PEMBROKE

Olive Downs Coking Coal Project

Additional Information to the
Environmental Impact Statement

Section 20

Ripstone Creek Diversion

20 RIPSTONE CREEK DIVERSION

1. Provide further justification for the proposed diversion of Ripstone Creek with reference to the economic impacts to the project of not diverting the creek.

Section 21 of this document provides a detailed justification for the proposed Ripstone Creek Diversion.

Ripstone Creek is located in the south-western corner of the Ripstone Open Cut Pit. Without diverting the creek, approximately 3M tonnes of coal would be left in situ. The economic benefit of mining the coal in this location out-weighs the cost of the environmental impacts, including the diversion of Ripstone Creek and the rehabilitation works required to replicate the natural hydraulic behaviour of the Ripstone Creek waterway. A net benefit of at least $11M was calculated when accounting for the value of the coal (i.e. $36M), the production benefits associated with employment and royalties associated with ODS9 open cut pit and the cost of the Ripstone Creek diversion (i.e. $25M).

2. The draft EIS notes a heavy concentration of threatened species records around Ripstone Creek. Limited information is presented in the draft EIS in relation to the rehabilitation objectives and outcomes for the proposed diversion. Describe how threatened species values would be improved on the diverted length of Ripstone Creek over the short and long term.

As described in the Terrestrial Fauna Assessment provided in the draft EIS, threatened species habitat mapping was produced in consideration of the locations of threatened species recorded during the ecology survey work, including the presence of threatened species along Ripstone Creek. The Terrestrial Fauna Assessment identifies that the riparian habitat along Ripstone Creek is suitable habitat for the Squatter Pigeon (southern), Koala and Greater Glider based on these species records and the identification of suitable habitat features.

Given the potential impact to the habitat of these species, Pembroke has committed to constructing a diversion with similar habitat values and providing an offset for the loss of the habitat during Stage 2 of the Project, when the diversion works are scheduled to commence (as described in Sections 10 and 11).

Additional information on the proposed rehabilitation objectives for the Ripstone Creek Diversion are provided within Schedule H of the revised draft EA (Appendix B). In addition, Pembroke has committed to preparing a Ripstone Creek Diversion Design Plan which will include a Revegetation and Vegetation Management Plan. The Ripstone Creek Diversion Design Plan is proposed to be completed prior to commencement of the construction of the diversion in accordance with the proposed EA Condition I2 (refer to Item 3 below).

3. Provide a preliminary design plan for the proposed diversion which includes the following:

a) engineering drawings depicting the physical attributes and dimensions of the watercourse diversion

b) the location, function and description of geomorphic and riparian vegetation features within the proposed watercourse diversion

c) a revegetation and vegetation management plan (a revegetation plan)

d) plans and specifications sufficient to complete construction and revegetation in accordance with the design

Pembroke submitted a "Functional Design" for the Ripstone Creek diversion within Section 13.7 of the Flood Assessment (Appendix F of the draft EIS). This has been prepared in accordance with the 2014 DNRM *Guideline: Works that interfere with water in a watercourse – watercourse diversion* (the DNRM Guideline). The DNRM Guideline states that a "Functional Design" be submitted at the EA application stage, and a "Design Plan" be submitted after grant of the EA, prior to construction of the diversion.

This process is reflected in the Model EA Conditions I1, I2, I3 and I4, which require submission of a certified "Design Plan" (which is in accordance with the "Functional Design" presented in the draft EIS) to DES prior to commencing construction of the diversion.

Pembroke is seeking Model EA Conditions I1, I2, I3 and I4 as Stated Conditions for the Project. As such, Pembroke proposes to submit a certified "Design Plan" to DES prior to construction of the diversion (consistent with the EA conditions being sought).

In accordance with Section 1.5.4 of the DNRM Guideline, the Design Plan will include (but not be limited to):

- engineering drawings depicting the physical attributes and dimensions of the watercourse diversion;
- the location, function and description of geomorphic and riparian vegetation features within the proposed watercourse diversion;
- a revegetation and vegetation management plan (a revegetation plan); and
- plans and specifications sufficient to complete construction and revegetation in accordance with the design.

4. Discuss how the proposed diversion of Ripstone Creek will comply with the following outcomes:

a) Outcome 1: The permanent watercourse diversion incorporates natural features (including geomorphic and vegetation) present in the landscape and in local watercourses.

Section 4.2.3 of the Geomorphology Assessment (Appendix E of the draft EIS) provided a description of the characteristics of Ripstone Creek. The Geomorphology Assessment concluded that the geomorphic character of Ripstone Creek was relatively unchanged through the majority of the Project area, where it had a well-defined channel of variable width and depth, and sand bed. The sand-bed of the creek was relatively thick, but had significant variation in form due to the common presence of trees and large wood in the bed which would create hydraulic resistance and turbulence under high flow conditions. The riparian vegetation structure had variable tree cover and is comprised predominantly of Eucalypt open forests to woodland (e.g. RE 11.3.25)

Section 13.7 of the Flood Assessment (Appendix F of the draft EIS) provides details of the Functional Design of the Ripstone Creek Diversion. The proposed diversion reach has been designed to replicate the length, sinuosity and cross section of the relevant Ripstone Creek reach. The length and therefore longitudinal grade, as well as the sinuosity, closely resemble that of the existing reach. The section incorporates a low flow channel and benches in a similar manner to the existing Ripstone Creek channel section although the benches have been widened to match the existing hydraulic capacity of Ripstone Creek for the larger floods. Also, the proposed diversion has been designed to have a similar sediment transport regime. Further work to incorporate riparian features that are evident in the existing channel will be undertaken during Detailed Design.

A Revegetation and Vegetation Management Plan will be developed as part of the Detailed Design in accordance with the DNRM Guideline. The Ripstone Creek Diversion is proposed to be rehabilitated to riparian Eucalypt woodland similar to RE 11.3.2, RE 11.5.3 and RE 11.3.25 (*Queensland Blue Gum [Eucalyptus tereticornis] or River Red Gum [E. camaldulensis] woodland* with an understory of perennial grasses, sedges or forbs such as Common Couch [*Cynodon dactylon*] and Queensland Bluegrass [*Dichanthium sericeum*]) (Section 3).

b) Outcome 2: The permanent watercourse diversion maintains the existing hydrologic characteristics of surface water and groundwater systems.

As outlined in response to Item 4 (a) above, the proposed diversion reach has been designed to replicate the length, sinuosity and cross section of the relevant Ripstone Creek reach. Section 13.5.2 of the Flood Assessment (Appendix F of the draft EIS) describes the changes that have occurred to the Ripstone Creek catchment as a result of the development of the Peak Downs Mine. The loss of catchment that would report to the Ripstone Creek Diversion, due to the Project, is minimal, and therefore the change in surface hydrology to the Ripstone Creek Diversion (due to the Project) would also be minimal. It is likely that there will be a permanent loss of catchment flow draining to Ripstone Creek due to Peak Downs Mine. However, for the purposes of the Ripstone Creek Diversion Functional Design, it has been conservatively assumed that no catchment excision due to the Peak Downs Mine occurs post mining (i.e. the Functional Design conservatively assumes a larger catchment will report to the Ripstone Creek Diversion than what will likely occur).

Section 5 of the Groundwater Assessment (Appendix D of the draft EIS) states that the regional groundwater table in the vicinity of the diversion is some 15 m below the existing Ripstone Creek channel and there is little alluvium along Ripstone Creek. Accordingly, any baseflow that would be generated would be negligible. On this basis, the proposed diversion will not impact on any groundwater systems.

c) Outcome 3: The hydraulic characteristics of the permanent watercourse diversion are comparable with other local watercourses and are suitable for the region in which the watercourse diversion is located.

Section 13.8 of the Flood Assessment (Appendix F of the draft EIS)compares the hydraulic modelling results of the existing Ripstone Creek channel and the proposed diversion. The average (mean) stream velocity, stream power and bed shear stress are comparable for the 1 in 2 year average recurrence interval (ARI). The average (mean) stream velocity, stream power and bed shear stress are higher for the 1 in 50 year ARI event, however, the 1 in 50 year ARI hydraulic characteristics for the proposed diversion remain within the ACARP design guideline values (DNRM, 2014). The existing reach of Ripstone Creek that would be diverted has a lower longitudinal grade than the diversion has been designed to have, as the existing reach has been modified due to the construction of a dam. The construction of the dam has lower stream velocities along the existing reach than are predicted for the diversion (which would not be influenced by a dam). Further refinement of the channel and floodplain configuration will be undertaken during Detailed Design.

d) Outcome 4: The permanent watercourse diversion maintains sediment transport and water quality regimes that allow the watercourse diversion to be self-sustaining, while minimising any impacts to upstream and downstream reaches.

The proposed diversion will have the same catchment type and a similar catchment area to the section of Ripstone Creek that is being replaced. Therefore, the catchment water quality and sediment regime draining to the proposed diversion will be the same as for the section of Ripstone Creek that is being replaced. Also, as outlined in response to Item 4 (a), the proposed diversion has been designed to have similar geomorphic and hydraulic characteristics (e.g. length, sinuosity and cross section) as the section of Ripstone Creek that is being replaced and therefore will have the same sediment transport regime. The Revegetation and Vegetation Management Plan to be developed as part of Detailed Design, in accordance with the DNRM Guideline and proposed EA condition I2, will describe measures to minimise the generation of sediment along the diversion reach (e.g. Pembroke would increase stabilisation through the revegetation of the banks for 2 years prior to use).

e) Outcome 5: The permanent watercourse diversion and associated structures maintain equilibrium and functionality and are appropriate for all substrate conditions they encounter.

Geotechnical investigations will be undertaken as part of Detailed Design, in accordance with the DNRM Guideline and proposed EA condition I2, to identify and develop strategies to manage the geotechnical and geological characteristics of the substrate material. Given the close proximity, the geotechnical and geological characteristics of the substrate material along the diversion realignment are expected to be similar to that encountered for Ripstone Creek channel that is being replaced. Given this, the proposed diversion is expected to maintain equilibrium and functionality and is appropriate for the expected substrate conditions.

As outlined in Section 1.5.7 of the DNRM Guideline, Pembroke would prepare an operational and monitoring plan as part of the Design Plan which outlines how Pembroke proposes to undertake monitoring of the Ripstone Creek Diversion. Pembroke would undertake ongoing monitoring, conducted by a suitably qualified person(s), and, if required, rectify the cause of any change to equilibrium that threatens the performance and integrity of the Ripstone Creek Diversion and/or adjoining watercourses.