Moomba Carbon Capture & Storage Project

2021 Roundtable for Oil & Gas Projects in South Australia

9th December 2021

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Santos to be net zero by 2040

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Emissions reduction targets designed to support Australia's Paris Agreement commitments. 26-30% reduction by 2030

2025 target	2030 target	2030 Scope 3 emissions target	2040 target
+ Reduce emissions >5% across the Cooper Basin and Queensland operations + Ahead of plan	+ Reduce Scope 1 and 2 absolute emissions by 26-30% by 2030 from 2020 baseline[1] + New target	+ Santos will actively work with customers to reduce their Scope 1 and 2 emissions by >1 $mtCO_2e$ per year by 2030	+ Net zero Scope 1 and 2 absolute emissions by 2040

Technology enablers

+ Fuel efficiency
+ Electrification and renewables integration
+ Utilisation of CCS technology to reduce emissions and to accelerate the economic feasibility of hydrogen and natural gas to hydrogen switching as the market transitions

[1] Reductions are relative to a baseline defined as Santos' net share of Scope 1 and 2 emissions from financial year 19/20 production volumes, adjusted to include Bayu-Undan and DLNG at 68.4% from 1 January 2020.

A solid foundation for the Moomba CCS Project

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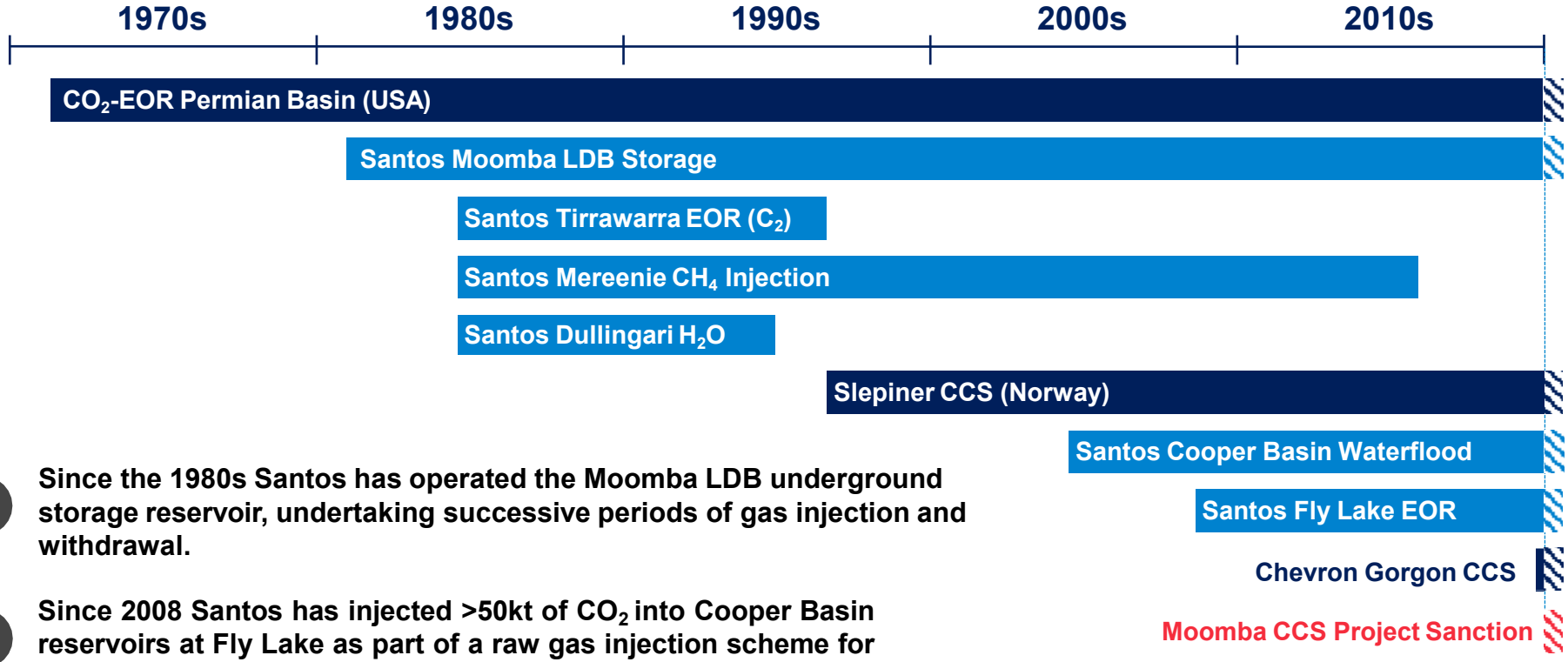
Santos has a proven track record and decades of experience injecting hydrocarbons and water for enhanced recovery and storage



1. **Since the 1980s Santos has operated the Moomba LDB underground storage reservoir, undertaking successive periods of gas injection and withdrawal.**

2. **Since 2008 Santos has injected >50kt of CO_2 into Cooper Basin reservoirs at Fly Lake as part of a raw gas injection scheme for enhanced oil recovery (EOR)**

Moomba Carbon Capture and Storage overview

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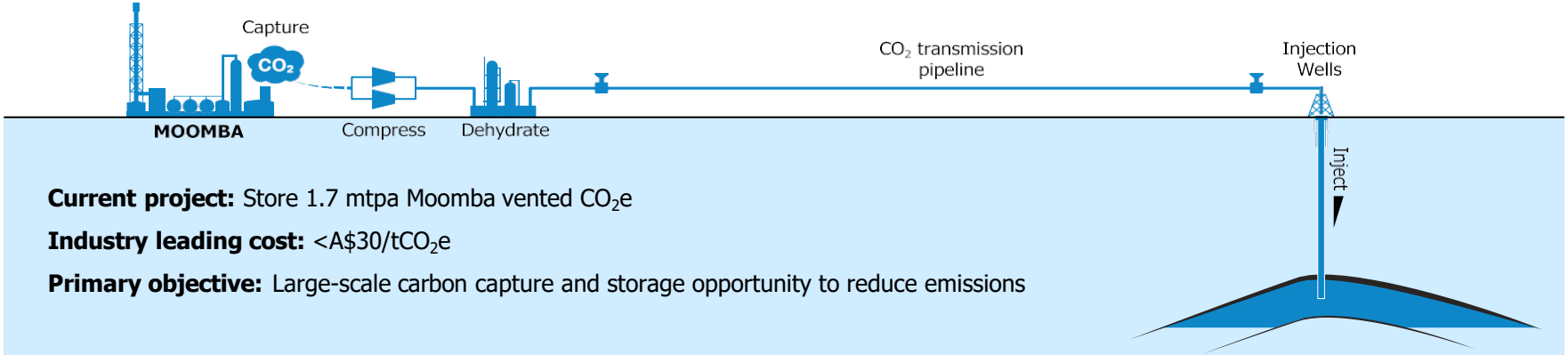

Current project: Store 1.7 mtpa Moomba vented CO_2e

Industry leading cost: <A$30/t$CO_2e$

Primary objective: Large-scale carbon capture and storage opportunity to reduce emissions

Cooper Basin uniquely placed for low cost CCS	+ Existing separated industrial CO_2 source at Moomba gas plant + Long-term experience with gas injection + Depleted reservoirs with proven containment properties and extensive data
Project milestones	+ Pre-FEED Complete late 2019 + FEED complete and FID-ready December 2020 + ACCU registration & FID November 2021
Future opportunities	+ Enabler for Hydrogen production + CO_2 imports into Moomba

Facility overview

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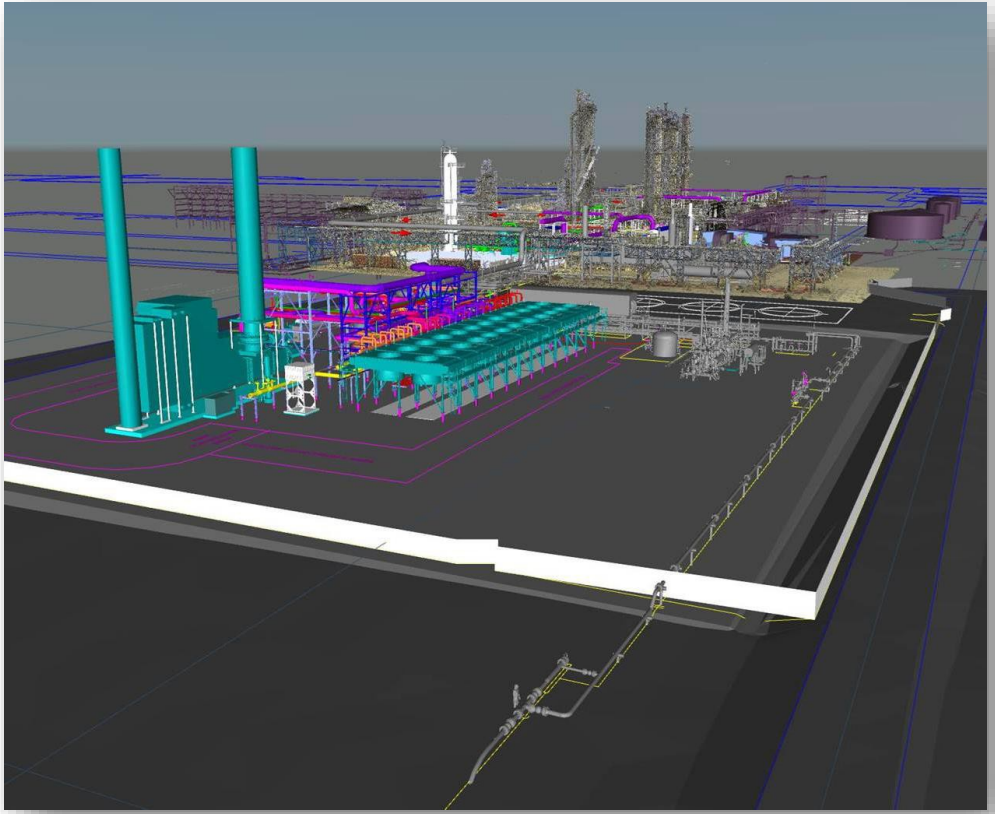
Brownfields Integration

+ Capture from Benfield Trains
+ Utilities integration

Greenfields Development

+ Gas driven compressor
+ Heat Recovery Steam Generator
+ TEG Dehydration
+ CO_2 export pipeline



Selection of storage reservoirs

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Depleted hydrocarbon reservoirs are well understood making them the ideal storage targets

Containment	+ Demonstrated containment of hydrocarbons over geological time + Geochemical and geomechanical analysis confirms containment confidence
Capacity	+ Storage capacity well understood through hydrocarbon production volumes + Larger capacity lower costs
Injectivity	+ Injectivity well understood through decades of production and geological data + Higher injectivity drives lower costs
Distance from source	+ Many depleted gas reservoirs in vicinity of Moomba + Storage reservoirs closer to the source reduce overall project costs

Storage formations

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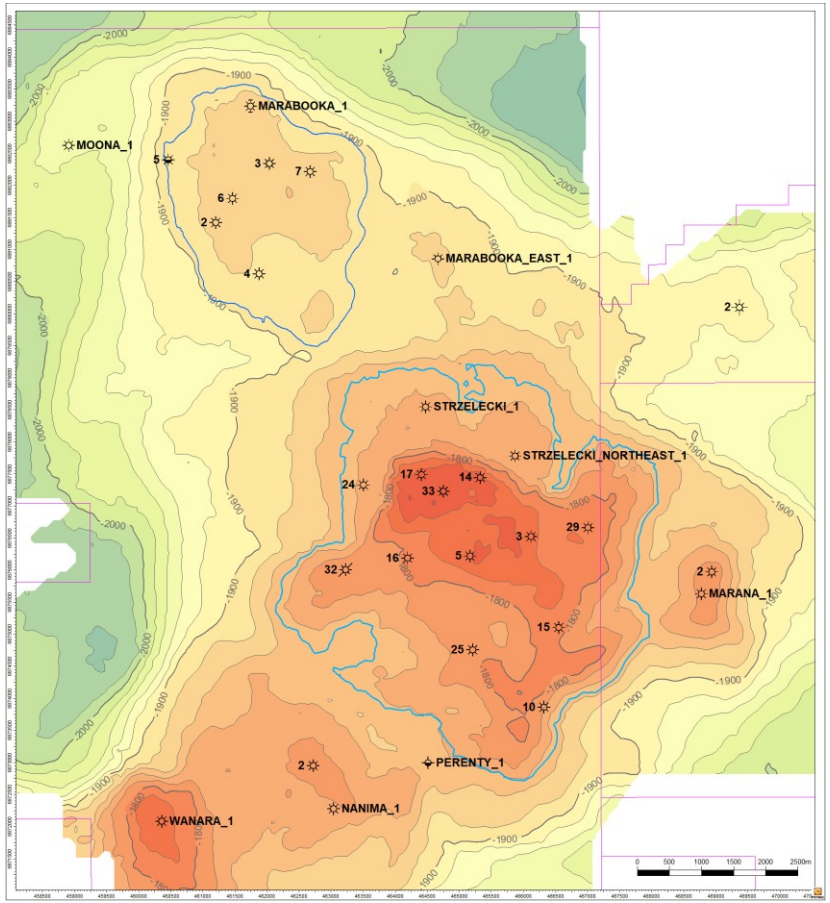
Strzelecki & Marabooka Toolachee Formation

- High quality, fluvial sands
- Four-way dip closed anticline structures
- CO_2 storage capacity extrapolated from produced gas volumes
- Known volumetric containment
  - Extensive 3D seismic coverage
  - Defined by 29 well intersections
  - Hydrocarbon trapping



Storage formation seal

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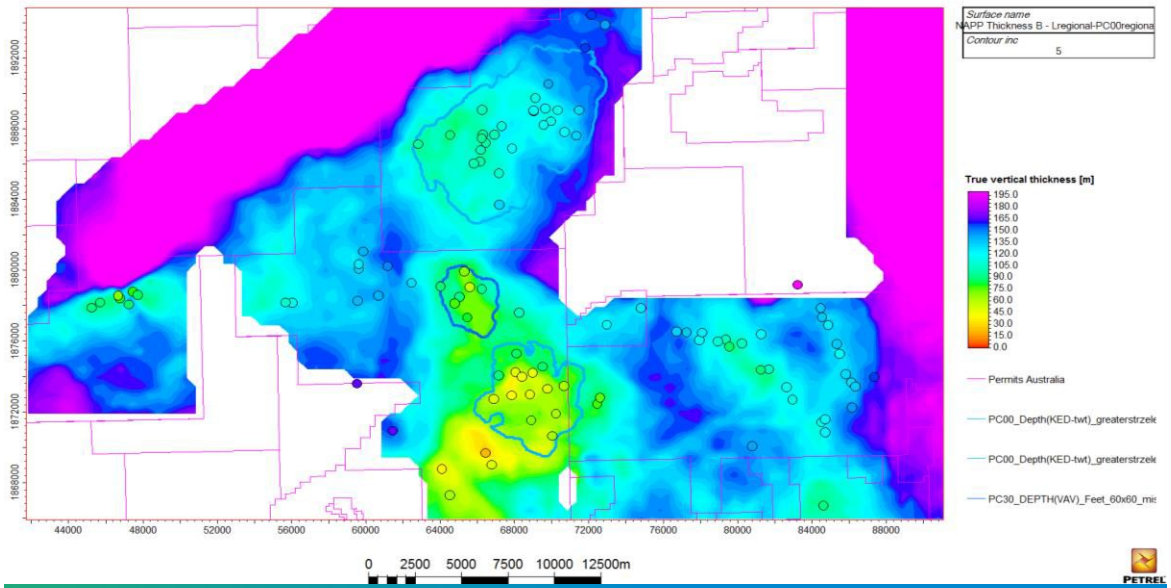
Toolachee formation has proven seal presence in the storage area through the regionally pervasive Nappamerri seal.

Regional Permian seal:

- Present throughout the Cross-Border region
- 50 – 100m thick
- Laterally extensive – nearest edge is ~20km SW on the Murteree Ridge
- ~110m gas column trapped at Strzelecki prior to production



Regional Map – Primary Toolachee seal (Nappamerri Group) interval thickness

Strzelecki-Marabooka complex has many seals

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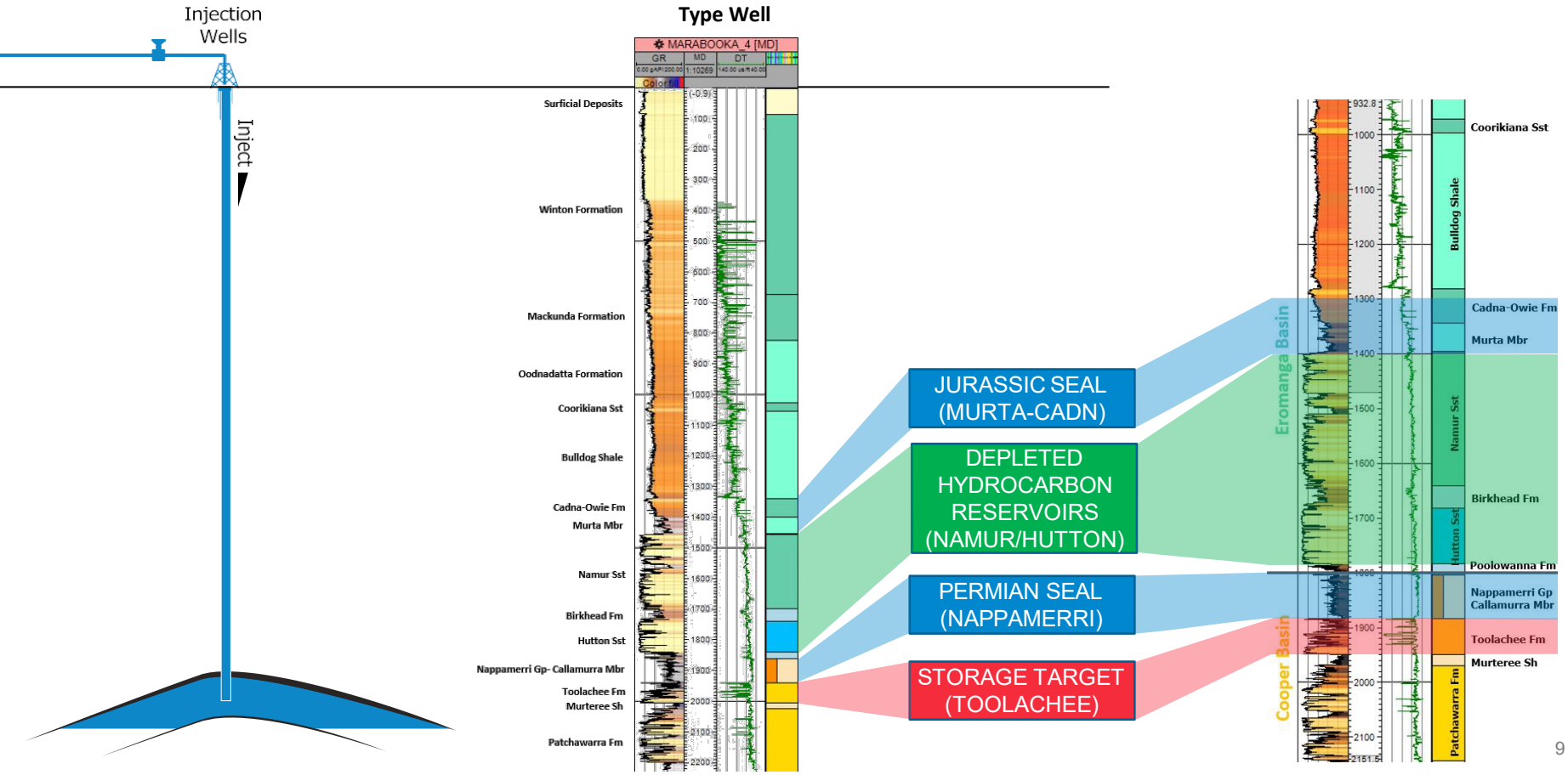

Monitoring and verification through direct measurement

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MEASURE

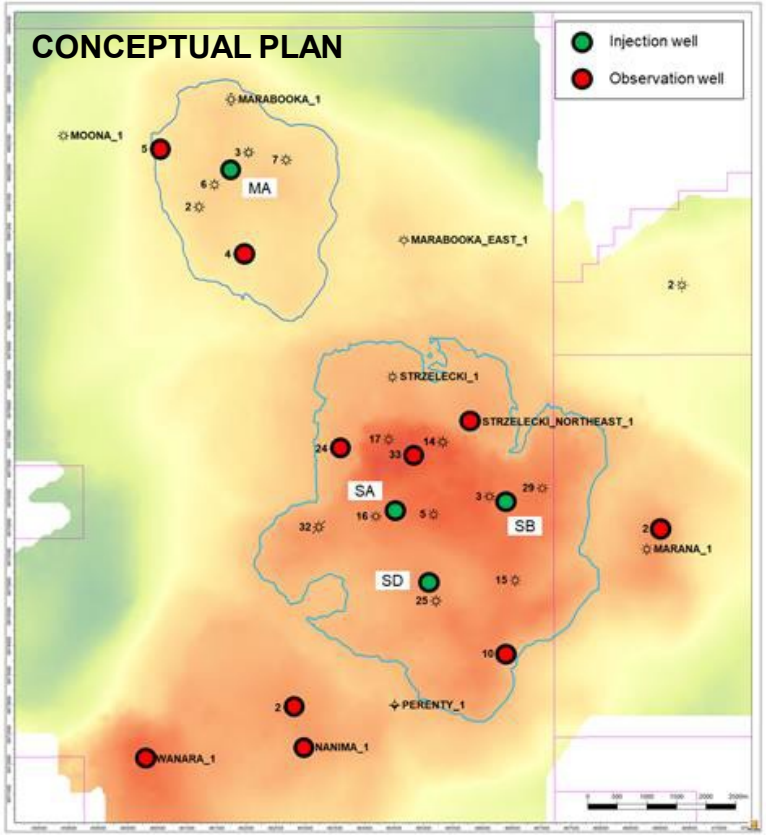
+ Establish baseline conditions
+ Accurately measure the volume of CO_2 injected into the reservoir
+ Measure reservoir pressure, temperature and other reservoir fluid properties

MONITOR

+ Determine the shape and movement the injected CO_2
+ Ongoing assessment of reservoir parameters and subsurface data
+ Monitor the integrity of the storage complex and wells

MANAGE

+ Detect deviations to expectations and facilitate timely response
+ Assess the effectiveness of any implemented risk control measures



Moomba CCS Project

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- ✓ Large scale and globally cost competitive
- ✓ Proven track record of gas storage
- ✓ Geological seals demonstrated containment ability
- ✓ High level of geological knowledge through production history
- ✓ Enables future zero-emissions hydrogen production