Background

- Requested to develop a Cooper Basin Water Strategy
  - How do we source and use our water?
  - What improvements and alternative solutions might we consider?
  - How will we handle future demands?

- Key Business Drivers:
  - Potable water demand and prioritization
  - Significant logistics and cost of trucking
  - Impacts of future activities and third party demands
Project Scope

- In order to develop a strategy we needed a Water Balance
  - How much water do we use, dispose and recycle?
  - Geographically where are our water supplies and demands located?

- Modelled 2012 ‘current’ and 2013-17 ‘future’ scenarios
  - How do we expect demand to change in the future?
  - What are the capacity limits of our water facilities?

- Water Strategy developed by the Stakeholders
  - Change management process to engage across the business
  - Proactive initiatives to improve water management
Integrated Approach

- Involvement across business units and functional groups
- Direct engagement >100 people, Online survey 90 responses
- Four strategy workshops involved ~50 people across the business
Water Balance Structure

- Model is structure by Operating Area
  - Based on Santos Cooper Basin convention
  - Geography of water supply/demand is a key parameter

- Model components:
  - Plants / Satellites (x41)
  - Major Camps (x6)
  - RO Treatment Plants (x4)
  - D&C + mobile camps (per op area + unconventionals)
  - Civils (roads + lease builds) – split into SA and Qld

- Sources and sinks are limited
  - Bore Water, Produced Formation Water, Rainfall
  - Evaporative ponds, losses to process or downhole
Model Development

- Drilling & Completions example

Potable

- Camp
- EnviroFlow Treatment
- Discharge to grade (via sprinklers)
- Cementing Activities
- Down Hole
- Recycled (50%)

Bore

- Drilling Mud
- Sump at Well Site (Unlined)

PFW

- Fracture Stimulation
- Flow Back Pit (Lined)
- Coil Tubing
- Completions
Example Results: 2012 PFW By Area

- Opportunity to increase reuse by cross-mapping supply and demand locations
- Ability to forecast change in distribution with future model cases

![Pie chart showing different areas and their contribution to 2012 PFW.]
Results: 2012 vs 2017 Forecast by Activity

- Total water demand increasing – direct use up 90%
- Changes in supply requirements and geography – D&C largest shift
Ability to forecast evaporative pond capacity limitations
Results: Logistics Planning

- Opportunity to optimise reuse where geography is favourable
Deliverables & Follow On Projects

- **Deliverables achieved:**
  - Clear understanding of water volumes, geographic spread and use
  - Improved data to support decision making and risk management
  - Strategic plan to guide water management developed by stakeholders
  - Corporate alignment in our approach to water management

- **Cost of Water**
  - Water Balance results provide input data
  - Develop model combining both direct and indirect costs

- **Water Forecasting**
  - Improve input data assumptions for water balance
  - Include third party supply demands
Industry Collaboration

- Water Roundtable assessing appetite for a basin wide model
  - Collate high level water balance information from all Operators
  - Ability to identify re-use opportunities
  - Collaborate to avoid duplication of infrastructure
Opportunity to Improve and Expand

- Follow on projects from the Water Strategy will review data assumptions with intent to improve model accuracy

- Third party forecasts unknown, missing data in future models

- Encourage other Cooper Operators to develop similar models
  - Ability to identify re-use opportunities
  - Assess potential to avoid duplication of infrastructure

- Opportunity to provide data for a Cooper hydrogeology study