DURALIECOAL
Part of the Yancoal Australia Group

Duralie Open Pit Modification
Environmental Assessment






ATTACHMENT 2

AQUIFER INTERFERENCE POLICY AND WATER LICENSING REQUIREMENTS

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Resource Strategies

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A2 AQUIFER INTERFERENCE POLICY CONSIDERATIONS AND WATER LICENSING ADDENDUM

This attachment provides further discussion on the requirements and application of relevant water licensing and associated approvals under the New South Wales (NSW) *Water Management Act, 2000* and the NSW *Water Act, 1912*. It also provides a discussion of relevant requirements of the *NSW Aquifer Interference Policy* (the AIP) (NSW Government, 2012).

A2.1 AQUIFER INTERFERENCE POLICY CONSIDERATIONS

Policy Overview

The AIP (NSW Government, 2012) has been developed by the NSW Government as a component of the NSW Government's Strategic Regional Land Use Policy. The AIP applies State-wide and details water licence and impact assessment requirements.

The stated purpose of the AIP is to ensure equitable water sharing between various water users and proper licensing of water taken by aquifer interference activities such that the take is accounted for in the water budget and water sharing arrangements.

The Water Management Act, 2000 defines an aquifer interference activity as any of the following:

- *the penetration of an aquifer;*
- *the interference with water in an aquifer;*
- *the obstruction of the flow of water in an aquifer;*
- *the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations; and*
- *the disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.*

Examples of aquifer interference activities include mining, coal seam gas extraction, injection of water, as well as commercial, industrial, agricultural and residential activities that intercept the watertable or interfere with aquifers (NSW Government, 2012).

The AIP applies to all aquifer interference activities but has been developed in particular to address the following high risk activities (NSW Government, 2012):

- ***mining activities** such as open cut voids, underground mine workings and the disposal of water taken from an aquifer including water taken as part of coal seam gas extraction;*
- *other **extractive industries**, such as sand and gravel extraction...;*
- ***coal seam gas activities**, including those related to both exploration and production*
- *other large projects which require **dewatering** such as for the construction and maintenance of associated works, such as buildings, roads and other civil works;*
- ***injection works** used to transmit water into an aquifer; and*
- *activities with the potential to contaminate groundwater or result in unacceptable loss of storage or structural damage to an aquifer.*

Licensing Requirements

The AIP requires all water taken by aquifer interference activities to be accounted for within the extraction limits set by a relevant Water Sharing Plan. A water licence is required, whether water is taken either incidentally or for consumptive use, where any act by a person carrying out an aquifer interference activity causes (NSW Government, 2012):

- *the removal of water from a water source; or*
- *the movement of water from one part of an aquifer to another part of an aquifer; or*
- *the movement of water from one water source to another water source, such as:*
  - *from an aquifer to an adjacent aquifer; or*
  - *from an aquifer to a river/lake; or*
  - *from a river/lake to an aquifer.*

The AIP also requires consideration of the continued take of water from groundwater or connected surface waters following cessation of an aquifer interference activity. For example, the post-closure inflow that occurs until a groundwater system reaches equilibrium following cessation of open cut mining is required to be considered.

Licences are required to be held to adequately account for the ongoing take of water until the system returns to equilibrium, or alternatively, sufficient licences are required to be surrendered to the Minister administering the *Water Management Act, 2000*.

Minimal Impact Considerations

In addition to licensing requirements, the Water Management Act, 2000 includes the concept of ensuring "no more than minimal harm". In this regard, the AIP includes minimal impact considerations relating to watertable and groundwater pressure drawdown and changes in groundwater and surface water quality.

The AIP provides that (NSW Government, 2012):

> *Aquifer interference approvals are not to be granted unless the Minister is satisfied that adequate arrangements are in force to ensure that no more than minimal harm will be done to any water source, or its dependent ecosystems, as a consequence of its being interfered with in the course of the activities to which the approval relates.*
>
> *While aquifer interference approvals are not required to be granted, the minimal harm test under the Water Management Act 2000 is not activated for the assessment of impacts. Therefore, this Policy establishes and objectively defines minimal impact considerations as they relate to water-dependent assets and these considerations will be used as the basis for providing advice to either the gateway process, the Planning Assessment Commission or the Minister for Planning.*

The AIP establishes minimal impact considerations for groundwater categories of both "highly productive" and "less productive" groundwater. Highly productive groundwater is defined by the AIP as groundwater which (NSW Government, 2012):

> *...is defined in this Policy as a groundwater source that is declared in the Regulations and will be based on the following criteria:*
>
> *a) has total dissolved solids of less than 1,500 mg/L, and*
>
> *b) contains water supply works that can yield water at a rate greater than 5 L/sec.*

The AIP further groups highly productive groundwater into the following categories:

- Alluvial.
- Coastal sands.
- Porous rock, including:
  - Great Artesian Basin – Eastern Recharge and Southern Recharge;
  - Great Artesian Basin – Surat, Warrego and Central; and
  - other porous rock.
- Fractured rock.

The AIP similarly defines categories for less productive groundwater, which includes:

- Alluvial.
- Porous rock.
- Fractured rock.

A2.2 AQUIFER INTERFERENCE POLICY REQUIREMENTS

An assessment of the Duralie Open Pit Modification (the Modification) against the licensing requirements and minimal impact considerations of the AIP is provided in the sub-sections below.

Water Source

The AIP requires all water taken by aquifer interference activities to be accounted for within the extraction limits set by the relevant Water Sharing Plan.

The Duralie Coal Mine (DCM) does not require water from external water supplies. As such, the only water licensing requirement relevant to the DCM (and the Modification) is associated with groundwater inflow to the open pits.

Because the draft Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources has not yet commenced, groundwater inflow to the DCM open pits remains managed and licensed under the *Water Act, 1912* (Appendix C).

Baseline Groundwater Conditions

Baseline groundwater conditions and the existing observed impacts of the approved DCM on groundwater levels are presented in Appendix C.

Modelling of Potential Impacts

HydroSimulations (2014) has revised the groundwater model prepared in 2009 for the Duralie Extension Project to account for the proposed changes to the Clareval open pit and revised mining sequence for the Modification, and in consideration of recent groundwater monitoring results. The potential impacts of the Modification have been assessed against those predicted, and subsequently approved for, the Duralie Extension Project.

Groundwater Licensing Requirements

Duralie Coal Pty Limited (DCPL) currently holds an existing Bore Licence (20BL168404) issued by the NSW Office of Water (NOW). This licence was renewed under Part 5 of the *Water Act, 1912* on 23 September 2012, and is valid until 22 September 2017.

Licence 20BL168404 allows for up to 300 megalitres (ML) of groundwater to be extracted in any 12 month period. The licence excerpt relevant to this assessment states:

> *(8) The volume of groundwater extracted from the works authorised by this licence shall not exceed 300 megalitres in any 12 month period commencing 1st July.*

No increases to the existing groundwater licensing volumes are predicted to be required as a result of the Modification (Appendix C). Accordingly, no additional groundwater licences are required for the Modification (Appendix C).

Licensing of groundwater inflow to the DCM open pits would continue in accordance with the conditions of the existing Water Act, 1912 licence, until such time as a relevant water sharing plan is implemented.

A detailed assessment of the potential impacts of the Modification on groundwater resources has been conducted for the Environmental Assessment and is detailed in Appendix C and Section 4.3.

Reliable Surface Water

It is noted the definition of a reliable water supply is provided in the current *Strategic Regional Land Use Policy for the New England North West Strategic Land Use Plan* and the *Strategic Regional Land Use Policy for the Upper Hunter Strategic Land Use Plan*. Although no Strategic Regional Land Use Plan is currently in effect for the area associated with the DCM, it is expected that any future plan implemented would be consistent with the existing plans. The definition of a reliable water supply is as follows (NOW, 2012):

> *reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (ie the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.*

The AIP only refers to a *'surface water source that is defined as a reliable water supply'.* Therefore, the rainfall criteria and the groundwater aquifer criteria for a reliable water supply do not apply.

There are no regulated rivers or unregulated rivers with flow for at least 95 percent (%) of the time or 5th order rivers within 150 metres (m) of the DCM. Accordingly, there are no reliable surface water supplies relevant to the DCM or the Modification.

Minimal Impact Considerations

As discussed above, the AIP established minimal impact considerations for highly productive and less productive groundwater.

The NOW mapping of highly productive groundwater in the vicinity of the DCM indicates there is no highly productive groundwater mapped within Mining lease (ML) 1646. The mapping does indicate however that an area of highly productive alluvial aquifer exists within ML 1427, in an area that was open pit mined prior to the release of the mapping. Highly productive alluvium has also been mapped along the Mammy Johnsons River to the east and the Karuah River to the west of the DCM.

The NOW mapping indicates there is no highly productive fractured or porous rock aquifer in the vicinity of the DCM.

As such, potential impacts associated with the DCM incorporating the Modification have been assessed against the minimal impact considerations for the following aquifer categories specified in the:

- Highly productive alluvial aquifer (Table A2-1).
- Less productive alluvial aquifer (Table A2-2).
- Less productive porous or fractured rock aquifer (Table A2-3).

Tables A2-1, A2-2 and A2-3 conclude the Modification is within the 'Level 1' minimal impact considerations outlined in the AIP for highly productive and less productive alluvial aquifers, and less productive fractured rock water sources.

A2.3 SUMMARY OF POTENTIAL IMPACTS AND RELEVANT MITIGATION AND CONTINGENCY MEASURES

A summary of potential impacts of the Modification to groundwater, and relevant mitigation and contingency measures, are presented in Section 4.3 of the EA. In summary, it is predicted (Appendix C):

- There would be negligible impact to the shallow alluvial groundwater system in which the Mammy Johnsons River sits, or river leakage/baseflow contributions from/to the Mammy Johnsons River.
- There would be negligible impacts to groundwater dependent ecosystems.
- There would be negligible impacts to other groundwater users.
- There would be negligible impacts to groundwater quality in the alluvium and surface water quality in the Mammy Johnsons River).

A2.4 SURFACE WATER LICENSING REQUIREMENTS

Water Supply Works

DCPL currently hold an existing water supply works approval (20WA202053) under the *Water Management Act, 2000* for the Coal Shaft Creek Diversion and various onsite water management structures. No change to this existing license would be required for the Modification.

Water Access Licenses

The Mammy Johnsons River and its tributaries fall within Management Zone 4 of the Water Sharing Plan for the Karuah River Water Source, 2003 (the Water Sharing Plan).

Clause 5 of the Water Sharing Plan provides that the plan applies to the following waters:

(1) The waters of this water source include all water occurring on the land surface shown on the map in Schedule 2 including, but not limited to:

(a) all rivers in this water source including, but not limited to, those nominated in Schedule 3, and

(b) all lakes and wetlands in this water source.

(2) The waters of this water source exclude all water contained within aquifers underlying this water source.

(3) The waters of this water source exclude all water determined by the Minister to be saline estuarine waters.

Clause 5 of the Water Sharing Plan (above) excludes aquifers from the Karuah River Water Source, and accordingly, licensing of groundwater inflow is not relevant to the Water Sharing Plan.

The DCM does not require water from external sources supplies, and negligible impact to stream baseflows is predicted for the Modification (Appendix C). Accordingly, no water access licences are required.

The use of surface runoff captured by the approved DCM water management system is undertaken in accordance with the harvestable rights order published in the Government Gazette on 1 July 2004 pursuant to section 54 of the *Water Management Act, 2000*. As such, no access licence is required for the use of this surface runoff.

There would be no change to the surface water licensing requirements due to the Modification.

Table A2-1
Minimal Impact Considerations for Highly Productive Alluvial Water Sources

Aquifer	Highly Productive Alluvial Aquifer
Category	Highly Productive Water Source

Level 1 Minimal Impact Consideration	**Assessment**
<u>Watertable</u> 1. Less than or equal to a 10% cumulative variation in the watertable, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan; or A maximum of a 2 m decline cumulatively at any water supply work.	**Level 1 – Acceptable.** HydroSimulations (2014) concludes the DCM incorporating the Modification would result in negligible impact to water levels in the alluvium, consistent with the predictions of the Duralie Extension Project (DEP) and groundwater monitoring in the alluvium to date, which has shown negligible response to existing mining activity and the DCM. There is no water sharing plan relevant to the mapped highly productive alluvial aquifers potentially relevant to the DCM. No groundwater dependent ecosystems have been identified within, or in proximity to, the DCM area or surrounds. Further, FloraSearch (2014) has concluded that no vegetation identified in or surrounding the Modification disturbance areas appears to be associated with groundwater (i.e. the vegetation appears to be dependent on rainfall and surface flows). Therefore, negligible impact to groundwater dependent ecosystem is predicted for the DCM incorporating the Modification (Appendix C). No high priority culturally significant sites have been identified within, or in proximity to, the DCM area. The DCM incorporating the Modification is not predicted to result in greater than 2 m decline in the watertable level at any water supply work (Appendix C). The Modification is considered to adequately satisfy the watertable and water pressure minimal impact considerations relating to highly productive alluvial water sources defined in the AIP.
<u>Water pressure</u> 1. A cumulative pressure head decline of not more than 40% of the "post-water sharing plan" pressure head above the base of the water source to a maximum of a 2 m decline, at any water supply work.	
<u>Water quality</u> 1. (a) Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity; and (b) No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. Redesign of a highly connected surface water source that is defined as a "reliable water supply" is not an appropriate mitigation measure to meet considerations 1.(a) and 1.(b) above. (c) No mining activity to be below the natural ground surface within 200 m laterally from the top of high bank or 100 m vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a "reliable water supply". (d) Not more than 10% cumulatively of the three dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200 m laterally from the top of high bank and 100 m vertically beneath a highly connected surface water source that is defined as a "reliable water supply". ...	**Level 1 – Acceptable.** HydroSimulations (2014) has concluded there would be negligible impact to groundwater quality in the mapped highly productive alluvium due to the DCM incorporating the Modification. Therefore, the existing beneficial use category of groundwater would not change due to the Modification. There are no "reliable water supplies" within 200 m laterally of the DCM. The Modification is considered to adequately satisfy the water quality minimal impact considerations relating to highly productive alluvial water sources defined in the AIP.

Table A2-2
Minimal Impact Considerations for Less Productive Alluvial Water Sources

Aquifer	Less Productive Alluvial Aquifer
Category	Less Productive Water Source

Level 1 Minimal Impact Consideration	**Assessment**
<u>Watertable</u> 1. Less than or equal to a 10% cumulative variation in the watertable, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan; or A maximum of a 2 m decline cumulatively at any water supply work. ...	**Level 1 – Acceptable.** HydroSimulations (2014) concludes the DCM incorporating the Modification would result in negligible impact to water levels in the alluvium, consistent with the predictions of the DEP and groundwater monitoring in the alluvium to date, which has shown negligible response to existing mining activity and the DCM. There is no water sharing plan relevant to less productive alluvial aquifers potentially relevant to the DCM (Appendix C). Negligible impact to groundwater dependent ecosystem is predicted for the DCM incorporating the Modification. No high priority culturally significant sites have been identified within, or in close proximity to, the DCM area. The DCM incorporating the Modification is not predicted to result in greater than 2 m decline in the watertable level at any water supply work (Appendix C). The Modification is considered to adequately satisfy the watertable and water pressure minimal impact considerations relating to less productive alluvial water sources defined in the AIP.
<u>Water pressure</u> 1. A cumulative pressure head decline of not more than 40% of the "post-water sharing plan" pressure head above the base of the water source to a maximum of a 2 m decline, at any water supply work. ...	
<u>Water quality</u> 1. (a) Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity; and (b) No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. Redesign of a highly connected surface water source that is defined as a "reliable water supply" is not an appropriate mitigation measure to meet considerations 1(a) and 1(b) above. (c) No mining activity to be below the natural ground surface within 200 m laterally from the top of high bank or 100 m vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a "reliable water supply". (d) ...	**Level 1 – Acceptable.** HydroSimulations (2014) has concluded there would be negligible impact to groundwater quality in the alluvial aquifers due to DCM incorporating the Modification. Therefore, the existing beneficial use category of groundwater would not change due to the Modification. There are no "reliable water supplies" within 200 m laterally of the DCM. The Modification is considered to adequately satisfy the water quality minimal impact considerations relating to less productive alluvial water sources defined in the AIP.

Table A2-3
Minimal Impact Considerations for Less Productive Porous and Fractured Rock Water Sources

Aquifer	Porous Rock or Fractured Rock
Category	Less Productive Water Sources

Level 1 Minimal Impact Consideration	**Assessment**
<u>Watertable</u> 1. Less than or equal to a 10% cumulative variation in the watertable, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan; or A maximum of a 2 m decline cumulatively at any water supply work. ...	**Level 1 – Acceptable.** There is no water sharing plan relevant to less productive porous or fractured rock aquifers relevant to the DCM. Negligible impact to groundwater dependent ecosystem is predicted for the DCM incorporating the Modification (Appendix C). No high priority culturally significant sites have been identified in proximity to the DCM or the Modification. The DCM incorporating the Modification would not result in greater than 2 m decline in the watertable level at any water supply work (Appendix C). The Modification is considered to adequately satisfy the watertable and water pressure minimal impact considerations relating to less productive porous or fractured rock aquifers sources defined in the AIP.
<u>Water pressure</u> 1. A cumulative pressure head decline of not more than a 2 m decline, at any water supply work. ...	
<u>Water quality</u> 1. Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity. ...	**Level 1 – Acceptable.** The HydroSimulations (2014) predicts groundwater quality in the aquifers surrounding the final void would not change significantly, and therefore, there would be no change to the beneficial use category of this less productive groundwater due to the Modification. The Modification is considered to adequately satisfy the water quality minimal impact considerations relating to less productive porous or fractured water sources defined in the AIP.