



Groundwater and the Environment are Protected

because of robust fracking checks and controls

Checks and Controls	Process	
Continuous Ground Water Monitoring	Test and report	Baseline ground water monitoring
	Check 1: Are the additives safe for use?	Additives registered with and approved for use by NICNAS Independent chemical analysis - confirm no BTEX or PAH Risk assessment - environmental
	Check 2: How do we know the well has integrity?	Well design Risk assessment - well design and execution Cement bond log (CBL) Pressure test - stress test the whole system Regulatory review and approvals
	Check 3: How are the fractures confined?	Safe execution operating envelope to maintain containment - alarms and fail-safes ensure no exceedance of envelope Geomechanics data, modelling and verifications
	Test and report - ongoing until end of well life	Well Integrity Management System - pressure and rate monitoring and regular inspection and maintenance schedule Ongoing ground water monitoring

Check 1

Are the additives safe for use?

Full Disclosure

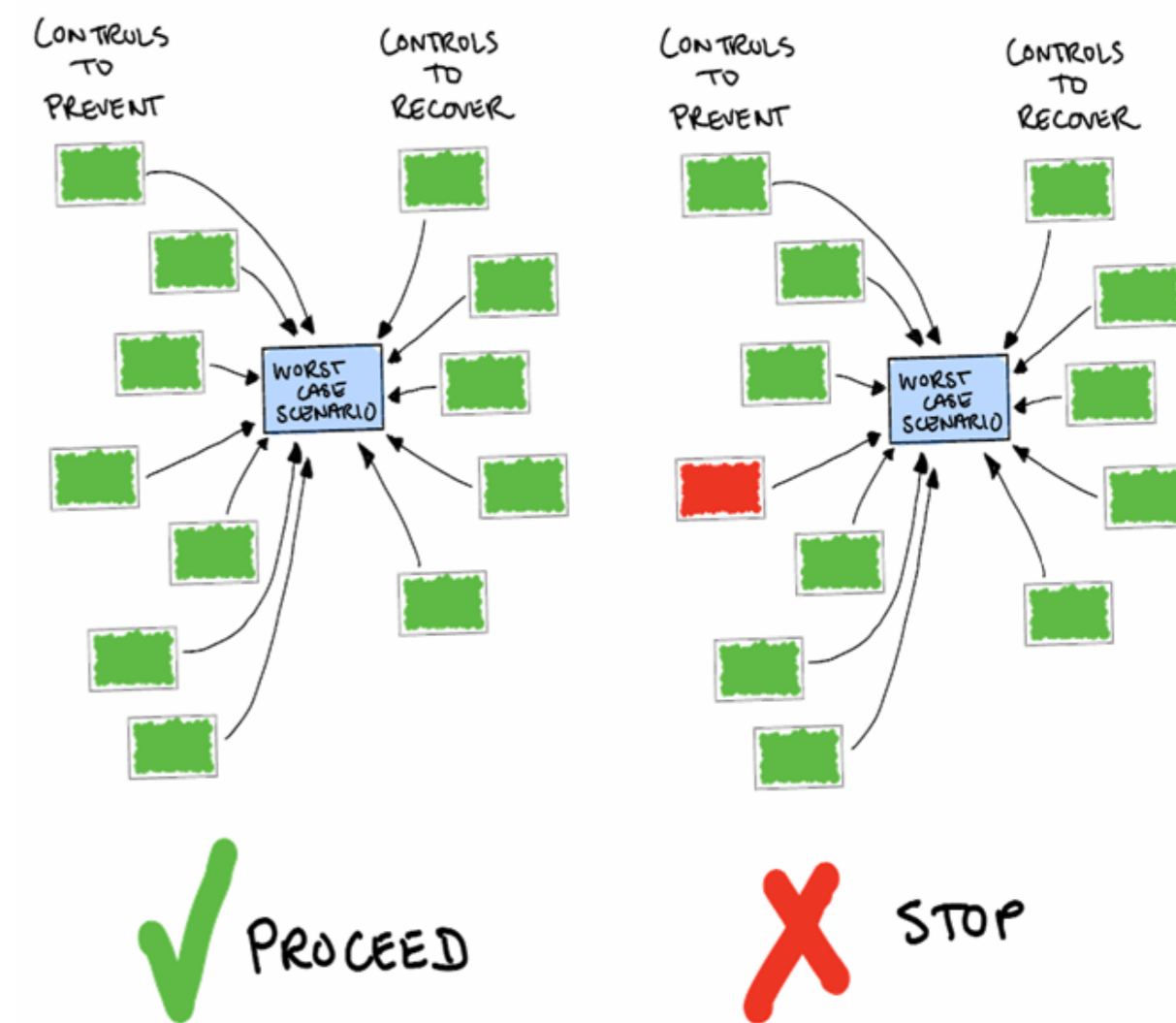
- All proposed and pumped fluids systems disclosed to DPIR and EPA, full public disclosure
- Detailed composition and CAS number, volumes and weight disclosed

Risk Assessment

- Assess fluids against environmental and regulatory requirements
- Assess fluid to ensure it meets ADWG and ANZECC requirements
- Assess transport, surface handling, and disposal procedures

Verification

- Highly regulated
- All additives are registered with NICNAS
- Independently screened for BTEX and PAH
- Ground water monitoring plan



Check 3

How are the fractures confined so that they do not spread beyond the target?

Well Data

- Distance to aquifer mapped
- Geo-mechanical property profile built from log and core data

Modelling and Risk assessment

- Geohazard risk assessment
- Detailed stress and fracture stimulation modelling
- Optimize fracture design to remain in target

Verification

- Active pressure and rate monitoring
- Analogue microseismic data
- Ground water monitoring plan

Check 2

How do we know the well has integrity?

Well Design

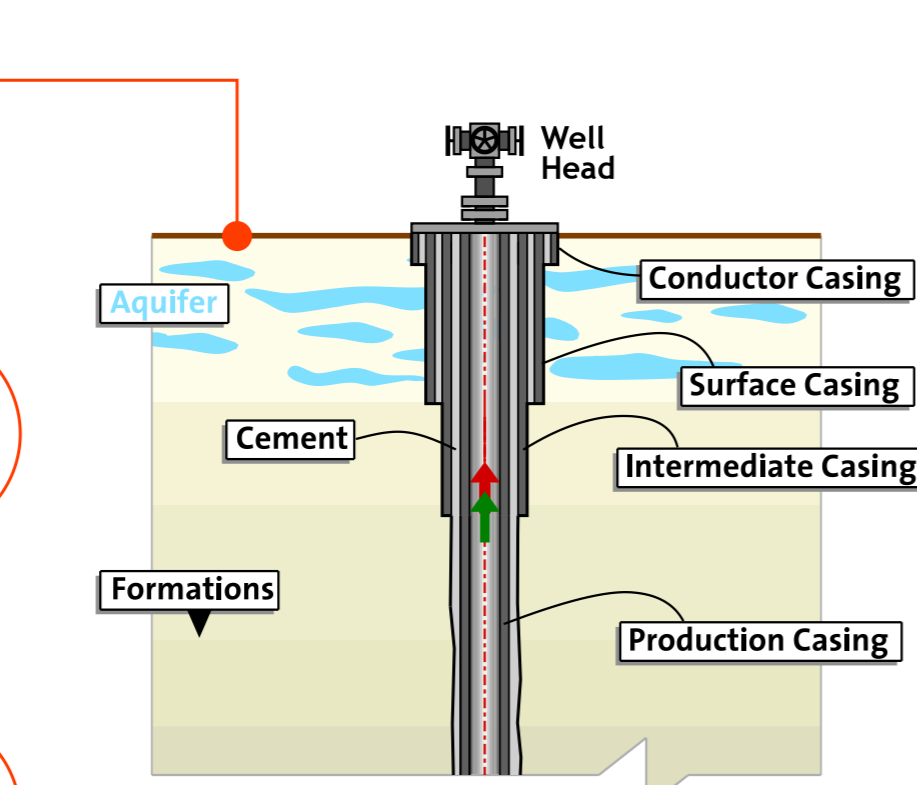
- Full life cycle design
- Design standards
- Material selection
- Multiple layers of high strength steel and engineered cement

Risk Assessment

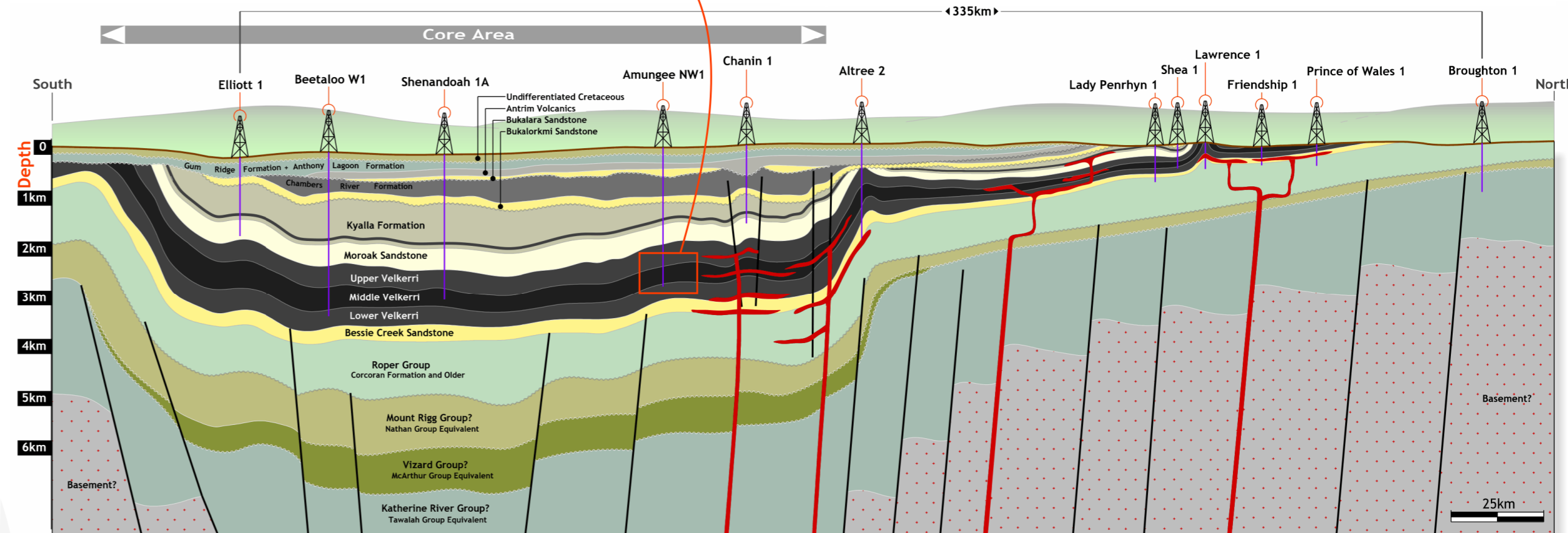
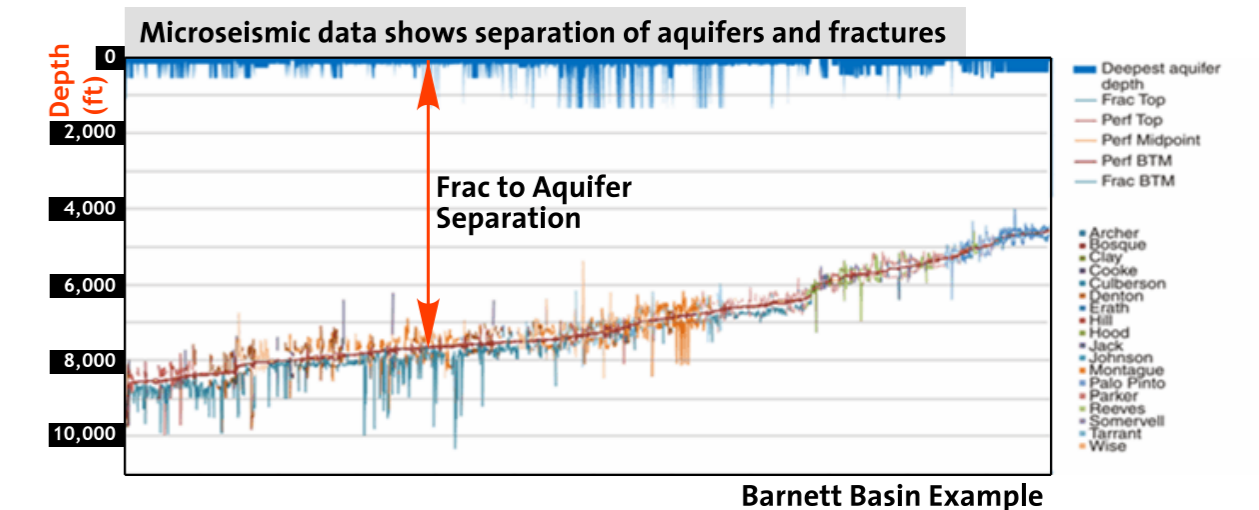
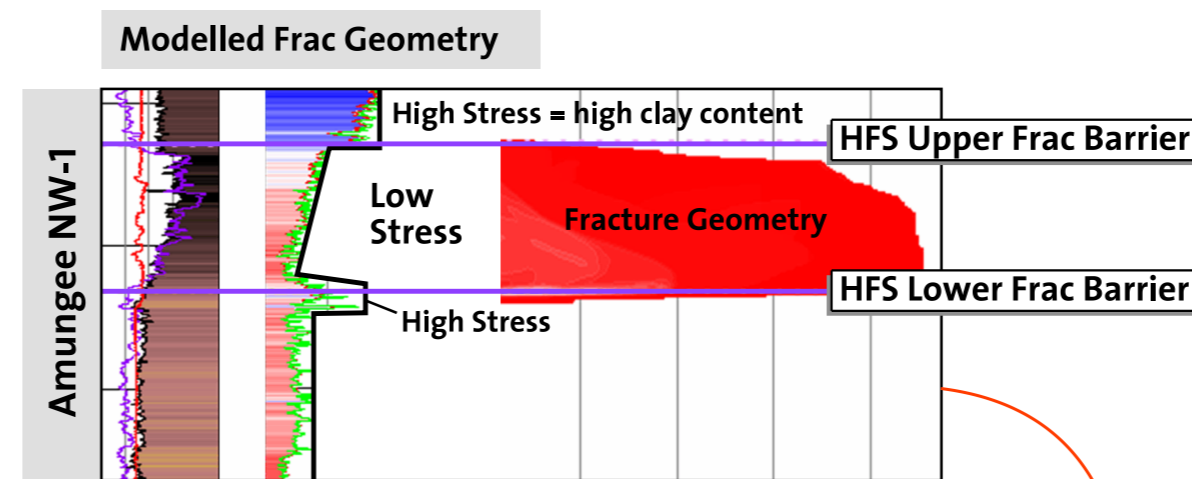
- Operations and execution risk assessment conducted both internally and with service providers
- Assess the well design to handle life cycle requirements

Verification

- CBL
- Pressure testing
- Regulatory review and approval
- Well integrity management system
- Ground water monitoring plan



EPA: Environmental Protection Authority
 DPIR: Department of Primary Industry and Resources
 NICAS: National Industrial Chemical Notification and Assessment Scheme
 ANZECC: Australia and New Zealand Environmental Control Council
 CAS: Chemical Abstract Number
 ADWG: Australian Drinking Water Guidelines
 CBL: Cement Bond Log
 PAH: Polycyclic Aromatic Hydrocarbon
 BTEX: Benzene, Toluene, Ethylbenzene, Xylene

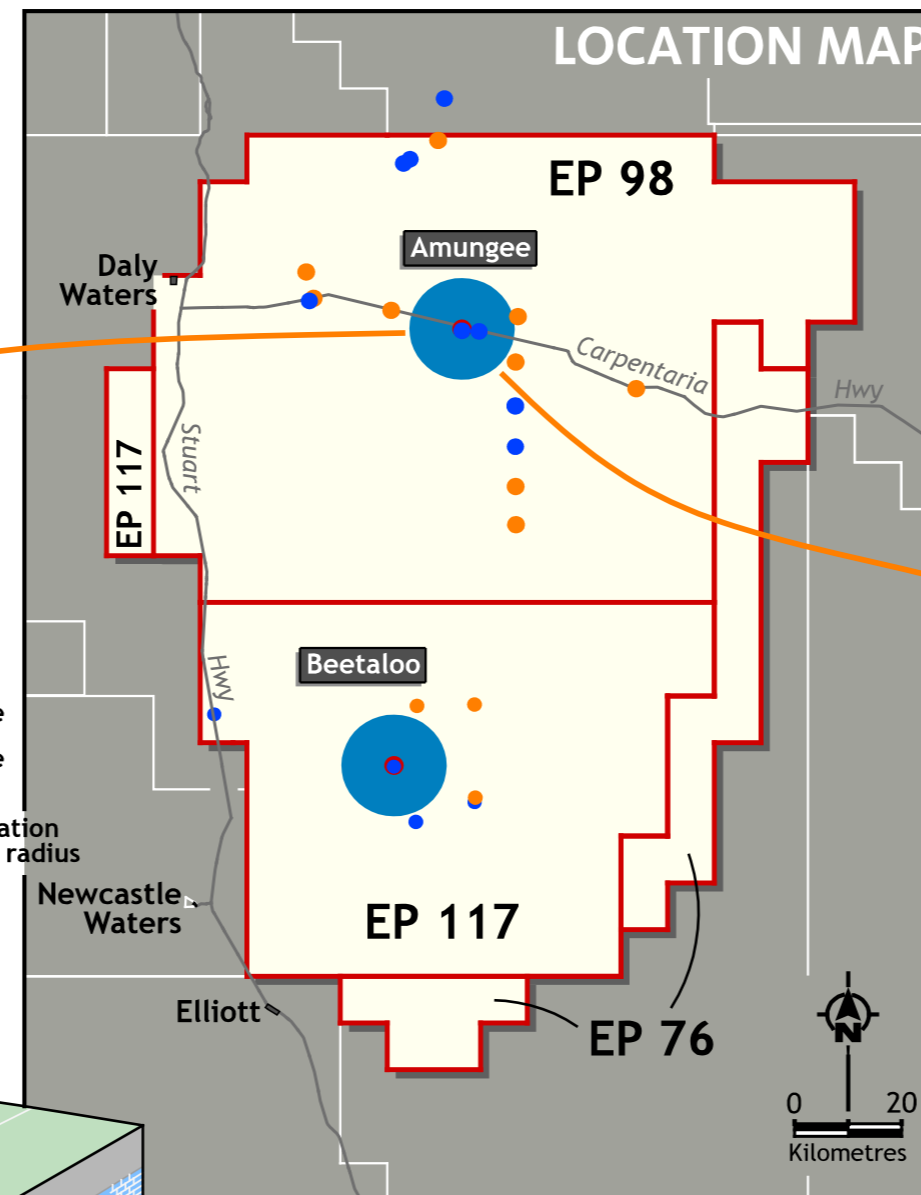




AMUNGEE NW-1 Drilling Program & Environmental Controls

OBJECTIVES of this groundwater monitoring plan are to:

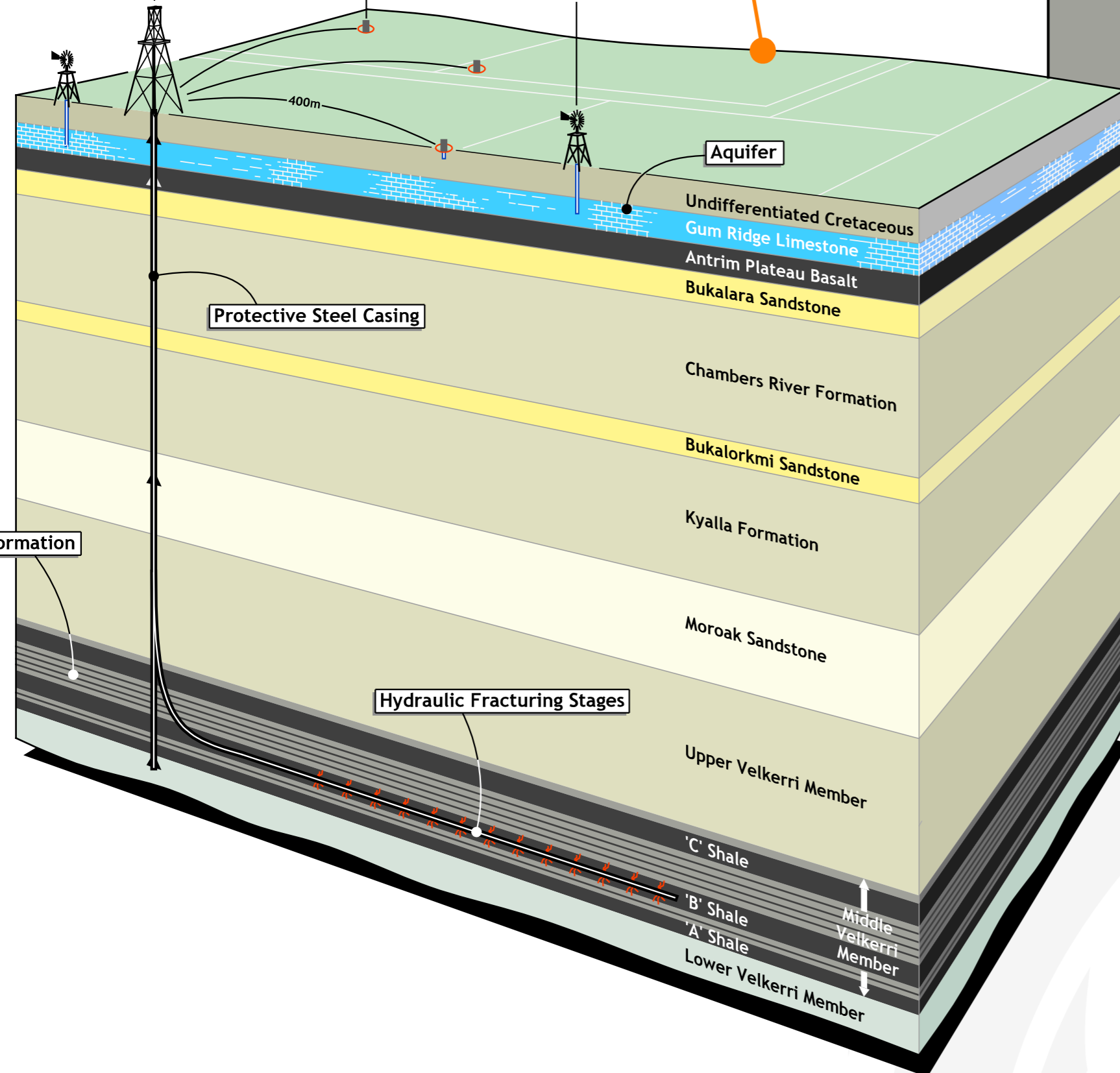
- Enable detection of potential groundwater impacts associated with exploration activities (regulatory requirement);
- Enable improved understanding of the temporal water quantity and water quality trends (natural variability) prior to the preparation of groundwater assessments as part of potential Environment Impact Statements; and
- Support improved understanding of the hydrogeological system of the Beetaloo



Amungee NW-1
Amungee NW-1H
Horizontal Well Drilled in 2015,
to be Fracture Stimulated in 2016

Shallow Water
Monitoring Bores
Approximately 5m deep
400m from well

Typical Stock Bore
Average Beetaloo Basin Water Bore
Drilled into Gum Ridge Limestone Aquifer



CONCLUSIONS

Groundwater monitoring commenced in 2014, pre-dating the commencement of current exploration activities

A formalised Groundwater Monitoring Plan for the current exploration program was developed and commenced implementation in 2015.

- Monitoring focusses on the shallow, used aquifers, which are vertically offset from the exploration target by over 1.5km of intervening low permeability rocks

Water level monitoring to date has found:

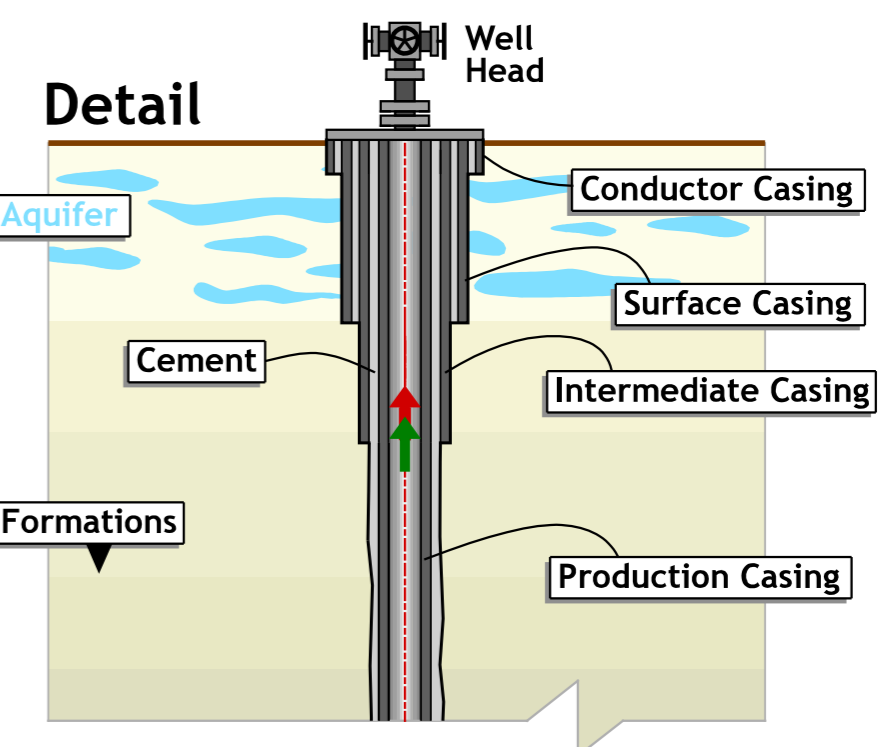
- Groundwater levels have essentially been stable over the period of monitoring in the Cretaceous and Cambrian Limestone aquifers
- The Cenozoic perched aquifer responds strongly to rainfall, but water levels recede quickly suggesting relatively limited volume in storage
- There is a groundwater mound in the central portion of the EPs

Water chemistry monitoring has found:

- Limited presence of hydrocarbons in the bores sampled. Only one location has reported dissolved methane (trace concentration)
- All waters sampled are suitable for stock use

There is no evidence of any impact from the current exploration activities

Amungee Site 2016





SUCCESSFUL CO-EXISTENCE

between resources and agriculture is a proven proposition

Shared value

- We actively seek to share real value with communities
- Shared value is a proven reality for Origin and partner landholders in our APLNG Project

CO-EXISTENCE ON THE LAND

AROUND \$400M in committed compensation value to **100 LANDHOLDERS** – with more value for others to come

WELL SITE is half the size of a **TENNIS COURT**

OVER 900 agreements reached with landholders across **700 PROPERTIES**

100% of our **FARMERS** and **GRAZIERS** with gas infrastructure **STILL FARM AND GRAZE THEIR LAND**

Plain English agreements

Continuously **LEARNING** and **IMPROVING**

As of March 2017.

CO-EXISTENCE IN THE COMMUNITY

\$46.1 MILLION IN COMMUNITY INVESTMENT

\$130 MILLION INVESTED IN REGIONAL ROADS

AROUND 78% of all construction expenditure sourced through **Australian providers**

\$27.5 MILLION IN REGIONAL AIRPORT UPGRADES

IMPROVED COMMUNITY ACCESS to emergency medical services

\$10 MILLION invested in regional housing

15,000 JOBS created during construction **2,500** in ongoing operations

As of March 2017.

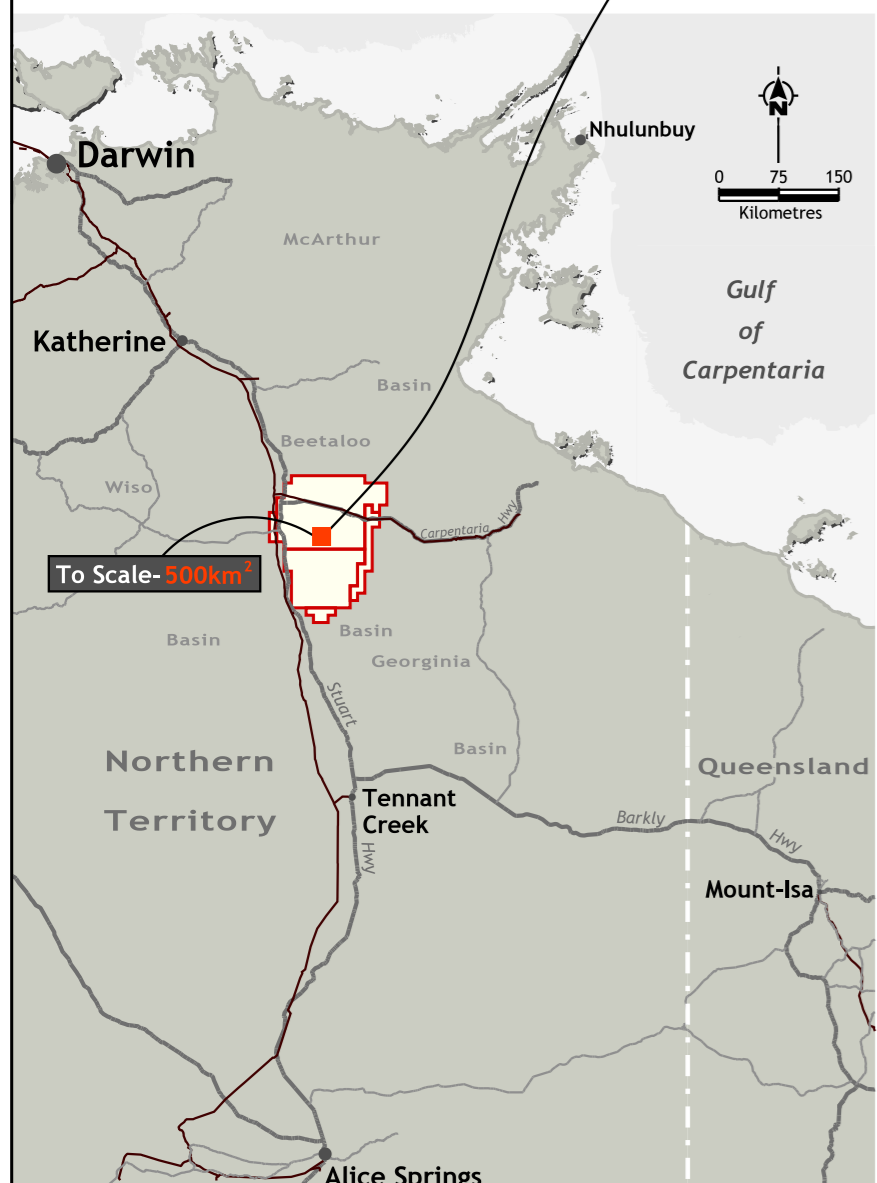
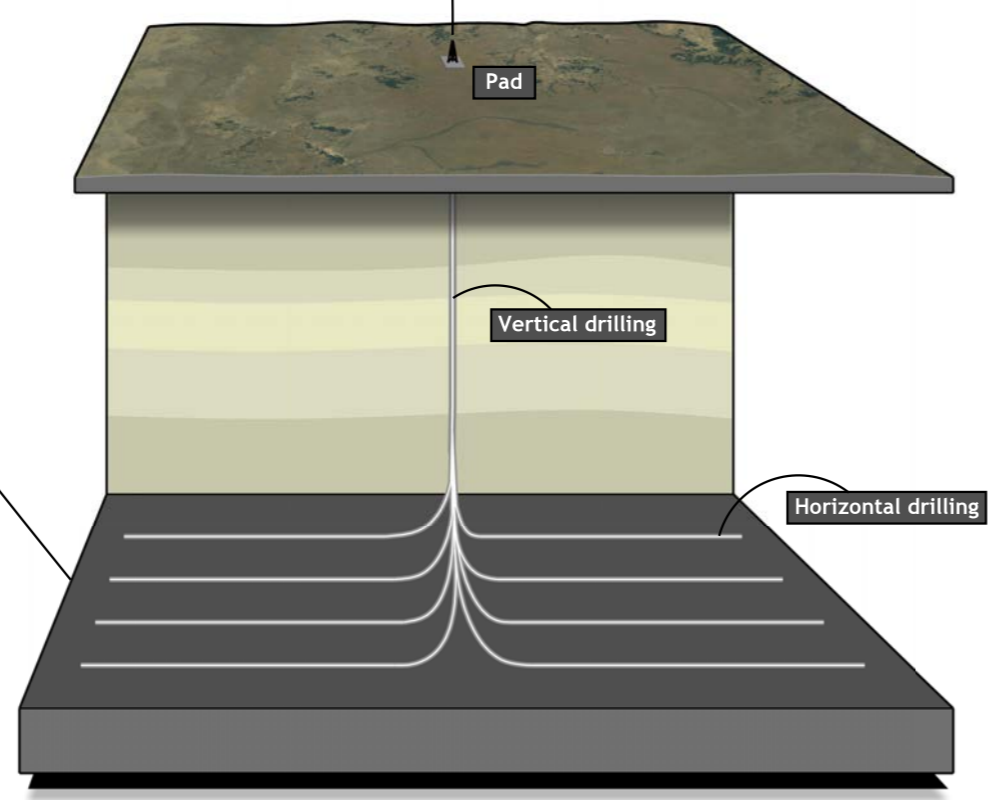
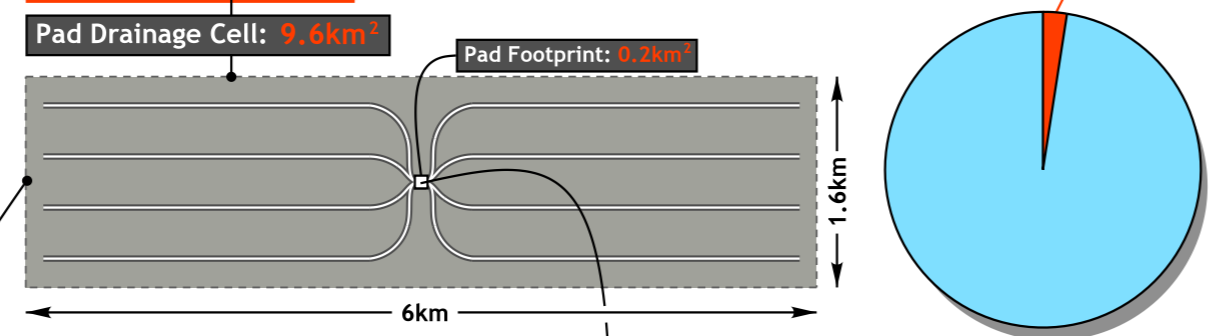
Minimising impact

- Small surface footprint with minimal impact on pastoral activities
- Minimise potable water consumption, e.g. recycling, surface capture, non-potable source water

Preliminary estimates

	Dimensions per pad	Area per pad
Pad footprint	140m x 140m	.02km ²
Pipeline right of way footprint per pad	3km x 30m	.09km ²
Road footprint per pad	3km x 10m	.03km ²
Total surface area footprint per pad	-	.10km ²
Total subsurface drainage area per pad	6km x 1.6km	9.6km ²

Typical Development Area: **500km²**



ORIGIN'S COMMUNITIES CHARTER

Within our community we build shared understanding, unite on common values and respect the differences that make us unique. Mutual value is built and maintained through trust. Earning and growing our trust with the community is at the heart of everything we do.



- Everyone knows how they connect**
 - We seek to understand and recognise that good communication relies on active listening.
 - Our communication with landholders, neighbours and community is planned, purposeful and frequent.
 - We talk regularly, act promptly and share openly.
- Relationships are Everything**
 - We build relationships on mutual respect, trust, empathy and know that relationships underpin community success.
 - We care for and value relationships which guides our decisions.
- Value is Shared**
 - We are conscious of our impacts on landholders, neighbours & communities and reflect this in our actions.
 - We actively seek to share real value with communities.
- We Involve**
 - We identify and care about our stakeholders and we involve and consider them in planning and change.
 - We respect and deliver on our commitments in alignment with Origin's Compass.

Our charter helps guide our actions. We have the support and authority to stop the job when we feel our commitments under the Charter could be impacted.

Beetaloo Project

- NT landholders already benefiting from infrastructure improvement and annual payments
- All activity has been undertaken with the express approval of Traditional Owners and pastoralists
- Key landholder protections
 - Insurance: every landholder agreement provides insurance against loss, damage or environmental harm
 - Groundwater: proactive monitoring programs

Welcome to Country Beetaloo W-1



Hydraulic Fracture visit



- Visit held in collaboration with Traditional Owners and local pastoralists
- Open access to onsite Supervisors and HFS Engineer to facilitate a conversation about the onsite processes and address any questions with direct answers

Land access and regulation

- Government's role is to determine whether any resource is developed for the public good
 - A landholder veto would prioritise the rights of an individual over the rights of the public
 - A simple, clear land access framework creates a base which supports collaborative and equitable negotiations between companies and landholders
- Existing Act and Regulations have been shown to be appropriate for current level of activity in the NT





PUBLIC BENEFITS

substantial long term economic benefits to the NT

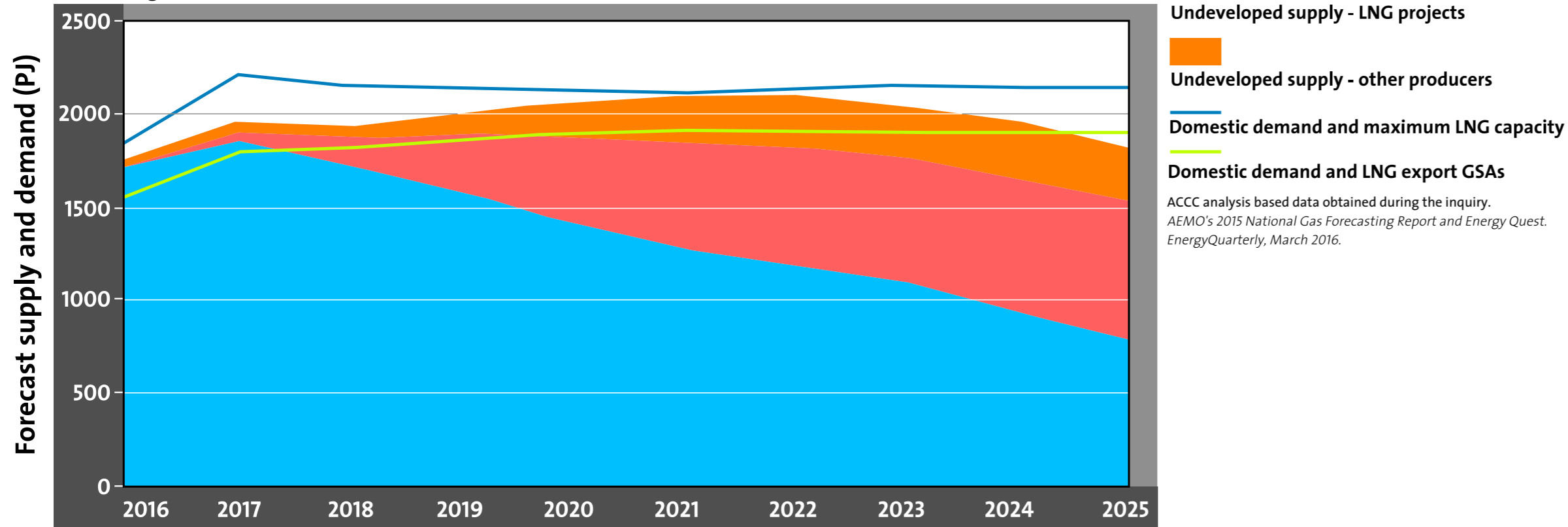
Economic Benefits

- Very real opportunity to meet looming Australian gas supply gap
- Direct public benefits of a successful development
 - Government royalties
 - Royalties to and economic participation of Traditional Owners
 - Diversified local and regional employment and business opportunities
 - Shared infrastructure (roads, airports, telecoms, etc)
- Indirect public benefits
 - Increased opportunity for territory wide investment
 - Stimulus for broadening economic activity

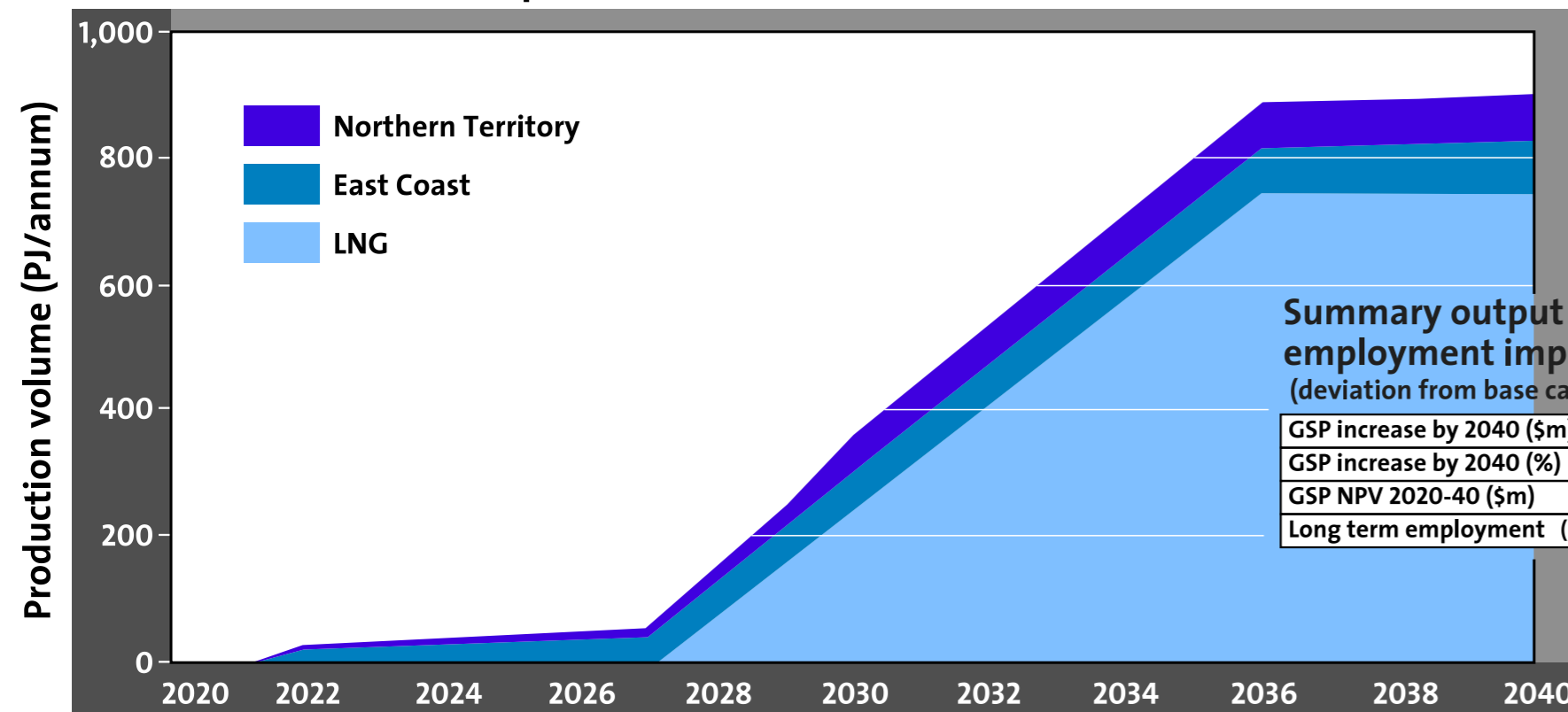
Avoiding Boom/Bust Cycles

- Forecast supply gap allows new discoveries to supply existing markets or contracts
- Substantial existing LNG infrastructure in Darwin and Queensland - many of the challenges in other regional centres have been associated with construction cycles
- The NT opportunity is to grow sustainably and steadily to meet the supply gap over the coming decade

Forecast gas supply and demand balance in the east coast gas market, excluding Arrow, 2016-25



Production volumes - Aspirational scenario



Summary output and employment impacts (deviation from base case)

	Success Scenario	Aspirational Scenario
GSP increase by 2040 (\$m)	\$5,088	\$7,514
GSP increase by 2040 (%)	26%	37%
GSP NPV 2020-40 (\$m)	\$17,226	\$22,384
Long term employment (FTEs in 2040)	4,195	6,321

Deloitte Access Economics (2015)

Indigenous Opportunities

Employment & Training



- DCGI Training (Drilling & Completions General Induction)
- Run in conjunction with local business interest
- Local people employed through primary contractor with onsite training of machinery operation during road construction works
- Ongoing well site maintenance programs to be determined

Cultural Heritage surveys - sacred site identification



- Sacred site inspections
- Well site clearances
- Access track clearances
- Special work conditions Aboriginal Areas Protection Authority (AAPA) certificates
- Ongoing management to those conditions
- Civil activities
- Road construction
- Borrow pit locations
- Water bores

Environmental scouting

