



The Hon Niall Blair MLC
Minister for Primary Industries
Minister for Regional Water
Minister for Trade and Industry

IM18/33182

Mr David Koppers
Independent Planning Commission NSW
Level 3, 201 Elizabeth Street,
SYDNEY NSW 2000

Dear Mr Koppers *David*

Advice to the Mining and Petroleum Gateway Panel on the Maxwell Project

Thank you for your email of 10 December 2018 concerning the Gateway Application for Maxwell Project near Muswellbrook, NSW.

I have considered the application in conjunction with the advice issued by the Independent Expert Scientific Committee and key impacts are listed below in relation to the NSW Aquifer Interference Policy, which I ask you consider in setting the conditions you will place on a potential Gateway Certificate. I also attach a detailed technical assessment from the Department of Industry – Water, which was prepared to support my advice.

- Obtaining entitlement from the Sydney Basin North Coast Groundwater Source will pose a significant challenge as there are several competing mines similarly seeking entitlement from this water source.
- A strategy to manage water level impacts beyond 2m cumulative decline at any water supply work will be required at the EIS stage. Groundwater impact modelling lodged with the EIS will need to include an uncertainty analysis.
- Malabar will require detailed supporting evidence at the EIS stage demonstrating compliance with the Aquifer Interference Policy with respect to depth and distance of mining beneath aquifers defined as a 'reliable water supply'.

I note that consideration of other impacts, such as potential agricultural impacts, is beyond the scope for my advice at this stage, and my Department will contribute to the Government's robust assessment of this project at a later stage.

I have asked that Mr Mitchell Isaacs, Director, Strategic Relations, Department of Industry - Water be available to discuss this matter further with you. Mr Isaacs can be contacted by email on mitchell.isaacs@dpi.nsw.gov.au.

Yours sincerely

The Hon Niall Blair MLC
Minister for Primary Industries
Minister for Regional Water
Minister for Trade and Industry

20 DEC 2018

Encl.

ATTACHMENT C - Technical Assessment by DoI Water for the Minister for Regional Water

Maxwell Project – Application for Gateway Certificate

1. Purpose

To review the preliminary groundwater assessment provided in the Application for a Gateway Certificate for the Maxwell Project in relation to the NSW Aquifer Interference Policy (AIP).

2. Background

Malabar Coal is seeking consent to develop an underground coal mining operation in the upper Hunter Valley, approximately 10km south-east of Muswellbrook. The project is expected to have a lifespan of 26 years.

The proponent has made an application for a gateway certificate, which is a requirement for any State Significant Development mining or petroleum proposal which is proposed in areas where there is designated Biophysical Strategic Agricultural Land (BSAL). This is a preliminary assessment made prior to the regular planning and assessment process which will require a full Environmental Impact Statement (EIS).

3. Review and Comment

IESC Review

The Independent Expert Scientific Committee on Large Coal Mines and Coal Seam Gas (IESC) has provided a detailed submission on the Maxwell Project. The IESC submission does not report on issues that should prevent the project progression to the EIS stage. It does however, provide prescriptive detail on the investigations that should be undertaken, with particular emphasis on refining model uncertainty. The impacts of depressurisation extending up to several kilometres within the hardrock aquifer systems are discussed however these impacts are consistent with other Hunter Valley coal mines model predictions. Issues about the risk of hydrological connection between mine with the shallow unconfined aquifer of both Saddlers Creek and Hunter River were noted by the IESC. This risk of hydrological connection with a reliable water supply is part of the AIP 'minimal impact considerations' assessment criteria and is discussed in the above commentary, will need to be fully investigated for adherence with NSW Government policy.

The IESC has made a particular point of the need to undertake stygofauna sampling. Whilst DoI Water supports the investigations as a potential tool for evaluating ecological health, stygofauna are not listed as high priority GDE and not understood sufficiently well enough to be a regulatory tool should mining proceed.

The recommendation in paragraph 21d of the IESC review, relating to detailed river reach and geophysics mapping was of interest to DoI Water. DoI Water support the concept with a view that it be expanded to better inform on the impact with fracturing to surface and how the groundwater model will resolve potential losses from 1st 2nd, 3rd etc order streams impacted by subsidence fracturing if treated as drain cells. Cumulative stream losses/capture, albeit ephemeral streams impact on the catchment run-off, hence stream baseline stream data and catchment run-off modelling should be a key issue, but generally not embedded within the groundwater impact assessment criteria. Identifying potential changes in catchment run-off losses as a consequence of shallow underground mining based on a collective of climate, stream and groundwater monitoring and modelling is recommended. The proponent is required to demonstrate to identify catchment run-off losses and fully account to of water. The IESC advice complements DoI Water's objectives.

The NSW Mining and Petroleum Gateway Panel has requested the IESC provide advice and recommendations on the following four questions:

1. What are the potential likelihood and significance of any impacts of the proposal on water resources;
2. What are the boundary conditions used in the groundwater model;
3. What is the appropriateness of the proposed mitigation measures; and
4. What are the recommended further studies that should be undertaken if relevant.

AIP Assessment

Licensing

Malabar Coal holds licences for water associated with the Hunter Regulated River Alluvial Water with sufficient units to offset predicted take. However, Malabar does not hold sufficient entitlement to offset predicted peak take of groundwater from the Sydney Basin North Coast Groundwater Source. Malabar advises it would seek and obtain the appropriate water licences (as required) and/or comply with appropriate trading rules in accordance with the relevant Water Sharing Plans. This licensing requirement will pose a significant challenge for Malabar as there are several competing mines similarly seeking entitlement from this water source.

AIP - Minimal Impact Considerations – Water Table Impacts

Malabar present the Project activity as adhering with category 1 minimal impact considerations of the Aquifer Interference Policy 2012 (AIP). However, One (1) user within the Sydney Basin North Coast Porous Rock aquifer is predicted to be impacted to a level greater than 2 metres. A strategy to manage this impact will be required at the EIS stage.

AIP - AIP - Minimal Impact Considerations – Water Quality impacts

Table 1 of the AIP (2012) describes the relevant category 1 minimal impact consideration as - *No mining activity to be below the natural ground surface within 200m laterally from the top of high bank or 100m 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".*

The Upper Hunter Strategic Regional Land Use Plan (2012) defines aquifers which have a yield rate greater than 5 L/s and total dissolved solids of less than 1500 mg/L as a 'reliable water supply'. DoI Water has categorised NSW aquifers into the categories of less productive and highly productive based on aquifer yield and salinity thresholds as defined above. Saddlers Creek is a tributary of the Hunter Regulated River and mapped by NSW Government as 'Highly Productive' i.e. a "reliable water supply". The project proposal does not adhere with the setback distances for a category 1 impact as defined by the AIP. As such, the impact is defined as category 2, and the following conditions are required to be met:

Appropriate studies are required to demonstrate to the Minister's satisfaction that:

- there will be negligible river bank or high wall instability risks;
- during the activity's operation and post-closure, levee banks and landform design should prevent the Probable Maximum Flood from entering the activity's site; and

- low-permeability barriers between the site and the highly connected surface water source will be appropriately designed, installed and maintained to ensure their long-term effectiveness at minimising interaction between saline groundwater and the highly connected surface water supply;

Malabar presents the alluvial aquifer of Saddlers Creek as being less productive based on water quality and thereby not a 'reliable water supply'. The depth and distance of mining with respect to Saddlers Creek alluvial boundary and the AIP requirement is not discussed in the report. Malabar will need to consider this issue in detail at the EIS stage demonstrating compliance with the AIP.

Table 1: Does the activity require detailed assessment under the AIP?

Consideration		Response
1	Is the activity defined as an aquifer interference activity?	If YES , continue to 2.
2	Is the activity a defined minimal impact aquifer interference activity according to section 3.3 of the AIP?	If NO , then continue on for a full assessment of the activity.

The response to Table 1 above is YES, thus the activity requires a detailed assessment under the AIP, as provided below.

Section 3.2 of the AIP defines the framework for assessing impacts. These are addressed here under the following headings:

1. Accounting for, or preventing the take of water
2. Addressing the minimal impact considerations
3. Proposed remedial actions where impacts are greater than predicted.

1. Accounting for, or preventing the take of water

Where a proposed activity will take water, adequate arrangements must be in place to account for this water. It is the proponent's responsibility to ensure that the necessary licences are held. These requirements are detailed in Section 2 of the AIP, with the specific considerations in Section 2.1 addressed systematically below.

Where a proponent is unable to demonstrate that they will be able to meet the requirements for the licensing of the take of water, consideration should be given to modification of the proposal to prevent the take of water.

Table 2: Has the proponent:

AIP Requirement		Proponent response	DoI Water Comment
1	Described the water source (s) the activity will take water from?	Of specific relevance to the Project area are the Sydney Basin – North Coast Groundwater Source (within which the Maxwell Underground Mining Area is wholly located) and the New England Fold Belt Coast Groundwater Source (to the north-east).	Water Sources identified. Point of note, Saddlers Creek is a tributary of the Hunter Regulated River and is mapped as 'Highly Productive' and thereby a Reliable Water Supply within the Strategic Regional Land Use Plan.

	AIP Requirement	Proponent response	DoI Water Comment
		<p>In relation to unregulated surface water, the Project is located within the Jerrys Water Source. A portion of the Maxwell Infrastructure area (including CHPP) is located within Muswellbrook Water Source.</p> <p>In relation to alluvial water sources, the unconsolidated alluvial sediments associated with Saddlers Creek are located within the Jerrys Management Zone of the Jerrys Water Source to the north and west of the Project area. The Hunter Regulated River Alluvial Water Source (Upstream Glennies Creek Management Zone) is located to the south of the Project area.</p> <p>Management Zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction) of the Hunter River is located to the south of the Project area.</p>	<p>Malabar presents the alluvial aquifer of Saddlers Creek as being less productive based on water quality and thereby not a Reliable Water Supply. The AIP sets a minimum depth of mining as 100m from the base of a reliable water supply. Figures in Attachment C presents the alluvial boundary of Saddlers Creek, whilst Figure 3 Attachment C presents longwall panel of the Woodlands Hill Seam extending beneath small portion of the alluvial boundary.</p> <p>Further assessment during the EIS would be required to demonstrate compliance with the AIP.</p>
2	Predicted 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?	Table 39 Groundwater Assessment Part 1 (p.81)	<p>Average and maximum licensing requirements outlined.</p> <p>Adequately addressed to DoI Water requirements</p>
3	Predicted the total amount of water that will be taken from each connected groundwater or surface water source after the closure of the activity?	Table 39 Groundwater Assessment Part 1 (p.81)	<p>As above.</p> <p>Adequately addressed to DoI Water requirements</p>
4	Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to Table 2, below)	The complexity of the numerical groundwater model developed as part of this study is adequate for this preliminary groundwater assessment by simulating contrasts in	Adequately addressed to DoI Water requirements

	AIP Requirement	Proponent response	DoI Water Comment
		hydraulic properties and hydraulic gradients that may be associated with changes to the groundwater system because of the proposed development. Based on the Australian Groundwater Modelling Guidelines (2012), the model is classified as Class 2, with a good steady-state calibration and verification (transient) performance of 7.5% and 4.5% scaled root mean square error respectively, both achieving the target for less than 10% suggested in the MDBC Groundwater Flow Modelling Guideline (2001).	
5	Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?	Table 39	<p>Table 39 presents licences currently held to offset predicted take.</p> <p>1347 units from the Sydney Basin North Coast Groundwater Source yet to be acquired.</p> <p>Adequately addressed to DoI Water requirements</p>
6	Described how any licence exemptions might apply?	To be offset with licences	As above
7	Described the characteristics of the water requirements?	<p>The Project would involve the use of the existing infrastructure with minor augmentations and extensions. New water management infrastructure would also be developed at the underground mine entry and for other Project activities.</p> <p>The Project would involve the use of a combination of mine water, recycled treated mine water and potable water in underground and surface operations.</p> <p>Water and brine from water treatment activities would be</p>	Noted.

	AIP Requirement	Proponent response	DoI Water Comment
		<p>stored within existing voids in CL 229 and ML 1531.</p> <p>Final water supply requirements for the Project would be subject to the outcomes of a detailed water balance that would be presented in the EIS.</p>	
8	Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?	<p>In the 2017/18 period, a total of 187 Aquifer WALs with a total share component of 67,794.5 units were available in the Sydney Basin – North Coast Groundwater Source.</p> <p>In the 2017/18 period, a total of 10 Aquifer WALs and 19 Unregulated River WALs with a total share component of 1,246 and 2,097 units respectively were available in the Jerrys Water Source.</p>	<p>There will be challenges for any available water for the Sydney Basin North Coast Groundwater Source with several other coal mines also seeking entitlement within the Hunter – Newcastle Coalfield. With the bulk of existing entitlement held by mining companies entitlement hence the acquisition of the required entitlement will be a significant hurdle to resolve.</p>
9	Considered the rules of the relevant water sharing plan and if it can meet these rules?	<p>Malabar would seek and obtain the appropriate water licences (as required) and/or comply with appropriate trading rules in accordance with the relevant WSPs.</p>	<p>As above</p>
10	Determined how it will obtain the required water?	<p>As above</p>	<p>As above</p>
11	Considered the effect that activation of existing entitlement may have on future available water determinations?	<p>Clause 39 of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 includes rules (specifically distance restrictions) for granting water supply works approvals.</p> <p>Relevantly for the Project, the distance restrictions in clause 39 do not apply where (see clause 39[6]):</p> <p>(a) a hydrogeological study undertaken by the applicant, and assessed as adequate by the Department, demonstrates that the water supply work will have no more than minimal impacts on the existing licensed taking of water from the water source;</p>	<p>Adequately addressed to DoI Water requirements</p>

	AIP Requirement	Proponent response	DoI Water Comment
		<p>(b) all potentially affected persons in the near vicinity of the water supply work, holding an access licence or having a right to take water under the Water Management Act 2000 have been notified by the applicant; and</p> <p>(c) any approval granted contains conditions setting out a process for remediation in the event that any more than minimal impact on existing extraction from the water source occurs in the future. There are no flow classes established for the Hunter Regulated River Alluvial Water Source under the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009.</p>	
12	<p>Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?</p>	<p>Malabar would establish a groundwater monitoring network surrounding the existing voids at the Maxwell Infrastructure area. The network would be used to validate previous groundwater drawdown predictions (i.e. development of localised groundwater sinks), as well as monitoring of potential seepage migrating away from existing rejects/emplacement areas towards the catchment of Ramrod Creek, if any.</p>	N/A for the underground.
13	<p>Developed a strategy to account for any water taken beyond the life of the operation of the project?</p>	Table 39	Post mining take require surrender of licences.
	<p><i>Will uncertainty in the predicted inflows have a significant impact on the environment or other authorized water users?</i></p> <p><i>Items 14-16 must be addressed if so.</i></p>		
14	<p>Considered any potential for causing or enhancing hydraulic connections, and quantified the risk?</p>	<p>Section 3.9.4 Impact of Mining on Overlying Strata</p> <p>The impact of mining on the</p>	<p>Discussion presented on hydraulic fracturing.</p> <p>Presented diagrammatically</p>

AIP Requirement		Proponent response	Dol Water Comment
		<p>permeability of caved overlying strata has been based on experience of monitoring and groundwater modelling gained to date, in other locations, combined with the most recent research available for subsidence impacts on aquifer and aquitard materials.</p> <p>Section 4.5 Hydraulic Properties</p>	in Figure 32 of the Groundwater Assessment
15	Quantified any other uncertainties in the groundwater or surface water impact modeling conducted for the activity?	Section 4.9.3 Sensitivity Analysis	Discussion of changes in specific yields (Sy). Further testing of multiple parameters at the EIS stage would be required.
16	Considered strategies for monitoring actual and reassessing any predicted take of water throughout the life of the project, and how these requirements will be accounted for?	<p>Section 10 Ongoing and Future Hydrological Investigations</p> <p>Available groundwater monitoring datasets would be used in the development of the groundwater model for the EIS assessments, and future monitoring programs.</p>	Outlines proposed investigations to be completed in preparation for the EIS and notes the requirements of a WMP at post approval stage.

Table 3: Determining water predictions in accordance with Section 3.2.3 (complete one row only – consider both during and following completion of activity)

AIP Requirement		Proponent response	Dol Water Comment
1	For the <i>Gateway</i> process: Is the estimate based on a simple modelling platform, using suitable baseline data, that is fit-for-purpose?	Class 2 Model	<p>Accepted. USG used. Steady state and transient (2001 – 2018) i.e 18yrs) calibration applied. 14 layer model. Indicative long time frame of data capture for model calibration. Reported SRMS stat < 10% for 100 bores and data points in steady state and 4.5% SRMS in transient with 107 bores and 6,156 points.</p> <p>Adequately addressed to Dol Water requirements.</p>

	AIP Requirement	Proponent response	DoI Water Comment
2	<p>For <i>SSD or mining or CSG production</i>, is the estimate based on a complex modelling platform that is:</p> <ul style="list-style-type: none"> • Calibrated against suitable baseline data, and in the case of a <i>reliable water source</i>, over at least two years? • Consistent with the Australian Modelling Guidelines? • Independently reviewed, robust and reliable, and deemed fit-for-purpose? 	Table 16	Modflow Not required at the Gateway Certificate stage.
3	<p>In all other processes, estimated based on a desk-top analysis that is:</p> <ul style="list-style-type: none"> • Developed using the available baseline data that has been collected at an appropriate frequency and scale; and • Fit-for-purpose? 		N/A

Other requirements to be reported on under Section 3.2.3

Table 4: Has the proponent provided details on:

	AIP Requirement	Proponent response	DoI Water Comment
1	Establishment of baseline groundwater conditions?	<p>Groundwater monitoring was first installed in the EL 5460 area in 1998. The monitoring network was progressively expanded and included 23 monitoring bores and seven vibrating wire piezometers (VWPs) including:</p> <ul style="list-style-type: none"> • six monitoring bores installed in 1998; • eight bores installed between 2000 and 2003; • two VWPs installed in 2010; and • nine monitoring bores and five VWPs installed in 2011. <p>The groundwater monitoring network covering the Maxwell Infrastructure currently consists of 15 bores. Long-</p>	<p>Baseline data available for model development suitable for the Gateway Certificate stage.</p> <p>Accepted</p>

		term data are available from all of these bores, with some bores providing data in excess of 30 years. All of the monitoring bores located at the Maxwell Infrastructure target the Permian coal measures.	
2	A strategy for complying with any water access rules?		Licensing Offsets required.
3	Potential water level, quality or pressure drawdown impacts on nearby basic landholder rights water users?	<p>AIP Assessment</p> <p>While 'less productive' groundwater sources are not the primary focus under the SRLUP Guideline for Gateway Applicants (2013), the minimal impact considerations of the AI Policy for the 'less productive' groundwater sources have been classified in this report (i.e. Level 2, as more than 2 metres cumulative drawdown is predicted at some water supply works). Accordingly, a groundwater management plan should be developed and implemented to define groundwater level triggers, and a trigger action response plan.</p>	Level 1 Minimal Impacts Predicted Refer to AIP tables for highly productive and less productive.
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?	As above	As above
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?	As above	As above
6	Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?	As above	As Above
7	Potential to cause or enhance hydraulic connection between aquifers?	Covered in Item 14 above	Covered in Item 14 above

8	Potential for river bank instability, or high wall instability or failure to occur?		Underground Mine proposal
9	Details of the method for disposing of extracted activities (for CSG activities)?		N/A

2. Addressing the minimal impact considerations

Section 3.2.1 of the AIP describes how aquifer impact assessment should be undertaken.

1. Identify all water sources that will be impacted, referring to the water sources defined in the relevant water sharing plan(s). Assessment against the minimal impact considerations of the AIP should be undertaken for each ground water source.
2. Determine if each water source is defined as "highly productive" or "less productive". If the water source is named in the register of highly productive water sources, then it is defined as highly productive, all other water sources are defined as less productive.
3. With reference to pages 13-14 of the AIP, determine the sub-grouping of each water source (eg alluvial, porous rock, fractured rock, coastal sands).
4. Determine whether the predicted impacts fall within level 1 or level 2 of the minimal impact considerations defined in Table 1 of the AIP, for each water source, for each of water table, water pressure, and water quality attributes. The tables below may assist with the assessment. There is a separate table for each sub-grouping of water source – only use the tables that apply to the water source(s) you are assessing, and delete the others.
5. If unable to determine any of these impacts, identify what further information will be required to make this assessment.
6. Where the assessment determines that the impacts fall within the Level 1 impacts, the assessment should be "Level 1 – Acceptable"
7. Where the assessment falls outside the Level 1 impacts, the assessment should be "Level 2". The assessment should further note the reasons the assessment is Level 2, and any additional requirements that are triggered by falling into Level 2.
8. If water table or water pressure assessment is not applicable due to the nature of the water source, the assessment should be recorded as "N/A – *reason for N/A*".

Table 5: Minimal impact considerations

Aquifer	Alluvial aquifer	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
<u>Water Table</u> Less than or equal to a 10% cumulative variation in the water table, 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 water table decline cumulatively at any water supply work.		No known risks to 'high priority' GDEs or 'high priority' groundwater-dependent culturally significant sites listed in relevant Water Sharing Plans. The modelled 2 m water table drawdown at the end of mining is not predicted to extend beyond the EL 5460 boundary.
<u>Water pressure</u> 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 2m decline, at any water supply work. OR , for the Lower Murrumbidgee Deep Groundwater Source: A cumulative pressure head decline of not more than 40% of the "post-water sharing plan" pressure head above the top of the relevant aquifer to a maximum of a 3m decline, at any water supply work.		
<u>Water quality</u> Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity. 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. No mining activity to be below the natural ground surface within 200m laterally from the top of high		(P 88) No measurable impact on water quality in the Hunter Regulated River Alluvial Water Source (Upstream Glennies Creek Management Zone) or the Hunter Regulated River Source. And

<p>bank or 100m 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".</p> <p>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 200m laterally from the top of high bank and 100m vertically beneath a highly connected surface water source that is defined as a "reliable water supply".</p>	
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Aquifer	Porous rock or fractured rock	
Category	Less productive	
Level 1 Minimal Impact Consideration		Assessment
<p><u>Water Table</u></p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40 m from any:</p> <p>(a) high priority groundwater dependent ecosystem; or</p> <p>(b) high priority culturally significant site;</p> <p>listed in the schedule of the relevant water sharing plan.</p> <p>OR</p> <p>A maximum of a 2 m water table decline cumulatively at any water supply work.</p>		Potential impact to one privately-owned bore (drawdown greater than 2 metres) is predicted due to the Project.
<p><u>Water pressure</u></p> <p>A cumulative pressure head decline of not more than a 2m decline, at any water supply work.</p>		As above
<p><u>Water quality</u></p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity.</p>		Low beneficial use class already.