

Advice to decision maker on coal seam gas project

IESC 2014-060: Strike Energy Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96, Cooper Basin – New Development

Requesting agency	The South Australian Department of State Development
Date of request	03 November 2014
Date request accepted	04 November 2014
Advice stage	Pre Development Assessment

Context

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) was requested by the South Australian Government Department of State Development to provide advice on the Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96, Cooper Basin Project proposed by Strike Energy in South Australia.

This advice draws upon aspects of information in the Environmental Impact Report (EIR) and the Hydrogeological Assessment together with the expert deliberations of the IESC. The project documentation and information accessed by the IESC are listed in the source documentation at the end of this advice.

The Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96, Cooper Basin Project (the proposed project), is an appraisal of coal seam gas potential within the Patchawarra Formation, located in the southern Cooper Basin that underlies the Great Artesian Basin (GAB), approximately 110 km south of Moomba.

The proposed project will have an operational life of approximately six months and comprise production testing of up to 10 wells. Extracted water is proposed to be directed initially to lined ponds and, if water quality is suitable, then transferred to earthen ponds or freeform areas within interdune swales.

Key potential impacts

The current analysis suggests limited impacts to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Lake Blanche Springs complex and the small number of water users accessing the GAB in the vicinity of the production test.

Assessment against information guidelines

The IESC, in line with its Information Guidelines¹, has considered whether the proposed project assessment has used the following:

Relevant data and information: key conclusions

The proponent has provided detailed regional and local geological information including stratigraphical and hydrogeological information. The hydrological and ecological information presented is appropriate for a project of this scale and stage. Data is needed to confirm the source of the springs.

Application of appropriate methodologies: key conclusions

The analytical groundwater modelling approach used for predicting drawdown at the Lake Blanche Springs is generally considered suitable for this stage of the project. More detailed conceptual and numerical models would be expected if the proposed project moves beyond the exploration stage.

The Draft Statement of Environmental Objectives (Draft SEO)² clearly identifies the main environmental objectives prior to the project approval, enabling a focused appraisal of the proponent's assessment of potential impacts. More detailed assessment criteria, including trigger values, and associated action measures, would improve confidence in mitigation and management of the identified environmental objectives.

Reasonable values and parameters in calculation: key conclusions

The analytical model currently assumes extraction from the Hutton Sandstone when extraction is actually from the Patchawarra Formation approximately 300 m below the Hutton Sandstone. Salinity measurements from the Lake Blanche Spring suggest a non-Hutton/GAB source. The actual source for these springs needs to be determined and the implications for the model results reassessed.

Advice

The IESC's advice, in response to the requesting agency's specific questions is provided below.

Question 1: Is the information provided in the EIR and hydrological report sufficient to assess the potential impacts of drawdown on GAB aquifers (water resources and groundwater dependent ecosystems (GDE)) as a result of water extraction and pressure reduction in the Patchawarra Coals? If not, could you please identify the gaps in knowledge and/or recommend further studies that should be undertaken?

Response

1. While the elevated salinity levels reported for the Lake Blanche Springs suggest a non-Hutton aquifer source, a hydrochemical comparison (including principal ion and isotopic analysis) confirming this would improve confidence and support the proponent's view that the modelled drawdown predictions (which assume the Hutton Sandstone is the source) will have minimal impact on the springs.
2. It is acknowledged that the Far North Prescribed Wells Area Water Allocation Plan requires the use of the de Glee steady state equation and associated parameters to assess potential drawdown impacts. However, a simple sensitivity analysis and uncertainty analysis that considers the range of possible hydraulic conductivity values would improve confidence in prediction of potential drawdown impacts to the Lake Blanche Springs. It would also be useful to assess the timescales associated with this drawdown.

3. A modelling analysis that employs both the actual extraction formation and the actual source of the springs would improve confidence in the modelled drawdown predictions and the assessment of potential impacts on Lake Blanche Springs.

Question 2: Based on the EIR and hydrological report, please provide advice on the adequacy of the management and proposed monitoring measures being proposed to avoid and/or mitigate the risk to water resources and GDEs and whether the measures being proposed are the most appropriate and effective approach, and/or if there are any additional monitoring or management measures that should be employed.

Response

4. The proposed management measures including well abandonment and surface water disposal protocols outlined in the Draft SEO are generally considered sufficient to mitigate the low level risks to groundwater and surface water systems from the proposed project. However, while the Draft SEO outlines the environmental objectives for the project it does not set clear trigger values and management actions and protocols should those trigger values be exceeded. With regard to the disposal of produced water to earthen ponds or freeform areas, the Draft SEO does not clearly state protocols for determining changes in water quality including contaminants and salts, or seepage outside approved areas.
5. While acknowledging the low likelihood of impacts to the Lake Blanche Springs, monitoring of flow from the springs complex prior to and at completion of the production test would improve confidence in impact predictions and provide important baseline data should the project progress to assessment of a proposed development stage.
6. The risk assessment uses an unconventional approach in considering the likelihood of a particular consequence eventuating. Risk assessments normally use the probability of the hazard or event itself occurring. Justification of the different approach is needed.

Question 3: Should the proposal be approved and successful and larger scale production development approval be requested, what further groundwater resource impact assessment studies/modelling would be required/warranted to ensure impacts of larger scale development are appropriately captured and assessed.

Response

7. If larger scale, long-term development were to be undertaken in the future, there is a potential risk to the EPBC Act listed springs at Lake Blanche and GAB groundwater users proximal to the development site. Information generally required to appropriately assess the risks associated with larger scale activities is outlined in the Information Guidelines¹. This information would include, but not be limited to:
 - a. Identification of the source formation and hydrology for the Lake Blanche Springs. Methods are likely to include stratigraphic interpretation and hydrochemical and isotopic analysis of springs and groundwater units.
 - b. An ecological risk assessment of the Lake Blanche Springs complex including identification of flora and fauna and assessment of resilience of the ecosystem to potential reductions in spring flow and pressure and changes in water quality.
 - c. Detailed conceptual and numerical modelling of proposed production activities, with predictions of impacts to springs and other GAB users, inclusive of uncertainty and sensitivity analysis.

- d. Detailed understanding of the lateral extent and vertical hydraulic conductivity of low permeability layers overlying production formations (Patchawarra and if proposed in future, the Toolachee Formation) and subsequent connectivity (including the potential role of geological structures or faults) to the GAB and the source aquifer for the Lake Blanche Springs.
 - e. Detailed description of the fluvial geomorphology and ecology of Strzelecki Creek and floodplain and associated temporary waters, and an assessment of potential risks associated with infrastructure and excess water storage and disposal.
8. Any future proposal should also consider ongoing impact assessment through management plans and the SEO including:
- a. A water management plan including a system of monitoring wells (and a monitoring and action plan) sufficient to characterise possible impacts to the GAB and provide early warning of potential impacts to the Lake Blanche Springs.
 - b. Assessment criteria within the SEO which includes acceptable levels of impact (developed in consultation with stakeholders), detailed trigger values and associated actions and protocols for adaptively managing any potential impacts to water resources such as Strzelecki Creek, GDEs and other water users.

Other considerations

9. The Lake Eyre Basin, including the Cooper Basin subregion, has been identified as a Bioregional Assessment priority region. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and other government research to assist the knowledge base for regional scale assessments.

Date of advice	15 December 2014
Source documentation available to the IESC in the formulation of this advice	<p>Hydrogeologic, 2014. Hydrogeological Assessment for Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96 Southern Cooper Basin. Prepared for Strike Energy Limited, 30 September 2014.</p> <p>Strike Energy, 2014. Environmental Impact Report. Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96, Cooper Basin. October 2014. Prepared by JBS&G Australia Pty Ltd.</p> <p>Strike Energy, 2014. Draft Statement of Environmental Objectives. Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96, Cooper Basin. October 2014. Prepared by JBS&G Australia Pty Ltd.</p>
References cited within the IESC's advice	<p>¹ Information Guidelines for Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals available at: http://iesc.environment.gov.au/pubs/iesc-information-guidelines.pdf</p> <p>² Strike Energy, 2014. Draft Statement of Environmental Objectives. Multi-well Exploration and Appraisal Production Testing from Deep Coals in PEL 96, Cooper Basin. October 2014.</p>