




Arrow Energy

Arrow's Beneficial Use Network CDIL member's briefing

16 July 2020

 Safe Work. Strong Business.

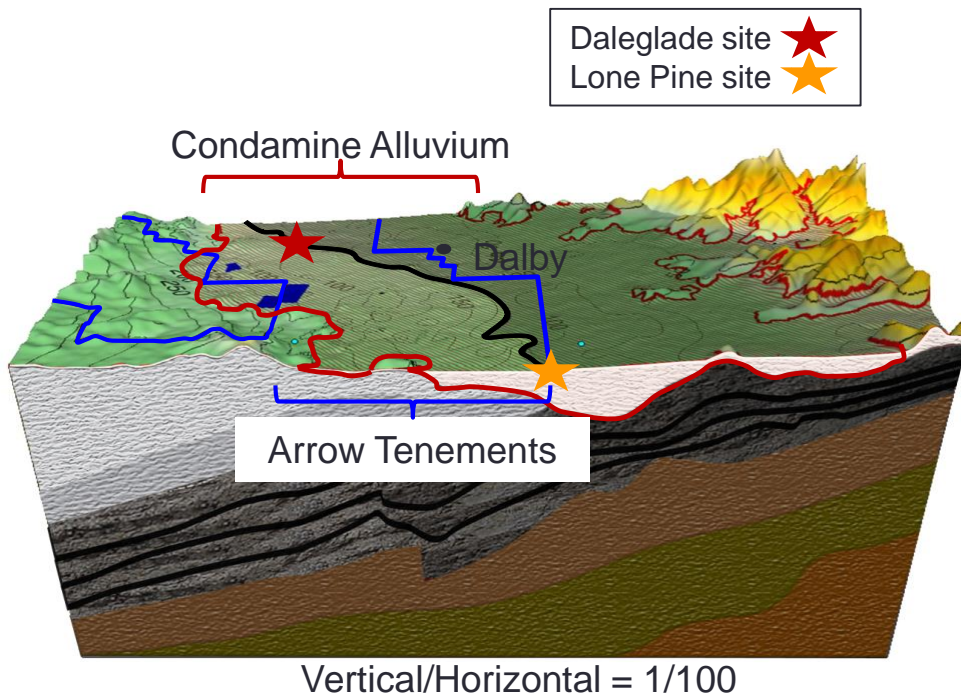




- Beneficial use to mitigate impacts in the area of Arrow's greatest potential drawdown
- Beneficial Use Network scheme objectives
- The Arrow Beneficial Use Network committee purpose & CDIL's role
- Topics for committee consideration
- Outstanding issues for committee consideration



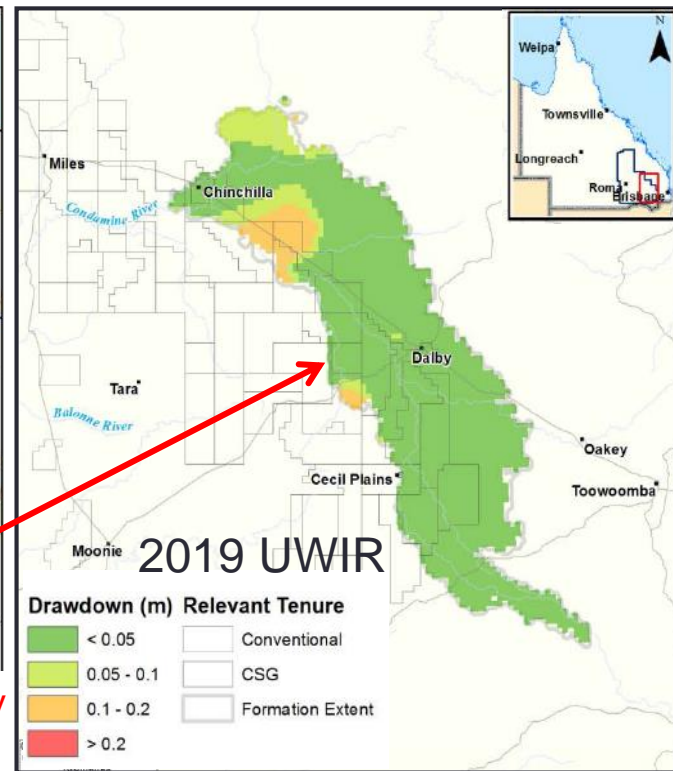
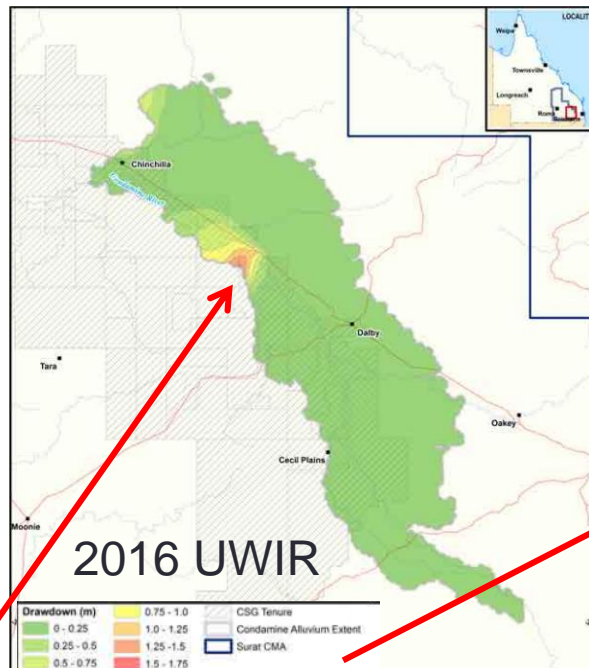
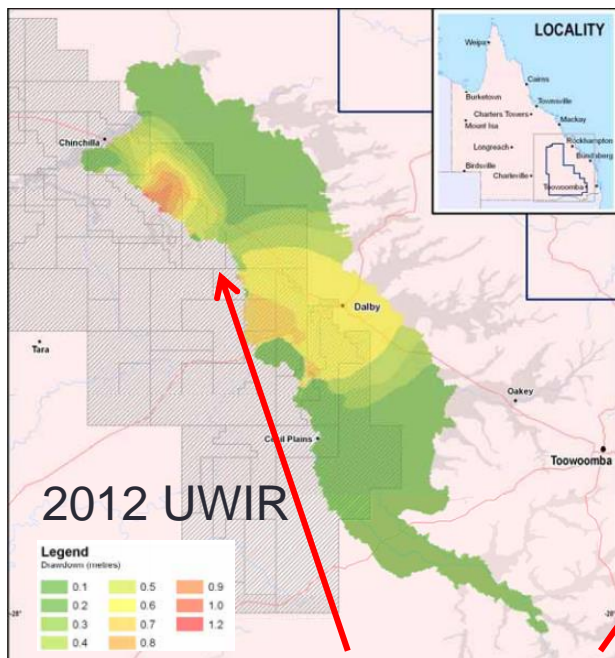
- Condamine Alluvium aquifer critical to supporting local irrigation
- Concerns that CSG activity will reduce groundwater availability from the Condamine Alluvium
- Any impact will be dependent on whether groundwater moves between the Condamine Alluvium and Walloon Coal Measures (hydraulic connectivity)
- Research designed to provide scientific evidence:
 - does CSG development of coal seams underlying and to the west of the Condamine Alluvium aquifer impact on critical groundwater supplies for irrigation?
 - undertaken in partnership with the Office of Groundwater Impact Assessment (OGIA) as part of a broader program to provide more scientific evidence on industry impacts on groundwater



- Two research sites:
 - Daleglade – ~20 km west of Dalby where the CA directly overlies the WCM
 - Lone Pine – ~40 km south of Dalby where CA directly overlies the WCM.

Data collected from the tests:

- Verified only a low level of hydraulic connection between the Condamine Alluvium and the underlying Walloon Coal Measures
- Supported earlier OGIA modelling that predicted CSG operations would have a minimal effect on the Condamine Alluvium (OGIA, 2012).



- Area of greatest impact is predicted to occur on the western boundary
- Predictions of **maximum** drawdown have reduced from ~1m to <0.2m
- Average predicted drawdown is now less than 5cm
- Predicted 100 year CSG impact is a fraction of typical seasonal variation



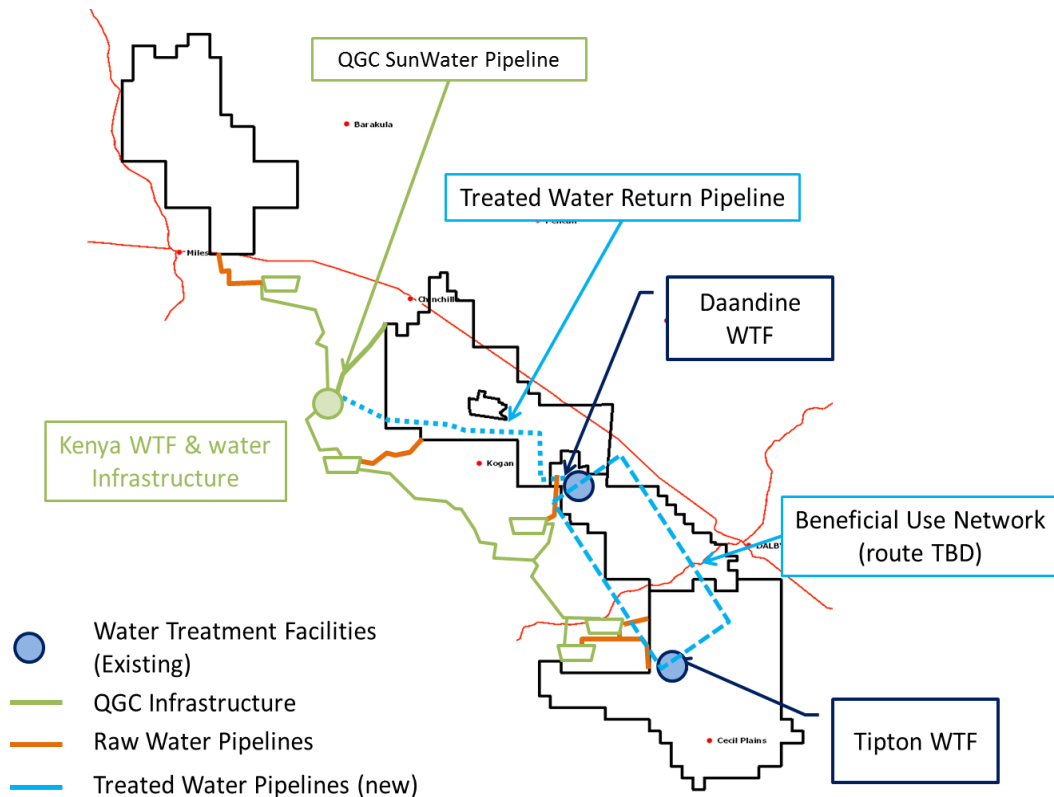
- Groundwater modelling using OGIA's 2012 model predicted 63 GL less water in the Condamine Alluvium over 100 years, as a result of low level of interconnectivity (due to Arrow's project)
- To mitigate this, Arrow has committed to:
 1. Maximise beneficial use of produced water
 2. Where practical, return water to the region from which it is produced
 3. Offset our impact on the Condamine Alluvium in the area of greatest predicted Arrow drawdown
- Following previous community feedback, Arrow committed to achieving this through substitution of allocation

Treatment

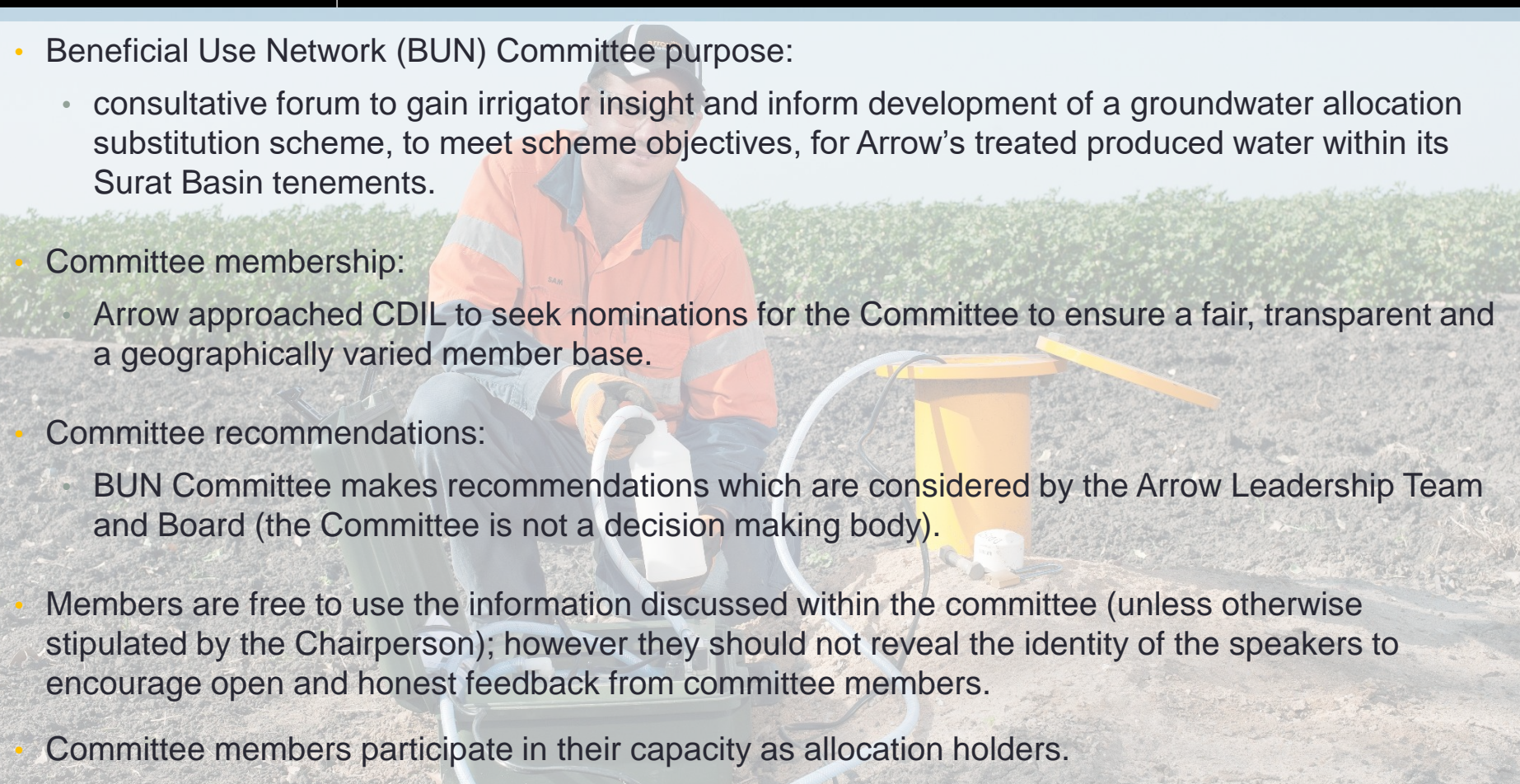
- Existing Arrow water infrastructure (Tipton & Daandine)
- Existing QGC water infrastructure (Kenya).

End use

- Existing QGC/SunWater pipeline
- New pipeline back to Condamine Alluvium region
- New beneficial use network.



- Supply is prioritised for substitution of Condamine Alluvium allocation in the area of Arrow's greatest predicted drawdown:
 - must achieve a substitution target (currently identified as 63GL)
 - planned volume supplied through the Beneficial Use Network (BUN) is equal to the treated water volume associated with the volume of water extracted from that area.
- Additional losses from providing substitution will need to be accounted for through a 'multiplier'.
- Additional substitution may be an option to achieve greater benefit for the aquifer (the greater the multiplier, the less substitution achieved).
- Forecast volumes will change over time and have historically become smaller towards the end of a project.

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- Beneficial Use Network (BUN) Committee purpose:
 - consultative forum to gain irrigator insight and inform development of a groundwater allocation substitution scheme, to meet scheme objectives, for Arrow's treated produced water within its Surat Basin tenements.
 - Committee membership:
 - Arrow approached CDIL to seek nominations for the Committee to ensure a fair, transparent and a geographically varied member base.
 - Committee recommendations:
 - BUN Committee makes recommendations which are considered by the Arrow Leadership Team and Board (the Committee is not a decision making body).
 - Members are free to use the information discussed within the committee (unless otherwise stipulated by the Chairperson); however they should not reveal the identity of the speakers to encourage open and honest feedback from committee members.
 - Committee members participate in their capacity as allocation holders.

Topic	Committee considerations
Scheme concept	<ul style="list-style-type: none">• Supply options (detailed on next slide including Western Downs Regional Council)
Substitution management	<ul style="list-style-type: none">• Ensuring irrigators have timely access to water• How reduction in take will be managed (and resumed)• Managing water losses to participating irrigators (by providing a ‘multiple’ of the volume of their allocation, detailed on slide 11)• BUN committee requested substitution is accounted for by the Department of Natural Resources, Mines and Energy (DNRME) (engagement to be progressed with correspondence)
Operational overview	<ul style="list-style-type: none">• Water quality• Management of instances of low water volume• Delivery point location and design
Terms and conditions	<ul style="list-style-type: none">• To capture outputs discussed (drafting underway)• Third party legal review prior to finalisation
Participant selection	<ul style="list-style-type: none">• To be determined

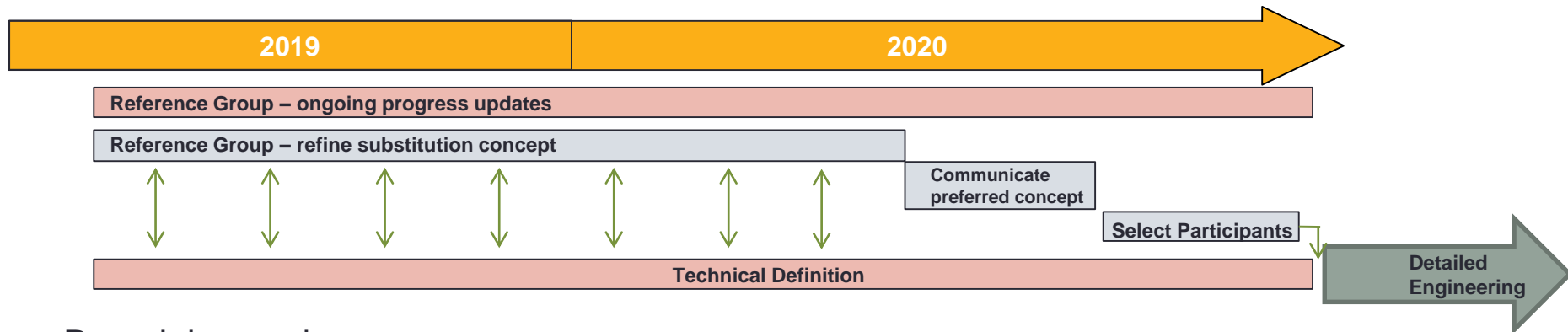


- Options were considered to improve efficiency:
 - concentrate supply to fewer users e.g. trade allocations, co-op/water board to manage, co-operative farm, etc.
 - supply water in more efficient ways e.g. supply WDRC.
- The alternative options were determined to be unfeasible, not preferred or difficult to manage.
- Proposed option to provide selected supply arrangements:
 - individuals will be offered the opportunity to participate
 - individuals can determine whether to trade more allocation to be substituted.

- Treated water will be supplied all year round:
 - additional losses will be 30-40%
 - a 'multiplier' (additional water) required to cover these losses
 - Arrow may consider substituting more than its modelled impact up to limit of available water for greater benefit to the aquifer
 - higher multiplier will result in less overall substitution.

Multiplier	Possible Offset (GL)	Allocation required (ML/yr)
2.6	63	2990
2.5	67.5	3200
2	84.4	4000
1.5	112.5	5300

Note: Total allocation in BUN Area ~6000 ML excl. WDRC



Remaining work:

- Identify how DNRME would account for substitution
- Define process for participant selection
 - including how multiplier will be determined
- Finalise key terms and drafting of water supply agreement to which participants will need to agree:
 - opportunity for a third party legal review, paid for by Arrow, instigated by Arrow, or a third party (e.g. CDIL)

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