



Environment and Community

Presented by Ken Horton

Group Manager Corporate Affairs, Upstream Qld & CSG to LNG

Origin Operational Review and Asset Visit

19-20 September, 2011

Origin has a proven track record in conventional operations and CSG developments ...

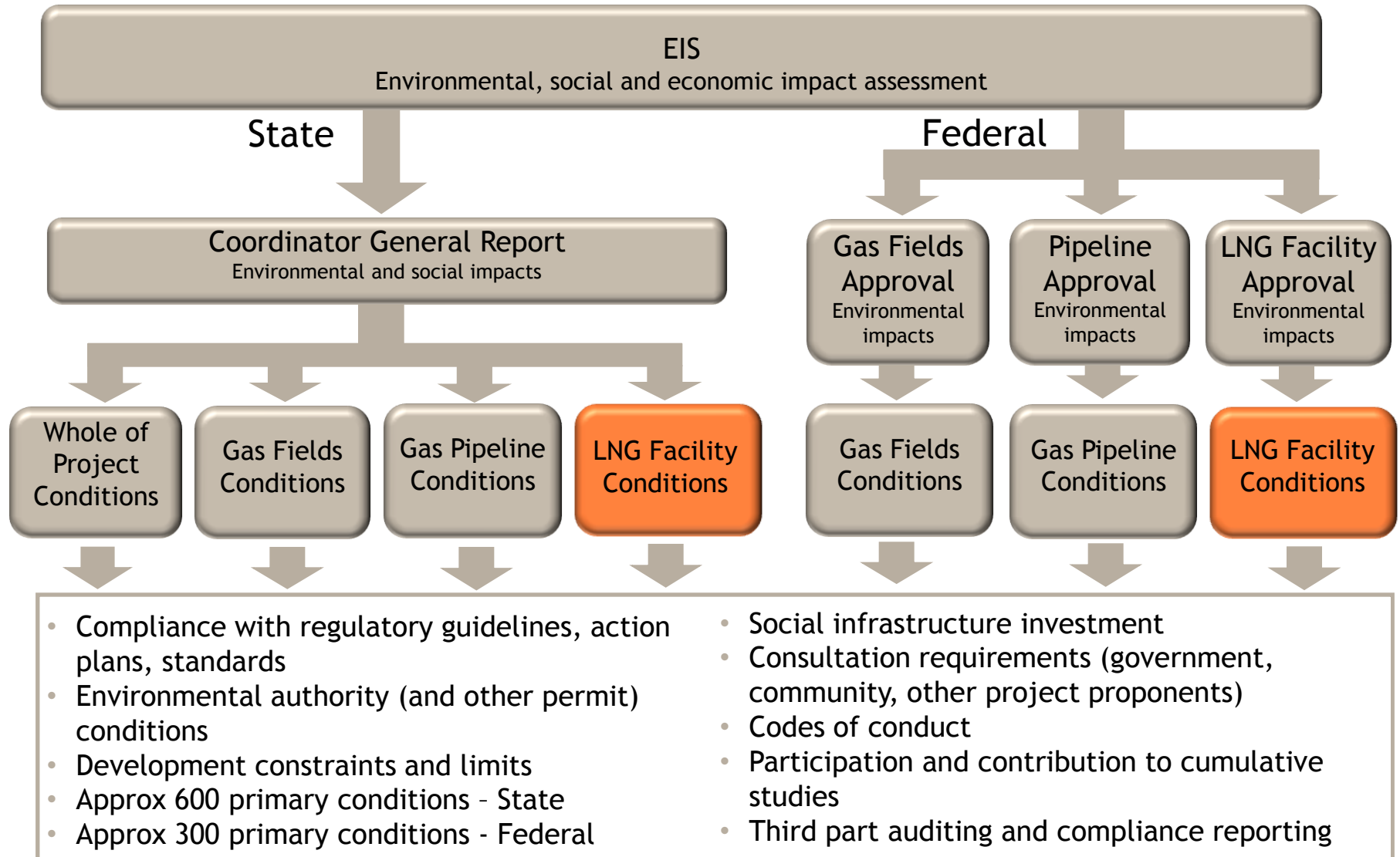


- Origin and predecessor companies have been operating successfully in the Surat Region for 40 years
- Origin drilled its first CSG well in 1993 and has been producing CSG since 1997 - we are building on a long history of successful landowner and community engagement
- Origin (and now APLNG) maintains a leadership role in technical innovation and impact management including:
 - First Reverse Osmosis (RO) water treatment plant
 - First basin-wide groundwater model
 - Partnering with landowners
- During the EIS, Australia Pacific LNG met or corresponded with more than 6,000 stakeholders:-
 - 90 non-government organisations
 - Over 500 individual landowners
 - Consultation meetings across regional Queensland and tours of existing upstream and downstream facilities



... and has undertaken extensive shareholder engagement through the EIS process

A comprehensive regulatory regime underpins CSG to LNG projects

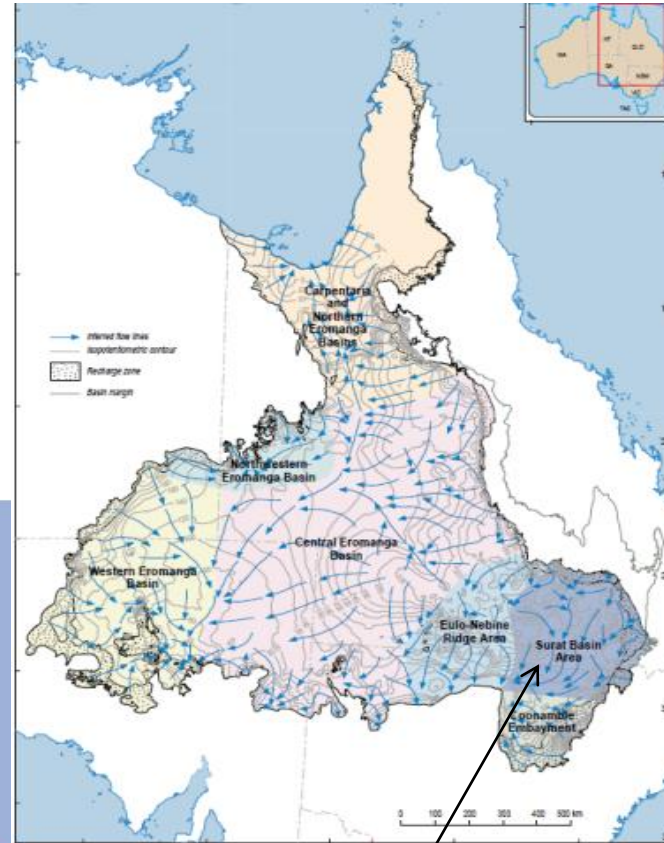
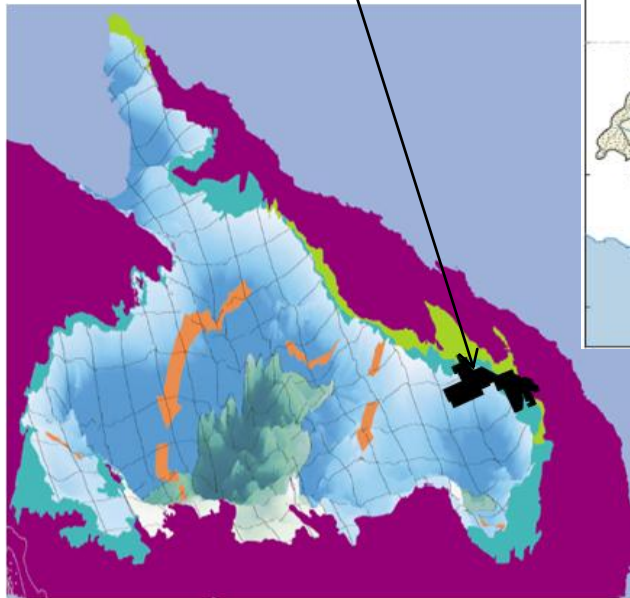


- Impact on the Great Artesian Basin
- Impact on farmers' bores
- Gas migration
- Fracking
- Salt

The CSG to LNG industry operates in a small proportion of the overall Great Artesian Basin (GAB)



Location of CSG projects



The Surat Basin is a sub basin of the Great Artesian Basin

Water produced by the industry (on average over 40 years) will be about half the amount taken by other users (in perpetuity) and is small compared to the annual recharge of the GAB



GAB and Surat Basin water figures
Estimated annual water levels (ML)

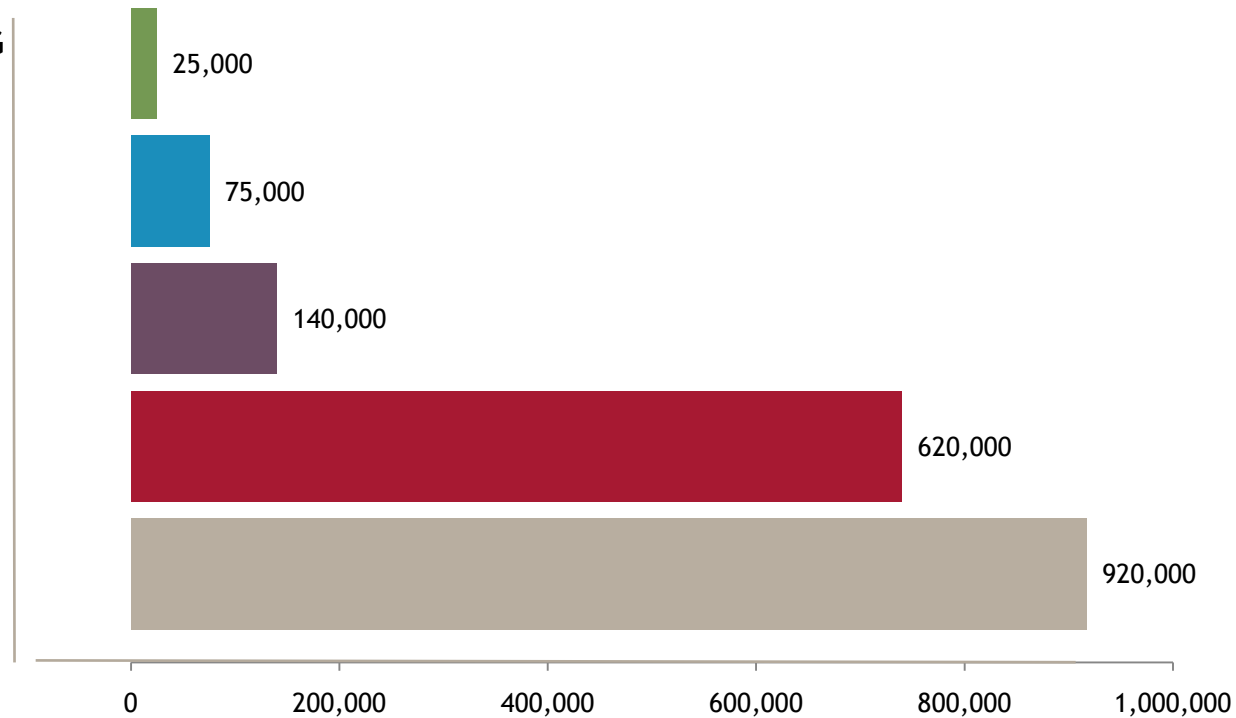
Typical annual water production by APLNG post 2015 - taken from the coal measures

Average annual water production by the CSG- LNG industry post 2015 - taken from the coal measures

Current groundwater use in Surat Basin - taken mainly from shallow aquifers

(Total surface water use in Surat Basin)

Annual recharge to the Great Artesian Basin



CSG water will be taken from the coal measures - farmers and others take water almost entirely from aquifers. The bulk of CSG water is re-injected or directed to beneficial use so is not 'lost'

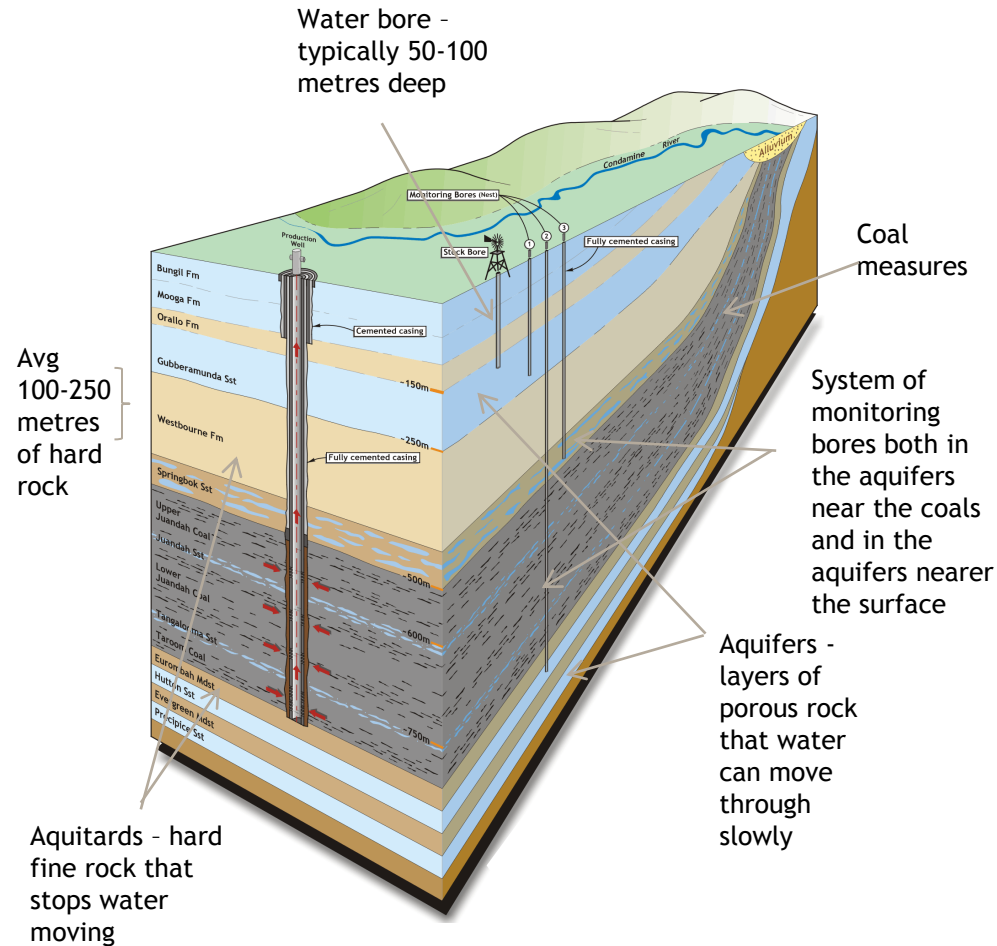
The coal seams are separated from the aquifers by layers of hard rock - and the aquifers are monitored comprehensively



In our operating areas:

- We take water from the coal measures
- Others take it mainly from the shallow aquifers
- The coal measures are separated from the shallow aquifers by ~100-250m of hard low-permeability rock (equals a 30-80 story building)
- Our comprehensive monitoring system will identify impacts on both the adjacent deep aquifers and the shallow aquifers
- We have now taken baseline measurements from ~450 existing bores, to compare against in future
- Any impacts on water would be very gradual - it moves in neighboring aquifers at around 1-5 metres per year or much less
- We are obliged to make good *in advance* any lowering of water levels in bores near our operations

Our most noticeable impact will be on the small number of farmers who have a bore direct into the coal measures and who are close to our operations (see next page)

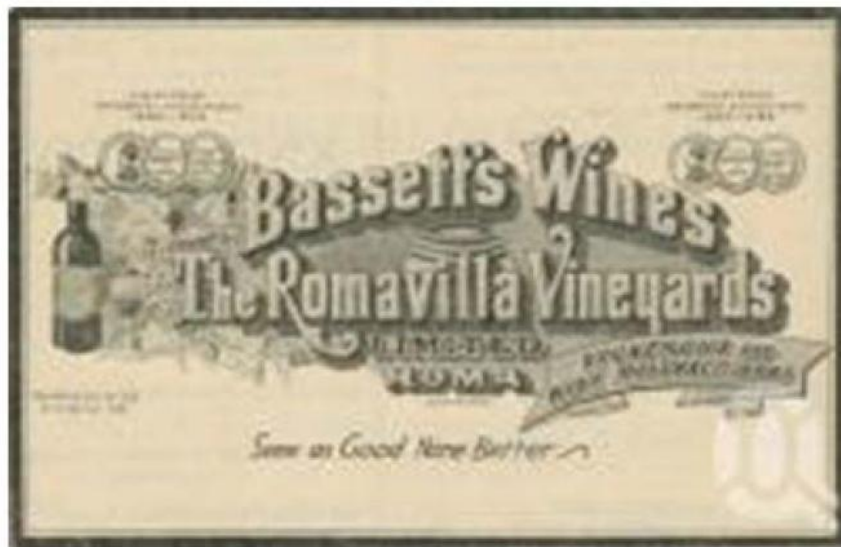


The information we are gathering will help make the Surat Basin one of the best understood underground water systems in the world

Gas has a long history in the Surat Basin of appearing naturally in water bores



Extract from vineyard promotional materials in Roma, circa 1905



business men). The water supply is derived from the Bungil Creek and two large reservoirs. Two artesian bores have been sunk by the Government which give an almost unlimited supply. In the second bore gas was encountered at a great depth, which, in quality, is said to be 50 per cent. better than London gas, and the Municipal Council is preparing to light the town with this. Roma is now lighted with acetylene. During the past few years the place has grown considerably in importance. A

The 'flaming bore' on 60 Minutes and 4 Corners

Historical State Government records clearly report natural gas in many bores and in all the commonly used GAB aquifers

The presence of gas in water bores is particularly common in areas such as Hopelands (the same 'flaming' bore that appeared on both 60 Minutes and Four Corners)

In these areas, heavy water extraction from water bores can replicate the CSG production process, depressurising the coal measures and causing natural gas to flow

Of landholder bores tested so far, more than 80% have recorded various levels of methane within the bores - prior to CSG operations taking place in these areas

In the limited number of cases where operations impact on nearby bores we are obliged *in advance* to “make good” that impact



- All CSG to LNG projects are required to make good any bore that has more than a 5 metre drawdown directly related to CSG
- “Making good” has a moderate cost but is straightforward:
 - in the Walloons it will generally require a new, deeper bore to be drilled
 - elsewhere, it might involve lowering pumps
- A longer-term solution would be reinjection of our water back into underground aquifers
 - APLNG is planning reinjection trials near all 4 of our water treatment plants
 - Talinga trial has commenced, with some initial good signs about aquifer receptivity

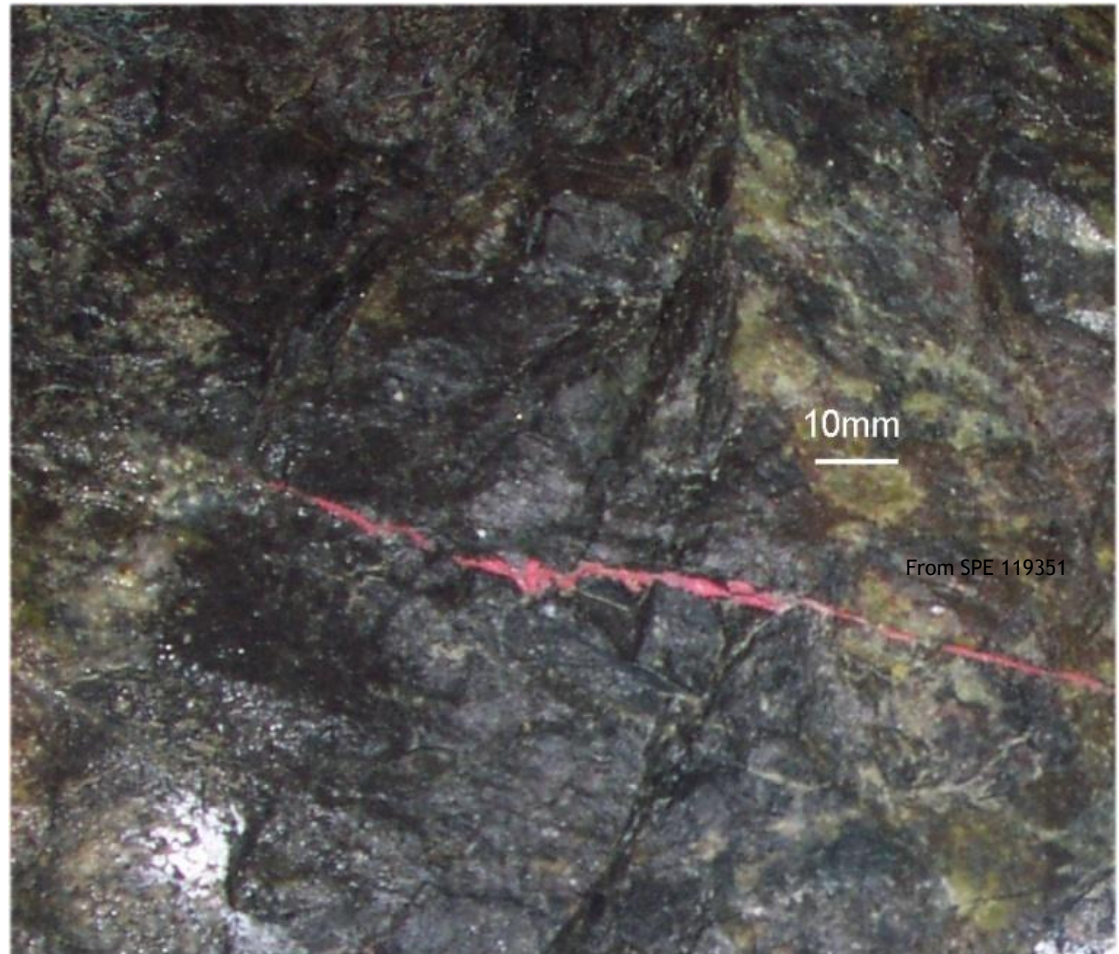
APLNG planned in its EIS for ~300 wells to be ‘made good’ - we now estimate that fewer than 10 bores will be impacted in the next 5 years

- The number of bores that are APLNG liability will be determined by the Qld Water Commission when “Responsible Tenure Holder” areas are defined
- Current “make good” estimates are conservative as based on APLNG making good all bores impacted by the project
- Baseline surveys have revealed fewer bores exist than in the government database
- Actual make good will be defined by the monitoring program
- The majority of landowner bores to be made good are those drawing from coal measures

In some areas where permeability of the coals is low, the process of fracking may be used to enhance the flow of fluids ...



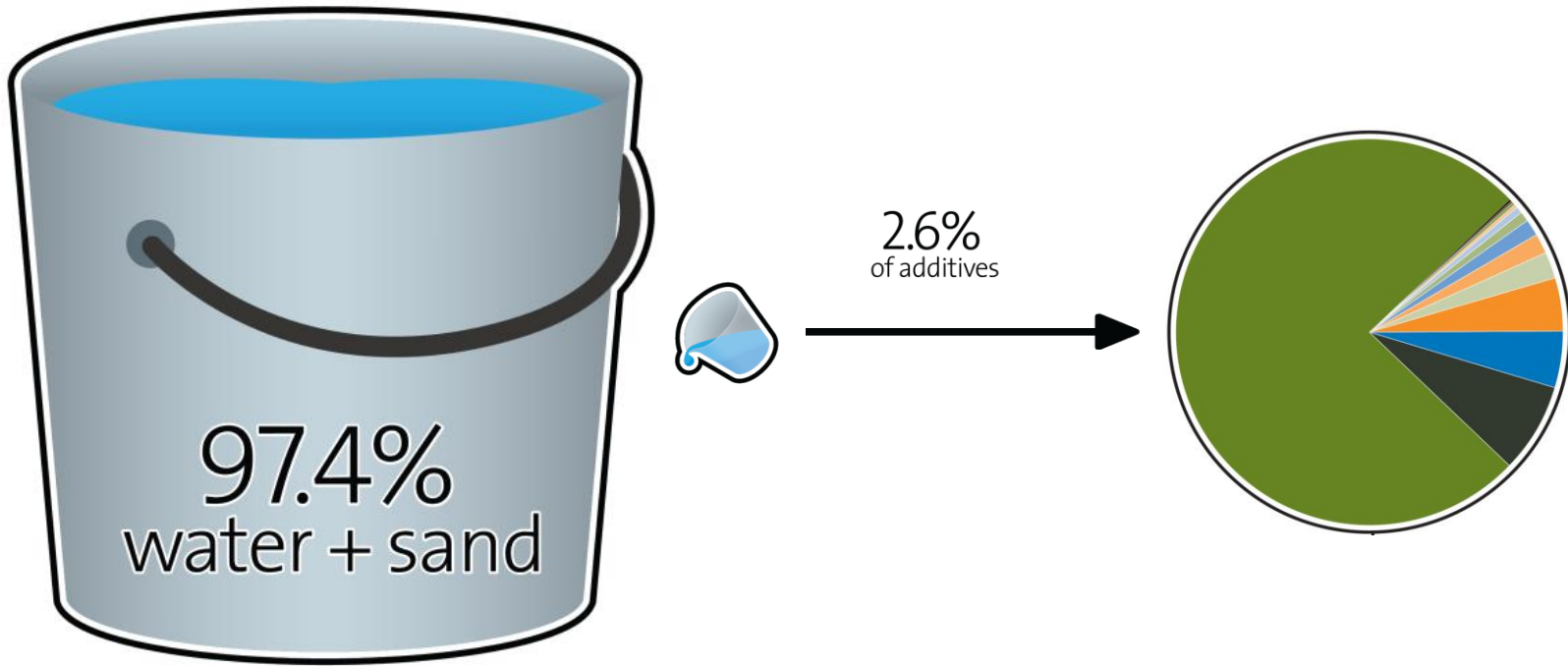
- Hydraulic Fracture stimulation or 'fracking' is a method to increase flow of gas and extract gas more efficiently from the coal seam
- 'Fracs' are placed using 'frac' fluid (primarily water) and sand at pressure to create / connect / open fractures in the coal
- The resulting fractures are ~5-20 millimetres thick
- Layers of rock, typically shales and siltstones, act as barriers to confine the 'frac' from growing vertically
- Importantly fracs are designed to be contained within the coals as intersecting other layers - particularly aquifers - would introduce unwanted additional water into the coal seams inhibiting gas production



From SPE 119351

... by creating small thin openings through the coals and rock

Over 97% of the fracking fluid used is water with a further 2% a salt and minor concentrations of other common household additives



■ Potassium chloride _____ 2%	■ Sodium Thiosulphate _____ 0.06%	■ Bleach _____ 0.016%
■ Guar gum _____ 0.2%	■ Acetic acid _____ 0.04%	■ Terpenes / terpenoids / sweet orange oil _____ 0.01%
■ Alcohol _____ 0.12%	■ Caustic soda _____ 0.04%	■ Enzyme _____ 0.005%
■ Monoethanolamine Borate _____ 0.12%	■ Ferric chloride _____ 0.02%	■ Bronopol _____ 0.0018%
		■ Octoborate _____ 0.0007%

The CSG to LNG industry will produce broadly the same amount of salt produced by other users



- All our produced water will be treated with Reverse Osmosis (RO)
- Currently more than 90% of the water treated by RO becomes clean and usable - expected to rise to 97.5% as the technology develops which means less pond acreage required
- The remainder is a highly concentrated brine solution (salty water) that must be dealt with



- Brine will be contained in fully lined ponds - it can then be crystallised, completely enclosed and disposed of in landfill
- 2 selective salt recovery trials are underway at overseas pilot facilities - both trials are collaborations with QGC
- Additional brine pre-treatment trials are planned

Indicative salt produced Over Project life		Destination of salt Majority
APLNG	3.5 Mt	Isolation ponds + investigating other options
CSG to LNG industry	8-12 Mt	Isolation ponds + investigating other options
Non-CSG in the Surat in perpetuity*	6-9 Mt	Released to the environment

* Based on public statements of other project proponents
Estimate uses an assumed average salinity across the Surat Basin; does not include salt from unlicensed bores

The CSG to LNG industry is isolating the salt and testing alternatives, rather than releasing direct to the environment

Impacts on farmers, land-use and local communities



- Reaching agreement with landholders
- Impact on high quality agricultural land
- Improving infrastructure
- Community engagement

Origin has reached around 600 agreements with farmers - without going to Land Court



- Landowners do not own resources underneath their land - these belong to the State
- Origin respects the rights held by landowners - and always seeks to work with them
- Origin has so far accessed properties entirely by reaching agreement with landowners - we have not taken anyone to the Land Court for access
- Government has published a land access Code of Conduct that includes:
 - minimum notice periods
 - requirements for property development plans
 - headings under which compensation is required
 - requirement for companies to pay for fair and reasonable legal costs
- Origin has also started to engage on innovative value-sharing deals with larger landowners - e.g. employing farmers to undertake routine well inspections
- However the ongoing Senate Enquiry has fuelled land access and compensation issues, with neighbours and those close by often the most vocal

Our operations will have limited impact on Good Quality Agricultural land or on the agricultural production of the land we buy



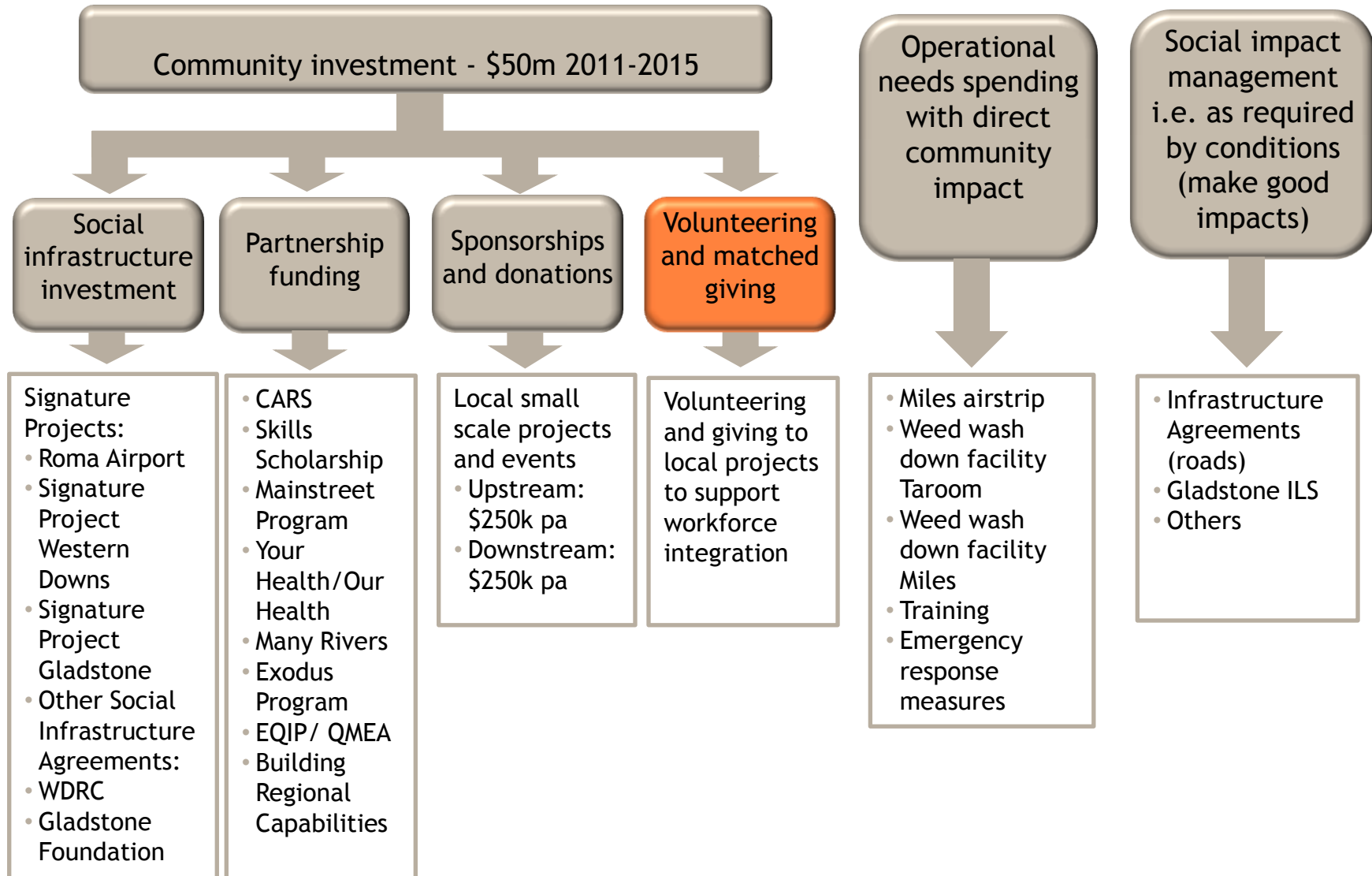
- APLNG will affect about 7% of Good Quality Agricultural Land within the permit areas
- Due to the progressive nature of development and progressive nature of rehabilitation there probably will not be more than 2-3% at a 'peak'
- Following rehabilitation (within 1-2 years) this reduces to about 1.3% being removed for the life of the Project (with final rehabilitation at the end of the project)
- Low impact drilling should reduce the 7% number (but not the 1.3% number)

Increasing the agricultural productivity of our owned land

- We will make improvements on many of our owned properties including regrowth control, pasture improvement and upgrades to fencing, roads, water supplies, etc
- These improvements mean agricultural output from the 65,000 hectares of land we own is expected to be greater than the output of the previous landowners
 - We expect to run 5,000 head of beef cattle in joint ventures with rural producers on our land; we currently run 3,000 head of cattle
 - we intend to grow more than 2,000 hectares of irrigated crops, such as wheat, sorghum and chickpea
 - Beef and grain production will be enough to feed a population of more than 60,000 each year



We will invest substantially through a mix of infrastructure investment and long running community programs



Origin has extensive ongoing engagement with stakeholders across the social environment



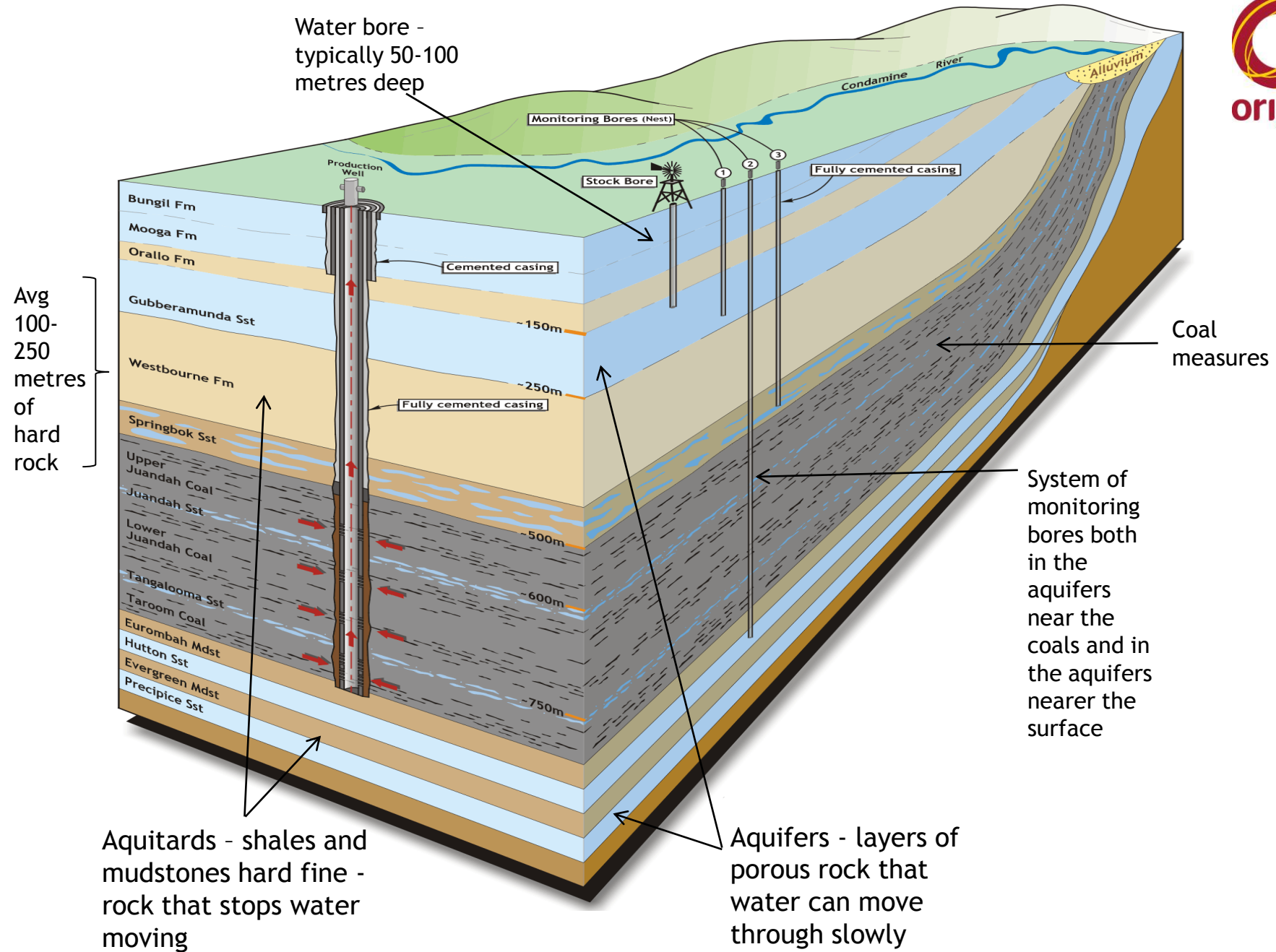
- We are looking well into the future to ensure our impacts are understood and integrated into strategies towards delivering a sustainable project while supporting regional communities
- Long term stakeholder engagement is required with
 - Landowners - up to 1,500 relationships including 300 with moderate to major impacts
 - Local MP's and Local Government (5 main regional LGA's affected by our Project)
 - Lobby groups
 - Community residents
 - Local business
 - Indigenous Groups
- Social impact management strategies developed for:
 - Local content strategy
 - Workforce and training
 - Housing and accommodation
 - Community investment
 - Indigenous engagement
 - Community health and safety
- Indigenous Peoples (native title) and cultural heritage - dedicated approaches for recognition of indigenous interests in land and protection of indigenous cultural heritage



Engagement processes with other proponents, Government, key NGO's and Stakeholders are now firmly established and functioning well



- An Industry Leadership Group has been established by all 4 CSG to LNG proponents to consider key issues and cumulative impacts - 8 working groups have been established
- Industry, Government and Key Stakeholder Groups now coming together via several formal arrangements:
 - Surat Basin CSG Engagement Committee (main focus on Land Access and Water issues and includes Roma and Dalby sub-committees)
 - Gladstone Infrastructure Working Group
 - Regional Community Consultative Committee's (Maranoa, Western Downs, Banana, Gladstone)
- Regular contact via joint committee membership, briefings, 1:1 sessions etc with Agforce, NFF, Basin Sustainability Alliance (most successful regional lobby group)
- Maintaining relationships with Western Downs Alliance ('Tara Blockies'), Friends of Felton, Queensland Murray Darling Basin Committee, Great Artesian Basin Consultative Committee, Queensland Conservation Council, Wildlife Preservation Society of Queensland, Capricorn Conservation Association, Fitzroy Basin Association, Concerned Landowners of Roma North and various local Landcare and wildlife groups
- Focused information sessions - regular 'Origin of Gas' tours, several tours by the LNG Show, APPEA Water Forum (Brisbane and Dalby), recent core viewing attended by over 100 external participants
- Development planning session including technical presentation have recently been run for Condabri, Combabula and Ironbark landowners. Sessions for local landowners have also been run to discuss irrigation plans in the Talinga/Condabri area
- GISERA - APLNG research alliance with CSIRO in key EIS impact areas of water, land, biodiversity, marine and social. Actively looking to expand participation in GISERA by other proponents, government, NGO's and scientific institutions.





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Thank you
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