

Advice to decision maker on coal mining project

IESC 2015-064: Drayton South Coal Project – Expansion

Requesting agency	The New South Wales Mining and Petroleum Gateway Panel
Date of request	27 January 2015
Date request accepted	27 January 2015
Advice stage	Gateway Application

Context

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) was requested by the New South Wales Mining and Petroleum Gateway Panel to provide advice on the Drayton South Coal Project in New South Wales proposed by Anglo American Metallurgical Coal Pty Ltd.

The IESC has previously provided advice to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities on the initial project proposal for the Drayton South Coal Project (1 February 2013). The previous advice was provided prior to the introduction of the 'water trigger' and should be read in this context.

This advice draws upon aspects of information in the Gateway Certificate Application, together with the expert deliberations of the IESC. The project documentation in relation to water is largely the same as provided in the 2012 documentation although the project has been reduced in scale. Information accessed by the IESC is listed in the source documentation at the end of this advice.

The currently proposed Drayton South Coal Project (the proposed project) is an extension to the existing Drayton Coal Mine and is located approximately 13 kilometres south of Muswellbrook in the Hunter Valley. Anglo American has operated Drayton Mine for over 30 years and the current project approval 06_0202 held for Drayton Mine expires in 2017.

Drayton mine is located about six kilometres northeast of the proposed Drayton South Coal Project and produces more than five million tonnes per annum of thermal coal within a lease area of 1,768 hectares (Anglo American 2013). As at December 2012 the reserve estimate was approximately 12 million tonnes, with an additional 12 million tonnes outside the current mine layout. In addition, the existing Mt Arthur coal mine is located about three kilometres north of the proposed project.

The proposed project will produce up to seven million tonnes per annum of thermal coal for a further 15 years, mining a resource of approximately 75 million tonnes. The proposed project will result in

direct impacts to approximately 1470.9 hectares of land and the creation of a final void lake. It will require construction of a transport corridor to the new mining area; realignment of a section of Edderton Road; and installation of water management infrastructure.

Assessment against information guidelines

The IESC recognises that the Application for a Gateway Certificate addresses the criteria specified as part of the Gateway process and does not contain the level of detail expected for the subsequent development application and accompanying environmental assessment.

Relevant data and information: key conclusions

Updated water-related information has not been provided for the proposed project. Data are needed on the magnitude and variability of surface flows (including baseflow) and subsequent response of groundwater levels within the alluvium to different climatic events, in order to understand and quantify the actual alluvial recharge processes in the Hunter River and Saddlers Creek.

Application of appropriate methodologies

If adequate additional temporal data on stream flows and groundwater level variability within the Hunter and Saddlers Creek alluvium has been collected since the previous assessment (2012) it should be incorporated into the groundwater model. The model should be calibrated using transient data and variable river boundary conditions. To improve confidence in temporal predictions of groundwater - surface water interactions and in estimates of river recharge through the alluvium, the model should use shorter time steps and finer discretisation in the vicinity of alluvium.

Reasonable values and parameters in calculations: key conclusions

Appropriate groundwater model sensitivity analysis should consider ranges of parameter values that are likely to be representative of the system. Estimations of travel time from the newly proposed mine void should include estimates for flow directly to the Hunter River and via Saddlers Creek and its tributaries and include a simple uncertainty analysis which considers a range of hydraulic and porosity values representative of undisturbed and, if applicable, reinstated material.

Advice

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

Question 1: It would be appreciated if the IESC could advise on the potential likelihood and significance of any impacts of the proposal on water resources, as well as advise on the appropriateness of proposed mitigation measures.

Response

1. In its previous advice the IESC considered, based on the information available, that the site-specific water-related impacts may be minimal. The limited level of up-to-date detail in the project documentation at the Gateway stage restricts the ability of the IESC to assess the likelihood and significance of impacts to water resources from the proposed project. However given the current project proposal has reduced in scale (spatially and temporally) the significance of site-specific impacts to water resources is likely to be reduced from those previously considered by the IESC (1 February 2013, see attached).
2. Key potential impacts associated with the proposed project include:

- reduction in flows to Saddlers Creek and the associated influence on water quality and quantity affecting riparian ecosystems (including groundwater dependent ecosystems (GDEs)) and any proposed rehabilitation program
- water quality issues associated with seepage from the proposed final void lake
- effects of mine water discharges to the Hunter River, Saddlers Creek and their instream communities, and
- cumulative impact on groundwater systems of the proposed project, adjacent mining operations, and other water users.

Potential impacts to water resources and the appropriateness of proposed mitigation measures are discussed below.

Explanation

Site-Specific Impacts

3. It is likely that baseflow contribution to Saddlers Creek will be reduced through reduction or reversal of groundwater gradients. This would result in groundwater flow from the alluvium to the underlying Permian strata due to a cumulative drawdown from Drayton South and the adjacent Mt Arthur mines. Reductions to flow in Saddlers Creek will also occur due to mining reducing the catchment area. As stated in the previous advice, this is highly likely to adversely affect groundwater-dependent riparian and floodplain vegetation and associated water-dependent ecosystems.
4. There is potential for additional saline discharges to the Hunter River, Saddlers Creek and their tributaries in the long term from seepage of saline water from the proposed final void lake. There is currently insufficient information to assess the likelihood and significance of any potential impacts on water quality or riparian vegetation/GDEs that are dependent on alluvial groundwater (refer to Paragraph 10).

Cumulative Impacts

5. While at this Gateway stage the proponent has not provided up-to-date details of potential water discharges to the Hunter River, the IESC notes the proponent's commitment (WRM 2012) to discharging excess water in accordance with the Hunter River Salinity Trading Scheme. The proponent has not yet provided information of potential cumulative impacts of contaminants (e.g. metals, polycyclic aromatic hydrocarbons (PAHs), ionic composition) on downstream environments. The importance of these issues was highlighted in the previous IESC advice.
6. The groundwater modelling (AGE 2012) does not include impacts to water resources from the adjacent Mt Arthur mine or other groundwater users. Assessment of cumulative impacts to Saddlers Creek has been determined by adding together the individual predicted loss estimates from adjacent mines (AGE 2012) which were derived utilising differing models with differing parameterisation. This reduces confidence in predictions of cumulative impacts. As such, the potential scale of cumulative impacts to Saddlers Creek, the Hunter River, the associated alluvium and the underlying Permian groundwater system is not able to be assessed from the information provided.

Question 2: The IESC may also recommend further studies that should be undertaken if relevant.

Response

7. Updated assessments of groundwater, surface water quality and quantity and water-related ecological impacts should be provided and include conceptual and numerical models developed to address potential site-specific and cumulative impacts of the current project proposal. This would include updated conceptualisation of the interaction between surface flows, groundwater and GDEs in the Saddlers Creek alluvium and underlying regolith / Permian strata, accurate representation of these flow processes in the numerical groundwater model with consideration to both spatial and temporal variations, and inclusion of groundwater extraction from the Mt Arthur mines.
8. Further studies undertaken in preparation for a development application should include the type of information that enables characterisation of baseline groundwater, surface water and ecohydrological conditions and a robust assessment of impacts to water resources such as those outlined in the IESC Information Guidelines (IESC 2014). Specific considerations for further work are discussed below.

Explanation

Site-Specific Assessment

9. Improved temporal conceptualisation and quantification of river recharge processes and groundwater-surface water interactions in the Saddlers Creek and Hunter River alluvium would inform transient model calibration and reduce uncertainty in model predictions. This information should be used to inform ecological conceptualisation using the method described in Commonwealth of Australia (2015) and water-related aspects of proposed rehabilitation works at the site (WRM 2012).
10. The following further studies would help inform and enable evaluation of the ecological success of the planned rehabilitation: mapping of floodplain and riparian vegetation and determination of its likely groundwater dependency; and collection of at least two sets of samples of instream biota (e.g. invertebrates, amphibians) from Saddlers Creek collected more than two weeks after resumption of flow.
11. Further adequate sampling of GDEs, such as stygofauna and hyporheic fauna is needed in order to inform the assessment of ecological impacts.
12. Transient groundwater model calibration using data collected from wells installed in the alluvium and regolith in 2011 and predictive modelling considering shorter time-steps and finer discretisation in the vicinity of the alluvium would better represent river recharge and groundwater surface water interactions. This would improve confidence in predictions of the scale and lateral extent of potential impacts of extraction and also inform water-related planning and monitoring aspects of any proposed rehabilitation design.
13. Sensitivity analysis of the groundwater model should consider greater ranges of parameter values than the $\pm 50\%$ used in the 2012 groundwater assessment (AGE 2012) or provide justification where ranges remain the same. Future data collection and monitoring should be designed to improve understanding of sensitive parameters in order to reduce model uncertainty.
14. An updated assessment of the potential accumulation of salts in the final void and an assessment of potential travel times of seepage to the Hunter River and its tributaries are needed. The assessment should consider the likelihood of the generation of saline seeps in nearby tributaries (including ephemeral creeks developed as part of site rehabilitation) and a simple uncertainty

analysis of potential travel times using a range of potential hydraulic conductivity and porosity values. These values are likely to differ if/where there is potential for transport through reinstated materials in rehabilitated areas.

15. An updated site water balance is needed to assess and quantify the potential for reduced catchment runoff, spillages from water storages, and discharges to the Hunter River consistent with the proposed project.

Cumulative Impact Assessment

16. In conjunction with adherence to the Hunter River Salinity Trading Scheme requirements an assessment of potential impacts of physical and chemical composition of discharge water, including the impacts of metals and PAHs, on downstream ecosystems and environments would improve understanding of potential regional cumulative impacts of mining. This is consistent with the recent findings of Krogh et al. (2013) which recommends experimental studies to fully understand the effects of different components of saline water including metals/metalloids and ionic compositions discharged to the Hunter River. Such studies may include field studies at targeted sites and experiments to determine the chronic and sublethal salinity sensitivity of macroinvertebrate taxa. A program investigating the whole-of-effluent toxicity of the various mine waters prior to discharge is also needed to see whether any toxicity exists and the degree of dilution (if any) needed to mitigate potential toxic effects.
17. A sub-regional groundwater model including all mines and major water users in the vicinity would better assess spatial and temporal cumulative impacts to water resources and dependent ecosystems in the vicinity of the proposed project. The model would need to be updated on a regular basis and be informed by ongoing dedicated monitoring to validate and reduce uncertainty in model predictions.

Other considerations

18. The Northern Sydney Basin has been identified as a Bioregional Assessment priority region. It is anticipated that the Bioregional Assessment programme will deliver a regional groundwater model for the Hunter Bioregional Assessment area which will include Drayton South, the adjacent Mt Arthur mines and multiple other mines in the region. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and other research to assist the knowledge base for regional scale assessments.

Date of advice 23 February 2015

Source documentation available to the IESC in the formulation of this advice

Hansen Bailey 2015. Drayton South Coal Project. Gateway Certificate Application for Anglo American Coal January 2015.

AGE 2012. Report on Drayton South Coal Project, Groundwater Impact Assessment. Project No. G1544 October 2012.

WRM 2012. Surface Water Impact Assessment, Drayton South Coal Project. October 2012.

References cited within the IESC's advice

Anglo American 2013 Drayton Fact Sheet.

Commonwealth of Australia 2015. Modelling water-related ecological responses to coal seam gas extraction and coal mining, prepared by Auricht Projects and the Commonwealth Scientific and Industrial research Organisation (CSIRO) for the Department of the Environment, Commonwealth of Australia.

Eco Logical Australia (2012) *Drayton South Coal Project: Stygofauna Impact Assessment*. Prepared for Hansen Bailey Environmental Consultants.

IESC 2014. 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>

Krogh, M., Dorani, F., Foulsham, E., McSorley, A., and Hoey, D. 2013. Hunter Catchment Salinity Assessment. Final Report. NSW Environment Protection Authority.

Advice to decision maker on coal mining project

Proposed action: Drayton South Coal Mine (2011/5911)

Requesting agency Department of Sustainability, Environment, Water, Population and Communities

Date of request 13 December 2012

Date request accepted 13 December 2012

Advice stage Environmental Impact Assessment - Draft

Summary of request from the regulator The Department of Sustainability, Environment, Water, Population and Communities (the Department) is currently assessing the proposed Drayton South Coal Project in accordance with the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

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 the Environmental Assessment Report for the proposed Drayton South Coal Project.

Specifically, the Department seeks the advice of the Committee as follows:

1. What does the Committee consider to be the potential impacts of the proposed mine on the surface water resources and /or groundwater resources which may support surface habitat in or around the project area?
 2. In the context of the above question, does the Committee identify any particular concerns relating to cumulative impacts?
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Advice

The Committee was requested to provide advice on the Drayton South Coal Mine in NSW to the Commonwealth regulator at the environmental assessment stage.

1. The Committee notes that the proponent has provided an adequate site water balance for the project. However, the proponent has not provided a regional water balance and as such the cumulative water-related impacts of the proposed development cannot be evaluated. Notwithstanding this, the Committee considers that the site-specific impacts may be minimal.
2. The Committee notes that cumulative groundwater drawdown from the Mt Arthur and Drayton South coal mines is predicted to reduce groundwater flows to Saddlers Creek. In addition, the Committee recognises that surface water impacts would be caused by a reduction in catchment flows of 14 per cent or approximately 13 ML per year to Saddlers Creek, where flows are estimated to be approximately 90

ML per year under pre-mining conditions. The Committee notes that a reduction of flows would likely alter the geomorphic characteristics, habitats and ecological values of the creek.

3. In order to ensure that the Hunter River is not further impacted by saline discharges, the Committee considers that it will be important to confirm the proponent's participation in the Hunter River Salinity Trading Scheme and confirm the capacity of the Scheme to cope with additional saline discharges within the catchment. It is noted that the potential impacts of heavy metals are not discussed in the documentation.
4. The Committee considers that the ecological impact assessment provided for the project to be thorough. The biodiversity offset strategy proposed by the proponent consists of onsite and offsite offsets. The Committee recommends that the regulator review the contribution of the offsets towards a representative water dependent ecosystem; noting that the current offset site is located 75 km north of the proposal and consists of different landform and ecosystem types.
5. The Committee notes that the proposal will remove approximately 180 ha of remnant *White Box – Yellow Box – Blakey's Red Gum Grassy Woodland and Derived Native Grassland* ecological community, which has the potential to cause ecosystem fragmentation and loss of connectivity within the project site. The Committee considers that remaining vegetation, such as groundwater dependent riparian vegetation and River Red Gum and River Oak communities associated with floodplains, would be placed under additional stress, making them more vulnerable when droughts occur.
6. The Committee notes that a reduction in catchment area and surface and groundwater flow is highly likely to adversely affect groundwater dependent riparian and floodplain vegetation and water dependent ecological communities. While the Green and Golden Bell Frog has not been located in field surveys, the Committee notes that the Hunter region is within the species' current distribution. The Committee suggests the 'biodiversity action plan' include a monitoring regime for the rehabilitation of ephemeral streams for likely impacts on water dependent ecosystems, including the Green and Golden Bell Frog.
7. The Committee suggests that the proponent consider further information relating to physical and ecological outcomes of the project. The Committee has asked the Office of Water Science to provide to the regulator specified references for suggested papers which look at these issues within the proposed mine area, and asked that they be passed to the proponent.

Date of advice 1 February 2013
