

## Advice to decision maker on coal mining project

### Proposed action: Duchess Paradise Project (EPBC 2011/6033) – New Development

<b>Requesting agency</b>	Department of the Environment
<b>Date of request</b>	5 November 2013
<b>Date request accepted</b>	5 November 2013
<b>Advice stage</b>	Assessment

#### Advice

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the Committee) was requested to provide advice on the Duchess Paradise Project in Western Australia, which is being assessed by the Department of the Environment (the Department) in accordance with the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This advice draws upon aspects of information in the draft Public Environmental Review (PER) together with the expert deliberations of the Committee. The project documentation and information accessed by the Committee are listed in the source documentation at the end of this advice.

The proposed project is located on a pastoral station about 175 km by road south-east of Derby, Western Australia and 30 km south of the Great Northern Highway between Derby and Fitzroy Crossing within the Shire of Derby/West Kimberley. The proposed project is within the Fitzroy River catchment, which overlies the Canning Basin, a large sedimentary basin extending across 400,000 km<sup>2</sup> in northern Western Australia.

The proposed project is a 20 year thermal coal mine with a planned production rate of up to 2.5 million tonnes of export quality coal per annum. Two methods are proposed to mine the target coal seam (P1) over the life of the project. Initially, the project will use slot and highwall mining approximately 50 m in depth and 42 m in width, to access and mine the shallower coal deposits. Where the coal seam is deeper and slot mining is not practical, conventional room and pillar underground mining will be used.

The Committee, in line with its Information Guidelines<sup>1</sup>, has considered whether the proposed project assessment has used the following:

### Relevant data and information: key conclusions

The draft PER provides adequate information for a preliminary assessment of the likely impacts on water resources from the proposed project, although additional characterisation of the groundwater/surface water dynamics of the Fitzroy River is needed to fully consider the potential impacts on dry season pools which can be important habitat for the EPBC Act listed vulnerable Freshwater Sawfish (*Pristis pristis* (formerly *Pristis microdon*)) and represent national indigenous cultural heritage values.

The assessments carried out by the proponent of the potential impacts from the proposed project demonstrate a robust analysis of relevant data and information. The inclusion of additional information on groundwater and surface water interactions, water balance, water quality in regard to uncontrolled discharge and the project's contribution to cumulative impacts within the region, would provide further confidence in the proponent's assessment.

### Application of appropriate methodologies: key conclusions

The proponent's environmental assessment has been undertaken following key guidelines and regulations where available and has specifically attempted to address the Committee's Information Guideline methodology. The draft PER would benefit from the following key assessments or methodologies:

- A site water balance which allows assessment of the impacts of the proposed water management strategy on receiving environments, incorporating all water inputs and outputs in the system;
- An assessment of the potential impacts to the Fitzroy River from the proposed project's variation in groundwater quality, quantity and interconnectivity with the Fitzroy River alluvium;
- An assessment of cumulative impacts; and
- A representative stygofauna survey in the Fitzroy River alluvium to assess whether stygofauna are likely to be impacted by the project.

These inclusions would help validate and increase confidence in the proponent's impact assessments and mitigation proposals.

### Reasonable values and parameters in calculation: key conclusions

The draft PER uses relevant values and parameters in calculations, with the exception of: the site water balance; interactions between the hydrogeological units and the Fitzroy River; and the discussion of potential impacts on water quality. The assessment of recharge to baseflows between the Fitzroy River and the surrounding alluvium has been based on figures obtained from surface flow monitoring points. Data obtained from groundwater monitoring bores would provide an improved input into the appropriate assessment of the potential impacts.

The Committee's advice, in response to the Department's specific questions is provided below.

*Question 1: Does the Committee consider that the proponent has provided sufficient information on the water resources and its management to assess likely significant impacts from its proposed action? – If the information is considered insufficient for that purpose, what advice regarding areas of inadequacy can the committee provide?*

1. The draft PER broadly provides sufficient information to allow a reasonable assessment of the likely impacts on water resources from the proposed project. The proponent has undertaken a

range of detailed analytical, modelling and field based monitoring work to provide the basis for their assessment of the likely significant impacts related to the proposed project.

2. Further information on the points identified below would decrease uncertainty in the assessment of the potential impacts from the proposed project.
  - a. Inclusion of water systems in a regional context, including a salt balance, would decrease uncertainty within the impact assessment. For example, within this region, information is needed about the set of water stores and the flow of water between those stores under current conditions. The assessment should extend across the regional surface and groundwater systems to defined monitoring points, beyond which there will be no measurable impacts as a result of the proposed project, or cumulative impacts.
  - b. Inclusion of the following numerical input values in the site water balance assessment:
    - CHPP gland, reagent and processing requirements;
    - Runoff capacity generated by rainfall onto coal handling facilities, disturbed areas and mine areas;
    - Amounts of water entrained in coal, including volumes lost and volumes returned to the water storage dam; and
    - Amount of potable water required for human consumption, separate to the amount required for use within the CHPP.
  - c. Groundwater baseline data would benefit from additional monitoring to assess potential impacts from any reduction in groundwater interaction with the Fitzroy River alluvium and groundwater recharge into the Fitzroy River during the dry season.
    - i. Monitoring at a greater distance from the target seams would improve certainty in determining the extent of impacts of the proposed project on the quality, drawdown and pressure of groundwater resources at the regional scale.
    - ii. The hydraulic connectivity between different sedimentary strata is not well defined. A sensitivity analysis to test the effect of varying vertical hydraulic conductivity on predicted impacts of the project would decrease uncertainty in the groundwater model results.
    - iii. Information regarding the horizontal hydraulic conductivity of groundwater within the Poole Sandstone hydrogeological unit is limited to testing from a single bore. This could not be considered to adequately represent the regional behaviour of this hydrogeological unit and additional testing should be undertaken to characterise the range of hydraulic characteristics of this aquifer
  - d. Surface water impacts, particularly around uncertainties with uncontrolled discharge and design detail of sedimentation ponds.
    - i. The size and holding capacity of each of the sediment ponds has not been provided within the draft PER. The water balance should be utilised when considering the final design size and specifications of the sediment ponds. Utilising the water balance model to inform the final design of the sediment ponds would provide more clarity on design requirements to prevent discharge during a range of rainfall event scenarios.
    - ii. The Committee notes that the proponent has designed the proposed project to minimise the potential for direct discharge to the environment, and considers that

they have provided a clear baseline on analysis and measures to reduce potential impacts to the surrounding water resources. Due to the climatic variability of the area and potential localised rainfall events, it is suggested that the proponent include dedicated in-situ gauging stations on the predicted overflow points of all sedimentation dams to capture discharge volumes and water quality of potentially contaminated overflow.

- e. The draft PER has a limited assessment of how the cumulative reduction of water in hydrogeological units may potentially modify the natural ephemeral flow regime due to surface and groundwater interconnectivity. Of benefit would be a detailed assessment of cumulative impacts that considers all relevant developments in light of increased exploration in the Canning Basin.
- f. The presence of perennial pools in the Fitzroy River Catchment indicates that a saturated zone persists in the alluvium, providing likely stygofaunal habitat. It is noted within the draft PER that monitoring bores have been installed in the alluvium. To confirm the conclusion that no significant stygofaunal values are likely to be impacted by the project, these bores should be sampled. If there are no monitoring bores in the alluvium, or bores are only installed at the outer edge of the alluvium, then it is suggested that sampling be carried out through temporary piezometers or Karaman-Chappuis pits.

*Question 2: What are the likely impacts of the proposed mine on surface and groundwater resources, in particular, changes to surface and/or groundwater dynamics and resources that may support surface habitat for threatened species and communities?*

- 3. The proponent assumes no impacts to the Freshwater Sawfish will occur as a result of the proposed project and has not discussed any mitigation or management measures for this species. The Fitzroy River, particularly the permanent pools and river baseflows during the dry season, represents important habitat to maintain viable populations of the Freshwater Sawfish. The proponent's assessment of the potential for ecological impacts to Fitzroy River habitats would benefit from the consideration of changes to interactions of surface and groundwater systems and the potential for mining related groundwater drawdown within the Fitzroy River alluvium to impact on Freshwater Sawfish habitat.
- 4. The Committee considers that the proponent could improve their assessment of potential impacts to surface water, groundwater and listed threatened species by taking into account the following:
  - a. Role of Faults: The Committee notes that drilling data included within the draft PER states that faults within the proposed project area may represent zones of higher permeability. Geological mapping of the proposed project area indicates that several northwest trending faults appear to intersect the Fitzroy River Alluvium that is associated with Hardman Creek (a tributary of the Fitzroy River). There is potential for these faults to act as recharge conduits, or leachate contaminant pathways, to the Fitzroy River alluvium southeast of the proposed project area. The proponent's assessment of groundwater impacts could be improved by considering the role of faults in acting as a pathway for baseflow recharge to the Fitzroy River alluvium, particularly during the dry season.
  - b. Surface Water Quality Sampling: To increase confidence in the surface water management system, surface water quality sampling throughout the entire range of flow conditions is suggested in semi-permanent pools and in sedimentation ponds during dry periods to gather a more comprehensive water quality data set. Further detail on the proposed design of sedimentation ponds and the proposed controls to mitigate against

uncontrolled discharge of water direct to the environment would also improve confidence in the proposed surface water management system.

*Question 3: Are likely impacts of the proposed mine on surface and groundwater likely to cause downstream impacts on the Fitzroy River and/or the Camballin floodplain?*

5. The proponent has considered the majority of potential impacts that may result from the proposed action. However, given the size of the proposed project and the sensitive nature of the Fitzroy River and Camballin Floodplain, the Committee's confidence in the proponent's assessment of the likelihood of significant impacts would be improved by addressing the following issues.
  - a. The proponent has indicated that the reduction in groundwater flows to the Fitzroy River alluvium as a consequence of the proposed project will be negligible; therefore no management measures are proposed to mitigate the expected reduction in groundwater discharge to the Fitzroy River. Due to the uncertainty in the proponent's characterisation of surface and groundwater interactions, the following monitoring measures are recommended:
    - i. Monitoring points to the south of the project area, adjacent to or within the Fitzroy River alluvium would improve the ability to identify potential decreased alluvium recharge from groundwater systems and inform characterisation of the groundwater contribution to the habitat requirements of the Freshwater Sawfish. The location of monitoring points and frequency of sampling should reflect the spatial and temporal variability in surface water and groundwater interactions.
    - ii. Monitoring is important as modelling identifies that groundwater drawdown curves extend into the Fitzroy River alluvium to the south of the project area. This may result in further unpredicted variability in groundwater flows from the Poole Sandstone to the Fitzroy River alluvium, and in surface water-groundwater interactions. It is recommended that the proponent identify appropriate contingency measures if unpredicted impacts to the Fitzroy River occur.
  - b. The Committee notes the national indigenous cultural heritage values associated with the biophysical representation of the Fitzroy River. Further analysis of the role of surface and groundwater interconnectivity, including fault pathway recharge, in maintaining dry season permanent pools along the Fitzroy River would increase confidence in the assessment that these indigenous heritage values will not be impacted.
  - c. Sensitivity analyses would benefit from the incorporation of climatic and seasonal variability within the groundwater system, as this will improve the groundwater model's ability to determine if the proposed project will have an impact upon the Fitzroy River dry season pools and the Camballin Floodplain.

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**Date of advice**      12 December 2013

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**Source documentation available to the Committee in the formulation of this advice**      Rey Resources Limited. 2013. Duchess Paradise Project, Public Environmental Review, EPA Assessment No. 1899, EPBC Assessment No. 2011/6033, Draft, October 2013

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**References  
cited within the  
Committee's  
advice**

<sup>1</sup> Information Guidelines for Proposals Relating to the Development of Coal Seam Gas and Large Coal Mines where there is a Significant Impact on Water Resources available at: <http://www.environment.gov.au/coal-seam-gas-mining/project-advice/pubs/iesc-information-guidelines.pdf>

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