ARROW ENERGY UPDATE COMMUNITY INFORMATION SESSIONS SEPTEMBER 2018

Arrow Energy update
Community information session 4-5 September 2018

Introduction

In September 2018, Arrow Energy (Arrow) held a series of community information sessions to provide an update on Arrow's Surat Gas Project and Gas Sales Agreement with QCLNG.

Following a formal presentation, attendees were invited to ask questions of Arrow staff members.

These notes reflect the questions asked and answers provided during the information sessions. While the notes include some paraphrasing and summarising, every effort has been made to preserve the integrity of the discussions.

Information sessions were held on 4 and 5 September 2018, and included formal presentations and question and answer sessions. An informal community drop-in session was held in Miles with no formal presentation. Information sessions were held as follows:

Cecil Plains	4 September 2018	Presentation, questions and answers
Dalby	4 September 2018	Presentation, questions and answers
Chinchilla	5 September 2018	Presentation, questions and answers
Miles	5 September 2018	Drop in session with one-on-one conversations

A copy of the presentation is available on the Arrow website: **www.arrowenergy.com.au**

How to read these notes

Questions and comments from the audience are in bold type, with the responses from Arrow staff also provided. In some cases responses have been summarised. In others, additional information is included to provide further context or explanation. This information is italicised following the answer.

If you have questions or comments about the project or these meeting notes, please contact the project team during working hours on:

Freecall: 1800 038 856
email: info@arrowenergy.com.au

Acronyms

OGIA – Office of Groundwater Impact Assessment
UWIR – Underground Water Impact Report
QGC – Queensland Gas Company
CCA – Conduct and Compensation Agreement
LNG – Liquefied Natural Gas
CSG – Coal seam gas
ATP – Authority to Prospect
PL – Petroleum Lease
SGP – Surat Gas Project
EIS – Environmental Impact Statement
SREIS – Supplementary Report to the Environmental Impact Statement
DNRME – Department of Natural Resources, Mines and Energy
IAA – Immediately affected area
IFL – Intensively Farmed Land
AWP – Area Wide Planning

Legislation

Regional Planning Interests Act 2014 (Regional Planning Act)
Water Act 2000 (Water Act)
Petroleum and Gas Act 2004 (P&G Act)
Environmental Protection Act 1994 (EP Act)
Coal Seam Gas Water Management Policy 2012

Date:	4 September 2018
Time:	11.30 am – 1.30 pm
Venue:	Cecil Plains Memorial Hall
Presenters:	Dave Wolf – Project Manager Offplot, Arrow Energy Nathan Blundell – Surat Front End Development Manager, Arrow Energy Simon Gossmann – Groundwater Manager, Arrow Energy Brydie Hedges – Community Engagement Manager, Arrow Energy
Facilitator:	Leisa Elder – Vice President, External Relations and Tenure Management, Arrow Energy

1. **In the well count, do deviated wells count as one well?**

   Each individual well is counted regardless of whether it is on a multi-pad or single pad e.g. a six well multi-pad and a single well vertical pad would be counted as seven wells in total.

2. **What are the hours of operations and traffic/work times on Broadwater Road?**

   Arrow will have traffic management plans in place for Broadwater Road and contractors will be expected to comply with speed limits. Lower speed limits may be put in place to help with traffic management in busy times. 100-120 truck movements are to be expected for the construction period over 18 months. Traffic will be during daylight hours, 6 am-6 pm. Drilling operations may be 24 hours.

3. **Is water offset provided back to the area that was impacted?**

   Yes, offsets will go back to the area from where water was drawn.

4. **How would Arrow pump the water back?**

   The water will be pumped back through a new 50 km pipeline to be constructed.

5. **What about the water quality, will the quality be impacted?**

   Arrow is removing water from the ground. The same process and mechanisms are used when constructing water bores. Arrow does not need to stimulate the coal seam through hydraulic fracturing. The methods used are engineer designed and not high risk. Gas flows up and the wells are designed and spaced to be the most attractive space to which the gas will flow.

   The key objective of the Plainview Pilot project is to measure baseline soil gas. Soil gas monitoring sites have been installed to collect ongoing data. The project is currently underway. Arrow takes the issue of gas migration very seriously.

6. **It would be good for people to be able to visit the Plainview Pilot as there's intense interest in the work.**

This pilot is in a very visible location near a public road.

Plainview Pilot is located on a private property. While the pilot is visible from the public road, we encourage people to be respectful of private property.

7. How is Plainview Pilot powered?

Plainview Pilot is powered by an Ergon connection at the request of the landholder. This is not the standard design for Surat Gas Project which will maintain flexibility in power options between reticulated power and gensets considering landholder and engineering constraints.

8. Would you expect more noise from a multi-well pad?

Multi well pads are using down hole pumps which will actually reduce the noise generated. Genset design has contributed to making the newer well pads quieter. Noise studies have been carried out as part of our EIS commitments.

9. How long does Plainview Pilot run for?

Plainview Pilot will form part of the future operations. It will be gathered to the existing Tipton field and will continue to be used for long term production.

10. Does Arrow still have tenure south of Cecil Plains and what are plans for that area?

Arrow has a Potential Commercial Area (PCA) application for the area just to the South of Cecil Plains. This application is in preparation for longer term development plans, 12-15 years away.

We have 10 PCA applications.

Areas are more likely to be under a PCA as we step away from our core tenure.

11. Does Arrow have plans to surrender that tenure?

No. A lot of work has been carried out to determine where the gas is. We are working hard to give landholders certainty around our development plans.

12. When will development occur around Cecil Plains?

The areas mapped in orange will be the first areas to be developed (refer to maps available in presentation material).

There are uncertainties with CSG development. We cannot provide exact timeframes but, each phase has a 4-5 year window.

The overall footprint has been reduced from earlier Surat Gas Project plan and the staged development allows us to minimise our impact; we can take our time and be more selective in the areas we develop rather than approaching it wide and quick.

13. How do you work out how to phase areas?

Generally we will develop close to the delivery point and then gradually move away. The shading represented in the maps is indicative on how we plan to develop the areas. The areas may change once we start to engage landholders.

14. Can Arrow produce a map with the Horrane fault shown as an overlay to the development plans?

Yes. We have provided maps which can be sourced on our website – https://www.arrowenergy.com.au/community/community-engagement.

15. Where will the Field Compressor Station (FCS) 8 at Lynwood be located, and why have nearby neighbours not been told before now. Where is the engagement with landholders?

Planning is still progressing, with the exact location of the FCS still to be determined. The proposed location will take into consideration the Environmental Authority conditions and any non-technical impacts.

Landholders in the area will be engaged as part of Area Wide Planning, which is our program to incorporate landholders' knowledge into our field development plans.

We will work together with landholders to identify locations for infrastructure. Area Wide Planning forms part of Arrow's compliance with the Regional Planning Interests Act.

16. How far from wells do facilities have to be?

Wells need to be within approximately 40 kilometres from the compression facility but there is no hard and fast rule for this.

17. On a multiwell pad, how many well heads will there be? How many wells go through the Condamine Alluvium? How far do deviated wells go?

Deviated drilling involves drilling multiple, deviated wells from one surface location resulting in a 'multi-well pad'. The benefits include a smaller over-all footprint (between 25-50 per cent of a traditional vertical well field design), including:

- up to 8 wells located on one pad with a construction size of up to 110 x 200 metres, instead of 8 separate well pads of 110 x 100 metres
- greater distance between pads (up to 2.4 kilometres)
- less gathering pipelines and access required
- Arrow's presence (infrastructure and access by staff) is concentrated within a smaller area
- well pads can be located in paddock corners and less productive areas for a better fit with farming practices.

18. How can you vouch for the integrity of the wells in the black soil?

Arrow adheres to strict design and management procedures which are enforced through Government legislation.

Once drilled and steel casing is installed, both deviated and vertical wells are cemented using a pressure cement technique.

Cement is pumped down the inside of the well, and up the outside of the casing, between the casing and the formation, to ensure all aquifers and other formations are isolated from each other.

The expected life of a well pad from 'on pump date' to final abandonment is approximately 20 years. Wells are monitored and maintained throughout their life to ensure well integrity remains intact.

19. How far is the deviated drilling distance?

To construct a deviated well, a vertical section is drilled from the ground surface to a depth of between 50 and 120 metres.

The drill is then rotated so it slants away from other wells on the same pad. The deviated section of the well reaches coal seams to a vertical depth of around 600 metres. The bore can reach up to 800m horizontally away from the pad.

20. How long will Arrow be accountable for water substitutions and "make good" agreements?

Under the provisions of the Act, the company is accountable for a 100 year period to have effective "make good".

21. Is the intention of the Beneficial Use plans to provide water in lieu of allocations?

Yes, the details around beneficial use plans are still being designed. We will have further information to share in 2019.

As part of our Gas Sales Agreement, we have specified that the water we produce must go back to the area from where was drawn, as far as practicable.

Date:	4 September 2018
Time:	5.30 – 7.30 pm
Venue:	BMO, Drayton Street, Dalby
Presenters:	Dave Wolf – Project Manager Offplot, Arrow Energy Nathan Blundell – Surat Front End Development Manager, Arrow Energy David Wiggington – Produced Water Manager, Arrow Energy Brydie Hedges – Community Engagement Manager, Arrow Energy
Facilitator:	Leisa Elder – Vice President, External Relations and Tenure Management, Arrow Energy

1. What is the process for well decommissioning?

To plug and abandon (P&A) a well, Arrow digs down to 1.5 metres below the surface, cuts and caps the well head, and concrete fills the void. The pipelines stay in-situ and all surface infrastructure is taken away.

2. Does a deviated well become a horizontal well? How do you decommission a deviated well?

To construct a deviated well, a vertical section is drilled from the ground surface to a depth of between 50 and 120 metres.

The drill is then rotated so it slants away from other wells on the same pad. The deviated section of the well reaches coal seams to a vertical depth of around 600 metres. The bore can reach up to 800m horizontally away from the pad.

The same plug and abandon method is used to decommission a deviated well.

3. Please explain beneficial water re-use.

Arrow will aim to beneficially use treated water within the region it is produced, provided appropriate existing end uses are available.

Arrow will have insufficient water production to support new industries. We do however remain committed to offsetting any impact it has on the Condamine Alluvium and to maximising beneficial use of its treated CSG water.

Our plan is to return a portion of treated water from QGC treatment facilities to users with Condamine Alluvium allocations in order to achieve this commitment (the Beneficial Use Network).

4. What if you do have excess water – can landholders apply to use water?

We will look at demand versus supply and that may change over the years.

5. What does Arrow do with the waste water from reverse osmosis? Is all the water treated through reverse osmosis?

There are a small number of users who currently take untreated water from Arrow, but the majority of water is treated using reverse osmosis. The treatment process results in a salty water (brine) stream and a treated water stream.

Brine is currently stored in brine dams until there is sufficient volume to allow further processing. The current base case, as per the Surat Gas Project Supplementary Report Environmental Impact Statement (SGP SREIS), is to crystallise the salt and dispose in a purpose-built encapsulation facility (landfill); however opportunities to beneficially re-use salt will continue to be investigated.

6. **How can you say that there's no impact/damage to the Great Artesian Basin when through make good agreements you are pushing users to the Huttons (accelerating the drop in the Huttons)?**

The GAB is a very large system; we need to look at CSG impacts on the system in context of the entire system.

The Hutton is a deep, large reservoir with a large available drawdown. There may be impacts but it will not be permanently damaged. The management of the GAB system is a matter for DNRME.

Date:	5 September 2018
Time:	5.30 – 7.30 pm
Venue:	Chinchilla Cultural Centre
Presenters:	Dave Wolf – Project Manager Offplot Nathan Blundell – Surat Front End Development Manager Simon Gossman – Groundwater Manager, Arrow Energy Brydie Hedges – Community Engagement Manager, Arrow Energy
Facilitator:	Leisa Elder – Vice President, External Relations and Tenure Management, Arrow Energy

STATEMENT: It is important to inform the community about flaring. We recently experienced very visible flaring for two days from another proponent, with no community notification.

Arrow is committed to keeping the community informed of planned and future activities.

We regularly update our website with project activities.

Prior to planned flaring, Arrow also notify nearby neighbours through mail-outs and email notifications.

Residents are encouraged to log onto the Arrow website and register to receive email notifications to find out about planned maintenance and construction activities in their area.

1. How deep does coal need to be for deviated wells on multi-well pads?

Arrow has committed to multi-well pads and deviated wells on intensively farmed land, where geology allows.

Multi-well pads require deeper coals (from approximately 450 metres) to enable the drill head to rotate and deviate within the coal seam.

Land Liaison Officers will provide detailed information including coal depths when they engage landholders as part of the Area Wide Planning process.

2. Where does Arrow's produced water from here [Chinchilla area] and Miles end up?

Arrow is committed to maximising beneficial use of its treated CSG water. Arrow plans to continue to utilise the existing Daandine and Tipton water treatment facilities. Remaining water will be treated at QGC's Kenya water treatment facility. Where possible, Arrow aims to beneficially use water within the region from which it is produced.

In some areas, there are insufficient existing water use options to enable this to occur. Treated water will be returned to the area of the Condamine Alluvium for beneficial use through substitution of Condamine Alluvium allocations (in order to achieve Arrow's commitment to offset its impact to the Condamine Alluvium).

Remaining water will be beneficially used in the area south of Chinchilla via the QGC/Sunwater pipeline.

STATEMENT: Underground water systems cannot sustain the use. I believe there will be no underground water left in 30 years' time. I don't believe what your hydrogeologist says.

3. **Why can't we have Heart of Australia in Chinchilla? We don't want to travel 80 kilometres to Dalby.**

   Arrow can make a suggestion to the Heart of Australia service.

4. **I don't think it's fair to say that there will be no impact to the GAB. There will be impacts on the Huttons and Springbok systems. I think Arrow needs to make a distinction between the impacts on the Great Artesian Basin versus the Condamine Alluvium.**

   There will be impacts to the Hutton system from the CSG industry. These impacts will be in addition to any impacts that are non-CSG related. A 10-15 metre drawdown to the Hutton sandstone (which is 500-600 metres deep) will not render the aquifer unusable.

   There will be some areas of the Walloon Coal Measures that you will not be able to draw water from – there are make-good provisions for this.

5. **Landholders in the Condamine Alluvium area will be the lucky beneficial users of the returned water. Water should be returned to wherever it came from.**

   Arrow does intend, where practical, to return water to the region from which it is produced. Where possible, we will distribute this water in a way which addresses impacts which are predicted to be caused by Arrow. Hence in the area of the Condamine Alluvium, Arrow plans to substitute Condamine Alluvium allocations because there is a predicted impact to this aquifer from Arrow's activities.

   It is not feasible to return water to every landholder. Even based on the larger development captured in the SREIS (510 GL of water produced from 6,500 wells over 30 years), this is an average of less than 3 ML/year per well – equivalent to or less than a stock and domestic bore.

6. **What distance is it between wells (well spacing) for multi-well pads? Does this method allow Arrow to get around a 'no' landholder?**

   Deviated drilling, also called multi-well pads, involves drilling multiple, deviated wells from one surface location. An average surface spacing between pads can be up to 2.4 kilometres, but there is no hard and fast rule.

   It is not just geology that governs the distances; we also apply land use and non-technical constraints, for example, locating well pads in paddock corners and less productive areas for a

better fit with farming practices – well locations are agreed in liaison with the landholder. This method allows us to reduce impacts to the landholders in the area.

Arrow encourages all landholders to be a part of the Area Wide Planning process regardless of their stance.