

Presentation notes and reference material

Key points:

- Target seams Moura-Banana (Eastern margins): Baralaba Coal Measures:
 - Outcrop near Dawson/Moura Mine then dip down to 1200-1500m throughout western Bowen Basin.
 - Sealing above aquitard is the Rewan formation/group
 - Closest GAB aquifer is the Clematis sandstone, separated by Rewan Formation/group.
- Target seams Roma-Injune-Springsure (southern Bowen Basin): Bandanna Coal Measures:
 - 700-1000m.
 - Sealing aquitard above is the Rewan Formation/Group.
 - Closest GAB aquifer is Precipice Sandstone.
 - Near Injune the Precipice Sandstone comes in contact with the Bandanna formation.
- Clematis sandstone is separated by the Rewan Formation (aquitard) from the Baralaba coal measures - no impacts predicted in the Surat Basin UWIR or in the Westside UWIR (2013).
- Industry estimates that water in the Bowen Basin coal seams are significantly less than Surat Basin, in some areas up to a 10th of the water produced.
- Bowen Basin target coal seams are generally older, deeper and more isolated from water-bearing aquifers than in the Surat Basin and coal measures are not extensively used like the Walloons.
- CSG activities in the Surat Basin are not going to affect groundwater systems in the Bowen Basin, as predicted in Surat Basin UWIR.
- Bowen Basin does not form part of the GAB unlike the Surat Basin.
- The Surat Basin Cumulative Management Area (CMA) encompasses all tenures west of Moura across to Springsure. The Surat Basin UWIR predicts drawdowns to the Bandanna Formation and Walloon Coal Measures (WCM)- both target coal seams but not to any other aquifers in the Bowen Basin, i.e. Clematis Sandstone (see figure 2.).
- UWIR- is an underground water model that takes various pieces of data (baseline/bore assessments, water extraction estimates, geological data etc.) gathered from on ground assessments by the company, as well as historical and current data from the Department of Environment and Heritage Protection's (DEHP) groundwater database including monitoring bores and other sources (i.e. CSIRO). The model predicts aquifers and bores that are likely to be impacted/ experience a drop in water level as a result of CSG activities.
- Landholders should consider baseline assessments as part of a conduct and compensation agreement (CCA) prior to company carrying out advanced activities on property.
- Obtain professional advice if negotiating a make good agreement and utilise expert advice within the CSG Compliance Unit Groundwater Investigation Team.

Departmental Roles:

Department of Environment and Heritage Protection (DEHP)

- Responsible for sections of the Water Act dealing with make good agreements and the approval of underground water impact reports.
- Administers the EA process and regulatory framework under the *Petroleum and Gas Act* (P&G) and the *Environmental Protection Act* (EP).

Department of Natural Resources (DNRM)

- CSG Compliance Unit and the Groundwater Investigation Team (GIAT).
- Compliance and enforcement provisions under the *P&G Act* and *EP Act*.
- CSG compliance unit should be contacted for enquiries relating to CSG- compliance, regulatory or enforcement issues.

How is CSG and groundwater regulated?

Chapter 3 of the *Water Act (2000)* deals with underground water impacts by CSG companies/ activities:

- CSG companies are required to develop and submit to DEHP, for approval, an underground water impact report (UWIR) for production activities.
- Inside a CMA, OGIA is responsible for the review and implementation of the model.
- The UWIR must be reviewed and updated every three (3) years.
- Where CSG activities are impacting or are predicted to impact on a landholders groundwater supply, then the responsible company has an obligation under the water act to Make Good that impact by negotiating a make good agreement.

Environmental Authority (EA) issued under the *Environmental Protection Act (1994)*

- Places conditions on CSG activities such as; dust monitoring requirements, noise restrictions, water monitoring requirements and whether companies can undertake stimulation activities (fracking) among many others

Water Act (2000) requires CSG companies to:

- collect baseline data from all bores within a tenure area when entering production
- develop water monitoring strategies for aquifers and any springs
- report findings to DEHP/DNRM annually and update any UWIRs in place.

Petroleum and Gas (Production and Safety) Act 2004

- Tenures management.
- Land access.
- Gas Safety.

Environmental Protection (EP) Act 1994

- All other matters of environmental concerns eg. surface water, vegetation and water contamination.

Contact AgForce Projects CSG team for information regarding landholder rights and responsibilities under the framework.

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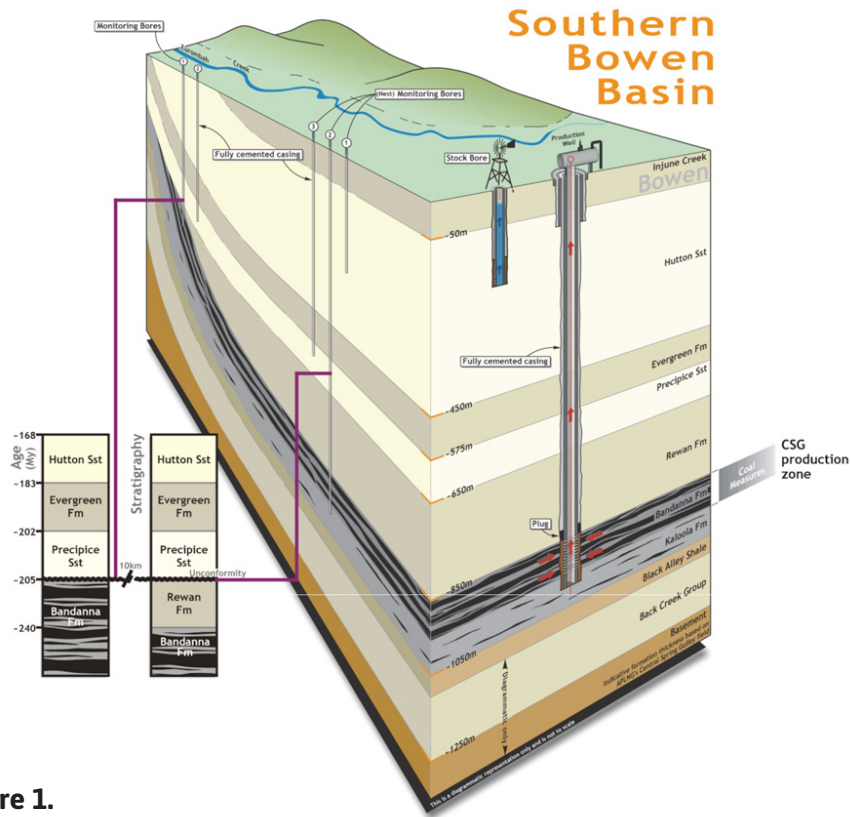


Figure 1.

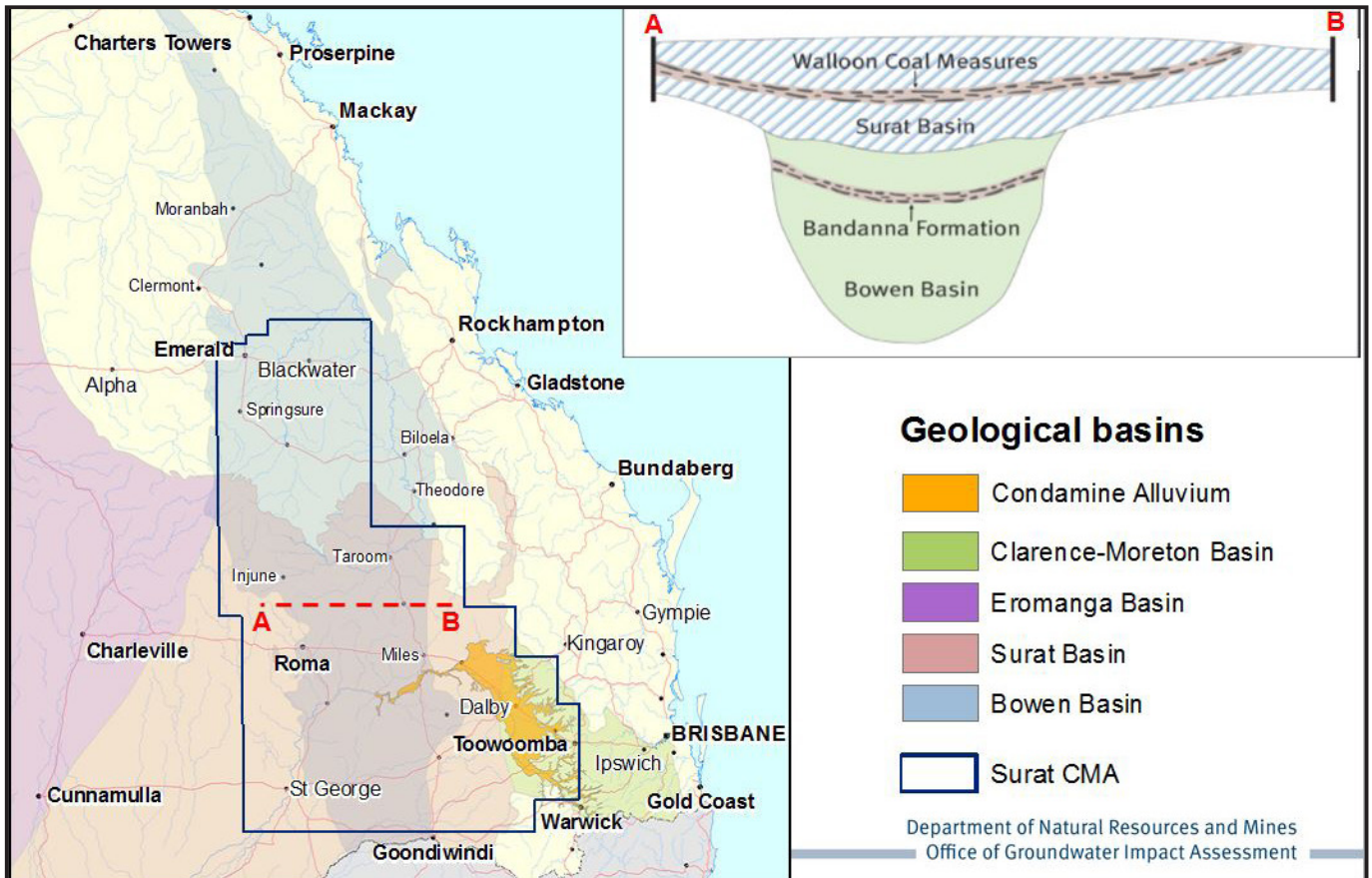


Figure 2.

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Bowen Basin Stratigraphy

	Geological Unit		Description	Thickness
Quaternary	Undefined alluvium		Alluvial sand, gravel and clay (AGE, 2011)	Locally deposited and frequently not present
Unconformity				
Tertiary	Undefined alluvium		Sandstone, siltstone, claystone, conglomerate (1:250,000 Geological Sheet)	Locally eroded and frequently not present
Unconformity				
Triassic	Moolayember Formation		Micaceous sandstone and siltstone	Locally eroded and frequently not present
	Clematis Group		Medium to coarse grained sandstone, siltstone, mudstone and conglomerate	Locally eroded and frequently not present
	Rewan Group		Sandstone, mudstone and conglomerate	Locally eroded
Unconformity				
Permian	Blackwater Group	Baralaba Coal Measures	Calcareous mudstone and shale, coal and feldspathic sandstone	250m (AGE, 2011)
		Gyranda Subgroup	Siltstone and shale with rare coal	Up to 1500m
	Back Creek Group	Flat Top Formation	Siltstone, sandstone, mudstone and conglomerate	Not reported
		Barfield Formation	Calcareous mudstone	700m
		Oxtrack Formation	Fossiliferous limestone	Not reported
		Buffel Formation	Fossiliferous limestone	130m
	Camboon Volcanics		Basalt	3000m
Data sourced from the Geoscience Australia Stratigraphic Units Database (http://www.ga.gov.au/products-services/data-applications/reference-databases/stratigraphic-units.html accessed 4/4/2012) except where otherwise indicated.				

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What is make good?

Make good refers to a company's obligation to restore a groundwater supply if it has been or is predicted to be impacted by CSG activities, such as a drop in pressure or water level beyond a set trigger level, or when that drop impacts on the authorised use of the bore.

How does it work?

When an Underground Water Impact Report (UWIR) has been developed and approved it will identify two areas; an immediately affected area (IAA) and a long term affected area (LTAA). An IAA is where a bore is likely to experience an impact within three years of the model being approved. Whereas the LTAA is a bore likely to experience an impact any time after that three year period.

In the IAA the company is required to contact the bore owner to negotiate access to the property and bore to carry out a bore assessment (BA). A Baseline Assessment Guideline can be found in this information pack and a link to the document is also found on the key resources page.

The outcome of this BA must be provided to the landholder and to the Department of Environment and Heritage Protection (DEHP). The BA is carried out to confirm if the predictions of the UWIR are correct and what make good measures will work (if required). Where an impact is expected, the CSG company and the landholder must then negotiate and develop what are called 'make good measures' to form the agreement.

These measures are what will be done to ensure the same, authorised supply of water and could include:

- deepening the bore
- installing a larger pump/pumping infrastructure
- drilling a new bore into another aquifer
- providing surface water or piping in water
- financial compensation.

It is important landholders understand that during this process all necessary and reasonable legal, valuation and accounting costs incurred must be reimbursed by the CSG company.

AgForce strongly encourages all landholders to seek specialist advice, such as an independent hydrogeologist, and to utilise the expert advice within the CSG Compliance Unit's Groundwater Investigation and Assessment Team (GIAT) (see contacts list for details).

Landholders need to consider what the proposed make good measures are and if they satisfy their requirements:

- Consider additional costs to install new equipment if required.
- What are the additional costs for increased pump capacity if any (power)?
- Will the pump require more regular servicing and maintenance and associated costs?
- Are there any licensing requirements from DNRM or DEHP? Any costs involved in this?
- Are there any long term impacts to the property? Reduction in productivity/capacity or land value potentially?
- Do you have future development plans and ensure the new water supply can handle these?
- Have you considered/negotiated ongoing monitoring of the bore?

If a bore is modelled in a UWIR to be impacted but the BA rejects this and finds that the bore won't actually be impacted as predicted, then a make good agreement is still required but will simply confirm the outcomes of the assessment.

Landholders should ensure that the company they are dealing with clearly explains the outcomes of the BA and that they contact GIAT to discuss the results. Consider negotiating ongoing monitoring of the bore in case impacts change.

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UWIR and Make Good Process:

Underground Water Impact Report (UWIR)
predicts impacts - immediate and long term

Bore identified to be in the IAA

BORE ASSESSMENT

Establish whether bore has or is likely to have any impaired capacity

- » Carried out by CSG company with landholder consent.
- » Ensure you understand what the baseline is testing for.
- » Review AgForce Baseline Assessment Guideline and contact Groundwater Investigation and Assessment Team within the CSG Compliance Unit.

IDENTIFY MAKE GOOD OPTIONS

- » If bore will be impacted - what actions will be taken?
- » Of, if no impacts, then what direction?

- » If the bore assessment (BA) classifies the bore is in a different aquifer than what is modelled, or the predictions won't actually impact the bore, then the make good agreement will simply state this - DEHP must be satisfied.
- » Ensure you understand and agree with this outcome.
- » If the BA does confirm impacts as predicted then CSG company and landholder must negotiate a make good agreement including 'make good measures' i.e. what will actually be done to restore supply.

NEGOTIATE & EXECUTE

- Make good measures
- Negotiations about what measure will be taken:
 - Deepen bore
 - New bore
 - Surface water
 - Compensation

- » It is important that landholders understand that during this process you're necessary and reasonable legal, valuation and accounting costs incurred must be reimbursed by the CSG company.
- » Landholders are also strongly encouraged to obtain specialist advice, such as an independent hydrogeologist and also utilise the Groundwater Assessment and Investigation Team.

Implement Make Good Agreement

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Company information:

Westside Corporation:

Westside operates in a number of tenures across Queensland, including the Bowen Basin. Around the Moura region they are targeting the Baralaba coal seams within two tenure areas, Petroleum Lease 94 (PL94) and ATP 769P, which are around and to the west of Moura.

Westside indicates that the coal seams vary in depth from areas of less than 100m (near the outcrops at the Dawson mine) to between 1200-1500m (to the west as the basin dips) and depths of 600m or more (across to the northwest).

Currently there are 30 operational production wells and Westside has approval for another 49 wells (UWIR 2013), one water treatment facility and seven compressor stations – a total of 148 wells are expected across the region (PL94 and sub-lease)

Westside reported in their UWIR (approved by DEHP in August 2013) that they expect the predicted peak extraction of water to be 90 ML/year, which according to their UWIR is expected in 2018-2019.

PL 94 Environmental Authority (EA)

www.ehp.qld.gov.au/management/env-authorities/pdf/eppg00783713.pdf

Project summary

www.westsidecorporation.com/Gas_Projects/Meridian_SeamGas_CSG_fields_.aspx

Westside 2013 UWIR

“The Baralaba Coal Measures are overlain by the Rewan Group, which is considered to comprise an aquitard. As such, any abstraction from the Baralaba Coal Measures will induce a ‘leakage’ of groundwater from the Rewan Group into the Baralaba Coal Measures”

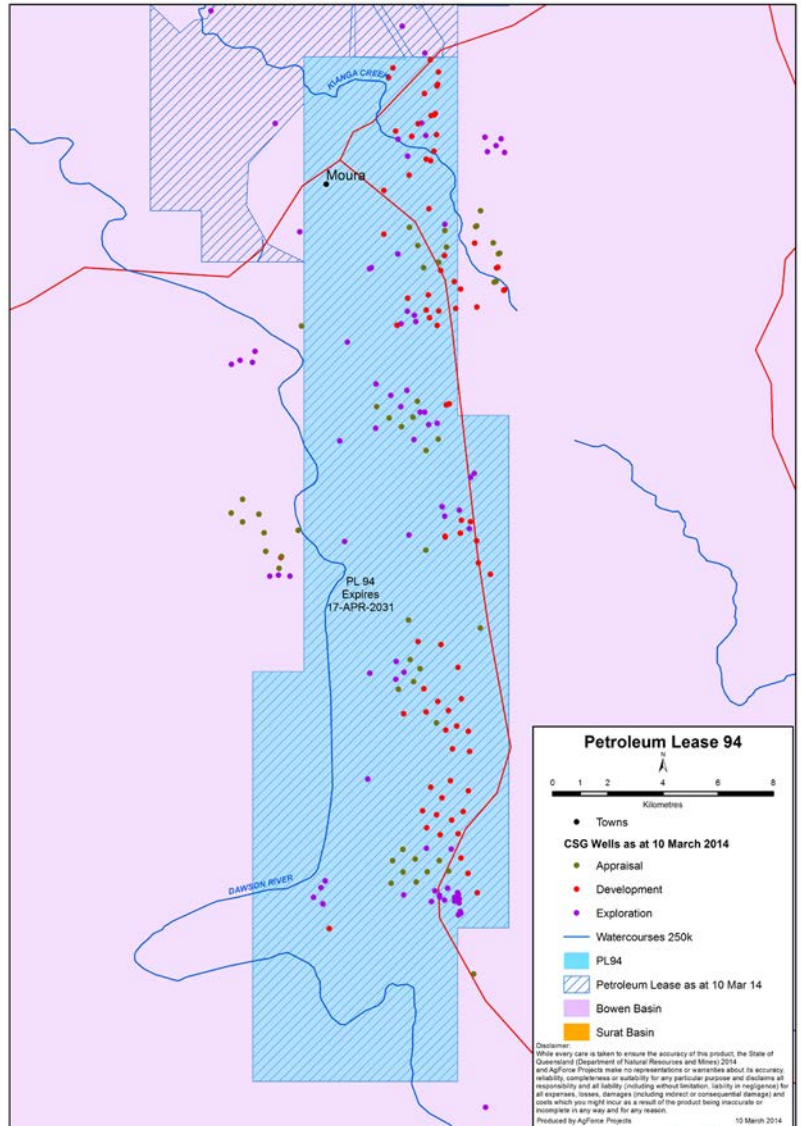


Figure 3. PL 94 UWIR

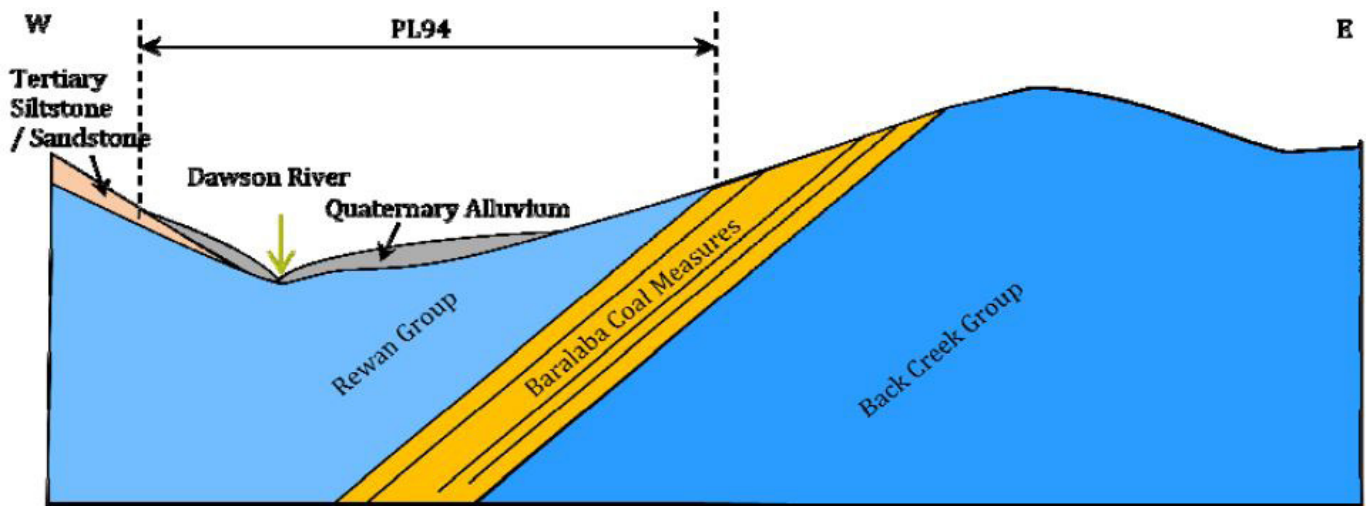


Figure 4.

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Westside also holds a tenure, ATP769P, located to the west of Moura. Westside reports that they operate a five well pilot program on this tenure. In this tenure area Westside is targeting the Baralaba coal measures and indicates that the depth can vary between 550-950m. The EA for this tenure also includes approval for four tight gas wells, which were approved in March 2013.

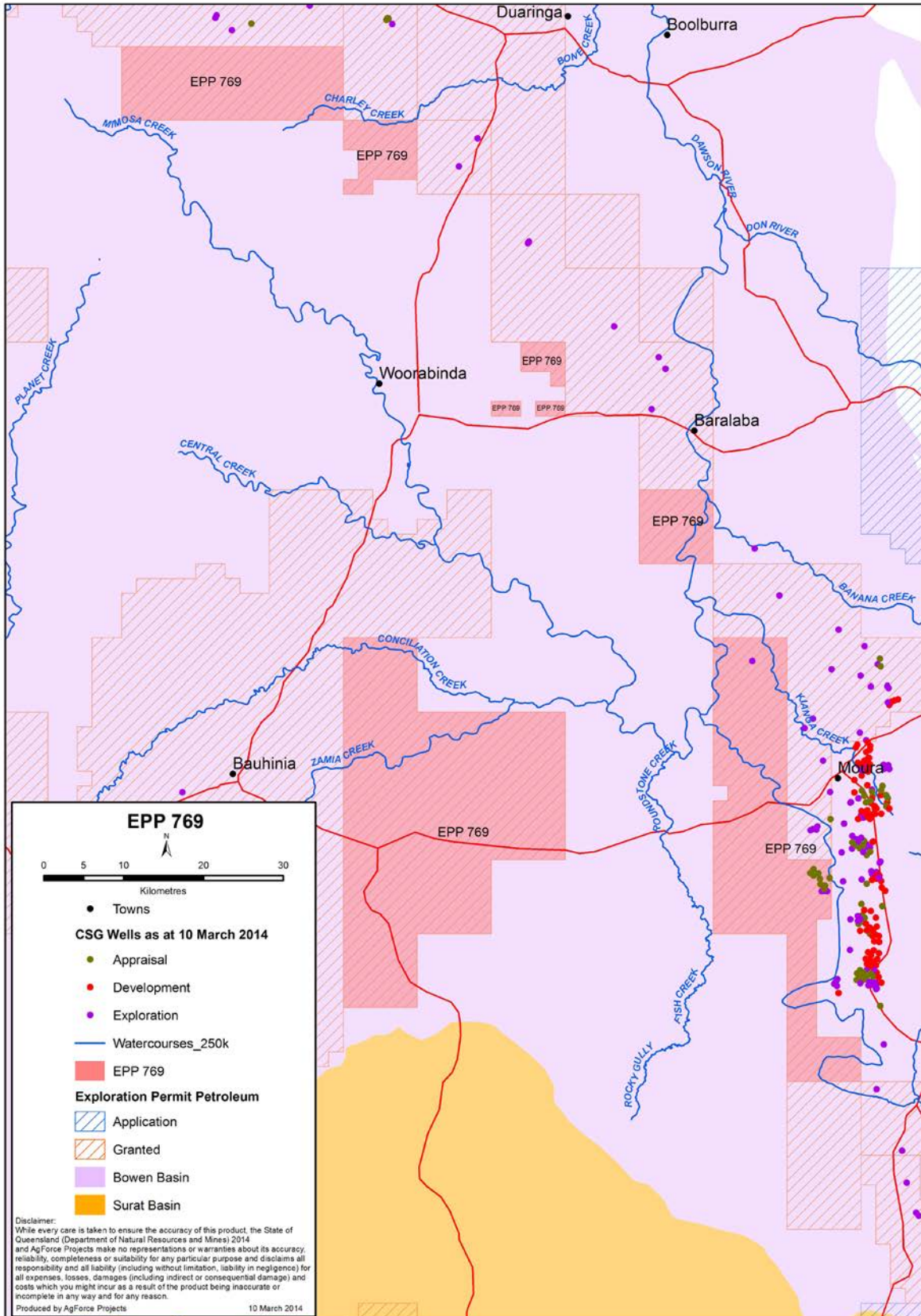


Figure 5. Map showing ATP769P to the west of Moura

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Westside Underground Water Impact Report (UWIR)

Westside submitted a UWIR to DEHP for their Meridian Gas Project (PL 94) and received approval for this report in August 2013. Some of the key points from this model include:

- Any predicted impacts to bores as a result of water extraction will be restricted to the Baralaba Coal Measures.
- Peak water extraction is predicted to be 2018-2019 at up to 90 ML/year.
- The Rewan Formation/Group is a sealing aquitard above the Baralaba and below the Clematis Sandstone.
- The thickness of the Rewan Formation/Group can be up to 500m.
- The model estimates that as a result of extracting water from the Baralaba Coal Measures that some water will leak from the Rewan Formation/Group into the seams.
- The Rewan Formation/Group contains an aquifer that is hydrologically connected to the Dawson River and depending on conditions discharge or receive water/recharge.
- The drawdown associated with the existing and proposed operations may be as great as 710m within the Baralaba Coal Measures.
- As production increases the maximum drawdown in the Baralaba Formation is predicted in the central area of PL94.
- Two bores registered in DERM groundwater database are identified in this area. It is predicted that abstraction from the Baralaba Coal Measures will have no impact on the Rewan Group or the overlying Quaternary Alluvium during the next three years of gas well operation.
- No impact to alluvium during first three years.
- No springs or wetlands within the project area identified.

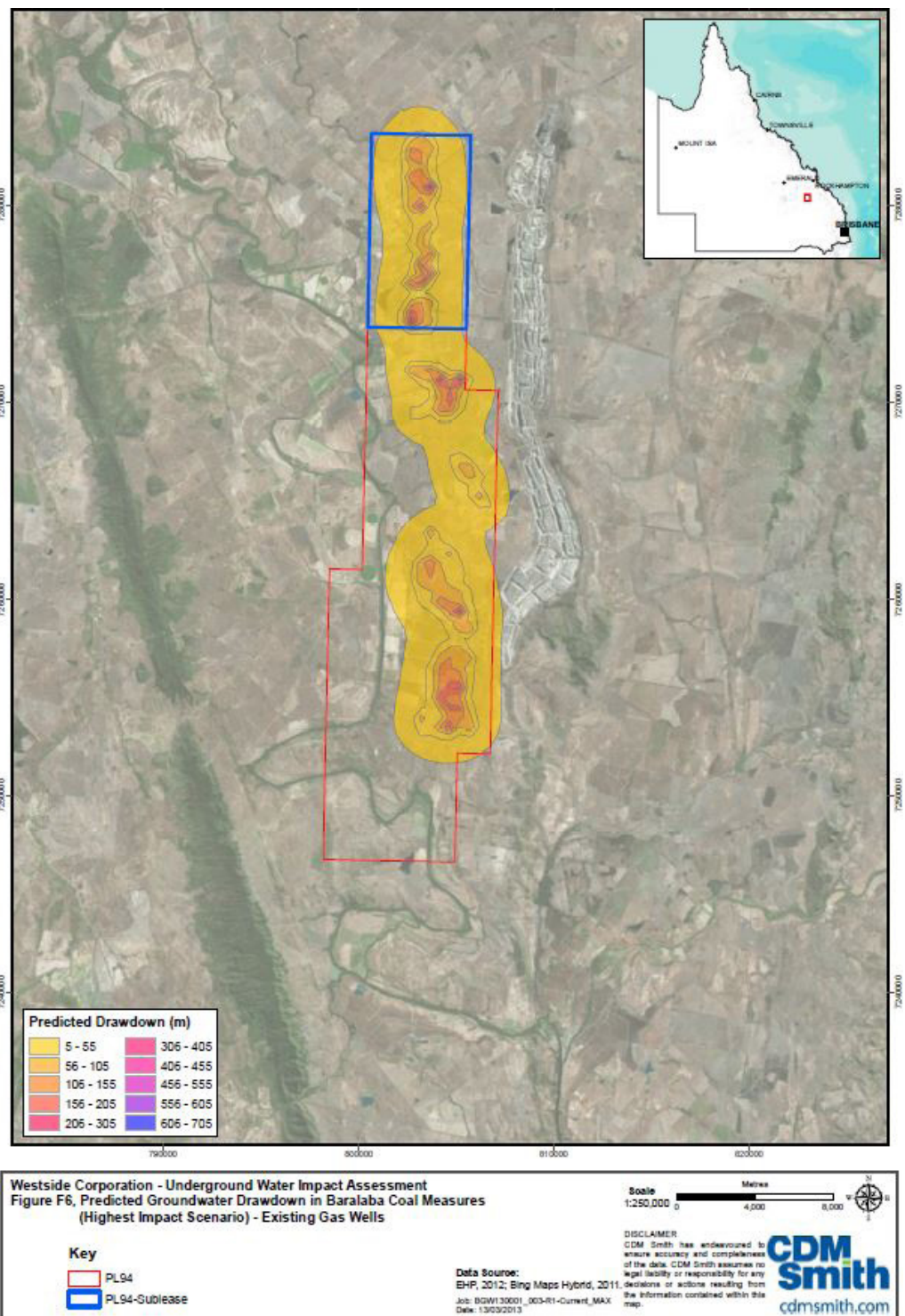


Figure 6. Draw down maps from Westside UWIR

Presentation notes and reference material

Arrow

ATP831: Baralaba to Dingo

Granted an EA in October 2012 for:

- 124km of seismic surveys
- 4 appraisal CSG wells
- 1 dam (max 10ML).

For more information visit: www.ehp.qld.gov.au/management/env-authorities/pdf/eppg00682613.pdf

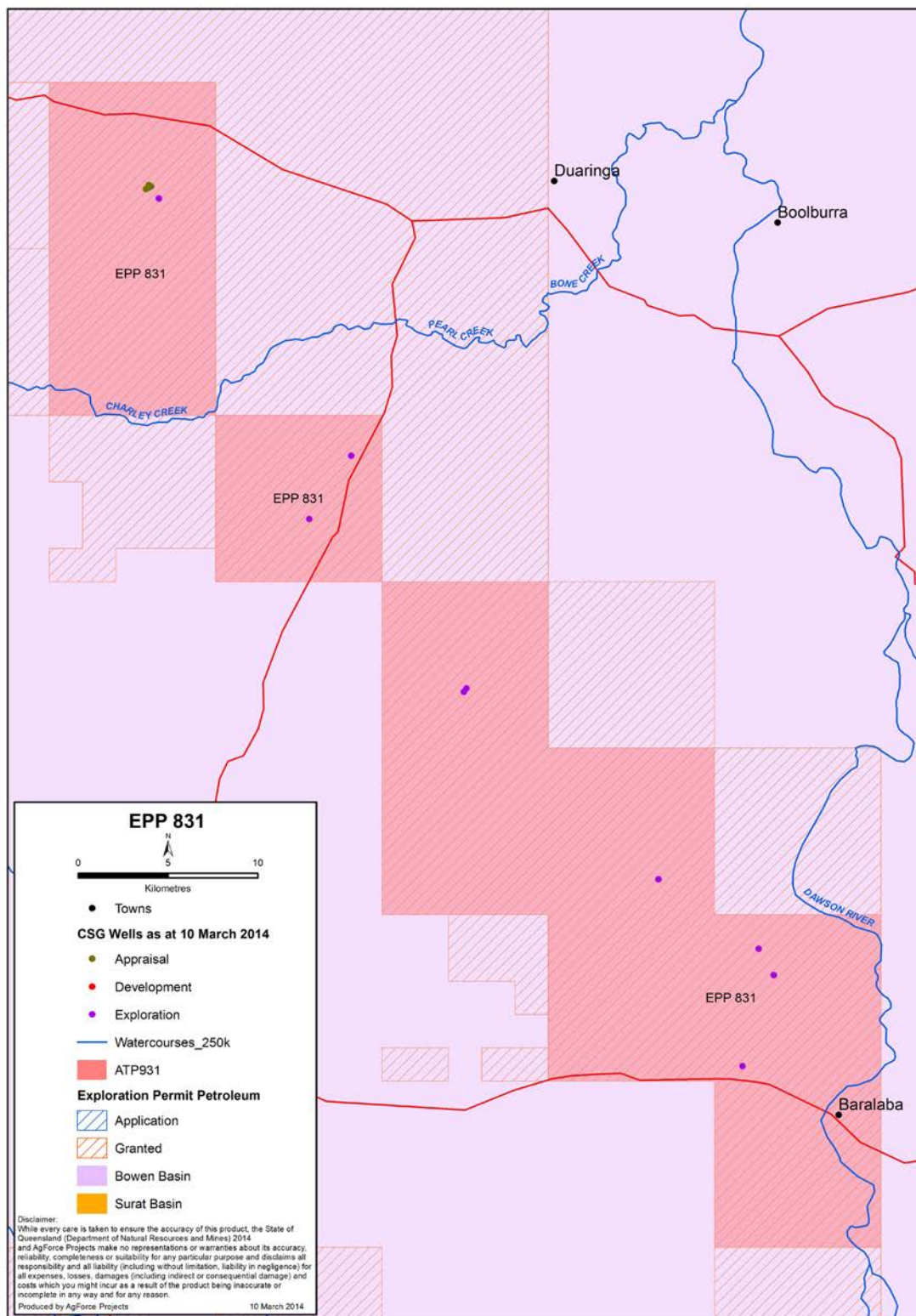


Figure 7. ATP831

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Santos

Santos Phase Two EIS:

Santos GLNG project is seeking to expand its development and production area through the development of a new EIS. Currently Santos has approval for up to 2650 wells and is seeking approval for up to another 6100 wells. The map below shows the new development areas (in green) that Santos is seeking approval for as well as existing areas which will be infilled with new wells.

Santos EA for Tenures; ATP526P and 653 and PL 233, 234, 235, 236, 420, 421 and 440:

For more information visit: www.ehp.qld.gov.au/management/env-authorities/pdf/eppg00984113.pdf

The EA was approved in February 2014.

Across this tenure area there is current approval for:

- 432 wells (currently there is 69 existing)
- 1032 dams (0 existing)
- 6 water treatment facilities and
- over 1650km of seismic surveys.

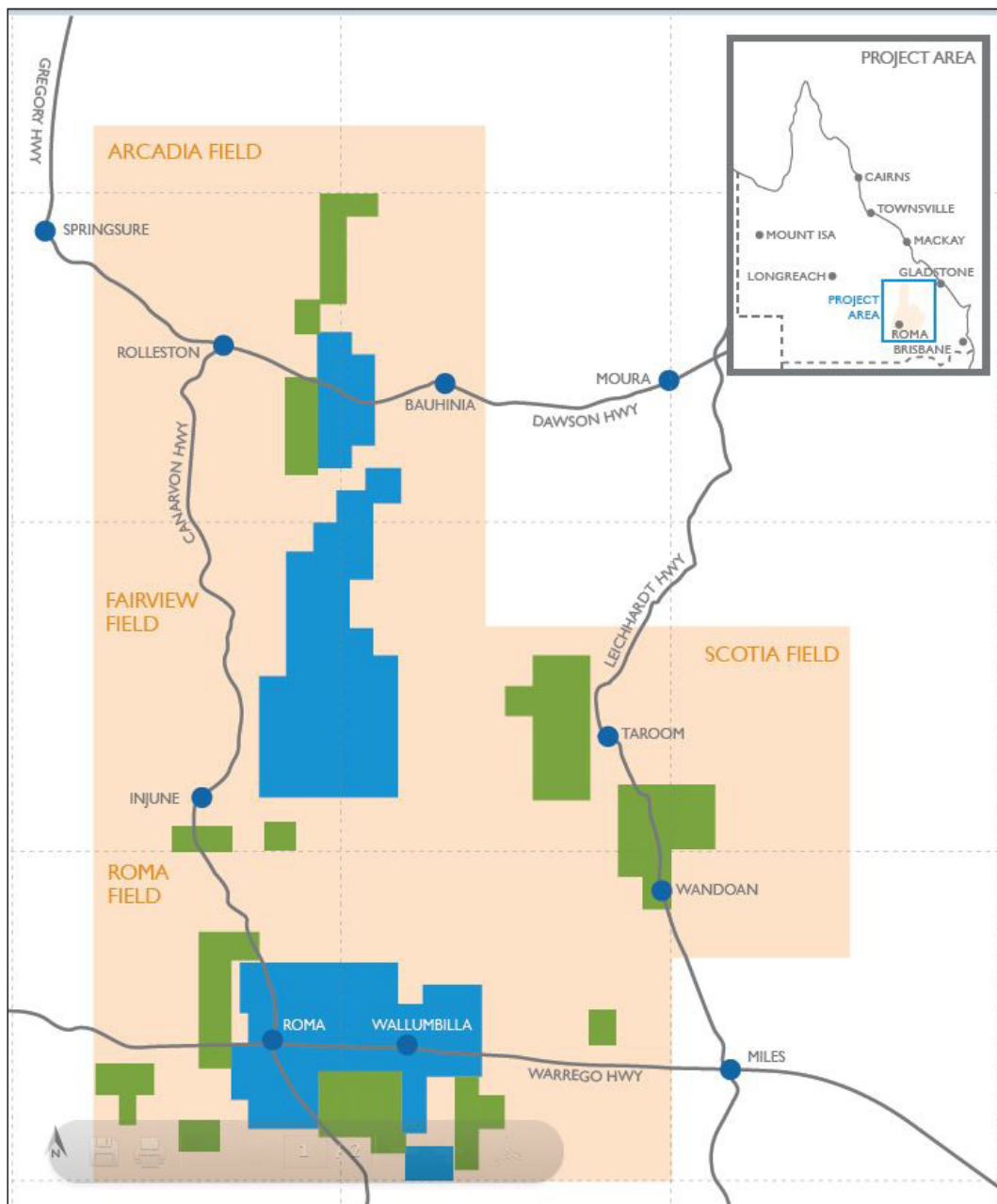


Figure 8.

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Santana Resources Company LLC:

Exploration Permit for Petroleum (EPP) /Authority to Prospect (ATP) 1079

- Environmental Authority (EA) approved by DERM (now DEHP) in sept 2011 for ATP1079.
- The EA provides approval for:
 - Up to 40 CSG wells
 - 60km of 2D Seismic surveys
 - 4 camps (100x100m)
- Approximately 50km west of Moura

For more information visit: www.ehp.qld.gov.au/management/env-authorities/details.php?permit_reference=EPPG00499713

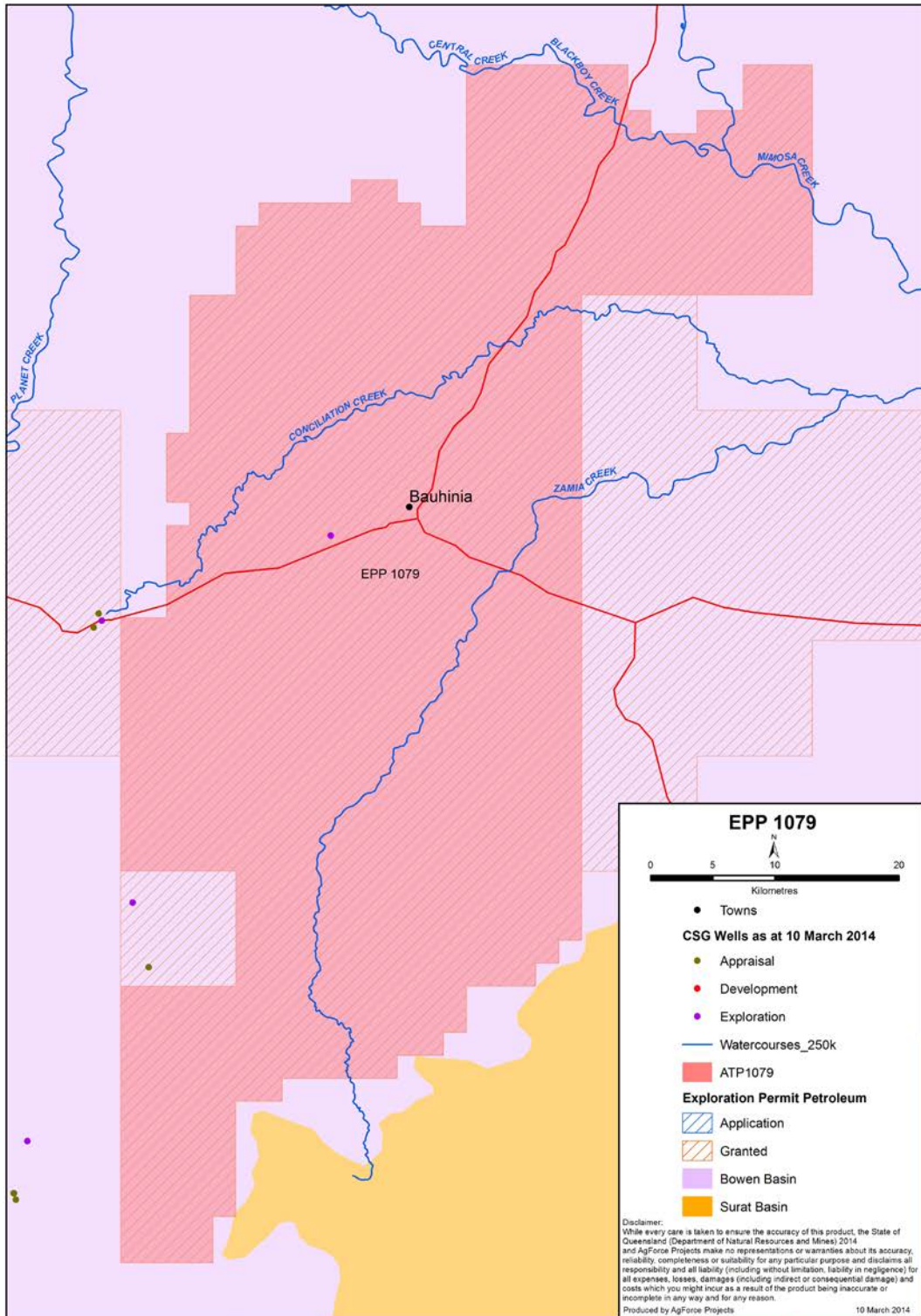


Figure 9.

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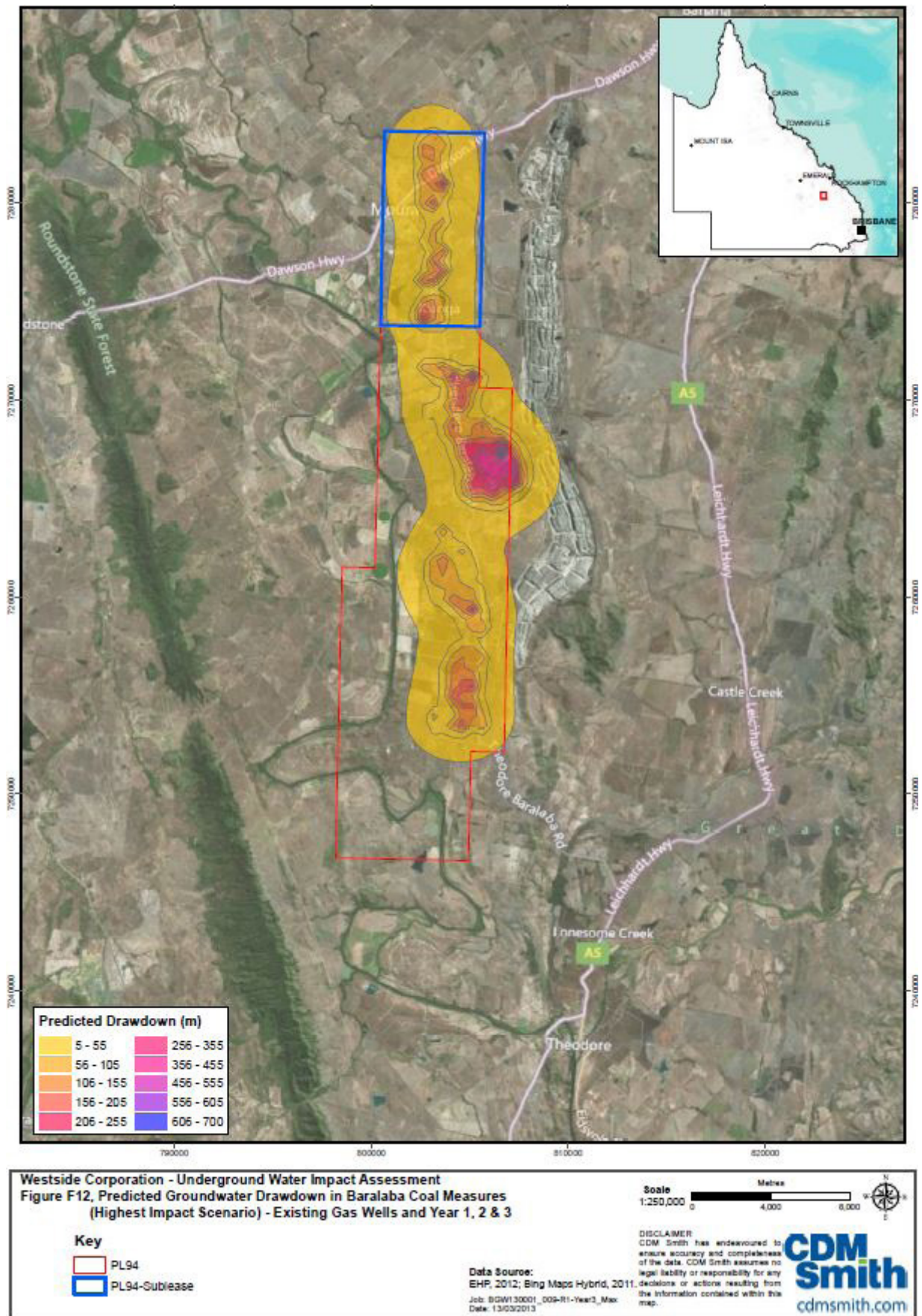


Figure 10.

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Key Contacts

AgForce Projects staff	p: (07) 3238 6048	e: csg@agforceprojects.org.au
Frank Murray, AgForce Central Regional Manager	p: 0427 021 370	e: murrayf@agforceqld.org.au
AgForce member contact	p: (07) 3236 3100	e: agforce@agforceqld.org.au
GasFields Commission Queensland	p: (07) 4688 1327	e: enquiries@gfcq.org.au
CSG Compliance Unit	p: (07) 4529 1500	e: csg.enquiries@dnrm.qld.gov.au
Petroleum and Gas Inspectorate	p: (07) 3224 7768	e: gassafe@dnrm.qld.gov.au
Beyond Blue/Lifeline	p: 1300 22 4636 / 13 11 14	
Pollution reporting hotline	p: 1300 130 372	e: pollutionhotline@ehp.qld.gov.au
DEHP Environmental Impact Statement (EIS) process	www.ehp.qld.gov.au/management/impact-assessment/eis-processes/index.html	
DEHP Environmental Authority lists	www.ehp.qld.gov.au/management/env-authorities/index.php	
DEHP Permit and Licensing management unit - Mining Environmental Authorities	www.ehp.qld.gov.au/land/mining/chapter-5-notifications.html	
Government Baseline Assessment guideline	www.ehp.qld.gov.au/management/non-mining/groundwater.html	
DEHP fact sheets	www.ehp.qld.gov.au/management/coal-seam-gas/index.html	
IRTM	mines.industry.qld.gov.au/geoscience/interactive-resource-tenure-maps.htm	
OGIA UWIR online bore database	dnrm.qld.gov.au/ogia/surat-underground-water-impact-report/bore-search	
QLD Government mines and energy fact sheets	mines.industry.qld.gov.au/mining/landholder-information.htm	
Australian Petroleum Production & Exploration Association (APPEA)	www.appea.com.au	
Origin Energy	www.aplng.com.au	
Santos	www.santos.com/coal-seam-gas.aspx	
Santos groundwater portal	www.santoswaterportal.com.au	
QGC	www.qgc.com.au	
Arrow Energy	www.arrowenergy.com.au	

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Activity on your property

A guide to potential activities on your property and the relevant legislation and compensation arrangements.

Activity	Tenure Type	Relevant Legislation	New Land Access Laws apply	Compensation
Authority to Prospect	ATP	Petroleum & Gas (production and safety) Act 2004 and Petroleum Act 1923	Yes	Compensatable Effects**
Petroleum Lease	PL	Petroleum & Gas (production and safety) Act 2004 and Petroleum Act 1923	Yes	Compensatable Effects**
Pipeline Survey Licence	PSL	Petroleum & Gas (production and safety) Act 2004 and Petroleum Act 1923	Yes	Compensatable Effects**
Petroleum Facility Licence	PFL	Petroleum & Gas (production and safety) Act 2004, Petroleum Act 1923	Yes*	Compensatable Effects**
Petroleum Pipeline Licence	PPL	Petroleum & Gas (production and safety) Act 2004 and Petroleum Act 1923	Yes *	Combination of Compensatable Effects** and ALA
Data Acquisition Authority	DAA	Petroleum & Gas (production and safety) Act 2004 and Petroleum Act 1923	Yes	Compensatable Effects**
Water Monitoring Authority	WMA	Petroleum & Gas (production and safety) Act 2004 and Petroleum Act 1923	Yes	Compensatable Effects**
Prospecting Permits	PP	Mineral Resources Act 1989	No	See s28 of MRA
Mining Claims	MC	Mineral Resources Act 1989	No	See s28 of MRA
Exploration Permit (coal or minerals)	EPC or EPM	Mineral Resources Act 1989	Yes	Compensatable Effects**

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Activity	Tenure Type	Relevant Legislation	New Land Access Laws apply	Compensation
Mineral Development Licence	MDL	Mineral Resources Act 1989	Yes *	Compensatable Effects** and also potential for "At Risk" provisions to apply but they have never been used. See s 278A of MRA
Mining Lease	ML	Mineral Resources Act 1989	No	See s281 MRA
Powerlines	N/A	Acquisition of Land Act 1967, State Development & Public Works Organisation Act 1971 and Electricity Act	No	See s18 of ALA
Railway Lines	N/A	Acquisition of Land Act 1967, State Development & Public works Organisation Act 1971	No	See s18 ALA
Telecommunication infrastructure i.e. Broadband cables	N/A	Telecommunications Act 1997	No	Land Acquisition Act (CTH) 1989

* While the New Land Access Laws may be relevant there may be occasions where other legislation is also applicable in terms of land access.

** The Tenure Holder must compensate each owner or occupier for any "compensatable effect" suffered which is caused by the activities.

"Compensatable effect" means all or any of the following:

- (a) all or any of the following relating to the eligible claimant's land— (i) deprivation of possession of its surface; (ii) diminution of its value; (iii) diminution of the use made or that may be made of the land or any improvement on it; (iv) severance of any part of the land from other parts of the land or from other land that the eligible claimant owns; (v) any cost, damage or loss arising from the carrying out of activities under the petroleum authority on the land;
- (b) accounting, legal or valuation costs the claimant necessarily and reasonably incurs to negotiate or prepare a conduct and compensation agreement, other than the costs of a person facilitating an ADR;
- (c) consequential damages the eligible claimant incurs because of a matter mentioned in paragraph (a) or (b).