

Advice to decision maker on coal seam gas project

Proposed action: Arrow Surat Gas Project (EPBC 2010/5344) – Expansion

Requesting agency	Department of Sustainability, Environment, Water, Population and Communities
Date of request	14 January 2013
Date request accepted	14 January 2013
Advice stage	Environment Impact Assessment (draft)
Summary of request from the regulator	<p>The Department of Sustainability, Environment, Water, Population and Communities (the Department) is currently assessing the proposed project in accordance with the provisions of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act).</p> <p>The Department notifies the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the Committee) of an opportunity to comment on a draft environmental impact statement (EIS). The Department seeks the advice of the Committee on:</p> <ol style="list-style-type: none"> 1. Does the draft EIS adequately address impacts to matters of national environmental significance relating to surface and/or ground water dependant species and communities? 2. Is the modelling that has been undertaken to support the EIS adequate to estimate hydrogeological impacts within the Great Artesian Basin and other affected ground and surface water systems? <p>Specifically, the Department asks the Committee to consider:</p> <ol style="list-style-type: none"> 1. What are the likely impacts to the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin and what further information, if any, is required to assess impacts on this community? 2. What are the likely impacts to listed threatened species dependent on artesian springs and what further information, if any, is required to assess potential water related impacts on these species? 3. Does the draft EIS adequately address cumulative impacts to ground and surface water systems, and in particular water dependant matters of national environmental significance?

Advice

The Committee was referred the Surat Gas Project, Queensland, for advice to the Commonwealth regulator, at the draft environmental impact statement stage. The above questions have been renumbered one through to five.

Question 1: Does the draft EIS adequately address impacts to matters of national environmental significance relating to surface and/or ground water dependant species and communities?

1. The Committee considers that the draft Environmental Impact Statement does not adequately address potential impacts to Matters of National Environmental Significance. Specifically, there was limited information to determine potential impacts to Matters of National Environmental Significance, including:
 - a. *presence of species*: The proponent conducted a preliminary aquatic survey of the project area. Initially, 73 sites were identified as suitable to be surveyed; however, only 11 sites were sampled as the proponent considered these were representative of the ecological conditions across the study area. The Committee considers that a number of improvements could be made to the survey method. As the study area is approximately 8600 km², and contains four sub-catchments in the northern reaches of the Murray-Darling Basin, more sample sites would improve the quality of results, such as fish species diversity, distribution and demography. In addition, it would be appropriate to survey sites upstream and downstream of a significant confluence, or upstream and downstream of a proposed discharge point;
 - b. *species thresholds*: The EPBC listed Murray Cod (*Maccullochella peelii peelii*) is known to be located within the region, but was not sighted during field surveys. However, freshwater blackfish (*Gadopsis mamoratus*) and purple spotted gudgeon (*Mogurnda adspersa*), both of conservation concern, were recorded;
 - c. *changes to surface water hydrology*: In terms of cumulative surface water impacts, the Committee considers that the Surat Gas Project has the potential to impact on Matters of National Environmental Significance through changes to surface water hydrology and water quality. The proponent states that discharges are not a preferred management option, but will be considered if an option of substitution for existing allocations, reinjection, or the demand for produced water by third parties is unavailable. The Committee notes that the catchments contain largely ephemeral systems, and that at least one of the rivers is fed by a spring. Specific discharge scenarios, including volume, timing and water quality, are critical to assess changes in hydrology and water quality in the receiving environment and subsequent impacts to aquatic ecosystems and Matters of National Environmental Significance. Sensitivity of different life stages to water quality and flow regime changes should also be considered in regard to potential impacts from the proposal;
 - d. *changes to groundwater hydrology*: Modelling indicates that the changes to groundwater hydrology have the potential to impact on Matters of National Environmental Significance and are further discussed in response to question 3. The Committee considers that Matters of National Environmental Significance are likely to be impacted by drawdown associated with cumulative impacts caused by this and other projects. Given the concerns raised regarding the uncertainty of drawdown predictions, further data is required to improve confidence in modelling of the likely impacts of drawdown on springs.
 - e. *changes to groundwater – surface water dynamics*: Limitations in understanding the groundwater dependencies of these water-related values, and in modelling of likely groundwater drawdowns (point 6 below), mean that the draft Environmental Impact Statement does not adequately address the groundwater impacts on Matters of National Environmental Significance. To determine potential vulnerabilities associated with changes to groundwater hydrology, the Committee considers that a field based assessment of groundwater-surface water relationships is required to characterise the current groundwater dependencies of Matters of National Environmental Significance including springs; Lake Broadwater (a nationally listed wetland); and the habitat of EPBC listed species (such as the Boggomoss Snail, Fitzroy River Turtle and migratory birds).

Question 2: Is the modelling that has been undertaken to support the EIS adequate to estimate hydrogeological impacts within the Great Artesian Basin and other affected ground and surface water systems?

2. The Committee does not consider that the modelling undertaken is adequate and includes a number of limitations as outlined in point 3. This raises concerns about the robustness of the drawdown predictions made using the numerical model. Furthermore, there is a discrepancy between the drawdown predicted by the Arrow model and Office of Groundwater Impact Assessment (formerly Queensland Water Commission) model which requires resolution.
3. The proponent's modelling predicts a cumulative drawdown in the Condamine Alluvium of approximately 2.5 m. There are concerns about the lack of information on both the spatial distribution and the hydraulic properties of the low permeability transition layer between the Condamine Alluvium and the Walloon Coal Measures. The inadequacies include:
 - a. *scale*: The model is designed to simulate drawdown in the Walloon Coal Measures and therefore has a limited ability to make predictions for the shallower aquifer systems;
 - b. *hydraulic parameters* : The anisotropy ratio of the Walloon Coal Measures is set to 5000 which is high compared with values found in the literature, which may lead to an underestimation of connectivity and fluxes;
 - c. *calibration*: Model predictions do not fit observation data sufficiently and only limited temporal information is used in the transient calibration; and
 - d. *sensitivity analysis* : The sensitivity analysis is limited in its scope and does not include full parameter ranges found in current literature. For example, the upper ranges of vertical hydraulic conductivities of the Walloon Coal Measures should be assessed more carefully.
4. The Committee considers that the proponent has not adequately developed a site and regional water balance that allows an assessment of cumulative impacts. Whilst water balance information is provided in the Office of Groundwater Impact Assessment's Underground Water Impact Report (2012) the Committee notes that this analysis does not include potential production from all of the proponent's tenements.

Question 3: What are the likely impacts to the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin and what further information, if any, is required to assess impacts on this community?

5. There is predicted to be a laterally extensive drawdown in the Walloon Coal Measures that has the potential to alter groundwater flow directions within several of the aquifers above and below the Walloon Coal Measures. This may result in changes in the availability of water for springs.
6. The proponent does not identify any springs within the project area but did identify discharge and ephemeral recharge springs between 50 and 300 km north of Wandoan. However, one known spring complex has been identified by the Office of Groundwater Impact Assessment in the vicinity of the Condamine River, halfway between Miles and Chinchilla; approximately 50 km from the western boundary of the development area. It is unclear which aquifer is the source for this spring from the published literature and the documentation provided.
7. Although the Office of Groundwater Impact Assessment has attempted to identify the source aquifer of springs within 30 km of the approved tenements, further work is required to assess the spring complex located between Miles and Chinchilla.
8. The Committee considers that the location and the source aquifer of all springs are required to enable an adequate assessment to be undertaken of potential impacts to discharge springs and to listed threatened species dependent on artesian springs and the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin.

Question 4: What are the likely impacts to listed threatened species dependent on artesian springs and what further information, if any, is required to assess potential water related impacts on these species?

9. The Committee's consideration of likely impacts to threatened species is outlined in the response to questions 1 and 3 above.

Question 5: Does the draft EIS adequately address cumulative impacts to ground and surface water systems, and in particular water dependant matters of national environmental significance?

10. In terms of cumulative impacts within the Surat and Bowen basins, the Committee notes that the region is currently experiencing significant development growth, with the approval of the Santos (EPBC 2008/4059), Australia Pacific LNG Pty Ltd (EPBC 2009/4974) and British Gas / Queensland Gas Company (EPBC 2008/4398) coal seam gas fields. The Surat Gas Project would significantly contribute to cumulative impacts associated with the Condamine Alluvium groundwater. There is limited information provided to determine the project's contribution to cumulative impacts, including impacts to Matters of National Environmental Significance from changes to hydrology and water quality.

11. The Committee considers that the cumulative impact assessment should be based on an adequate information set, including site and regional water balances. The implications of depressurisation to the structural integrity of the Springbok Sandstone should also be considered.

12. The Committee considers that well failure during construction, operation and decommissioning phases of the project has the potential to cause aquifer interconnectivity. With up to 7,500 wells being proposed even a 1% failure rate has the potential to significantly impact on aquifer integrity in the region. Water fluxes associated with the potential failure or degradation of well integrity are currently unknown. The Committee considers that a risk assessment of well integrity is required to enable potential impacts at a regional scale to be adequately determined. This should consider mitigation measures, maintenance, decommissioning, and the Code of Practice for Constructing and Abandoning Coal Seam Gas Wells in Queensland.

13. The proponent intends to dispose of brine through selective salt precipitation, brine injection, ocean disposal and/or suitably licensed landfill. The documentation provided with the project indicates approximately 4.5 tonnes of salt is predicted to be generated per megalitre of coal seam gas water. However, it is unclear how many megalitres of coal seam gas water will be produced. The Committee considers that further information is required to make an adequate assessment of potential impacts from brine disposal, including storage locations, water quantities and water qualities. Further, ecotoxicity tests are required to support proposed disposal options.

14. The Committee notes that the Northern Inland Catchment and the Clarence-Moreton Basin have been identified as Bioregional Assessments priority regions. Given that the proposed Arrow development is located within this region, the Committee considers that data and relevant information from this project should be made accessible for these Bioregional Assessments.

Date of advice 20 February 2013

Source documentation available to the Committee in the formulation of this advice Adriaansen, M., Butler, A., Anderson, T. & Broughton, J., 2011. Arrow Energy Surat Gas Project EIS – Surface Water Assessment – PART B: Water Quality. NRA (for Alluvium) for Coffey Environments, 12 Creek Street, Brisbane Qld 4000.

Arrow Energy Pty Ltd, 2012. Surat Gas Project Environmental Impact Statement. Available at:
www.arrowenergy.com/page/community/Project_Assessment_EIS/Surat_Gas_Project_EIS (accessed 20/02/2013).

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Coffey Environments Australia Pty Ltd, 2012. Surat Gas Project – Environmental Impact Statement. Attachment 3: Matters of National Environmental Significance. Prepared for Arrow Energy Pty Ltd.

Coffey Environments Australia Pty Ltd, 2012. Surat Gas Project – Environmental Impact Statement. Chapter 5: Project description. Prepared for Arrow Energy Pty Ltd.

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Coffey Environments Pty Ltd, 2012. Arrow Energy Surat Gas Project Groundwater Impact Assessment Report. Prepared for Arrow Energy Pty Ltd.
