APPENDIX F

Aquifer Interference Policy Assessment

DRAYTON SOUTH COAL PROJECT

RESPONSE TO SUBMISSIONS

AQUIFER INTERFERENCE POLICY ASSESSMENT

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DRAYTON SOUTH COAL PROJECT
RESPONSE TO SUBMISSIONS
AQUIFER INTERFERENCE POLICY ASSESSMENT

for

Anglo American Metallurgical Coal Pty Ltd

1 WATER SOURCES

1.1 REQUIREMENT

"Which water source(s) will the activity take water from" [clause 2.1 *Aquifer Interference Policy* (AIP) – page 7].

1.2 ASSESSMENT

The Drayton South Coal Project (the Project) will take water from the:

- Alluvium of the Hunter Regulated River – regulated under the *Water Management Act 2000* (WM Act) (Hunter Regulated River);
- Jerrys Water Source under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources* – regulated under the WM Act (Jerrys Water Source); and
- Permian coal measures – regulated under the *Water Act 1912* (Water Act) (Coal Measures).

2 QUANTITIES

2.1 REQUIREMENT

"A prediction of the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity and after closure of the activity" [clause 2.1 AIP– page 7].

"How and in what proportions this take will be assigned to the affected aquifers and connected surface water sources, even if take predictions are not based on groundwater modelling" [clause 2.1 AIP – page 7].

2.2 ASSESSMENT

There will be varying annual mining area inflows; however, peak annual take has been modelled as follows:

- Hunter Regulated River – 2 megalitres (ML) during mining and 4 ML after mining;
- Jerrys Water Source (Jerrys Management Zone) Aquifer Take – 45 ML during mining and 76 ML after mining;

- Jerrys Water Source (Jerrys Management Zone) Unregulated River Take – 67 ML during mining and 730 ML after mining;
- Coal Measures – 878 ML during mining and 124 ML after mining.

3 QUANTITIES

3.1 REQUIREMENT

"How any relevant licence exemptions might relate to the water to be taken by the activity" [clause 2.1 AIP – page 7]

3.2 ASSESSMENT

There are no licence exemptions relevant to the mining area inflows.

Water captured from run off from disturbed areas will be caught in dams, which are considered to be excluded works under the WM Act and *Water Management (General) Regulation 2011* (WM Regulation) and reused for mining related activities (such as dust suppression and coal washing) and therefore exempt from licensing.

Water captured from the surface water flows of the Jerrys Water Source (outside the disturbed areas) will be partially accounted for by "*harvestable rights*" under the WM Act and the relevant "*harvestable rights order*" with the remainder to be subject to water access licences (WALs) under the WM Act.

4 CHARACTERISTICS OF WATER REQUIREMENTS

4.1 REQUIREMENT

"The characteristics of the water requirements such as whether it is taken at a fixed rate or varying in time, i.e. is it ongoing, constant, unavoidable - which, in the case of regulated rivers, means that high security water may be required to account for the water requirements - or is it climatically/time varying or controllable in some way - which, in the case of regulated rivers, implies general security water is likely to be adequate to account for the water taken" [clause 2.1 AIP – page 7]

4.2 ASSESSMENT

The maximum rate of seepage into the mining areas from the Coal Measures is predicted to be less than 300 ML/year for Years 1 to 3, less than 600 ML/year for Year 4, a maximum of 878 ML/year between Years 5 and 15, less than 600 ML/year between Years 16 and 20 and less than 300 ML/year between Years 21 and 27 (end of mining).

The maximum rate of seepage from the Coal Measures post mining is predicted to be 124 ML/year (immediately after closure), decreasing over time to 20 ML/year 123 years after mining. If a Water Act licence is obtained for the maximum take during mining (878 ML) this will also cover the post mining take.

The displacement of water from the Hunter Regulated River alluvium is predicted to be relatively stable during the life of the Project to a maximum of 2 ML/year. After mining the maximum take is modelled to be 4 ML/year at 400 years post mining.

The displacement of water from the Saddlers Creek alluvium (Jerrys Water Source) will vary during the life of the Project and post mining. The take is predicted to be less than 7 ML/year for Years 1 to 5, less than 31 ML/year for Years 5 to 15, less than 38 ML/year for Years 16 to 20 and a maximum of 45 ML/year for Years 21 to 27. The peak annual take after mining is modelled to be 76 ML at 150 years post closure.

The capture of surface water flows from the Jerrys Water Source will also vary during mining. The peak take during mining will be 67 ML and the peak take after mining will be 730 ML.

5 AVAILABILITY OF WATER ENTITLEMENTS

5.1 REQUIREMENT

"Whether there are sufficient water entitlements and water allocations that are able to be obtained to cover the characteristics of the water requirements. Consideration must also be given to the water sharing plan rules by which water is credited to water accounts on an annual basis and by which those accounts may be managed (e.g. carryover rules for unused water allocations) to provide the flexibility required to ensure there is sufficient water in accounts to cover the take of water" [clause 2.1 AIP – page 7]

5.2 ASSESSMENT

An application for the necessary Water Act licence to account for the take of water from the Coal Measures will be made subject to consultation with NSW Office of Water (NOW). There is no embargo against such action under the Water Act.

The water access licences already held by Anglo American for the Hunter Regulated River have combined share component of 198 units. This is sufficient to account for the modelled take of water from the Hunter Regulated River.

WAL(s) with sufficient share component to authorise take of water from the Jerrys Water Source during mining will be purchased before that take occurs, having regard for available water determinations (AWDs). In determining the licensing required to account for that take, regard will be had for Anglo American's entitlements under harvestable rights which *"attach to"* Anglo American's landholding, which have been calculated to be 185 ML/year.

Under clause 54(1) of the *Water Sharing Plan for the Hunter River Unregulated and Alluvial Water Sources 2009* (Unregulated WSP), available water determinations for category aquifer access licences in the Jerrys Management Zone of the Jerrys Water Source are to be equal to 1 ML per unit of share component.

Under clause 52 of the Unregulated WSP, available water determinations for category unregulated river access licences in the Jerrys Water Source (after the first year of the plan) are to be equal to 1 ML per unit of share component where possible or such lower amount

resulting from clause 47 of the water sharing plan. From 2010 to 2012, the available water determination for unregulated river access licences in the Jerrys Water Source has been 1 ML per unit of share component.

The Unregulated WSP makes provisions for adjustments to the AWD provisions after six years after the commencement of the plan.

Clause 56 of the Unregulated WSP makes provision for the carrying over of 1 ML per unit of share component for aquifer and unregulated river WALs in the Jerrys Management Zone of the Jerrys Water Source (the zone relevant to the Project) from one year to the next, with the maximum volume taken in any three consecutive water years not to exceed the sum of water allocations accrued under the licence from AWDs during those years.

A search of the NOW access licence conditions register in April 2013 shows that there are 11 aquifer WALs with total share component of 1,246 units and 18 unregulated river WALs with total share component of 2,097 units in the Jerrys Water Source as a whole.

It is therefore considered that WALs with sufficient share component to authorise the peak take of water during mining from Jerrys Water Source by the Project are able to be obtained, with depth in the market, stable AWDs and carryover provisions available for the Jerrys Management Zone of the Jerrys Water Source (and "*harvestable rights*" relied upon to partially account for take where available subject to the conditions of the applicable "*harvestable rights order*").

6 HOW WATER ENTITLEMENTS WILL BE OBTAINED

6.1 REQUIREMENT

"How this water will be obtained - by what mechanism and what licence category, consistent with any trading rules specified in either the Minister's access licence dealing principles and/or relevant water sharing plans. Consideration will also need to be given to the possibility and effect of low water allocations in regulated river systems. For example, if high security entitlements have been purchased to cover the ongoing take of water from a regulated river water source, then there may be years of low water allocations due to low water availability. This may result in insufficient water allocation being credited to the high security licence account. One way to cover this shortfall would be to enter the temporary water trading market and purchase water allocations credited to other licences. The costs and ability to undertake this sort of trade (i.e., the market depth) during these low allocation times will need to be understood." [clause 2.1 AIP – page 8]

6.2 ASSESSMENT

An application for the necessary Water Act licence to account for the take of water from the Coal Measures will be made to NOW, subject to consultation with relevant officers of NOW. There is no embargo against such action under the Water Act.

The WALs already held by Anglo for the Hunter Regulated River have combined share component of 198 units. The modelled peak annual take from the Hunter Regulated River is

4 ML. It is highly unlikely that low water allocations will affect Anglo American's ability to take the water pursuant to its existing entitlements.

Subject to Anglo American's harvestable rights (relevant to that take), WAL(s) with sufficient share component to authorise take of water from the Jerrys Water Source will be purchased before that take occurs.

A category aquifer WAL will be required in respect of the displacement of water from the Saddlers Creek alluvium.

A category unregulated river WAL will be required in respect of the capture of surface water flows in the Jerrys Water Source which are outside of harvestable rights.

It is noted that clause 72(2) of the Unregulated WSP permits the conversion of an unregulated river access licence to an aquifer access licence in all water sources covered by the plan.

It is proposed to obtain the necessary Jerrys Water Source entitlements from the market.

The following relevant trading restrictions under the Unregulated WSP are noted:

- Clause 20(2)(c) provides that the assignment of share component or water allocation from an aquifer access licence nominating a water supply works more than 40 metres (m) from the top bank of a river to a water supply works located within 40 m of the bank of a river is prohibited in the Jerrys Water Source.
- Clause 70(2)(f)(vii) provides that the assignment of share component (or water allocation) from a WAL in the Jerrys Water Source to another WAL in different tributaries in the Jerrys Water Source is prohibited.
- Clause 70(2)(j)(vii) provides that a WAL, which currently nominates a water supply work in the Jerrys Water Source cannot be amended to nominate a water supply work in a different tributary in the water source.
- Clause 70(2)(k) provides that a WAL, which currently nominates a water supply work, which may be used to take water from alluvial sediments located more than 40 m from the top bank of a river cannot be amended to nominate a water supply work to take water from alluvial sediments located within 40 m of the bank of a river.
- It will not be possible to change the water source on a WAL to the Jerrys Water Source or to transfer water allocation from another water source to the Jerrys Water Source as the dealing would cause the total units of share component in the Jerrys Water Source to exceed the total at the commencement of the Unregulated WSP (under clauses 72(2)(b)(ii) and 74(5)(b)(ii)).

7 'ACTIVATION' OF EXISTING ENTITLEMENTS

7.1 REQUIREMENT

"The effect that activation of existing entitlement may have on future available water determinations for the proposed licence category and entitlement volume" [clause 2.1 AIP – page 8]

7.2 ASSESSMENT

This is not relevant to the take of water from the Coal Measures (as it is under the Water Act) or the Hunter Regulated River (given that Anglo American's existing entitlement is well above the predicted maximum take from this water source).

According to the NOW submission on the environmental assessment (EA) for the Project, the current number of access shares in the Jerrys Water Source is 4,198 shares, whereas the total number at the commencement of the Unregulated WSP was 2,573 shares.

As the water source is *"over-allocated"* the activation of existing entitlement may have some effect on future AWDs. However as the *"over-allocation"* is known this indicates that existing entitlement has already been activated.

8 INFLOW MINIMISATION MEASURES

8.1 REQUIREMENT

"Actions required both during operation and post-closure to minimise the risk of inflows to a mine void as a result of flooding, since these are very difficult to account for volumetrically. Therefore, set-back distances from rivers should be no less than that required to ensure structural integrity of the river bank during flooding events. Levee banks or landforms should also be constructed at the appropriate time to prevent at least a 1 in 100 year flood from entering the site either during or after operation. In some instances, where the implications of such inflows are significant, levee bank levels may be required to be higher" [clause 2.1 AIP – page 8]

8.2 ASSESSMENT

The groundwater impact assessment undertaken by Australian Groundwater & Environmental Consultants as part of the EA (see Appendix N) addresses these matters at section 7 of the report.

9 WATER TAKE BEYOND PROJECT LIFE

9.1 REQUIREMENT

"A strategy for accounting for any water taken beyond the life of the operation of the project, such as continuing to hold the appropriate amount of licence entitlement to cover the ongoing volumetric impact or surrendering a component of licence entitlement at the end of the project." [clause 2.1 AIP – page 8]

9.2 ASSESSMENT

The maximum post mining take from the Coal Measures is predicted to be 124 ML (which is less than the peak take during mining and accounted for by any Water Act licence granted to Anglo American following application to NOW for sufficient entitlement to cover take during mining).

The maximum post mining take from the Hunter Regulated River is predicted to be 4 ML, which will be accounted for by licences already held by Anglo.

The maximum post mining take from the Jerrys Water Source (Jerrys Management Zone) Aquifer Take is predicted to be 76 ML at 150 years after closure while for the Jerrys Water Source (Jerrys Management Zone) Unregulated River Take is predicted to be 730 ML after closure. These are both more than the peak take during mining and sufficient entitlement would be secured at the appropriate time.

In respect of that water which will be taken after mining, Anglo American will investigate (in conjunction with NOW) appropriate surrender of entitlements in lieu of holding licences indefinitely.

10 HYDRAULIC CONNECTION BETWEEN AQUIFERS

10.1 REQUIREMENT

"Any potential for causing or enhancing hydraulic connection between aquifers or between groundwater and surface water sources, and quantification of this risk in the volumetric inflow estimates." [clause 2.1 AIP – page 8]

10.2 ASSESSMENT

The groundwater impact assessment undertaken by Australian Groundwater & Environmental Consultants as part of the EA (See Appendix N) addresses these matters at sections 6 and 9 of the report.

11 OTHER UNCERTAINTIES

11.1 REQUIREMENT

Quantification of any other uncertainties in the groundwater or surface water impact modelling conducted for the activity. [clause 2.1 AIP – page 8]

11.2 ASSESSMENT

The groundwater impact assessment undertaken by Australian Groundwater & Environmental Consultants as part of the EA (see Appendix N) addresses this throughout the report.

12 MONITORING ACTUAL TAKE

12.1 REQUIREMENT

"Strategies in place for monitoring actual and reassessing any predicted take of water and how any changes in these requirements will be accounted for, including analysis of water market depth and/or in-situ mitigation and remediation options" [clause 2.1 AIP – page 8]

12.2 ASSESSMENT

The groundwater impact assessment undertaken by Australian Groundwater & Environmental Consultants as part of the EA (see Appendix N) addresses these matters at section 12 of the report.

13 ABILITY TO OBTAIN NECESSARY WATER LICENCES

13.1 REQUIREMENT

a) Ability to demonstrate that they have the ability to obtain the necessary licences in order to account for the take of water from any relevant water source; or

b) ability to demonstrate that the proposal has been designed in such a way as to prevent the take of water where applicants are unable to meet the requirements specified in point (a) above. [clause 3.2 AIP – page 11]

13.2 ASSESSMENT

Application will be made to NOW for a licence under Part 5 of the Water Act with sufficient megalitres to authorise the maximum amount of water taken by the Project from the Coal Measures at any one point during its life.

Anglo American already holds WALs 31439, 31440 and 1066 for Management Zone 1B of the Hunter Regulated River with total share component of 198 units. This will be sufficient to account for the minimal amount of take from the Hunter Regulated River (predicted to be a maximum of 2 ML/year during mining and 4 ML/year after mining), with the remaining units available for project water supply in dry conditions.

WAL(s) with sufficient share component to authorise take of water from the Jerrys Water Source will be purchased before that take occurs.

A search of the NOW access licence conditions register in April 2013 shows that there are 11 aquifer WALs with total share component of 1,246 units and 18 unregulated river WALs with total share component of 2,097 units in the Jerrys Water Source as a whole.

14 'MINIMAL IMPACT' CONSIDERATIONS

14.1 REQUIREMENT

"Ability to demonstrate that adequate arrangements will be in place to ensure that the minimal impact considerations specified in Table 1 and section 3.2.2 can be met" [clause 3.2 AIP – page 11]

14.2 ASSESSMENT

This matter is addressed at section 8.12.3 of the EA for the Project under the heading "*Highly Productive Groundwater*" and the groundwater impact assessment (see Appendix N of the EA).

15 CONTINGENT REMEDIAL ACTIONS

15.1 REQUIREMENT

"Proposed remedial actions for impacts greater than those that were predicted as part of the relevant approval [including]:

a) consideration of the potential types and risks of unforeseen impacts that may occur during the operational phase or post closure of the aquifer interference activity; and

b) whether the proposed mitigation, prevention or avoidance strategies will minimise these risks; and

c) whether the proposed remedial actions are adequate, should the proposed risk minimisation strategies in (b) fail; and

d) advice on what further mitigation, prevention, avoidance or remedial actions may be required; and

e) appropriate conditions that maintain any mitigation, prevention, avoidance or remediation actions until they are no longer required to keep the impacts at or below the predicted levels." [clause 3.2 AIP – page 11]

15.2 ASSESSMENT

The groundwater impact assessment undertaken by Australian Groundwater & Environmental Consultants as part of the EA (see Appendix N) addresses these matters at section 12.9 of the report.

16 MINIMAL IMPACT CONSIDERATIONS

16.1 REQUIREMENT

"If the predicted impacts are less than the Level 1 minimal impact considerations, then these impacts will be considered as acceptable.

Where an activity's predicted impacts are greater than the Level 1 minimal impact considerations specified in Table 1, but these predicted impacts exceed the Level 1 thresholds by no more than the accuracy of an otherwise robust model, then the project will be considered as having impacts that are within the range of acceptability, with extra monitoring and potential mitigation or remediation required during operation, should the project be approved. In such instances, the Minister's advice will include a request that appropriate conditions be imposed to ensure the impacts of the activity are acceptable. This may include for example, adaptive management conditions requiring the proponent to

monitor the actual impacts of the proposal and take action to mitigate or remediate the impacts that exceed the Level 1 thresholds.

Where the predicted impacts are greater than the Level 1 minimal impact considerations by more than the accuracy of an otherwise robust model, then the assessment will involve additional studies to fully assess these predicted impacts. If this assessment shows that the predicted impacts do not prevent the long-term viability of the relevant water-dependent asset, as defined in Table 1, then the impacts will be considered to be acceptable." [clause 3.2.1 AIP – page 13]

16.2 ASSESSMENT

Groundwater modelling undertaken for the Project indicates that the drawdown at all private bores is less than the 2 m trigger in the AIP.

The Unregulated WSP does not define any high priority groundwater dependent ecosystem or high priority culturally significant sites within the Drayton South area or its immediate surrounds.

As mining activities required by the Project will not occur near the Hunter River alluvium during mining and post mining, the final void will remain a sink to groundwater in the long term. In this regard, no impact on the beneficial use category of the Hunter River alluvium or the long term average salinity of the Hunter River is considered likely. Furthermore, no mining activity will occur within 200 m laterally from the top of high bank of the Hunter River, and no alluvial material will be excavated.

17 ADDITIONAL CONSIDERATIONS

17.1 REQUIREMENT

"a) Acidity issues to arise, for example exposure of acid sulphate soils;

b) Waterlogging or water table rise to occur, which could potentially affect land use, groundwater dependent ecosystems and other aquifer interference activities. Specific limits will be determined on a case-by-case basis, depending on the sensitivity of the surrounding land and groundwater dependent ecosystems to waterlogging and other aquifer interference activities to water intrusion." [clause 3.2.2 AIP – page 25]

17.2 ASSESSMENT

The groundwater impact assessment undertaken by Australian Groundwater & Environmental Consultants as part of the EA (see Appendix N) addresses acidity issues at sections 9.8 and 10.5 of the report and waterlogging/water table rise issues at sections 9.3 and 9.4 of the report.

18 REQUIREMENTS OF PROPONENTS

18.1 REQUIREMENT

"The proponent of an activity that may result in aquifer interference will need to provide the following to enable assessment of the activity against minimal impact considerations:

i. establishment of baseline groundwater conditions including groundwater depth, quality and flow based on sampling of all existing bores in the area potentially affected by the activity, any existing monitoring bores and any new monitoring bores that may be required; and

ii. a strategy for complying with any water access rules applying to relevant categories of water access licences, as specified in relevant water sharing plans;

iii. details of potential water level, quality or pressure drawdown impacts on nearby water users who are exercising their right to take water under a basic landholder right;

iv. details of potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources;

v. details of potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems;

vi. details of potential for increased saline or contaminated water inflows to aquifers and highly connected river systems;

vii. details of the potential to cause or enhance hydraulic connection between aquifers;

viii. details of the potential for river bank instability, or high wall instability or failure to occur;

ix. details of the method for disposing of extracted water (in the case of coal seam gas activities)" [clause 3.2.3 AIP – page 26]

18.2 ASSESSMENT

i. Refer to sections 4, 5 and 6 of the groundwater impact assessment (see Appendix N of the EA).

ii. Refer to sections 2 and 11 of the groundwater impact assessment (see Appendix N of the EA).

iii. Refer to sections 9.3 – 9.5 of the groundwater impact assessment (see Appendix N of the EA).

iv. Refer to sections 9.3 – 9.5 of the groundwater impact assessment (see Appendix N of the EA).

v. Refer to sections 6.1.6, 9.6 and 9.7 of the groundwater impact assessment (see Appendix N of the EA) and the ecology and stygofauna impact assessment (see Appendix J and O of the EA).

vi. Refer to sections 9.8, 10.5 and 10.6 of the groundwater impact assessment (see Appendix N of the EA).

vii. Refer to sections 6 and 9 of the groundwater impact assessment (see Appendix N of the EA).

viii. Refer to sections 2.6 and 7.0 of the groundwater impact assessment (see Appendix N of the EA).

ix. Not applicable.