources, coupled with growing international demand for energy, has driven Arrow to propose a CSG export industry, via development of a liquefied natural gas (LNG) plant on Curtis Island off Gladstone. This project is based on supplying CSG from fields in the Surat and Bowen Basins, which would be transported to the LNG Plant at Gladstone via pipelines. The gas field development in the Surat Basin is known as the Surat Gas Project.



THE SURAT GAS PROJECT

Arrow is planning the Surat Gas Project, its largest gas exploration and development program in the Surat Basin.

The project involves ongoing exploration in the Surat Basin to identify the most environmentally sustainable and economically viable areas for future gas production. The exploration program will be focused in an area extending from Wandoan to Dalby and south to Millmerran and Goondiwindi where the company currently holds exploration tenures and environmental approvals to conduct exploration activities. Field development and gas production will be undertaken based on the results of the exploration.

The Surat Gas Project will meet the ongoing gas supply opportunities arising from domestic and export markets, including the supply to the Queensland gas market, and potential supply to the proposed Arrow LNG Plant on Curtis Island.

The Surat Gas Project will see ongoing gas exploration, development of production wells and associated infrastructure (including gas compression and water treatment facilities and pipelines) for gas production, progressively conducted across different geographic areas within the project area over time.

In order to proceed, Arrow must gain approval from the Queensland and Commonwealth Governments. To do this, we are preparing an environmental impact statement (EIS) which will examine the entire exploration footprint in the project area.



WHY PREPARE AN EIS?

Arrow has a legal responsibility to assess the environmental, social and economic impacts of its proposed activities.

Prior to issuing government approval, regulatory authorities must be satisfied that our activities have been properly assessed and that appropriate measures are in place to avoid or minimise environmental, social and economic impacts.

For major development projects such as the Surat Gas Project, preparing an EIS is generally considered the most appropriate assessment method.

The Surat Gas Project EIS will:

- > identify potential adverse and beneficial impacts of the project
- > ensure Arrow finds practical and workable solutions to protect environmental, social and economic values that may be affected by the project
- > identify environmental management measures for the project
- > ensure community and stakeholder views are heard in the EIS assessment process.

The EIS will also examine ways to mitigate or minimise some impacts and maximise benefits for both the community and environment.

Arrow's activities are governed by the Queensland *Petroleum & Gas (Production and Safety) Act 2004* and the *Environmental Protection Act 1994*. The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* also requires Arrow to demonstrate its activities will not significantly affect matters of national environmental significance.

The EIS for the Surat Gas Project commenced in late 2009.

WHAT WILL THE EIS INVOLVE?

Figure 1 (The EIS Process) shows the approvals process for the Surat Gas Project EIS and the interaction between Arrow, the Queensland and Commonwealth Governments, and the public at various stages of the approvals process.

A wide range of environmental, social and economic studies are being conducted for the EIS, and Arrow is consulting with the community throughout the process.

THE EIS STUDIES

As part of the EIS studies, various community members and groups are being consulted on matters such as:

- > social and economic impacts on communities and businesses
- > flora and fauna
- > river and stream health
- > surface water and groundwater management
- > cumulative impacts of gas and energy projects on the region
- > traffic and road conditions and
- > historic places or items that hold heritage significance.

Prior to undertaking any environmental studies/investigations on land or property, Arrow contacts landholders to discuss access and technical components of the studies. Studies on private property may involve taking water samples, setting up noise monitors for a period of time, soil sampling and recording flora and fauna.

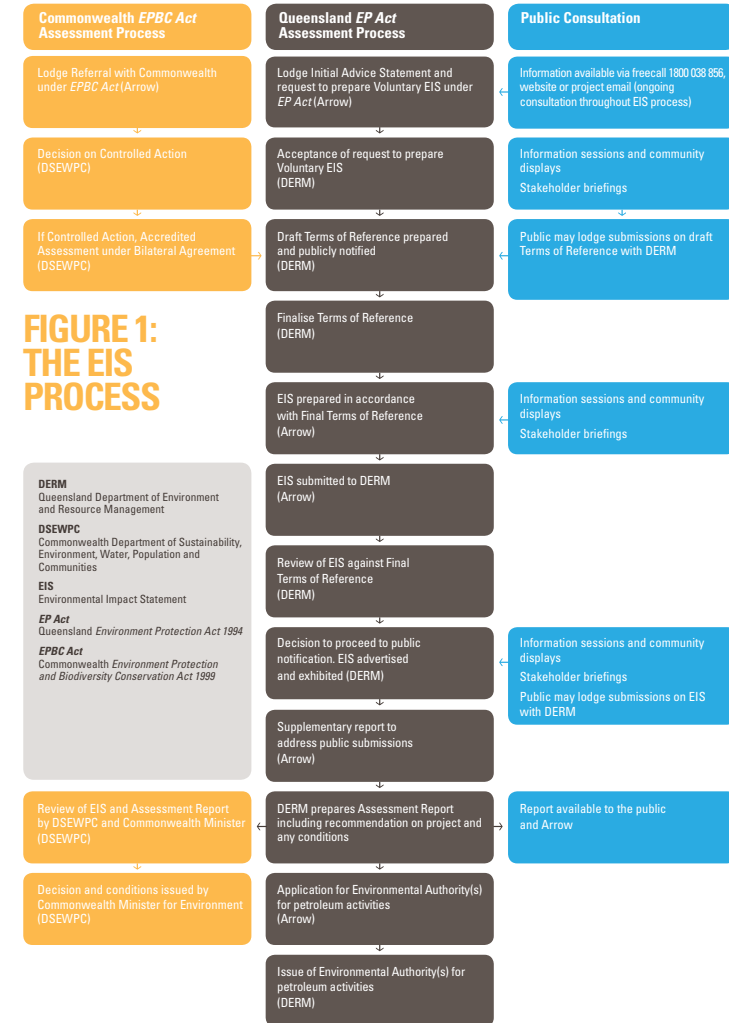
COMMUNITY INVOLVEMENT IN THE EIS

Public input is an important part of an EIS and Arrow is committed to consulting with Surat Basin communities and stakeholders throughout the process. Public feedback provides valuable information and understanding of potential impacts of the project and opportunities for further engagement.

The community is invited to participate in the EIS process through a number of community forums, public displays and meetings which will be promoted in local media.

Prior to making a decision on the project, regulators must be satisfied that the company has appropriately responded to issues raised by the community and stakeholders.

If you have questions about the EIS or information to share, call Arrow's freecall information line on 1800 038 856.





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Surat Gas Project: Information for Landholders
Coal Seam Fact Sheet / Coal Seam Gas Video
http://www.arrowenergy.com.au/page/Our_Company/Coal_Seam_Gas/

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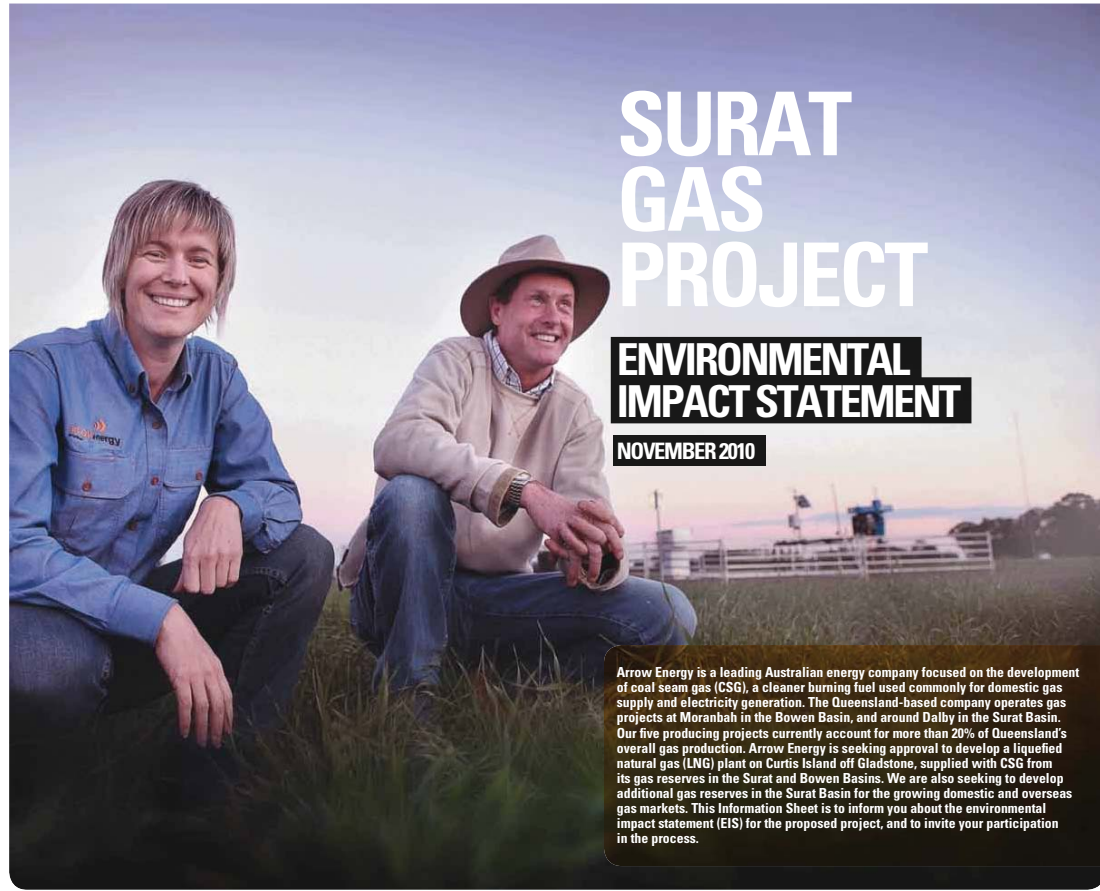
Queensland Regulation of the Petroleum Industry
 Department of Employment, Economic Development and Innovation -
 Queensland Mines and Energy
www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm
 Department of Environment and Resource Management
www.derm.qld.gov.au/environmental_management/land/petroleum/guidelines.html
www.derm.qld.gov.au/environmental_management/impact_assessment/index.html

Commonwealth Government Environmental Assessment
 Department of Sustainability, Environment, Water, Population and Communities
www.environment.gov.au/epbc/assessments/index.html

Information for Landholders
www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=14123

> www.arrowenergy.com.au

BRISBANE DALBY MORANBAH GLADSTONE



SURAT GAS PROJECT

ENVIRONMENTAL IMPACT STATEMENT

NOVEMBER 2010

Arrow Energy is a leading Australian energy company focused on the development of coal seam gas (CSG), a cleaner burning fuel used commonly for domestic gas supply and electricity generation. The Queensland-based company operates gas projects at Moranbah in the Bowen Basin, and around Dalby in the Surat Basin. Our five producing projects currently account for more than 20% of Queensland's overall gas production. Arrow Energy is seeking approval to develop a liquefied natural gas (LNG) plant on Curtis Island off Gladstone, supplied with CSG from its gas reserves in the Surat and Bowen Basins. We are also seeking to develop additional gas reserves in the Surat Basin for the growing domestic and overseas gas markets. This Information Sheet is to inform you about the environmental impact statement (EIS) for the proposed project, and to invite your participation in the process.



ARROW PROJECTS

Since 2005, Arrow has drilled over 300 operating wells in the Surat Basin to meet the state's gas and electricity requirements. The experience gained from these activities will assist Arrow to expand its gas production for both domestic and overseas markets. As part of this expansion, over the next few years Arrow plans to develop a world class liquefied natural gas (LNG) project, the **Arrow LNG Project**. The project involves:

- Exploration and development of gas resources to supply the project:
 - from the Bowen Basin - the **Bowen Gas Project**
 - from the Surat Basin – the **Surat Gas Project**
- Construction of surface facilities and pipelines to take gas from the Bowen and Surat Basins to Gladstone:
 - the pipeline from the Bowen Basin is known as the **Arrow Bowen Pipeline (ABP)**
 - the pipeline from the Surat Basin is known as the **Arrow Surat Pipeline (ASP)**
- Construction of an LNG plant on Curtis Island known as the **Arrow LNG Plant**

The broad schedule of development is:

- exploration, investigation and planning works to continue until 2012
- submission of environmental impact statement (EIS) and applications for all relevant approvals from government in the period 2011 - 2012
- final investment decision in 2013
- subject to successful completion of the items above, commencement of development in 2013. Initial gas field development will begin in the Surat Basin, with Bowen Basin to follow in later years
- construction of the Arrow Surat Pipeline commencing as early as 2013
- construction of the Arrow Bowen Pipeline commencing as early as 2014
- construction of the Arrow LNG Plant, and delivery of first LNG, by late 2016, early 2017.

Exploration

Although Arrow has been exploring both the Bowen and Surat Basins since 2000, the scale and extent of gas resources needed to supply the LNG plant requires additional work to be done to confirm that the quantity and quality of gas can be delivered as required. In addition, work is necessary to better understand the hydro-geology of both basins, particularly the location, nature and character of groundwater and aquifers in both regions. Exploration works are planned to be conducted across both basins, and will comprise

drilling of wide spaced exploration wells intended to confirm coal seam extent and reservoir character, and pilot wells to test gas production.

Tenure, operational and safety aspects of exploration works are regulated by the Department of Employment, Economic Development and Innovation (DEEDI). Arrow will conduct all environmental activities in accordance with Department of Environment and Resource Management (DERM) regulations and requirements.

Surface facilities and pipelines

Arrow is aware of the sensitivity of seeking to develop a CSG project which requires a large footprint over the Surat and Bowen Basins. The need to operate respectfully on private property, and to ensure that environmental impact is properly managed, will drive the appropriate engineering design of the final Field Development Plans (FDPs) for each area. The FDP is the integrated plan that sets out the location and timing of the development of wells, gas and water gathering and treatment facilities, transmission pipelines and other surface infrastructure.

The pipeline routes between the Surat Basin and Gladstone are currently being identified.

LNG Plant

The development of the Arrow LNG Plant on Curtis Island, off Gladstone, will allow the liquefaction of the CSG by reducing to minus 181 degrees in order for it to be shipped to overseas markets. The LNG Plant is subject to a separate EIS study which will include the land and marine aspects of the proposed development.

Approvals

The Queensland and Commonwealth Governments require numerous approvals to be obtained before the LNG, CSG and pipeline projects can proceed. Various regulatory authorities must be satisfied that Arrow's activities have been properly assessed, and that appropriate measures are in place to avoid or minimise environmental impacts. To do this, Arrow is preparing a number of environmental impact statements (EISs) which will thoroughly examine the proposed developments, and will be used to judge subsequent environmental and other approvals required for development.

The drilling of CSG wells, both for gas exploration and production, uses proven construction procedures and processes, and qualified and experienced personnel. Drilling is conducted within strict regulatory and environmental management measures. The fundamental aim of the drilling process is to ensure that the gas well is totally isolated and secure from overlying strata and aquifers, and that no water or gas can leak into or from the well.

ENVIRONMENTAL STUDIES

Arrow has a legal responsibility to assess the environmental, social and economic impacts of its proposed activities. For major development projects such as the Surat Gas Project, preparing an EIS is generally considered the most appropriate assessment method.

A wide range of environmental, social and economic studies will be conducted for the EIS.

Prior to undertaking any environmental studies or investigations on private property, Arrow will contact landholders to discuss access and technical components of the studies. Studies on private property may involve taking water samples, setting up noise monitors for a period of time, soil sampling and recording flora and fauna communities.

WORKING WITH LANDHOLDERS

Arrow respects private property rights and recognises that landholdings are both the home and livelihood for many people. Arrow is committed to working with landholders to inform them of its proposed activities, to minimise potential impacts on their land, to consider both existing and future use, and to agree fair terms and compensation for access.

Prior to commencing activities on private property, including EIS investigations, Arrow follows a protocol that involves communication well in advance, discussion on, and means of minimising potential impacts, and agreement on terms for access. Arrow has significant flexibility in locating its proposed infrastructure such as wells and can adjust plans to suit agricultural planning, timeliness, stock considerations, seasonal conditions, topography and other relevant considerations.

OVERLAPPING TENURE

The CSG industry shares a common interest in coal resources with both coal mining and underground coal gasification (UCG) companies. However, CSG is considered a petroleum activity and is managed under the *Petroleum and Gas (Production and Safety) Act 2004*, while both coal mining and UCG activities are considered mining activities and are managed under the *Mineral Resources Act 1988*. Due to the common interest in coal, it is possible for petroleum tenure to overlap other mining tenures.

Arrow's CSG business is separate and not linked to mining or UCG activities. However, the state requires that in the event of overlap, and where production by either party is contemplated, appropriate arrangements are in place to ensure safe and co-ordinated operations.

Arrow believes that coordinated production with coal mining activities is entirely feasible, and provides a number of benefits:

- allows for coordinated and optimal extraction of mineral and petroleum resources, and avoids duplication of effort/expense
- allows for establishment of mechanisms to reduce carbon emissions from coal mines
- provides means to improve coal mine safety by degassing coal seams ahead of mining, and utilising waste mine methane for beneficial use
- provides opportunity to use produced water for industrial use (e.g. coal washing) and thereby reduce reliance on other, potentially more valuable, sources of water

Arrow is a member of the Queensland Government Industry Consultative Committee that is working, in conjunction with an independent Expert Panel appointed by Cabinet, to address matters relating to potential interaction with UCG projects. This work is largely contingent on delivery of a report to government by the Expert Panel, and subsequent decision by Cabinet, on the viability and future of the UCG industry which is due to be decided in 2012. In the event that a landholder has coal mining and CSG tenures over their property, both companies are required to negotiate and consensu independently.

AUTHORITIES AND PERMITS

Arrow's activities are regulated within a framework of government legislation and policy. There are three key elements of this framework include:

Tenure, operations, safety and land access matters managed in accordance with the *Petroleum and Gas (Production and Safety) Act 2004* and associated regulations. This legislation sets out rights and obligations relating to petroleum tenure, of which there are three types:

- Authority to Prospect (ATP)** – used for exploration activities
- Petroleum Lease (PL)** – used for the development and commercialisation of petroleum (including gas) resources.
- Pipeline Licence (PLL)** – used for the construction and operation of gas pipelines.

It is notable that resource industry legislation, including the *Petroleum and Gas (Production and Safety) Act 2004*, has been amended to incorporate a Land Access Code that sets out terms and conditions for agreement for resource companies to work on private property.

Environmental matters are decided and managed in accordance with Queensland and Commonwealth legislation and policy, including:

- Queensland Environmental Protection Act 1994* and subordinate regulations
- Environmental Authorities* attached to ATPs and PLs
- Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*
- Vegetation Management Act 1999*
- Nature Conservation Act 1992*

operational policies such as the management of water produced in association with petroleum activities.

Cultural Heritage and Native Title matters are managed in accordance with the *Aboriginal Cultural Heritage Act 2002* (Queensland) and *Native Title Act 1993* (Commonwealth)

Additional information about the rights and obligations associated with CSG exploration and production can be found at www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm.

GAS EXPLORATION AND PETROLEUM FIELD DEVELOPMENT

EXPLORATION

The process used by Arrow to explore for CSG is done in a sequential way that seeks progressively to obtain better understanding of the nature of the coal resource. The basic steps are:

Define the extent and continuity of coal seams by seismic surveys and/or stratigraphic drilling.

- Seismic survey
This is a surface based activity using a vibration source to produce energy waves that travel underground. The energy is reflected off different geological strata such as a coal seam, back to the surface where it is recorded by a small geophone inserted by hand into the ground. Seismic is recorded in lines, is relatively quick to record, and is low impact in that it requires minimal disturbance of the ground.

- Stratigraphic drilling
This involves drilling slim diameter (120mm) wells in order to locate coal seams in order to determine their depth, thickness and lateral extent. This drilling method is also known as 'chip' drilling, named after the small stone chips returned to surface during the drilling process. The time to complete this type of well is usually less than one month.

Define the reservoir properties of a coal seam

- Core drilling
This is used to obtain direct measurement samples of important coal seam reservoir properties, most particularly gas content and permeability. Core drilling also involves drilling slim diameter wells (120mm), and also includes testing of the borehole itself to determine the permeability of the coal (in how readily gas will flow from the coal). As above, the time to complete this well is usually less than one month.

Probe the production potential of a coal seam (or seams)

- This is done by 'pilot testing' which seeks to confirm whether gas can be produced to surface in commercially viable quantities. A pilot test involves drilling a small number of wells (usually between two and five) in close proximity, then producing gas and water long enough to confirm production rates and volumes.

- This CSG is held in coal seams under pressure from both overlying rock strata and water within the coal seam (which combine to provide hydrostatic pressure), it is necessary to reduce this water pressure so that the gas can flow. Consequently, while the drilling phase of the pilot activity generally takes several weeks per well, once the pilot test is in operation (i.e. producing water and gas), the production phase of the pilot test could last up to twelve months or more. The gas is flared, and water is stored locally, because there is normally no access to pipelines or other beneficial uses of gas during this early testing phase.

- Pilot test wells that do not prove viable are shut down and rehabilitated in accordance with statutory obligations. Where a pilot program is successful and shows viable amounts of gas, Arrow would normally suspend the borehole (i.e. stop production, but otherwise leave the borehole intact), pending potential future use for gas production.

In the first two steps, the drilling process requires the use of water, sourced locally, which is stored in small ground pits. In the pilot test phase, the activities produce water from the borehole; this is stored in a purpose built small dam. If, for any reason, the project does not continue, this land area is remediated as required under government regulation.

At each of these stages, a decision is made either to proceed based on favourable results, or to abandon further works.

FIELD DEVELOPMENT

While exploration defines the resources that will underpin a CSG development, the engineering design and schedule of all the necessary infrastructure required to produce gas is set out in the field development plan. In simple terms this plan sets out the surface footprint of the CSG development, and includes key elements including location, design, construction and operation of the following:

- production wells including wellhead controls (e.g. metering and control valves)
- gas and water gathering systems (underground high-density polyethylene pipes to connect wellheads to central gas processing and water treatment facilities)
- central gas processing facilities (where gas is compressed and dehydrated ready for transportation via pipeline to domestic and/or export markets) and
- water treatment facilities to manage produced water.

Production wells

Gas production wells are typically drilled at spacings in the range of 800m – 1000m. The drilling process for each well has three main steps:

- pre-drilling – an inspection of the proposed site ensures that it is suitable, and determines whether there are any landholder, cultural heritage and environmental considerations that may require relocation. Once the site is agreed and checked, access tracks are established (if required), a drill site of about 60m by 60m cleared to allow rig access and movement, and either ground pits dug or surface tanks brought to site to manage water required during the drilling process.

- drilling – a mobile truck mounted drilling rig and associated support equipment (light vehicle, water truck, drilling equipment transport truck) will move to the site and drill the well. Various movements of men and materials are required during the typical ten to seventeen days required to drill a well. Drilling may be conducted 24 hours a day, seven days per week.

- post-drilling – after drilling, the well is readied for 'completion' so production equipment can be installed. The drill site area is tidied and rehabilitated. The final size of the finished well is approximately ten metres by ten metres.

Arrow drills different types of production wells depending on the geology of an area. In the Bowen Basin many wells are of a design called surface to in-seam (SIS), which consists of two horizontal wells drilled into a vertical well. The surface entry points for the horizontal wells are approximately 1.5m distant from the vertical well. Only the vertical well is used for gas production. Other wells drilled by Arrow, for example those in the Surat Basin, and in some portions of the Bowen Basin, only require the vertical well component.

Once installed, producing wells generally operate for at least ten to twenty years. Farming and grazing activities can continue as normal around established well sites.

Well operation and maintenance

Wellhead engines and pumps may require regular inspection and maintenance, with the frequency higher during the initial commissioning period of the well. Once the well is established, most monitoring of the well operation can be carried out remotely via telemetry back to the central gas processing facility.

Arrow representatives will physically visit the well at weekly to monthly intervals to complete scheduled care and maintenance.

During the life of a production well, temporary access for truck mounted 'work-over' rigs is required at intervals (months or years) for maintenance activities. These activities typically require one to three days per work-over.

Well decommissioning and rehabilitation of well sites

When wells reach the end of their useful life, they are decommissioned. During decommissioning all surface equipment is removed from the well site, the well is plugged with cement, and the well casing cut off 1m to 1.5m below ground. The well site is then rehabilitated to its previous land use, with final site rehabilitation agreed with the landholder.

Gas and water gathering systems

Each well requires the establishment of water and gas gathering pipelines which link the well back to central facilities. The pipelines are constructed of variable diameter (100mm – 630mm), high-density polyethylene pipes that are buried at a minimum depth of 0.75m. The location of these pipelines is reasonably flexible, and are designed to minimise impacts on productive land. The gas and water gathering system transports water to regional 'Integrated Processing Facilities' (IPFs), where the gas is compressed and water stored and treated. These IPFs are located at about 40km spacings across the project area, with consideration in their placement of a range of constraints in their placement, including environmental issues, site access, technical design, construction issues and proximity to dwellings. Arrow prefers to place these facilities on company-owned land.

COMMON QUESTIONS ANSWERED

Do I get a say in what happens on my land?

Yes. Arrow recognises that it's vital to establish and maintain a long term relationship with landholders then it must be able to reach equitable terms for access onto private property, and with that comes the need to consider landholder interests and concerns.

Can I refuse access to my property?

In a strict legal sense, refusal to allow access can be escalated to the Land Court. However, Arrow's preference is to work in a constructive and fair way with landholders in order to obtain consent through voluntary access agreements.

While Arrow has legal rights to enter your property under the Act, we also recognise our responsibilities to you and your property. This includes, for example, agreement on appropriate compensation for gas development activities, demonstration of our obligation to maintain the viability of land (e.g. by weed control), and use of flexible work practices to minimise impacts on current land use activities and value.

What if I do not agree with what is proposed on my land?

A new system of land access has recently been enacted as legislation, and is set out in the Land Access Code. This system provides mechanisms for additional protection to landholders, and is designed in part to provide a means to resolve disagreements of this sort.

More details on the Land Access Code can be found at www.dme.qld.gov.au/mines/land_access_code.cfm

Will I receive compensation for access to my property or any activities carried out on my land? If so, how much?

Yes. Under legislation Arrow is bound to compensate for the impacts of all its activities on a landholder's property. The amount of compensation depends on the level and duration of CSG activity proposed to be conducted on a property and includes for example:

- > loss of crop or income-producing land
- > restrictions on use of land adjacent to CSG infrastructure.

What effect will the project have on aquifers and groundwater?

Arrow and the Queensland Government appreciate there is concern about the possible impacts arising from CSG activities. For its part, the government is establishing enhanced regulatory requirements, e.g. including groundwater monitoring systems and provisions to safeguard bore water water supply.

Arrow is working on this key issue at many levels. It is improving its well design and construction methodology to ensure its integrity and ability to provide a conduit for transmission of water between aquifers. Similarly, we are studying the hydro-geology of the Surat Basin, and investigating means to minimise impact on aquifers (both the shallow Condamine alluvium and deeper Great Artesian Basin).

A sound understanding of impacts and monitoring and mitigation measures will be key criteria for approval of project EISs.

More details on water management matters can be found at www.derm.qld.gov.au/factsheets/pdf/environment/en1.pdf

What are you going to do with the salt?

Arrow is committed to the removal of produced salt from the local landscape. Our preference is to identify a beneficial use for the salt produced from our operations. We are currently investigating crystallisation for use in industrial processes and the use of brine in the chemicals industry.

Can I use the excess water for agriculture?

This has not been determined at this time. The preference is to use produced water to achieve a 'water balance' within the entire hydro-geological system that both maintains and, in some cases supplements, depletion and usage by other means. To explain, we are considering ways to re-inject treated water into aquifers, or else to supply it directly to groundwater users (e.g. irrigators), in order to replenish and/or reduce demand on existing groundwater sources.

There are numerous issues to be resolved on this topic, including technical and scientific, operations, legal and governmental, so it will require time to address properly.

Can I still use the surrounding land for grazing or farming?

Yes. All infrastructure will be secured to ensure grazing and farming can occur in relatively close proximity.

Can I plant crops above the gathering lines?

This request is best addressed early so that the gathering lines can be installed in an appropriate manner to allow cropping. In any case, all farming machinery can be used over gathering lines, and gathering lines are normally buried about 0.7m underground.

Are the well sites safe for stock? Will they be fenced?

Yes, well sites will be secured with strong stock-proof fence panels to prevent access.

How much noise will be generated?

Arrow considers noise levels in the selection and design of equipment to be used at wellheads and on facility plant and equipment. We are committed to locating wells and infrastructure a minimum of 200m away from homes (and in most cases much further), in consultation with landholders. Where sensitive areas are likely to be affected by generated noise, we take all reasonable measures to minimise the noise to acceptable levels. Should a noise issue be reported, we will investigate and take appropriate mitigation measures.

What will be done to stop the spread of weeds?

Arrow is committed to working with landholders to manage the potential spread of weeds from our operations. The company operates a weed inspection process and, where required, a wash down process to manage the potential spread of weed seed. Further investigations to stop the spread of weeds are underway.

What should I do if I suspect a well or pipeline on my property is leaking gas?

If you suspect an Arrow well or pipeline is leaking gas, please contact Arrow Energy straight away (telephone 1800 778 488). We will send a maintenance crew to inspect the well. Do not go within 50m of the well or pipeline leak, especially with ignition sources (including mobile phones). Arrow will keep you informed of response plans.

What should I do if there's a coal seam water leakage on my property?

If you suspect an Arrow well or pipeline is leaking coal seam water, please contact Arrow Energy straight away (telephone: 1800 778 488). We will send a maintenance crew to inspect the well or pipeline, and we will keep you informed of response plans.



FOR FURTHER INFORMATION ABOUT ARROW ENERGY PROJECTS

Telephone: freecall 1800 638 856
Email: info@arrowenergy.com.au
Visit: www.arrowenergy.com.au

FOR FURTHER INFORMATION ABOUT CSG OR RELEVANT LEGISLATION INFORMATION

Visit the following websites

Coal Seam Gas in Queensland
www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=14123

Queensland Regulation of the Petroleum Industry
Department of Employment, Economic Development and Innovation - Queensland Mines and Energy
www.dme.qld.gov.au/mines/petroleum_gas_exploration.cfm
Department of Environment and Resource Management
www.derm.qld.gov.au/environmental_management/land/petroleum/guidelines.html
www.derm.qld.gov.au/environmental_management/impact_assessment/index.html

Commonwealth Government Environmental Assessment
Department of Sustainability, Environment, Water, Population and Communities
www.environment.gov.au/epbc/assessments/index.html

Information for Landholders
www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=14123

www.arrowenergy.com.au

BRISBANE DALBY MORANBAH GLADSTONE

ARROW ENERGY

INFORMATION FOR LANDHOLDERS

NOVEMBER 2010

Arrow Energy is a leading Australian energy company focused on the development of coal seam gas (CSG), a cleaner burning fuel used commonly for domestic gas and electricity generation. The Queensland-based company operates gas projects at Moranbah in the Bowen Basin, and around Dalby in the Surat Basin. Its producing projects currently account for more than 20% of Queensland's overall gas production. Arrow Energy is seeking approval to develop a liquefied natural gas (LNG) plant on Curtis Island off Gladstone; this will be supplied with CSG from its gas reserves in the Surat and Bowen Basins. It is also seeking to develop additional gas reserves in the Surat Basin for the growing domestic and overseas gas markets. This Information Sheet provides information to landholders on how Arrow conducts its activities on private land.

arrow energy
go further

ARROW ENERGY

Employment and business opportunities

Employment opportunities

Recruitment websites – Arrow vacancies are advertised on www.seek.com.au, www.careerone.com.au and www.arrowenergy.com.au

Local advertising – some field-based jobs are advertised in local newspapers.

Business opportunities

Business vendor register

- interested suppliers, subcontractors or service providers are invited to register their interest and provide detailed company profiles by obtaining a Vendor Approval and Evaluation Form from the company's website at www.arrowenergy.com.au under 'Contact Us'

Arrow will supply successful construction contractors with details of prequalified Australian and local area suppliers, subcontractors or service providers on the Arrow business vendor register.

Industry Capability

Network Queensland

- assists Australian businesses to maximise opportunities that arise from purchasing requirements from both Government and private sectors, particularly in major project infrastructure and industrial projects. ICN Queensland allows businesses to register their services. Arrow refers to the ICN database for potential suppliers in the area. Further information is available at www.icnqld.org.au

Specific local area

business assistance

- during the detailed planning phase, the Contracting and Procurement department will proactively engage with the local business community to ensure opportunities to supply goods and services are effectively communicated to the local business communities.

Arrow's supply department will also organise specific information sessions to inform the local business community details required to complete tender requirements such as safety management and quality management plans, insurances and demonstration of capacity.

How can I find out more?

Freecall number: 1800 038 856

Email: info@arrowenergy.com.au

Website: arrowenergy.com.au

GET INVOLVED IN THE SURAT GAS PROJECT

Environmental Impact Statement

Arrow Energy is planning gas exploration and development in the Surat Basin. Areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration and/or production activities.

Arrow is preparing an Environmental Impact Statement (EIS) for the project. The EIS will examine environmental, economic and social issues, as well as potential impacts and benefits associated with the project. Public input is an important part of the EIS and Arrow encourages you to have your say.

General feedback and questions

Arrow encourages queries, feedback and public input into the project at any stage; this can be done via the freecall number, email or post.

Freecall 1800 038 856

Email suratgas@arrowenergy.com.au

Post Surat Gas Project Reply Paid 81 Hamilton QLD 4007

Website arrowenergy.com.au

The EIS approval process is managed by the Queensland Department of Environment and Resource Management (DERM). To find out more about DERM's Surat Gas Project EIS process and the Terms of Reference for the project visit:

Website www.derm.qld.gov.au/environmental_management/impact_assessment/eis-processes/surat-gas-project.html

Feedback on the EIS

Once Arrow has completed its investigations, a draft copy of the EIS will be on display for public input. DERM and Arrow will notify the community of when and where the draft EIS is on display and how you can obtain a copy.

Formal submissions on the draft EIS may then be made to DERM as coordinator of the project's approvals process.



BTEX FACT SHEET

▶ What is BTEX?

BTEX is an acronym for the group of chemicals Benzene, Toluene, Ethylbenzene and Xylene. Although these chemicals can be found in a number of everyday products, such as oil-based lubricants, diesel, petrol and even in some soft drinks¹, they are regarded as hazardous substances. Recently, in the United States, concerns have been raised that BTEX compounds, used during the hydraulic fracturing (fracking) process may have contaminated groundwater sources. As the fracking process is sometimes used in the drilling of coal seam gas (CSG) wells in Queensland, the state government has taken the precautionary step of prohibiting the use of BTEX in fracking activities.



▶ Arrow Energy has not and does not use BTEX.

▶ What is fracking and why is it done?

Fracking involves pumping fluid at high pressure into a coal seam to fracture the seam and allow gas to flow readily into gas wells. The process is carried out deep underground, usually at depths well below shallow aquifers – where drinking and stock water is commonly sourced. The vast majority of gas wells do not need to be fracked; to date Arrow has only used fracking in about 2.5 percent of its wells. There is no fracking planned in the Surat Gas Project area.

The Queensland Government has introduced regulations that require notification – both to the government and landholders – of all chemicals used during the fracking process. About 99.5 percent of the materials pumped into wells during the process are sand and water. The other 0.5 percent consists of other materials commonly used in household products.

Fracking has been used safely around the world for more than half a century and with appropriate safeguards and application it can be managed in a way that does not cause harm to people or the environment.

▶ Why does Arrow monitor BTEX levels within its wells?

The Queensland Government requires all CSG companies to monitor BTEX levels with regular well testing. Despite being prohibited in the fracking process, it is still possible for small traces of BTEX to be detected as these chemicals can be found in petroleum-based products used in the well drilling process, and also occur naturally in coal and petroleum.

If traces of BTEX are detected at Arrow Energy's well sites, Arrow will seek to determine where the chemicals have come from and, where possible, they will be eliminated.

In Australia, all coal seam gas activities are heavily regulated by state and federal authorities. In Queensland, the industry is subject to the most rigorous environmental approval and monitoring processes in the state's history and, to date, each potential LNG project's approval has been subject to around 1 200 state government environmental conditions.

¹ <http://www.foodstandards.gov.au/scienceandeducation/factsheets/factsheets2006/benzeneinflavouredbe3247.cfm> Accessed 16 November 2010

Products used in the fracking process**:

2-Butoxyethanol (used in stain remover)
Acetic acid (used in vinegar)
Alkanes / Alkenes (used for heating and cooking)
Boric oxide (used in glass)
Complex polyamine salt (used as a plant hormone)
Ethylene glycol (used as an automotive antifreeze)
Fatty alcohol (used in cosmetics and food)
Glutaraldehyde (used to disinfect medical equipment)
Guar gum (used in dairy products)
Hemicellulase enzyme concentrate (used in laundry detergents)
Methanol (used in explosives, paints)
Oxyalkylated alcohol (used for grease cleaning)
Oxyalkylated alkanolamine (used as solvents)
Polydimethyldiallylammonium chloride (used in waste water treatment)
Potassium carbonate (used in soap and glass production)
Silicone
Sodium persulfate (used as a bleach)
Surfactant (used in fabric softeners and laxatives)
Tetrakis(hydroxymethyl) phosphonium sulphate (used in pesticides)
Tetramethyl ammonium chloride (used in organic synthesis)
Triethanolamine (used in cement production)
Water

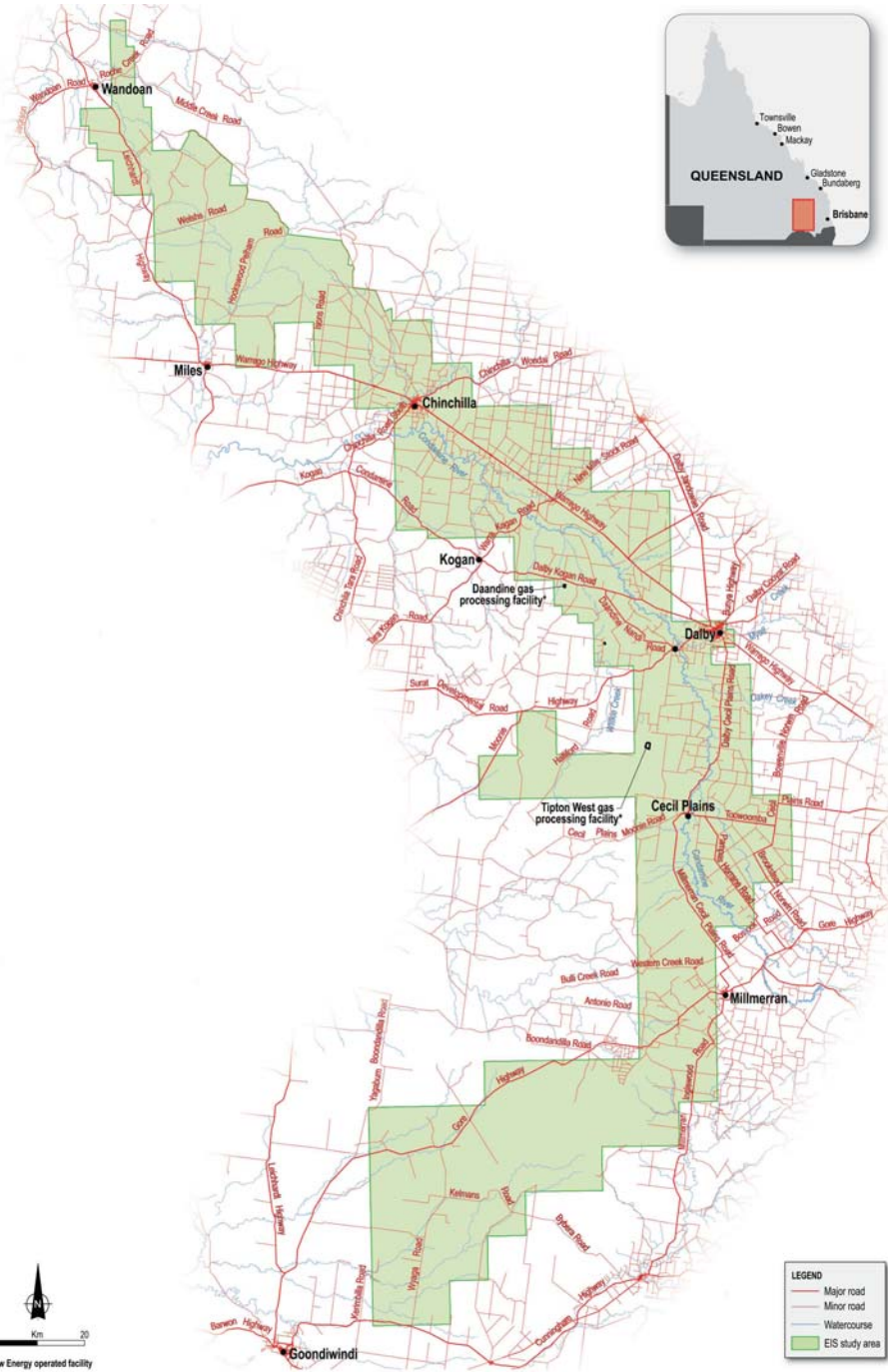
** None of these products contain BTEX.

Appendix 28

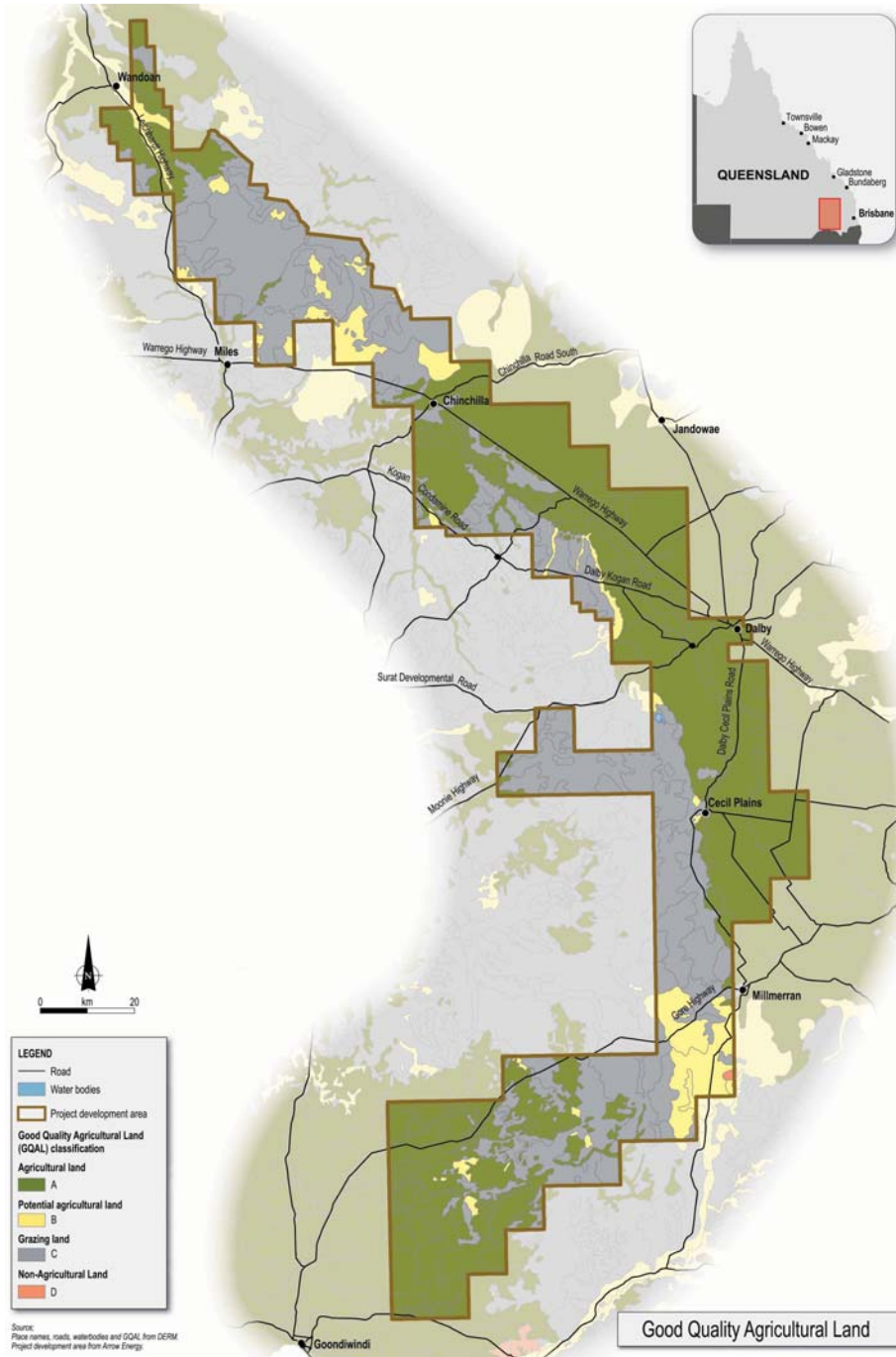
Banners - Phase 3



SURAT GAS PROJECT EIS AREA



GOOD QUALITY AGRICULTURAL LAND



WORKING WITH LANDHOLDERS

Arrow Energy recognises and respects the business interests of all landholders, and understands the land is their livelihood. Arrow is committed to working closely with them to understand their concerns and work together to ensure our work practices minimise impacts on land and existing agricultural activities.

Prior to undertaking any activities on private property, Arrow will engage with landholders to consider all aspects of the property, including the landholder's business activities.

When determining temporary or permanent locations for plant and equipment, the following issues are taken into account:

- › agricultural and stock activities
- › seasonal conditions and plans
- › topography
- › drainage lines
- › service corridors
- › vegetation and fauna communities
- › location of residences and other sensitive receptors
- › current and future landholder plans
- › irrigation systems.

Arrow's priority is to establish good long term working relationships with landholders of properties on which we would like to operate, and work together to resolve concerns. Arrow is committed to working with landholders to gain voluntary access agreements and to reach agreement on compensation arrangements.

Planning with landholders

This is a 'case study' example of how coal seam gas wells and infrastructure have been designed on an operating farm owned by Arrow in the Surat Basin.

1. Aerial photograph of property

The landholder and Arrow land team examine a property, including topography, drainage lines, existing services and infrastructure.

2. Farming plan

The landholder and Arrow land team discuss the landholder's existing operations and current enterprise plans, including seasonal planning and future expansion.

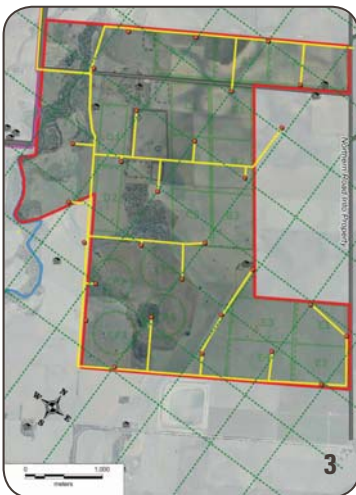
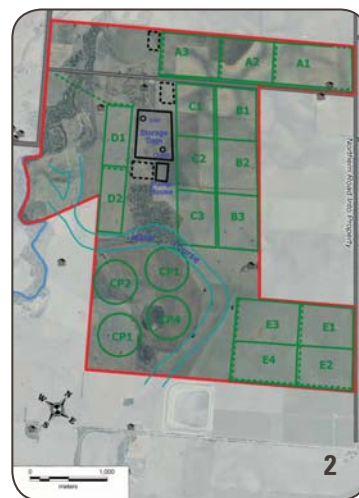
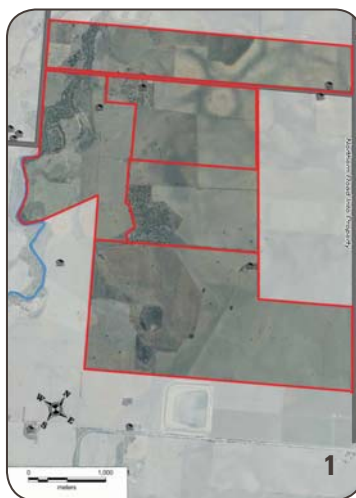
3. Preliminary plan for engineering estimates

Preliminary plans may apply a basic grid in order to carry out initial estimates of system pressures and infrastructure costs. However, these layouts are only for indicative planning purposes and are not intended to be strictly implemented on the ground.

4. Collaborative plan developed

The landholder and Arrow's land team combine the current and future farm plans, property's characteristics and engineering layout to jointly produce a customised system of wells and infrastructure that endeavours to satisfy both parties.

Some areas may prove incompatible with the current land use, topography, or environmental factors.



WHAT DOES 'MAKE GOOD' MEAN?

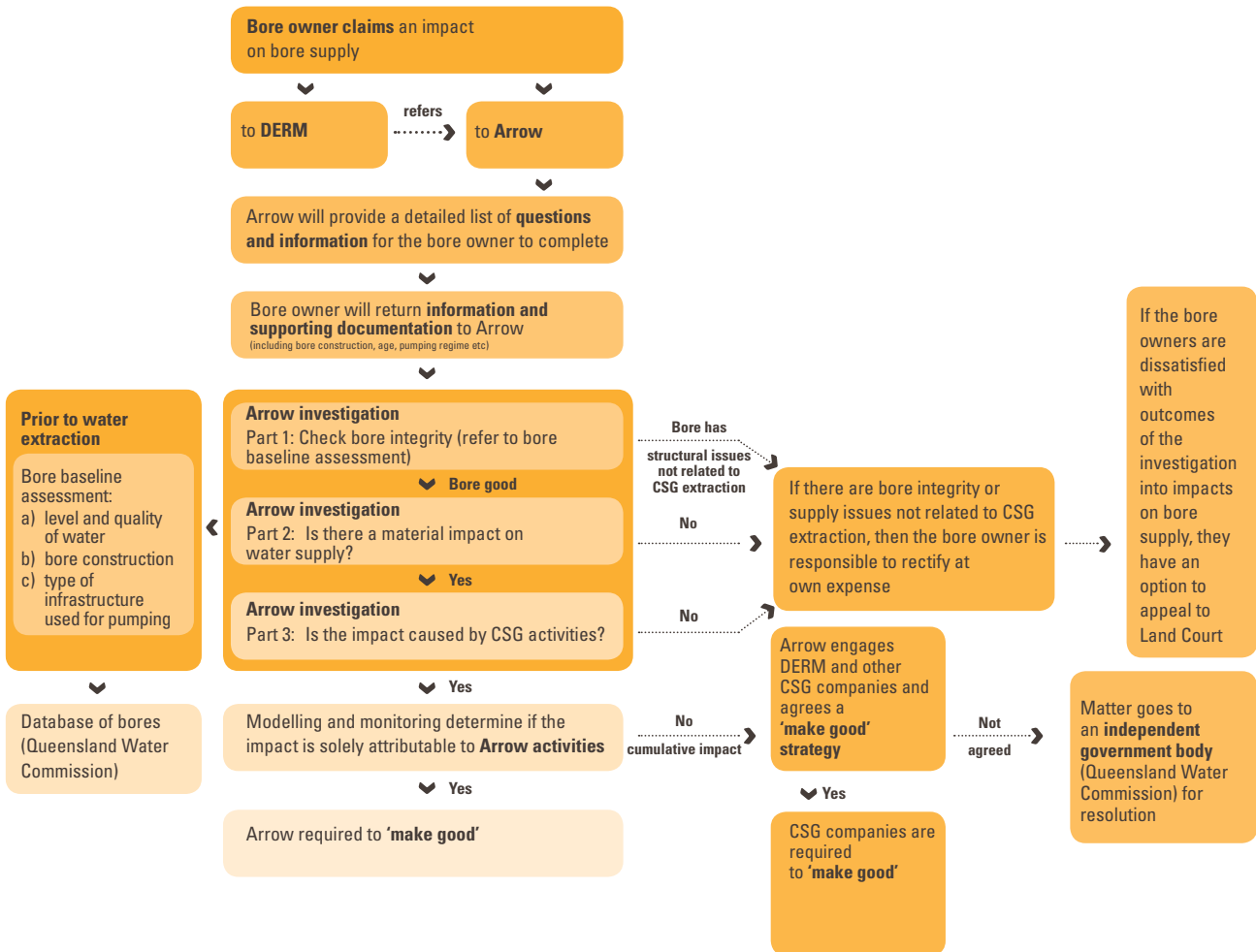
The following 'make good' options may be employed by Arrow Energy should there be a reduction in the capacity of a water bore to supply water for its intended purpose. These are some options:

- > deepening a bore
- > adding rising mains to lower the pump depth, thereby improving available pumping head
- > changing a pump
- > reconditioning a bore
- > drilling a new bore
- > providing an alternative water supply
- > other forms of compensation.

'Make good' arrangements will be agreed between Arrow and the owner of an affected water bore.

Bore impact investigation process

Arrow uses the following process to investigate any claim of material impact on water supply.



WATER AND SALT MANAGEMENT

Responsible management of water and salt associated with coal seam gas (CSG) production is one of the most significant challenges currently facing the industry.

Associated water or coal seam water is pumped from coal seam gas wells, lowering the water pressure in the coal seam and allowing the gas to separate from the coal and flow into the well.

The volume and quality of coal seam water varies between and across different coal basins and over the life of an individual well. For example, similar volumes of gas production in the Bowen Basin in Central Queensland are producing 1/10th the volume of water compared to the Surat Basin.

Coal seam water in the Surat Basin has been shown to range between brackish to salty, and on average is about 1/6th the concentration of sea water.

Coal seam water management

Queensland Government policy requires all coal seam water to be treated if it cannot be directly reinjected or used in its untreated form for environmentally acceptable beneficial uses.

The following beneficial use options are being considered by Arrow:

Untreated coal seam water beneficial uses (already in use)

- › power station cooling water
- › coal washing
- › feedlots.

Treated coal seam water beneficial uses

- › urban use
- › agriculture
- › irrigation
- › reinjection.

Arrow currently treats coal seam water through a process of micro filtration and reverse osmosis.

The CSG industry is intensively examining water treatment processes.

Salt management

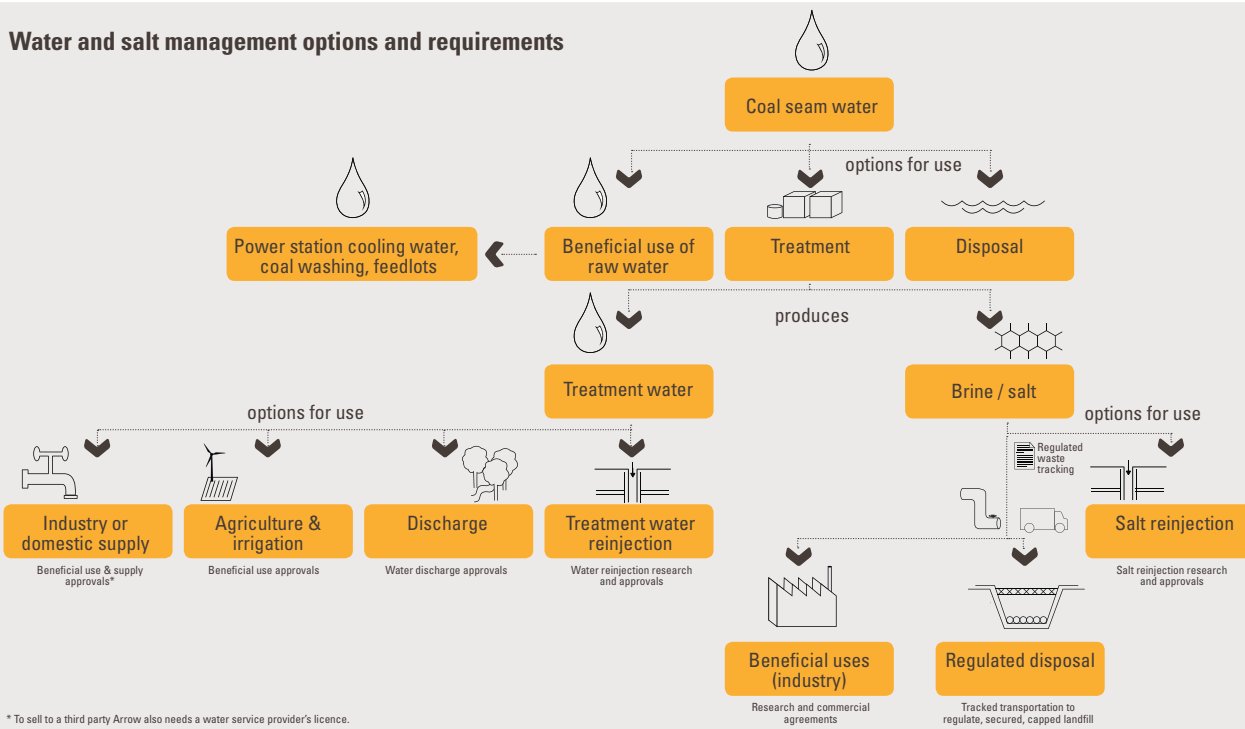
The amount of salt produced is dependent on the location and age of the coal seam.

1 megalitre coal seam gas water (1 megalitre = 1 million litres) → **5-8 tonnes salt on average** (5,000 – 8,000kg)

Arrow's preference is to identify a beneficial use for produced salt. It is investigating opportunities for use in chemical industries and industrial processes. Arrow is also considering other disposal options including reinjection of salt into aquifers with at least the same salinity.

Arrow is committed to the removal of produced salt from the local landscape to regulated disposal facilities, as a minimum standard.

Water and salt management options and requirements



TRAFFIC AND ROADS

Arrow Energy's Surat Gas environmental impact statement (EIS) includes a traffic study to examine potential impacts on:

- › road networks including intersection geometry and control, road links and hierarchy
- › infrastructure including road surfaces, bridges and cattle grids
- › safety including intersections, school bus routes, rail crossings, traffic composition and vehicle mix, and driver fatigue.

The traffic study will inform project design and field management activities to minimise traffic impacts.

Key project access roads classified significant include:

- › Leichhardt Highway from Wandoan to Miles
- › Warrego Highway from Miles to Warra
- › Moonie Highway near Dalby
- › Dalby Cecil Plains Road
- › Millmerran Cecil Plains Road
- › Gore Highway near Millmerran and Goondiwindi.

How will potential traffic impacts be managed?

Potential road and traffic impacts will be managed through implementation of Arrow's site specific traffic management planning (e.g. for large construction sites) and procedures.

Arrow's management procedures will address requirements such as:

- › preferred transport routes for construction traffic, heavy goods vehicles (i.e. to avoid built up areas and town centres, where possible)
- › fit-for-purpose transport routes
- › minimisation of significant road use conflicts and impacts by:
 - avoiding peak traffic times and use of school bus routes
 - scheduling vehicle deliveries to avoid disruption to neighbours
 - scheduling around seasonal activities (e.g. crop harvesting times)
 - staggering vehicles to prevent queuing on access roads and maintain free flowing traffic (i.e. avoid convoys that prevent safe overtaking)
 - using staff buses and car pooling to minimise traffic
- › compliance with appropriate permit and control requirements (i.e. police escorts and support vehicles).

Traffic management plans will consider the cumulative impacts of other projects on traffic and roads. In addition, Arrow will ensure facilitation of effective notifications to regional councils and road authorities to allow them to effectively plan current and future road maintenance and upgrade requirements.



Arrow is committed to working with local communities, regional councils and road authorities to identify opportunities to minimise Arrow's transport related impacts, and to communicate impacts to the community

LAND ACCESS RULES

Arrow's Land Access rules have been developed to set clear and concise guidelines for our staff to operate respectfully and cooperatively with all our landholders.

These rules apply to all personnel, including contractors, involved in Arrow Energy operations and are consistent with Arrow's values and the Australian Government standards.

- | | | | |
|---|---|--|--|
|  | 01
Only enter a property with the approval of your supervisor, who has cleared access with the landholder. |  | 07
Do not interfere with the landholder's property, equipment or operations. Use approved tracks and laydown areas. Drive at less than 10kph within 200m of buildings. Leave gates as signed or found. |
|  | 02
Only conduct activities that are approved within the access conditions. |  | 08
Do not take firearms, weapons, animals, illicit drugs or alcohol onto the property. |
|  | 03
Follow the directions of the landholders. Report any directions that are not within the access conditions. |  | 09
Do not light fires unless authorised. Smoking is only permitted in the designated locations. |
|  | 04
Report landholder discussions, complaints or incidents to your supervisor or Land Liaison Officer. |  | 10
Do not enter a site during or after wet weather without consent of the Land Liaison Officer (who has cleared access with the landholder) except in the case of a declared emergency. |
|  | 05
Carry personal and vehicle identification showing that you are an employee or contractor of Arrow. |  | 11
Do not negotiate with landholders. Only Land Liaison Officers are permitted to negotiate activities and access conditions. |
|  | 06
Keep sites tidy, ensure all rubbish is removed from site. |  | 12
Do not threaten or pressure landholders or other people on the property. |

Appendix 29

**Minutes of Arrow Surat community reference
group meetings - Phase 4**



MINUTES



MEETING:	Arrow Surat Community Reference Group
DATE:	Thursday February 10th 2011, 09.30am
ATTENDEES:	<p>Leisa Elder, Vice President Community and Corporate Affairs Mike Ward, Vice President, Well Delivery Carolyn Collins, Manager, Environment. Tony Knight, Vice President Exploration Sarah Delahunty, Senior Community Officer, Dalby Ian Hayllor, Basin Sustainability Alliance Stuart Copeland, University of Southern Queensland Geoff Hewitt, Future Food Qld Cr Mick Cosgrove, Deputy Mayor Western Downs Regional Council Cr Ray Jamieson, Western Downs Regional Council Greg Kulawski, General Manager, Access, Approvals and Water Patrick O'Flaherty, Senior, Water & Ground Water Co-ordinator (GUEST) Ross Dunn, Director APPEA</p>
APOLOGIES:	<p>Cr Paul Antonio, Toowoomba Regional Council Andrew Rushford Graeme Clapham Gordon Baker, Cotton Australia</p>
DURATION:	Tour End 2pm

Presenter	Agenda Item	Discussion	Agreed Action
Leisa Elder	Item 1	<ul style="list-style-type: none"> Given the circumstances of the past few weeks, appreciation to everyone for making the effort and giving up their time to attend today. Pleasing that everyone got through the floods safely 	
Leisa Elder	Item 2 –Previous meeting	<p>Previous Minuets</p> <ul style="list-style-type: none"> Graeme Clapham attended December meeting but not mentioned in minuets <p>Outstanding actions</p> <ul style="list-style-type: none"> Health and Safety issues and impacts is ongoing Safety package – to be presented at next meeting Local Gov rating of PL's (see notes in this file) <p>MOTION: Arrow will meet with Council to discuss the impacts and concerns of rating</p>	<p>AMENDMENT</p> <p>SD to send email to AI Muller for update</p> <p>TK to present</p> <p>TK will carry on</p>

		<p>Petroleum Leases. RJ: suggested including Lee Volland, Director of Finances WDRRC to be part of the discussion.</p> <p>Moved: LE 2nd : SC Carried</p> <ul style="list-style-type: none"> • Andrew Rushford accepted invitation to be on committee • Bus Routes: SD has a copy of the bus routes used in the WDRRC. A copy of these will be give to Jason Schroder (manager operations south) to be incorporated into travel considerations. <p>RJ: suggested that we also ensure Arrow contractors also have access to the information.</p> <ul style="list-style-type: none"> • A reminder to all members, especially the new members to have delegates name to Sarah asap. • Site visit: due to not all members getting the information and the time constraints of some members we will do the site visit again soon. <p>Independent Water bore audit: CC reported that Arrow are still drafting a document that outlines sampling frequency, how data is gathered, use of an independent party to conduct random sample and how the information will be shared.</p> <p>GH offered information about BOM test drilling in the area.</p> <p>GH suggested that perhaps Arrow conduct a workshop for ground water users to explain, baseline data, systems used, trigger point et.....</p> <p>PO'F is still collating information from regional bore drillers and will report back at next meeting.</p> <ul style="list-style-type: none"> • Notes from Cecil Plains: LE circulated the notes and asked committee to look over for comment at next meeting <p>Action: Committee to look over supplied notes for comment at April meeting.</p> <ul style="list-style-type: none"> • Meeting times: Thursday agreed as 	<p>looking at and comparing rating strategies</p> <p>RJ & MC to get background info on rating across the region and set a time for Arrow to attend a Council Info meeting.</p> <p>PO'F will speak to Wayne Newton to find out some more information.</p> <p>SD will circulate proposed meeting</p>
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		better time, perhaps look at SMS meeting notifications as reminders.	times for 2011
Members	Flood Impact	GH: -landholder impacts varied greatly -Cropping and infrastructure hardest hit -Assistance Arrow gave to the cleanup was a credit -Recent flooding has provided an opportunity to see water heights and flows and take that into consideration when planning future developments especially infrastructure like roads. The beneficial flooding that occurs by water movement over flood plains (ie: Brookstead flood plain) is essential on the blacksoil and is easily effected.	
Carolyn Collins	Water Update-combined committees	(see presentation in this file)	
Darren Stevenson	Site tour-combined committees		ACTION: repeat tour at a later date

Proposed ASCRG Meeting times 2011			
February 10 th	Dalby	RSL	Includes combined water update and site tour
April 7 th	Toowoomba	USQ Council Chambers	
June 2 nd	Dalby	RSL	
August 4 th	Toowoomba	USQ Council Chambers	
October 6 th	Dalby	RSL	
December 1 st	Toowoomba	USQ Council Chambers	

MINUTES



MEETING:	Arrow Surat Community Reference Group
DATE:	Thursday April 7th 2011, 09.30am
ATTENDEES:	<p>Leisa Elder, Vice President Community and Corporate Affairs Carolyn Collins, Manager, Environment. Tony Knight, Vice President Exploration Sarah Delahunty, Senior Community Officer, Dalby Stuart Copeland, University of Southern Queensland Cr Mick Cosgrove, Deputy Mayor Western Downs Regional Council Cr Ray Jamieson, Western Downs Regional Council Greg Kulawski, General Manager, Access, Approvals and Water Patrick O'Flaherty, Senior, Water & Ground Water Co-ordinator (GUEST) Ross Dunn, Director APPEA Gordon Baker, Cotton Australia</p>
APOLOGIES:	<p>Cr Paul Antonio, Toowoomba Regional Council Andrew Rushford Graeme Clapham Ian Hayllor, Basin Sustainability Alliance Geoff Hewitt, Future Food Qld</p>
DURATION:	Meeting close 12.15pm

Presenter	Agenda Item	Discussion	Agreed Action
Greg Kulawski	Item 1	<ul style="list-style-type: none"> driving and using Mobile phones 	
Leisa Elder	Item 2 –Previous meeting	<p>Previous Minuets</p> <ul style="list-style-type: none"> WDRC – a full presentation to Council in early May. <p>Outstanding actions</p> <ul style="list-style-type: none"> Gordon Baker – delegate Michael Murray <p>Moved: LE 2nd : SD Carried</p>	
Greg Kulawski / Carolyn Collins	Item 3 - Water Update	<p>(see presentation and notes in this file)</p> <ul style="list-style-type: none"> Need explanation around cross section map slide <p>ACTION: change picture to be more representative of cross section and include an explanation to clarify the map is representation only</p> <ul style="list-style-type: none"> Beneficial use of water is Arrow's preferred method of disposal Groups and organisations would be willing to support our position. 	Greg Kulawski

Leisa Elder	Item 4 – Surat Community Consult	<ul style="list-style-type: none"> • Request for more visual displays • More information on compensation • Water – base line data information • Include the groups / individuals we have a successful relationship with (ASCRG & AIFLC) • Cotton Australia conference in Moree same week as proposed EIS Consultation round. <p>ACTION: Arrow will raise this potential clash of dates in next Surat Consultation meeting.</p>	<p>Sarah Delahunty / Leisa Elder</p> <p>Leisa Elder</p>
Leisa Elder / Tony Knight	Item 5 – Approach to ATP 683	<p>Joint presentation with AIFLC</p> <ul style="list-style-type: none"> • Ploughing the ground – is still a concern given that there is a lifting of the ground which effects overland flow • Ploughing the ground still a potential given that it is about post event management. 	

2011 ASCRG Meeting times			
June 2 nd	Dalby	RSL	
August 4 th	Toowoomba	USQ Council Chambers	
October 6 th	Dalby	RSL	
December 1 st	Toowoomba	USQ Council Chambers	

Appendix 30

**Minutes of Arrow Intensively Farmed Land
committee meetings - Phase 4**



Arrow Intensively Farmed Land Committee Meeting February 10, 2011 – 8.30 – 2.00

ATTENDEES:	Jamie Grant, Paul McVeigh, Stuart Armitage, Jeff Bidstrup, Dave Armstrong Bryan O'Donnell, Glenda Viner, Jonny Shirley, Gerard Coggan, Caoilin Chestnutt, Darren Stevenson, Julian Leonard, Jason Schroder
	MINUTES: Bryan O'Donnell, Gerard Coggan and Jonny Shirley
APOLOGIES:	John Cameron, Charlie Mort, Wayne Newton

ITEM	DETAILS	ACTION
ITEM 1	Welcome and Thank you for attending	
	Safety Moment – Bryan O'Donnell - Extreme caution is required when driving on flood damaged roads	
ITEM 2	Minutes of Previous Meeting No further comment after the December 9, 2010 minutes of meeting were reissued in Jan 2011. Decision: December 9, 2010 minutes of meeting accepted	
ITEM 3	Arrow Surat Community Reference Group MOM - No comments	
ITEM 4	Updated – Land Owner Issues:	
	<p>Overview of the impact of the flood</p> <p>Overland water flow causes significant damage.</p> <ul style="list-style-type: none"> - There was significant erosion around above ground infrastructure (approximately 20% the Condamine floodplain impacted) - Flood water flow cut gullies on properties approximately 3-5 km long and 0.5-1.0 m deep. - Minor changes in the flood plain had significant impact during this flood event. - The landowners believe that these issues could be addressed by Arrow Energy working with landholders. <p>Council road formation diverted the Brigalow flood plain water course:</p> <ul style="list-style-type: none"> - Small changes to the height of a council gravel road of approx. 200mm caused overland flow diversion. - Diverted water travelled between catchments and created 7 km of new water cause downstream. - Resulted in loss of 500 acres of cotton for one landholder. - Impact area of approximately 20km downstream. <p>The age of infrastructure is a factor for what gets destroyed by overland flow.</p> <ul style="list-style-type: none"> - Old Infrastructure has been through previous floods and lessons learnt to adjust. - New gas infrastructure would cause overland flow diversion unless carefully designed. <p>All landholders believe that CSC will not be able to be developed over the entire floodplain (the recent floods further highlight this)</p> <p>Satellite photo provides good image of submerged areas.</p>	
	<p>AIFL Committee being used co-operatively by the CSG Industry</p> <ul style="list-style-type: none"> - Arrow Energy needs to be proactive in the industry. - The landowners requested that Arrow Energy formalise the process for negotiation of land access agreements as the legislation the government has put in place has times frames that are too short. 	

	<ul style="list-style-type: none"> - Landowners requested the CSG industry underpin the capital value of their farms. - Landowners requested the CSG industry develop a groundwater insurance or bond scheme for the Condamine aquifer. - Jamie Grant – recommended that we focus on agenda and ToR, to ensure we keep the committee focus practical - The landowners accept that the committee was put together in good faith. - Arrow Energy was recognised as leading the way with the guys who helped clean up. 	
	<p>New Landowner Issues</p> <ul style="list-style-type: none"> - Dave Armstrong tabled his letter of resignation from the committee. - Landowners did not wish to continue to come to the monthly meetings with the same issues - Landowners reinforce that there are 4 key issues of land, water, compensation and lifestyle. Moving forward we need to sort out these key issues. - Paul McVeigh suggested we don't use term "compensation" - Landowners were concerned about conditions in relation to EA for ATP683. - The concern related to legal ramifications of landholders providing advice to Arrow and the potential impacts on community as a result of advice. Landowners are not elected to represent landholders with ATP683 - Particularly concern was in relation to linkage into ATP683 EA and reasons why an EA is or is not awarded by DERM. - Entire tenement stressed out waiting to find out location of the CSG infrastructure. - Some of the Landowners are frustrated because we're trying to solve all issues and not solving the CSG surface infrastructure planning which is what they come here to fix. 	<p>Glenda Viner To seek Arrow legal advice to present to the committee.</p>
ITEM 5	<p>Update – Arrow Exploration Activities</p> <p>Due to time constraints to allow the Arrow Operations visit, this item was held over to next meeting.</p>	<p>Caoilin Chestnutt Provide an update of proposed activities next meeting.</p>
ITEM 6	<p>Water Management Update</p> <p>Carolyn Collins from Arrow Energy gave a presentation to both the Arrow Intensively Farmed Land Committee and the Arrow Surat Community Reference Group to update the committee members on the current water management plans</p>	
ITEM 7	<p>Arrow Operations Visit</p> <p>Arrow Energy conducted an operations visit for both the Arrow Intensively Farmed Land Committee and the Arrow Surat Community Reference Group committee members of the Daandine RO Facilities and associated dams.</p>	
ITEM 8	<p>Next Meeting – 7th April 2011 - Toowoomba</p>	

MEETING MINUTES



MINUTES OF: AIFLC meeting
HELD AT: University of Queensland, Office of external relations boardroom – 5th floor S block, West Street, Toowoomba
DATE: 7th April 2011
COMMENCEMENT TIME: 10:00am – 12:30pm

PRESENT:	ATTENDEES: Bryan O'Donnell, Darren Stevenson, Gerard Coggan, Melita Keast, Jonny Shirley, Julian Leonard, Jamie Grant, Brett Porter, Wayne Newton, Mike Ward
	MINUTES:
	APOLOGIES: Caoilin Chestnutt
CHAIRMAN:	Bryan O'Donnell
DISCLOSURES	NIL

	ACTION
ITEM 1 Safety moment Video of recovery of vehicles	
ITEM 2 Minutes from previous meeting Minutes accepted – The AIFL minutes being circulated to other group via Leisa Eida, & Glenda Viner	
ITEM 3 Update on Land, Water, Compensation and lifestyle 3.1: Arrow had a Temporary Environment Permit (TEP) to release 29 mega litres of treated water at Daandine RO across the land to Wilkie Creek. During high rainfall years, the only option for Arrow is a Temporary Environment Permit (TEP) to discharge water to the creek. Discharge will be part of our plan in extreme weather conditions. 3.2 : Community consultation session planned for week beginning 23 May 2011 3.3: Groundwater modelling well under way. Expected completion Q3. Arrow is targeting a presentation on ground water modelling in Q4 2011 Community Consultation Daandine – from RO plant western side of Wilkie Creek. Already have permitted release point	
ITEM 4 Proposed new AIFL committee member (Brett Porter) Graeme Clapham and Stewart Armitage propose that Brett Porter be new member of AIFLC. Replacement for Dave Armstrong. All in favour. Accepted by the committee.	

ITEM 5	Overview of data acquisition strategy and scope of work for core hole program including (water testing, aquifer data, etc) The land owners brought up the issue of drilling through grout too soon before the cement has cured as this can result in well integrity failures. Arrow has assured the committee that the correct grout and cure time will be used for all wells. This time lapse photography will be used on non IFL exploration area prior to going into IFL with exploration drilling. This is to ensure work is carried out to IFL standard on non IFL land prior to commencing on IFL. Conversion of old bores to monitoring wells was discussed. One of 6 pilot wells would usually also become a monitoring well. Gauges to monitor pressure would also be installed P&A will ensure no interconnectivity of aquifers.	
ITEM 6	Update on Glenburnie and River road pilot Arrow had some issues with the Meenawarra Pilot. The pilot hasn't provided conclusive data so Arrow may seek to drill another pilot for additional data.	
ITEM 7	Draft pipeline construction standard work practice for IFL Draft SOP presented in summary and electronic copy to be sent out with minutes for further review. Wayne to provide specifications with regard to weight and loading of large farming equipment to assess its potential impact on underground gathering pipelines.	
ITEM 8	Arrow energy legal department's view of "advice given by AIFL committee members in relation to ATP 683" Arrow cannot give legal advice because Arrow is in a prejudiced position.	
ITEM 9	Planning for desk top case studies for development on IFL Stuart Armitage has offered to allow Arrow to use his property for a Desk top study Jamie Grant has also offered his property for the Desk top study Wayne Newton to talk to his local community to confirm Theten as location.	
ITEM 10	Other business Bryan O'Donnell will be moving to new role with a large interaction with Arrow's commercial department and therefore will step down as the AIFLC Chairman from next meeting onwards. Bryan O'Donnell will remain on the AIFLC Committee to provide advise & support to the group Meeting closed at 11.40am to view water management presentation with the community reference group	

Next meeting planned for 09 June 2011

There being no further business, the meeting was closed at 11:40am

CONFIRMED AS A TRUE AND CORRECT RECORD.

Chairman
Bryan O'Donnell

Appendix 31

Invitation letter - Phase 4



20 April 2011

Dear Resident

Invitation to community information sessions 23 to 28 May 2011

Arrow Energy will be holding a series of community information sessions in the Surat Basin in late May. These sessions will give community members the opportunity to find out the latest on Arrow's exploration activities in the area and to ask questions about the Surat Gas Project.

Since Arrow held community sessions last November, the company has been continuing its work on the environmental impact statement (EIS) for the Project and is examining all environmental, economic and social issues, plus the associated impacts and benefits. I hope you will be able to attend one of the community information sessions which will be held from 23 to 28 May 2011. Details of the sessions are overleaf.

The sessions will commence with an opportunity for one-on-one and small group discussions with the project team, followed by a project update and a question and answer time. The sessions will cover water, environment, land, drilling, surface engineering, community and employment.

In addition, in response to an identified need for more information on water impacts, three specialist sessions will be held at 9am on 24, 25 and 26 May. These will provide detailed technical information on groundwater, interconnectivity, allocation substitution, modelling and monitoring, and salt.

The sessions are open to the whole community and refreshments will be available. If you require any further information, and to assist with catering, please RSVP by contacting the project team on freecall **1800 038 856** or email suratgas@arrowenergy.com.au. Feel free to pass this information on to anyone who may be interested in knowing the latest information about the Project.

Yours sincerely



Leisa Elder
Vice President Community and Corporate Affairs

Surat Gas Project community information sessions May 2011

Location	Date	Time	Venue
Miles	Monday 23 May	10.00am – 1.30pm * presentation commences 11.30am	Leichhardt Centre Columboola Function Room Corner Marian & Dawson Streets
Wandoan	Monday 23 May	4.30pm – 7.30pm * presentation commences 6pm	Community & Cultural Centre 6 Henderson Road
Chinchilla	Tuesday 24 May	1.00pm – 4.30pm * presentation commences 2.30pm	Bulldog Park Slessar Street
Cecil Plains	Wednesday 25 May	1.00pm – 4.30pm * presentation commences 2.30pm	Cecil Plains Hall Geraghty Street
Dalby	Thursday 26 May	1.00pm – 4.30pm * presentation commences 2.30pm	Dalby Showground Pavilion Nicholson Street
Millmerran	Friday 27 May	10.00am – 1.30pm * presentation commences 11.30am	Community & Cultural Centre Walpole Street
Goondiwindi	Saturday 28 May	9.00am – 12.30pm * presentation commences 10.30am	Goondiwindi Waggamba Community Cultural Centre Corner Russell & Short Streets

Water technical sessions

Chinchilla	Tuesday 24 May	9.00am – 11.00am * presentation commences 9.00am	Bulldog Park Slessar Street
Cecil Plains	Wednesday 25 May	9.00am – 11.00am * presentation commences 9.00am	Cecil Plains Hall Geraghty Street
Dalby	Thursday 26 May	9.00am – 11.00am * presentation commences 9.00am	Dalby Showground Pavilion Nicholson Street

Appendix 32

**Introduction to groundwater presentation
by Dr Lloyd Townley**



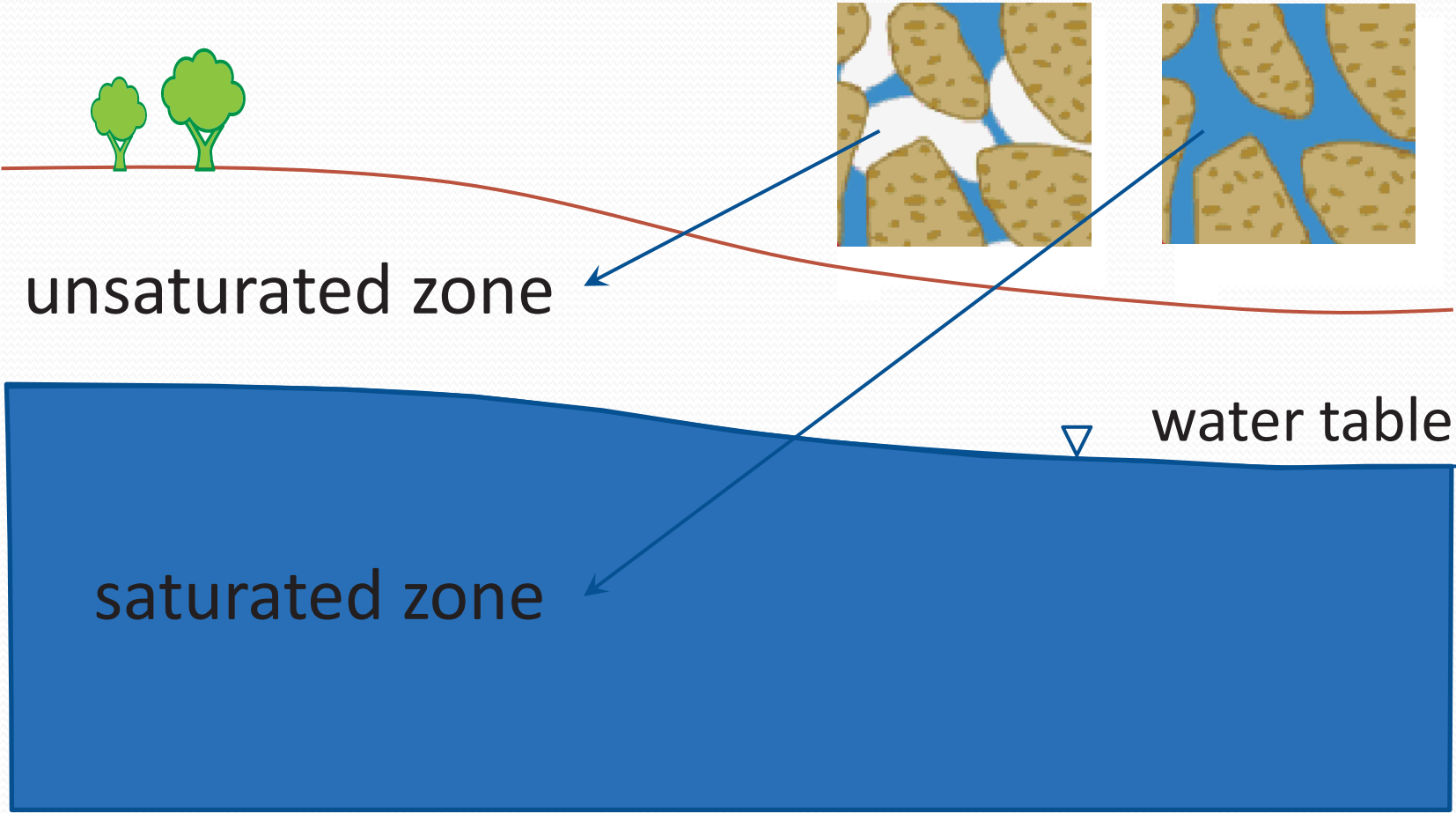


An introduction to groundwater

Objectives

- What are “aquifers” and “aquitards”?
- What is “head”, and how does it relate to “pressure”?
- How is water stored in rock?
- What is “hydraulic conductivity”?

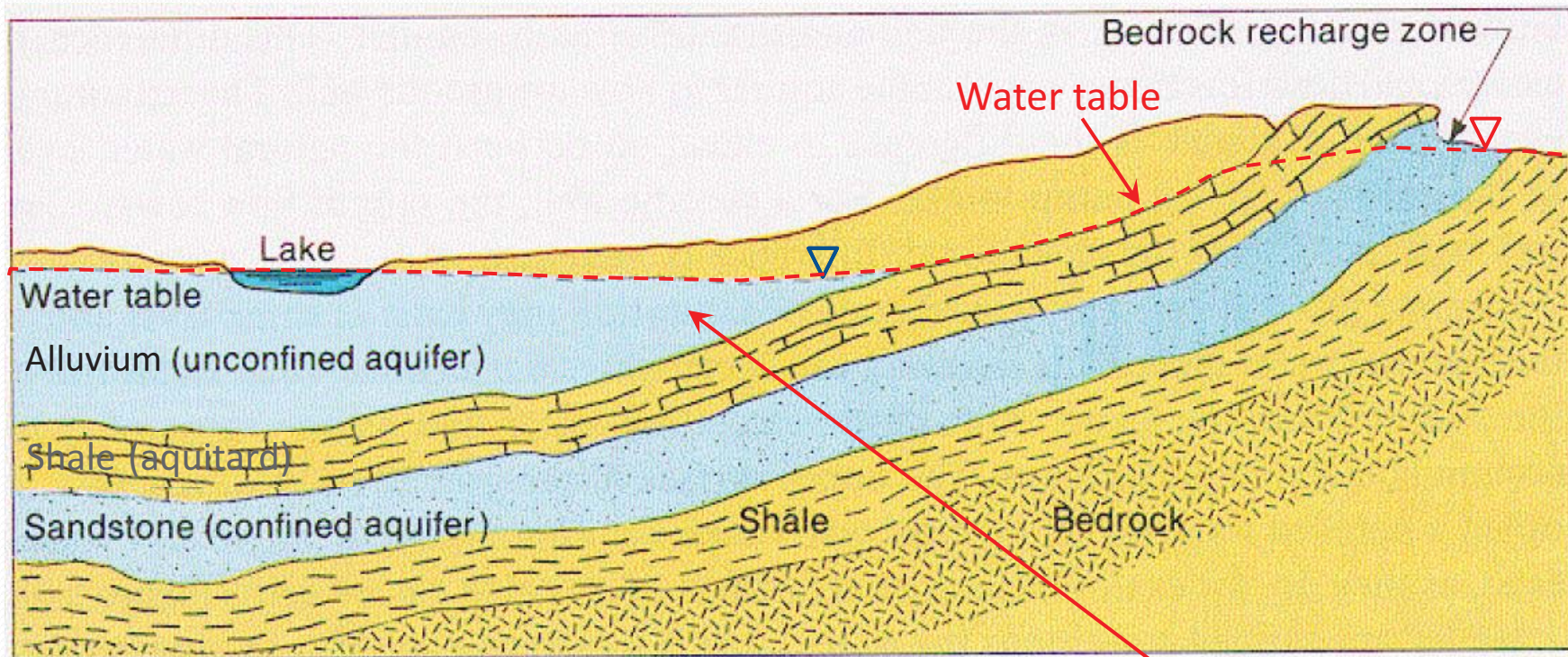
What is groundwater?



What is groundwater?

- Groundwater is water stored below the land surface
 - in pores within sediments
 - in fractures and micropores within rock
- The “water table” is the surface that separates the unsaturated zone (above) from the saturated zone (below)

Aquifers and aquitards

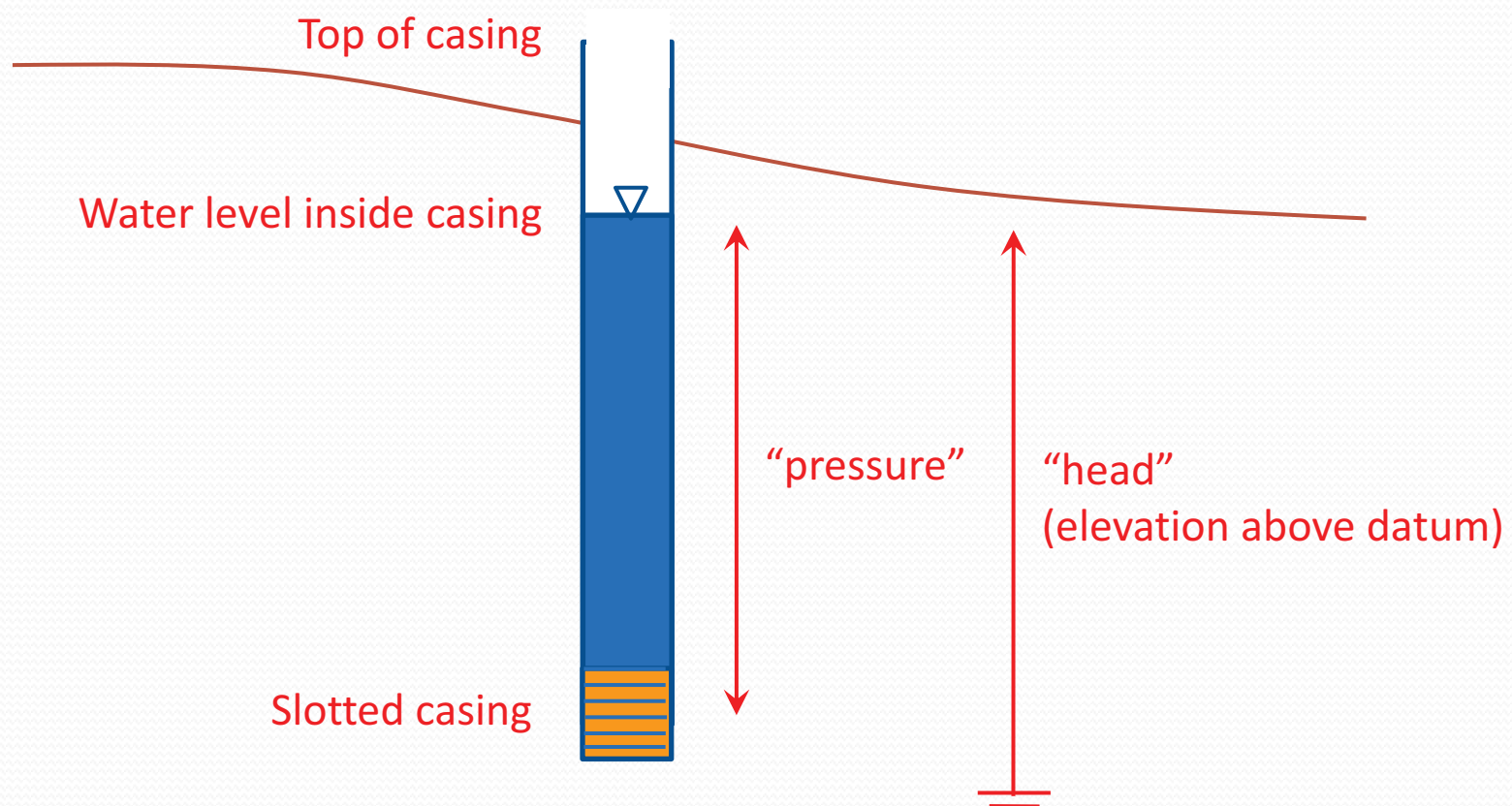


This is not a lake

Aquifers and aquitards (cont.)

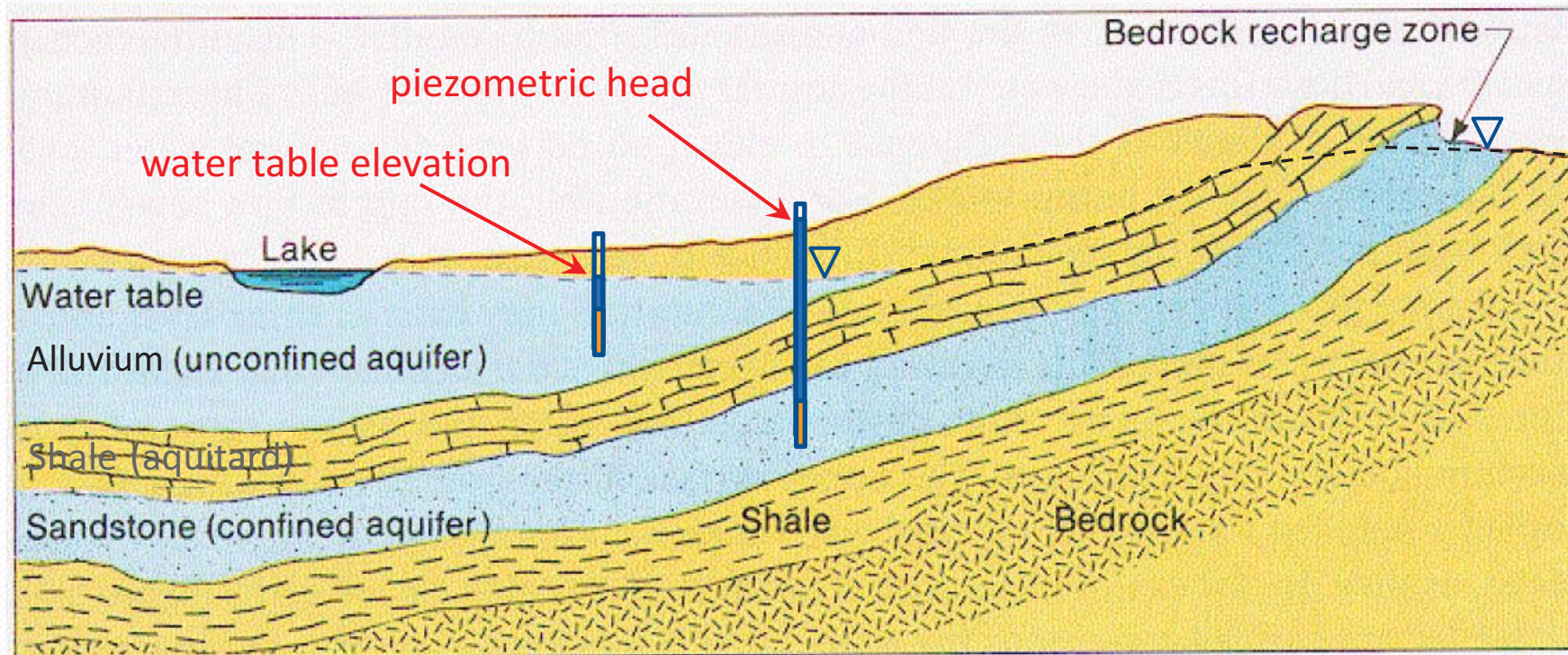
- An “**aquifer**” is a layer capable of transmitting a significant quantity of water
- An “**aquitard**” is a layer that impedes the flow of groundwater
- An “**unconfined**” aquifer is open to the atmosphere and has a water table (see “**unconsolidated**” in the *Water Act 2000*)
- A “**confined**” aquifer is bounded above and below (see “**consolidated**” in the *Water Act 2000*)

Pressure and head



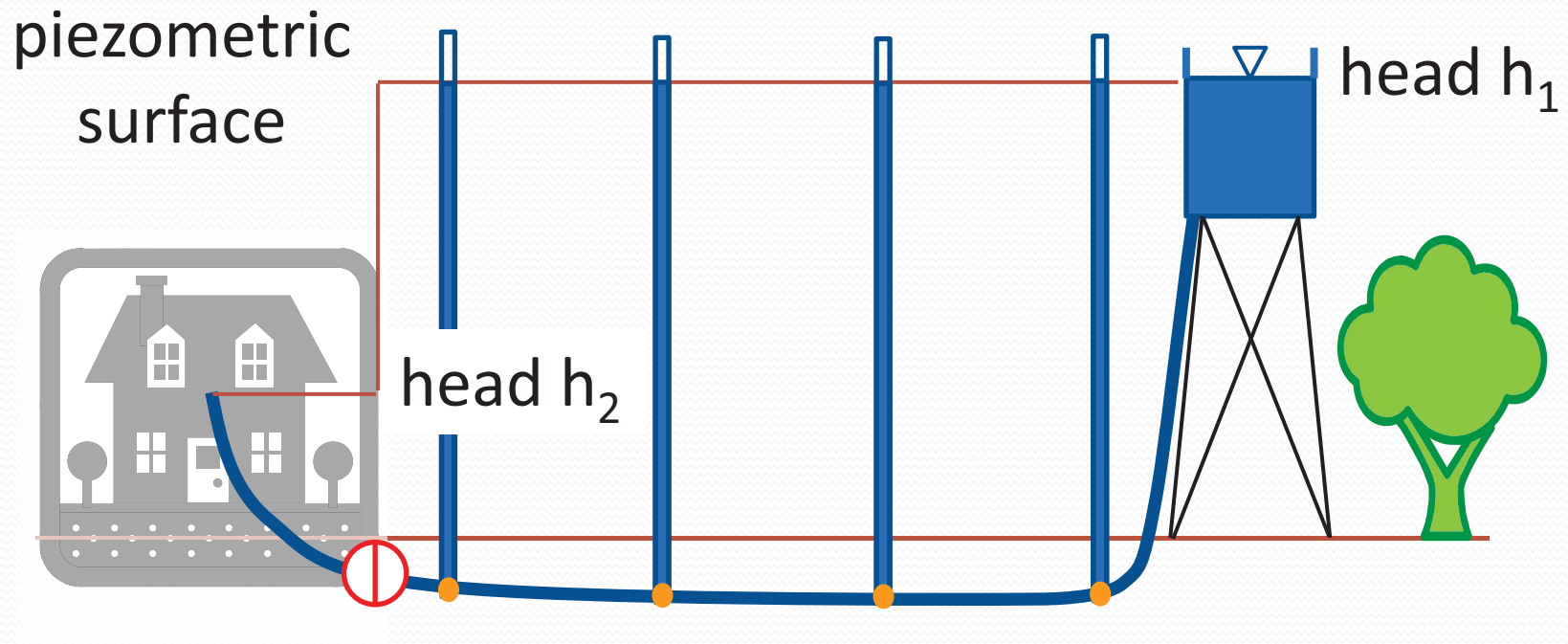
Monitoring bores measure pressure and "head"

Pressure and head



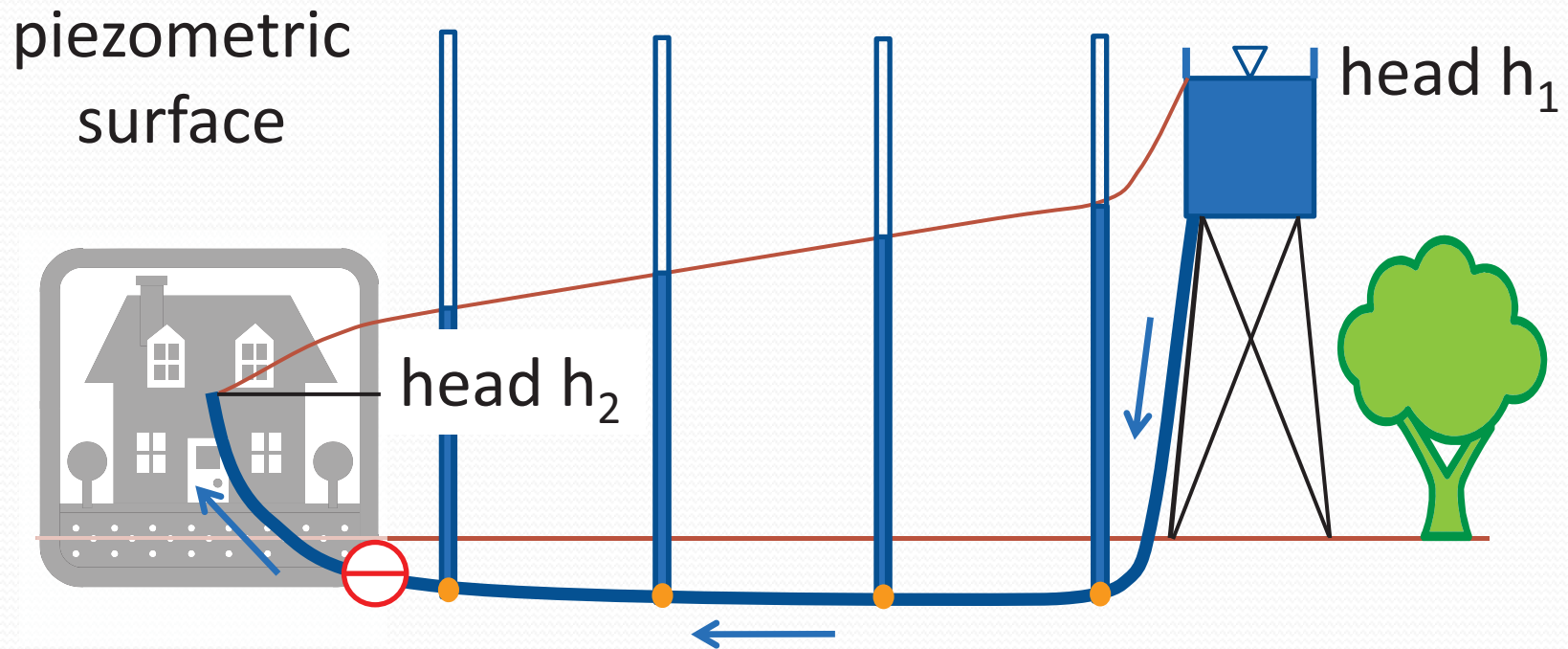
Groundwater flows due to differences in “head”

Consider a header tank



With valve closed, there is no flow

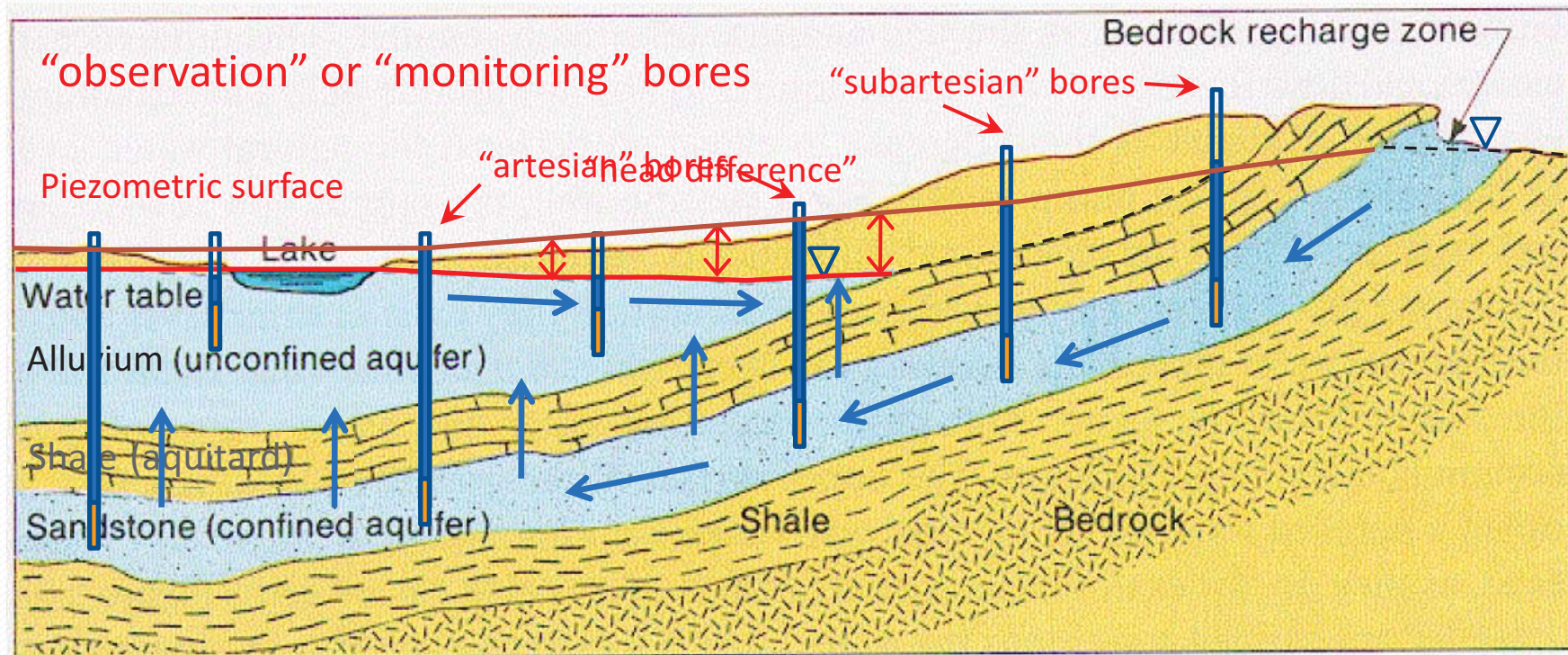
Consider a header tank



With valve open, there is flow

Note that flow in a pipe can be upwards!

Pressure and head

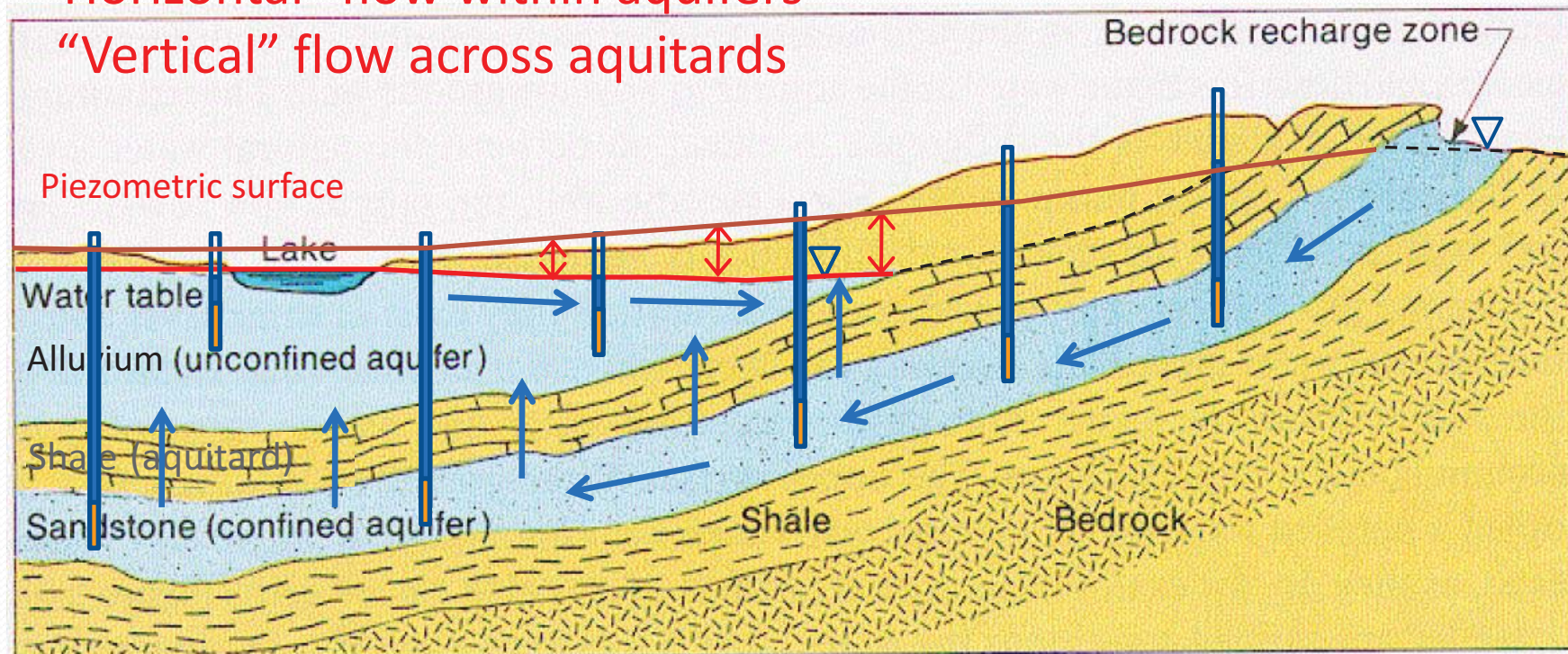


“horizontal” flow in aquifers with “vertical” leakage

Pressure, head \rightarrow flow directions

“Horizontal” flow within aquifers

“Vertical” flow across aquitards



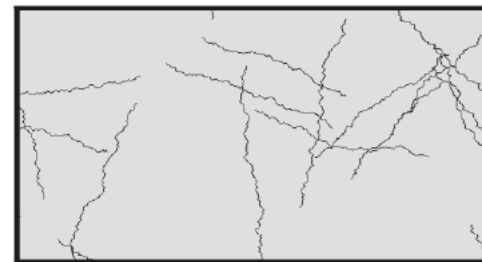
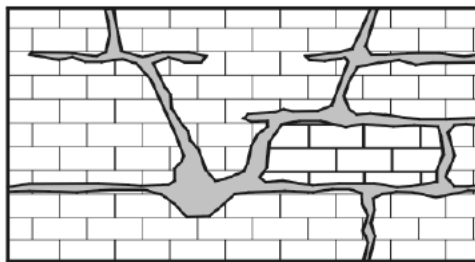
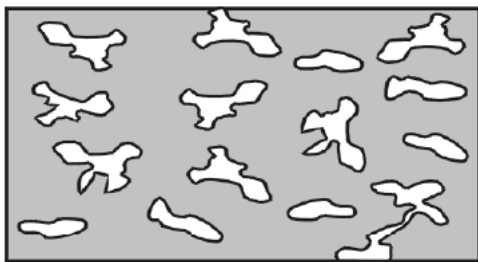
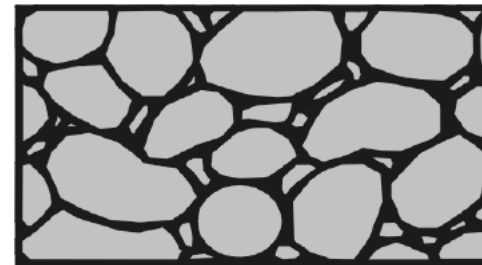
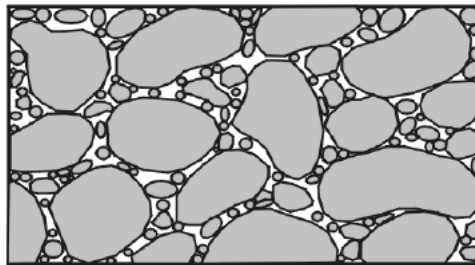
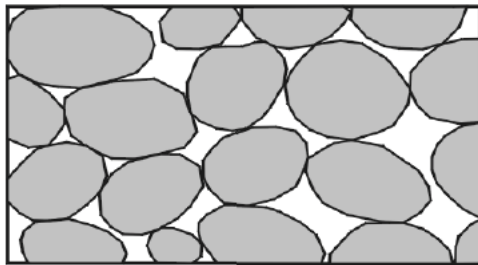
A confined aquifer acts like a pipe

Porosity

$$\text{porosity} = n = \frac{\text{volume of voids}}{\text{total volume}}$$

- Typical values:
 - 25-50% in sand
 - 40-70% in clay
 - 0-10% in fractured granite/shale
 - 5-30% in sandstone

The nature of porosity



Storage in an unconfined aquifer

- When the water table falls under gravity, most of the water in the pore space drains downwards
- The water that is released is called “specific yield”
- If specific yield = 10%:
 - a 1 m fall in the water table will release 0.1 m of water
 - a 1 m rise in the water table requires 0.1 m of recharge

Storage in a confined aquifer

- When water is stored at depth, in a confined aquifer, it is under pressure, so the water is “squeezed”
- A drop in head (pressure) causes expansion and a small amount of water is released
- “**Specific storativity**” allows us to explain this compression and expansion

Relative magnitudes of storage

Consider the impact of a 1 m change in head
over an area of 100 ha

In an unconfined aquifer,
with $S_y = 0.2$

2000 kL

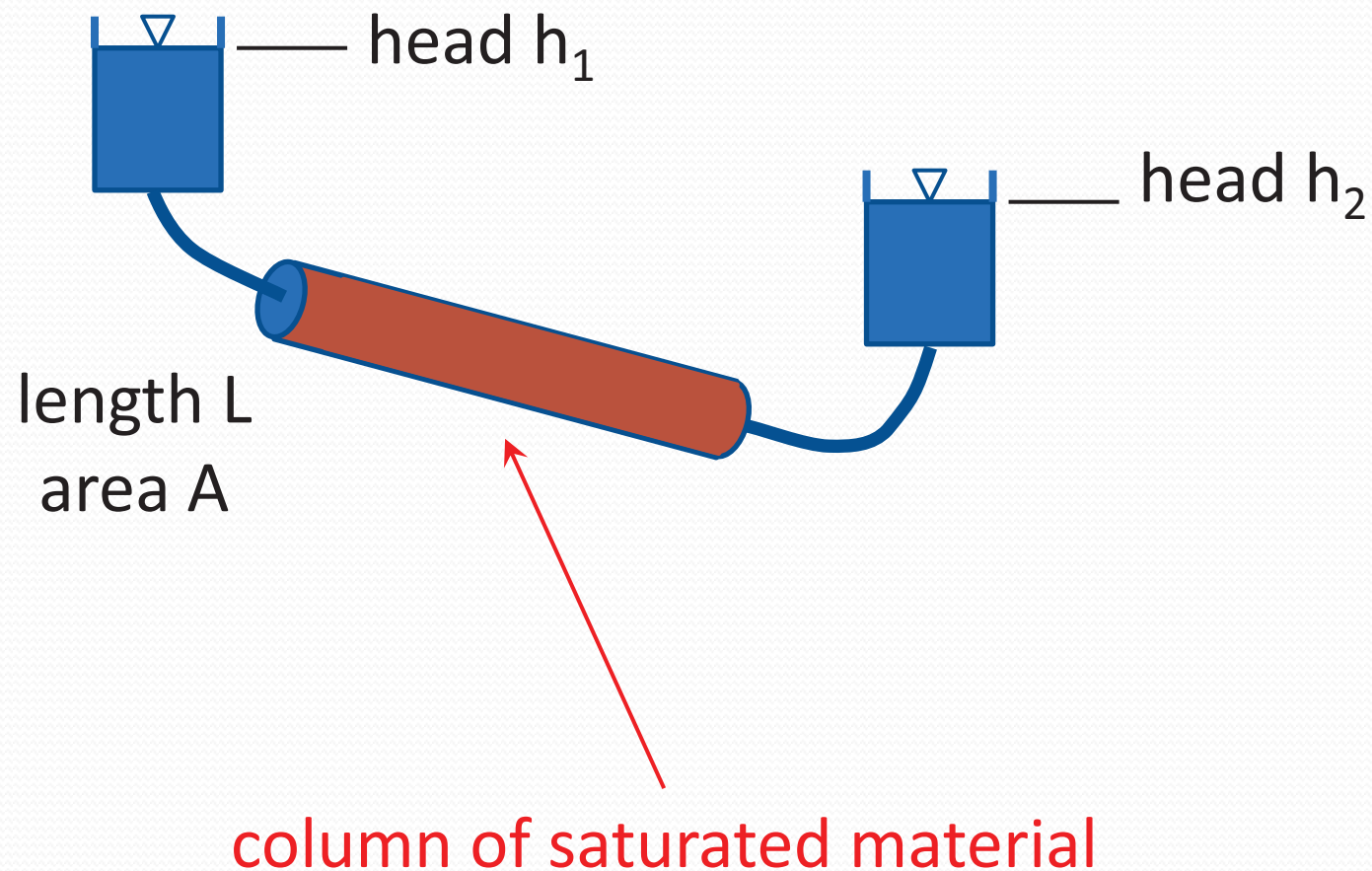


In a confined aquifer,
100 m thick,
with $S_0 = 0.000005 \text{ m}^{-1}$

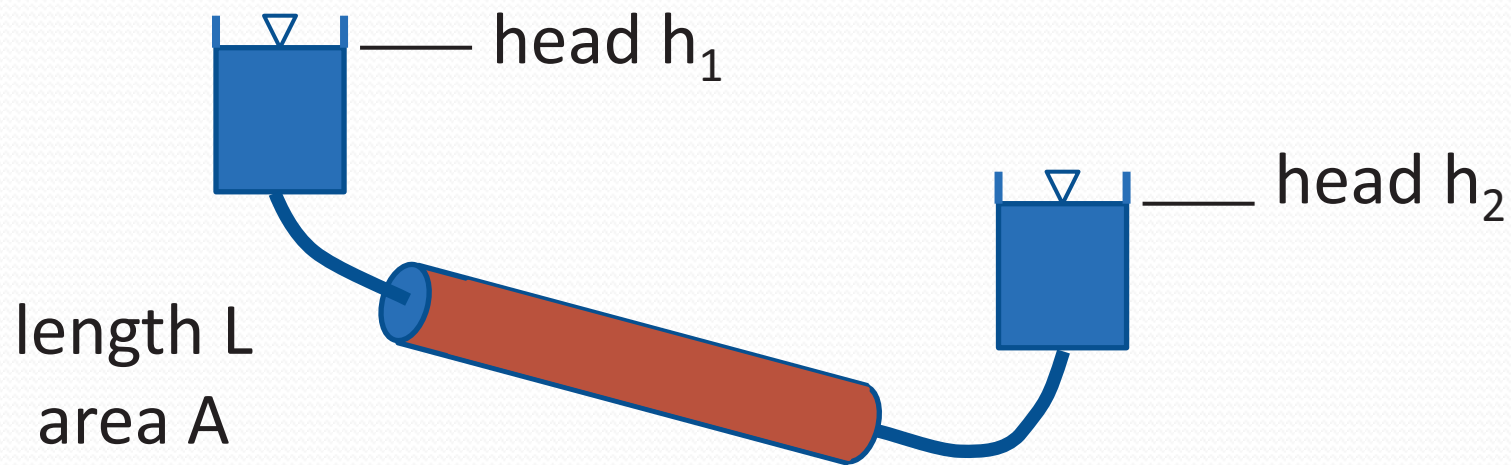
5 kL



Hydraulic conductivity



Hydraulic conductivity



$$\text{flow} = Q = K \cdot A \cdot \frac{h_1 - h_2}{L}$$

hydraulic conductivity

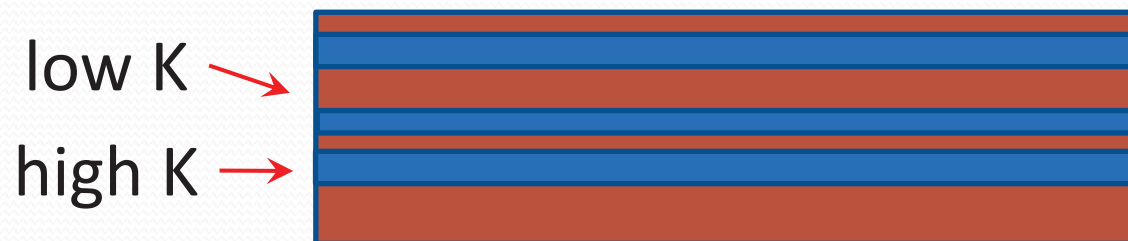
Darcy's Law

Hydraulic conductivity (cont.)

- “Hydraulic conductivity” K describes how easily rock transmits water
- It varies depending on the porosity and structure of rock
- As K increases, the flow Q increases

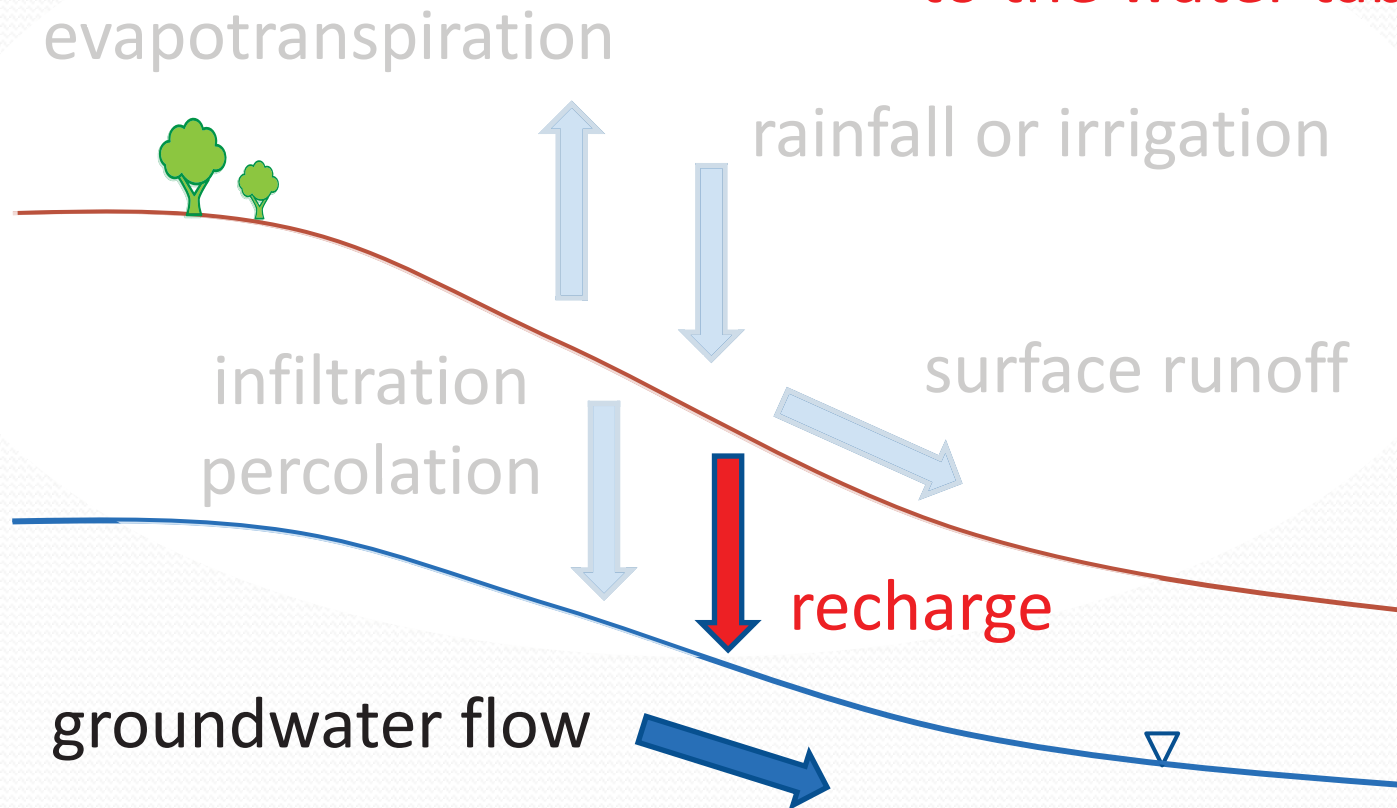
Hydraulic conductivity (cont.)

- Hydraulic conductivity is different in different directions
- Horizontal K_h is nearly always larger than vertical K_v assuming that bedding planes are roughly horizontal



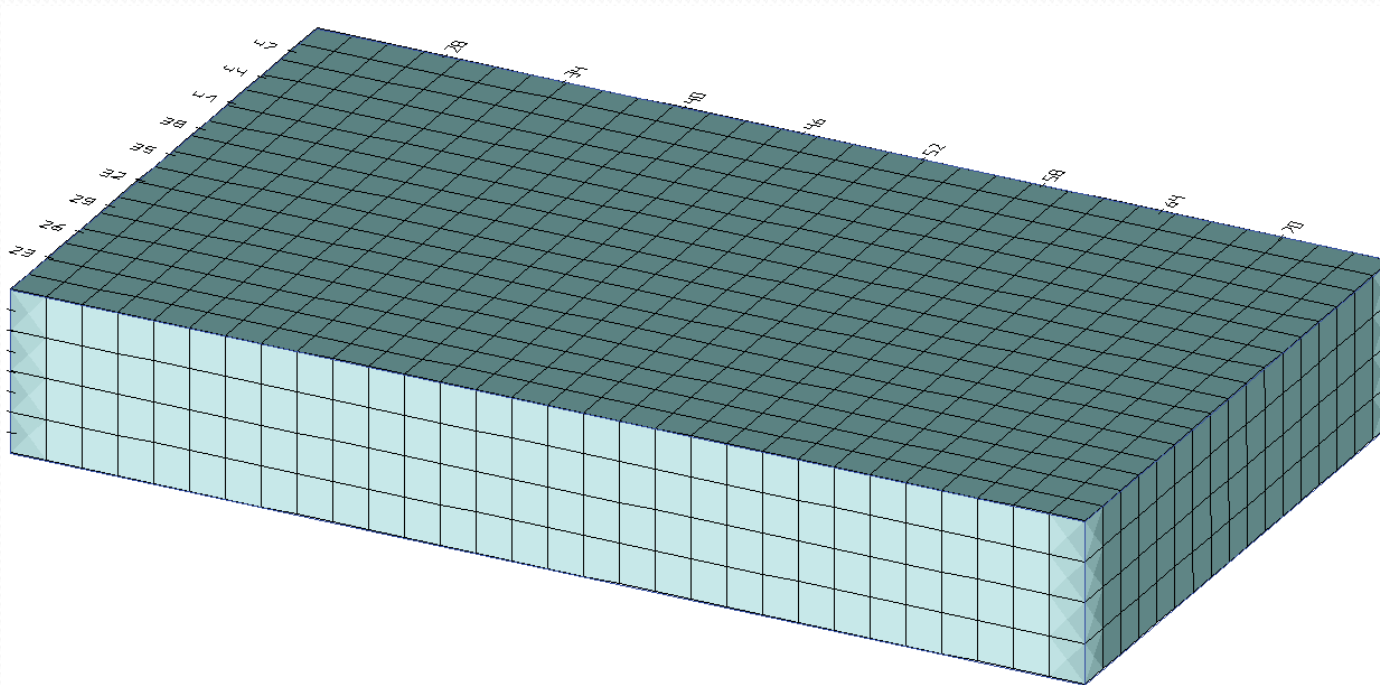
Water cycle

Net flux is “recharge”
to the water table



Numerical model

Three-dimensional region is divided into many small cells, so that calculations can be done



Summary

- Groundwater flow is driven by differences in **head**, which is a measure of potential energy
- The rate of flow of groundwater is controlled by **hydraulic conductivity**, which can be different in different directions.
- **Aquifers** are layers that transmit groundwater, mainly horizontally.
- **Aquitards** impede the movement of groundwater. They can support large head differences across them, so flow through aquitards is mainly vertical.

Appendix 33

Dr Lloyd Townley – Curriculum Vitae





SUMMARY

Lloyd Townley is a specialist in groundwater science and engineering. He is a Chartered Professional Engineer, with broad experience in water resources and mining environmental management. Most of his professional experience has been within Australia, but he has studied in the USA, taught in Egypt, Thailand and Vietnam, and worked on short term assignments in New Guinea, France, New Caledonia and Peru.

Lloyd's key technical skills are in analysing complex situations, developing conceptual models and then selecting and applying analytical and numerical modelling techniques to predict system behaviour. He also has broad experience in environmental impact assessment, mining project approvals and strategic planning for water management in mining and other contexts.

Lloyd loves a challenge. He has contributed to several high level reviews and Commissions of Inquiry. From 1996 to 1998 he led the Hydrology Sub-Group of the International Geomechanical Commission, a high-level team assembled by the French Government to conduct an independent review of the stability and hydrology of Mururoa and Fangataufa Atolls following underground nuclear testing. The processes that control groundwater flow and radionuclide transport following an underground nuclear explosion span time scales from microseconds to tens of thousands of years.

Lloyd has served on the Editorial Boards of several international journals, and chaired the organising committee for the first International Hydrology and Water Resources Symposium held in Australia in 1991.

SELECTED EXPERIENCE

2009 - Managing Director - NTEC Environmental Technology

Groundwater Management on Minesites - Lloyd is currently consulting to Rio Tinto Coal Australia and Xstrata Coal in the Hunter Valley (NSW) and Fortescue Metals Group (WA), modelling the impact of mine dewatering on nearby surface water bodies and the impact of reinjection of hypersaline brines (using FEFLOW and MODFLOW-SURFACT). He has also been a casual member of the Planning Assessment Commission in NSW, reviewing the work of other consultants in similar impact assessment studies.

North Perth Basin - Lloyd is currently working with other consultants, as Technical Director for their project for the WA Department of Water, developing a 12-layered groundwater flow model for a region approximately 300 km x 100 km in size, to the north of Perth.

Reviews of Groundwater Modelling - Lloyd has recently completed reviews of modelling undertaken by the WA Department of Water of the western Busselton-Capel Groundwater Area, using Visual MODFLOW, and regional modelling near the Clermont Mine in Queensland, using FEFLOW. Reviews are undertaken following the "Groundwater flow modelling guideline" prepared by the Murray-Darling Basin Commission (2000).

2005 - 2009 Principal Adviser, Water Management; Manager, Mining Strategy - Rio Tinto

Groundwater Management on Minesites - Lloyd oversaw the application of finite difference and finite element models to mine dewatering for the Kestrel underground coal mine in Queensland and Hunter Valley Operations' open cut coal mines in NSW. He initiated or reviewed groundwater models prepared for the Argyle Diamond Mine underground expansion (block caving) in WA, Northparkes Copper Mine in NSW and Dampier Salt in WA.

Sitewide Water Balances – Lloyd developed sitewide water (and solute) balance models for the La Granja Copper Project in Peru, Argyle Diamond Mine in Western Australia, Northparkes Copper

**Resume**

Mine in New South Wales and Bell Bay Aluminium Refinery in Tasmania. He reviewed the development of sitewide water balance models for iron ore mines throughout the Pilbara, Kennecott Copper in USA, Diavik Diamond Mine in Canada and Palabora Copper Mine in South Africa.

Projects and Due Diligence – Lloyd was a member of project teams for the Order of Magnitude Study for the La Granja Copper Project, a Pre Feasibility Study for the Kintyre Uranium Mine, and a Feasibility Study for the expansion of the Northparkes Copper Mine. He also worked on internal due diligence related to underground expansion of the Argyle Diamond Mine (by block caving), the Potash Rio Colorado Project in Argentina (solution mining of potash at a depth of 1000 m, and subsequent reinjection of waste brine) and expansion of the Ranger Uranium Mine.

Mine of the Future – Within Rio Tinto's global Innovation Centre, Lloyd was responsible for developing and testing concepts for the (surface) Mine of the Future™ across all commodities. His activities included scoping studies to investigate the potential for automation of excavators, and development of technologies that will sit behind Remote Operations Centres, to facilitate interaction between workers in different locations.

1997 - 2005 Managing Director - NTEC Environmental Technology

Environmental Impact Assessment – Lloyd managed project approvals processes for Preston Resources' Marlborough Nickel Project in Queensland, Kagara Zinc's Mt Garnet Zinc Project in Queensland, Taipan Resources' Ashburton Gold Project in Western Australia, and Mines and Resources Australia's Frog's Leg Gold Project in Western Australia. In all cases he identified government requirements, assembled and managed teams of sub-consultants, prepared complete Environmental Impact Statements (or equivalents), led and managed stakeholder consultation at all levels, and successfully gained approvals for these projects to proceed. He undertook similar studies for Argosy Nickel's New Caledonia Nickel Project in New Caledonia, including stakeholder consultation from the level of Deputy Prime Minister to local villagers, in French.

Due Diligence – Lloyd worked with Snowden Mining Industry Consultants on due diligence related to four gold and nickel projects in Western Australia, Northern Territory and South Australia. In all cases he examined issues related to tenements and Native Title, environmental approvals and water management.

New MetroRail City Project – Lloyd worked with WorleyParsons to design and implement four models in 2D section to simulate dewatering caused by excavations near the Perth foreshore, as well as a longitudinal north-south section aligned with William Street to simulate piezometric head distributions beneath the city. He developed models to interpret pumping tests near the Perth foreshore, and also to interpret tidal fluctuations. All modelling was performed using FEFLOW.

De Grey Aquifer Model – Lloyd worked with WorleyParsons to develop a model of the De Grey aquifer, using PMWIN, during design of a new Water Corporation borefield. He undertook analysis of rainfall and streamflow and developed a recharge algorithm to drive the regional groundwater flow model.

Portman Mining – Lloyd used FEFLOW to predict rates of pumping required to dewater an iron ore mine at Cockatoo Island being constructed inside an earthfill levee extending from the ocean shore. A combination of 3D saturated and 2D saturated-unsaturated modelling was used.

AMIRA, Anaconda Nickel – Lloyd undertook studies of recharge to palaeochannels near Kalgoorlie, and developed models of the movement of water and salt in low conductivity aquitards connected to paleochannel aquifers. He has designed palaeochannel borefields for minesites, using AQUIFEM-N.

Water Corporation, Water and Rivers Commission and Environmental Protection Authority – Lloyd advised the Water Corporation and Water and Rivers Commission in Western Australia on

**Resume**

the development of improved groundwater modelling capabilities for the Perth region. He was also a member of a 3-person Peer Review Group funded by the Environmental Protection Authority, overseeing a Section 46 Review being carried out by Water and Rivers Commission.

Mines and Resources Australia – Lloyd developed models using AQUIFEM-N and managed successful trials of injection by gravity of excess saline water from pit dewatering into a palaeochannel near Kalgoorlie, Western Australia.

Cable Sands – Lloyd undertook detailed modelling of Lake Jasper on the Scott Coastal Plain, using Visual MODFLOW, and assessed the impact of the proposed Jangardup South mineral sands mine on Lake Jasper.

Energy Resources of Australia – Lloyd conducted numerous modelling studies, using FEFLOW, of density-driven leakage of tailings liquor from the No.1 Pit at the Ranger Uranium Mine, following the filling of that pit with unconsolidated tailings.

1988 - 1997 Senior/Principal Research Scientist - CSIRO

Land and Water Resources Research and Development Corporation – Lloyd led long-term research on the interaction between lakes and unconfined aquifers. He designed and led analysis and modelling studies to complement field studies at Star Swamp, Nowergup Lake, Jandabup Lake, Lake Wattleup, the Yalgorup Lakes, Lake Jasper and numerous others. He developed conceptual models of the interaction of groundwater with the Swan-Canning Estuary near Perth, involving density-driven flows beneath river meanders. He developed FlowThru, a unique finite element model capable of classifying surface water – groundwater interaction, and supervised PhD research on periodic (fluctuating) groundwater flow beneath lakes.

Alligator Rivers Analogue Project – Lloyd undertook 2D and 3D groundwater flow modelling near the Koongarra uranium orebody, using AQUIFEM-N, and was a member of an international 4-person Editorial Committee coordinating the project's 16-volume 2000-page Final Report. The project studied a uranium orebody in the Northern Territory as an analogue of a leaking radioactive repository.

Western Mining Corporation – Lloyd led a multidisciplinary team studying the migration and impacts of a dense plume of ammonium sulphate emanating from beneath Kwinana Nickel Refinery's Baldivis tailings dam, near Perth. He developed a concept known as "dual pump" recovery that was successfully implemented to separately recover contaminated liquor for treatment by nanofiltration and reverse osmosis. He led the application of a USGS model SHARP, which assumes a sharp interface between fresh water and a dense saline layer below.

International Geomechanical Commission – Lloyd led a small team responsible for developing conceptual models of the natural geothermal circulation within Mururoa and Fangataufa Atolls in the Pacific Ocean, the forced convection following structural damage and release of heat due to an underground nuclear explosion, and the influence of tidal fluctuations within a karst layer on radionuclide migration. Lloyd selected and supervised Swiss consultants who carried out density-coupled simulations using FEFLOW, the world's best finite element software for studying groundwater flow. Lloyd was also a member of International Atomic Energy Agency Working Group 4 (on radionuclide transport in the geosphere), responsible for communicating the results of the International Geomechanical Commission to the IAEA team.

Commonwealth Commission of Inquiry, Shoalwater Bay, Capricornia Coast, Queensland – Lloyd was an expert consultant to the Commission of Inquiry, advising on the effects of proposed mineral sands mining on the hydrology of the eastern dunefields.

**Resume**

Environment, Resources and Development Committee of the Parliament of South Australia – Lloyd was an expert consultant to the Committee during the Roxby Downs water leakage inquiry (seepage from a tailings dam at a uranium mine).

MIBRAG – Lloyd was a member of a member of 5-person DITAC-funded mission to MIBRAG in the former East Germany to seek opportunities for Australian involvement in open cast coal mine rehabilitation.

Shark Bay Salt Joint Venture – Lloyd led a team studying (and simulating) optimal commercial solar salt production in Shark Bay, Western Australia.

Pine Creek Goldfields – Lloyd led the hydrologic and hydraulic design of a diversion scheme to flood the final void after gold mining at the Enterprise Pit in the Northern Territory.

1986 - 1987 Lecturer - Centre for Water Research, University of Western Australia

Perth Urban Water Balance Study – Lloyd was a member of both the Steering and Technical committees of the Perth Urban Water Balance Study, a 5-year study by UWA, the Water Authority of WA, the Geological Survey of WA, and the Department of Conservation and Environment. He was responsible for all aspects of computer modelling of an extensive unconfined aquifer supplying two thirds of Perth's water.

National Soil Conservation Programme – Lloyd conducted rainfall-runoff and soil erosion studies in Western Australian agricultural catchments.

1983 - 1985 Post Doctoral Research Fellow - Centre for Water Research, UWA

Lake-aquifer interaction – Lloyd laid the foundations for what became 10 years of research on surface water – groundwater interaction.

Response of aquifers to periodic forcing – Lloyd developed an interest in fluctuations in groundwater levels and flows, in response to cyclic forcing (due to tides, and diurnal and seasonal climatic variations), developing AQUIFEM-P, a unique periodic finite element model.

Model calibration and prediction uncertainty – Lloyd continued to conduct research on the inverse problem: the problem of inferring aquifer properties from observations of groundwater levels and flows.

1978 - 1983 Graduate Research Assistant – Massachusetts Institute of Technology

Lloyd was funded by the US Agency for International Development to develop AQUIFEM-1, a finite element groundwater flow model, for transfer to the University of Cairo for application to the Nubian sandstone aquifer underlying the Nile Delta.

During his doctoral research on model calibration and prediction uncertainty, he developed a finite element model CERT that was later transferred to the US Office of Nuclear Waste Isolation.

1977 - 1978 Graduate Research Assistant – Environmental Quality Laboratory, Caltech

Lloyd was a member of a USGS-funded team studying of the effect of control structures in rivers on the supply of sediment to the Southern Californian coastline.

1976 - 1977 Engineer - Snowy Mountains Engineering Corporation, Hydrology Branch



Resume

Development of computer software for the computation of steady state water surface profiles (backwater analysis) and flood routing (using the St Venant equations) in river networks, including the effects of bridges and weirs.

Mathematical modelling of the hydrologic regime of the Upper Nile Basin (Central Africa).

Flood and flood damage studies of the Parramatta River Basin (Sydney), Merri Creek Basin (Melbourne) and Trengganu River Basin (Malaysia).

Hydrological data processing system for Bougainville Copper Limited (Bougainville Island, New Guinea).

EDUCATION

Bachelor of Engineering (Civil) (Honours) – University of Sydney, 1976

Master of Science (Environmental Engineering Science) – California Institute of Technology, 1978

Doctor of Philosophy (Hydrology and Hydrodynamics) – Massachusetts Institute of Technology, 1983

Graduate Certificate in Management – Australian Graduate School of Management, 2004

REGISTRATIONS/AFFILIATIONS

Member, The Institution of Engineers, Australia

Member, The Australasian Institute of Mining and Metallurgy

Member, American Geophysical Union

Member, Association of Ground Water Scientists and Engineers

Member, International Association of Hydrogeologists

Member, International Association of Hydraulic Engineering and Research

PUBLICATIONS/PRESENTATIONS

To date, Lloyd has published 15 journal papers, 21 conference papers, and more than 100 reports.

He is acknowledged for conducting formal reviews prior to publication of reference books by:

- Anderson and Woessner (1992) on “Applied Groundwater Modeling” (comparing PRISM, MODFLOW and his own software, AQUIFEM-1), and
- Fischer, List, Koh, Imberger and Brooks (1979) on “Mixing in Inland and Coastal Waters” (covering dispersion, jets and plumes, and ocean outfall design).

SPECIFIC TECHNICAL EXPERTISE/SPECIALIST COURSES**Technical Expertise**

Modelling of groundwater flow and contaminant transport

**Resume**

Development of finite element models (AQUIFEM-1, AQUIFEM-N, AQUIFEM-P, CERT, FlowThru), and application of finite difference, finite element and other water balance models (all the above, plus FEFLOW, MODFLOW, MODFLOW-SURFACT, SHARP, GoldSim, OPSIM etc.)

Interaction between surface water and groundwater; the response of groundwater systems to periodic or cyclic forcing; model calibration and the inverse problem; recovery of contaminant plumes by dual pump recovery

Specialist Course

Lloyd successfully completed Rio Tinto's intensive in-house training on Orebody Knowledge and Strategic Mine Planning.

Appendix 34

Summary of Q&A sessions - Phase 4



Surat Gas Project

Community information sessions 23-28 May 2011

Introduction

In May 2011 Arrow Energy (Arrow) held a series of community information sessions to discuss the Surat Gas Project. Questions and answers from those sessions were captured by JTA Australia and are presented in this document.

The purpose of these meeting notes is to reflect the questions asked and answers provided during the community meetings. The notes are based on a written record of the questions raised and include some paraphrasing and summarising; every effort has been made to preserve the integrity of the discussions. Where the same or a similar question has been asked in other sessions, the most complete answer has been provided.

Questions varied across the seven sessions. To ensure that valuable information is shared throughout the communities of the Surat Basin, these notes summarise questions and answers asked across all sessions.

The Surat Gas Project community information sessions were held from 23 to 28 May 2011 at:

- Wandoan 23 May 2011
- Miles 23 May 2011
- Chinchilla 24 May 2011
- Cecil Plains 25 May 2011
- Dalby 26 May 2011
- Millmerran 27 May 2011
- Goondiwindi 28 May 2011

The proposed project is Arrow's largest gas exploration and development program in the Surat Basin and involves continued exploration in the Basin to identify the most economic and environmentally acceptable areas for future gas production. The areas covered by the project extend from Wandoan to Dalby and south to Millmerran and Goondiwindi where Arrow holds petroleum tenure and environmental approvals for exploration.

As many of you already know, JTA asks for feedback during each of the consultation phases. In response to the information needs expressed by you, phase four of the consultation included Technical Water Sessions in Chinchilla, Cecil Plains and Dalby. The notes from the question and answer sessions at each of those have been included in this document and the presentation by the West Australian water expert is available on the Arrow Energy website at www.arrowenergy.com.au, by freecall telephone number **1800 038 856** or at suratgas@arrowenergy.com.au.

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. Where one response to a commonly-asked question was more comprehensive at one session than another, the more detailed response has been used in the interests of better understanding. In some cases, additional information is included to provide further context or explanation; this information is in brackets within text, or italicised following the answer.

Surat Gas Project

Community information sessions 23-28 May 2011

Arrow will hold another round of information sessions in September or October 2011 to present initial results of the EIS and update technical progress on water management. Arrow will advise of session dates closer to the time. If you have questions or comments about the project or the meeting notes, please contact the project team during working hours on:

freecall 1800 038 856

email: suratgas@arrowenergy.com.au

post: Surat Gas Project, Reply Paid 81 Hamilton QLD 4000

Acronyms

ATP	Authority to prospect
BSA	Basin Sustainability Alliance
BTEX	benzene, toluene, ethylbenzene, and xylene
CSG	coal seam gas
CNPC	China National Petroleum Corporation
DEEDI	Department of Employment, Economic Development and Innovation
DERM	Department of Environment and Resource Management
EA	environmental authority
EIS	environmental impact statement
FID	final investment decision
GRC	Goondiwindi Regional Council
LNG	liquefied natural gas
PL	petroleum lease
QGC	Queensland Gas Company
QWC	Queensland Water Commission
RO	reverse osmosis
TRC	Toowoomba Regional Council
WCM	Walloon Coal Measures

Conversions

- 1 kilolitre (KL) = 1,000 litres
- 1 megalitre (ML) = 1,000,000 litres
- 1 gigalitre (GL) = 1,000,000,000 litres

Queensland Government Acts mentioned:

- Petroleum and Gas (Production and Safety) Act 2004*
- Mineral Resources Act 1989*
- Water Act 2000*
- Water Supply (Safety & Reliability) Act 2008*

Miles

Date:	23 May 2011	
Venue:	Leichhardt Centre, Columboola Function Room	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy

1. You say that Arrow does not frac in the Surat Region. Does it do so in other places, but not the Surat region? Can you give me a list of the chemicals used during this process?

We have produced a fact sheet on fracking which is available here and there is also a government information sheet on fracking. Although Arrow doesn't frac in the Surat Gas Project area, it does do so in the Bowen Basin as the geology is different. The chemicals used for the process do not include the BTEX chemicals which have received a lot of negative media coverage. The chemicals used by Arrow in the Bowen Basin have various proprietary names although it is best to describe them by their more generic names which are: acetic acid (basis of vinegar), gutaraldehyde (also used to disinfect medical and dental equipment), surfactants (also used in soaps and toothpaste), cellulose (also used in wallpaper paste and paper), bactericides (to inhibit the formation of bacteria that may corrode steel and cement well casing, also used in agricultural treatment of crops), guar gum (from the guar bean; vegetable gum is also used in ice cream and is fed to cattle).

Note: Regarding the comment that we won't be fracking, we should make clear that this commitment is in regard to the area of the Surat Gas Project. Arrow does hold some tenements in deeper parts of the Basin, which do not form part of the Surat Gas Project area, and for which we don't have any plans to develop in the foreseeable future. However, these areas are so deep that it may be necessary to use fracking in those areas - in the same way that other companies in the Surat Basin frac coals at great depths.

2. When you get these chemicals for fracking have they been passed by the chemicals authority in Canberra? Why aren't they approved by the federal government?

The chemicals we use are authorised by the Queensland Government as it is the state government rather than the federal government which regulates this aspect of the CSG industry. As I said previously, we do not use any of the BTEX chemicals and the chemicals mentioned above do not require assessment under the government's priority assessment scheme as many of them have common uses including in the food and agricultural industries. The chemicals used are quite benign and chemicals used in the United States are not allowed here. I would also like to add that a CSG company would not frac if it doesn't need to as it is a costly exercise.

Arrow is responsible not only for monitoring the level in groundwater aquifers but also ensuring its quality as there are strict monitoring requirements about quality as well.

3. If Arrow is not fracturing, how do you release the gas?

Gas is freed by releasing the water from the coal seam which in turn reduces the pressure; you do not always need to fracture the coal. Depending on its permeability (a measure of how easily gas and water flow through the coal) lower permeable coal may need some stimulation (fracturing is one stimulation technique). In the Surat Basin it is highly permeable. Arrow's tenure in the Surat Basin is shallow, i.e. at around 600m, and has relatively high permeability. Some of the CSG companies have coals which go deeper to around 1km. Because of the extra pressure from the additional overburden in those areas, permeability is lower and there may need to be some stimulation to get the gas flowing.

Comment - You don't seem to list many issues in relation to endangered species. Some 53% of Australia's extinct species are in Queensland. I've been dealing with QGC which generally doesn't use spotter catchers¹ – and the ones they have go through the foliage after it has been knocked down. Also, there is disrespect for the Indigenous people.

4. Re settlement dams - what are you going to do with the water?

Historically Arrow relied on evaporation dams to dispose of water; this was then going back into the environment through evaporation and raining down somewhere else. But there's been a change – the industry has gone from small scale to a scale that was not envisaged at the time - companies now need to process the water and do something beneficial with it. There are a range of beneficial use processes, and as Carolyn outlined some don't need treatment, including feedlots. Arrow is building an array of new dams at Tipton and a reverse osmosis treatment plant. It has bought a farm and has applied for a beneficial use approval from DERM which will set water quality and monitoring conditions to use the water coming from the treatment plant. It is also planning on drilling a well to trial reinjection.

In relation to spotter catchers there is a strict process on site clearing as well as vegetation and fauna management. Ecologists go out to site with land agents and discuss with the landholders what is there prior to clearing. They have to record the particular species and list it in a register. Likewise with cultural heritage, we work closely with Indigenous groups in the area to do those clearances. There is now a project requirement that a spotter catcher is required at the time of clearing.

Comment - The issue I have with spotter catchers is they are city-based and have no experience with invertebrates. I am now going with QGC to show where and how to find these animals. I want to know why local people can't be used. Once we lose our flora and fauna humans will be next.

5. Assuming you test the water, where do you send that test sample? Do you do it yourself, through a university or government?

The water sample goes to an accredited third party as is required by DERM.

¹ A spotter catcher is any person holding a current Rehabilitation Permit licensed under the Queensland *Nature Conservation Act 1992*. A spotter catcher will observe the clearing of an area, but also will identify habitat, nest sites and environmental elements which may constitute a threat to the wildlife at the site.

6. QGC talks about its project going ahead for 45 years and says it will retrieve 2.4 million tonnes of salt. What is your estimated amount (for the life of Arrow's project)?

Arrow is still at an early stage in water profiling. Our information sheet gives an indication of the proportion of the salt to our water volume. It will be a significant amount. We are working with QGC, Origin and Santos to consider putting a process in place to use it beneficially e.g. in chemical production.

Because we are still in the early stages of the project we don't yet have firm figures for volumes of salt; this means that at this stage we cannot enter into any commercial contracts in regards to the salt. In the absence of that, we need to have an answer for the government on how we will manage the salt in the interim – this includes brine dams, concentration of the salt, and an additional crystallisation process for easier transport to use in other products. As a base case we will remove it from the site and take it to a regulated waste facility. We are committed to removing the salt from the land, and our preference is to use it beneficially.

7. As the gas companies are operating all over Queensland, why haven't they come out to confirm the Great Artesian Basin will not be affected...or do gas companies consider there is a risk of contamination of the GAB.

Arrow believes it won't have a significant impact on the GAB, especially in terms of quality. The modelling to date indicates the volumes that we will be drawing as an industry are very small compared to the size of the GAB. When you look at the total volume stored in the GAB, around 8,700,000 GL, our take will be approximately 25 GL per year which is small relative to the capacity of the GAB.

8. But you still can't say that there isn't a risk that contamination will occur?

We believe that because of the way we are doing things now, with drilling techniques and early detection systems for leakage and seepage, we won't have an impact on water quality.

9. 25 gigalitres a year is a lot of water.

We understand that's a lot of water. That 25 GL isn't out of the aquifers that most people are using. It's out of the Walloon, not out of the Hutton Precipice or Condamine.

10. One of the issues that impacts on landholders is the question of compensation. That can vary based on the type of land you have. By the same token someone who has 2000 acres of good land in Dalby and someone who has 3000 acres of average land elsewhere, they still make a living from it, so you've got to try to balance that out. One of the things I would like to see is for Arrow and the government to work something out where the landholder feels like they're getting a benefit from it. Part of the problem is that it takes a long time for the issues to be resolved. There is a lot of emotional attachment to the land for landholders, and in my case I wanted to pass my land on to my sons and grandsons, which now won't happen. But this doesn't get valued in the overall consideration of the issue and yet is quite important.

We understand there are impacts that aren't measurable and we are trying to work out how to best deal with those. We think those impacts are most significant for production wells. With exploration wells there is much less activity, and they are there for a shorter

time. We really welcome the feedback from someone who has been through the process so that we can build up our compensation framework to work for everyone.

- 11. I now have two pipelines owned by other companies running through my property. The previous owner sold his land and got compensation of around \$1500 for that acreage. That land is now worth a lot more as it is close to town. We have had to do most of the maintenance on the pipeline and when the company does it themselves, they bring noxious weeds and seeds and we have to clean up the mess every time. The same company has bought another adjoining property and we're going to have the same problem. The compensation doesn't cover the ongoing maintenance of the lines.**

I am aware of differences in landholder arrangements re transmission pipelines and the infield pipelines which connect gathering systems up. It is usual in the case of transmission pipelines to have an upfront, one-off compensation payment to acquire the rights for the easement. On the upstream side, we recognise there is a much bigger ongoing impact i.e. crews visiting perhaps up to three times a week including workover² and maintenance workers. We not only pay an upfront payment but an ongoing one and we also fix up any mess; we take weeds and seeds seriously. We have taken a serious and thorough approach to weed management and washdowns as we move through the country. We also pay a fair bit of money to council to maintain the roads. The petroleum and gas inspectors will be particularly interested if there are problems with well integrity, weeds and seeds management, or maintenance issues.

- 12. Is the weed and seed certification now part of legislation or is this simply an agreement.**

It is now part of the regulatory framework and Arrow is in the process of rolling out its procedures to comply. When we now come onto someone's property we have to present a certificate to say vehicles are pest free and have had the appropriate washdowns. Also if we bring any soils or gravels on site there has to be a certificate from that supplier to say that it has been inspected and cleaned.

- 13. There are some issues with washdown. Now we have a problem with myrtle rust getting into the area from NSW; it is destroying gum trees, and we don't yet know what else it will destroy. It is very difficult to detect the pollen from myrtle rust. Who's going to inspect it and how's it going to be inspected? With respect to washdowns, I feel that it should be in the contract that property owners have the right to inspect all equipment and vehicles and to refuse entry if they feel they are not up to standard.**

The access arrangements are negotiated with every landholder; so whatever is negotiated becomes Arrow's commitment. All operational staff have training to enable them to identify these things and make sure they are not present.

A section in the Land Access Code makes washdown mandatory plus the need to provide the washdown certificate to landholders. Landholders are well within their rights to request them and sight them. Arrow, as part of its commitments, has developed land

² A workover is the re-entry into a completed well for modification or repair and maintenance work.

access rules. There was an incident recently where a contractor tried to get access without meeting these rules and the contractor was terminated.

- 14. From what I gather a lot of the time property owners are not given much notice of entry. How are washdowns going to identify pollen on these vehicles? A certificate means absolutely zilch to landholders; mining companies have a 'don't care' attitude.**

When we want to access a property we ring the landholder up several days before and give notification; there are actually mandatory timeframes for this. We tell the landholder what vehicles will be coming onto the property, when we'll be there and for how long.

- 15. I am unsure whether washdowns happen on approved sites. I observed another company doing it on the side of the road, next to my property. On a longer term basis as wells finish their usefulness, does Arrow remove all of that infrastructure as well as infrastructure that is not so visible? You were talking about 1.5m down – which is not that deep, some farmers put down strainer posts 2m deep. The problem is that there may be a loss of information through change of ownership and loss of memory as the owner ages. Is there a framework that deals with this?**

Yes, there is a regulatory framework. The well has to be plugged and abandoned i.e. cut off at 1.5m underground. The way to make it safe and achieve zonal isolation is to fill it all up with cement and cap it off. The well site is normally 8 x 12m fenced off by cattle panels, except when it is deemed to need something else for security. Everything on the surface is removed. The pipelines are cut off underground, we decommission the pipelines, evacuate the gas and water out of them, but we don't pull them up. They might be useful for pushing water around the farm later on. The pipes are plastic, and will not corrode. With a major facility, we have to return the land to substantially the same condition it was in when we arrived.

Wandoan

Date:	23 May 2011	
Venue:	Wandoan Community & Cultural Centre	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy

- 1. You talked about the impact of a three year period for the bores. I believe you won't know what the impact is because sometimes it can take years for an impact to show up.**

What we're trying to do through our modelling process is to see where those impacts will occur, and in what timeframes. That will change depending upon where the activities are, the sequence of development we have across the region, as well as that of our competitors. There is obviously an immediate impact that will occur in the Walloon coal measures. We expect there will be a short term impact. Queensland legislation requires ongoing assessment, and every twelve months we will re-evaluate our data and every three years we need to do another underwater impact report. So even if these impacts do not show up immediately the one in ten years might demonstrate changes.

- 2. This offset water is not new water available to rural producers, but it's going to replace water they are already using, is that correct?**

It will only be up to their current allocation. It is meant to provide a replacement for that water so there should be no commercial advantage to receivers of the water. It is only to minimise the impacts in the long term from the CSG industry.

- 3. In regards to water security you talked about immediate impact areas. Some are not going to be felt until 2065, after Arrow has surrendered its Environmental Authority. What conditions will apply to Arrow in the future after that?**

The changes to the *Water Act* mean that even after we surrender tenure our obligation in terms of water continues. The whole framework requiring monitoring, reporting and continuing our water bore monitoring program remains and any 'make good' obligations will continue in perpetuity – for quality and quantity.

- 4. DERM says 'make good' agreements will be whatever we agree with the resource company. If we agree on ten years are you saying I have security in perpetuity?**

In the agreement you agree measures to be taken should an impact occur and the process you need to go through to implement those measures. Obviously there would have to be an investigation to understand the causes and to confirm that it was Arrow, or one of our competitors, who caused the impact, and then the most appropriate measure identified in that agreement will be implemented. There are a whole range of provisions to deal with the situation where either party can't comply with what's in the agreement; i.e. if there's new technology and there are changes to impact areas then the agreement needs to be amended.

- 5. If Arrow is on my neighbour's property but not mine and yet my bore has reduced capacity what are your assurances then?**

Each company's obligation extends beyond its tenure boundary. Arrow is required to monitor and enter 'make good' agreements to the extent that it could have an impact. The

Queensland Water Commission (QWC) through its underground water impact reports has declared some cumulative management areas. Each of those areas will have a designated company which QWC appoints as responsible for any impacts in that area.

6. You talked about the salt content; there's only so much you can sell, what other disposal means do you have?

The actual volumes of salt Arrow will have are not enough for one company to enter into a commercial arrangement on its own. We'd have to cooperate with the others. There is a big market for that salt. Because it's early in our project and we haven't undertaken a final investment decision (FID) to proceed with the project, we are yet to finalise estimates on the quantity of salt that we will produce. This makes it impossible to enter into a commercial contract for the salt at this stage, but in the interim we are committed to taking the salt away from the area to a regulated landfill, and then working it into a beneficial use in the future.

7. Suppose nothing ends up well. Suppose the bores dry up and the gas runs out and Arrow goes insolvent, what will happen then?

Our business is producing gas. If we end up producing large volumes of water for long periods of time, it's not commercially viable for us to operate a gas business. So if it comes to that we will have to re-evaluate our business.

Arrow is owned by Royal Dutch Shell and PetroChina. To give you some idea of the scale of those companies PetroChina has 1.6 million employees and Royal Dutch Shell has about 110,000 employees – they can afford to put up the needed collateral for the long term. In doing the interim study on the Condamine Alluvium Arrow is not saying 'that is what is going to happen'. There will always be uncertainty, so you test those uncertainties for a range of impacts and probable bad outcomes, particularly groundwater impacts. We need to know what a probable bad outcome will be and the mitigation measures required, all this needs to be built into the plan otherwise we can't take an investment decision.

Chinchilla Technical Water Session

Date:	24 May 2011	
Venue:	Bulldog Park	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Dr Lloyd Townley, Director	NTEC Environmental Technology
	Carolyn Collins, Environment Manager	Arrow Energy
Other speakers:	St John Herbert	Arrow Energy

- 1. I attended the Healthy Headwaters meeting a few weeks ago and it became clear that there was totally inadequate information to make high level reliable estimates with much confidence. How accurately can the interconnectivity between aquifers be measured?**

In general, people who work in these areas can answer those questions if all the correct data can be provided. This is why we carry out monitoring programs to enable us to develop our models. The more information we have, the more accurate our models will be.

- 2. Your interest is getting gas from the coal seams. So the coal seams have connected fractures to allow water to move through?**
- Yes, there are small cracks, or cleats, in the coal seams. We pump out the water to remove the pressure, which in turn releases the gas from the face of the coal.
- 3. So water in coal seams is not connected to other underground water systems? And you don't need to break up the rock to remove the gas and water?**
- We want to take as little water as possible. If we have to remove too much water to get the gas out the exercise will not be commercially viable for us. In the Surat Basin, due to the high permeability of the coals, we do not need to frac.
- 4. So your process of extraction does not move water from the coal seam into other areas of the water table?**
- Our modelling will allow us to check this. We will collect as much information as possible from our monitoring programs, and the more we can collect the more accurate our models will be.
- 5. Can BTEX chemicals (benzene, toluene etc.) from coal get into fresh water systems?**
- These chemicals can naturally occur in coal, but at very low levels. The industry has been gathering a lot of information about this, and it believes this will not be a big problem.

Chinchilla Community Information Session

Date:	24 May 2011	
Venue:	Bulldog Park	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy

1. In regards to the proposed Hopeland pilot what is the GPS position and whose property is it on?

We don't have the information here right now. It's in the conceptual stage rather than at agreement. Arrow is currently negotiating with that landholder to determine the location so we cannot discuss it at this stage.

2. In regard to the Daandine gas release incident, according to media reports a large volume of salt water was released onto the land. What will you be doing to fix and/or rehabilitate that area?

The water coming out of that is not much different to that coming from landholder water bores. We don't think there will be much of an impact. However, that said part of our follow up activities is to conduct an investigation into all issues, to monitor and assess and rehabilitate if required.

We've had some very small spills before. We work with DERM, the soils are remediated. It's not a new issue, and we have the necessary expertise. We've taken some samples from yesterday's well incident and indications are the soil and water are of good quality.

3. The well that blew up, was it new or old?

It was drilled in November 2009. It was drilled and capped and left for 18 months. Not old, but not new either.

4. I have a long term interest in the CSG industry and I can be described as a chronic critic. I have questions on the beneficial use of salt and water. You made mention about the beneficial two million tonnes a year from production. I spoke to an Arrow staff member and was told that a commercial use arrangement was just around the corner. How are you going to transport it? Can you explain how you're going to transport this massive amount of salt to a chemical processing facility for beneficial use?

Nothing is going to happen in the short term. There's still some time until we can get a commercial agreement in place as we don't have a clear idea of the volumes that will be produced. In terms of transporting the salt, it may be that we pipe a brine stream or we crystallise it and send it by truck. Our environmental impact studies are assessing the impact on roads from its transport and we will look at all these issues as part of that.

5. In regards to the beneficial use of water, my concerns are about reverse osmosis water, 'hungry' water. You just can't use it as water for irrigation, it has to be re-mineralised and tailored to irrigate this particular soil type. In my view this will take a lot of technical expertise and liaison with farmers; how are you going to sustainably use this RO water in Queensland with its widespread irrigation

systems to meet your vision? Does that mean farmers will use less Condamine water? Can you do that?

We agree that water coming from RO is pure water; it removes pretty much every mineral. There is a lot of knowledge about water management, it's not a new thing and there's a lot of information worldwide. Farmers already need to balance their water resources for their soil type. It's not new for them so we don't see it as a big issue. We will adjust the water to meet a particular quality; if we don't meet specifications, we can't send it anywhere so if it is for irrigation it will need to meet a certain quality. The Queensland Government is still working on its approval conditions. There needs to be some discussion between DERM and farmers on what it should be. If we find a more suitable end use for the water then we might explore using that as well.

6. What's the cost? It must be a lot of money.

It does cost money. We don't want to drain aquifers; we don't want to take out any more water than necessary to get the gas out of the ground. So we need to manage the water. Our intention is not to make money out of this; it's for the benefit of the Basin and about sustainability, and not about those who get the money at the end of it. We do not want people to be out of pocket as a result of substituting the allocations with this alternate supply. We want to balance all these objectives.

7. You're saying that you expect the water table level to drop by one to four metres by 2065. If you're dropping by this much what's it going to do to the creeks and rivers?

The predicted impact of one to four metres is on the far west side of the Condamine Alluvium. This is a pretty conservative model which does not factor in recharge events. This prediction is based on what might occur if we did nothing to mitigate the effects. Our next step is to look in more detail at potential impacts on rivers and creeks, and also to fully investigate all mitigation measures.

8. After going through RO, waste water is still polluted water. Our native frogs won't be able to live in it, but mosquitoes will be able to breed and this will spread Ross River fever. Have you looked into this, how will you manage it?

In terms of looking into mosquitoes, no we haven't at this stage. If the RO water was to go into the creeks we have the same adjustments to make as we would for irrigation. There have to be certain minerals in place before that water can be discharged. We couldn't release pure water, there are regulations in place.

9. I understand you have undertaken a study on bacteria in the aquifers. Could we please have some information on it?

There are water characterisation tests which incorporate an assessment of the levels of particular bacteria within the water; we should have more information in October at our next consultation meetings.

10. It's good to hear Arrow won't be doing any fracking in the Surat basin. With respect to re-injection, DERM started trials in re-injection and it was evident how difficult the proposition was to find a site in which to contain water with high salt levels. Is my interpretation correct?

I agree that re-injection is a highly specialised field. There are limited areas into which you can inject, the chemistry needs to be aligned and you must ensure it's done properly.

Arrow is not taking reinjection as its first option. Beneficial use is a much better outcome. DERM is revisiting its policy on reinjection as we speak, and I believe it will strengthen its requirements. We are talking to DERM about our substitution of allocations program which we believe to be equivalent to reinjection.

There is a reinjection trial in our program for this year. We recently finished drilling the well and will take samples from across the different geological zones and layers. Later, this will allow us to install an injection string to reinject if everything lines up. We have to see if there are suitable aquifers for treated water, looking at the rock mechanics and water chemistry. We also need to determine the number of reinjection wells for every production well.

Regarding the comment that we won't be fraccing, we should make clear that this commitment is in regard to the area of the Surat Gas Project. We do hold some tenements in deeper parts of the Basin, which do not form part of the Surat Gas Project area, and for which we don't have any plans to develop in the foreseeable future. However, these areas are so deep that it may be necessary to use fraccing in those areas - in the same way that other companies in the Surat Basin frac coals at great depths.

11. Shell and PetroChina have billions of dollars, why don't you just buy all the properties and save yourself the hassle?

The majority of landholders don't want this. That's a pretty big level of disturbance. Some have wanted us to buy their land, and we have done so in some cases.

12. Regarding spacing between wells. I have a cotton field which is 2-3km long. If you say you're going to install a well every 800m, am I going to have 3 or 4 wells on my property? And are there going to be gravel roads on it as well?

If you just overlaid a grid over that 2km property, it would look like that. We know, however, that it can't work like that. We know we can't put a well on a square grid for every 800m; we have to fit around farming activities. For a mixed use farm, we have used a grid and we have adjusted the distance of the wells, and where the pipes and tracks go.

Our methodology for gravel roads is to build these to access our compressor stations and water treatment plants. We do not generally build gravel roads between wells and access points; instead we'll try to use the tracks that are already on the farm. Gravel can affect the flow conditions of water across the land, and one of the requirements of our environmental approval is not to affect those things.

13. What if something went wrong during a flood? How would you get in to check your wells?

We'd walk in, use our all-terrain vehicles or go in with a helicopter. In Daandine during the January floods all the roads around it were cut off. We were taking guys in by helicopter to look at wells.

14. Do you issue washdown certificates now?

There is now a new government requirement to do this. Arrow is implementing a new standard for vehicles, as well as fuels and other carriage items.

15. Is there a washdown facility here in town?

Yes. We were recently approached to participate in funding to improve the facility in this area. We haven't yet worked out a plan. If you think about the movement between properties, the long distances and varying flora, there's going to have to be some serious infrastructure to properly manage this, and more often than every 100km.

Comment - There is one at the old sale yards in Chinchilla. QGC uses it.

- 16. I recently heard of a case of a pig pushing through a fence, damaging the well and creating a leak, with the owner advised to stay indoors for three days. How often are you going to check your wells? When soil is waterlogged cattle and pigs will push through. If you have 2000 wells, in wet weather are you going to be checking all of them? You're going to have to prop those fences up.**

Unfortunately, these stories get a life of their own. In that instance this scenario of a feral animal was one of our theories of what potentially could have happened. The landholder was not required to stay inside for three days. We have made substantial changes to fencing specifications; one is an eight foot high wire mesh fence and the other a cattle panel. The wire mesh fence addresses the potential risk of stock and other animal entrance.

Our standard procedure is to visit a well two to three times a week. We do that because the monitoring systems are manual-based. We are looking into remote monitoring which would extend the period of time between checks. Our checks include looking for gas leaks and doing well integrity checks.

Our fences are designed not to fall over. If there is a gas leak identified remotely, we will check that, and also the ones we inspect as we go past to get to another site.

- 17. Can you guarantee that you will shut the gates and maintain the roads?**

Yes we have developed a set of Land Access Rules which (like our Life Saving (safety) rules) if breached may result in disciplinary action, and even termination of employment. We have found that this policy works. Leaving gates etc. as you found them is one of those rules.

- 18. How often will you be maintaining the roads when accessing private properties?**

Arrow recognises it is a significant road user so it contributes to the council for road maintenance. Under the *Petroleum and Gas (Production & Safety) Act*, Arrow is required to enter into an arrangement with council for the upkeep of the roads it uses.

Arrow fixes up any problems it causes on farms.

- 19. In regards to reverse osmosis processed water, do you know how much it's going to cost?**

Yes we do, it's going to cost a lot more than what you pay for water now. You wouldn't buy it if we sold it for a profit. However, we do have to treat the water if we want to carry on with this business. We will not be making a profit from this water.

Cecil Plains Technical Water Session

Date:	25 May 2011	
Venue:	Cecil Plains Hall	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Dr Lloyd Townley, Director	NTEC Environmental Technology
	Carolyn Collins, Environment Manager	Arrow Energy

- 1. I am given to understand from your presentation that changing head in confined aquifers gives a lot less water. The CSG industry will extract tens of thousands of litres of water; won't this have a drastic effect?**

Yes that's true. I don't know exactly what is projected for the whole industry, but everything is relative, depending on impacts, recharge etc.

If Arrow's daily take is 75 ML it is looking at 25.5 GL per annum. Is that able to be mitigated? We need to carry out further tests to understand what could happen if we do nothing.

- 2. Why do you need to substitute if you are not impacting the Condamine Alluvium?**

We've had quite detailed discussions with a whole range of people such as the Basin Sustainability Alliance who have asked for this in its blueprint as well as other irrigators. Because the Condamine Alluvium is already quite depleted this is something we believe we can do to help Arrow and the agricultural industry be sustainable.

- 3. How do you propose to 'make good' in 2065?**

It is important to note that the numbers we have here are cumulative numbers for the whole industry, and they don't reflect any mitigation measures. So, if we do nothing but take water from the region that is what we might be expecting. What we intend to do next is to look at possible mitigation methods and to study what must be done to mitigate those impacts. We are quite happy to work with the irrigation community to make sure there will be a good outcome.

- 4. Landholders and townships rely upon Artesian, Sub-Artesian and alluvial water. I understand that the artesian is connected all the way through the GAB. There must be some sort of connectivity between these aquifers. They are capping all the artesian bores, and the discharge from other bores has increased. We don't appear to have correct figures for what you will extract, but surely taking these quantities out will have an effect? This is an Australia-wide water supply – surely this will affect someone.**

We've explained what our plans are. We're doing a lot of work to understand interconnectivity. We're trying to be proactive in terms of understanding these issues. We are committed to putting a lot of resources in to understand this issue.

- 5. When you showed the diagram with two layers of water you showed water going up through the aquitard into the unconfined aquifer. When you dewater the confined aquifer won't the water go back down?**

You are correct – all underground waters are connected to some extent. What matters is to what extent they are connected. What really matters is the structural geology of the

region and the properties of materials in different layers, the impacts that nature has as well as the impacts we all have...whether it be pumping water for farming purposes, municipal purposes, or in the case of a project like this one. All activities have an impact on how the system works. Hydrogeologists use all the available information to construct the models that now have hundreds of thousands of cells, and use the information the best they can to give them confidence that their predictions are correct.

Carolyn indicated I am one of several people reviewing Arrow's modelling results. She also indicated that the first results have only just come through so I'm not prepared to comment on those; I haven't yet given Arrow my comments. In terms of direction, if you depressurise a system at depth it will change the system and may cause flows in another direction. The likelihood is for the water to come from above and flow downwards to make up for that drop in pressure. However, the permeability, the hydraulic conductivity of the layers in between, can be extremely small and the timescale over which the recovery takes place can be extremely long. In that same long period there can be recharge processes at the surface.

6. We want 'make good' provisions to be agreed upon between Arrow, the government and landholders. At this stage the landholders are only a speed bump in the process.

A 'make good' agreement is only between Arrow and the landholder, the owner of the bore potentially affected. Arrow is trying, outside the make good agreement, to determine mitigation measures. It is initiating a process to engage in discussions about how we do that. This will involve a lot of steps, including making sure our views are aligned. Arrow is also engaging with government to determine whether its policies fit with government policy. Arrow will also have to determine the appropriate irrigator group and engage with it.

7. In relation to the areas of Arrow tenure on the map...how long will you be carrying out activities there? Will it be beyond 2065?

That is something we will be talking about this afternoon.

I think what you are getting at is the issue of our long-term liability? Under both the Water and Petroleum Acts we are liable for any impacts we have within and outside our tenure areas in perpetuity. So once our tenure is either cancelled or surrendered at the end of the project life we still have obligations in regards to 'make good' and ongoing monitoring until the government is satisfied there is no longer going to be an impact.

8. What if Arrow folds? Will Shell and PetroChina be liable if Arrow ceases to exist?

Shell and PetroChina are very large companies. At this stage Arrow has not taken the final investment decision as to whether it will go ahead with the Surat Gas Project. It has a lot of work to do before it gets to that point. The EIS is not yet complete; it will examine a whole range of issues. Once it has been completed and submitted to the government there will be numerous approvals required before we can commence. Shell and PetroChina take all these issues very seriously and they will not decide to undertake this project if they think there is a significant risk that Arrow cannot make good.

9. With regards to groundwater substitution, practically speaking how will this work? Will you be piping water to landholders' farms?

As I said previously we are in the early stages of that. We are working closely with key people representing the irrigators group to work out how that is best done. So if you have anything you'd like to add to that we should talk out of session.

Comment - Lloyd, I feel you need to know that Arrow has been commercially active in this area for about five years. As I understand it, you have been asked to peer review Arrow's groundwater model. The government's legislation suggests that the groundwater model and baseline data has to be collected and submitted prior to commercial activity commencing. This has not yet been done; therefore there is a great deal of concern here about the lack of compliance with government regulations.

This is the first time we've seen a model and the first time that a potential impact on the Condamine Alluvium has been publicised. You've probably heard here this morning that we do rely heavily on the alluvium and are taking cuts to existing allocations to preserve it. I would also have concerns about the model that has been presented in the sense that Arrow has suggested that in the next 12 months it is drilling a number of observation holes – 50-100?

- 10. I would question what holes were used to make the model? Are the holes going in after the model has been made? This doesn't really seem to add up to us as lay-people.**

The visualisation we have prepared shows the boreholes used to support the model. Today is about communicating that information. Arrow is a couple of years behind the other proponents in this industry and is not planning to go ahead with the project until around 2013. So it does have more time than other companies to understand these processes. If you have a chat with the guys from the water team who are here they will be able to show you where those bores are. Some of those are DERM bores, some are Arrow's. We also had a bore inventory done a couple of years ago, and some of the information came from that.

Arrow is compliant with the current legislation in terms of underground water impact reports, modelling and bore assessments; the requirement is to submit one after the EIS. Arrow has 14 months to submit its reports but the work will be done before then. Information is coming together and Arrow now has a lot more understanding than previously.

Once the model has been peer reviewed more information will be available; Arrow will be holding a detailed session in September/October to explain the results of the modelling.

- 11. What is the difference in terms of your obligations between currently producing areas and new areas?**

Arrow has certain obligations when tenure is granted. The timing of these obligations begins from the start date of that tenure. It must meet these obligations before it undertakes any petroleum activities.

- 12. There have been significant periods of time when Arrow has not been compliant with production regulations.**

Yes, we have said previously that under the old regime government did not have all the processes in place to deal with issues, and to deal with all the information provided.

Things have moved on, and government has now put in place processes to make sure there is a real focus on this, both within industry and by the public because of the consultation processes involved. Government has also resourced itself now to deal with this appropriately. Additionally, by using the Queensland Water Commission everyone can be better informed to make appropriate decisions in the future.

13. Some landholders have begun to undertake their own baseline bore assessments as an 'insurance policy'. What guidelines would have to be in place for Arrow to take on board some of this data for its management plans or make good arrangements? Is there an Australian Standard at which baseline data should be collected?

The government is currently developing a guideline which has been through quite a few iterations in the last six months or so. It will set out what is required in the baseline assessments. These requirements will probably include certain information to be collected by the company with the bore owner present. It will feed into Arrow's modelling program as well as the government's policies. Arrow is happy to take on board information already collected by landholders.

14. What guidelines are you currently using for baseline bore assessments?

We have been in discussions with the government while it's been working out what standards to develop and impose. We've also talked to the other CSG companies to ascertain the minimum level of information that is being collected. Origin has possibly done the most work in that area. I believe what we've been collecting should satisfy the requirements under the new guidelines, but if they don't then we will obviously have to collect some more information.

15. My home was built in the early 60's and since then my bore has produced good water. In terms of your make good provisions, if the water stops due to your drilling, the water table falls, and you put another bore down to make good, what if that water is not of the same quality? That will be no good to me. Can you assure us that the water will not be poorer quality?

There are a whole lot of requirements around the make good system, and a lot of options to allow for individual cases and uses. A new bore or deepening a bore is only one option. The obligation we have to make good is to provide you with the same or better quality water. There are several arrangements that can be entered into such as alternative supplies or monetary or non-monetary compensation. The way this is being approached is to use an early detection system through our monitoring and modelling programs so that we understand what is happening to the groundwater systems and what those impacts could possibly be.

16. Was any water lost from water dams or evaporation ponds during the floods?

We did have a small approved discharge from our treated water dam at Daandine. That was mainly due to the Wilkie Creek mine being flooded, so it wasn't taking any water from us. There was no discharge from untreated water dams. We are currently building some more treatment facilities. We are required every year to make sure we have sufficient dam storage allowance to get through the wet season. If we don't then we have to have an approved plan for what we will do. In this case we did have approval for the discharge of treated water, and the discharge was strictly monitored.

Cecil Plains Community Information Session

Date:	25 May 2011	
Venue:	Cecil Plains Hall	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy

- 1. You said in your presentation that your aim was to have a zero impact on the water balance in the region. Does this mean that Arrow, unlike QGC, won't be applying for a licence to discharge into the Condamine River?**

What we want to do is have the framework for substituting allocations up and running. We will be seeking an approval for discharge but the only reason for this is in case there is some way that water supply is interrupted or if there was such unseasonal wet weather for several years in a row that water supply is unable to be used and there is a backup to maintain the integrity of our dams. If the dams reach a critical level, which may affect their integrity, we would only discharge treated water if it can't be used or supplied in any other way. We would discharge only the bare minimum required to maintain the integrity of our dams. This is not our preference.

- 2. Darren, in regards to your changed arrangements to do with compensation, the last time you guys were here the question was asked in these terms: will this be a business proposition for landholders? Unless I am mistaken the answer was at that time that you are in the business to make money for Arrow, and will only compensate for effects. Is this a turnaround from that? Will this be a business proposition for landholders? Because of the unknowns of this process as the industry progresses we both learn new things. It would be impossible to negotiate upfront a compensation arrangement which compensates for effect. There has to be some incentive and there has to be a business proposition. Is this the case?**

Firstly, is it different from six months ago? Yes. We have understood the message that if we simply compensate for just the easily measurable impacts then that does not meet all the impacts. As to whether it's a business proposition for you, I don't know that yet because we're not far enough along in the process. What we ask of you now is to send through to us what added value looks like to you. What percentage of your farming revenue are you looking for? Obviously if you say 100% then the answer will be no. But we need this information. So the answer to your question is yes, we have listened and taken on board what you are saying, but we're so early in the process that I can't make a commitment as to what it will look like.

- 3. We always hear about how good your Shell and PetroChina are – how big they are. But they still want to hide behind the government's compulsory land access legislation, and the ability to use the Land Court. I think it would make it a better business proposition if you were willing to step out from behind that legislation.**

Voluntary access and agreements is our preference. With every landholder we would like to have a negotiated outcome. There have been instances where, for a range of different reasons, those negotiations have failed, and Arrow has ended up in the Land Court. We will not say that we commit to never going to the land court because a range of things can

happen that are outside our control. But we absolutely understand that we cannot have a 20 year relationship with someone that starts in such an adversarial way.

4. **The make good provision for the water seems to be satisfactory for us in the early stages. But when you reach the stage that your wells stop producing and the Walloon coal measures are dewatered we need an assurance as to what your long term make good provisions are. We have had discussions with you regarding Brisbane grey water which is an alternative and we believe it should be brought forward as quickly as possible, not left in the background as a backup. It needs to be included in your negotiations with farmers now.**

What we've considered is the extent to which we will supply that water e.g. we're not sure when that water will cease to be available. We anticipate that when that time arrives, we would have been providing that water to existing users. This will allow for a natural recharge in the relevant aquifers. By doing it early on and not leaving it until an impact does occur we hope that this will mitigate any impacts. In the interim we need to run these mitigation scenarios through our model before we come back here to see you again. We have put a lot of work into understanding these issues. We commit that we will make good, which may include a number of potential methods. We have taken the information you have already provided us with back to the project team, and that is being looked at. What we want to do is work out what will provide the best outcome in the long term.

5. **I'm a landholder in ATP683. In Schedule A of the Environmental Authority (EA) for ATP683 it describes an operational plan which is to be submitted to DERM within 60 business days after issue of the EA. It states the plan must include a description of proposed infrastructure that will be developed within the term of the plan, maps that record the locations of the infrastructure, regulated dams, wells, transmission pipelines, gas processing facilities and water treatment facilities. For each disturbed site there must be a description of the rehabilitation activities to be performed. Will you provide me and any other landholder who is interested with copies of this plan?**

At the moment there is a legal action regarding ATP683 and the Environmental Authority. This means it is inappropriate to provide that plan at the moment while the matter is before a court. As a company we are willing to discuss and talk through this plan; however our ability to do so is constrained while this court action is in train.

On that list you mentioned things like infrastructure and compressor stations. However, remember that it's an exploration tenure; it won't have compressor stations on the land because they are not authorised activities. So if you want to obtain the plan to understand our development intentions it will not be in that plan as it will only be written for the exploration phase, not long term.

6. **As soon as the legal matter is concluded, will you provide the plan? When will the legal action be concluded?**

Yes we will but at this stage we have no idea when the court case will be finished.

7. **You made mention that your salt management would include regulated disposal areas. How do you propose to manage the rapidly mounding salt at the Grassdale field? Will that be moved offsite to a regulated area?**

Arrow currently has a project underway to upgrade the facilities at Tipton, including a reverse osmosis plant. There are also some new dams associated with that which will be used in the interim to manage the brine in the area.

8. Are the unlined ponds at Tipton going to be remediated?

Those dams were commissioned as evaporation dams and they will be converted to aggregation dams. This means we are not allowed to evaporate in them, they are only to be used for the relatively short-term storage of peaks and troughs in field production. At the end of their life they will be remediated.

In terms of managing the salt on the site, we are building a new lined dam, with a double liner with the leak detection and physical protection under the liners. That work is ongoing at the moment. We will treat the salt from that as part of the wider project.

9. Will you have a company policy to stop aggregation dams from evaporating?

All dams will have some evaporation; it is in the nature of a dam, but our intention is for as much water as possible to flow through the system for beneficial use.

Comment - That compounding salt is the biggest blight on our local community visually. Even if you convert that to an aggregation dam you will still have sideways and vertical movement of those salts because the salts will be above the natural ground level.

10. I feel that this industry is very good at isolating individual growers. In regards to the alluvial component of ATP683 land use from a farming perspective, water, household and domestic use is almost identical across almost the entire acreage of your tenure. This company has to get serious with area-wide management and monitoring of the water situation. If you are forecasting a peak impact in 2065 I strongly suggest that a 2km limit on monitoring around your existing setup is completely inappropriate.

I may not have said it clearly enough, but our water monitoring program will be quite extensive over that entire area and will also include areas outside our tenure. Our immediate priority is those areas we're currently producing from. We're installing those bores and moving outwards from those areas into new areas. This is something we are committed to. It is the only way we can collect enough information to improve our modelling and understanding of the situation.

11. So at this stage you don't know if specific techniques will be for groundwater substitution, is this correct?

Most stakeholders appear to think that this is a good offset strategy. Next step is to work with key people in the areas where that might be implemented to sort out the details of how it might happen. That includes working with government to ensure that the appropriate approvals are in place although the agreement would be between the actual people who would be using the substitution, and Arrow.

12. Are you aware there have been changes to the beneficial use guidelines over the last six to twelve months?

Absolutely. We've been very involved in trying to do some pre-work in terms of understanding what that would mean for our proposal here. The guidelines have been developed enormously, especially in the last six months. DERM is looking at those issues

now, and is looking to refine the process even further. This is something we need to be involved with. We have to make sure we understand all the requirements and understand the needs of the end users, and that the two are aligned.

13. My understanding of the current guidelines is that CSG-produced water can't be used for irrigation. So is DERM in the process of changing those guidelines to help you dispose of CSG-produced water?

That guideline is for a general beneficial use approval. DERM's intention was that it would apply to low risk activities. There is a whole separate framework for specific approvals, such as the irrigation of treated CSG water. That is a very involved process, and that's one that we are going through now. We're looking at one now that we've been talking about to DERM for a year or more. The requirements for an application under that are far greater and the conditions that come at the other end of that are extremely restrictive. The one you are referring to is quite general. Yes it does prohibit those things, but under a general beneficial use approval.

14. The water for this substitution is coming out of the Walloon Coal Measures, but it won't be substituted back to users in the Coal Measures because there won't be enough of them for the volume you will be producing. So I assume that you will be substituting that water to licensed groundwater users of the Condamine Alluvium in light of the fact that you are forecasting that there will be some impacts. Is that true?

As we showed on the slide before, we intend to substitute existing allocations from the Condamine Alluvium.

15. So is Arrow Energy currently in discussions with DERM to somehow freeze our current entitlements, to make way for you to take your water? The map that you showed indicated up to four metres take assuming that you do nothing, but I don't know if it allowed for the assumption that we are already taking groundwater. In your presentation you said that in order to allow the Condamine Alluvium levels to recharge from natural infiltration from rainfall, you were going to substitute the water for us. I assume that in the meantime we won't be taking the water that we have an allocation for, and will be taking this substitution water instead. That's the only way I can see that will allow the water levels in the Condamine Alluvium to increase past where they are now. The landholders themselves are attempting to make that system environmentally sustainable for the long term but once the substitution water comes to an end, and we go back to using groundwater, there will be no way to tell whether the drawdown is due to our use or is a lasting impact from the CSG activities.

In that time there will still be ongoing monitoring undertaken so the movement of water can certainly be monitored through that process by DERM, by Arrow and by you.

In terms of your question re if we are working with DERM to cut your entitlement and make you do this? The answer is no. We're working with representatives of particular areas. It's a voluntary process, and one that groups such as the BSA have raised. It's something that we think is a good solution, and one that will work for those people that want to make it happen. No one will make you enter into anything that you don't want to do. We're looking at collectively working with a group of people to look at all the issues, work through the different scenarios and find the best way to put this into place. This will

involve talking to government about what we want to do and ensuring that the existing rights of irrigators are protected. If it doesn't suit irrigators, then it's not the right solution.

16. I understand that Arrow is doing the EIS process voluntarily? What is the purpose of this? Why not wait until you are asked to do it?

We made a decision as a company early on that we would need to undertake an EIS as part of the process. We believed that rather than wait for one to be mandated, it would be best to just go out and do it. You actually have to apply for an approval to undertake a voluntary EIS, and we did that.

17. Other companies have applied for their projects to receive significant project status. Does Arrow intend to apply for this status?

You can apply to the Queensland Coordinator-General for 'Significant Project' status which means that your project is assessed under the Coordinator-General's framework. There is a different framework under the *Environmental Protection Act* and Arrow made the decision early on that it wanted to complete an EIS under that legislation, so we didn't seek significant project status at that point in time and nor are we going to now. That said, we have a number of EISs underway as there are a number of components to our project. One of these is the LNG plant on Curtis Island which has significant project status. Shell was originally doing that EIS and the work on it has continued with Arrow now responsible for it (under the Coordinator-General framework). The EISs for the Bowen upstream developments and pipeline projects are being assessed under the EIS process in the *Environmental Protection Act*. If we wanted the Surat Project to be changed to an assessment under the significant project process we would have to start from scratch.

18. The Terms of Reference for the Surat Gas Project talk about the inclusion of a consultation report, and that you are required to identify the interested and affected people and summarise your consultation with these people. I assume that these consultation sessions we are having now are part of that report and process, and that you have to address those issues. Given that there are issues that we don't necessarily feel have been addressed (regarding activities on black soil and groundwater impacts) and given that there is quite an overwhelming lack of support for the project, will this be identified in the EIS report?

They will be. The purpose of the EIS is to identify all those issues, understand and document all the concerns, and come up with strategies as to how we will manage them. They will be taken into consideration in that process. After the EIS is submitted to government there is a public exhibition period to allow for comments so you will have an extensive opportunity to comment on the document.

In terms of the EIS, we won't presume to put words in your mouth about how you feel about the project, we will be listing the issues you have raised and summarising the consultation sessions like today. Through the submission process you will have the opportunity to raise those issues in a formal sense. An important point is that the consultation report will not be written by Arrow, it will be written by JTA.

19. You've mentioned some of the benefits that our community may see through advanced exploration and production in our area – sponsorship programs, education and traineeships etc. I have a list of the concerns of the community, how are you going to counterbalance these concerns to make us feel good about you

coming onto our land? The concerns are the risk of de-watering the Condamine aquifer, contamination of soil, unsuccessful rehabilitation of soils, loss of farm production due to competition for area, capital value loss, noise pollution, reduced air quality, loss of privacy and security, competition for labour, increased costs of service providers, road upkeep and interference with slope characteristics on farms due to buried pipelines. What are you going to do to counter balance these concerns – offering a traineeship simply isn't enough.

Of course we understand that something like a helicopter service will not balance out all your concerns. What we're saying is that in order to operate in these regions and communities we need to pay our way. That happens at different levels. We have compensation agreements with individual landholders. We also recognise that not everyone who is affected is on a farm, there are the people in town and the community generally who are also affected. We're not trying to buy a social licence; we will earn our social licence. With our Brighter Futures program we are trying to put something back into the community, and today we have made an honest attempt to show you what we have been doing. The issues that you list are concerns we have heard before, and we are working on these in many different ways.

- 20. I have two questions which relate to the physical footprint on the land. Firstly stemming out of what happened on Tom O'Connor's property? For some time we have been getting our minds around the impact of a well site. My understanding is that there has to be access to that well site for all your machinery; at the recent incident there was enough onsite machinery to fill half of Cecil Plains. Intensively farmed black soil just doesn't accommodate that type of machinery. If you have to have access at a moment's notice to respond to an incident you would need a significant hard stand area to manoeuvre equipment like that to actually get to the site. This greatly multiplies the potential effect on our land, especially on previously unaffected areas. So, my question is, is the impact on our properties as we were told previously, 20m x 20m with access tracks or will you have to have access with a moment's notice to wellhead sites?**

Some of the literature here today mentions 'workovers'. Generally that is something that doesn't happen at a moment's notice. The work that was going on at Daandine was planned. A workover basically takes out a broken pump and puts another one in. Over the life of a well, that will probably happen every two to three years. It generally wouldn't require as much equipment as was used on that property. We had extra water tankers there as part of our contingency plan so we could properly kill the well. We would most definitely require the rig, the mud pump etc. One of the reasons why this area is not on the timeline is because we haven't yet figured out how to do a workover out in your paddock and manage those impacts. It's going to take a considerable amount of time to properly work these issues out, it's been built into the plan that we don't intend to develop on this land for many years, because we don't have those answers yet.

- 21. Unfortunately your assurance about when you're coming out onto the floodplains doesn't leave us completely satisfied. Within the last year we were here in this hall and you made those same statements. But what you didn't tell us was that you had an application to convert part of the ATP to a PL right outside here. That PL covers part of the floodplain. So technically speaking you have approval for 50 wells out there. That doesn't give us much confidence in what you're saying.**

I can see how you might interpret it in that way. But our development plan shows where we intend to develop and we do not have any plans to develop in this area as we do not have these answers yet. We do intend to develop on the area to the west of the Condamine River which is in those same petroleum leases because the land impacts are significantly different.

That petroleum lease was applied for a number of years ago in 2007. The only reason it wasn't granted straight away is that a number of coal mining companies hold tenure here as well. The way the government works is that the mining company is required to give its consent to grant a petroleum lease. We should have drawn attention to it. A petroleum lease is defined by square blocks not limited by any geographic feature but a particular block (one minute of latitude by one minute of longitude) doesn't necessarily mean you go and drill in the area covered by that PL.

- 22. In regards to gathering lines it's been reported that in production areas away from here some companies have demanded control over operations allowed to happen over the gathering lines to guarantee the integrity of those lines. This leads to a 20 m exclusion zone. Do you require control on the areas above the gathering lines?**
- On a steel transmission line, it is traditional practice for the pipeline owner to have some control over the land above. If a digger accidentally damaged the pipeline, it would create significant impacts. For the gathering systems we design those in consultation with the land users and there are no restricted zones as such. We compensate for the strip of land where the pipe goes through. Part of the compensation arrangement is recognising that we might have to come in and do some maintenance or slash an access track. We have recently provided an awareness program for landholders in our production leases about the risks of doing something unusual there. We ask people to call us first before doing something so we can come out and have a look at it, before some major issue arises.
- 23. I noticed you are not using the piezometer nest³ holes for your water monitoring; rather you are using a single piezometer down the well. I was wondering how far apart these wells are so you can tell what is happening in those other aquifers. How far laterally is that next well?**

Above the coals we want a piezometer as close as possible to the interface between the Walloons and the immediate unit above it. So whether it is the Condamine Alluvium or the Springbok Sandstone...where that coal finishes we want something pretty close to it to be able to achieve accuracy.

The design we have there for one part of the well would be in the deepest formation we are interested in, for example the Hutton, and then the piezometers are on the casing beyond that same well. So they are not nested in the sense that there are multiple openings the other gauges are cemented in so they are all in the same well. The lateral spacing from there depends on how transmissive the coal is, so you step it out if it's very transmissive and it'll be closer together if it's not very transmissive. We're gradually bringing the program in so where we're targeting initially is around existing production and

³ A piezometer is a borehole designed to measure groundwater conditions at a single point within the aquifer. A piezometer nest is where a number of piezometers of varying depth are constructed at one location.

from there we'll see what the impacts on the coal are, and from there we'll know how far we have to step out.

24. You mentioned before that there is the potential for significant groundwater impacts to be unable to be mitigated. What would constitute that?

That's something that we need to collect more data on to see what those impacts are. At this point there is nothing to demonstrate we're heading down that path but if risks are identified such that our parent companies decide they do not want to proceed on that part of the project that will be a decision they will make when it comes to the final investment decision.

25. What are your expected takes for the Walloon Coal Measures?

We're estimating 25 gegalitres per year. That will change over time. As we move to different locations new wells that we bring on line will have a ramp up phase during which the dewatering phase draws off water, and then decreases in volume after a relatively short period. So by bringing new wells online over time you get curves in water production and by joining these together you get a relatively flat production profile.

26. So you'll have 25 GL that you can match against that for substitution?

Yes, the idea is we use that 25 GL for substitution so that as we produce the water it feeds into the process.

27. I see that other companies such as Santos are using electricity for their wells as the gas is too valuable to use to drive the wellhead. Is Arrow looking at going down that path? And will supply continue for domestic gas users?

Yes, roughly speaking at domestic gas prices it is slightly more efficient to have well site generators. As the value of the fuel goes up, it changes the relative economics if we can buy power at a cheaper price. There are also some significant benefits we can gain by putting underground power in; visual amenity is improved and it doesn't impact on crop-dusting. There are some limitations because with underground power the heat doesn't radiate off, so we need a bigger cable which makes it more expensive. It also relates to the sort of pump we are using so if we were using electric submersible pumps and could take underground power to our site, we could fit our wellhead into a substantially smaller space than at the moment. However, we haven't yet proved the use of electric submersible pumps. There are a lot of competing technical, economic and environmental factors that we have to take into account. The best solution may change depending on many factors such as where the source of the power is (i.e. a local power station), suitability for landscape and land use. There will not be one answer for the entire project.

28. Please explain how drilling a gas well will not allow poison from drilling getting into the Great Artesian Basin when the drill head has to be drilled ahead of the casing? The water and gas is under high pressure the moment it is released.

I think the crux of that question is the word 'poison'. We do not use poisons. I know there is concern about BTEX chemicals and the fracturing process but we currently do not frac in the Surat Basin, and have no plans to do so in the project area. In terms of the fluids used for drilling, in most cases they are very common products such as Bentonite clay, salts etc.; they are not poisons in the sense of being nasty chemicals. There are also two different drilling methods; what we call overbalance, where we pump water down, and the pressure from pumping that water down might encourage it to flow into the formation. The

alternative to that is called underbalance, where we encourage the water from the formation into the hole. We can do both of those, it's just a bit of a different set up for the drilling process. So there are ways and means to stop the release of any drilling fluids into the surrounding formation from happening.

29. I'm thinking more of the salts and heavy metals in the aquifer you are drilling into escaping into the GAB rather than chemicals you put down the hole yourselves.

We have not found dangerous chemicals in the water.

30. Do you completely ignore all the experience and knowledge of the hydrologist John Hillier in terms of his report on groundwater in Queensland?

We don't disregard science and fact. If you look at our own interpretation of the Condamine Alluvium contact and groundwater model and you look at Mr Hillier's and Mr Huxley's and the work DERM has done, you will see there is a growing understanding of that contact. You go further and further each time, it's like an evolution to gain a greater understanding of the issues.

31. On *Four Corners* John Hillier said he expects a 5% failure rate of your drilling to escape into the artesian water.

I'm not sure where 5% comes from, that's not our experience with drilling. Our experience in drilling is that we design the well before we drill it, use the correct equipment, trained people and the right procedures. As we drill the well, if things go wrong we make the decision whether to fix it or to seal and abandon it. We don't work with failed wells, it's either a successful well or we seal it.

32. In the event of any failure does the CSG industry understand the consequences for Australia if the water in the GAB is rendered undrinkable?

If we were going to do substantial long-lasting damage, we wouldn't go ahead with the project; it's as simple as that. The GAB is a massive basin; we're talking about a very minute area of water compared to the water in the GAB. We couldn't damage it, even if we tried.

33. Why should Australia run any risk to our water supply when the benefit of the project is for foreign use and foreign profits?

We think there is a way to do this where we won't have those impacts. Already a lot of that gas is going to local electricity generation and other industrial use. There's a balance here between looking after the environment and the GAB, and getting energy out for people to use.

34. According to the Arrow Energy website each resource area will have approximately 1,500 production wells and 5 integrated production facilities. Will any of these production facilities be located on the floodplains?

An integrated production facility is quite a significant thing, so no. There is a certain distance of 20-25km we can haul gas through the pipes without compression. If, for example, we needed to haul gas 40km, we could establish a field booster station which looks a lot like an enclosed substation that you might have seen in Toowoomba or Brisbane. That is the extent of what will go out there. There might be clean water dams for reticulation of water for beneficial use, and little fuel booster stations. But nothing like what you may have seen in pictures of Tipton or Daandine.

35. If there are no chemical compounds in the CSG water why would the government have allowed for pre-existing BTEX levels in its fracking framework?

In regards to BTEX, it can be naturally occurring in all sorts of environments. Our wells are designed to extract water to the surface as part of the production process; we are not pumping it below ground. The well integrity programs and the maintenance and inspection programs we put in place ensure we're not getting cross contamination of aquifers.

36. Can landholders access daily drilling logs to check the integrity of the strata formations before production commences on any Arrow lease? The information goes to DEEDI, but there appears to be no scrutiny of it by DERM.

The daily driller's log is more a timesheet of what has happened in each shift. Under the *Petroleum and Gas (Production & Safety) Act* we are obliged to provide a report for every well we drill, summarising all the details of that well. It would be very difficult to derive an understanding of the strata integrity solely from the daily drilling logs, since these only detail events on the rig for invoicing purposes.

There's a timeframe within which that report must be submitted after completion of the well drilling. If there are any queries about well integrity or the formation or geological strata then there is a decision to be made whether to proceed or abandon. The lifetime of a well can be more than a decade, so we have plenty of time to respond to any kind of issue that may arise. Well completion reports are available from DEEDI but it would be up to government to establish appropriate resources to scrutinise this information, it is not really up to us.

37. I don't see the reason why you're doing these community meetings. Effectively you've annexed part of the floodplains east of the river under the authority of an EA. Why do we as a community have to beat up companies such as Arrow to go further than the legislative requirements? You talk about Brighter Futures and building up the community, and yet it was a disgraceful oversight that at the November community meeting here you failed to notify this community that you had in place an application for a Petroleum Lease. Sure, you met legislative requirements and put a postage stamp sized ad in the *Dalby Herald*. Why don't you notify those individual landholders that they're about to have a PL granted over their land and get them to respond? Why did you not tell us in November?

We have made a commitment not to develop on land east of the Condamine until we have resolved a way forward. That is our promise, regardless of where our PL might be. There's not some subterfuge where we're trying to sneak some development across the Condamine. When we make a commitment as a company we stand by it. We've written these commitments down and published them in newspapers and on information sheets. We stand by those. The fact that the PL covers a boundary does not somehow remove from us the need to resolve those issues.

38. There are people in that PL who aren't aware of the situation. You have 50 or 60 floodplains farmers who are now under your PL and have not received a letter or any notification from Arrow that this is the case. Surely, if you are trying to gain a social licence you should at the very least notify people of changes like this. Arrow has missed an opportunity to make a positive social connection here.

That is a good idea, something we haven't done in the past. The fact that we didn't draw to your attention the application for a PL wasn't a deliberate ploy, more an oversight on our part. I understand what you're saying, and this is something we will definitely take on board about the need to notify landholders when a PL is to be approved over their properties.

- 39. Comment from the Deputy-Mayor of the Toowoomba Regional Council (TRC).**
We've had some concern recently around exploration permits being sought quite close to suburban Toowoomba. Based on the knowledge available, we strongly resist the movement of the CSG industry across the Condamine. Most councils are keen on development, but TRC has made a very deliberate decision that it is not keen to see the CSG industry come across the Condamine with the current knowledge that appears to be on the table, and the current community concerns. Something raised many times today, and something to remember, is that this kind of land does not grow on trees, it's vital for the future of the state, the nation and the world. Local government is fairly impotent in this process; the state government certainly runs this, council mostly monitors and puts up with the impacts. When the project is deemed of state significance, we're right out of the loop. So I think you are doing the right thing by consulting with people, but just to let you know the TRC has made its decision based on the current information.
We hear you clearly. We are at a certain point in our investigations, and we know that we need to work out these issues. We just want the chance to work them out and then to be able to present the information to you all.
- 40. In terms of the buried infrastructure, are we still allowed to farm over the top of it? You said that landholders will be compensated. If a landholder is going to be compensated, and we can continue farming, does that mean we have to give access or a right-of-way?**
Yes.
- 41. Does that mean every wellhead that has underground pipes associated with it requires a right of way or an easement? What about roads – how big will they be?**
It's not an easement, but it is an effective right-of-way for every production well – not exploration wells as they are not connected up to anything. If we form roads they will be put on that same parcel of land, historically the corridor beside the pipeline. Many of our roads are no more than graded farm tracks. We do have some engineered gravel roads which are used for entry to compressor stations and major water treatment plants but everything else is basically a graded farm track.
- 42. Does your commitment not to come onto the black soil until 2023 still stand?**
That was our indicative development plan at that time. As we do more appraisal work the development plan will change. But we don't feel like we have all the answers yet, and until we do, we will not be coming onto this land to develop it.
- 43. Do those concerns you have include water and soil concerns?**
Yes. The water concerns have to be addressed first. Water issues are part of the EIS, so these issues have to be addressed as part of the EIS.

- 44. I've been advised you have just finished your first round of modelling. But it seems apparent that you need to do a lot more work to fully understand all the issues. Are you saying that you will not be coming onto the Condamine Alluvium until you have completed this further modelling?**

We have to complete and have that modelling reviewed before we can issue our EIS. We have to have that done before we can get any approvals to progress with our project, and before we do that we will also have to take a final investment decision.

- 45. So you won't be releasing your EIS in the final quarter of this year, or early next year? It appears that the modelling you need to do will take many more months than that.**

We acknowledge we are a long way from finishing this process but what we have achieved is a broad understanding of how the water moves, and predictions of what we think will happen. What we need to do over time is collect more information so the density of data in our model can be refined to a smaller lateral extent which is the only way we can improve the level of certainty. So it's an ongoing process.

- 46. So all you require for the EIS is that broad analysis?**

When I say broad analysis, it's based on a one kilometre square grid which gives us a very good understanding of what will be happening in terms of trends, water flows etc. So at this point in time I think we have enough to take that next step.

- 47. The Meenawarra Pilot and the River Road Pilot, have these happened? What were the results of the Meenawarra Pilot? Was there sufficient gas there to warrant going to a PL?**

Basically the findings were inconclusive as the production data was inconsistent with the log data. The log data seemed to say that it would be a good production area, but the production data had much lower water rates and we're still investigating why that happened.

- 48. So is the reason why that site has not been rehabilitated because there is a possibility of further activity in that area?**

Yes, that is one of the reasons.

- 49. In relation to your assurances regarding production on the flood plains, your Environmental Authority gives permission for 34 core wells and 36 appraisal wells. My understanding is the appraisal well process would involve 6 or 7 wells at each site. I wouldn't like you or anyone else to think that an exploration pilot is not invasive. A 6-well pilot basically destroys a farm. So your assurance that you are not going to develop on the floodplains, does this extend to pilot projects on private property on the floodplains i.e. you have no intention to put a pilot on the floodplain until issues are resolved and agreement is reached?**

Yes, that's right; our commitment includes any activity on the floodplain. The only thing we want to do is put in water bores to check the conductivity within the Condamine, and the water bore and drain. Other activities are incorporated into our commitment. Pilots are at the higher end of exploration activity.

- 50. Arrow already has approval to drill 250 LNG production wells. Of these 50 are in PL258 which surrounds Cecil Plains and extends out onto the floodplain. I live in**

PL258 and around 90% of my neighbours are unaware of their current CSG status. If you are looking to establish a win-win relationship with the community, you need to start educating people by sending out information even if you don't have to.

We have our decision point in 2013, provided that we get all our approvals. Only after that will we drill for gas. While we do have dots on the map for potential future wells, until the final investment decision (FID) nothing will happen.

That authority you are talking about is the Dalby Expansion Project Environmental Authority which we applied for in late 2009. At that time we were doing a different project called Fisherman's landing, a project that Arrow as an independent company was proposing to do. The number of wells and project facilities applied for were consistent with the requirements and timelines for that project. What happened was that the EA got tied up in the approvals process; it was granted in December 2010 and came to us in March 2011. But it was based on the work activities we intended to do for a completely different project. If we had gone ahead with that project, if our plans had stayed the same, our land agents would have had those conversations with all the landholders in that area by now.

- 51. My suggestion to you is in regard to your website which shows where the pipelines were to be. Now you're saying that they are not going to be coming onto the black soil. It would be helpful to be shown the whole pictures (or take it all off) because we plan generationally. Currently I can see a well site planned 200m from my house and this does not give me any confidence for my future.**

We wish we understood what it would look like, that would make it a lot easier for us. Until we've done exploration and appraisal we can't know what the development will look like. We've been putting those maps out to try to assist with the picture but it probably won't look like the maps we have here.

Comment - We plan generationally, but we're going to lose a generation because who will want to take these farms on? There is a stigma attached once you come on our farms.

Comment - If you had gone ahead with that other project you said you would have been talking to landholders. However, you would have been talking to them at a point when they would have had no say in that Environmental Authority. You need to notify the community when you are submitting your applications for an Environmental Authority. If you don't give everyone the opportunity to comment, you're not involving them.

- 52. The Surat Gas Project extends from Wandoan down to Goondiwindi. There are many different soil types within that area. Will you develop a standard operating procedure for every different soil type in your operating area?**

Yes, we will probably end up with standard operating procedures for each activity and each land use and soil type, because we will be doing things in different ways for different areas. We have developed a standard operating procedure for drilling and exploration on black soil through consultation with the Arrow Intensively Farmed Land Committee and the Arrow Surat Community Reference Group (CRG). Rehabilitation is included in that.

- 53. How do you establish a standard operating procedure? Do you conduct trials or experiments? Where will trials be conducted... on Arrow land?**

For most of the things we do, there is a range of different ways and methods we can employ. To drill on black soil, we drafted the basic procedure, identified what the impacts were, and took it to the community reference group which assessed it, identified other impacts and rated them. Arrow then identified potential mitigation strategies and developed the necessary procedure; the next step is a field trial. We haven't done the first hole yet; we've identified the rig and the crew for the rig, as it's important to use the same rig and crew. We will then do it on some less sensitive land types, practise the procedures and then move to the test case. Rehabilitation is part of that procedure, so we will have to rehabilitate the well. Generally when we're doing something new, it's on Arrow land first then we move to landholders with less sensitive land and one has volunteered to trial this.

54. What is JTA's role here? Where does the information from our questions and answers go? We received notes from the last time, and I felt that some of the questions and answers were changed.

Leanne and Victoria from JTA are taking written notes of the proceedings; they will not be verbatim notes but are definitely not sanitised. The notes will be edited by JTA though to remove the ums and ahs and make them more readable. JTA's role here is to assure attendees that their questions haven't just been heard by Arrow, but the wider community will also hear them through our summaries of the session. Arrow brings us in as a third party to organise the consultation and prepare the EIS consultation report. After these sessions JTA and Arrow sit down together and discuss what could have been done better. JTA's job in terms of the summaries is to help Arrow pass on the information and to make sure it's understandable even to those who are not in attendance today.

55. Question directed to Arrow CEO, Andrew Faulkner – what's your personal view of accountability given that we have seen CEOs from the global financial crisis to the Deep Horizon incident walk away from disaster? People want to see accountability for CEOs of large corporations.

Where I come from accountability comes from the top and stays at the top. So at an event like today the experts are speaking with my voice. I am aware of what they are saying, and they have my support. I have every expectation personally to be here for some years and I know the parent companies plan to be here for many years to come. Both parent companies are global entities with very high standards and business principles which they expect their staff to uphold. I hope you can have confidence in Arrow Energy because of the robustness of the parent companies and through hearing and seeing the quality of Arrow's staff.

56. In light of BP and the Deep Horizon disaster, and the fact that CEOs of failed US financial institutions walked away from their companies (after they fell over, despite US Government prop-ups), with multi-million dollar packages isn't it reasonable that there is scepticism when someone like you says you and your overseas parent companies are in it for the long term? There is a long sad history of a lack of accountability on the part of large corporations.

I do see that it would be easy to draw conclusions like that. The GFC provided examples that I understand people can find intensely frustrating but I think it might be too broad an assumption to tar everyone with the same brush. I would put emphasis on, and take comfort from, the fact that Arrow's parent companies are two of the biggest companies in the world, and have been around for many years. They are not fly by night companies who looking for a quick buck.

In regards to foreign ownership, Shell Australia has been investing in Australia for 130 years and will be investing five to seven billion dollars in the next couple of years. Projects like this require huge investments. I heard the comment earlier that with foreign ownership the profits go out of the country. The point I would like to make is that companies like Shell and PetroChina are investing in a greenfield project i.e. right at the start. They will be spending in the order of tens of billions of dollars in Australia long term so we all benefit from that. It's therefore not entirely correct to say everything goes overseas.

57. That leads on to an interesting point. If you've invested so much money in this project when you have to look at the cost versus the risk won't that provide a greater incentive to accept a much higher level of risk? Without a high level of accountability the temptation to accept higher levels of risk may play a big part.

I would have to look at that the other way. If you have two companies who have publicly invested \$5 billion in buying Arrow Energy you don't invest that much money and easily walk away from it. In the years after that, the period we're in now, we spend in the order of \$700 million a year. Increasingly the two companies are building up their commitment. That's not something that you risk or walk away from. It just demonstrates an increasing commitment to Australia and to the project. In terms of accountability and responsibility, why would they want to walk away from that?

58. Did PetroChina exist before 1948?

PetroChina has been in existence for over 100 years. It has long existing indigenous gas resources in the north and north east of China, and employs more than 1.6 million people. If I think of how Arrow has morphed, in terms of accountability, responsibility and robustness, it is now in a much stronger position.

59. In terms of accountability, you are clearly aware of the legalities regarding how corporations can be prosecuted. By definition it means there is a lack of accountability at a personal level.

If Arrow does something illegal, along with the penalties on it, I could go to jail. The Board, as directors of Arrow Energy, have absolute legal responsibility. They too can be prosecuted as can our parent companies. They are global companies with global reputations. Arrow is also building its reputation; it is a Queensland company with a large domestic business. Reputation and responsibility are important to us.

60. At the last meeting in November I asked if you could provide a list of the twelve drilling fluids. Could you also provide water quality data from your reverse osmosis (RO) water and the chemical analysis of RO water?

The list of drilling fluids is available in a fact sheet and all fact sheets are available on the Arrow Energy website. One of the issues is that Arrow is not actually producing that much water. It has been sitting in a dam for quite some time because we're not currently allowed to do anything with that water. We can provide historical data.

61. In the Environmental Management Plan for the Dalby Expansion Project it states that several activities to be undertaken by Arrow are 'of concern' including the loss of the agricultural land, water impacts etc. What does this mean?

The Environmental Management Plan and the Environmental Authority for the Dalby Expansion Project are currently before the courts. That is something we cannot comment on.

Dalby Technical Water Session

Date:	26 May 2011	
Venue:	Dalby Showground Pavilion	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Dr Lloyd Townley, Director	NTEC Environmental Technology
	Carolyn Collins, Environment Manager	Arrow Energy

1. You say there will be a drawdown of one to four metres by 2065, what volume of water does that amount to?

We received the first results of our modelling program only last week so we need to work through that information before we know anything definite.

2. In regard to the cumulative effect, how many gigalitres will that be? What are the volumes of chemicals used that could potentially get into the GAB? It is not just the quantity, but the quality of water that is important.

We have committed not to do any fracking in the Surat Gas Project area. In other areas where we have fracked i.e. the Bowen Basin, the chemicals used are very benign (e.g. chlorine and vinegar). We don't have to extract very much water but as we do extract water it reduces the chance of contamination.

In the context of the ideal section, in a natural system recharge will occur in the high land and then flow down into the confined aquifer. Pore spaces are full of water in the saturated zone; in the coal layer gas is squeezed into the spaces between the water and the coal. By reducing the head as part of operations, the tendency of the chemicals is to move upwards with the extraction, not out into the water systems.

3. Question to Lloyd Townley. Can you put your hand on your heart and say contamination won't happen?

I am an independent reviewer of Arrow's modelling program. At this stage I do not have enough information to promise anything.

4. What will be the volumes of produced salt going to landfill?

At this point we don't have a full field development and production profile so we don't have a definitive answer. The water has roughly one sixth of the concentration of salt in seawater. At this point we have not identified a landfill to use; we will be looking at many options for how to manage the salt. We will be talking to the other CSG companies regarding salt management as the volume we alone produce will not be sufficient to enter into a commercial contract for supply of salt for a beneficial use, such as commercial or industrial options.

5. Do you have an estimate of the percentage of water extracted from each well?

That will vary across the landscape from well to well. It is too early to give that sort of quantification. The asset team will be able to give more of an idea of current quantities later today.

Dalby Community Information Session

Date:	26 May 2011	
Venue:	Dalby Showground Pavilion	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy

- 1. With regard to exploration wells and monitoring bores and your compensation structure why is it that you go to one landholder and, when he refuses, you offer the neighbour double. How can you explain that, please? This happened recently, within the last fortnight.**

Arrow has been exploring in the area since 2000 and this may have been the case but not now. There will always be differences in compensation because the amount agreed will depend on the land use and Arrow's proposed activities amongst other things. Arrow is trying to put in place a system that is transparent for all landholders.

- 2. I was under the impression that as part of the initial exploration an assessment is done. My property is only two or three kilometres from the other one...**

Compensation is linked to how many wells as well as other factors. It is not open ended.

- 3. Can an agreement include a condition that there is a maximum number of wells?**

Arrow is required to enter into an access and compensation agreement with the landholder. Once the agreement is in place, notice of entry is required. We have got to get the access process in place first before we come.

If we are going to conduct activities that have impact, we need to enter into an agreement with the landholder. These activities might include drilling, cultural heritage assessment, ecology clearances, and ground truthing⁴. These all have to be arranged through land access agreements.

As part of the preliminaries, land agents will sit down with landholders and discuss possible activities. If we want to do an exploration well there will be a discussion on its potential site; if the proposed site is unsuitable to the landholder then there will be a discussion re a more acceptable site and access arrangements. Once these are agreed, a discussion on compensation will occur until an agreement is reached and executed.

In regards to your specific question on the number of wells, if Arrow specifies ten wells in the agreement then that's it. If we wanted to do another ten, we'd have to come back to you and go through the whole process again. Just remember we are doing exploration wells at the moment and the wells are spaced at considerable distances apart. Since properties in this area are relatively small (unlike the Bowen Basin) the number of wells per property should be relatively small. Where properties are much larger e.g. the Bowen Basin some landholders can have up to thirty wells on their properties.

⁴ Ground truthing activities provide confirmation of what is on the ground e.g. ecology assessment, survey, cultural heritage assessment etc.

4. What rent do you pay? What if your activities stop?

Compensation consists of a few things including rent and land disturbance. Part of the process is to understand how the land is used and what it is worth.

Loss of productivity is factored in, as well as your time and the cost of professional fees for any advice you might decide to access. Because of all these factors, compensation can be significantly different between properties. Also, if the agreement covers a number of years and we elect to pull out earlier we continue to pay compensation for the agreed period.

5. Do production wells have a built in time limit?

They can produce for ten to twenty years. Once finished, we come in and plug the well and remove any equipment. Arrow has obligations under its environmental authorities to return any site to substantially the same condition it was in before it started.

6. Does the initial agreement last four years?

The initial agreement will last the length of the petroleum tenure which could be thirty years.

7. Do you know of any approval to come onto our flood country?

There are a number of regulatory conditions in relation to where we site things; we take into consideration flood plains and overland water flows. They can be quite different, for example wells are quite resilient to flooding but facilities such as dams have very specific rules in terms of where they are sited.

8. If there is agreement on ten wells and the gas price doubles and you find you want another ten wells, you have the law of the land on your side to basically force the landholder to an agreement. Is this how it works?

Legally we have some rights. However, we cannot rely on those rights to just do what we want. We want to behave in a way that is fair and reasonable. I understand that some people are concerned about some of the backstop rights that petroleum companies have through the Land Court. There is no point in Arrow beginning a twenty year relationship in an adversarial manner; it has made some mistakes in the past and is working to improve in those areas.

In relation to drilling more wells, Arrow will base the economics of the project on a particular well spacing. Once that is decided we will not come back and drill more wells at smaller spacing as it is not economical to do so.

9. What volume of water would represent one metre of drawdown?

Arrow only received those results last week. There might be a 2.5m impact on the western side but the modelling shows a low of 1.5m and a high possibly of 4m. There is still more work to be done on the modelling and we will have all that data when we return in September/October with the full modelling.

10. This word compensation is really starting to get up my nose. You've got the attitude that your business might add value to mine. Compensation implies that you're compensating me for a loss that I have not yet incurred. If you developed a positive attitude and came up with something like a business plan that adds value

to my enterprise along with yours, we could move forward. Until then we're going to have a civil war.

I appreciate that feedback and have received it previously. I'm told just the word itself can upset people because they don't believe it should be a 'nil sum game'. The next step will involve landholder groups advising us on these matters, feeding back to us what value-adding looks like from a landholder's perspective. I understand that we have to get that feedback to get the relationship right.

- 11. I don't think you really understand the disruption that happens on our land before you get to the exploration stage. My son was to buy out my land and we should be well on our way to negotiating this happening. But we now have this grey cloud over us and he doesn't want to be involved as he is just jack of this whole process. And that's before you even put a well on my property. I'm just wondering if you understand.**

I'm not in your situation so I can't say I know exactly how you feel. But I do understand that there may be uncertainty in your future.

Comment - You talk about compensation. I had one conversation and then you went. In one day we had 27 vehicles go past. You're talking about value-adding; all you're doing is negative.

- 12. I agree with Pat and Lance. I simply don't want you on my place no matter what. I don't want your money; this is my life and livelihood. So when you come and say where you want the wells and everyone says no, are you going to push your way in?**

No, we're going to need agreements to do that. We do understand the concerns and believe good relationships are good business; forcing our way onto your land is not good business. No one wants that, especially Arrow.

From 2000 to now has been a steep learning curve, and we've acknowledged mistakes. What has now changed is that we have taken your feedback on board and are about best practice. You need to let us demonstrate that we can do this in a way that is not disruptive. We have wells in the Bowen Basin which fit in with the activities of graziers up there. We can provide examples to give people confidence and to be willing to engage and compromise with us. We think there is a way forward so please keep your options open.

Comment - I think your parent companies have made a mistake. They looked at the map, did their surveys and decided that what was below the ground was more important than what was above the ground. I put it to you that you have made a mistake in choosing this land. This land is the best in the state so it is your problem not ours.

- 13. Tony, would you like a well in your back yard? Other companies have answered no, and they're honest. What about you? Would you like a hole and a rig in your back yard?**

The answer is clearly no but Arrow will not put wells close to where people live. The unfortunate issue for Arrow is that there is a coincidence of geology and geography coming together. There is a need to supply gas and energy. We have to find a way to get

it out of the ground. If we believed it could cause a major environmental impact or risk the future livelihood of families we wouldn't do it.

Comment - We have no rights, what do we pay rates for?

- 14. Arrow energy does have wells within 200m of houses. You've been on my father-in-law's property for two years and we're still waiting for the mess to be cleaned up. How much longer do you need to make it right? We've been having this conversation for twelve months.**

We want to work it out and have that conversation with you. We need to sort out access arrangements and have that discussion with your father-in-law.

- 15. Does Arrow have any specific intention or policy in relation to strategic cropping land?**

Arrow has made some commitments about intensively farmed land. There is some overlap with strategic cropping land and Arrow will not do any development in those areas until it has a way to manage the impacts. It's in the process of working with landholders who have those land types.

- 16. In relation to 'make good' notices who or what decides if you have 'made good'? Surely anyone can see from the wells you install that there's no possible way to put the land back the way it was. There will be some cases that you can't make good if you contaminate our aquifers.**

'Make good' has an official meaning regarding water impacts. However, in terms of rehabilitation and land clearing there are specific legislative provisions in our licence to operate as to what is required and these conditions are much tougher than previously. We need to enter into an agreement regarding the type of mitigation measures to be implemented and that agreement will be between Arrow and individual landholders (with an opportunity for government to step in and mediate).

- 17. Obviously 'make good' is a bit of a worry. If my bores were to stop operating because the underground water had somehow been disrupted my land value would go down rapidly. You can say you'll cart water into my property but how is the Great Artesian Basin (GAB) going to re-establish itself with the activity that is going on?**

We talked earlier about the groundwater modelling. Let's assume that model was acceptable then there would be a monitoring program to assess what was happening. You mention the GAB...this map shows just how massive it is; the volumes of water in there are immense. When you look at the volume of water that we will extract it's an incredibly small percentage of that. I've read media reports that the CSG industry will destroy the GAB... it is so dynamic that we couldn't do it even if we wanted to...which clearly no one wants. What we're trying to explain is that some of the media comments are based on sensationalism. Our modelling predictions come nowhere near the scales bandied about in the media.

- 18. It's an impossible scenario as the water is not reusable.**

All that has been shown so far is an indication of the scale. The plan is to return in September or October with the completed model and independent experts to explain what is good and what is not.

Millmerran Community Information Session

Date:	27 May 2011	
Venue:	Millmerran Community & Cultural Centre	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice-President Exploration	Arrow Energy
	Darren Stevenson, Asset General Manager South	Arrow Energy
	Carolyn Collins, Environment Manager	Arrow Energy

1. In relation to the information provided re the predicted loss of one to four metres in the Condamine Alluvium (CA) and Walloon Coal Measures (WCM) by 2065 why would there be that loss?

The modelling that has been done provides a prediction only and assumes that Arrow Energy would do nothing to mitigate the potential loss (which of course is not the case). In relation to connectivity, as soon as you hit the water table the sand is saturated with water as the pressure head is higher than the WCM. There will be movement between the CA and the WCM.

Coarse sandstone with artesian head will have different pressure and there will be a small amount of leakage between the layers caused by lateral movement.

2. So you are saying you've got to suck the water out to remove the gas? What will happen to the existing bores?

Yes, we have to remove water to reduce pressure; this means the level will drop in the Walloon Coal Measures. Now that we have the initial modelling results we need to go back into the model and work out the volume of water represented in the level drop. Arrow will explore substitution of allocations to see how it can prevent that drop. Once we know the total volume of water that will be removed we can look at mitigation options.

3. Does that mean you don't have a plan now?

Arrow has 'make good' obligations in perpetuity in regard to water. We will have intensive monitoring programs, particularly in regard to interconnectivity, and will make sure that you have a water supply of the same quality. The monitoring program is a very early warning system; if there is something that we haven't understood, we have to work to make sure that we do. Arrow is committed to making sure it does not have a negative impact.

4. Irrigators are allocated a certain amount of water. Are you restricted in the amount you can use? And if your company goes under, who will compensate us?

The short answer is that Arrow does not have an allocation. However, there are other legislative requirements plus different obligations in regard to groundwater...and government requirements will increase. That said, Arrow is in the gas business and the less water we take the better. We don't want to take any water if we can help it as it means we have to find ways to store and treat it...and that costs a lot of money. One of Arrow's key business drivers is to reduce the water/gas ratio and of course the company recognises it's an important resource to landholders and others. Over the last couple of years Arrow has halved its ratio of water to gas compared with some years ago. The company is only young and is looking at innovative solutions; its objective is to end up in the same net groundwater position in this area.

In relation to the second part of your question about the financial security of Arrow Energy, its joint owners Shell and PetroChina are very large, financially conservative organisations which have been in existence for a very long time and continue to be there financially for Arrow Energy. You all know the Shell organisation; PetroChina is one of the world's largest commercial entities with 1.6 million employees. Both are going to be around for a very long time. However, regardless of who owns Arrow Energy its legislative obligations continue in perpetuity even after its tenures are finished.

There are two aspects to the water solution. Modelling tells us what is happening; this will be checked over time with a continuous monitoring program to ensure things are happening as predicted. If there is a negative impact it then gives us time to respond appropriately.

5. The resources sector requires skilled staff. Is Arrow Energy prepared to consider upskilling of farmers?

Arrow already does this. The company has a deliberate policy of hiring locally in Dalby and there are obvious benefits if we can get that right. We have a strong relationship with the high schools in Dalby for Years 10-12 as well as with TAFE. The latter provides entry level skills to new recruits coming in from other industries.

6. Who do you class as locals? Four people have just moved into my street and are already working at Arrow. The local power station considers someone who has only moved into town a week ago to be local?

We certainly aren't trying to do anything dodgy in this regard. Some people may move to town after getting a job with Arrow; it doesn't mean that we don't try to hire long-term locals where we can. In Dalby 75% of staff live locally; some of those may have elected to come from elsewhere and become part of the local community but others are long-term local residents or have been living on properties in the district. Usually drillers, geologists and other specialists move with their rigs constantly.

7. Can we get a copy of the presentation?

I understand it's going onto the website; if you have difficulty accessing that we can post a hardcopy to you.

8. I have a bore on the Condamine Alluvium. If I lose ten metres of water and my bore runs dry, what is going to happen?

There is a legislative requirement that Arrow Energy must abide by the *Underground Water Impact Report* which identifies who will be affected in the next three years.

What we showed you earlier re the modelling was an indicative water profile only. That is not the end point. When we have all the results from the model a lot more information will be provided.

9. When will that be available?

The current plan is to come back with the additional information in September/October.

One issue that keeps coming up is the Great Artesian Basin (GAB). It is a massive water storage reservoir as this map shows. Some sections of the media say that the CSG industry will destroy it and yet the whole CSG area represents an incredibly small part of the Basin.

We are absolutely aware that we have to look after the aquifers and important layers containing water.

The modelling framework looks at what the available drawdown is and will come back with the data to better estimate what the effects will be. We can compare the predicted impacts with the actual impacts.

10. Where we are situated is sub-artesian isn't it, we're not a part of the GAB?

The Surat Basin is in fact part of the GAB. The coal seams here form part of the GAB although you are not that far from its boundary.

11. Just going back to water, will you use in one day what irrigators on the Darling Downs use over a year?

That is not factually correct. The amount of water we will take is substantially less than the current irrigation allocations and demand. We also believe that it is why substitution of allocations will work, there is demand for it and substitution would mean that we can get as close to a net zero groundwater position as possible.

What Arrow is trying to get across is the resilience of the system, not that its activities will not have an impact. Most of you are aware that as soon as the free flowing bores were capped some years ago by landholders and government, the sub-artesian bores began flowing again.

Goondiwindi Community Information Session

Date:	28 May 2011	
Venue:	Goondiwindi-Waggamba Community Cultural Centre	
Facilitator:	Jan Taylor, Principal	JTA Australia
Presenters:	Tony Knight, Vice President Exploration	Arrow Energy
	St John Herbert, Groundwater Modelling Coordinator	Arrow Energy
Other speakers:	Tobias Burwood, Production Superintendent, Dalby	Arrow Energy

1. What is the tenure on your wells?

The life of the wells is usually ten to twenty years. There will be upfront payments and then ongoing annual payments. The access agreements will stipulate the relationship and the lease as such. Production wells, which have a ten to twenty year life, can only be drilled under the authority of a Petroleum Lease, which in itself has a life of thirty years.

2. Do you own the land?

No it is private property so we need to negotiate agreements with each landholder whose land we would like to use.

3. With regard to bore pressure will there be ongoing assessment?

Arrow collects data on water quality, pressure etc. initially so it can track changes over time. All agreements must include 'make good' information so if there is any change to pressure, quality, and capacity the initial data is already known. A groundwater monitoring program will be ongoing for the life of the project. Some bores will have constant monitors installed; some require regular visits, perhaps on a quarterly basis

4. Shouldn't landowners do their own monitoring so it's independent?

There's nothing to stop landholders from doing so but Arrow is legally required to do ongoing monitoring. The minimum requirement for baseline assessments is within two kilometres of any activity. Landholders will be involved throughout the process and Arrow is required to feed back all information to them.

5. Would you consider deepening bores for landholders? Blue Energy had different sized casing which wasn't consistent with our casing.

If your bores are affected our 'make good' provisions protect you as Arrow is responsible for ensuring adequate water supply. Our practice is not to convert exploration wells to water bores because they are drilled for two different purposes.

6. As a small business owner I'm interested to know if things have improved in Dalby in terms of local business activity.

There has been a huge expansion in Dalby. For example, there are three new motels and an influx of pupils to local schools; local shops and businesses are doing good trade and there is generally more employment and money in town.

Arrow's focus is to train local people and use local suppliers. You can expect massive and quite measurable change should resource development come to your region. Arrow is committed to supporting local businesses wherever it can.

7. Have rents gone up in Dalby?

Yes.

8. I might have a future business development idea for my land. Will you compensate me if I cannot continue with any future development plans? If I plan to subdivide my land and build other houses on it in ten years will you compensate me if I am unable to do that?

We would need to have a discussion about compensation. If there is a plan in place for that to happen we would need to consider it as part of our negotiation.

9. We all know who Shell is but what is CNPC?

CNPC, or PetroChina, is listed on the New York and Chinese stock exchanges but majority ownership is held by the Chinese government. It is one of the biggest companies in the world with over 1.6 million employees and it has been in existence for more than a hundred years. I know there are issues for some people in relation to foreign ownership but these large companies bring the capital needed to develop these projects. Both Shell and PetroChina have that capacity.

10. Will Arrow pay rates to the Goondiwindi Regional Council (GRC)?

Petroleum Leases are rateable so we do pay rates to council. In relation to roads, there is a requirement in the Petroleum Act that when traffic reaches a certain level (10,000 tonnes) Arrow will need to enter into an agreement with council to partner with it. Arrow will do that voluntarily.

11. To the best of my knowledge, council still has not heard from Arrow. GRC found about use of Tenomby road three weeks ago. There should be a duty of care that information is provided to councils early. It is important to council so that it can plan its maintenance program properly.

Arrow has been meeting regularly with the Western Downs and Toowoomba Regional Councils to keep them updated. We will certainly do the same for the GRC and I will follow up on that.

12. The well at Daandine that blew out on Sunday (22 May), what is happening with it? Is it out altogether, is it damaged?

The well is now fine, there is nothing wrong with it and it is still a viable well. The only thing we needed to do was stem the flow of gas, which we did by flooding it with water. It is now totally fine to use as a normal production well.

13. If Arrow discovers sufficient reserves is there a production plan in a two, five or ten year period. There are other companies with potential pipelines; if they want to pipe through your areas, do they liaise with you?

That will depend on the exploration results. We've already done a lot of work across the region and are exploring the southern portion. There is already enough gas there to underpin our operations and to support the project. Assuming that Arrow goes to a final investment decision (FID) the map shows where it will initially work. You can see that the area down in Goondiwindi is very pale and there is probably going to be no development here for another 15-20 years by the latest projections. Once we get more detail that will determine how hard we push into here. It's a process over time.

There are other players who might have acreage here, and if they cross our tenements, they will talk to us, but there will be no formal relationship with them.

14. What's the tenure on Arrow's well heads?

A production well can be 10-20 years. Compensation will be for the life of it, from the day we drill it to the day we plug and abandon it.

Comment: the Mayor has asked me to raise with Arrow Energy the need to keep council informed of any activity in the area. Although you may only be at the exploration stage within the GRC area it is essential that council be advised if there is going to be unusual activity on particular roads. It is pointless for it to spend money on a maintenance program in areas where companies like Arrow Energy will be potentially damaging roads during an exploration program. If council knows beforehand it can defer maintenance work in some areas until after the company has done its work and made any repairs necessary. Limited council dollars can then be put to better use elsewhere.

15. This was raised at Arrow's last community information session in November and the company promised it would liaise with council on future exploration timelines. This has not occurred.

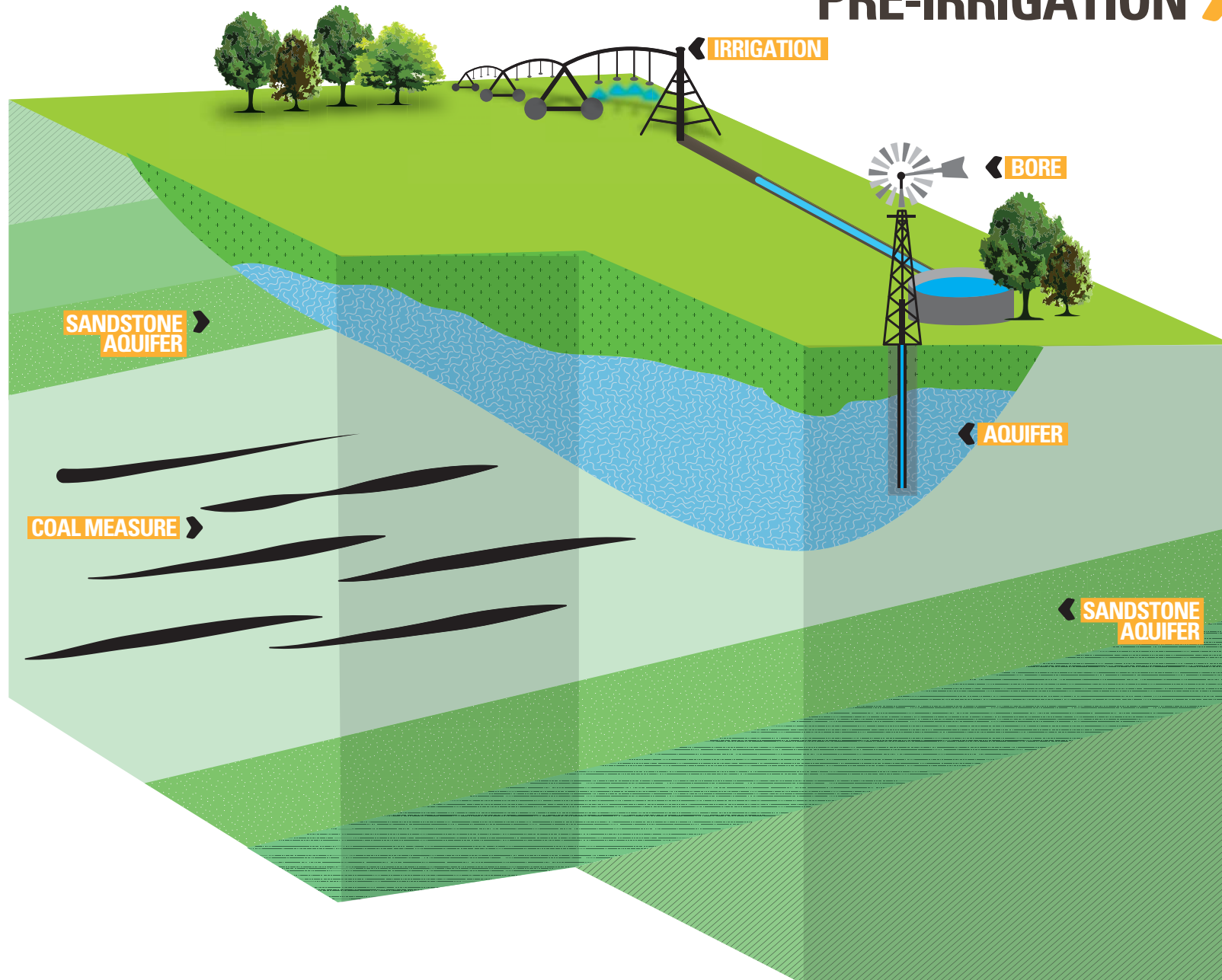
Arrow undertakes to make contact with the Mayor and his council officers in the next month or so to discuss this issue further.

Appendix 35

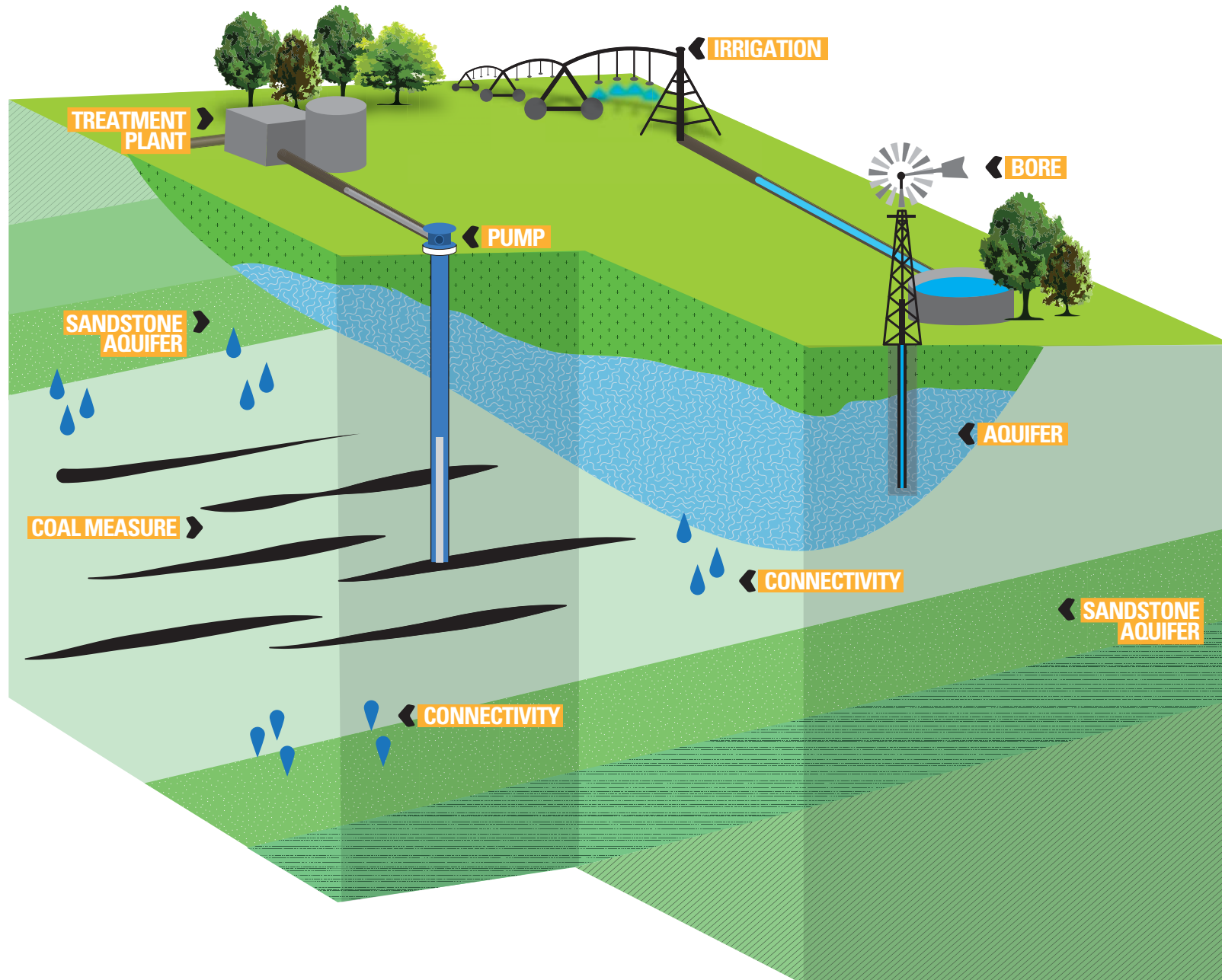
Reinjection and Substitution animation



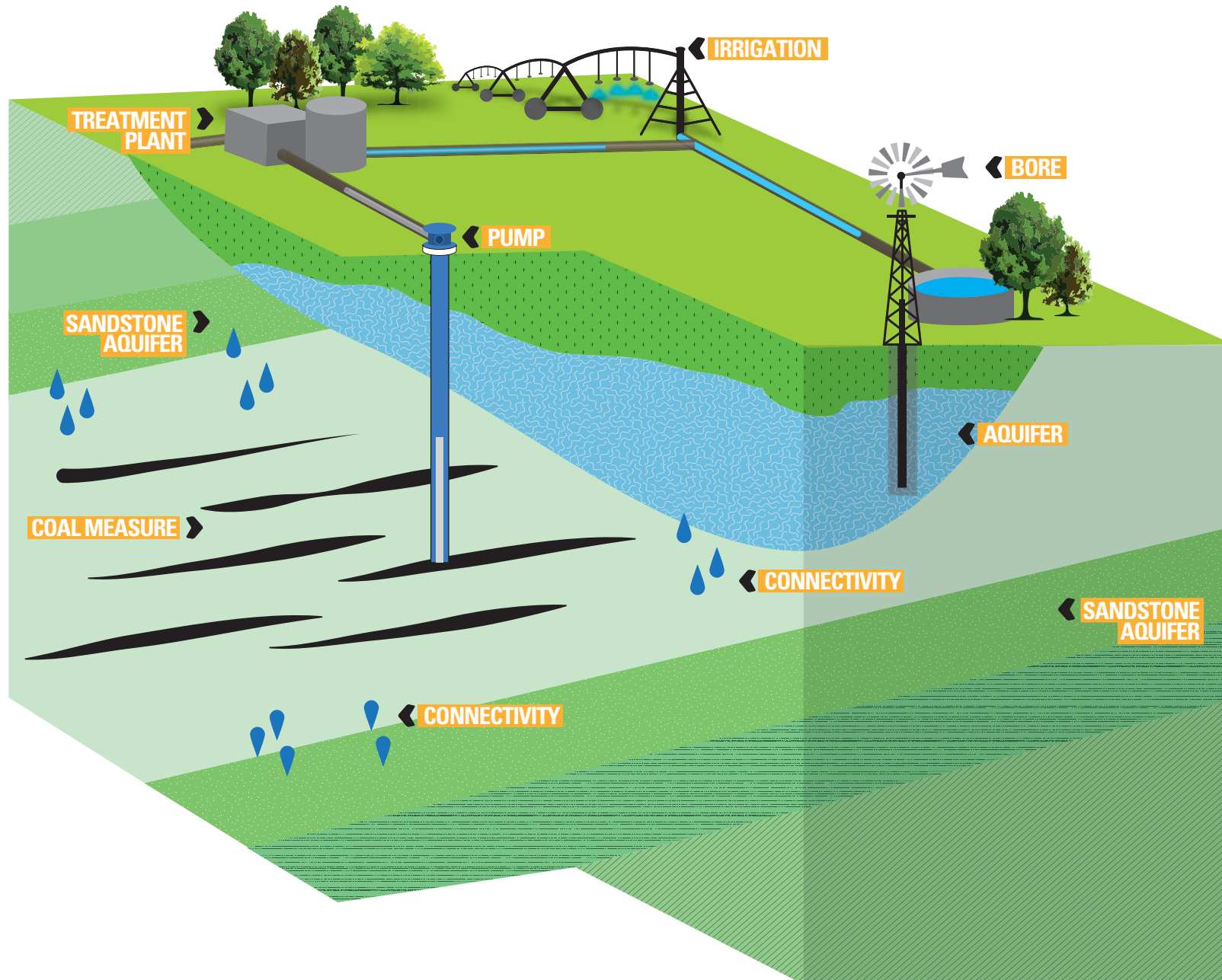
PRE-IRRIGATION >



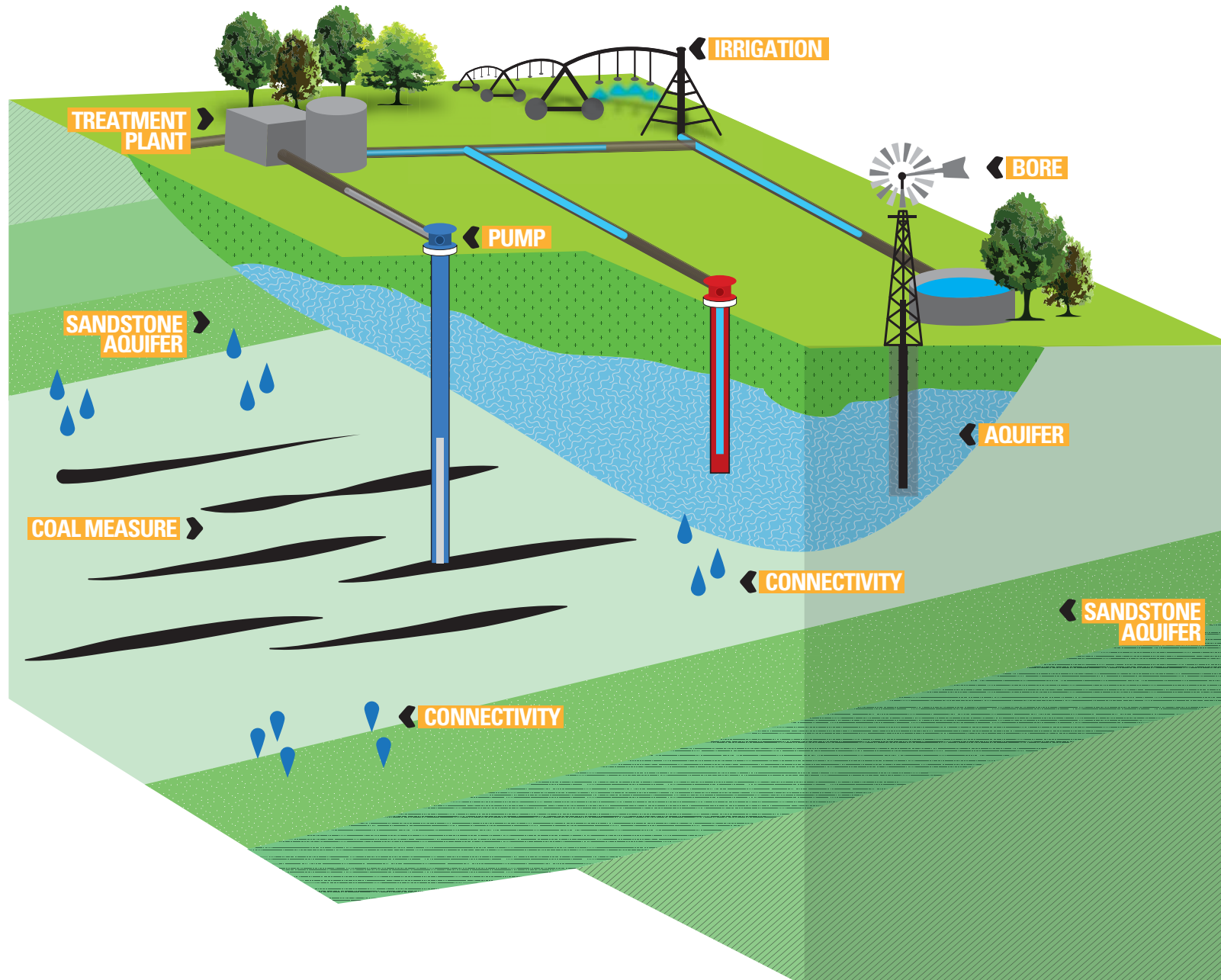
PRODUCTION >



SUBSTITUTION >



INJECTION >

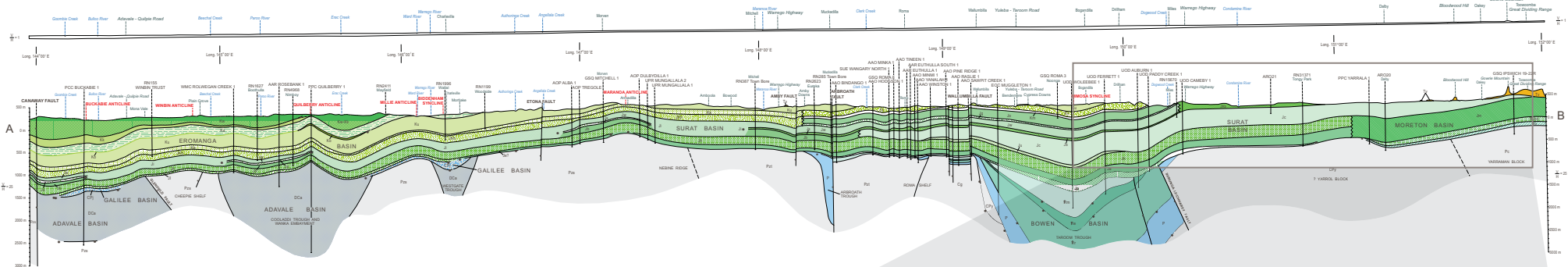


Appendix 36

Geostrata poster



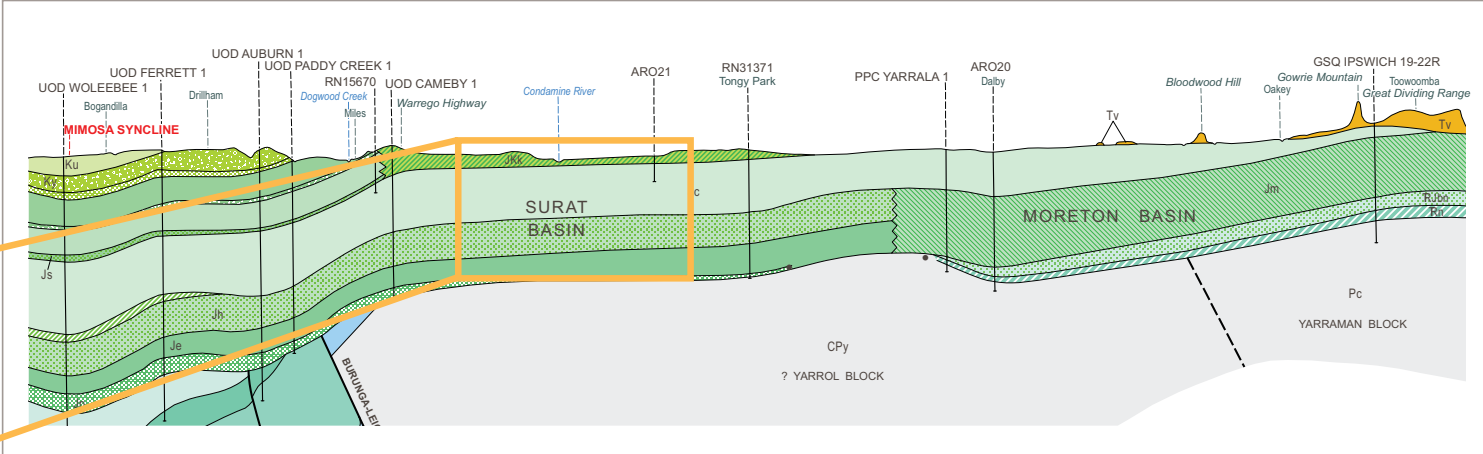
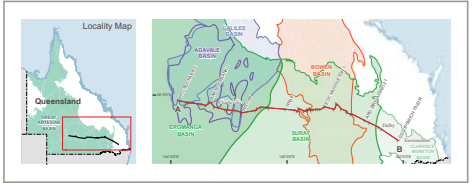
REGIONAL CROSS SECTION THROUGH THE GREAT ARTESIAN BASIN IN SOUTHERN QLD



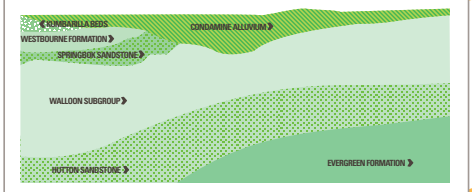
CROSS SECTION KEY

TERTIARY	CRETACEOUS	JURASSIC - JURASSIC	BASEMENT (Map underside)
<ul style="list-style-type: none"> Triassic sandstone Triassic shale Triassic siltstone Triassic mudstone Triassic limestone Triassic dolomite Triassic chert Triassic concretion Triassic fossiliferous sandstone Triassic fossiliferous shale Triassic fossiliferous siltstone Triassic fossiliferous mudstone Triassic fossiliferous limestone Triassic fossiliferous dolomite Triassic fossiliferous chert Triassic fossiliferous concretion 	<ul style="list-style-type: none"> Cretaceous sandstone Cretaceous shale Cretaceous siltstone Cretaceous mudstone Cretaceous limestone Cretaceous dolomite Cretaceous chert Cretaceous concretion Cretaceous fossiliferous sandstone Cretaceous fossiliferous shale Cretaceous fossiliferous siltstone Cretaceous fossiliferous mudstone Cretaceous fossiliferous limestone Cretaceous fossiliferous dolomite Cretaceous fossiliferous chert Cretaceous fossiliferous concretion 	<ul style="list-style-type: none"> Triassic sandstone Triassic shale Triassic siltstone Triassic mudstone Triassic limestone Triassic dolomite Triassic chert Triassic concretion Triassic fossiliferous sandstone Triassic fossiliferous shale Triassic fossiliferous siltstone Triassic fossiliferous mudstone Triassic fossiliferous limestone Triassic fossiliferous dolomite Triassic fossiliferous chert Triassic fossiliferous concretion 	<ul style="list-style-type: none"> CPy NE NS NT NP PP PT PC PD PE PF PG PH PI PJ PK PL PM PN PO PP PT PC PD PE PF PG PH PI PJ PK PL PM PN PO

REGIONAL ZOOM



CONDAMINE ZOOM



Appendix 37

Arrow presentation - Phase 4



Community Information Session Surat Basin

May 2011



INTRODUCTION OF PRESENTERS

- Tony Knight, Vice President, Exploration

- Darren Stevenson, Asset General Manager (South)

- Carolyn Collins, Manager Environment and Water

ARROW ENERGY

WHAT WE WILL COVER TODAY

- Company Overview
 - Domestic Gas Operations
 - Brighter Futures

- Surat Gas Project Update
 - EIS status
 - Exploration & Pilot Wells
 - Pipeline
 - Compensation framework
 - Approach to co-existence on intensively farmed land
 - Groundwater

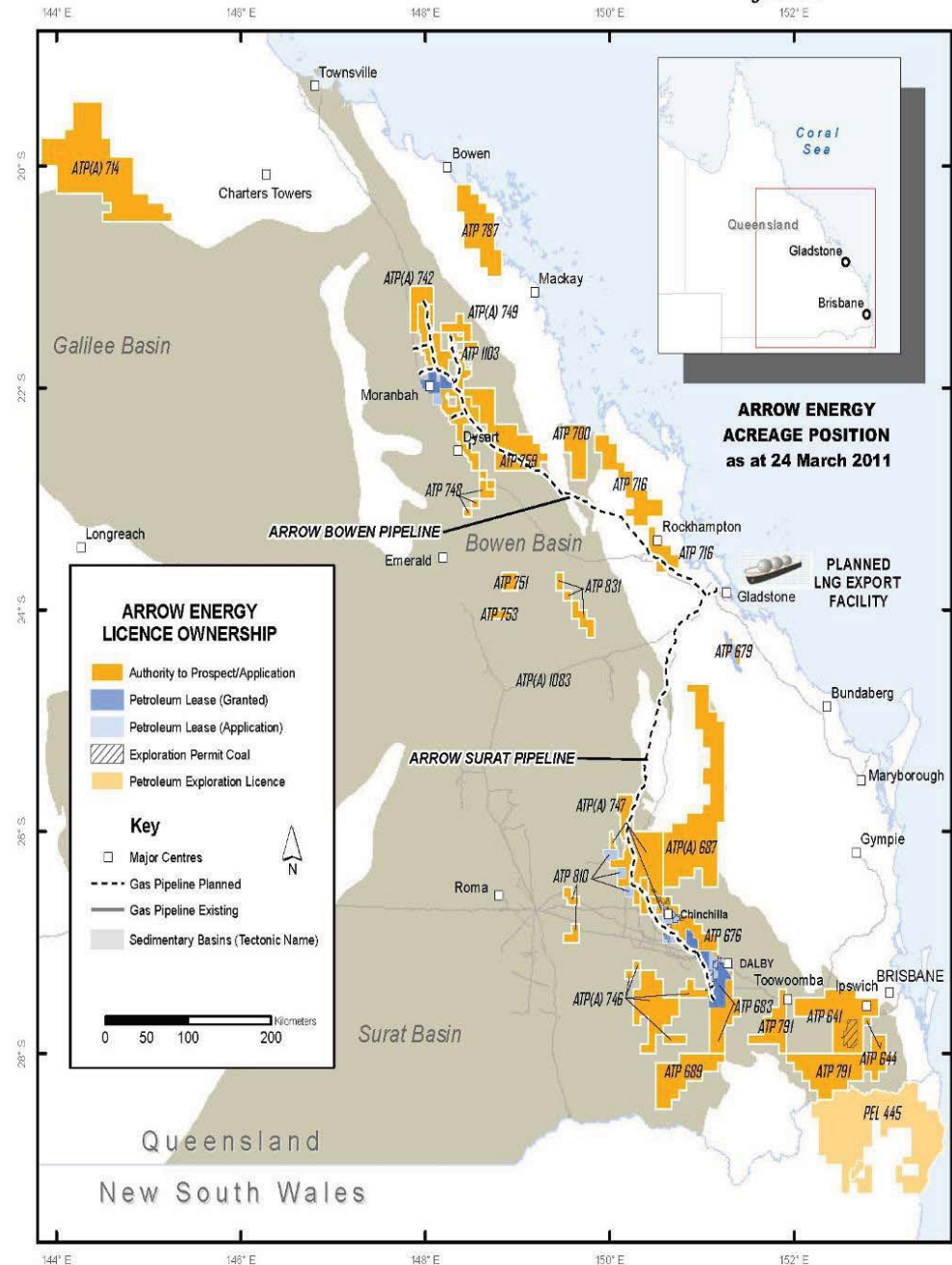
- Your questions

ARROW ENERGY

COMPANY OVERVIEW

- Queensland based company – started in 2000, first gas sales in 2004
- Currently supplies >20% of gas & electricity needs of Queensland
- 50/50 Shell and PetroChina – 2 stable owners committed to safety, environment and long term relationships with stakeholders
- 630 staff in Dalby, Moranbah and Brisbane

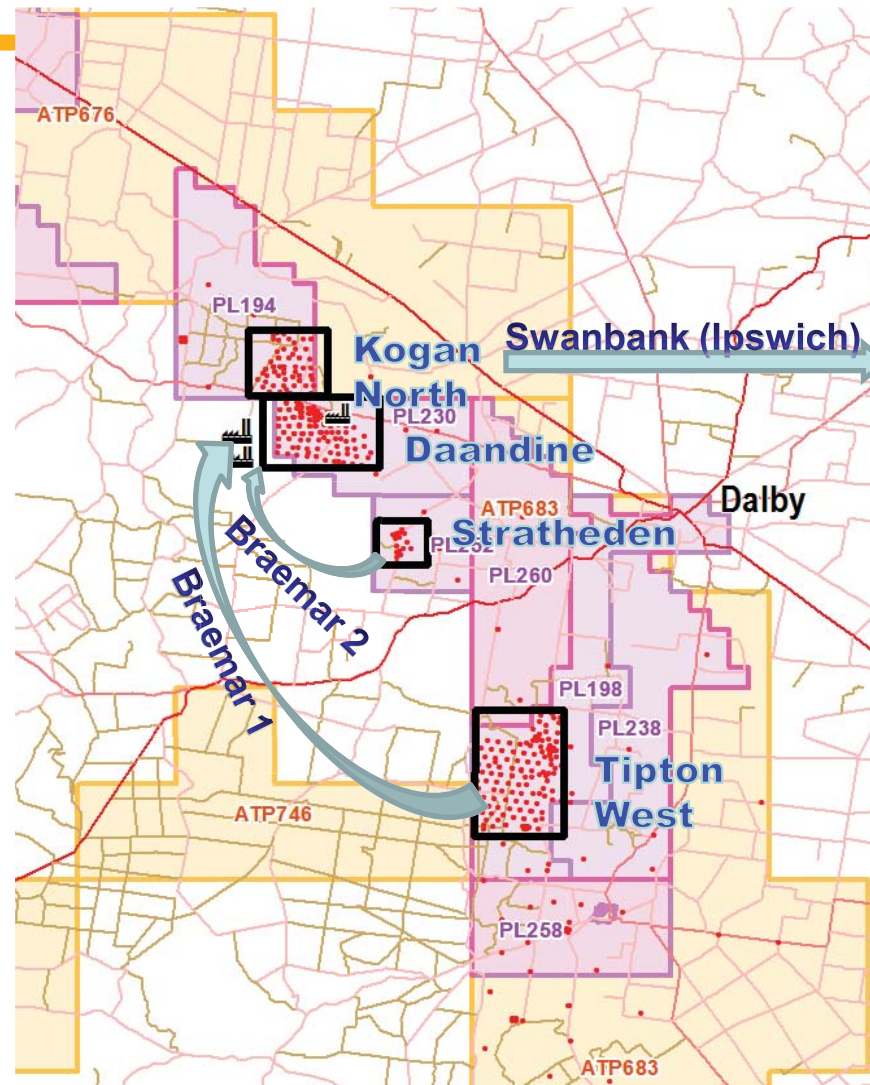
ARROW ENERGY ACREAGE POSITION



ARROW ENERGY

DOMESTIC GAS OPERATIONS

- Arrow's domestic gas and electricity supply business has been in operation since 2005
- Includes
 - Kogan North
 - Daandine
 - Tipton
 - Dalby Expansion Project



ARROW ENERGY

GAS RELEASE INCIDENT

- Resolved Sunday 22 May gas release incident in the Daandine field
- Filled the well with dense drilling fluids
- Capped and secured the well
- Well retains integrity, below and above ground
- Commenced immediate investigation

COMMUNITY PROGRAMS

BRIGHTER FUTURES

- Brighter Futures based on understanding that our operations depend on a social licence to operate
 - Surat Basin Gas Industry Aeromedical Retrieval Service
 - Joint gas industry service to respond to critically injured personnel in remote areas
 - Three community rescues to date
 - Donation and sponsorship assessed by local employee committees



COMMUNITY PROGRAMS

BRIGHTER FUTURES AND REFERENCE GROUPS

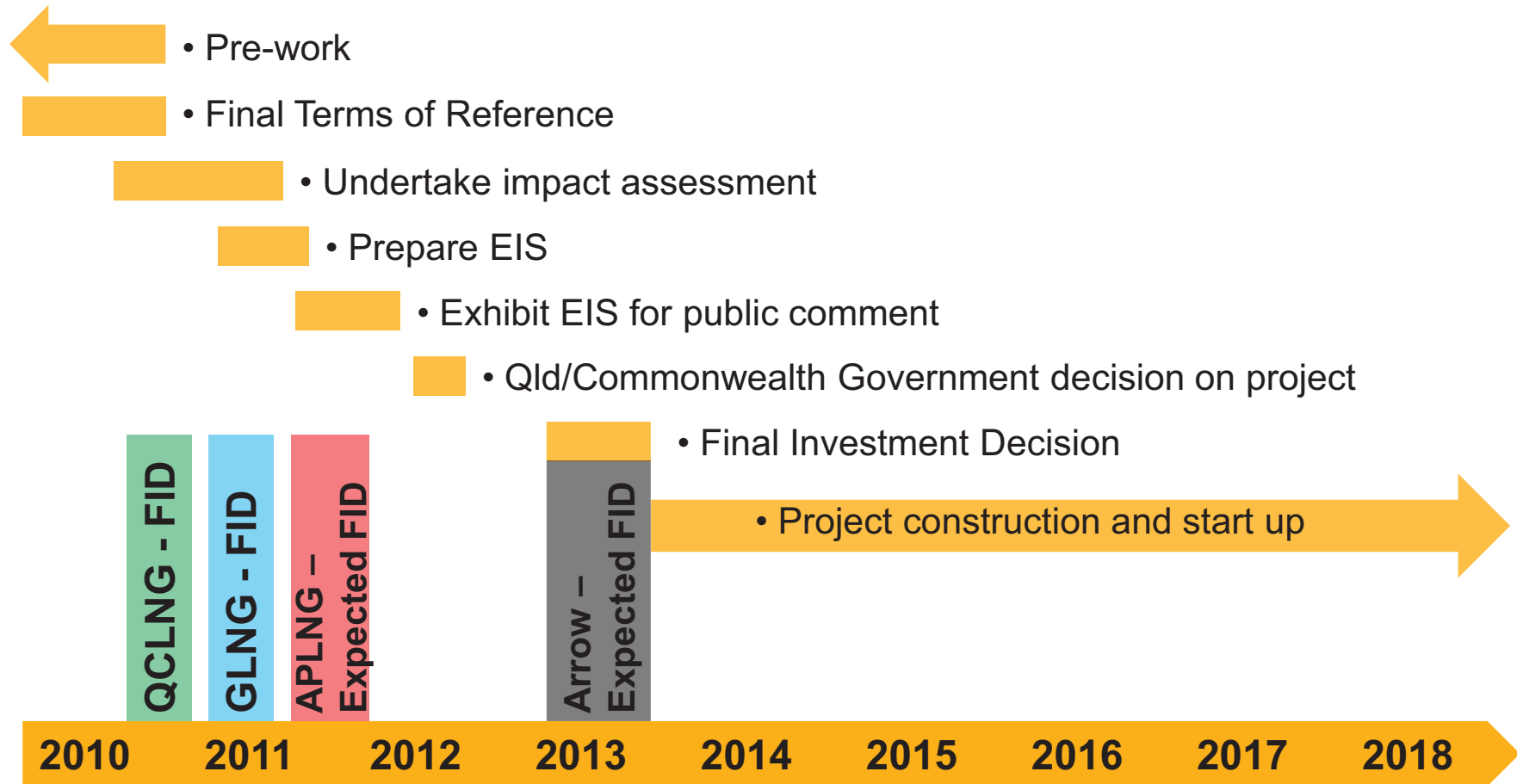
- Six university scholarships
 - 1 x USQ student studying Engineering – offer being made by end May
- Partnership with Dalby State High School
 - 16 students training in Hydrocarbon Processing at Arrow facilities
- Arrangement with Southern Queensland Institute of TAFE
 - 34 Arrow Dalby employees to study Hydrocarbon Processing
- Three indigenous trainees currently working at Arrow in Dalby

- Arrow Surat Community Reference Group
- Arrow Intensively Farmed Land Committee
 - Working to identify improvement opportunities and implement coexistence strategies, eg Work Method statement for drilling exploration core holes

SURAT GAS PROJECT UPDATE

SURAT GAS PROJECT UPDATE

EIS STATUS

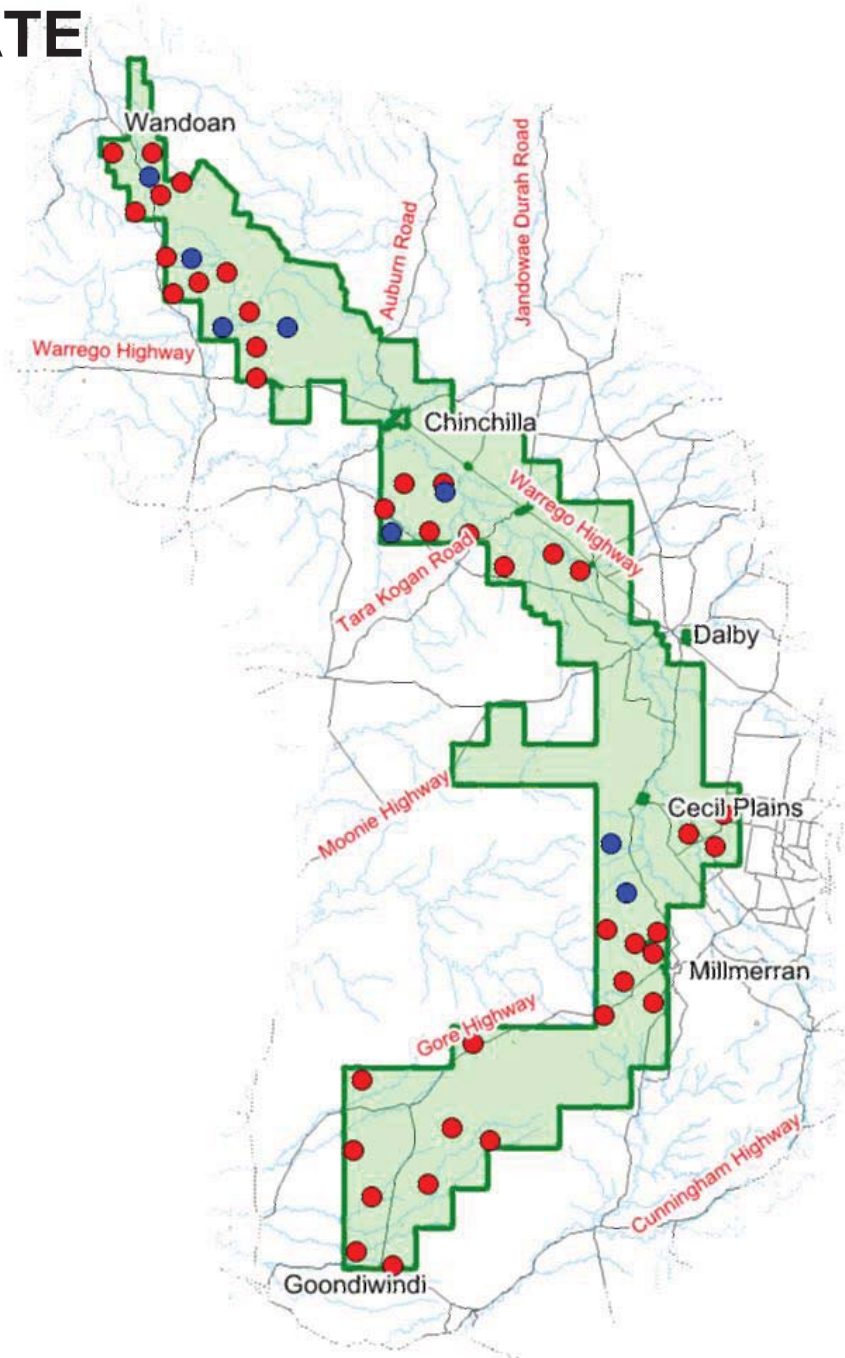


SURAT GAS PROJECT UPDATE

EXPLORATION

- Exploration work is continuing in order to confirm viable gas supply for Arrow LNG Project

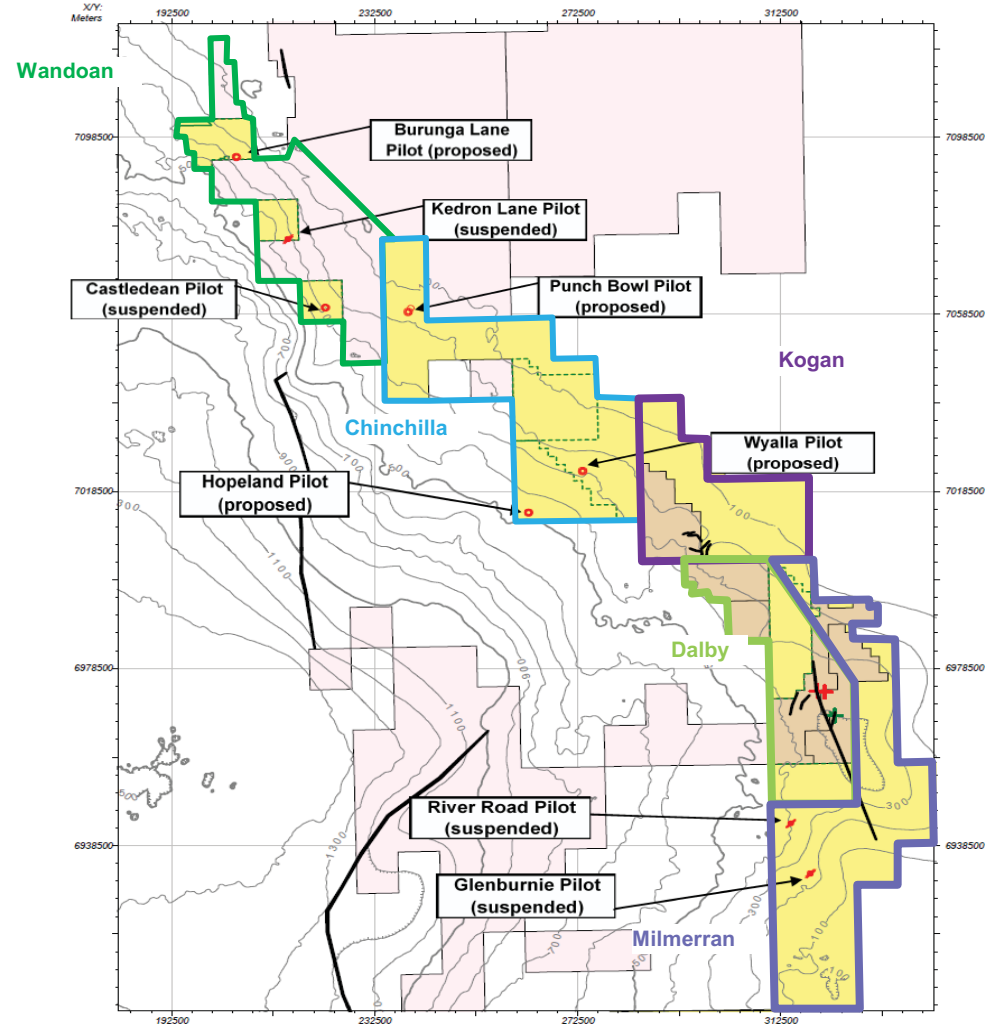
 - Exploration involves identifying:
 1. Presence, depth and extent of coal seams
 2. Whether coals seams contain gas
 - core holes
 3. Whether gas can be produced and brought to the surface
 - pilots
-



SURAT GAS PROJECT

EXPLORATION – CORE ,CHIP AND PILOT WELLS

- Exploration works completed to date in 2011:
 - 9 – Core wells
 - 5 in ATP683
 - 3 in ATP689
 - 1 in ATP810
 - 5 – Pilot wells
 - ATP810 (Burunga Lane pilot)



ARROW ENERGY PTY LTD.

Grid - 40,000m
Taroom contours - (MD) 100m

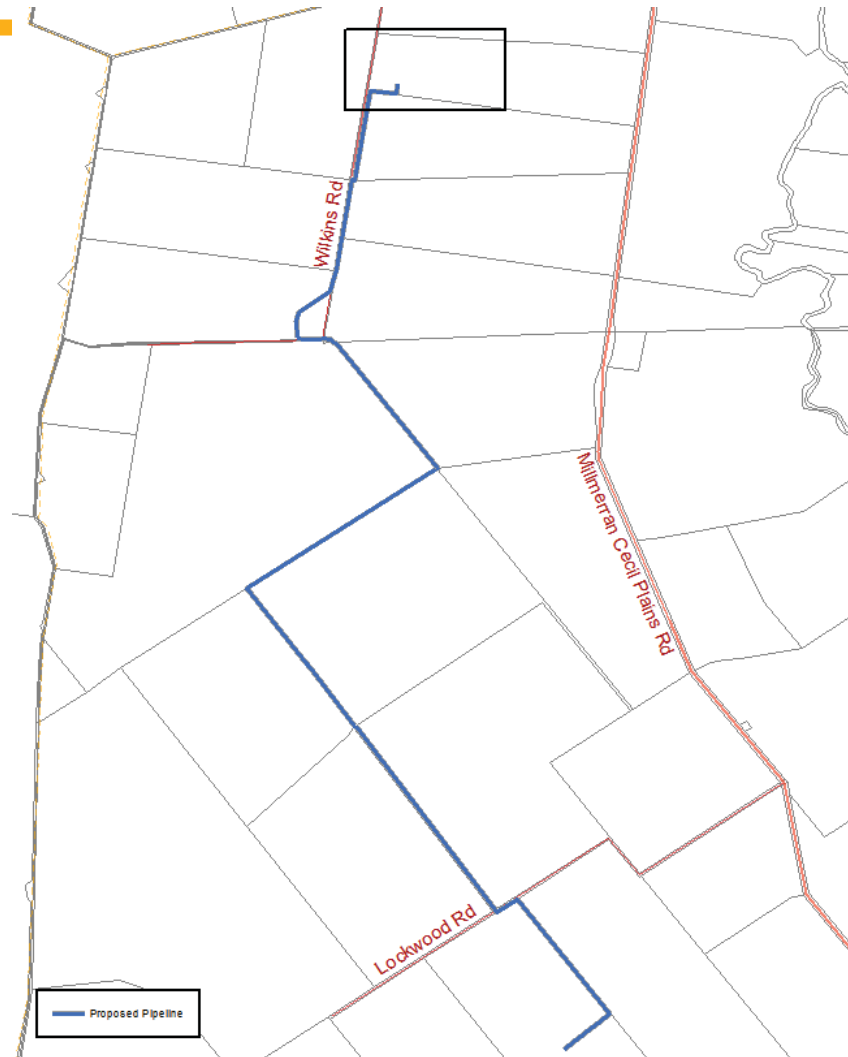
Southern Pilots
Surat Basin

Grid 06_Taroom_MD_02_11 (Halfspan) (DarkGreen), Data Type Depth (Active Contour: 06_Taroom_MD_02_11) (Halfspan) (MediumGrey), Data Type Depth), Version: 7.5

SURAT GAS PROJECT

PILOT TESTING – ATP683

- **River Road and Glenburnie Pilot plan:**
 - Build 400 ML dam at Arrow's Hillview site
 - Negotiating to build pipeline from River Road site to Hillview
 - Build local holding pond at Arrow's Glenburnie site

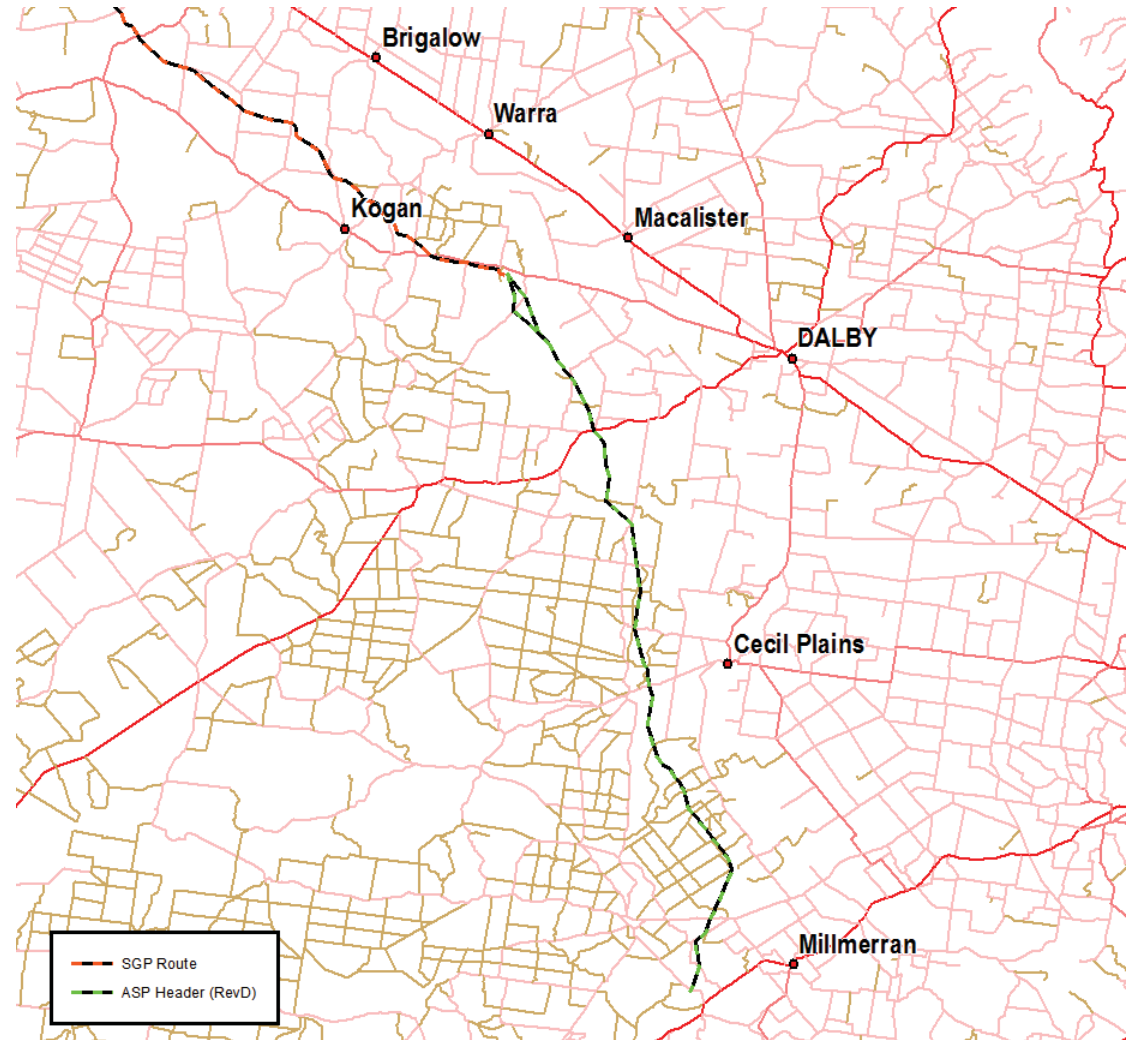


SURAT GAS PROJECT

PIPELINE UPDATE

➤ Arrow Surat Header Pipeline plan:

- Application to DEEDI for construction of 110km pipeline
- Will be subject to separate approval process

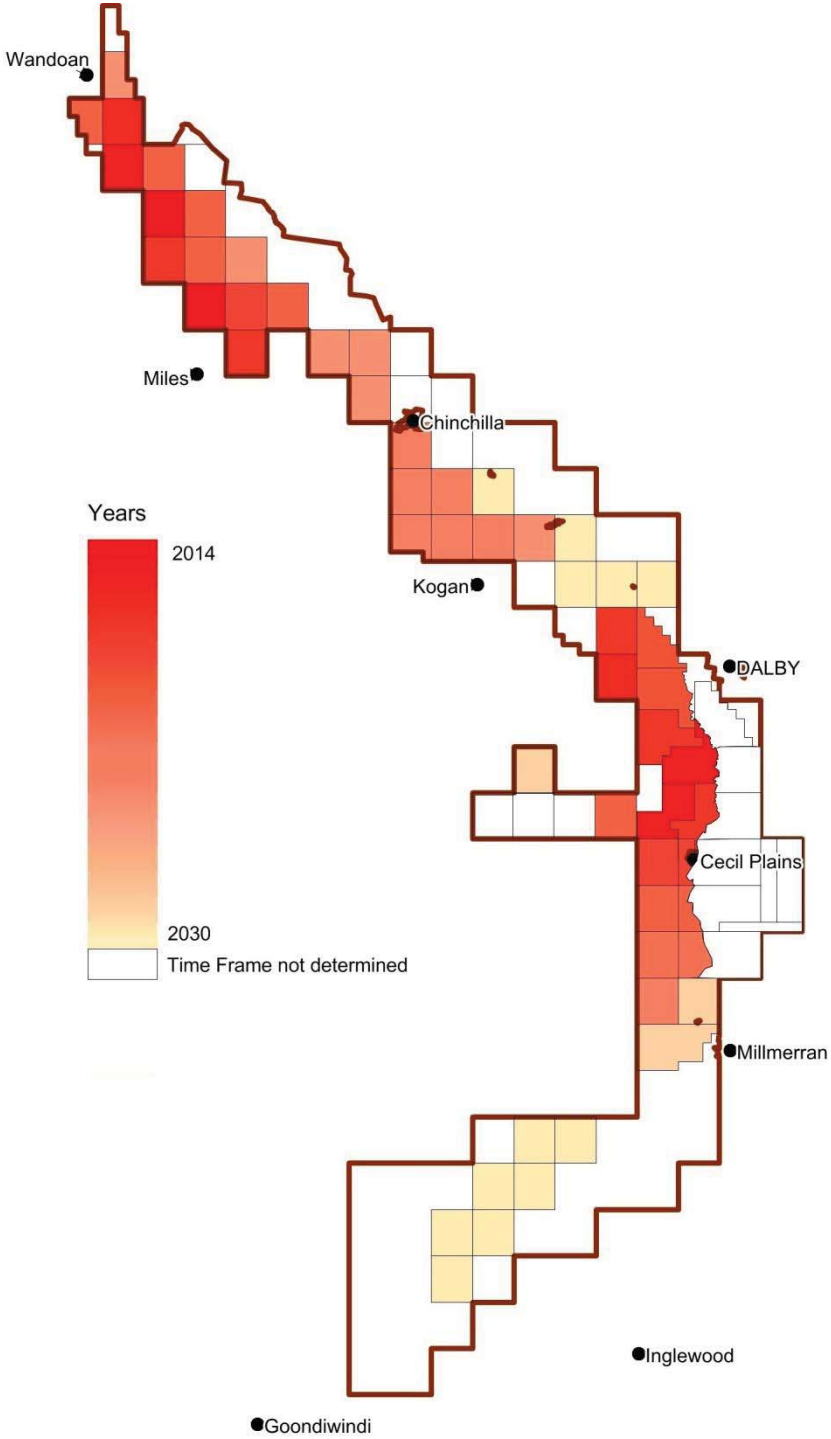


SURAT GAS PROJECT

DEVELOPMENT AREAS AND TIMING

- Target area for development between 2013 and 2023:
 - ~ 2,000 wells

- Production wells:
 - ~ 15 wells in next 12 months



SURAT GAS PROJECT

COMPENSATION

You told us you want:

- Landholders' time considered in the negotiation process
- Different land types to be recognised for compensation
- Independence and transparency for compensation

We have ensured:

- **Landholder time component is included**
- **Five different categories of land type used to calculate compensation**
- **Independent third party valuations form basis of compensation calculation**

COMPENSATION

NEW FRAMEWORK FOR EXPLORATION ACTIVITIES

- Developed and implemented new compensation framework for exploration activities

- New compensation framework for production activities under development

- Our new exploration compensation is based on:
 - An allowance for Landholders' time
 - Land value as defined by a third party
 - Impact on operations and amenity (eg disturbance, loss of profit)
 - Change in value and or/use of land
 - An upfront allowance for legal, valuation and accountant advice

COMPENSATION

NEW FRAMEWORK FOR PRODUCTION ACTIVITIES

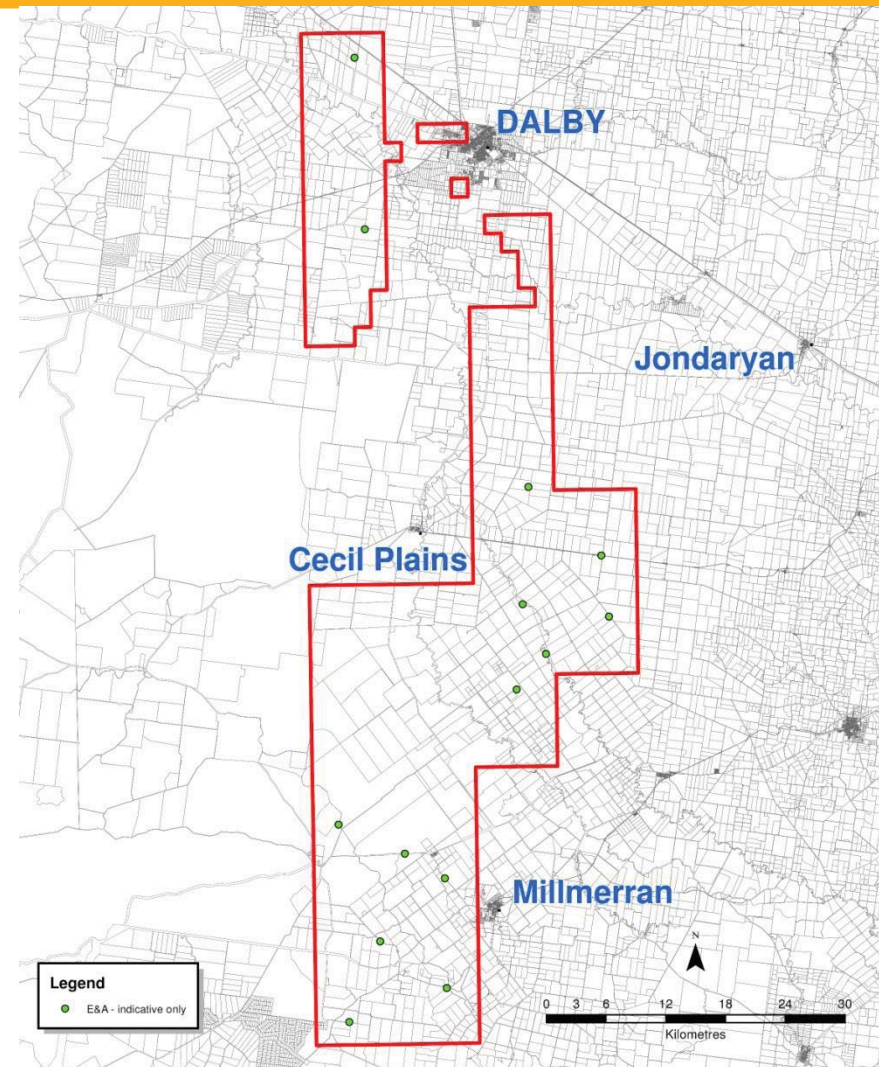
Landholders on the Arrow Community Groups have asked Arrow to “add value’ rather than just compensating for impacts (a nil sum game)

- We acknowledge that intensively farmed land requires a different approach for the gas industry to co-exist with an important agricultural industry
- We have heard the compensation concerns raised in the BSA Blueprint
- We need a framework that provides consistency and fairness in our negotiations
- Arrow has asked lead landholder groups to qualify what the term ‘added value’ looks like
- Arrow has already committed to
 - implement a Standard Compensation agreement;
 - remove the privacy provisions where a landholder requests it
- We will also commit to a range of standard options in our agreements (ie legal costs; road specifications; traffic conditions) to get the best alignment of the interests of the individual landholder and Arrow

SURAT GAS PROJECT

APPROACH TO INTENSIVELY FARMED LAND

- ATP 683 covers a substantial area of the Condamine Floodplain
- Arrow acknowledges that CSG development will require a best-practice, co-ordinated approach
- Seeking to better define eastern coal boundary with the view to reduce the size of ATP 683



SURAT GAS PROJECT

APPROACH TO INTENSIVELY FARMED LAND

Exploration & Appraisal

- Pitless drilling trials to commence in June
- Intensively Farmed Land specific project management including dedicated rig and crew
- Mobile wash down units to be used
- Improved drilling fluids management
- Time-lapse photography to demonstrate the lifecycle of activities
- No fracking in Surat Gas Project area

SURAT GAS PROJECT

APPROACH TO INTENSIVELY FARMED LAND

Field Development

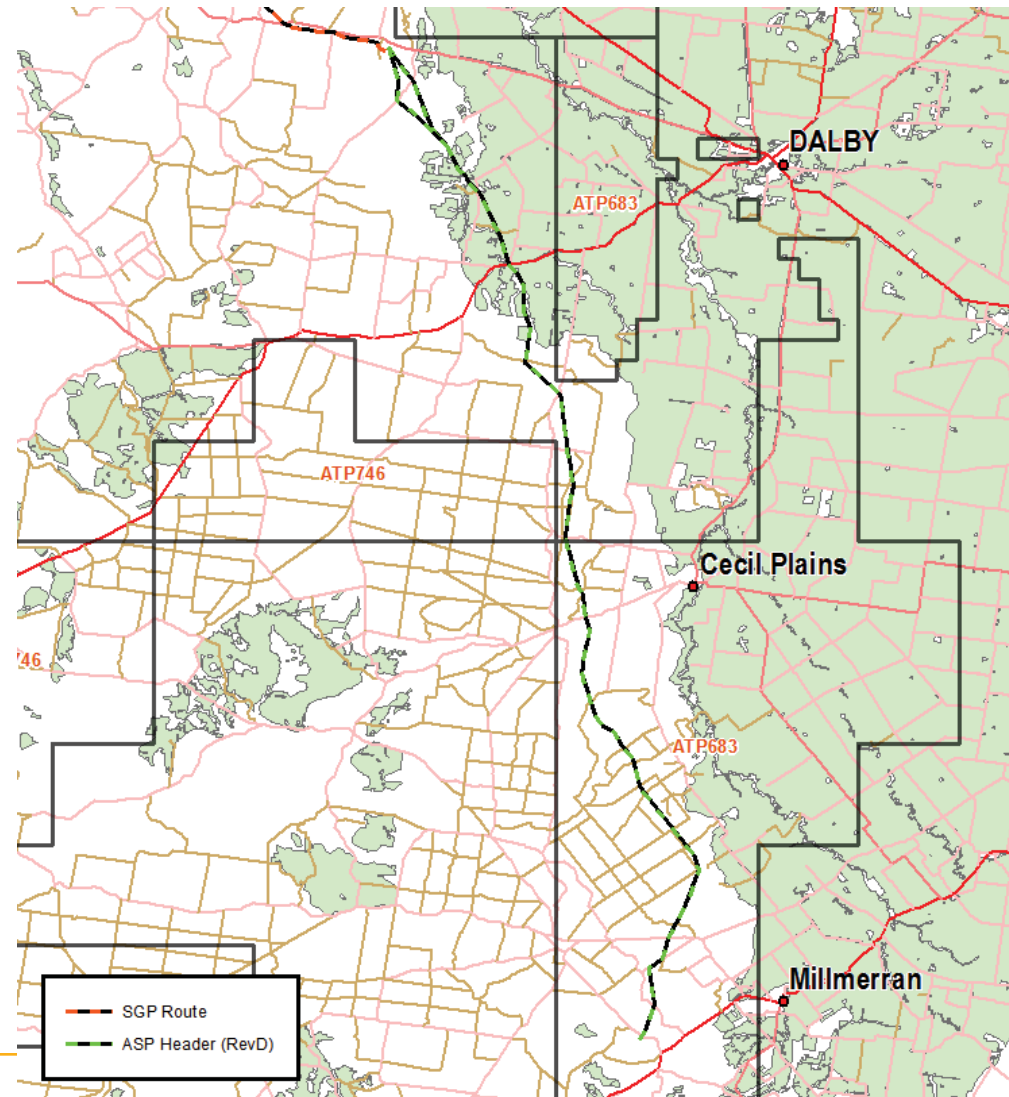
- Flexibility in well locations and spacing eg from 0.8km to 1.5km
- Studying methods to minimise impacts and maintain soil profile for gathering system pipelines:
 - Fully understand soil types in the region
 - Use plowing rather than trenching
 - Burial to 1.5m depth
- Discussions with farmers for three field development case studies on SCL (various farming practices)

SURAT GAS PROJECT

APPROACH TO INTENSIVELY FARMED LAND

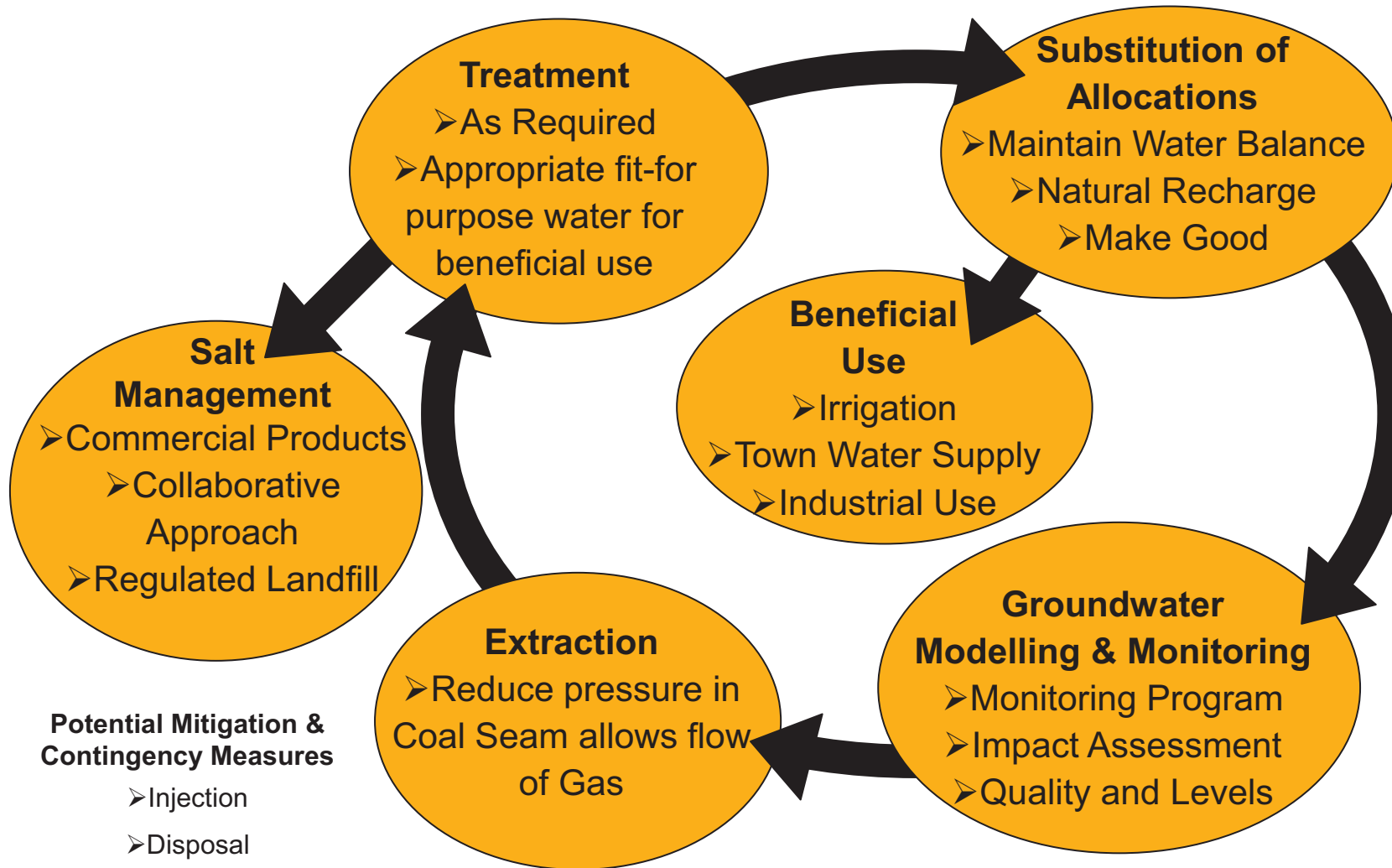
Transmission Pipeline Development

- Trial of constructing and restoring a transmission pipeline on intensively farmed land in 2012
- World leading practice to demonstrate :
 - soils can be removed and replaced in layers to maintain the existing soil profiles; and
 - the area can be rehabilitated with precision to minimise impacts on farming businesses

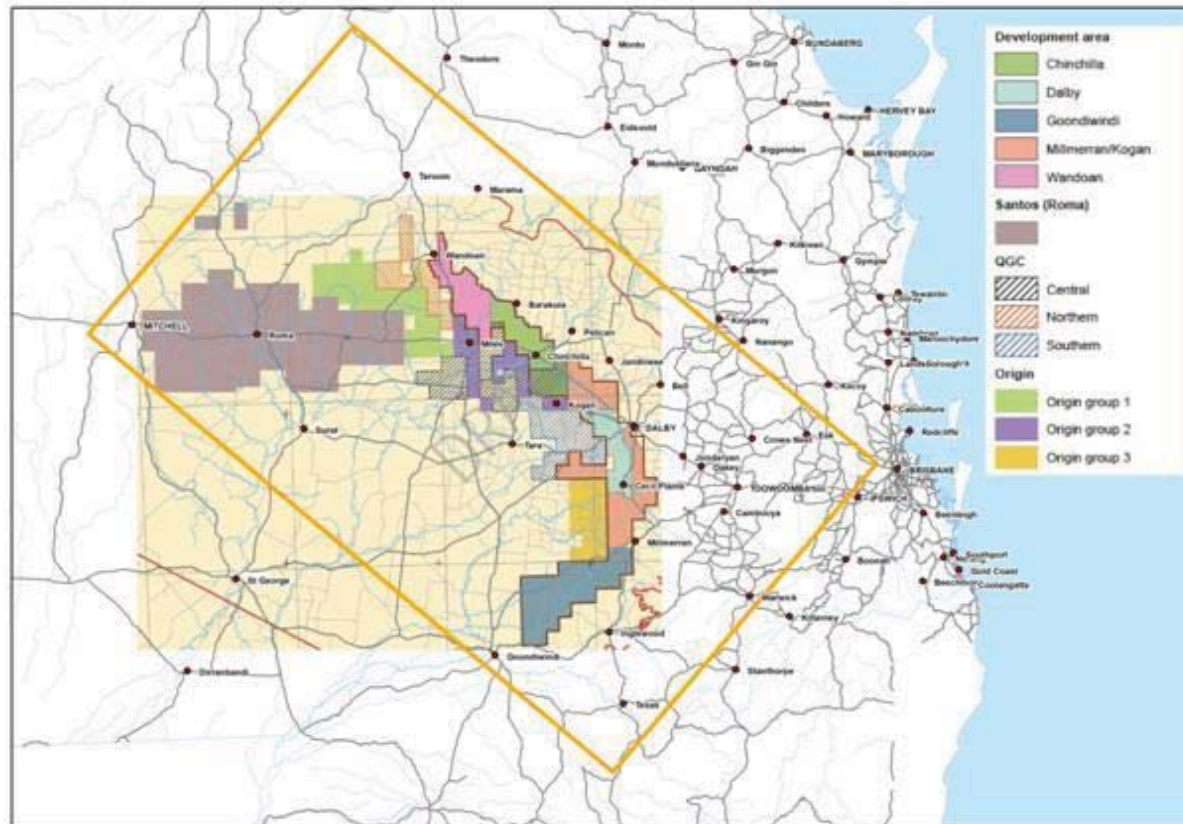


GROUNDWATER MANAGEMENT STRATEGY

Substitution of Allocations



GROUNDWATER MODELLING



- Updated 2010 model
- 450km x 270km area
- Incorporates **EIS development** scenarios
- Independent peer review
- Impact Report - EIS

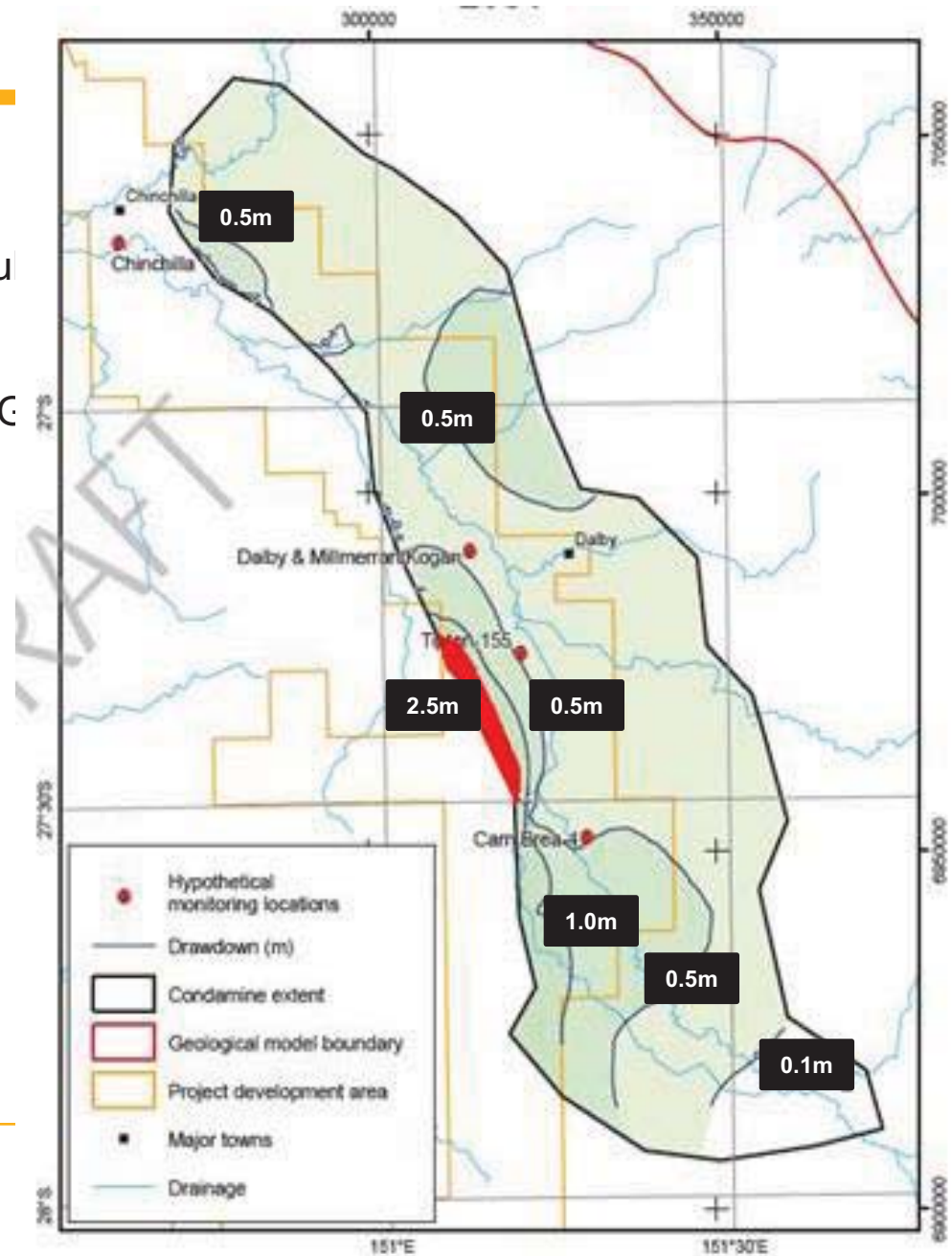
GROUNDWATER MODELLING

- Based on Arrow geological model of the basin
- Model developed by Schlumberger over the past 18 months and includes geological information from over 10,000 bores and water level data from 4000-5000 bores, obtained from:
 - Arrow bore information
 - Queensland Petroleum Exploration Database
 - DERM Queensland Groundwater Database
- The model includes:
 - Approximately 1.5 million cells
 - 15 layers within the model from the Condamine Alluvial Aquifer to the Precipice Sandstones
- Preliminary results recently received – independent verification ongoing
- Arrow's contribution to QWC groundwater model is ongoing

GROUNDWATER MODELLING

Preliminary Findings

- **Condamine Alluvium**
 - **Prioritised** the Condamine resu
 - Preliminary results:
 - **Cumulative impact** of all CSC proponents
 - **Without mitigation**
 - Max. impact occurs **2065**:
 - 1m - 4m
 - **Western** portion
 - **Incremental** to other impacts
 - Present complete results by **September/ October 2011**
-

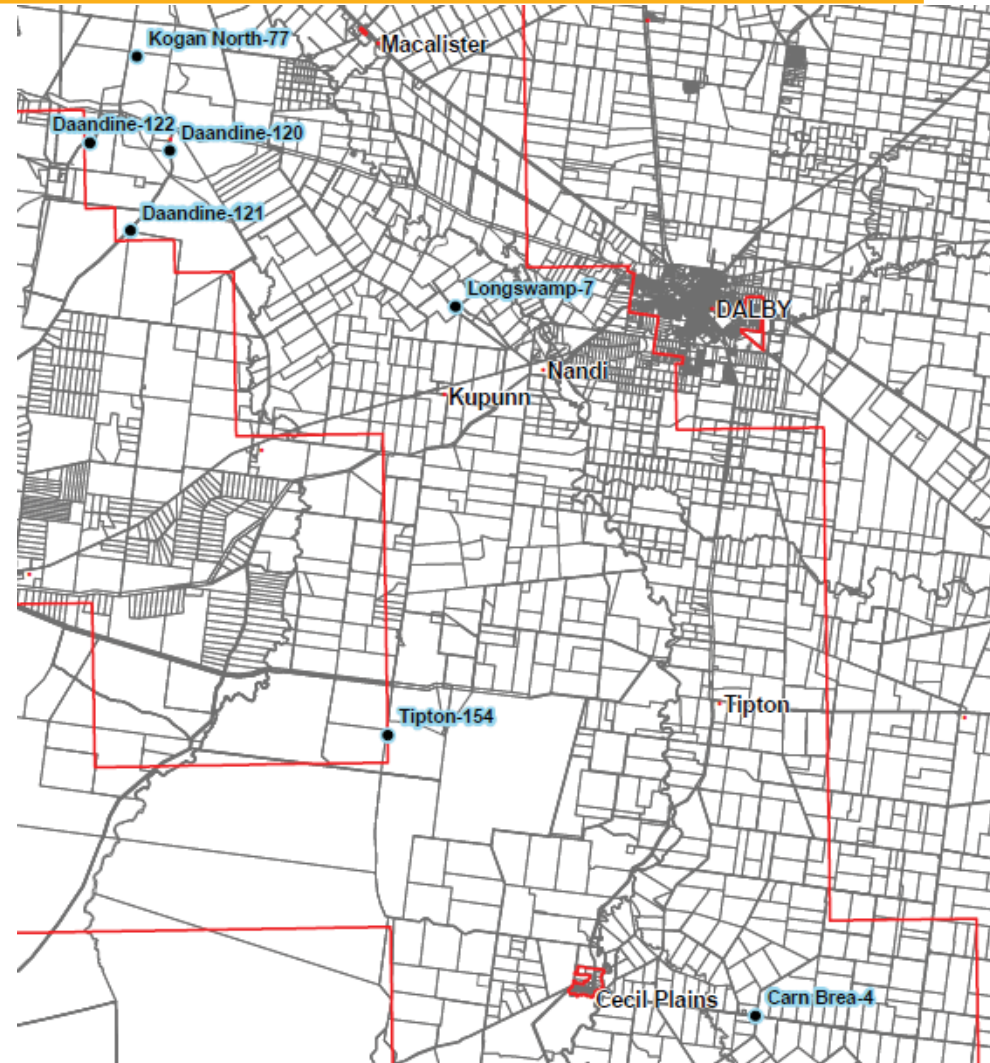


STRATEGY FOR MITIGATION & 'MAKE GOOD'

- **Substitution** of existing **groundwater allocations**
 - Ensure **net take** is **minimised** - as close as possible to pre Arrow production
 - **Loss limited** to volume of concentrated brine or evaporation removed from the system
 - **Offset** CSG take to remain in line with current usage and plans
 - Facilitate **natural recharge** of alluvial aquifers
 - Most **effective and efficient** means of **mitigation**
- If **additional** mitigation is required:
 - Consider deep **injection** into target aquifers (current trial)

GROUNDWATER MONITORING

- **20 – 50 monitoring wells** in the next 12 months
- Aquifers **overlying and underlying** the coals including:
 - Condamine Alluvium
 - Aquifers in GAB
- **Priority areas** around:
 - Existing producing wells
 - Appraisal wells
- **Future program:**
 - New production
 - New appraisal areas



MONITORING & 'MAKE GOOD'

- **Baseline Assessment**
 - **Initial assessment** of all bores in Tenure Area
 - Preparing **Plan** for DERM showing **priority** order
- **Bore Assessment**
 - **Immediately Affected Area**
 - Identified bores - **Underground Water Impact** report
 - **Make Good Agreement**
 - **Outcome** of assessment
 - Identify **potential** for impairment
 - If Impaired Capacity – '**make good**' measures
- **Groundwater Monitoring**
 - **Arrow** network plus some **DERM** and **landowner** bores

MAKE GOOD EXAMPLES

- **Reset pumps** at deeper levels within bores
- **Deepen bores** to provide water
- **Replacement bores**
- Provide **alternative supply**
- Monetary or non-monetary **compensation**

SUMMARY

- Company Overview
 - Domestic Gas Operations
 - Brighter Futures

- Surat Gas Project Update
 - EIS status

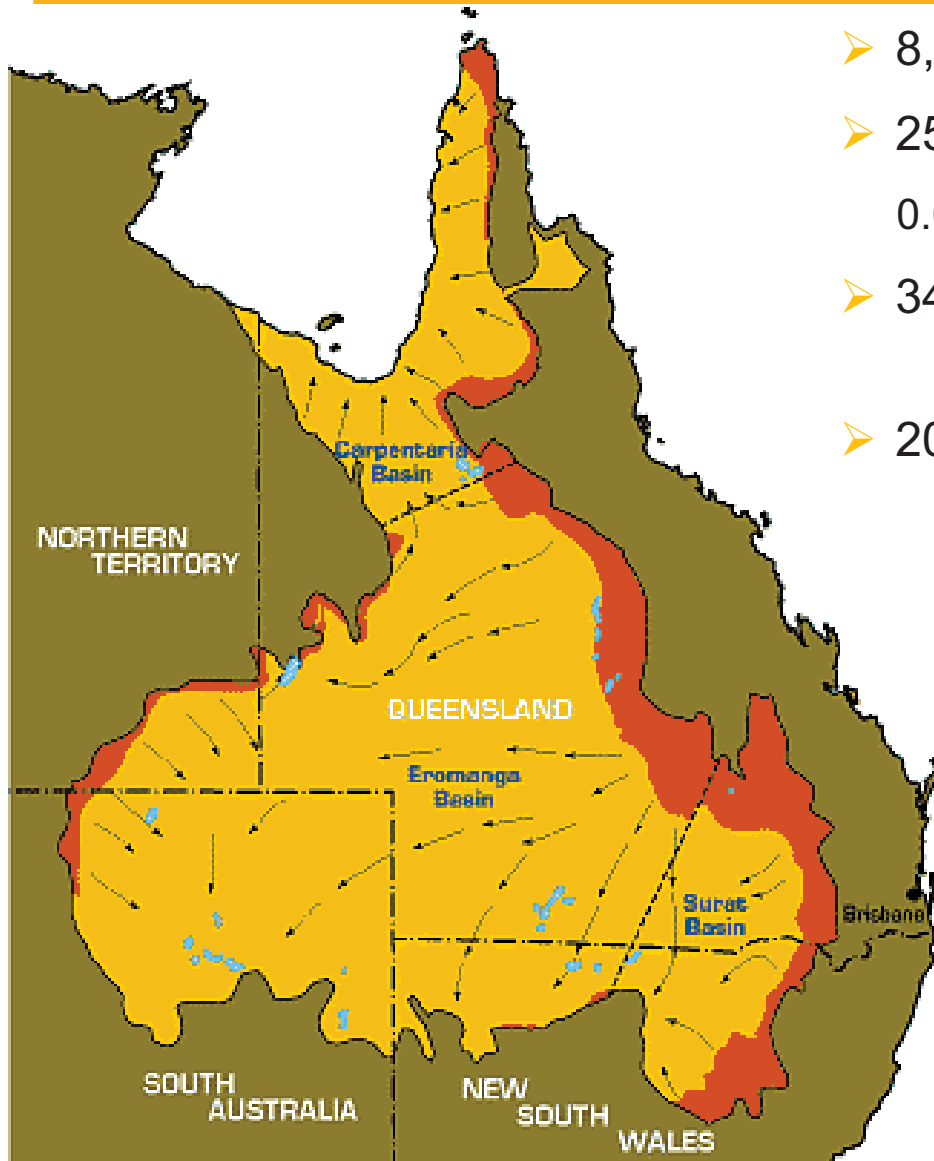
- Activities Update
 - Exploration & Pilot Wells
 - Pipeline
 - Compensation framework
 - Approach to co-existence on intensively farmed land
 - Groundwater

Questions & Answers

- Freecall: 1800 038 856
- Email: suratgas@arrowenergy.com.au

GREAT ARTESIAN BASIN

Resilience of the GAB



- 8,700,000 GL – Volume Stored in GAB
- 25 GL/yr - Arrow abstraction
0.00029% of GAB Volume per year
- 3400 years to drain - If assume 1% of GAB is recoverable water
- 200 GL/yr lost from:
 - Uncapped bores
 - Unlined drains

Source: GAB Coordination Committee

- Great Artesian Basin
- Intake Area
- Concentration of Springs
- Direction of Flow
- Structural Ridges

Appendix 38

Advertisement - Phase 4



WORKING WITH OUR COMMUNITIES

INFORMATION UPDATE ON ARROW ENERGY'S SURAT GAS PROJECT

Arrow Energy will be holding a series of community information sessions in the Surat Basin from 23 to 28 May. These sessions will provide the community with the latest information on the project and Arrow's current exploration activities.

The sessions will give an opportunity for one-on-one discussions with the project team, followed by a project update and questions and answer time. In addition, three specialist workshops will be held to provide detailed technical information on matters relating to water.

The sessions are open to the community and refreshments will be available.

Water technical sessions:

Location	Date	Time	Venue
Chinchilla	Tuesday 24 May	9.00am – 11.00am Presentation: 9.00am	Bulldog Park Slessar Street
Cecil Plains	Wednesday 25 May	9.00am – 11.00am Presentation: 9.00am	Cecil Plains Hall Geraghty Street
Dalby	Thursday 26 May	9.00am – 11.00am Presentation: 9.00am	Dalby Showground Pavilion Nicholson Street

Community information sessions:

Location	Date	Time	Venue
Miles	Monday 23 May 2011	10.00am – 1.30pm Presentation: 11.30am	Leichhardt Centre Columboola Function Room Corner Marian & Dawson Streets
Wandoan	Monday 23 May 2011	4.30pm – 7.30pm Presentation: 6pm	Community & Cultural Centre 6 Henderson Road
Chinchilla	Tuesday 24 May 2011	1.00pm – 4.30pm Presentation: 2.30pm	Bulldog Park Slessar Street
Cecil Plains	Wednesday 25 May 2011	1.00pm – 4.30pm Presentation: 2.30pm	Cecil Plains Hall Geraghty Street
Dalby	Thursday 26 May 2011	1.00pm – 4.30pm Presentation: 2.30pm	Dalby Showground Pavilion Nicholson Street
Millmerran	Friday 27 May 2011	10.00am – 1.30pm Presentation: 11.30am	Community & Cultural Centre Walpole Street
Goondiwindi	Saturday 28 May 2011	9.00am – 12.30pm Presentation: 10.30am	Goondiwindi Waggamba Community Cultural Centre Corner Russell & Short Streets

To RSVP your attendance at a session, find out more about the Surat Gas Project or get involved in the EIS contact the project team at:
freecall 1800 038 856, **email** suratgas@arrowenergy.com.au,
or **post** Surat Gas Project, Reply Paid 81 Hamilton Q 4007.

Also visit www.arrowenergy.com.au/community



Appendix 39

Poster - Phase 4



WORKING WITH OUR COMMUNITIES

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Community information sessions:

Location	Date	Time	Venue
Miles	Monday 23 May 2011	10.00am – 1.30pm Presentation: 11.30am	Leichhardt Centre Columboola Function Room Corner Marian & Dawson Streets
Wandoan	Monday 23 May 2011	4.30pm – 7.30pm Presentation: 6pm	Community & Cultural Centre 6 Henderson Road
Chinchilla	Tuesday 24 May 2011	1.00pm – 4.30pm Presentation: 2.30pm	Bulldog Park Slessar Street
Cecil Plains	Wednesday 25 May 2011	1.00pm – 4.30pm Presentation: 2.30pm	Cecil Plains Hall Geraghty Street
Dalby	Thursday 26 May 2011	1.00pm – 4.30pm Presentation: 2.30pm	Dalby Showground Pavilion Nicholson Street
Millmerran	Friday 27 May 2011	10.00am – 1.30pm Presentation: 11.30am	Community & Cultural Centre Walpole Street
Goondiwindi	Saturday 28 May 2011	9.00am – 12.30pm Presentation: 10.30am	Goondiwindi Waggamba Community Cultural Centre Corner Russell & Short Streets

To RSVP your attendance at a session, find out more about the Surat Gas Project or get involved in the EIS contact the project team at:
freecall 1800 038 856, **email** suratgas@arrowenergy.com.au,
 or **post** Surat Gas Project, Reply Paid 81 Hamilton Q 4007.

Also visit www.arrowenergy.com.au/community



Appendix 40

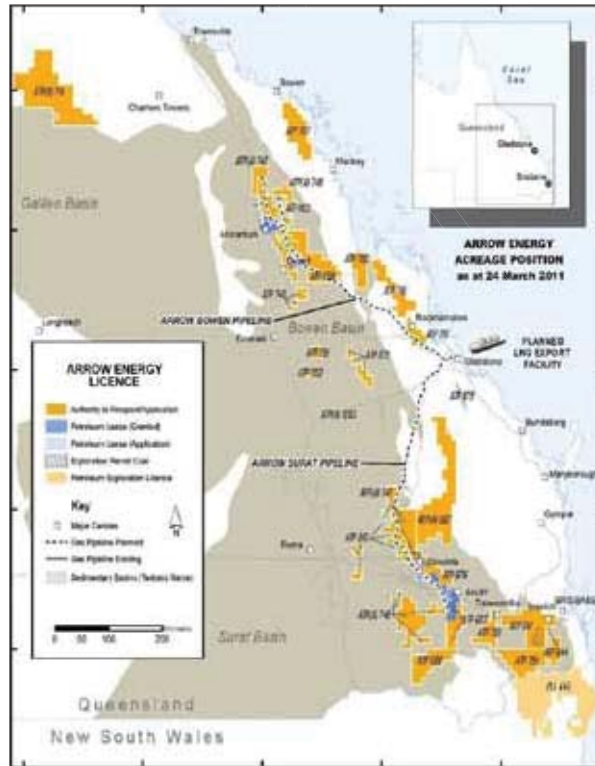
Information sheets - Phase 4



**ARROW
ENERGY** ➤



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OUR DETAILS >

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WHO IS ARROW ENERGY? >

Arrow Energy is one of the largest integrated energy companies in Australia with five gas producing projects in the Surat and Bowen Basins and interests in three gas fired power stations. Arrow provides approximately 20 per cent of Queensland's gas and electricity needs.

In 2010 Arrow was acquired by Royal Dutch Shell and PetroChina in a 50/50 joint venture partnership.

We are currently expanding our CSG exploration activities across

Queensland and northern New South Wales, to also deliver a major CSG to liquefied natural gas project to meet international demand for cleaner energy.

Arrow's key priority is the safety of our employees, contractors and those people living in the communities in which we operate.

Arrow has offices located in Brisbane, Gladstone, Moranbah and Dalby.



OUR PROJECTS >



The Arrow LNG project involves the production of gas from our fields in both the Surat Basin (south east Queensland) and the Bowen Basin (central Queensland). Two major pipelines are being developed to take the gas from these fields directly to a new liquefaction processing facility on Curtis Island, off Gladstone, for transport to international markets. This mega project has five key sub-projects:

Arrow LNG Plant (Downstream)

Arrow is developing a liquefaction plant on Curtis Island to process the gas, and cool it to -162°C to form liquefied natural gas (LNG). The LNG is then shipped to overseas markets, where it is heated and returned to its gaseous state, for use as a cleaner form of energy. An Environmental Impact Statement (EIS) for this project is underway and expected to be submitted in late 2011.

FROM A PRIVATELY OWNED EXPLORATION BUSINESS, ARROW HAS GROWN INTO ONE OF AUSTRALIA'S LARGEST INTEGRATED ENERGY COMPANIES. >



COAL SEAM GAS TO LIQUEFIED NATURAL GAS

Coal seam gas (CSG) will be extracted from coal seams in Arrow's tenements across the Bowen and Surat Basins. The gas will then be piped from the well head to Arrow's liquefaction plant on Curtis Island where it will be cooled to -162°C to form a liquid. At the completion of this process, the gas will be transferred to large shipping containers for international markets.

Surat Gas Project (Upstream)

The Surat Gas Project will see the staged development of approximately 7,500 wells in an area of Arrow's tenures in the Surat Basin from near Wandoan in the north, via our existing fields near Dalby, to near Goondiwindi in the south. An EIS is underway and expected to be submitted in late 2011.

Bowen Gas Project (Upstream)

The Bowen Gas Project will see the staged development in an area of Arrow's tenures in the Bowen Basin, adjacent to Arrow's existing Moranbah Gas Project. An EIS is expected to be submitted in late 2012.

Arrow Surat Pipeline (Midstream)

The approximately 480km Arrow Surat Pipeline (ASP) pipeline will connect our fields in the Surat Basin to the liquefaction plant off Gladstone. An EIS has already been approved, and a licence granted for this project. Construction is expected to commence in 2015/16.

Arrow Bowen Pipeline (Midstream)

The Arrow Bowen Pipeline (ABP) will transport CSG approximately 600km from the Bowen Basin to the Arrow LNG Plant off Gladstone. An EIS has commenced for this project and is expected to be submitted in late 2011.





DOMESTIC GAS PRODUCING FIELDS

Arrow currently provides 20 per cent of Queensland's gas and electricity needs.

Daandine Project

Located 40km west of Dalby, the Daandine Project has been operational since September 2006. The Daandine Project supplies gas to both the Daandine and Braemar 2 Power Stations.

Kogan North Project

The Kogan North Project is located 40km west of Dalby and is owned by an Arrow – CS Energy Joint Venture. First gas was sold to CS Energy in January 2006.

Moranbah Gas Project

The Moranbah Gas Project (MGP) is one of the largest operating CSG projects in Australia. It is located in

the Bowen Basin, approximately 170km west of Mackay. The Arrow – AGL Energy Joint Venture first sold gas in September 2004 and supplies Queensland Nickel Industries and Copper Refineries, Incitec Pivot and the Townsville Power Station.

Stratheden Project

The Stratheden Project, located 20km north-west of Dalby, produced first gas in July 2009. Arrow has a 12-year contract to supply gas from the Stratheden and Daandine fields to the Braemar 2 Power Station.

Tipton West Project

Located 20km south of Dalby, gas from the Tipton West Project was first sold under contract to Braemar Power Partners in February 2007. The Project has 15-year gas sales contracts to supply gas to both the Braemar 1 and Braemar 2 Power Stations.

**ARROW ENERGY IS A PRIVATELY OWNED
COMPANY FOCUSED ON THE EXPLORATION,
EXTRACTION AND USE OF COAL SEAM GAS**

FRACGING FLUIDS USED BY ARROW

The fracking fluids used by Arrow are comprised of many day-to-day household products and include:

- › acetic acid, food grade (the basis of vinegar, also used in herbicides)
- › gutaraldehyde (also used to disinfect medical and dental equipment)
- › surfactants (also used in soaps and toothpaste)
- › cellulose (also used in wallpaper paste and paper)
- › bactericides (to inhibit the formation of bacteria that may corrode steel and cement well casing, also used in agricultural treatment of crops)
- › guar gum (from the guar bean, vegetable gum also used in ice cream and fed to cattle).

While various proprietary product names are used to identify and market fracking fluids, their basic components are primarily those listed above.

OUR DETAILS

Find out more about Arrow's fracking processes by contacting:

FREECALL 1800 038 856

EMAIL info@arrowenergy.com.au

POST Arrow Energy, Replay Paid 81, Hamilton Q. 4007

- ▶ Find out more online at www.arrowenergy.com.au/community
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WHAT IS BTEX? WHAT YOU NEED TO KNOW





WHAT IS BTEX? >

BTEX is an acronym for the group of chemicals benzene, toluene, ethylbenzene and xylenes. They can be found in a number of petroleum-based products such as lubricants, petrol, plastics and foam, and evidence exists to show that they are present in some soft drinks*. BTEX chemicals have been associated with the coal seam gas hydraulic fracturing (fracking) process due to their presence in a number of fracking fluids.

In mid-2010, the Queensland Government banned the use of fracking fluids that contain BTEX in coal seam gas operations. Arrow ensures that the fracking fluids we use are free of BTEX chemicals.

Despite this, it is still possible for small traces of BTEX to be detected during testing as these chemicals may be present in petroleum-based lubricants used during the well drilling process, and they can also potentially occur naturally in coal.

* <http://www.foodstandards.gov.au/scienceandeducation/factsheets/factsheets2006/benzeneinflavouredbe3247.ctm>

Under Queensland legislation, all coal seam gas companies are now required to monitor BTEX levels through regular testing. While the State Government has banned the use of BTEX in fracking fluids, the Government is currently establishing threshold levels that recognise that BTEX chemicals can be naturally occurring. In line with this, Arrow regularly conducts testing on our wells.

To check for the presence of BTEX, Arrow undertakes reviews of the compounds in its fracking fluids and the water produced from the wells at ultra-trace part per billion levels.

DOES ARROW NEED TO USE FRACGING?

Fracking is a common method used to increase the permeability of coal seams. It has been used in the oil and gas industry for more than 50 years.

Fracking is used in areas where the character of the seam impedes gas flowing readily into a gas well. In these areas, the coal may need to be stimulated to enhance the flow of gas.

Arrow has already committed to not fracking in the area of its Surat Gas Project. However the technique may be required in deeper portions of the Surat Basin and the Bowen Basin, where coal seams are below about 600m deep.





ARROW IS COMMITTED TO WORKING WITH LANDHOLDERS TO MANAGE THE POTENTIAL SPREAD OF WEEDS. ▶



VEHICLE WASH DOWN

Before first entering a property, Arrow staff wash down vehicles and equipment to ensure no plant matter is introduced to the land. Once cleaned and free of plant, animal and soil matter, the vehicles are issued a certificate by a qualified wash down inspector.



THE LAND TEAM ▶

Arrow aims to build long-term, positive working relationships with all landholders. We understand these relationships take time to develop and we are increasing our capacity to better meet landholder needs now and in the future.

Once Arrow has identified private property as a possible site for exploration or production activities, the landholder will be contacted by a Land Liaison Officer, who will be the primary point of contact for all negotiations. The Land Liaison Officer will discuss site access, schedule cultural heritage and environmental clearances, co-ordinate other activities on the property and ensure rehabilitation of the site. At each stage, whenever possible, Arrow aims to accommodate the landholder's requirements and existing land uses. We will be flexible in the location of wells and infrastructure.

Questions or concerns about Arrow's proposed activities, can be addressed by the landholder's designated Land Liaison Officer. For general landholder inquiries call 1800 038 856.



LAND ACCESS RULES ▶



01 Only enter a property with the approval of your supervisor, who has cleared access with the landholder.



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



03 Follow the directions of the landholders. Report any directions that are not within the access conditions.



04 Report landholder discussions, complaints or incidents to your supervisor or Land Liaison Officer.



05 Carry personal and vehicle identification showing that you are an employee or contractor of Arrow.



06 Keep sites tidy, ensure all rubbish is removed from site.



07 Do not interfere with the landholder's property, equipment or operations. Use approved tracks and laydown areas. Drive at less than 10kph within 200m of buildings. Leave gates as signed or found.



08 Do not take firearms, weapons, animals, illicit drugs or alcohol onto the property.



09 Do not light fires unless authorised. Smoking is only permitted in the designated locations.



10 Do not enter a site during or after wet weather without consent of the Land Liaison Officer (who has cleared access with the landholder) except in the case of a declared emergency.



11 Do not negotiate with landholders. Only Land Liaison Officers are permitted to negotiate activities and access conditions.



12 Do not threaten or pressure landholders or other people on the property.

AUTHORITIES ▶

Arrow's tenure is administered under the *Queensland Petroleum and Gas Production and Safety Act 2004*. In parallel, each tenure requires an Environment Authority (EA) under the *Environmental Protection Act 1994*.

Under the *Petroleum and Gas Production and Safety Act 2004*, there are three types of Petroleum Authorities that Arrow must apply for at different stages:

1. Authority to Prospect (ATP) – used for exploration activities

- Petroleum Lease (PL) – used for the development and commercialisation of proven gas reserves
- Pipeline Licence (PPL) – used for the construction and operation of pipelines.

This legislation sets out the rights and obligations of Arrow with respect to exploring, producing and transporting gas and the land on which it is located.





INFORMATION FOR LANDHOLDERS
WHAT YOU NEED TO KNOW ▶

ARROW RECOGNISES THE SUPPORT OF OUR STAKEHOLDERS, PARTICULARLY LANDHOLDERS AND THE LOCAL COMMUNITIES IN WHICH WE OPERATE, IS VITAL TO THE SUCCESS OF OUR PROJECTS. ▶

WORKING WITH LANDHOLDERS ▶

Arrow recognises every property is unique. We are committed to working closely with landholders to ensure our work practices minimise impacts on land and existing agricultural activities.

Arrow communicates with landholders at least three months before any activities, including environmental studies, take place on private property.

When determining temporary and permanent locations for wells, plant and equipment, all aspects of the property are considered in consultation with the landholder. Agricultural activities, stock considerations, seasonal conditions, topography, drainage lines, service corridors, vegetation and fauna are all taken into account.

Our aim is to gain voluntary access agreements to private property and we are continually working to develop relationships with landholders that make this possible.



CONTACT
Land Team, Arrow Energy Pty Ltd
Phone 1800 038 856
Email info@arrowenergy.com.au

LAND LIAISON OFFICER

▶ Find out more online at www.arrowenergy.com.au
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ASSESSMENT OF LANDHOLDER BORES >

Arrow is required (by the *Water Act 2020*) to undertake a baseline assessment of existing bores within our tenure and prior to commencing production in new project areas. The outcome of the assessment must be submitted to the bore owner and the Queensland Water Commission.

Arrow is also obligated to undertake a bore assessment and enter into a 'make good' agreement with each owner of a bore identified in an approved Underground Water Impact Report as potentially being affected by Arrow's activities within three years, identified in the report as an 'immediately affected area'. The agreement must document the result of the bore assessment and any measures necessary to ensure the bore owner continues to have access to a reasonable quantity and quality of water for the authorised purpose.

Find out more about 'make good' online at: <http://www.derm.qld.gov.au/factsheets/pdf/csg/csg5.pdf>



ARROW WILL CONTINUE TO WORK CLOSELY WITH STAKEHOLDERS TO IMPLEMENT A COMPREHENSIVE STRATEGY TO MANAGE GROUNDWATER >

ZONAL ISOLATION >

ZONAL ISOLATION
Zonal isolation is the method used in coal seam gas wells to prevent cross-flow of gas or water between different geological layers. The aim is to isolate the gas producing zone of the well from its surroundings. CSG wells may need to be drilled through various geological layers in order to access their target coal seam or gas producing zone. The non-gas producing layers above the gas producing zone may in some cases be aquifers themselves. The standard method used to protect the aquifer in CSG wells, and indeed in oil and gas wells around the world, is to case and cement the well so as to isolate it from surrounding geological layers. The technology used to achieve zonal isolation is very advanced and has been tested in differing and adverse conditions around the world. Various equipment and methods are used to ensure that the casing and cementing process provides zonal isolation and in doing so provides protection to nearby aquifers. Arrow has dedicated and professional personnel who design, manage and check all aspects of our drilling and well construction processes.

GROUNDWATER MANAGEMENT STRATEGY >

Arrow understands the importance of groundwater resources to local communities and has developed a comprehensive strategy to manage the potential impacts from our activities. The aim is to offset the potential impacts on groundwater levels by establishing an agreement with holders of existing groundwater allocations. This agreement will provide coal seam water to substitute the volume of water currently pumped from aquifers for agricultural, industrial and urban use. 'Substitution of Allocation' agreements will ensure that the net take of groundwater from all users will remain as close as possible to volumes extracted prior to Arrow's activities. These agreements will enable allocation holders to cease pumping from the shallow aquifers, allowing these aquifers to replenish naturally. Water supplied by Arrow will require approval under the *Environmental Protection Act 1994* and meet specific water quality standards. Arrow will continue to closely monitor the success of this substitution strategy and will develop alternative strategies if additional mitigation is required. Injection of coal seam water into target aquifers is a possible mitigation strategy and Arrow is undertaking a trial in the Precipice Sandstone Aquifer. The feasibility of an injection trial requires assessment of the aquifer and geological properties, quantification of the aquifer storage potential and assessment of the flow paths and water quality. In order to successfully inject water, the chemistry of the water must be understood and matched to the chemistry of the target aquifer. Further studies will assess injection characteristics of both deep and shallow aquifers in other areas, with the potential to include the Condamine Alluvium.

In the interim, Arrow will continue to supply coal seam water for existing approved industrial and agricultural use. The use of this water requires State Government approval. Arrow's Groundwater Management Strategy will ensure that the quality and volume of groundwater is protected by:

- > hydrogeological investigations to confirm our understanding of the:
 - interconnectivity of the aquifers and aquitards (low permeability layers) overlying and underlying the coal seams, and
 - connection of the coal seams to significant aquifers
- > design and construction of wells that prevent connection of overlying and underlying aquifers to the target coal seams
- > expansion of the existing network of groundwater monitoring bores to identify the potential impacts of CSG extraction
- > development of a groundwater model to understand and predict the potential impacts of CSG extraction
- > assessment of all groundwater bores within Arrow's tenure
- > entering into 'make good' agreements with owners of bores
- > investigation of the feasibility of injecting coal seam water to mitigate impacts of CSG extraction.

Arrow will continue to work closely with government and its key stakeholders to implement this comprehensive strategy to manage groundwater.

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CONTACT
Find out more about Arrow's groundwater processes by contacting the project team:
Freecall 1800 038 856
Email info@arrowenergy.com.au
Post Surat Gas Project, Reply Paid 81, Hamilton Q 4007.



UNDERSTANDING GROUNDWATER WHAT YOU NEED TO KNOW >

Find out more online at www.arrowenergy.com.au
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ARROW IS DEVELOPING A COMPUTER MODEL TO SIMULATE GROUNDWATER FLOW IN THE SURAT BASIN TO PREDICT POTENTIAL IMPACTS FROM COAL SEAM GAS ACTIVITIES.



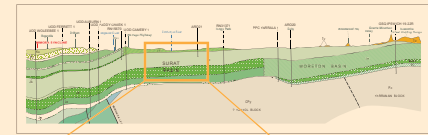
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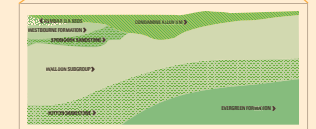


ARROW IS DEVELOPING A COMPREHENSIVE UNDERSTANDING OF THE GEOLOGY AND HYDROGEOLOGY OF THE SURAT GAS PROJECT AREA.

SURAT BASIN



CONDAMINE ALLUVIUM



CRETACEOUS	JURASSIC - CRETACEOUS	TRIASSIC - JURASSIC	BASEMENT (see methods)
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FIG 2: A CROSS SECTION OF THE LANDSCAPE IN ARROW'S SURAT GAS PROJECT.

GROUNDWATER MOVEMENT



Coal seam gas (CSG) is the name given to any naturally occurring gas trapped in underground coal seams by water pressure. Removing groundwater from a coal seam releases the stored gas and allows it to come to the surface. In the Surat Gas Project, the coal seams that Arrow will work with are called the Wallaroo Coal Measures and they are found in the Surat and Clarence-Moreton Basins. There is already extensive use of groundwater in both basins for irrigation, stock and domestic use and for town water supply. This groundwater is sourced from significant aquifers such as the Condamine Alluvium and the Hutton Sandstone.

Arrow has put a large amount of work into developing a comprehensive understanding of the geology and hydrogeology of the Surat Gas Project area. This data is integrated in a computer model so that predictions of the impacts of CSG activities on the regional aquifers can be made.

An assessment of all existing groundwater bores within Arrow's tenure will also be undertaken to understand which bores may be affected by CSG activities.

GROUNDWATER MONITORING

Arrow is expanding its existing groundwater monitoring program to confirm our understanding of the hydrogeology of the Surat Basin, including changes to water levels in important aquifers within the basin.

Arrow is also required by the Water Act 2009 to provide a groundwater impact report to the Queensland Water Commission for approval. The Commission will compile the information provided by all CSG companies to develop a cumulative Underground Water Impact Report. These reports will include an analysis of trends in water level and movement of water between aquifers; produce maps showing where impacts may occur in the immediate and long-term future; and summarise the results of any mitigation measures that have been implemented. In addition, the Commission's report will identify and manage potential impacts to naturally occurring springs.

Both Arrow and the Queensland Water Commission will provide their groundwater impact reports to potentially affected bore holders, who will have the opportunity to comment prior to approval by the Department of Environment and Resource Management (DERM). When approved, these reports will then be published and made available to the community.

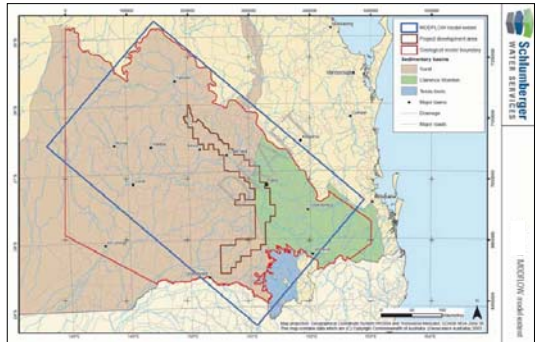


FIG 1: THE REGION COVERED BY ARROW ENERGY'S GROUNDWATER MODEL.

GROUNDWATER MODELLING

Arrow has been collating data and preparing a three-dimensional groundwater model to simulate groundwater flow in the Surat Basin and potential impacts from CSG activities.

This model has been designed to assess impacts for inclusion in the Environmental Impact Statement (EIS), which Arrow is preparing. The groundwater model covers an area of approximately 450km by 271km and has 15 layers representing the aquifers and aquitards (from the shallow Condamine Alluvium down to the deep Hutton and Precipice Sandstone). The extent of the model is illustrated in Figure 1 (see left).

This will allow Arrow to simulate and assess whether mitigation measures, in addition to our Groundwater Management Strategy, will be required. It will also guide the location and timing of any necessary mitigation measures.

Model simulations will be used to make predictions for decades beyond the life of the currently proposed Surat Gas Project.



UNDERSTANDING INTERCONNECTIVITY TO PROTECT AQUIFERS

The Wallaroo Coal Measures are generally separated from the important regional aquifers in Arrow's project area by low permeability layers known as aquitards, which prevent or restrict the movement of groundwater between aquifers. While groundwater is removed from the coal during Arrow's activities, other groundwater may not necessarily flow into the coal seams from regional aquifers because of the presence of these aquitards.

Arrow's groundwater investigations will confirm the effectiveness of the hydraulic seal provided by these low permeability aquitards, with a focus on significant aquifers such as the Condamine Alluvium (see Figure 2 on right).

To date, groundwater monitoring by Arrow indicates the extraction of coal seam water from the Wallaroo Coal Measures has had no discernible impact on water levels in the overlying Condamine Alluvium.

In addition, Arrow further protects regional aquifers by drilling techniques such as zonal isolation.

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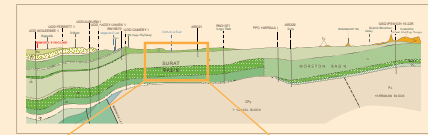
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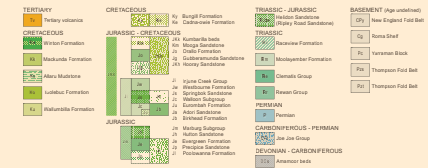
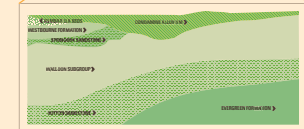


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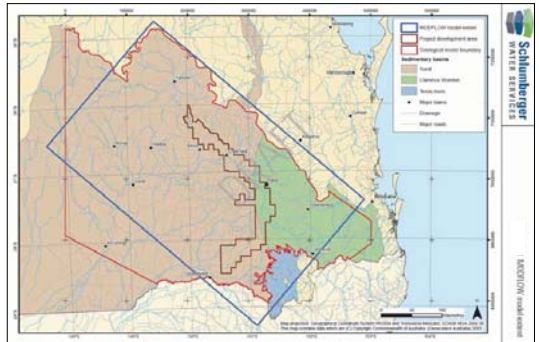


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This will allow Arrow to simulate and assess whether mitigation measures, in addition to our Groundwater Management Strategy, will be required. It will also guide the location and timing of any necessary mitigation measures.

Model simulations will be used to make predictions for decades beyond the life of the currently proposed Surat Gas Project.



UNDERSTANDING INTERCONNECTIVITY TO PROTECT AQUIFERS

The Wallon Coal Measures are generally separated from the important regional aquifers in Arrow's project area by low permeability layers known as aquitards, which prevent or restrict the movement of groundwater between aquifers. While groundwater is removed from the coal during Arrow's activities, other groundwater may not necessarily flow into the coal seams from regional aquifers because of the presence of these aquitards.

Arrow's groundwater investigations will confirm the effectiveness of the hydraulic seal provided by these low permeability aquitards, with a focus on significant aquifers such as the Condamine Alluvium (see Figure 2 on right).

To date, groundwater monitoring by Arrow indicates the extraction of coal seam water from the Wallon Coal Measures has had no discernible impact on water levels in the overlying Condamine Alluvium.

In addition, Arrow further protects regional aquifers by drilling techniques such as zonal isolation.

ARROW IS DEVELOPING A COMPUTER MODEL TO SIMULATE GROUNDWATER FLOW IN THE SURAT BASIN TO PREDICT POTENTIAL IMPACTS FROM COAL SEAM GAS ACTIVITIES.



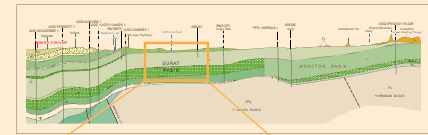
MANAGING GROUNDWATER IN THE SURAT BASIN

Arrow understands the importance of groundwater resources to local communities and has developed a comprehensive strategy to manage the potential impacts from our activities.

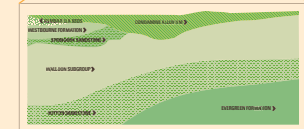


ARROW IS DEVELOPING A COMPREHENSIVE UNDERSTANDING OF THE GEOLOGY AND HYDROGEOLOGY OF THE SURAT GAS PROJECT AREA.

SURAT BASIN



CONDAMINE ALLUVIUM



CRETACEOUS	JURASSIC	TRIASSIC - JURASSIC	BASEMENT (pre-Cambrian)
<ul style="list-style-type: none"> 14 Murray Formation 13 Murrumbidgee Formation 12 Murrumbidgee Sandstone 11 Murrumbidgee Sandstone 10 Murrumbidgee Sandstone 9 Murrumbidgee Sandstone 8 Murrumbidgee Sandstone 7 Murrumbidgee Sandstone 6 Murrumbidgee Sandstone 5 Murrumbidgee Sandstone 4 Murrumbidgee Sandstone 3 Murrumbidgee Sandstone 2 Murrumbidgee Sandstone 1 Murrumbidgee Sandstone 	<ul style="list-style-type: none"> 14 Bungle Formation 13 Condamine Formation 12 Condamine Formation 11 Condamine Formation 10 Condamine Formation 9 Condamine Formation 8 Condamine Formation 7 Condamine Formation 6 Condamine Formation 5 Condamine Formation 4 Condamine Formation 3 Condamine Formation 2 Condamine Formation 1 Condamine Formation 	<ul style="list-style-type: none"> 14 Hinton Sandstone 13 Hinton Sandstone 12 Hinton Sandstone 11 Hinton Sandstone 10 Hinton Sandstone 9 Hinton Sandstone 8 Hinton Sandstone 7 Hinton Sandstone 6 Hinton Sandstone 5 Hinton Sandstone 4 Hinton Sandstone 3 Hinton Sandstone 2 Hinton Sandstone 1 Hinton Sandstone 	<ul style="list-style-type: none"> CP1 New England Field Belt CP2 Rooka Shelf PK1 Yarraman Block PK2 Thompson Fall Belt PK3 Thompson Fall Belt

FIG 2: A CROSS SECTION OF THE LANDSCAPE IN ARROW'S SURAT GAS PROJECT.

GROUNDWATER MOVEMENT



Coal seam gas (CSG) is the name given to any naturally occurring gas trapped in underground coal seams by water pressure. Removing groundwater from a coal seam releases the stored gas and allows it to come to the surface. In the Surat Gas Project, the coal seams that Arrow will work with are called the Wallaroo Coal Measures and they are found in the Surat and Clarence-Moreton Basins. There is already extensive use of groundwater in both basins for irrigation, stock and domestic use and for town water supply. This groundwater is sourced from significant aquifers such as the Condamine Alluvium and the Hutton Sandstone.

Arrow has put a large amount of work into developing a comprehensive understanding of the geology and hydrogeology of the Surat Gas Project area. This data is integrated in a computer model so that predictions of the impacts of CSG activities on the regional aquifers can be made.

An assessment of all existing groundwater bores within Arrow's tenure will also be undertaken to understand which bores may be affected by CSG activities.

GROUNDWATER MONITORING

Arrow is expanding its existing groundwater monitoring program to confirm our understanding of the hydrogeology of the Surat Basin, including changes to water levels in important aquifers within the basin.

Arrow is also required by the Water Act 2009 to provide a groundwater impact report to the Queensland Water Commission for approval. The Commission will compile the information provided by all CSG companies to develop a cumulative Underground Water Impact Report. These reports will include an analysis of trends in water level and movement of water between aquifers; produce maps showing where impacts may occur in the immediate and long-term future; and summarise the results of any mitigation measures that have been implemented. In addition, the Commission's report will identify and manage potential impacts to naturally occurring springs.

Both Arrow and the Queensland Water Commission will provide their groundwater impact reports to potentially affected bore holders, who will have the opportunity to comment prior to approval by the Department of Environment and Resource Management (DERM). When approved, these reports will then be published and made available to the community.

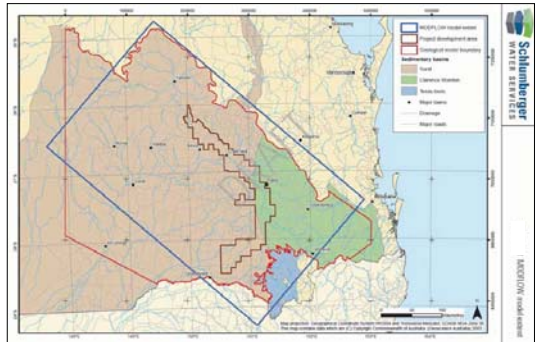


FIG 1: THE REGION COVERED BY ARROW ENERGY'S GROUNDWATER MODEL.

GROUNDWATER MODELLING

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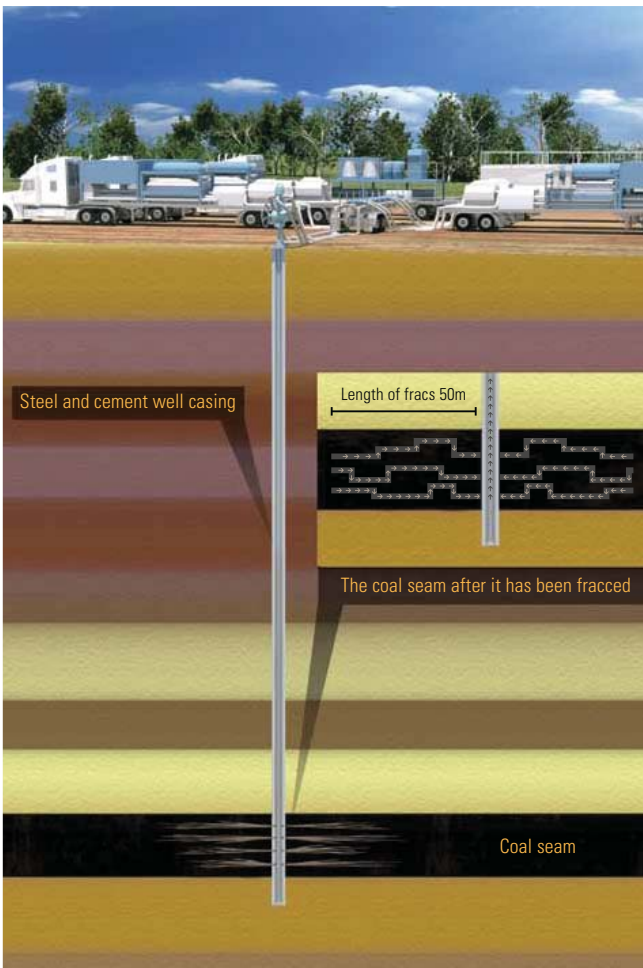
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In addition, Arrow further protects regional aquifers by drilling techniques such as zonal isolation.



Production wells are lined with steel and cement casing before the gas and water are extracted through separate pipes.

CONTACT

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Email info@arrowenergy.com.au

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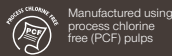
FRACGING

WHAT YOU NEED TO KNOW



► Find out more online at
www.arrowenergy.com.au
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ARROW HAS COMMITTED THAT NO FRACING WILL TAKE PLACE IN THE SURAT GAS PROJECT AREA. ▶



IN THE SURAT BASIN ▶

Not all gas wells require fracking. Generally the technique is only used when the well intersects low permeability coal seams, which usually only occurs in very deep wells. Since most of Arrow's tenements in the Surat Basin have relatively shallow coal, fracking has not been required. However, it is possible that in some deeper portions of the Surat Basin, where coal seams are below about 600m, it may be necessary to use fracking in the future.



ARROW DOES NOT USE FRACING CHEMICALS THAT CONTAIN BENZENE, TOLUENE, ETHYLBENZENE OR XYLENES.

WHAT IS FRACING? ▶

Hydraulic fracturing – or fracking – is a safe and environmentally responsible process used in areas where the character of a coal seam impedes gas flowing readily into a gas well. In these areas, the coal may need to be stimulated to enhance the flow of gas.

Fracking is a common method used to increase the permeability of the coal seam.

During the process, a fluid comprising 99.5 per cent water and sand (0.5 per cent of other additives, as outlined in this brochure) is pumped at high pressure down the cased well and into the coal seam. This creates fractures in the seam in a horizontal plane up to 100m or so around the well, which are then held open by sand.

The decision to frac a well is made before drilling commences because the process requires additional considerations in well design and construction procedures. The well must be fully cased from top to bottom and then the casing is perforated at specific intervals where the frac is to be conducted. Once the perforation is complete, the fracking process is conducted.

Fluids are flushed from the coal seam and pumped to lined containment pits or tanks. From here they are taken for disposal at an appropriate offsite location.

Fracking operations are undertaken within the existing drilling footprint. In sensitive areas, specialised drilling techniques can be used in readiness for fracking.

The fraced zones are designed and controlled so they are limited to coal seams and do not extend above or below the targeted seam. Arrow is trialling microseismic technology which provides a close-up view of the fracture while it is occurring. This allows improved monitoring of the location of the fracking.

Fracking is only used where there is significant ground pressure, it is not conducted at coal seam depths less than about 300m.

Fracking is a long established and widely used practice in the oil and gas industry. The process has attracted media coverage in the USA where extensive programs of fracking for shale gas are underway and different chemicals are being used by industry.

FRACING AND GROUNDWATER ▶

Fracking is specifically designed and executed to create fractures in a target coal seam. The seams typically comprise weak and brittle strata that readily fracture in comparison to the rock layers above and below them. This contrast in strength properties, together with the precise positioning of fracking perforations made in the gas well casing, ensures that fracking is confined to the seam. Coal seam gas (CSG) wells that will be fraced are fully lined with steel casing which is securely cemented in place to isolate all aquifers overlying the target coal seam.

Before fracking is conducted, Arrow confirms the integrity of the cement bond between the casing and rock. This identifies leakage of high pressure fracture fluids. The extent of fracturing can be accurately measured at the time of fracking via microseismic monitoring. To do this, highly sensitive geophones, placed at ground surface, detect the fracturing as it progresses through the coal seam.

The water and additives injected into the coal seam (the fracking fluids) are flushed from the well soon after fracking operations are completed. These fluids are brought to the surface inside the steel casing so they are isolated from overlying strata and aquifers. Consequently the frac fluids are not able to mix with groundwater.



FRACING FLUIDS ▶

About 99.5 per cent of the material pumped into a frac well comprises water and sand. The remaining 0.5 per cent is made up of minor quantities of additives used to:

- ▶ enhance fracture initiation
- ▶ help lubricate the flow of the sand into the fractures
- ▶ prevent microbial or chemical reactions following introduction of surface water
- ▶ prevent formation of scale deposits that may affect the well or pumps.

Different additives may be used in different wells depending on the local conditions. In general, the additives used in fracking fluids are made of substances commonly found in many household products.

The fracking fluids used by Arrow are:

- ▶ acetic acid, food grade (the basis of vinegar, also used in herbicides)
- ▶ gutaraldehyde (also used to disinfect medical and dental equipment)
- ▶ surfactants (also used in soaps and toothpaste)

- ▶ cellulose (also used in wallpaper paste and paper)
- ▶ bactericides (to inhibit the formation of bacteria that may corrode steel and cement well casing, also used in agricultural treatment of crops)
- ▶ guar gum (from the guar bean, vegetable gum is also used in ice cream and fed to cattle).

Like many common household products these additives can be toxic in highly concentrated forms, however in fracking they are heavily diluted and present minimal risk as they remain isolated throughout the process. All additives used for fracking are handled in accordance with the appropriate legislation covering health, safety and environmental management.

Arrow ensures that the fracking fluids we use do not contain:

- ▶ benzene
- ▶ toluene
- ▶ ethylbenzene
- ▶ xylenes.

Arrow believes fracking is a useful technique for extracting gas and, when conducted with the right controls, presents negligible risk to people or the environment.

WHO IS ARROW ENERGY? ▶

Arrow Energy is one of the largest integrated energy companies in Australia with five gas producing projects and interests in three gas-fired power stations. Arrow currently provides 20 per cent of Queensland's energy needs through coal seam gas.

In 2010 Arrow was acquired by Royal Dutch Shell and PetroChina in a 50/50 joint venture partnership.

We are currently expanding our CSG exploration activities across Queensland and northern New South Wales, and are delivering a CSG to liquefied natural gas (LNG) major project to meet the international demand for cleaner energy.

Arrow's key priority is the safety of our employees, contractors and those people living in the communities in which we operate.

Arrow has offices located in Brisbane, Gladstone, Moranbah and Dalby.



DRILLING FLUIDS

WHAT YOU NEED
TO KNOW >

OUR DETAILS >

Find out more about Arrow's drilling processes
by contacting the project team:

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POST Arrow Energy, Replay Paid 81, Hamilton Q 4007

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ARROW IS COMMITTED TO RESPONSIBLE ENVIRONMENTAL MANAGEMENT ACROSS ALL ACTIVITIES AND THEREFORE CHOOSES DRILLING FLUIDS THAT WILL NOT HARM THE ENVIRONMENT. >



HOW IS DRILLING FLUID DISPOSED OF?

Once a well has been drilled, the drilling fluids will be removed and separated from other products before being transported to a purpose built treatment facility.

With treatment, it is possible to remove the fluids in the drilling of subsequent wells.



ARROW MANAGES DRILLING FLUIDS FROM PRODUCTION TO TRANSPORT, STORAGE, USAGE AND FINAL DISPOSAL.

WHO IS ARROW ENERGY? >

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WHY ARE DRILLING FLUIDS USED? >

Drilling fluids are used in the rotary drilling process during the construction of gas wells. Also known as mud or drill mud, the fluid has a number of functions including:

- > clearing rock fragments from beneath the bit and carrying them to the surface
- > applying sufficient pressure against subsurface formations to prevent fluids and gases from flowing into the well
- > keeping the newly drilled bore hole open until casing or lining has been cemented in place
- > cooling and lubricating the rotating drill string and bit.

Not all fluids are suitable for drilling. A drilling fluid must not cause any adverse effects on the formation being drilled, interfere with evaluation techniques or cause drilling equipment to corrode.

Arrow is committed to responsible environmental management across all stages of its activities and therefore chooses drilling fluids that will not harm the environment when used with appropriate practices and safeguards.



WHAT DRILLING FLUIDS ARE USED BY ARROW? >

Drilling fluids are classified according to their main components. Liquid drilling mud is either water-based or oil-based; gas liquid mixtures can be foams or aerated water; and gas-based mud consists of air or natural gas.

Arrow prefers to use very basic water-based mud on its rigs. The mixture consists of a large component of fresh water combined with two to three per cent of salts, which increases the mud weight and prevents natural clay in the formation from swelling. A small amount of bentonite clay may be added to coat the bore hole to stabilise the formation and prevent loss of fluid.

Arrow currently uses the following chemicals and products:

- > **Clay Stabilisers**
 - calcium chloride
 - calcium chloride anhydrous
 - potassium chloride
- > **Cement additive**
 - bentonite
 - calcium sulphate
- > **Disinfectant**
 - biocide
- > **Viscosifier** (similar to detergent)
 - FS2000
 - XCD polymer
 - NIF 20 liquid
- > **Foaming Agent**
 - tuff foam ultra
- > **Fluid Loss prevention**
 - tuff loss

Although Arrow has previously used foam drilling in the Daandine Project, there are no plans to continue this in the future. Further, there are no plans to move to oil-based mud.

HOW DOES ARROW MANAGE DRILLING FLUIDS? >

Safety is the number one priority at Arrow. The company is committed to the safety of people and the environment.

Arrow manages drilling fluids across their life cycle, from production through to final disposal including transport, storage and usage. For every product that Arrow uses, we maintain a Material Safety Data Sheet (MSDS) which contains information on safe handling of the product, first aid and toxicity. Arrow has an MSDS for every chemical purchased and used in our operations, which are kept on site. Further, regular audits are carried out to ensure all chemicals are handled and stored in accordance with regulatory safety requirements.

Arrow also adheres to strict Standard Operating Procedures (SOPs), which cover all chemical operations including transport, storage and handling. Every drilling contractor also has a safety representative to ensure chemicals are handled in accordance with the MSDS and SOPs.





SALT MANAGEMENT >

Coal seam water contains salt, the majority of which is made up of chloride, sodium and carbonates. The amount of salt depends on the location and age of the coal seam but it is typically between five and eight tonnes (5000kg-8000kg) for every megalitre (one million litres) of water. This salt is concentrated through the water treatment process.

Arrow is committed to removing all produced salt from the landscape.

Arrow's preferred strategy is for beneficial use of salt for industrial applications. Current work to investigate potential beneficial uses of salt includes:

- > crystallisation for use in industrial processes
- > use of brine in the chemicals industry.

The most common marketable salts which can be produced through the crystallisation process include sodium chloride (table salt), sodium carbonate (soda ash) and sodium bicarbonate (bicarb soda). Unprocessed brine can also be utilised in other chemical processes such as caustic soda and chlorine production.

Arrow is also investigating other disposal options for produced salt including injection into suitable aquifers and regulated waste facilities.

ARROW IS COMMITTED TO REMOVING ALL PRODUCED SALT FROM THE LANDSCAPE. >

FAQ'S ABOUT SALT >

WHAT IS BRINE?

Brine is the high salt concentrate that is produced by the desalination or reverse osmosis (RO) process, where we recover 80-90% clean water. The anticipated quality of the brine solution will be very similar to seawater which is around 30,000ppm total salt content.

HOW IS THE BRINE STORED?

Brine on site will be stored in specifically engineered storage dams that will conform to all regulatory requirements. This includes double plastic lining, leak detection and collection, and groundwater monitoring bores around the dam.

WHAT IS THE WATER QUALITY OF THE RO TREATED WATER (PERMEATE)?

Treated water or permeate is the water that has passed through the reverse osmosis membrane and has a very low concentration of impurities (ions). This water will generally need conditioning to re-establish beneficial ions so that it is suitable for reuse.

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OUR DETAILS >

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FREECALL 1800 038 856
EMAIL info@arrowenergy.com.au
POST Arrow Energy, Reply Paid 81 Hamilton Q 4007

Find out more online at www.arrowenergy.com.au
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SALT MANAGEMENT WHAT YOU NEED TO KNOW >





MANAGEMENT OF WATER AND SALT ASSOCIATED WITH COAL SEAM GAS PRODUCTION IS A SIGNIFICANT CHALLENGE



MANAGING GROUNDWATER IN THE SURAT BASIN

Arrow understands the importance of all water resources to local communities and has developed a comprehensive strategy to manage the potential impacts from our activities.



ARROW IS DEVELOPING ALTERNATIVE TECHNOLOGIES FOR EFFICIENT AND SUSTAINABLE WATER TREATMENT.

COAL SEAM GAS EXTRACTION PROCESS

Coal seams are like sponges that store both gas and water. The gas occurs naturally as a by-product of coal formation, and is held in the coal seam by the pressure of water, also present in the seam. The water pressure is created because of the depths at which coal seams occur. If this pressure is reduced, then the gas is gradually released.

The gas wells drilled by Arrow use proven construction procedures and processes, and qualified and experienced personnel. They are conducted within strict regulatory and environmental management measures. The aim is to ensure the gas well is totally isolated and secure from overlying strata and aquifers, and that no water or gas can either enter or escape from the well. The design and operation of the wells ensure that coal seam water and gas are separated at the coal seam level and are contained throughout the extraction process.

Well construction is a staged process:

- 1 Drilling through surface soil and alluvium to firm ground, with careful placement of steel casing and cement lining over this entire depth to isolate the well from overlying aquifers
- 2 Deepening the well to fresh hard rock and inserting further steel casing and cement lining of a narrower diameter than the first
- 3 Further drilling to the coal seam, placing steel casing and cement lining to the top of the coal seam.

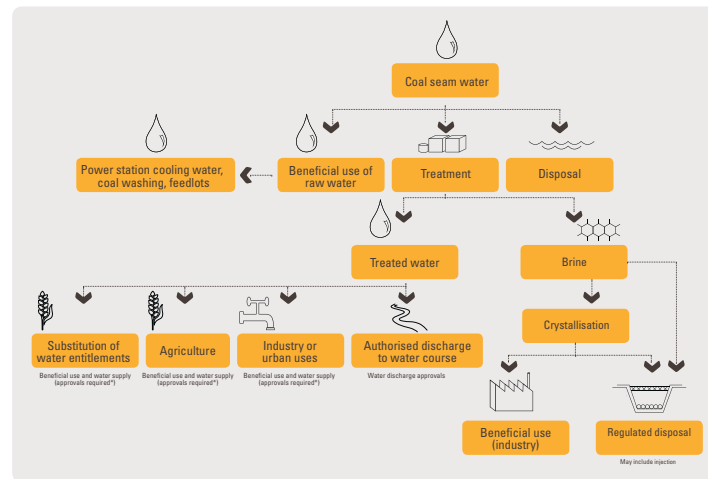
The section through the target coal seam is cased with perforated steel to allow gas and water flow. In some cases there may be a need to stimulate the coal seam to enhance the flow of gas (see Arrow's 'Fracing' Information Sheet).

Once the drilling process is complete a submersible pump and pump string are installed and water is pumped from the coal seam. The water is brought to the surface via the pump string and the gas is allowed to flow up in the space between the pump string and the casing, so the gas and water are separated at the coal seam level. At surface, the gas and water are then transported to central facilities via separate buried pipelines.

Water released from the coal is generally brackish in quality, or about one-sixth the concentration of sea water. This is caused by various minerals dissolving into the water over time.

The volume and quality of coal seam water varies between and across different coal basins and over the life of an individual well.

WATER AND SALT MANAGEMENT OPTIONS



COAL SEAM WATER MANAGEMENT

Arrow understands the importance of all water resources to local communities and has developed a comprehensive strategy to manage the potential impacts from our activities.

The aim is to offset potential impacts on groundwater levels by establishing an agreement with holders of existing groundwater allocations. 'Substitution of Allocation' agreements will provide coal seam water to substitute the volume of water currently pumped from aquifers for:

- > agricultural (irrigation, feedlots, etc)
- > industrial (coal washing, power station cooling)
- > urban use.

Water supplied by Arrow will be treated to meet specific water quality standards.

Arrow will continue to closely monitor the success of this substitution strategy and will develop alternative strategies if additional mitigation is required.

Injection of coal seam water into target aquifers is a possible mitigation strategy and Arrow is undertaking a trial in the Precipice Sandstone Aquifer. Further studies will assess injection characteristics of both deep and shallow aquifers in other areas, with the potential to include the Condamine Alluvium.

In the interim, Arrow will continue to supply coal seam water for existing approved industrial and agricultural use. The use of this water requires State Government approval.

COAL SEAM WATER TREATMENT

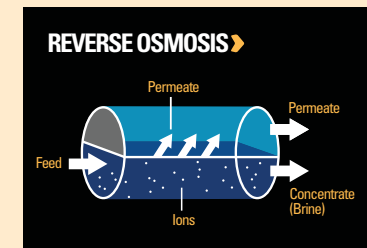
Arrow currently treats coal seam water through a process of pre-filtration and reverse osmosis (RO). During filtration water passes through fine filters that remove sediment and organic matter.

The water is then put through a reverse osmosis process (see below), where salts are removed under high pressure through a semi-permeable membrane that allows clean water to pass through while trapping most of the salts. The clean water (permeate) is available for use and the salt concentrate

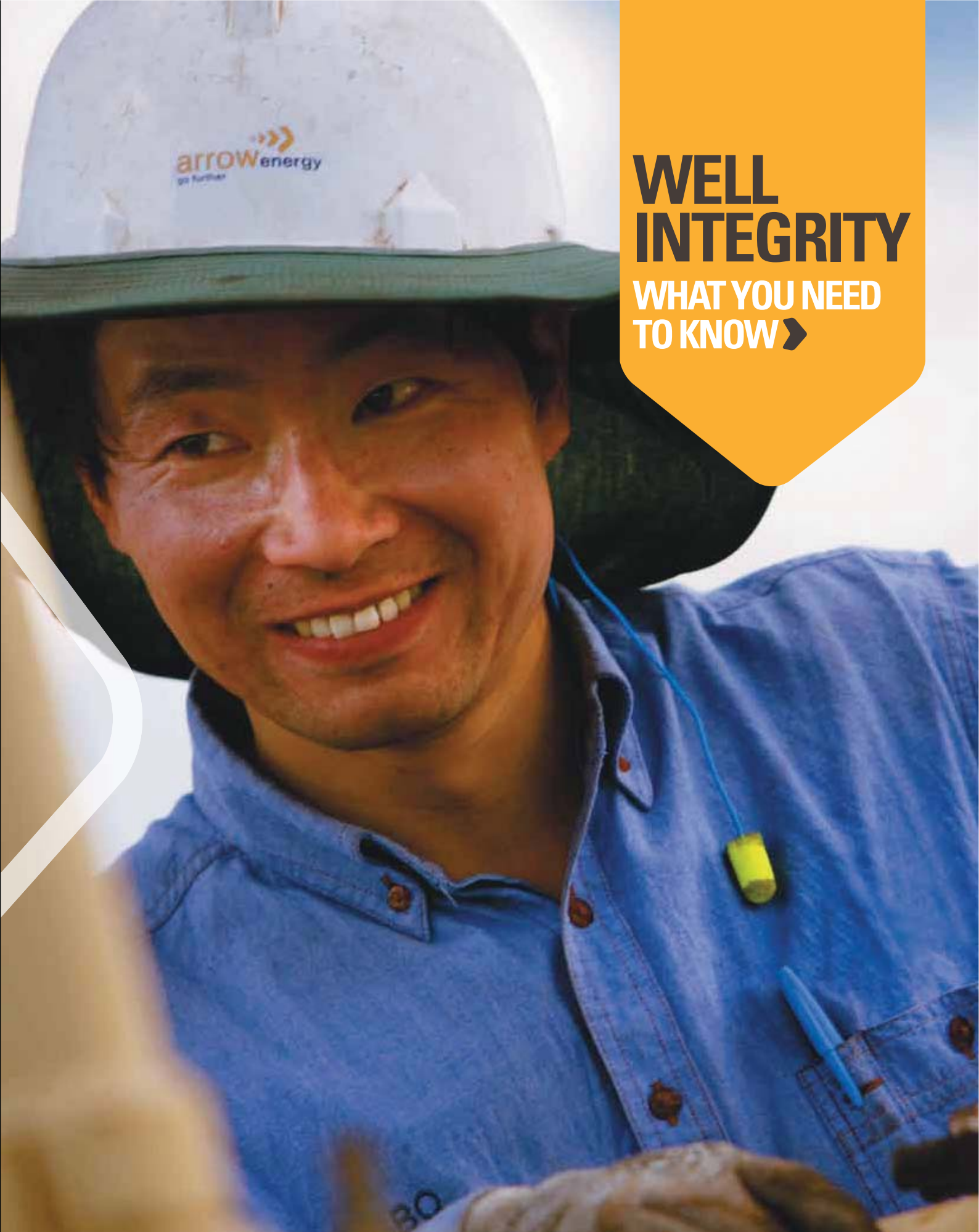
is made available for further processing.

Arrow currently operates an RO plant at Daandine in the Surat Basin, and has plants under construction at Tipton West (Surat Basin) and Moranbah in the Bowen Basin.

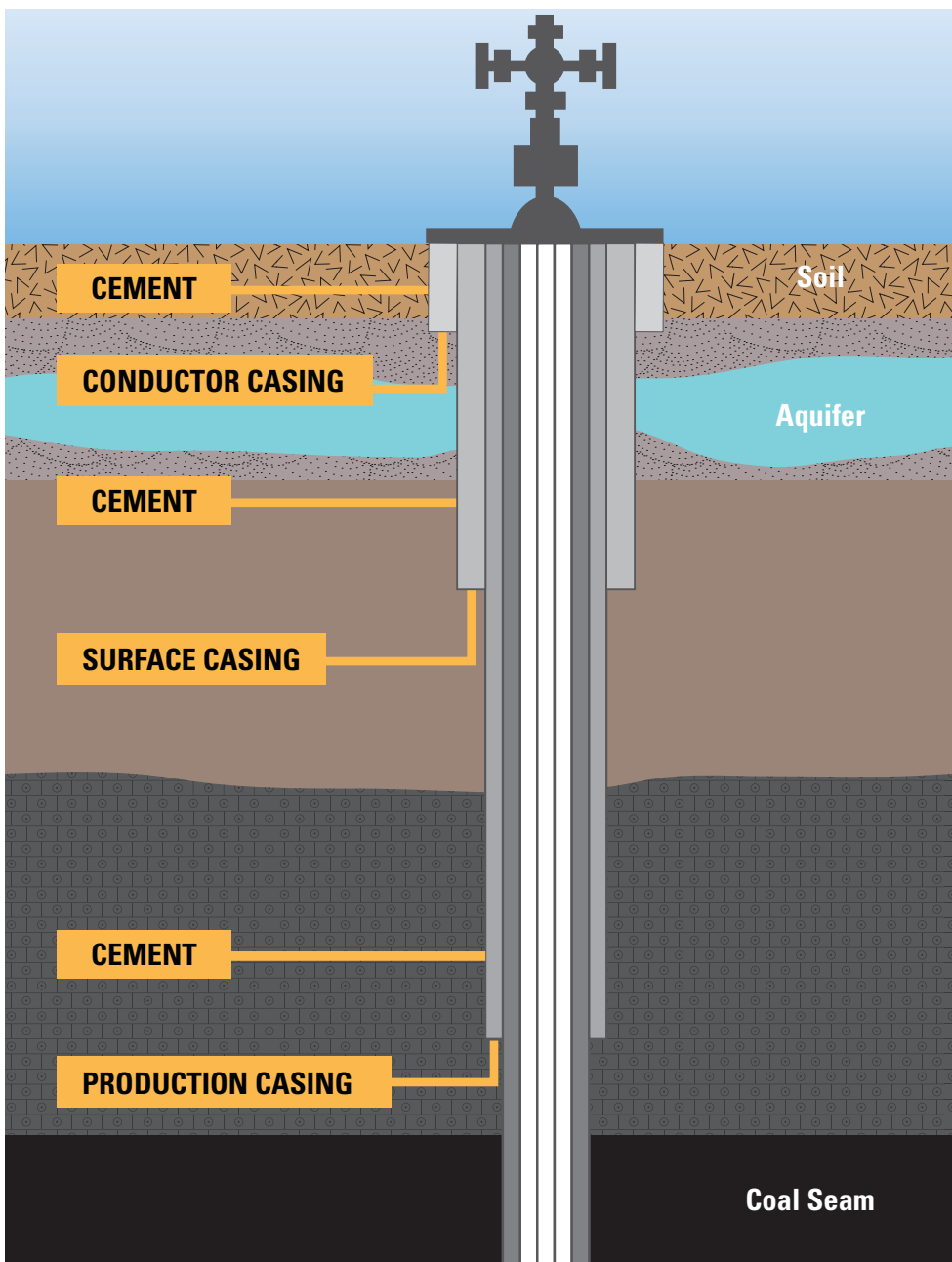
Arrow is continuing to investigate long term industry-wide solutions and alternative technologies for efficient and sustainable water treatment.



THE REVERSE OSMOSIS PROCESS THAT ARROW USES TO PURIFY COAL SEAM WATER.



**WELL
INTEGRITY**
WHAT YOU NEED
TO KNOW ▶



OUR DETAILS >

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MAINTENANCE ▶

Each well type is designed, constructed, operated, maintained and finally sealed with specific well integrity considerations in mind for each of its life cycle phases.

During production, wells are regularly checked and inspected to ensure their integrity remains unaffected. This is done through:

- › internal and external inspection to assess the corrosion rate
- › inflow test of wellhead valves
- › gas 'sniffer' test
- › casing corrosion surveys.

The frequency and details of those tests depend on the well type, its risk profile and history.

When production ceases, the well is shut down and the site rehabilitated. This process involves sealing the hole fully with cement which prevents interconnectivity, as well as isolating all down hole zones from the surface and from other adjacent formations.



CEMENT SAMPLES ARE KEPT TO DEMONSTRATE THAT THE CEMENTING PROCESS HAS BEEN SUCCESSFUL AND ACHIEVED THE DESIRED RESULT. ▶

Under legislation, when sealing a well Arrow must:

- › isolate groundwater aquifers within the well from each other and hydrocarbon zones
- › isolate hydrocarbon zones from groundwater aquifers and zones with different pressure
- › isolate surface casing or production casing from the open hole
- › place a surface cement plug in the top of the casing
- › recover or removing the wellhead.

The cement mix used to seal the wells is configured to provide strength and durability. Cement samples are kept to demonstrate that the cementing process has been successful and achieved the desired result. Arrow uses an excess volume of cement to completely fill the well when it is no longer in use, which ensures the well is fully sealed for the future.



GAS WELLS ARE FUNDAMENTAL TO THE CSG INDUSTRY – THEIR DESIGN, CONSTRUCTION AND MAINTENANCE ARE VITAL. >



WELLHEAD SYSTEMS

The wellhead systems used by Arrow are constructed of materials designed for gas production, and incorporate appropriate safeguards to maintain well integrity. The materials and products conform with Australian and international design standards. They are pressure-tested before installation, and inspected during regular scheduled maintenance program to ensure that leaks, if they occur, are identified and rectified early.

WHAT IS WELL INTEGRITY? >

Gas wells are the most fundamental part of the coal seam gas (CSG) industry. They are the means by which gas is accessed and brought to the surface. CSG companies invest a lot of time and money into drilling

gas wells and they make sure the wells are constructed and maintained to guarantee continued and maximum gas production. Arrow works hard to ensure that gas cannot leak from its wells. The safeguards used avoid costly repair work and provide security to the community and environment, by ensuring that gas and water cannot enter or escape from the well in an uncontrolled manner.

The process that ensures that CSG wells are designed, constructed and maintained to preserve full production potential for design life is known as well integrity. The term integrity is used in the sense of ensuring the well is sound, unimpaired and complete. The key elements of well integrity are:

- > design
- > construction
- > maintenance.

DESIGN >

The most fundamental design objectives of a well are that it should:

1. isolate the well from its surrounds, both above and below ground
2. contain the produced gas and water within the well.

Steel casing, cemented securely in place, is the basic mechanism used to provide this isolation and containment. This combination of steel and cement provides a strong, seamless, secure and long-lasting barrier to the movement of water and gas between the well and its surrounds.

The design of a well is planned long before drilling is undertaken. A team of drilling and petroleum engineers compile and assess geological and other technical data, such as the pressure and temperature expected within the target formation to select appropriate drilling equipment and methods. This design draws on experience gained from previous drilling in the local area, as well as established techniques, equipment and materials used in the oil and gas industry throughout the world.

The application of this expertise ensures the well is completed successfully, and that the materials used in its construction are durable and capable of providing the required well integrity.





CONSTRUCTION >

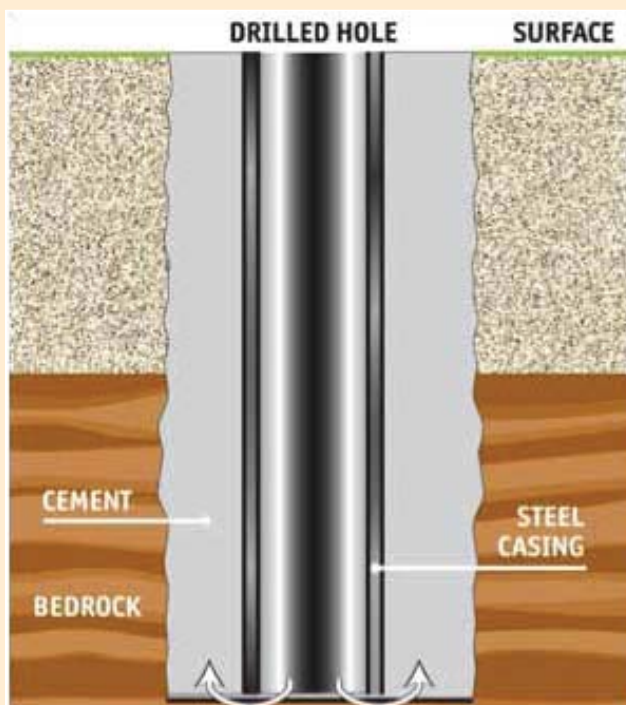
The drilling and construction of a gas well is a staged process. It is broken into several parts in recognition of the different formations that are drilled through on the way to the target depth. The well is divided into:

- > the very shallow, near surface, or conductor section which is commonly comprised of soil, sand and gravel
- > the section of weathered and weakened rock that can extend to 50m or more below ground surface, known as the surface section
- > the fresh, hard and competent rock that extends down to and includes the target coal formations, which is known as the production section (the majority of the well will be in this section)

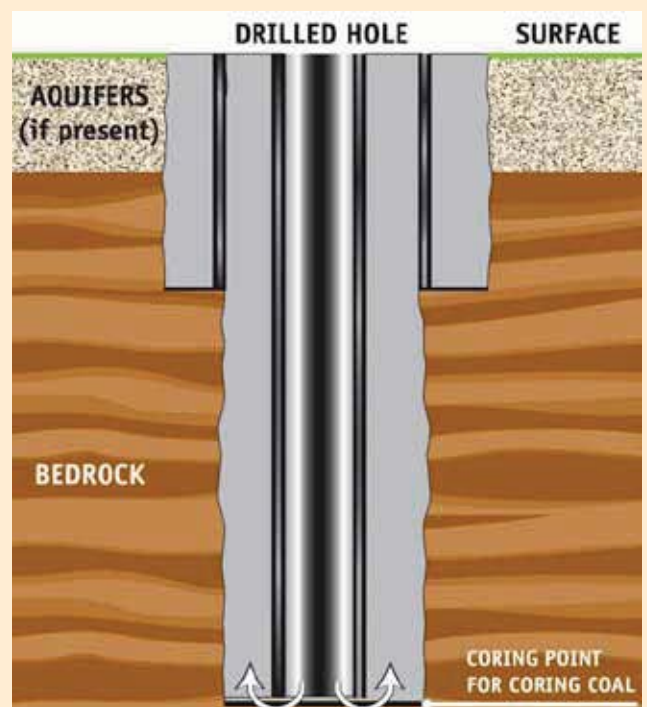
Drilling of the well is staged, with use of different sized drill bits to allow for insertion of a series of casing strings (or connected pipes).

The end result is a telescopic arrangement, with the largest casing in the conductor section, narrowing to the surface section and finally to the production section. Each of these strings is inserted into the well and pressure cemented in place before drilling of the next section commences. Upon completion, each section of casing will extend back to the surface. The final stage of well construction is the fitting of the above-ground wellhead system, which is attached to the casing and used to both pump and pipe water and gas to their respective destinations.

SURFACE CASING



INTERMEDIATE OR PRODUCTION CASING





THE DRILLING AND CONSTRUCTION OF A GAS WELL IS A STAGED PROCESS IN RECOGNITION OF THE DIFFERENT FORMATIONS BELOW GROUND.

STEEL CASING

The diameter and amount of casing inserted into a well vary, depending on:

- › actual depth of the conductor, surface and target formations (which will be confirmed during drilling by an on-site geologist)
- › aquifer depths
- › well control requirements including the key safety mechanism used during drilling of gas wells, a blow-out preventer which is secured to the casing inserted in the well
- › the expected life of the well, together with the nature of the subsurface environment in terms of pressures, temperatures, corrosion potential, etc
- › the cementing requirements and associated pressure ratings of the steel casing.

Various additional safeguards are applied in selection and use of steel casing, for example:

- › all casing is inspected, with both the diameter and length checked prior to commencing the installation to ensure there are no defects
- › safety factors are applied in casing selection to ensure that it has ample capacity to maintain well integrity and safety throughout its life. The principle safety feature in this regard is its strength, with the casing being extremely strong, and corrosion resistant
- › quality control requirements, which are included in casing supply contracts

- › casing used by Arrow, which conforms to Australian and international design standards (eg the American Petroleum Institute is the benchmark for many petroleum industry products around the world)
- › variable wall thicknesses used, generally in the order of 6.4mm. The casing is threaded, so as to ensure a water and gas tight connection between each length
- › great care is taken to prevent damage to casing and casing thread during transport and insertion in the well
- › casing centralisers are used to allow space for cement to be pumped into the well.

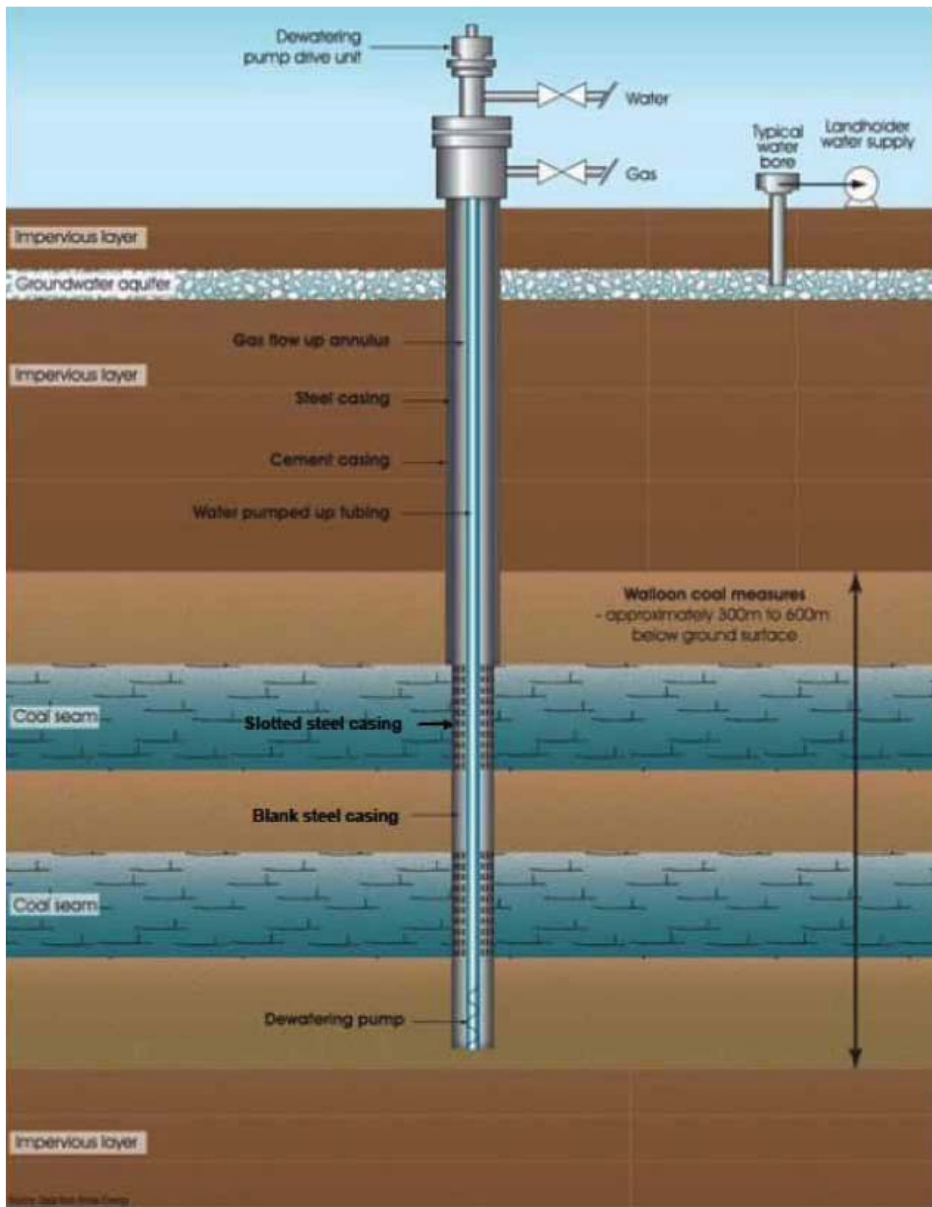
CEMENTING

The purpose of cementing the casing into place is to:

- › isolate the well and prevent the transfer of water or gas between the formation and the well
- › protect the casing from corrosive soils and/or water
- › isolate aquifers (apart from the target coal seams, which are themselves aquifers)
- › isolate non-target coal seams
- › prevent leakage.

Arrow injects cement slurry into the well and displaces this cement to the surface in the annulus between the bore of the gas well and the outer casing surface.

Excess volume of cement is used to ensure that cement returns to the surface and that a full column from base to surface is established. This provides continuous external corrosion protection over the full length of the string. Once the cementing process is completed, the installed casing is pressure tested to ensure that it does not leak. If it does leak, then remedial cementing works are conducted to plug the leak.



OUR DETAILS >

Find out more about Arrow's zonal isolation processes by contacting the project team:

FREECALL 1800 038 856

EMAIL info@arrowenergy.com.au

POST Arrow Energy, Reply Paid 81 Hamilton Q 4007

Find out more online at
www.arrowenergy.com.au
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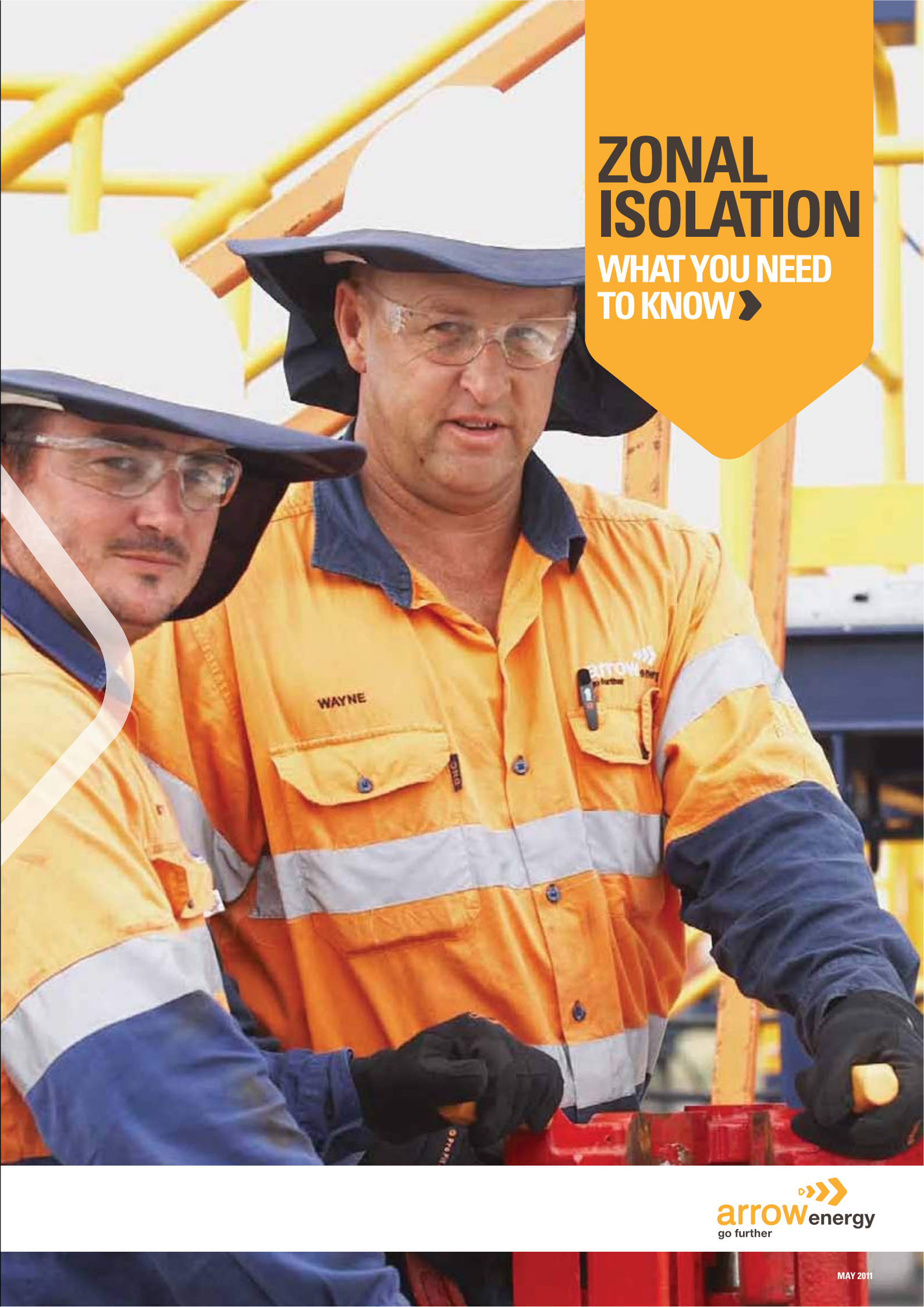


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ZONAL ISOLATION

WHAT YOU NEED TO KNOW >





CSG WELLS ARE LINED WITH CEMENTED CASING TO ISOLATE THE UPPER AQUIFER FROM THE GAS WELL.



HOW DEEP IS THE CEMENTED CASING?

The depth of the cemented casing is determined during the planning stage using standard drilling procedures, data from surrounding drill holes and close scrutiny of rock samples collected while drilling the hole.

Normally between 50m and 250m deep, the casing isolates upper aquifers and formations from the production zone which, in turn, reduces the risk of fluids moving to different zones.

“CAN YOU PLEASE PROVIDE AN EXPLANATION OF THE DRILLING PROCESS AND THE INTEGRITY OF HOLES?”

IF THERE IS INTER-CONNECTIVITY ... WILL (THE ZONES) CONNECT?”

COMMUNITY MEMBER, CECIL PLAINS INFORMATION SESSION, NOVEMBER 2010



WHAT IS ZONAL ISOLATION? ➤

Zonal isolation is the method used in coal seam gas (CSG) wells to prevent cross-flow of gas or water between different geological layers. The aim is to isolate the gas producing zone of the well from its surroundings.

CSG wells may need to be drilled through various geological layers in order to access their target coal seam or gas producing zone. The non-gas producing layers above the gas producing zone may in some cases be aquifers themselves. The standard method used to protect the aquifer in CSG wells, and indeed in oil and gas wells around the world, is to case and cement the well so as to isolate it from surrounding geological layers.

The technology used to achieve zonal isolation is very advanced and has been tested in differing and adverse conditions around the world. Various equipment and methods are used to ensure that the casing and cementing process provides zonal isolation and in doing so provides protection to nearby aquifers.

Arrow has dedicated and professional personnel who design, manage and check all aspects of our drilling and well construction processes.

HOW IS ZONAL ISOLATION ACHIEVED? ➤

Zonal isolation is achieved through the correct casing and cementing of a gas well. There a number of steps to achieve this:

1. Drilling begins from ground level through the soil, clay, sand or gravels of the shallow, near surface conductor zone, and casing is inserted and cemented in place.
2. Once the cement has set, drilling continues to the base of the weakened and weathered rock layers of the surface zone and, once again, casing is inserted and cemented in place.
3. Once the surface casing is cemented and set, drilling continues to the gas production zone. Once reached, casing is again inserted and cemented into place. The casing is pressure tested to check for leaks, in which case they are remediated immediately.

4. Perforated production liner casing is inserted into the well, so as to maintain any unstable portions of the gas producing zone.

The end result is a telescopic arrangement of casing and cement that isolates the various geological layers from the inner portion of the well. This method provides a permanent seal between the well and any aquifers that it penetrates.

The casing that is used, together with the envelope of cement in which it is sealed, ensure that the well remains intact for its production life. When the well is no longer required, Arrow removes all production equipment and liner from it, then fills it from base to surface with cement. Finally, the casing near surface is cut-off about 1.5m below ground level.



WELL CEMENTING IS A ROUTINE PROCESS THAT USES WELL ESTABLISHED AND PROVEN TECHNIQUES AND EQUIPMENT.



IS ZONAL ISOLATION EFFECTIVE? >

Zonal isolation is a proven technique used in the petroleum industry around the world. Some of the measures that Arrow takes include:

- > **Use of excess cement volumes:** Arrow always uses an excess volume of cement to allow for any losses/leakages encountered during the drilling process.
- > **Pressure Test:** After the cement has set, Casing Cement Integrity Tests are conducted under both low and high pressure to ensure the strength of the seal.

In addition, surface casing depth is regulated, including regulation of casing depth and cement quality. These regulations ensure aquifers are isolated both during production and once the well has been sealed.



CEMENTING INTEGRITY AND SAFETY >

CEMENT INTEGRITY

Cementing of oil and gas wells is an advanced science. There are many factors to be considered in the design of a well cementing program and very significant learnings are available from experiences both within Australia and around the world.

Cementing technology is constantly developing, with a strong focus on minimising the risk of cement deterioration due to, for example, corrosive agents, leaching and fluid loss from cement.

Arrow is confident that our existing practices, products and equipment already allow for a very high standard of cementing to be successfully conducted in each well.

Arrow can also draw upon the experience and support of its parent companies, Royal Dutch Shell and Petrochina, both of whom are major oil and gas production companies, for expertise and support in refining its casing and cementing practices.

CEMENT SAFETY

Arrow's first priority is the safety of our employees and contractors, and the community in which we operate.

Although cement is commonly used in the construction industry and domestic environment, it has a high alkaline content which can damage the skin if there is long-term skin exposure. Arrow has Standard Operating Procedures (SOPs) in place that govern the transporting, storing and handling of all dangerous chemicals and a Material Safety Data Sheet (MSDS) is registered with Workplace Health and Safety Queensland. Every drilling contractor has a safety representative who ensures that all chemicals are handled in accordance with the MSDS information and the SOPs.



WHERE ARE WE BASED? >

While Arrow's head office is based in Brisbane's CBD, a large number of our staff are located in our regional Queensland offices.

The teams in Moranbah, Dalby and Brisbane are responsible for our exploration activities to identify future gas reserves, the running and expansion of our existing domestic production activities and the supply of gas for Queensland's power needs.

There is also a small but growing office in Gladstone, as Arrow prepares to deliver a liquefaction plant on Curtis Island.

Arrow prefers to employ locally but we offer flexible working arrangements – including a regional locality allowance – to encourage workers and their families to be part of our regional communities.

ARROW IS RECRUITING STAFF WITH A RANGE OF SKILLS. YOU DO NOT NEED TO WAIT FOR A JOB TO BE ADVERTISED WITH ARROW – YOU CAN REGISTER YOUR EXPRESSION OF INTEREST ONLINE. >

WHO IS ARROW ENERGY? >

Arrow Energy is one of the largest integrated energy companies in Australia with five gas producing projects and interests in three gas-fired power stations. Arrow currently provides 20 percent of Queensland's energy needs through coal seam gas (CSG).

In 2010 Arrow was acquired by Royal Dutch Shell and PetroChina in a 50/50 joint venture partnership.

We are currently expanding our CSG exploration activities across Queensland and northern New South Wales, and are delivering a CSG to liquefied natural gas (LNG) major project to meet the international demand for cleaner energy.

Arrow's key priority is the safety of our employees and those people living in the communities in which we operate.

Arrow has offices located in Brisbane, Gladstone, Moranbah and Dalby.

WHAT OUR STAFF SAY... >



"What attracted me to Arrow was the opportunity to be a part of an organisation that's a leader in the resources sector and has a strong commitment to safety, community and sustainability." **Sarah Briggs, Graduate Community Officer, Brisbane**



"A large part of the reason that I've stayed at Arrow for so long is that it's a local company, employing local people, with stakes in the local community – we simply have global goals. Arrow has supported me in my engineering degree as well as countless other training and education opportunities. I've been taught a lot during my time from labourer to manager." **Tobias Burwood, Tipton West Production Superintendent, Dalby**



"I was attracted not only by Arrow's competitive remuneration and benefits package, but the opportunity to be involved in a company that's growing. There are many career opportunities here and I believe Arrow is fast becoming an employer of choice." **Shirley Walk, Health and Safety Field Advisor, Moranbah**

CONTACT

Recruitment, Arrow Energy Pty Ltd

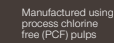
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► Find out more online at www.arrowenergy.com.au/careers
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WORKING AT ARROW ENERGY

WHAT YOU NEED TO KNOW >





ARROW IS EXPERIENCING A PERIOD OF TREMENDOUS GROWTH. AS WE EXPAND OUR OPERATIONS, YOU TOO CAN BROADEN YOUR HORIZONS. ▶



GRADUATE PROGRAM

Our graduate program includes specialist activities such as:

- ▶ on-the-job discipline-related training
- ▶ skills training in the three critical areas of technical, business and personal
- ▶ mentoring by the Leadership Team
- ▶ coaching in the technical discipline by experienced staff.



ARROW IS KNOWN FOR ITS HIGH PERFORMANCE CULTURE THAT EMBRACES DIVERSITY AND REWARDS HARD WORK. YOU CAN SHARPEN YOUR TALENTS, LEARN NEW SKILLS AND MANAGE YOUR OWN DEVELOPMENT.

WHY CHOOSE ARROW ENERGY? ▶

Arrow is a leader in the coal seam gas industry and to maintain that position we are committed to recruiting the best people. We know that quality employees often have a number of options, so we offer a range of benefits to help us attract and retain staff. Benefits include:

- ▶ an attractive remuneration package
- ▶ flexible hours allowing one Friday off per month
- ▶ the opportunity to purchase an additional two weeks leave per year
- ▶ a paid parental leave scheme
- ▶ up to \$3,000 per year towards superannuation, health insurance, income protection, and death and disability insurance
- ▶ salary sacrificing your electricity bill up to \$1,300 per year
- ▶ a wellbeing and leisure program, with benefits such as discounted gym membership
- ▶ regional locality benefits.



EDUCATION AND TRAINING

Arrow is committed to providing staff with the skills they need to effectively operate in their day-to-day employment. We strive to develop the knowledge base of all employees through the delivery of quality training programs and offer development opportunities throughout a person's career, whether starting out as a graduate or moving into senior management.

Management Development Programs

These in-house programs are designed to develop the managerial skills of employees moving into higher level positions within the organisation.

Specialist Training

Arrow provides specialist training in each employee's area of expertise to ensure they keep up-to-date with developments.

Environmental Health and Safety Training

Ensuring the safety of employees and contractors is the company's number one priority and as such, employees will have training provided for the Environmental Health and Safety requirements of their role.

External Education Programs

Approved applicants can be fully reimbursed the annual expenses of their course upon the successful completion of external programs leading to higher educational qualifications.

Vocational/Trade Training

Arrow encourages people working in vocational areas to gain nationally recognised qualifications and provides them with the opportunity to do so.

Graduate Development Program

This program aims to provide a planned development path for newly degree-qualified employees that allows them to become professionals in their chosen disciplines.

Scholarships

Arrow offers four-year scholarships for first year university students who want to pursue a career in the coal seam gas industry.



Vacation Employment

Specifically designed for undergraduates in their second last year of study, this program provides 12 weeks' paid employment within the company.

School Based Training

Arrow has programs for Year 11 and 12 students in Dalby and Moranbah who want to gain vocational qualifications at the certificate II level.

START YOUR CAREER AT ARROW

Arrow is committed to attracting and developing quality graduates who will ensure the company's success into the future.

Applications are accepted in the accounting/finance, business/commerce, engineering, environmental science, geoscience and information technology disciplines and open in September of the year prior to work commencing. To be eligible, you must be graduating before January of the intake year and have graduated no more than three years previously.

Arrow also offers scholarships to high quality university students. Scholarship recipients are selected from approved

Australian universities during the first semester of their first year in Bachelor of Engineering or Bachelor of Geoscience degrees, receive financial assistance throughout their programs and priority for paid vacation employment at Arrow.

While all students are welcome to apply, there is a particular focus on recruiting students from Dalby, Gladstone, Moranbah and the surrounding regions.

In addition to these programs, Arrow offers a range of 12 week vacation employment opportunities to students about to enter their final year of tertiary studies.

Appendix 41

Banners - Phase 4



WHAT DOES 'MAKE GOOD' MEAN? ➤

Arrow Energy will 'make good' any situation where it is proven that our activities have contributed to the capacity of a water bore being impaired and the bore is no longer able to supply water for its authorised purpose. Options that will be considered include:

- lowering the pump within the existing bore
- deepening a bore
- changing a pump
- reconditioning a bore
- drilling a new bore
- providing an alternative water supply
- other forms of compensation.

'Make good' arrangements will be agreed between Arrow Energy and the owner of an affected water bore. This will reflect the magnitude of any demonstrated impacts.



The 'make good' agreement provides for:

- the outcome of the bore assessment
- if the bore has or is likely to have impaired capacity, in which case, 'make good' measures are also required.

WATER AND SALT

Responsible management of water and salt associated with coal seam gas production is one of the most significant challenges currently facing the industry.

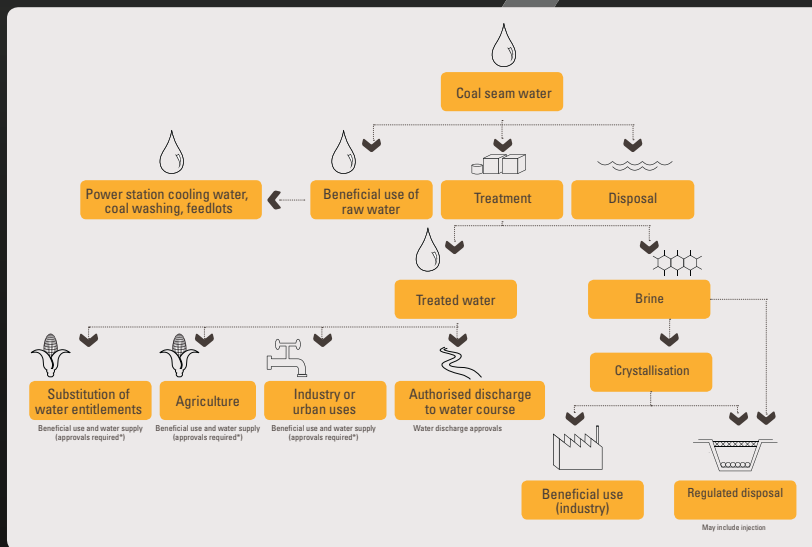
Coal seam water is pumped from coal seam gas wells, lowering the water pressure in the coal seam and allowing the gas to separate from the coal and flow into the well.

The volume and quality of coal seam water varies between and across different coal basins and over the life of an individual well.

For example, similar volumes of gas production in the Bowen Basin in Central Queensland are producing 1/10th the volume of water compared to the Surat Basin.

Coal seam water in the Surat Basin has been shown to range between brackish to salty, and on average is about 1/6th the concentration of sea water.

Arrow's preference is to identify a beneficial use for produced water and salt.



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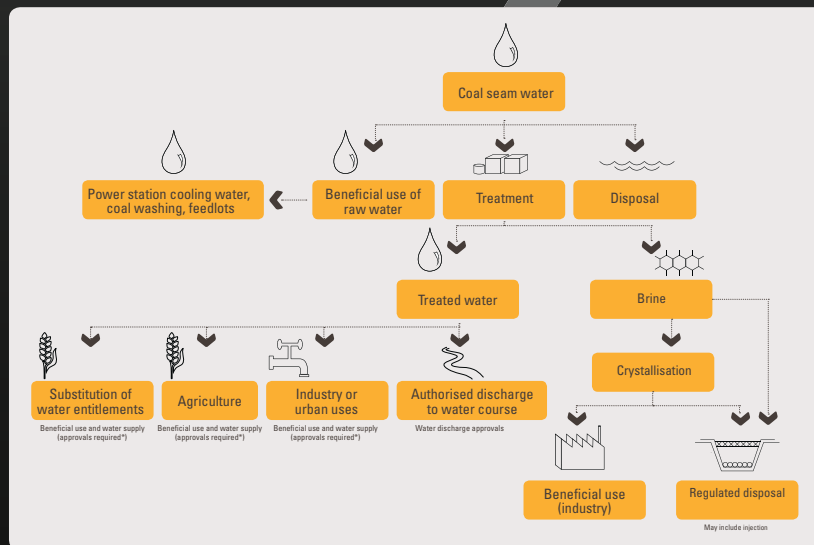
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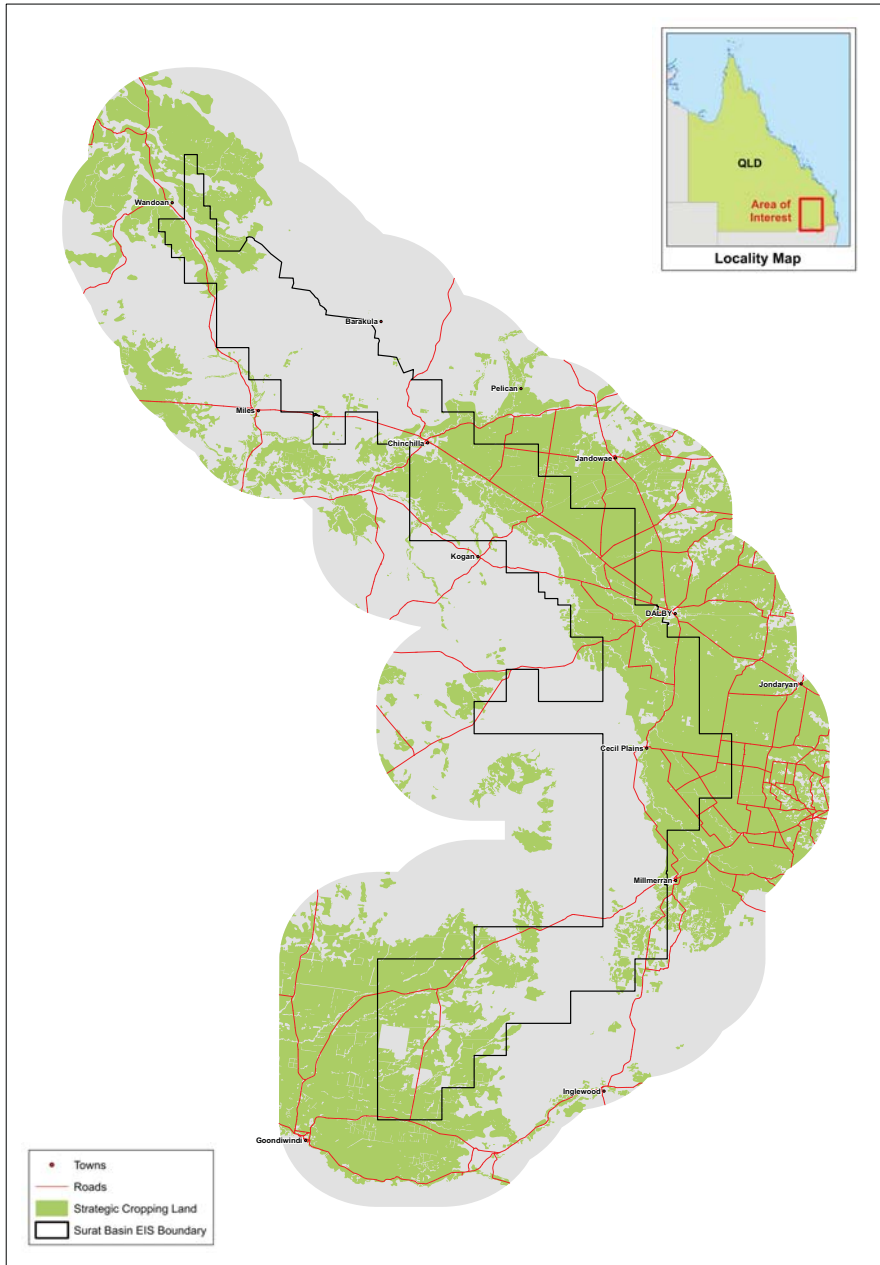
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Arrow's preference is to identify a beneficial use for produced water and salt.





STRATEGIC CROPPING LAND





CO-EXISTENCE WITH STRATEGIC CROPPING LAND ▶

Arrow recognises that it must demonstrate the ability to co-exist with the agricultural industry on Strategic Cropping Land.

WE HAVE COMMITTED TO:

Exploration and Appraisal

- ▶ Pitless drilling trials to commence in 2011
- ▶ Specific project management including dedicated rig and crew on land that is intensively farmed
- ▶ New mobile wash down units
- ▶ Review of drilling fluids/lubricants for use on land that is intensively farmed
- ▶ Seismic activity to define the limits of coal and allow the excise of areas that will not be affected
- ▶ Time-lapse photography for review and training as agreed with landholders
- ▶ No fracking on existing Surat Gas Project area

Field Development

- ▶ Evaluate drilling of up to eight wells from a single well pad to reduce footprint and associated infrastructure
- ▶ Increase well spacing (160 to 320 acres: 0.8km to 1.5km)
- ▶ Be flexible in well locations
- ▶ Study ways to reduce gathering system pipe diameter and potential for alternative construction method to preserve soil profile
- ▶ Negotiate with landholders for three field development case studies on intensively farmed land (various farming practices)

Major Pipeline Development

- ▶ Demonstration trial of constructing and restoring a transmission pipeline on intensively farmed land
- ▶ Trial to commence on Jimbour Flood Plain in 2011
- ▶ Trial would use world leading practice to demonstrate that:
 - ▶ soils can be removed and replaced in layers to maintain the existing soil profiles
 - ▶ the area can be rehabilitated with precision to minimise impacts on farming businesses

Water Management

- ▶ Drilling of 20 – 50 water monitoring bores planned for 2011
- ▶ Working with Surat landholders on a Substitution of Allocation solution as Arrow's preferred solution
 - ▶ Based on a commercial agreement with landholders
 - ▶ Potentially could account for 100 per cent of water management over the Surat Basin

Land Access

- ▶ Access and safety inductions tailored for intensively farmed land
- ▶ Single contact within Arrow for each individual landholder
- ▶ Restricted personnel access
- ▶ Development of wet weather access rules

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brighter futures
arrow energy in the community

INVESTING IN OUR SHARED FUTURE

Arrow Energy's community investment program *Brighter Futures* is enhancing the quality of life and creating shared value for the communities where we live and operate.

The three key focus areas are:

- health and safety
- education
- environment.

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ARROW ENERGY CAREERS

Arrow Energy is known for its high performance culture that embraces diversity and rewards hard work.

Benefits include:

- › An attractive remuneration package
- › Flexible hours allowing one Friday off per month
- › The opportunity to purchase an additional two weeks leave per year
- › A paid parental leave scheme
- › Up to \$3,000 per year towards superannuation, health insurance, income protection, and death and disability insurance
- › Electricity bill rebate up to \$1,300 per year
- › A wellbeing and leisure program, with benefits such as discounted gym membership
- › Regional locality benefits
- › Comprehensive training and development program.

View jobs online at: www.arrowenergy.com.au, www.seek.com.au and www.careerone.com.au

WHAT OUR STAFF SAY

"What attracted me to Arrow was the opportunity to be a part of an organisation that's a leader in the resources sector and has a strong commitment to safety, community and sustainability." **Sarah Briggs, Graduate Community Officer, Brisbane**

"Arrow has supported me in my engineering degree as well as countless certificates and other training courses. I've grasped many learning opportunities and been taught a lot during my time from labourer to manager." **Tobias Burwood, Tipton West Production Superintendent, Dalby**

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OUR COMMITMENTS TO YOU >

- › Improved community and landholder engagement
- › An open and honest dialogue about issues and opportunities with our stakeholders
- › Engagement with landholders at least six to 12 months prior to production drilling
- › Adoption of a standard approach to compensation and land access
- › No development in intensely farmed areas until concerns are properly addressed
- › No construction of dams for coal seam gas water or brine on intensely farmed areas
- › Use of surface tanks, not pits, when drilling production wells on black soil
- › Development of a robust groundwater monitoring regime
- › Prompt response to bore owners who report a reduced water supply
- › Construction of 'fit for purpose' dams to government standards
- › Removal of produced salt from the landscape
- › Working with regional communities to maximise community benefits and opportunities for local businesses
- › Location of wells and infrastructure away from homes in consultation with landholders (minimum 200 metres)
- › No hydraulic fracturing (fracking) in the area of the Surat Gas Project

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ARROW ENERGY

BUSINESS OPPORTUNITIES

Opportunities for Local Business

› Business vendor register

– interested suppliers, subcontractors and service providers are invited to register their interest and provide detailed company profiles by obtaining a Vendor Approval and Evaluation Form from the company's website at www.arrowenergy.com.au under 'Contact Us'

Successful construction contractors will be given details of prequalified Australian and local area suppliers, subcontractors and service providers on the Arrow Energy business vendor register.

› Industry Capability Network Queensland (ICN)

– assists Australian businesses to maximise opportunities that arise from purchasing requirements from both Government and private sectors, particularly in major project infrastructure and industrial projects. ICN allows businesses to register their services. Arrow Energy refers to the ICN database for potential suppliers in the area. Further information is available at www.icnqld.org.au

› Specific local area business assistance

– during the detailed planning phase, Arrow Energy's Contracting and Procurement Department will proactively engage with the local business community to ensure opportunities to supply goods and services are effectively communicated

Arrow Energy's Supply Department will also organise specific information sessions to inform the local business community of details required to complete tender requirements such as safety management and quality management plans, insurances and demonstration of capacity.

Contract and Procurement staff are available to talk one-on-one at many of Arrow Energy's community consultation sessions. For more information on these sessions, visit our website.

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DRILLING PROCESS

BEFORE

- › Discussions on access and compensation with landowner and/or occupier
- › Surveying and pegging of the site
- › Inspection and assessment of the proposed site for its cultural heritage and environmental values
- › Establishment of site access and site clearing (including digging of ground pits).

DURING

- › Drilling rig and supporting equipment used to drill the well to target depth (generally less than 800m deep)
- › Transport of casing, cement, water and other supplies required for drilling
- › Well testing.

AFTER

- › Upon completion of drilling and testing all pilot production, the well is sealed, which involves filling it with cement and cutting off the casing about 1-1.5m below ground
- › The site is rehabilitated (ie ground pits are emptied of fluid and then back-filled)
- › A well completion report is prepared and provided to the State Government, detailing all relevant information about the well.



EXPLORING FOR A CLEANER SOURCE OF ENERGY >

Arrow Energy is exploring for coal seam gas across Queensland and northern New South Wales.

Exploration is conducted under an Authority to Prospect and has three basic steps:

DEFINING THE COAL SEAM STRUCTURE

The first step is confirming the presence, depth and extent of the coal seams, which is done using seismic and/or the drilling of holes.

DEFINING THE COAL SEAM RESERVOIR CHARACTER

Exploration drilling determines whether gas is present in the coal seam. Once a coal seam is found, the next step is to determine whether it holds gas by taking core samples.

TESTING THE PRODUCTION POTENTIAL

The third and final step in exploration is to prove that gas can be extracted from the coal seam. This is done by pilot testing, where a series of close-spaced wells are drilled and brought into production for a trial period.

Exploration seeks to find gas and prove that it can be recovered. There are a number of regulatory and commercial approvals required before a gas resource can move into the project development and production phase, including obtaining an Environmental Authority, Native Title resolution and granting of a Petroleum Lease.