

Advice to decision maker on coal mining project

IESC 2015-062: Mount Owen Continued Operations Project (EPBC 2013/6978; SSD 5850) – Expansion

Requesting agency	The Australian Government Department of the Environment The New South Wales Department of Planning and Environment
Date of request	27 January 2015
Date request accepted	27 January 2015
Advice stage	Assessment

Context

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) was requested by the Australian Government Department of the Environment and the New South Wales Department of Planning and Environment to provide advice on the Mount Owen Continued Operations Project (MOCO project) proposed by Mt Owen Pty Ltd (wholly owned by Glencore) in New South Wales.

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

The proposed MOCO project is located in the Hunter Valley, approximately 20 km northwest of Singleton and 24 km southeast of Muswellbrook. The proposed project area is located within the Hunter River Catchment and within the sub catchments of Bowmans Creek (to the west) and Glennies Creek (to the east).

The proposed MOCO project is an extension of the existing Mount Owen Operations and Ravensworth East open cut coal mines. Under the proposal, these two mining operations will be amalgamated into a single operation to improve extractive capacity and coal handling efficiency. The MOCO project proposes to concurrently extend and mine, at a rate of up to 15 million tonnes per annum, three existing open cut pits: Bayswater North Pit, Ravensworth East Resource Recovery, and the North Pit Extension (NPE). Coal is proposed to be extracted from the Ravensworth to Hebden seams, within the Whittingham Coal Measures. The MOCO project would enable mining to continue until 2030 with an additional 92 million tonnes of coal proposed to be extracted. Associated works include upgraded coal handling facilities, new rail infrastructure, and a bridge over Bowmans Creek.

Key potential impacts

The key impacts potentially resulting from the proposed MOCO project are predominantly of local importance and are likely to be similar in scale and significance to the impacts resulting from the existing Mount Owen and Ravensworth East mining operations. Noting the above, the potential impacts will contribute to regional, mining-related, cumulative impacts to water resources within the Hunter Valley. Key potential impacts include decline in riparian groundwater dependent ecosystems (GDEs) along ephemeral streams that provide habitat for the nationally listed endangered Spotted-tail quoll (*Dasyurus maculatus maculatus*). There is a lack of information regarding the existing conditions of Glennies Creek, which creates uncertainty and difficulty in identifying the surface water quality and quantity impacts to Glennies Creek, and to the Hunter River.

Assessment against information guidelines

The IESC, in line with its Information Guidelines (IESC, 2014), has considered whether the proposed project assessment has used the following:

Relevant data and information: key conclusions

The proponent's assessment of Bowmans Creek is comprehensive. However, water quality monitoring in all watercourses does not include individual chemical species and contaminants. Quantitative flow data for Glennies Creek has not been provided or analysed. The water balance model predicts spillage from sediment dams to occur twice per year. The location and receiving surface watercourses of spills have not been identified. It is unclear whether the proponent has a licence to discharge under the Hunter River Salinity Trading Scheme (HRSTS).

Application of appropriate methodologies: key conclusions

The proponent's groundwater model is robust, well constructed and has been peer reviewed. The inclusion of 43 mines within an approximately 451 km² domain would allow sub-regional groundwater impacts to be estimated cumulatively. Aquatic fauna and habitat surveys within Glennies Creek and Main Creek have not been undertaken, or if they have, are not included in the EIS. Information on the presence or absence of GDEs along riparian corridors has not been provided outside of the project boundary even though the potential impacts of the project extend beyond the boundary.

Reasonable values and parameters in calculation: key conclusions

The numerical groundwater model is suitable for groundwater drawdown and flow assessments, however a cell size of 100 m by 100 m is too large to predict fine scale groundwater and surface water relationships. The changes to baseflows in creeks and rivers within the project area have been predicted on an annual scale and do not consider the importance of baseflow during seasonal or climatic low flow periods.

Advice

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

Question 1: Do the groundwater and surface water assessments, including numerical modelling therein, provide reasonable estimations of the risk (including likelihood, extent and significance) to water resources, with particular reference to Bowmans Creek, Glennies Creek and the Hunter River, in the short and long term?

Response

1. The project specific risks to Bowmans Creek provided within the EIS appear to be reasonably estimated, except with regard to quantification of seasonal flow regimes and water quality other

than total dissolved solids (TDS), total suspended solids (TSS), electrical conductivity (EC) and pH. Limited information on the potential hydrological and ecological risks to Glennies Creek and the Hunter River has been provided in the EIS. A reasonable estimation of the risks to Glennies Creek and the Hunter River would need to include quantitative flow regime data (including seasonal, high flow and contribution to the Hunter River), existing water quality data and ecological assessments (in-stream, hyporheic and riparian zones).

Explanation

Surface water

2. Apart from the uncertainties raised in paragraphs 3 and 4, identification and assessments of the existing hydrological conditions along Bowmans Creek (including its tributaries, Stringybark Creek, Yorks Creek, Swamp Creek and Bettys Creek) are reasonable. Based on the assessment, risks within these watercourses are unlikely to significantly change compared to those from the existing mining operations.
3. Information on existing water quality conditions within Bowmans Creek (and tributaries) and the assessment of potential impacts to water quality as a result of the MOCO project in all watercourses includes TDS, TSS, EC and pH, but would need to include metals, metalloids, polycyclic aromatic hydrocarbons (PAHs) and ionic compositions.
4. The current seasonal flow regime has not been described or quantified for all watercourses in the area. The assessment of existing hydrological, geomorphological and ecological conditions along Glennies Creek is minimal throughout the assessment documentation. The limited data and information presented with regards to Glennies Creek makes it difficult to assess the proponent's estimation of risk, including downstream risks to the Hunter River.
5. The proponent states that "due to the limited localised impact, it is anticipated that the Project will have negligible impact on major downstream watercourses including Bowmans Creek, Glennies Creek and the Hunter River" (EIS, App 9, p 6.4). The assessment of potential surface water flow impacts is based on contributing catchment area losses within Yorks Creek, Bettys Creek, Swamp Creek and Main Creek and by inferring potential flow volumes using historical rainfall records from Jerrys Plains (approximately 19 km to the south). Flow within the tributaries was monitored visually though this data was not provided. The assessment of existing flows within Bowmans Creek and Glennies Creek was not supported by quantitative seasonal flow data from existing flow gauges on these two watercourses (for example, Bowmans Creek gauge 210130 and Glennies Creek gauge 210044 where presumably there is existing data). A discussion on the uncertainties and assumptions associated with this method of assessment, including the potential impact of using the Bowmans Creek (Grenell) (station number 61270) meteorological station for the rainfall source, is needed.

Groundwater

6. The numerical groundwater model has a cell size of 100 m by 100 m which is adequate for estimating regional groundwater behaviour, though is too large to predict fine scale groundwater and surface water interactions. Nevertheless, the groundwater model predicts baseflow reductions to surface watercourses as follows (with results from the 'plus one standard deviation' model run in brackets): 6 ML/year (9 ML/year) decrease to Bettys Creek, 15 ML/year (22 ML/year) decrease to Main Creek and "negligible" losses from Bowmans and Glennies Creeks. Seasonal quantification or estimation of baseflow within each of the surface watercourses has not been provided. Baseflow analysis was only described as an annual percentage and therefore the importance of baseflow contribution to Bowmans and Glennies Creeks during seasonal or climatic low flow periods is unknown.

7. The groundwater model predicts drawdown within the Main Creek alluvium of between 2 m and greater than 6 m (for the plus one standard deviation model run). Within the predicted zone of impact this would lower the Main Creek alluvial water table to between 4 m and 8 m below the surface. The effect on the Central Hunter Swamp Oak Forest GDE of lowering the Main Creek alluvial water table has not been addressed within the EIS.

Water dependent ecological assets

8. The EIS states (App 10, p 92) that no GDEs are associated with Yorks Creek and Swamp Creek. However, the riparian zones of these watercourses are mapped as containing the Central Hunter Swamp Oak Forest which is considered to be a GDE (EIS, App 11, Figure 4.1). The proponent has not mapped or estimated the area inhabited by groundwater dependent riparian vegetation outside of the project area, including within the zone of predicted alluvial impact and downstream of the proposed project area.
9. The proponent states that ephemeral streams represent limited habitat opportunities for aquatic fauna. However, the EIS states in a number of places (for example App 10, p 26 and App 11, p 2.3-2.4) that pools of standing/stagnant water remain in ephemeral streams. These pools may be semi permanent and represent important refugia for aquatic fauna. The ecological assessment does not assess the habitat value, duration of persistence or map the extent or location of these pools.
10. Given the Main Creek alluvium supports known groundwater dependent riparian vegetation that is also habitat known to be utilised by the nationally listed endangered Spotted-tail quoll, information identified in paragraphs 8 and 9 is needed to determine the existing habitat conditions along this watercourse.

Question 2: If not, what additional information would be required to provide a sufficiently robust assessment of the likelihood, extent and significance of potential impacts on water resources resulting from the project?

Response

11. The assessment of risk to Glennies Creek needs to include data and information that describes the existing hydrological (water quality, flow quantity, seasonal regime) and ecological (presence of fauna, habitat quality/quantity) conditions within the Glennies Creek system, including its tributary Main Creek.
12. Water quality monitoring within receiving surface water systems needs to include contaminants such as metals, PAHs and ionic composition to determine the potential downstream project specific and cumulative water quality impacts to the Hunter River.

Explanation

13. While the assessments of the majority of surface watercourses within the vicinity of the proposed project area are sufficiently robust, the assessment of existing conditions within Glennies Creek is limited. An assessment of the following is needed to understand the existing conditions within Glennies Creek and provide a robust assessment:
 - a. Flow data, including seasonal and annual quantities, and details of Main Creek's alluvial groundwater and surface water contribution to flows in Glennies Creek.
 - b. Water quality data above and downstream of Main Creek. Data needs to include the full range of contaminants such as those already considered within existing monitoring (paragraph 3) as well as metals, metalloids, PAHs and ionic compositions.

- c. An assessment of surface water contaminant contribution to cumulative impacts on downstream environments within Glennies Creek and the Hunter River.
14. The proponent has undertaken sufficiently robust ecological stream habitat and aquatic fauna assessments for Bowmans Creek and Bettys Creek. However, equivalent assessments of Main Creek and Glennies Creek have not been provided within the EIS. To understand the existing ecological conditions within, and provide a robust assessment for Glennies and Main Creek, a description of the riparian, in-stream, and alluvial habitat for fauna and flora needs to be provided. This would include:
- a. mapping of vegetation including in riparian zones and areas of shallow groundwater
 - b. sampling of GDEs including stygofauna and hyporheic fauna
 - c. an in-stream aquatic fauna survey (e.g. fish, macroinvertebrates, amphibians)
 - d. an existing conditions aquatic habitat assessment in line with a national standard (for example using the AUSRIVAS (2007) sampling protocols utilised for Bowmans Creek)
 - e. the development of ecological conceptualisations using the method described in Commonwealth of Australia (2015) to identify the ecological and water relationships of the MOCO project area.
15. The geochemical characterisation study needs to be included as a component of the EIS. The document is referenced in the Mine Closure and Rehabilitation Strategy (EIS, Appendix 18) as Environmental Geochemistry International Pty Ltd, 2013 *Geochemical Assessment of the Mount Owen Optimisation Project*. This is an important document to allow a thorough assessment of the potential geochemical risks posed by the final landform including the three final voids.

Question 3: Has the proponent provided effective strategies to avoid, mitigate, and / or reduce the likelihood, extent and significance of these impacts?

Response

16. The potential to implement avoidance measures is limited by the large scale of the project, compared to the size of the proponent's mining leases. However, where possible the proponent has attempted to reduce the project's disturbance footprint by proposing development on existing disturbed sites and has increased the setback for the NPE to 450 m from Main Creek's central flow channel.
17. Mitigation measures are proposed to be implemented through existing management plans which have not been included within the assessment documentation. It is not possible to determine how effective the measures have been, or would be, at mitigating or reducing impacts from the existing operations as this information has not been provided within the EIS.

Explanation

18. The proponent commits to continue utilising various approved plans, programs and strategies to mitigate potential impacts to water resources, including the Landscape Management Plan, Erosion and Sediment Control Plan, Water Management Plan and the Flora and Fauna Management Plan. These plans are not included as a component of the EIS, though are available on the proponent's website. The proposed mitigation measures that have been described broadly include ongoing review of groundwater modelling, biodiversity offsetting, rehabilitation, the addition of new monitoring locations, surface water diversions and erosion and sediment control techniques. The ongoing effectiveness or results of these measures within the existing operations have not been clearly stated. Water quality within existing stream diversions

(including metals, PAHs and ionic compositions), as well as their habitat values and geomorphological stability has not been provided.

19. The groundwater impact assessment states (EIS, App 10, p 128) that, if necessary, the proponent would adjust mining and dewatering plans to mitigate unacceptable actual or predicted impacts on the alluvial systems of Glennies Creek and Bowmans Creek. The criteria to be used to determine an unacceptable impact should be provided in relation to the alluvial systems (or impacts to riparian GDEs) associated with the tributaries of Glennies Creek or Bowmans Creek.
20. Given the predicted drawdown in the Main Creek alluvium of between 2 m and up to greater than 6 m (for the plus one standard deviation prediction), there is a risk of impact to the riparian Central Hunter Swamp Oak Forest GDE along this watercourse. Mitigation, rehabilitation or vegetation improvement is not proposed, or has not been described within the EIS, to compensate for the predicted drawdown impacts to riparian vegetation along Main Creek.

Question 4: If not, what additional measures should be recommended to avoid, mitigate, reduce or remediate the likelihood, extent and significance of these impacts?

Response

21. The proponent's mitigation strategy should consider the potential impacts to riparian vegetation affected by but outside of the proposed project area, such as along reaches of Bettys Creek and Main Creek. Stream diversion specifications as well as construction and performance criteria should be provided to determine the diversion's ability to avoid or mitigate potential downstream surface water impacts. The legacy risks associated with the three final voids need to be identified and mitigated or managed, including those associated with potential post mining contamination of aquifers and connectivity with the underlying longwall mine.

Explanation

22. Given the riparian Central Hunter Swamp Oak Forest community is a GDE and a known habitat corridor for the nationally listed endangered Spotted-tail quoll, the application of mitigation or remediation measures along Main Creek (including outside of the proposed project boundary) within the zone of impact is warranted. These measures would need to include improved mapping of riparian vegetation potentially affected by drawdown but outside of the MOCO project boundary as well as ongoing monitoring of condition to determine if mitigation or remediation is required. If required, mitigation measures could include provision of additional water to the Main Creek alluvium, improvement of bank stability and water quality as well as vegetation remediation, rehabilitation and Spotted-tail quoll habitat improvement.
23. Ongoing monitoring and refined mapping of GDEs that occur outside of the project boundary, which may be impacted by the proposed project, is also needed to determine the extent of the potential impacts of the proposed project.
24. Specifications for surface water diversions as well as construction and performance criteria are needed to determine the effectiveness of each diversion in mitigating surface water quality and quantity impacts to downstream watercourses, particularly within Glennies Creek and the Hunter River. These specifications need to include: construction materials and geochemistry, meander length, in-stream flow velocities, shear stresses within flow channels, sediment control measures as well as modelled performance under a variety of flow velocities and vegetation establishment.
25. The final landform, in its current conceptual form, following the completion of the proposed project contains three final voids. The proponent has identified the key rehabilitation and final landform design criteria in their Mine Closure and Rehabilitation Strategy. This report will need to be updated to demonstrate that the legacy issues and risks to water resources as a result of the final

landform have been assessed and will be adequately mitigated and managed. This will need to include:

- a. the design of a post-mining groundwater and surface water monitoring network to provide a representative indication of groundwater and surface water quality to identify any leaching of saline or acidic material
- b. an assessment of the potential risks to regional hydrogeological units and surface watercourses caused by potential leakage or connectivity from the NPE final void into the underlying goaf of the Integra underground operations.

Question 5: Does the EIS provide a reasonable consideration of the potential for discharges (including salt) to nearby watercourses and the significance of any resulting impacts to water quality and the downstream environment? If not, what additional information would be required to provide a sufficiently robust assessment of these matters?

Response

26. The EIS does not provide reasonable consideration of the potential for discharges. The water balance model predicts spillages to occur twice a year however the locations of receiving surface water systems are not identified. The water quality impacts of spillages to the downstream watercourses for a variety of contaminants have not been considered. The EIS inconsistently states that discharges will occur under the HRSTS, when the proponent's Environmental Protection Licence (EPL) EPL 4460 has been varied to remove conditions relating to discharges under the HRSTS.

Explanation

27. The proponent's water balance modelling results indicate that the frequency of spills from sediment dams following rainfall events is twice a year. Average spill volumes caused by rainfall events are predicted to be between 478 ML/ year and 534 ML/year, with maximum spill volumes between 3,765 ML/year and 4,173 ML/year (EIS, App. 9, App. B, p 14). Spills from water management system (WMS) dams may occur more regularly than predicted given the water balance model utilises the lower average annual rainfall values from the Jerrys Plains meteorological station, rather than the 35 per cent greater average annual rainfalls observed at the Bowmans Creek (Grenell) meteorological station.
28. The Mount Owen EPL 4460 was varied in November 2014, removing conditions regarding the proponent's licence to discharge water under the HRSTS to Swamp Creek (NSW EPA, 2014a). Additionally, the Ravensworth East EPL does not contain conditions that relate to water discharges (NSW EPA, 2014b). The EIS consistently states that, if required, excess mine water will be discharged to the HRSTS under EPL 4460. The proponent will need to clarify whether discharges to the Hunter River will actually occur or provide details of an alternative method of containing their excess saline water.
29. The WMS for the proposed project is based on the existing systems in place at the Mount Owen and Ravensworth East mines. However, detailed information has not been provided for the WMS currently implemented at the existing operations. With regards to the MOCO project's WMS, the following information is needed:
- a. A water management schematic, illustrating water transfers between stores, under a range of climatic scenarios and including licensed surface water and groundwater extraction/discharge quantities

- b. The location of particular sediment dams or water storages that are considered most at risk of regular spills
- c. Identification of receiving watercourses of spills
- d. Water quality monitoring of the full range of contaminants (including metals/metalloids, ionic composition and PAHs) prior to, during and following spills, consistent with the recent findings of Krogh et al. (2013), to provide evidence that spills have negligible impacts on the downstream water resources, including the Hunter River
- e. Alternative options, including redesign of dams and their storage capacity within the WMS, to avoid bi-annual spills, or mitigate their impacts.

Other considerations

- 30. The Northern Sydney Basin bioregion which includes the Hunter subregion 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 subregion which will include the MOCO project, the adjacent coal mines and coal mine hydrogeological processes. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and other research projects.

Date of advice 11 March 2015

Source documentation available to the IESC in the formulation of this advice Umwelt, 2015. Glencore – Environmental Impact Statement, Mount Owen Continued Operations Project. January 2015.

Hydro Algorithmics, 2014. Mount Owen Continued Operations – Groundwater Impact Assessment Peer Review. 27 October 2014.

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

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