

RECOMMENDATION: The proponent is required to ensure it has adequate water supply prior to production.

The Site Water Balance for the Project demonstrated that, based on historic climatic conditions over a period of 128 years, the water management system would provide “a reliable source of water for use in mining operations even in extended periods of below average rainfall” (p66 of Appendix B).

This analysis considers periods where licenced extraction from the Namoi River is not available (i.e. 0 ML/unit share) (see Figure 7.6 of Appendix B).

The sensitivity of water availability during the current drought conditions is acknowledged. However, sufficient water supply for the Project is a commercial issue for Whitehaven.

If climatic conditions are such that water availability is limited, then operations will need to adjust accordingly. This is consistent with the requirement of Condition 24 of Schedule 3 of the Development Consent (SSD-5000) for the Vickery Coal Mine (the Approved Mine):

24. The Applicant shall ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Secretary.

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.

RECOMMENDATION: The proponent should confirm that the identified water entitlements are available for the project and will not be required to account for continuing take where nominated. We recommend that Table 6-1 (Appendix 6 of the EIS) is updated showing all WALs held in each water source, clearing detailing which project(s) each WAL applies to, and where a WAL is being counted against multiple projects how much of the total is allocated to each project.

This is required to satisfy the Secretary’s Assessment Requirement to demonstrate access to sufficient water for all projects running concurrently.

The Aquifer Interference Policy requires the proponent to hold sufficient water entitlement prior to approval.

The Aquifer Interference Policy does not require proponents to hold sufficient water entitlements prior to approval. The Aquifer Interference Policy requires (emphasis added):

*The proponent should therefore demonstrate during the planning assessment process that these licences **can be acquired** if development consent is granted.*

Given Whitehaven already holds sufficient licences to account for predicted water take over the life of the Project, this requirement of the Aquifer Interference Policy is satisfied.

Attachment 6 of the EIS provides WALs currently held by Whitehaven that are available for the Project. Note these WALs are not concurrently required with other Whitehaven operations.

This is clearly stated in Attachment 6 (pA6-3) (emphasis added):

*Details of the current water access licences (WALs) held by Whitehaven Coal Limited (Whitehaven) for the Project are summarised in Table A6-1 (**WALs held for Whitehaven’s other operations are not included**).*

Tables A6-1 and A6-2 from the EIS are reproduced below, which show the WALs available for the Project and the demonstration that these WALs are sufficient to account for mining-induced drawdown and external water supply requirements.

Table A6-1
Existing Water Licensing Summary for the Project

Water Sharing Plan	Water Source	Licence Category	Water Access Licence Number	Allocation (Shares)
<i>Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources 2011</i>	Gunnedah-Oxley Basin MDB Groundwater Source	Aquifer	36576	600
<i>Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003</i>	Upper Namoi Zone 4, Namoi Valley (Keepit Dam to Gin's Leap)	Aquifer	12653	166
		Aquifer	12651	52
		Aquifer	12645	35
		Aquifer	12724	45
		Aquifer	12715	75
		Aquifer	12701	20
		Aquifer	12731	3
		Subtotal	-	396
<i>Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016</i>	Lower Namoi Regulated River Water Source	High Security River	16034	50
		General Security River	14936	1,056
		General Security River	13051	96
		General Security River	2682	486
		Supplementary River	13052	10.5
		Supplementary River	2683	53
		Subtotal	-	1,751.5

Table A6-2
Estimated Water Licensing Requirements for the Project – During Mining

Water Sharing Plan	Water Source	Allocation (Shares)	Maximum Project Licensing Requirement for Groundwater Inflows (ML/year) ¹	Residual Whitehaven Allocation Available for External Water Demands (Shares) ²
<i>Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources 2011</i>	Gunnedah-Oxley Basin MDB Groundwater Source	600	517	83
<i>Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003</i>	Upper Namoi Zone 4, Namoi Valley (Keepit Dam to Gin's Leap)	396	5	391
<i>Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016</i>	Lower Namoi Regulated River Water Source	50 (High Security)	11	39 (High Security)
		1,638 (General Security)		1,638 (General Security)
		63.5 (Supplementary River)		63.5 (Supplementary River)
		Total: 1,751.5		Total: 1,740.5

¹ Licensing requirement for groundwater includes direct pit inflows from the porous rock and induced leakage from the Namoi River and alluvial aquifer.

² Assuming a 1 ML entitlement per share. External water demands are net of water captured in on-site storages.

RECOMMENDATION: An impact assessment of the borefield is required against the DPIE Water groundwater dealing/new bore impact assessment criteria in consultation with DPIE Water.

The Groundwater Assessment (Appendix A of the EIS) modelled the Project borefield cumulatively with proposed and existing mining, with predicted impacts demonstrated to comply with the NSW Aquifer Interference Policy Level 1 ‘minimal impact’ criteria. In addition, positioning of the bores would be consistent with the requirements of Clause 36 of the *Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003*. Figure 1 shows the proximity of the Project borefield to privately-owned bores. The closest privately-owned bore (YA1) is approximately 5 kilometres away.

It is understood from consultation with DPIE Water that, should the Project be approved, assessment against the new bore impact assessment criteria would be conducted by the NSW Government when WALs held by Whitehaven within Zone 4 of the *Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003* are assigned to the Project borefield.

As such, it is considered that completion of this legislative post-approval requirement is not required pre-determination of the Project.

Notwithstanding, assessment of the Project borefield has also been conducted against the *Water Resource Plans Fact Sheet - Assessing Groundwater Applications* criteria for two modelling scenarios (Table 1):

- **Scenario 1** (EIS modelling) – modelling the proposed borefield as ten bores pumping at a combined rate of 600 ML/year (each bore pumping at a rate of 0.164 ML/d) over the 25-year Project life (as in the EIS).
- **Scenario 2** – the same total extraction volume over the life of the Project as Scenario 1, however, with pumping from only two bores (BH3 and BH5) at a rate of 3.0 ML/d each, in years 1, 5, 9, 13, 17, 21 and 25 of the Project life to reflect the expected use of borefield intermittently as a backup up water supply (as per its predicted use in the Site Water Balance).

It is also noted the Secretary’s Environmental Assessment Requirements (SEARs) for the Project required assessment against the NSW Aquifer Interference Policy. The SEARs did not require assessment against the *Water Resource Plans Fact Sheet - Assessing Groundwater Applications*.

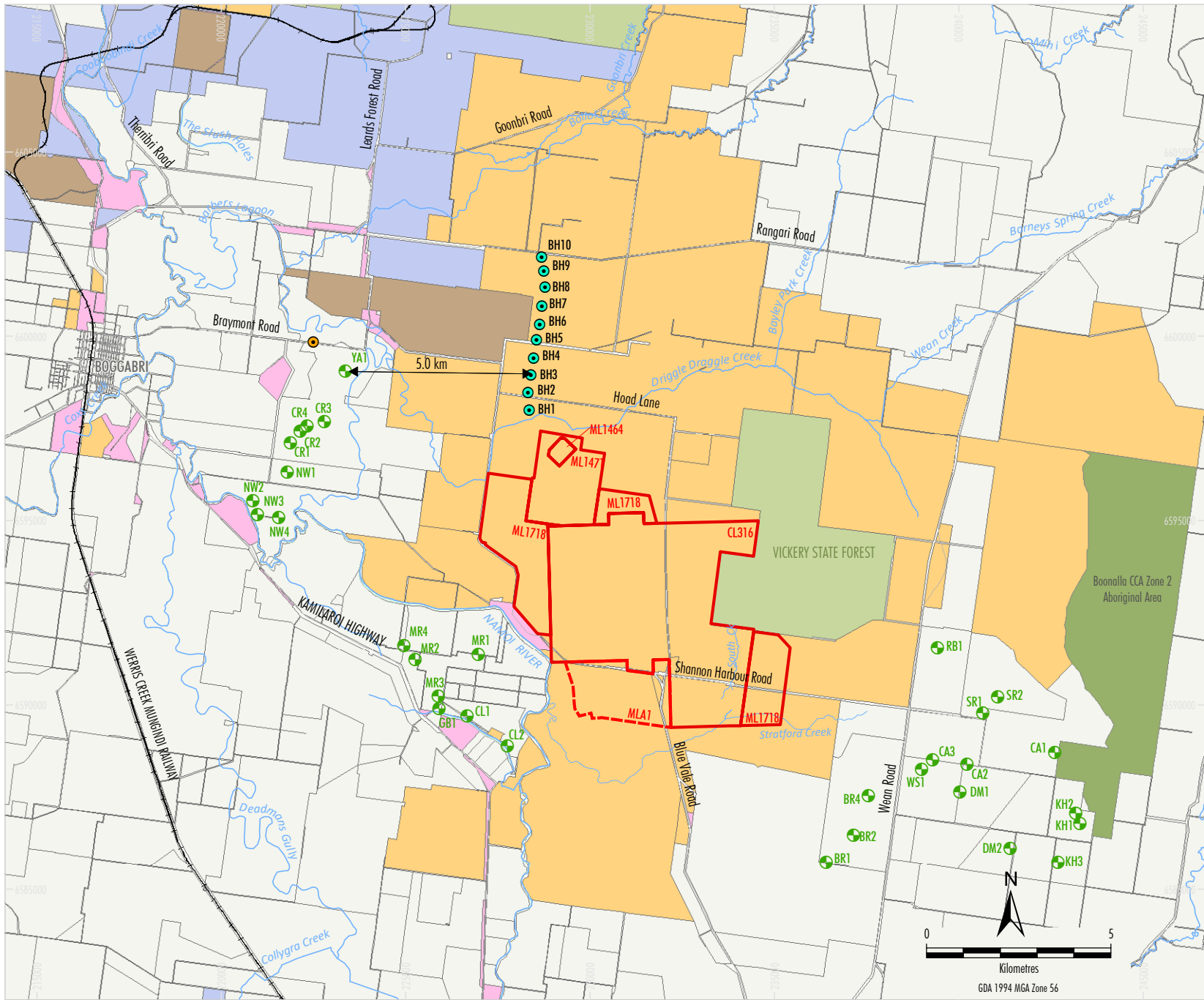
Figures 2a and 2b depict cross-sections of the indicative water table for Scenarios 1 and 2, respectively.

It is noted that both Scenario 1 and 2 are conservative as they involve a rate of extraction far in excess of Whitehaven’s existing WALs for Zone 4 (600 ML per annum or more, versus 396 unit shares for WALs currently held for the Project), and the predicted maximum requirement of water sourced from the borefield in the site water balance (up to 390 ML in any given year).

The assessment in Table 1 demonstrates the Project bores would comply with the criteria for “confined/semi-confined” aquifers in the *Water Resource Plans Fact Sheet - Assessing Groundwater Applications*. It is noted that the Australian Government Bioregional Assessment for the Lower Gyndir Alluvium describes the Gunnedah Formation (which the Project bores would be screened in) as follows¹:

*Groundwater in the more productive, deeper (35 to 80 m) groundwater system of the **Gunnedah Formation is confined to semi-confined.***

¹ <https://www.bioregionalassessments.gov.au/assessments/11-context-statement-gwydir-subregion/1142-groundwater-levels-and-flow>



LEGEND

- Mining Tenement Boundary (ML and CL)
- Mining Lease Application (MLA)
- Railway
- State Conservation Area, Aboriginal Area
- State Forest
- Crown Land
- Whitehaven Owned Land
- Whitehaven/Idemitsu Boggabri Coal Joint Owned Land
- Idemitsu Boggabri Coal Owned Land
- Privately Owned Land and Other Land
- Privately Owned
- Proposed Bore
- Boggabri Town Water Supply Bore

Source: Department of Land and Property Information - Land Tenure (2016); Department of Industry (2016); Whitehaven (2016)



VICKERY EXTENSION PROJECT
Existing Privately Owned Bores
and Proposed Bore Locations

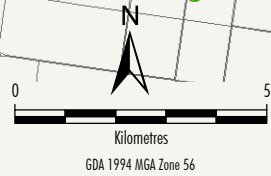
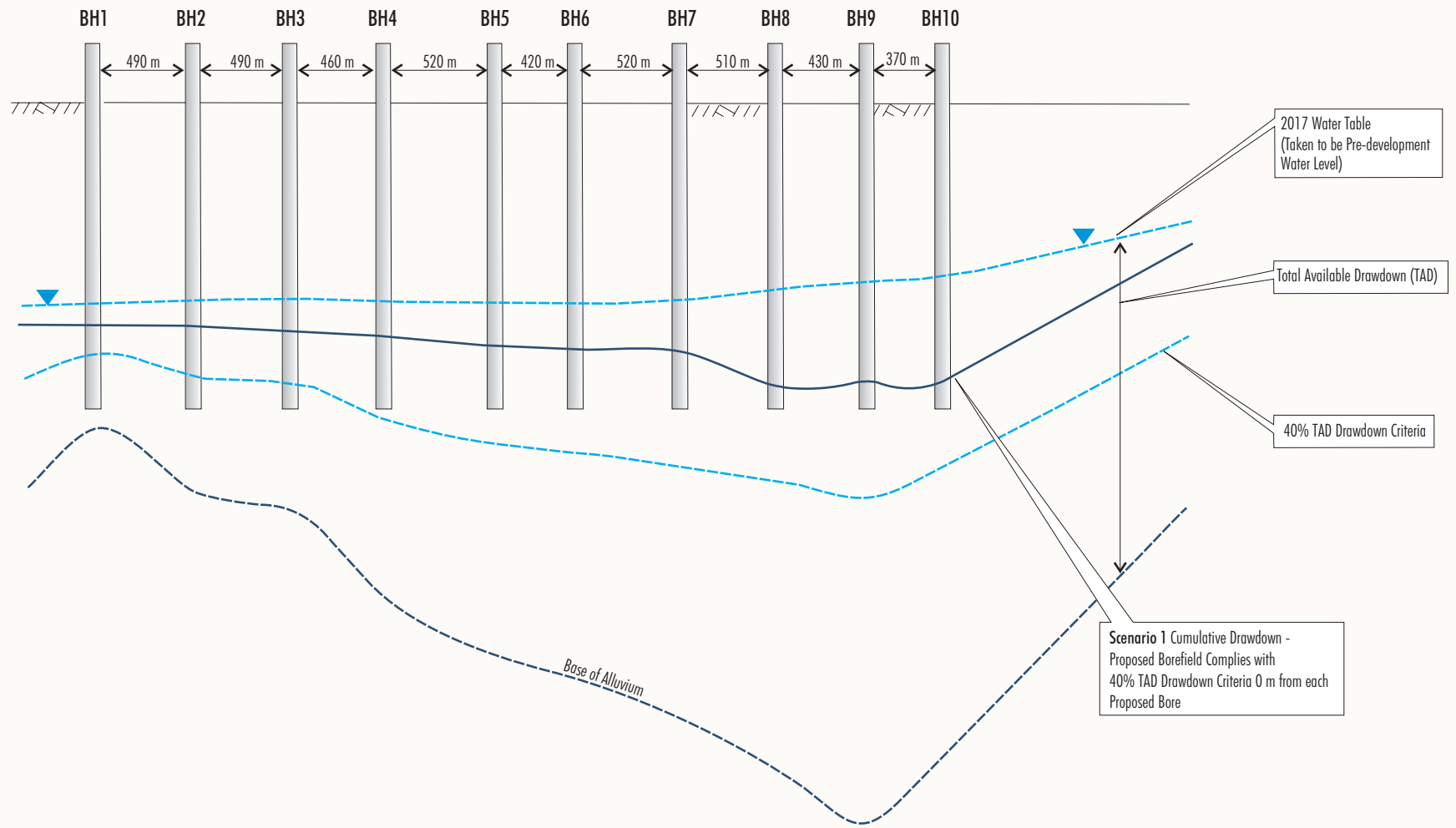
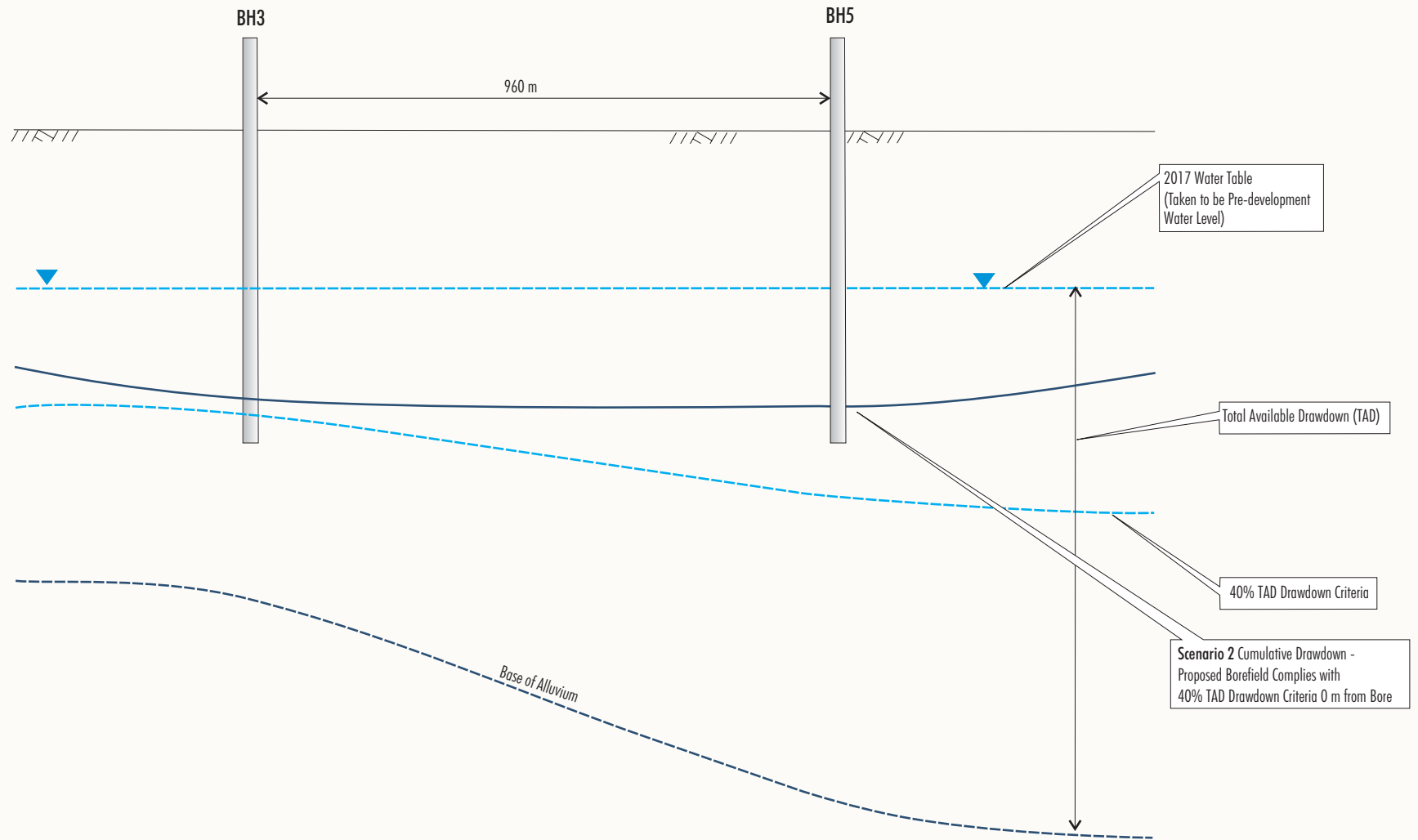


Figure 1



Not to Scale



Not to Scale

Table 1
Vickery Groundwater Bore Field – Assessment against Fact Sheet Acceptable Levels of Impact

Groundwater Source	Impact Category	Groundwater Criteria	Response	Criteria Satisfied
Alluvial groundwater sources	Confined or semi-confined aquifer	1. <i>A cumulative drawdown of not more than 40% of the pre-development TAD above the base of the water source distance of 200 metres from any water supply works including the pumping bores</i>	The maximum drawdown does not exceed the 40% TAD threshold at 0 m from the proposed bore sites for either Scenario 1 or Scenario 2 (refer to Tables 1 and 2). Therefore, the 40% TAD threshold criteria will not be exceeded at a distance of 200 m.	✓
		2. <i>An additional drawdown of not more than 10% of the pre-development TAD above base of the water source to a maximum of 3 metres at any water supply works (excluding those on the same property), subject to negotiation with impacted parties</i>	The 10% TAD at the closest proximal privately-owned bore (YA1) is greater than 3 m and therefore the drawdown has been assessed against the 3 m criterion. For both Scenario 1 and Scenario 2 the maximum predicted drawdown at the closest proximal privately-owned bore YA1 is less than 0.2 m. Therefore, drawdown at privately owned bores within the vicinity of the proposed borefield will not be more than the 3 m drawdown criterion.	✓

Table 2
Scenario 1 – Predicted Cumulative Groundwater Drawdown

Bore Number	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8	BH9	BH10
Eastings	228356	228320	228405	228473	228554	228638	228700	228782	228753	228693
Northings	659800	659847	659895	659940	659990	660032	660082	660133	660177	660214
Total Available Drawdown (TAD)										
Base of Alluvium (mAHD)	223.7	217.4	215.5	207.2	202.3	200	196.3	191.2	186.3	192.6
Pre-development Water Level (mAHD)	235.6	235.9	236.1	235.9	235.6	235.7	236.0	237.1	237.8	238.3
TAD (m)	11.9	18.5	20.6	28.7	33.3	35.7	39.7	45.9	51.5	45.7
40% TAD (m)	4.8	7.4	8.2	11.5	13.3	14.3	15.9	18.4	20.6	18.3
Assessment of Predicted Drawdown										
Maximum Drawdown (m) (0 m distance laterally from the Bore)	2.3	2.6	3.2	3.6	4	4.4	4.9	9.4	9.6	10
Maximum Drawdown less than 40% TAD?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 3
Scenario 2 – Predicted Cumulative Groundwater Drawdown

Bore Number	BH3	BH5
Eastings	228405	228554
Northings	659895	659990
Total Available Drawdown (TAD)		
Base of Alluvium (mAHD)	215.5	202.3
Pre-development Water Level (mAHD)	236.1	235.6
TAD (m)	20.6	33.3
40% TAD (m)	8.2	13.3
Assessment of Predicted Drawdown		
Maximum Drawdown (m) at 0 m from the Bore	7.3	7.3
Maximum Drawdown less than 40% TAD?	✓	✓

RECOMMENDATION: The proponent should review the size of their proposed sediment dams to ensure they satisfy an exclusion from holding water entitlement in the Harvestable Right Zone noting the exclusion in Schedule 1(3) of the Water Management Regulation 2018 requires dams to be designed consistent with best management practice.

Whitehaven accepts this recommendation. Sediment dams would be sized and built in accordance with best management practice. The details of this would be confirmed in any Water Management Plan for the Project.

RECOMMENDATION: Relevant approvals and licences under the Water Management Act 2000 must be obtained before commencing any works which intercept or extract groundwater or surface water, including incidental or induced take from adjacent groundwater sources.

Whitehaven accepts this recommendation.

RECOMMENDATION: With respect to the stockpile -

- **The proponent is required to map the proposed stockpile locations in relation to the alluvial boundaries. Figure 3 in the RTS must be updated with this information.**
- **The proponent is required to address compaction of the alluvium in relation to extent and loss of storage.**
- **The proponent is required to address water quality risks including baseline, lateral extends, duration, risk to receptors to the alluvium as a result of the emplacements that overlie or are adjacent to the alluvium.**
- **The proponent is required to clarify any measure in place to mitigate the risk of the stockpile to the alluvium.**

Please refer to Figure 3 for the alluvial boundaries and the Western Emplacement.

Approximately 202 ha of the proposed waste emplacement will overlap a thin clay-dominated alluvium embayment (approx. 30 m thick) to the north-west of the open cut and adjacent to Canyon Coal Mine (refer attached Figure 3).

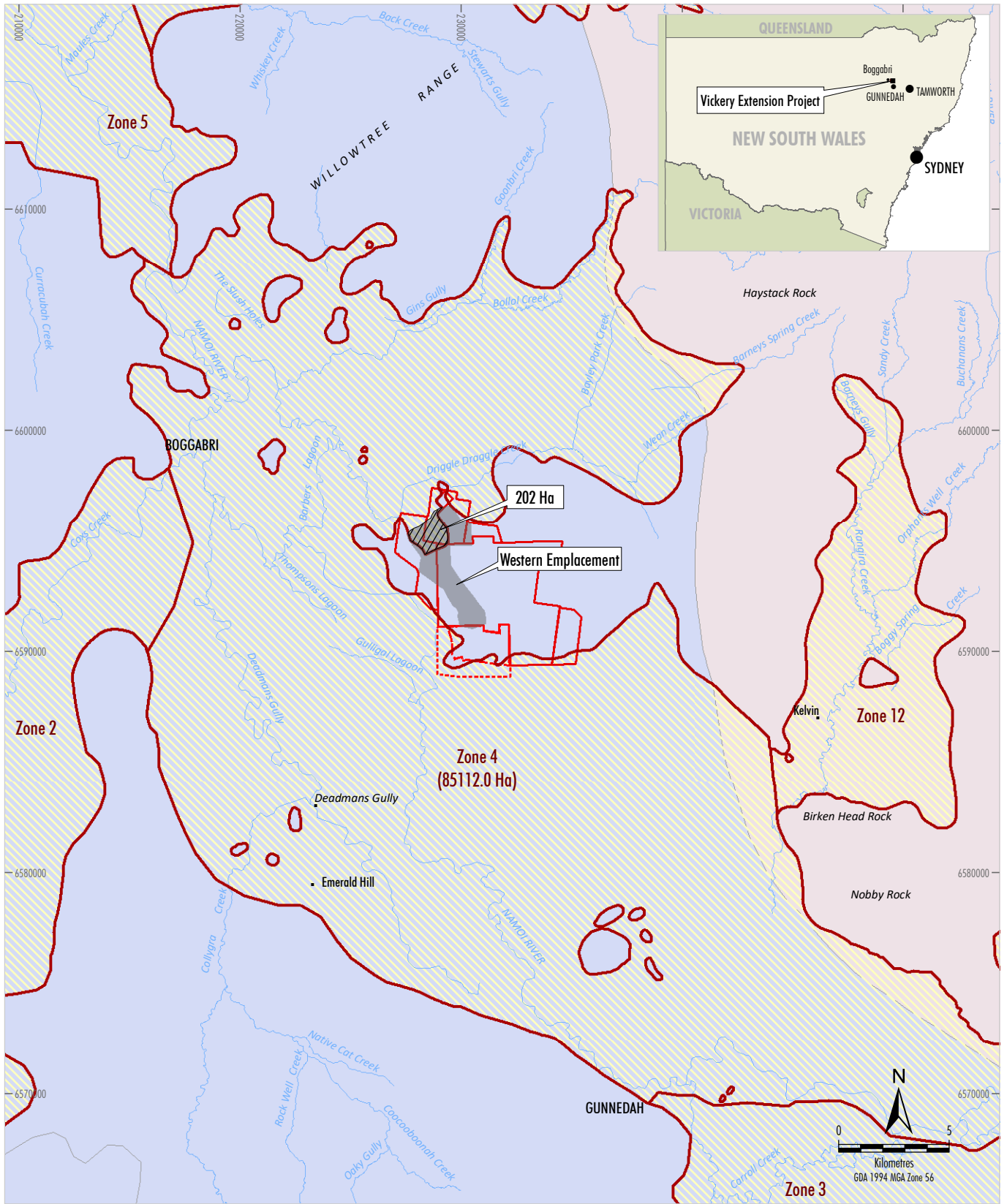
This equates to approximately 0.2% of the total area of the Upper Namoi Zone 4 alluvium groundwater source.

The alluvium that the emplacement would overlap has been impacted by the existing Canyon Coal Mine final void.

Any increase in density of the aquifer, which would be minimal in any event, would occur in the area bordering the Maules Creek Formation and would not have a material effect on the remaining Zone 4 alluvium. Therefore, effects of the overlapping emplacement to regional groundwater storage or flow would be negligible.

The long-term flow of water from the Western Emplacement to the alluvium is restricted by the residual final void, which operates as a strong sink. The Groundwater Assessment (p50) concluded:

...the small amount of seepage from the Western Emplacement will cause no adverse water quality impacts to the alluvium”.



WHC 15-33_ConsultPlan_Nov2019_207A

Source: Geoscience Australia Topographic Base (2006);
NSW Department of Industry (2015); NOW (2011)

WHITEHAVEN COAL
VICKERY EXTENSION PROJECT
Relevant Groundwater Sources

Figure 3

RECOMMENDATION: The proponent is required to identify the presence and volume of potentially acid-forming waste rock, fine-grained amorphous sulphide minerals and coal reject/tailings material and exposure pathways -

- **Present an acid-base mass balance, based on scheduled volumetric rock mixing, and kinetically effective acid-forming potential and acid neutralising capacity of rock materials.**
- **Identify potential exposure pathways for acidity and trace metals.**
- **Discuss conflicting analytical results with consideration of the effect of measurement error on interpretations**

The Geochemistry Assessment was undertaken for the Project (Appendix M of the EIS) to determine the geochemical characteristics of:

- ROM coal;
- coal reject material; and
- overburden/interburden.

The test work (which was based on over 100 samples of material from the Project area) included pH, electrical conductivity (EC), acid base accounting, net acid generation tests, a sodicity assessment, and multi-element enrichment and solubility test work.

Multi-element analysis was undertaken for a total of 29 metals, as well as chlorine and sulfate (refer Tables B-6, B-7 and B-8 of the Geochemistry Assessment). Relatively soluble elements identified in the multi-element analysis informed the water monitoring recommendations.

The Geochemistry Assessment concluded:

The bulk of the overburden and interburden is expected to be relatively barren with no risk of generating acid or saline condition.

A small quantity of overburden, typically identified as non-continuous units adjacent to some coal seams, was identified as containing increased sulfur concentrations but with low acid generating capacity. These materials are anticipated to produce acidic conditions, but only in the unlikely event they are left exposed to the atmosphere for a number of years.

Some interburden material (typically mudstone) was identified as containing increased sulfur concentrations and higher acid generating capacity, which would have the potential to generate acidic conditions in a shorter period of time (within weeks of exposure to the atmosphere). Blending of this material during excavation, transport and dumping is expected to produce an overall NAF material.

To manage any non-benign materials, the EIS commits to the following management measures regarding the placement of material (as per the recommendations of the Geochemistry Assessment and Surface Water Assessment):

- No coal reject material be placed within 30 m of the edge of the Western Emplacement, and coal reject materials be covered with at least 5 m of inert material on the outer surface of the waste rock emplacement.

- Potentially acid forming (PAF) material would not be placed in the final lift of the waste rock emplacement.
- Dewatered reject material would be co-disposed in locations such that runoff and infiltration would report to the mine water management system.

Notwithstanding the conclusions of the Geochemistry Assessment (i.e. the majority of material is benign) and the management commitments described above, potential pathways for acidity and metals to be managed during the Project are related to:

- surface water runoff; and
- groundwater seepage.

The key management for surface water runoff is that “mine water” and “coal contact water” is not proposed to be released for the Project.

The key management for groundwater seepage is that the active open cut and final void would act as groundwater sinks, limiting the potential for the migration of water that has infiltrated the waste emplacement to the surrounding groundwater system.

In addition, and consistent with the recommendations of the Geochemistry Assessment, a range of analytes will be included in the Project water quality monitoring network to confirm material handling management practices are effective:

- **Groundwater quality** monitoring for bores installed in the waste rock emplacement: pH, dissolved oxygen, Electrical Conductivity (EC), total dissolved solids (TDS), iron, aluminium, arsenic, magnesium, molybdenum, selenium, calcium, sodium, chloride and sulphate.
- **Water quality** in sediment dams capturing runoff from the waste emplacement: pH, EC, total alkalinity/acidity, sulphate, aluminium, arsenic, molybdenum and selenium (in addition to total suspended solids).

Details of the above were provided to the Independent Planning Commission (IPC) at a meeting on 25 February 2019. The IPC in its subsequent Issues Report for the Project (emphasis added) stated the proposed monitoring appeared to be adequate:

Based on the Commission’s observations, as listed in paragraphs 131 to 138, and the Additional Material now available, the Commission considers that the Department should give detailed consideration to:

...

- *the commitment of the Applicant to an appropriate water quality monitoring program for water contained in sediment basins and other mine storages. Detail of any such program should include whether it includes a full range of analytes, including those outlined in **paragraph 137**, that will aid in its meeting discharge standards consistently with the quality of target watercourses and, by pre-commencement monitoring, sets up appropriate trigger values for acceptable discharge;*

[Paragraph 137 of the IPC’s Issues Report states]

The Commission considers that the monitoring of groundwater analytes provided by the Applicant at the supplementary meeting, held 25 February 2019, is likely to be adequate for the Department’s purposes.

RECOMMENDATION: As a condition of consent, develop a WMP in consultation with DPIE Water to include ...

Consistent with Development Consent (SSD-5000) for the Approved Mine, Whitehaven expects that any approval for the Project would include the requirement for a WMP.