

LAND COURT OF QUEENSLAND

REGISTRY: Brisbane

NUMBERS: MRA713-13 & EPA714-13

Applicant: **HANCOCK GALILEE PTY LTD (ACN 136381970)**

AND

Objectors: **COAST AND COUNTRY ASSOCIATION OF QUEENSLAND INC & ORS**

AND

Statutory Party: **DEPARTMENT OF ENVIRONMENT AND HERITAGE PROTECTION**

CCAQ CLOSING SUBMISSIONS

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INTRODUCTION

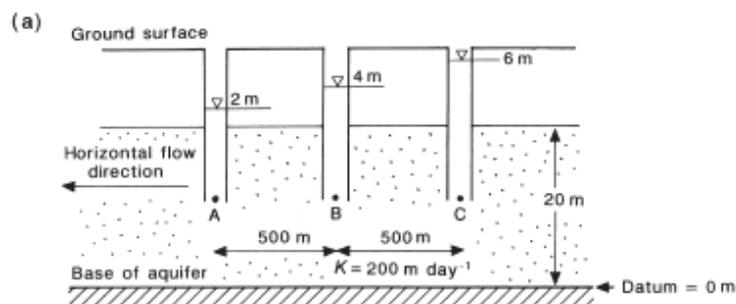
1. The Applicant has applied for a mining lease under the *Mineral Resources Act 1989* (Qld) (**MRA**) and for an environmental authority under the *Environmental Protection Act 1994* (Qld) (**EPA**)¹ for the proposed Kevin's Corner Coal Mine (**the mine**). The mine was declared a coordinated project and underwent the environmental impact statement process under the *State Development and Public Works Organisation Act 1971* (Qld) (**SDPWOA**).
2. Coast and Country Association of Queensland Inc (**CCAQ**) objected to the proposed mine on a number of grounds but these grounds have been narrowed to focus on groundwater impacts and economics.
3. These submissions address the evidence on groundwater and economics first before considering the statutory framework. The submissions on groundwater are divided into two parts:
 - (a) Groundwater – two critical flaws in the Applicant's case; and
 - (b) Groundwater – other issues.
4. The two critical flaws in the Applicant's case discussed in the first part of the submissions on the groundwater evidence are:
 - (a) The hydraulic heads measured by the groundwater monitoring network on the Alpha and Kevin's Corner mine sites show recharge to the D-E sandstone is occurring to the west of the mine along the Great Dividing Range and to the south.
 - (b) The Applicant's groundwater numerical model defies reality:
 - (i) by not including recharge to the D-E sandstone to the west of the mine along the Great Dividing Range and instead applying recharge uniformly across the entire modelled area; and
 - (ii) by assuming infinite water can flow across the southern and northern boundary of the mine.
5. These two critical flaws are addressed first and separately to other groundwater issues for three reasons:
 - (a) to emphasise their importance in the Court's fact finding process;
 - (b) because they involve facts that are not disputed (although the implications of these facts are disputed by the Applicant); and
 - (c) to avoid them being lost in the fog and complexity of other issues such as the mechanism by which recharge is moving through the Rewan formation to reach the D-E sandstone along the Great Dividing Range to the west of the mine.

¹ These submissions are prepared on the basis of the MRA as currently in force but the EPA as in force on 30 March 2013 for the reasons explained at [188] and [189] below.

GROUNDWATER EVIDENCE – TWO CRITICAL FLAWS IN THE APPLICANT’S CASE

The hydraulic heads measured by the groundwater monitoring network on the Alpha and Kevin’s Corner mine sites show recharge to the D-E sandstone is occurring to the west of the mine along the Great Dividing Range and to the south

6. Mr Stewart and Dr Webb agree that the hydraulic heads² measured by the groundwater monitoring network on the Alpha and Kevin’s Corner mine sites show recharge to the D-E sandstone is occurring to the west of the mine along the Great Dividing Range and to the south.
7. The basic hydrogeological concepts and principles and the hydraulic head data from the site establishing these matters are not in dispute.
8. Mr Stewart agreed³ with the explanation given in the textbook by Kevin Hiscock (2005), *Hydrogeology: Principles and Practice*,⁴ of how groundwater flow direction and the hydraulic head gradient is determined from piezometer measurements for horizontal and vertical flow. For example, in the following extract from Figure 2.15 of that book, the observations of groundwater heads decreasing from right to left in the three piezometers installed at the same depth indicates that groundwater flow is moving from right to left down the hydraulic gradient in accordance with Darcy’s Law.⁵



Extract from Figure 2.15 in Exhibit 70 (Hiscock 2005)

9. Mr Stewart also agreed⁶ with the explanation given in Hiscock’s (2005) textbook of the basic principles for drawing flow net diagrams across groundwater contours of equal hydraulic head (or equal piezometric head).

² “Head (or hydraulic head)” is defined in the glossary to Dr Webb’s report (Exhibit 57, p 82), as amended by Dr Webb (at Transcript 5-83, lines 7-13) and agreed by Mr Stewart (at Transcript 3-91, line 9) as:

“The elevation of the water level in a bore/well. Technically it is the potential energy of the groundwater at the screened interval in the bore produced by water pressure at that point, and due to the elevation of the recharge area of the aquifer and the elevation of the screened interval.” (footnote omitted).

³ Commencing at Transcript 3-39 (Mr Stewart XXN).

⁴ Exhibit 70 (Extract from *Hydrogeology: Principles and Practice* by Kevin Hiscock, pp 33-41).

⁵ Darcy’s Law is defined in the glossary to Dr Webb’s report (Exhibit 57, p 79) as (omitting footnotes):

- An empirical law which states that the velocity of flow through *porous* medium is directly proportional to the *hydraulic gradient* assuming that the flow is laminar and inertia can be neglected (after Darcy, 1856).
- An equation that can be used to compute the quantity of water flowing through an *aquifer*.
- The basic law of laminar groundwater flow, which states that flow rate (Q) is equal to the product of the *hydraulic conductivity* (K), the *hydraulic gradient* (i) and the area (A) of aquifer material (perpendicular to the direction of flow) through which flow is taking place. Darcy’s Law is most commonly written: $Q = K \cdot i \cdot A$

⁶ Transcript 3-45, lines 7-29 (Mr Stewart XXN).

10. Mr Stewart agreed⁷ with the rules for constructing a flow net and interpreting flow lines as explained in Hiscock’s (2005) textbook, e.g., that flow lines and equipotential lines should intersect at right angles throughout the groundwater flow system. Hiscock (2005) noted that this is based on the implicit assumption that flow is perpendicular to the lines of equal hydraulic head.⁸



Extract from Box 2.3, p 35, in Exhibit 70 (Hiscock 2005)

11. Mr Stewart agreed⁹ that these basic rules allow the construction of groundwater flow nets across groundwater contours and identification of recharge and discharge areas based on the hydraulic head data for an area, as illustrated in Figure 2.16 of Hiscock (2005):

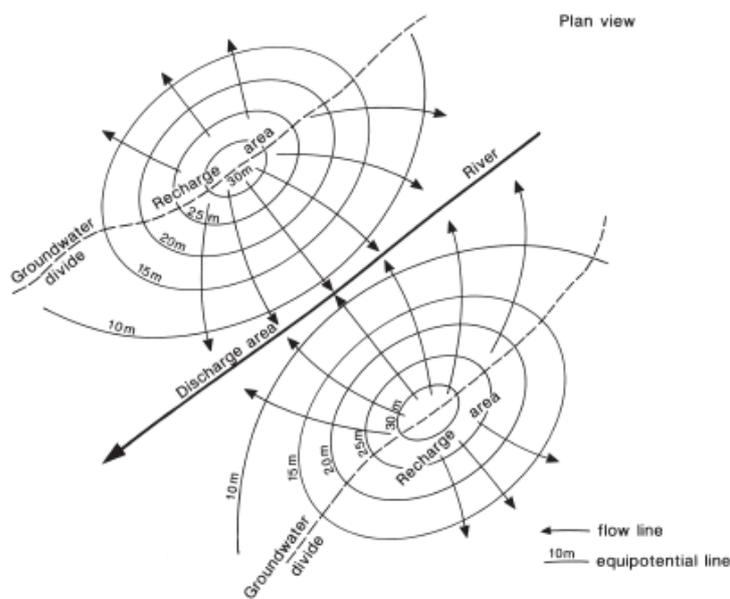


Fig. 2.16 Sketch map of the surface of the water table in an unconfined aquifer showing recharge and discharge areas and the position of groundwater divides.

Figure 2.16 in Exhibit 70 (Hiscock 2005)

12. Mr Stewart agreed that “a lot of work has gone into the piezometer bores across the site” and that the data from the whole array across the site “is really the gold” for a hydrogeologist trying to work out what’s happening on the site.¹⁰
13. The results of the groundwater monitoring across the Alpha and Kevin’s Corner sites were presented in the SEIS Groundwater Report¹¹ and allow the Court to understand this

⁷ Transcript 3-45, lines 30-40 (Mr Stewart XXN).

⁸ Exhibit 70 (Extract from *Hydrogeology: Principles and Practice* by Kevin Hiscock, Box 2.3, p 35).

⁹ Transcript 3-45, lines 30-40 (Mr Stewart XXN).

¹⁰ Transcript 3-44, lines 9-15 (Mr Stewart XXN).

¹¹ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), pp 1875-1883.

important primary data. For instance, Mr Stewart confirmed what is apparent from the hydrographs presented in Figure 4-21 of the SEIS Groundwater Report that the hydraulic heads in bores in the D-E sandstone in bores AVP-11, AVP-13 and AVP-14 are 295, 305 and 304 mAHD respectively.¹²

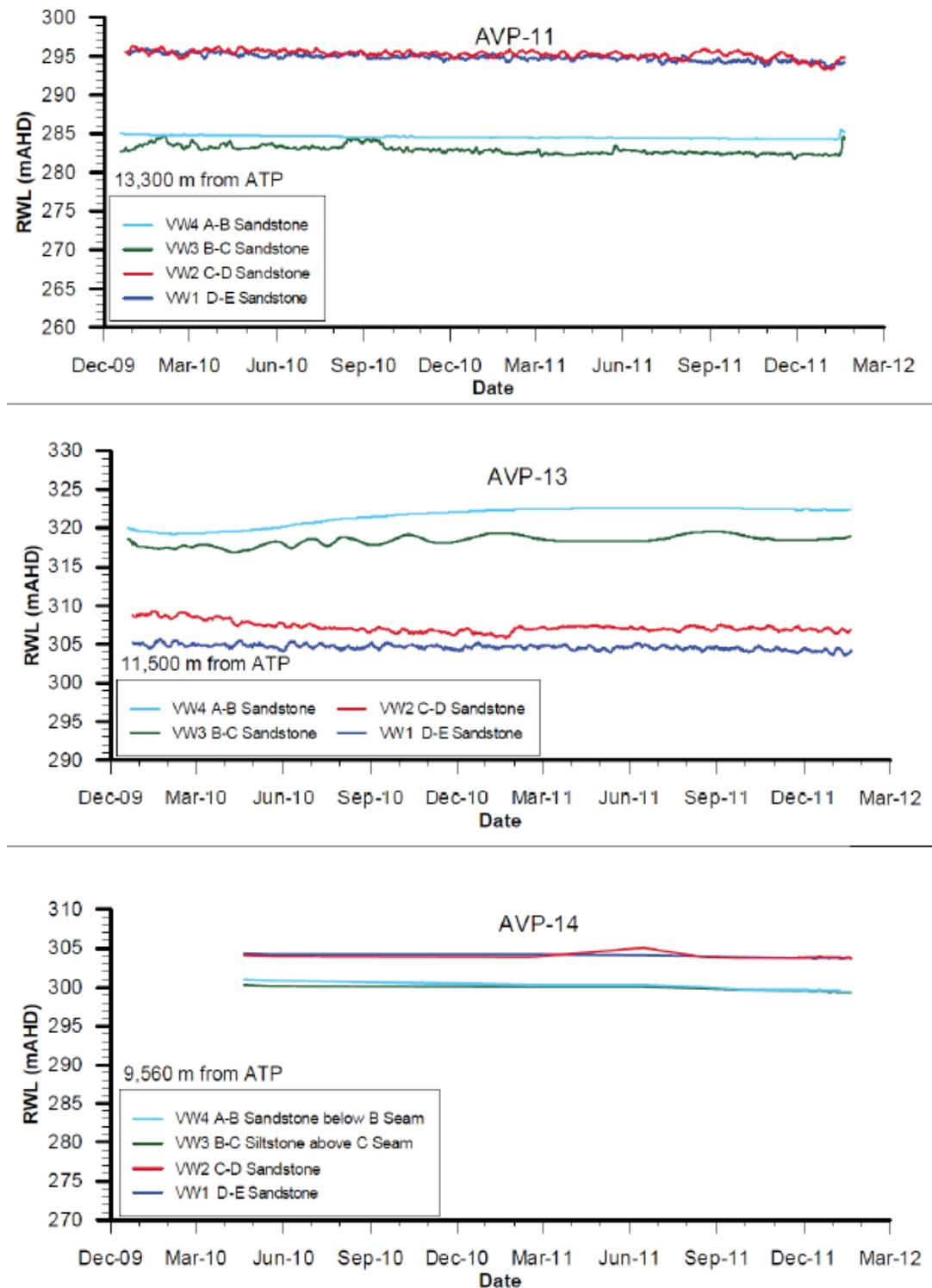


Figure 4-21: Bore hydrographs – AVP-11, AVP-12, AVP-14¹³

¹² Transcript 4-13, line 30 to 4-14, line 10 (Mr Stewart XXN).

¹³ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1878.

14. The Court noted that caution is required in using the data presented in the SEIS Groundwater Report:

“HIS HONOUR: Don’t forget these pages come out of a computer printer and are photocopied. So you can’t be sure as a matter of fact that you’ve got a precisely accurate X and Y axis from the original.”¹⁴

“HIS HONOUR: It’s the measured head that you got Mr Stewart to agree with you about, looking at some computer-generated print-outs that have been photocopied. So you’re imputing a fine degree of accuracy, and I’m not convinced the evidence establishes that that fine degree of accuracy is appropriate. Can you see what I’m saying?”¹⁵

15. These observations are, with respect, undoubtedly correct, however, during re-examination of Mr Stewart the Applicant chose not to present any more accurate bore hydrograph data or to correct any errors that had been made by using the printed versions of the hydrographs. Nor did the Applicant seek an adjournment to be able to do so or call any other witnesses knowledgeable in the data who could correct any errors. The Court can infer from this¹⁶ that such evidence would not have assisted the Applicant in establishing an error in the data or Mr Stewart’s oral evidence. Conversely, the Court can infer that the data for the hydraulic heads in the D-E sandstone presented in the hydrographs is accurate and Mr Stewart’s figures drawn from those hydrographs during cross-examination were also accurate.
16. Using the hydraulic heads in the D-E sandstone shown in the bore hydrographs, Mr Stewart made an “informed estimate [based on his] professional qualifications and experience”¹⁷ to draw by hand the 305 and 304 mAHD groundwater contours across the western and southwestern section of the Alpha lease (Exhibit 79).
17. Mr Stewart used a similar method to draw by hand a revised 300 mAHD groundwater contour on Figure 4-6 of this supplementary report (Exhibit 80).
18. As noted by the Court, a fine degree of accuracy should not be imputed in this exercise.¹⁸
19. However, the basic principles and data are sufficiently clear to establish that the Applicant had omitted to plot the hydraulic head in the D-E sandstone for bore AVP-14 and this omission makes a material difference to the groundwater contours and flow directions in the western and southwestern parts of the Alpha lease area.
20. Rather than groundwater flow coming predominantly from the south and southwest as presented in Figure 4-16 of the SEIS Groundwater Report¹⁹ and Mr Stewart’s Figures 4-6 and 4-10 in his supplementary report,²⁰ inclusion of the data from bore AVP-14 shows, Mr Stewart agreed, that groundwater in the D-E sandstone is flowing “much more from

¹⁴ Transcript 4-14, lines 6-8 (Mr Stewart XXN).

¹⁵ Transcript 4-40, lines 40-45 (Mr Stewart XXN).

¹⁶ Applying the principles in *Commercial Union Assurance Co of Australia Ltd v Ferrcom Pty Ltd* (1991) 22 NSWLR 389 at 418-419 (Handley JA) and *White Industries (Qld) Pty Ltd v Flower & Hart (a firm)* [1998] FCA 806; (1998) 156 ALR 169 at ALR 226-228 (Goldberg J), discussed at paragraph 75 of these submissions.

¹⁷ Transcript 4-43, lines 26-27 (Mr Stewart XXN).

¹⁸ Transcript 4-40, lines 40-45 (Mr Stewart XXN).

¹⁹ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1872.

²⁰ Exhibit 40 (Mr Stewart supplementary report), pp 13 and 21.

the west” at bore AVP-14.²¹ Similarly, Dr Webb responded as follows to a question during evidence-in-chief:

“... how do the changes to the groundwater contours suggested Mr Stewart in exhibits 79 and 80 affect your views?---They reinforce my belief that there’s a significant amount of recharge coming from the west.”²²

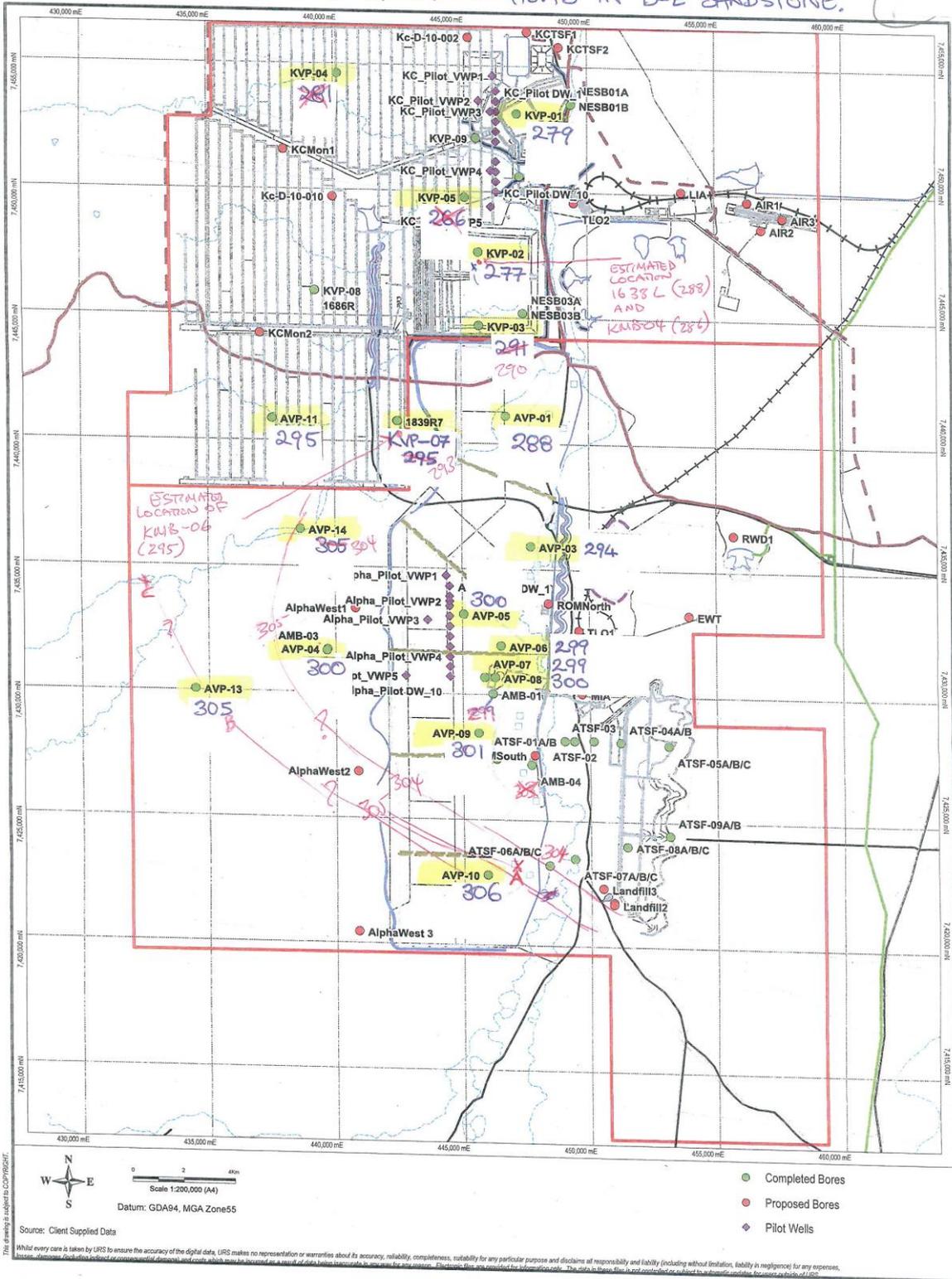
21. Again, during re-examination of Mr Stewart the Applicant chose not to present any more accurate groundwater contours incorporating the hydraulic head from AVP-14 or to correct any errors that had been made by Mr Stewart in drawing the contours by hand. Nor did the Applicant seek an adjournment to be able to do so or call any other witnesses knowledgeable in the data who could correct any errors. Again, the Court can infer from this²³ that such evidence would not have assisted the Applicant in establishing an error in the contours drawn by Mr Stewart in Exhibits 79 and 80.
22. For these reasons, the hydraulic heads measured by the groundwater monitoring network on the Alpha and Kevin’s Corner mine sites show recharge to the D-E is occurring to the west of the mine along the Great Dividing Range and to the south. The very fact that the flow from the west is evident at bore AVP-14 indicates that the recharge from the west must be significant in the context of groundwater flow in the D-E sandstone across the Alpha and Kevin’s Corner sites. This follows from the data and basic principles of flow diagrams discussed above at [9] – [11].

²¹ Transcript 4-58, lines 20-22 (Mr Stewart XXN).

²² Transcript 5-84, lines 39-41 (Dr Webb XN).

²³ Applying the principles in *Commercial Union Assurance Co of Australia Ltd v Ferrcom Pty Ltd* (1991) 22 NSWLR 389 at 418-419 (Handley JA) and *White Industries (Qld) Pty Ltd v Flower & Hart (a firm)* [1998] FCA 806; (1998) 156 ALR 169 at ALR 226–228 (Goldberg J), discussed at paragraph 75 of these submissions.

MAP OF BORES SHOWING HYDRAULIC HEAD IN D-E SANDSTONE.



HANCOCK COAL
PTY LTD

HANCOCK REGIONAL MODEL REFINEMENT

MONITORING BORE
NETWORK

URS

GROUNDWATER

Figure: 1

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Approved: MS

Date: 08-11-2011

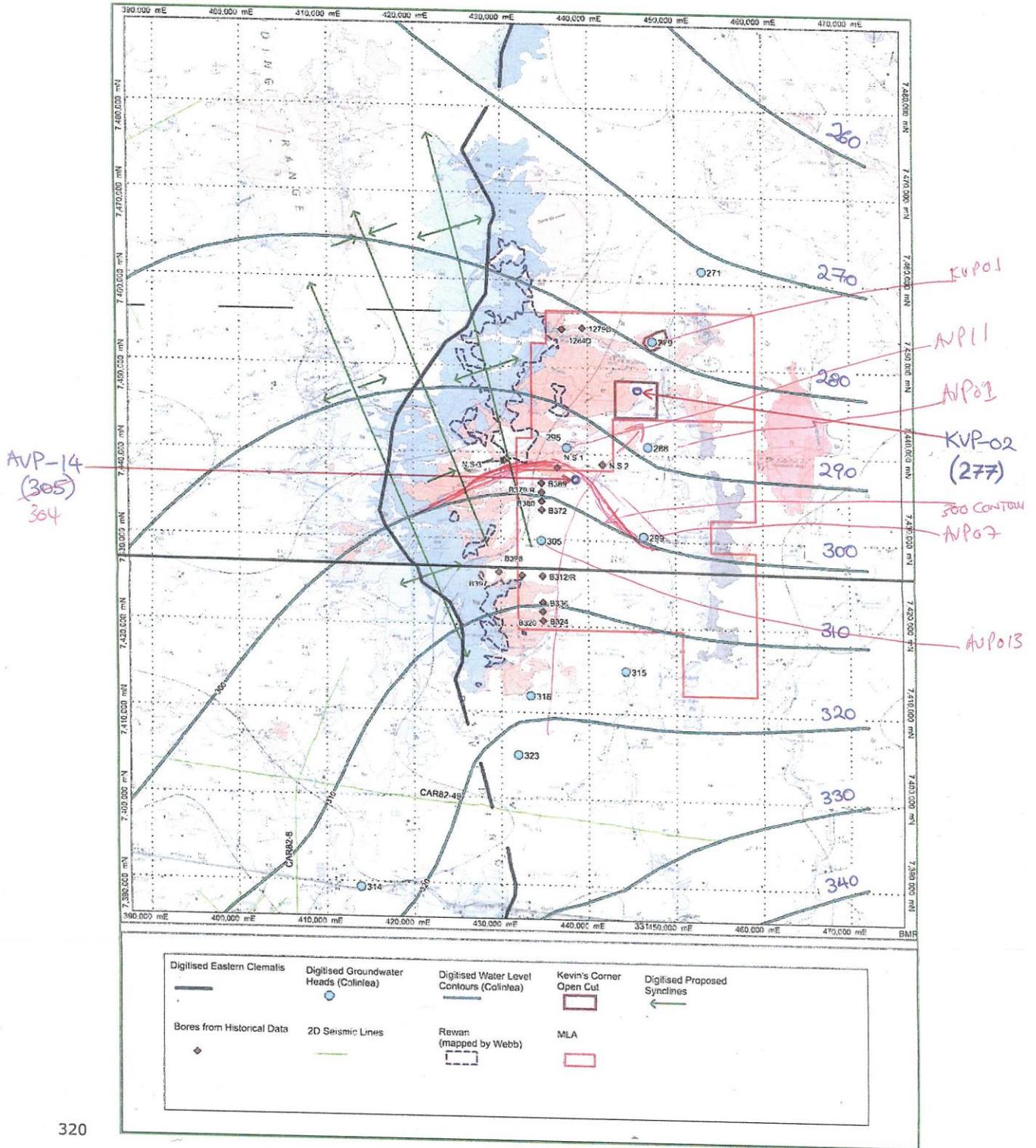
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Exhibit 79: Map of bores showing hydraulic head in D-E sandstone

LOCATIONS OF AVP-14 AND KVP-02 ON FIGURE 4-6 OF SUPPLEMENTARY EXPERT REPORT BY MARK STEWART.

319 Figure 4-6 Rewan Formation data



320

The Applicant's groundwater numerical model defies reality

24. The confusion and inconsistencies in the conceptual hydrological model adopted in the SEIS Groundwater Report and Mr Stewart's later conceptual hydrological model for groundwater flow in the D-E sandstone from the west are discussed later in these submissions.²⁴
25. The primary problems with the model are that the numerical model did not reflect the known reality of recharge to the west of the mine site and adopted an unrealistic boundary condition that allows for an infinite amount of water to flow into or out of the northern boundary.
26. These issues call into question the reliability of the model predictions. Indeed, Mr Stewart accepted that he is only 60% confident in the modelled outcomes over the vast majority of the modelled area (i.e. those areas off the proposed mine lease area).²⁵

Modelled recharge doesn't reflect conceptualisation

27. While the hydraulic heads measured by the groundwater monitoring network on the Alpha and Kevin's Corner mine sites show recharge to the D-E sandstone is occurring to the west of the mine along the Great Dividing Range and to the south,²⁶ the Applicant's groundwater numerical model does not reflect this.
28. The importance of a groundwater numerical model reflecting the conceptual hydrological model and the importance of establishing the correct boundary conditions were not disputed by Mr Stewart. He agreed that groundwater modelling involves two broad steps of developing:
 - (a) a conceptual hydrological model; and
 - (b) a numerical model (computerised model).²⁷
29. The SEIS Groundwater Report stated the recharge and boundary conditions for the numerical model as follows:²⁸

8.4 Recharge

Based on review of available groundwater monitoring data, recharge was only applied to the shallow perched aquifer as there was no correlation observed between rainfall events and groundwater level fluctuations in the deeper Permian layers that comprise the major aquifer systems in the MLA areas.

30. Mr Stewart confirmed in the first joint expert report that recharge was applied uniformly across the entire model:²⁹

Recharge into the model, at a rate of 62.1453 m³/day, was introduced across the model uniformly so as to simulate recharge (regardless of mechanism or locality) occurring over time.

²⁴ Commencing at paragraph [78] of these submissions.

²⁵ Transcript 5-53, lines 6-11 (Mr Stewart XXN).

²⁶ As discussed above at [6] – [22].

²⁷ Transcript 3-48, lines 37-43 (Mr Stewart XXN).

²⁸ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1931.

²⁹ Exhibit 39 (Groundwater JER 1), p 8, para [18].

31. Mr Stewart also confirmed orally that recharge in the model is coming from the top across the entire model area as a uniform top flux boundary.³⁰
32. This included recharge to the Colinlea (D-E) sandstone being applied at a uniform rate within the entire model domain.³¹ He agreed that this was “completely inconsistent with” and “completely contradicts how” he conceptualised recharge in his conceptual hydrological model,³² in which water is flowing predominantly from the south and west of the mine, but relied upon the model calibration process and recharge being a small component of the water balance obtained from the calibration process to justify the approach taken.³³

Model allows infinite flow across the southern and northern boundary

33. The SEIS Groundwater Report stated the recharge and boundary conditions for the numerical model as follows:³⁴

8.5 Boundary and Initial Conditions

The model boundary conditions for the steady state model include:

- *Top flux boundary* comprising recharge and evapotranspiration rates. Recharge was considered insignificant and could be less than 0.1% of mean annual rainfall. All surface water drainages (creeks) are ephemeral and dry through the year except when receiving wet season rainfall runoff. Constant base flow from groundwater is not considered to occur. Any potential groundwater loss to creeks was included through evapotranspiration.
- *No Flow Boundary*: The Great Diving Range forms the model boundary in the west, as it is assumed to comprise a groundwater divide and to act as a groundwater catchment boundary. The water divide was considered as a no-flow boundary for all 11 layers in the model. The Joe Joe Formation aquitards to the east, based on drilling and aquifer hydraulic data, acts as another no-flow boundary for the model with partly no-flow boundary for Layer 1 (overburden) and fully no-flow boundary for Layers 2 to 10.
- *Head Boundaries*: Horizontal inflow/outflow into and out of the model was determined based on specified head boundaries. The head boundaries along the model north and south boundaries were assigned based on the extrapolation of available topographical data. The eastern boundary for Layer 11 (Joe Joe Formation) was also assigned as prescribed head boundary as the Joe Joe Formation / Colinlea Sandstone contact was conceptualised (based on Galilee Basin geology) to extend to the north as there is no mapped geological outcrop.]

34. The selection of correct model boundary conditions is critical. In this regard, Mr Stewart agreed³⁵ with views in the professional groundwater modelling literature expressed by Anderson and Woessner in their 2002 text, *Applied Groundwater Modelling: Simulation of Flow and Advective Transport* (Exhibit 81):

Correct selection of boundary conditions is a critical step in model design. In steady-state simulations, the boundaries largely determine the flow pattern. Boundary conditions influence transient solutions when the effects of the transient stress reach the boundary. In this case, the boundaries must be selected so that the simulated effect is realistic. According to Franke et al. (1987), setting boundary conditions is the step in model design that is most subject to serious error.

³⁰ Transcript 4-82, lines 30-45 (Mr Stewart XXN).

³¹ Transcript 4-86, lines 40-45 (Mr Stewart XXN).

³² Transcript 4-87, lines 1-3 and 4-88, lines 9-11 (Mr Stewart XXN).

³³ Transcript 4-87, lines 1-36 (Mr Stewart XXN).

³⁴ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1931.

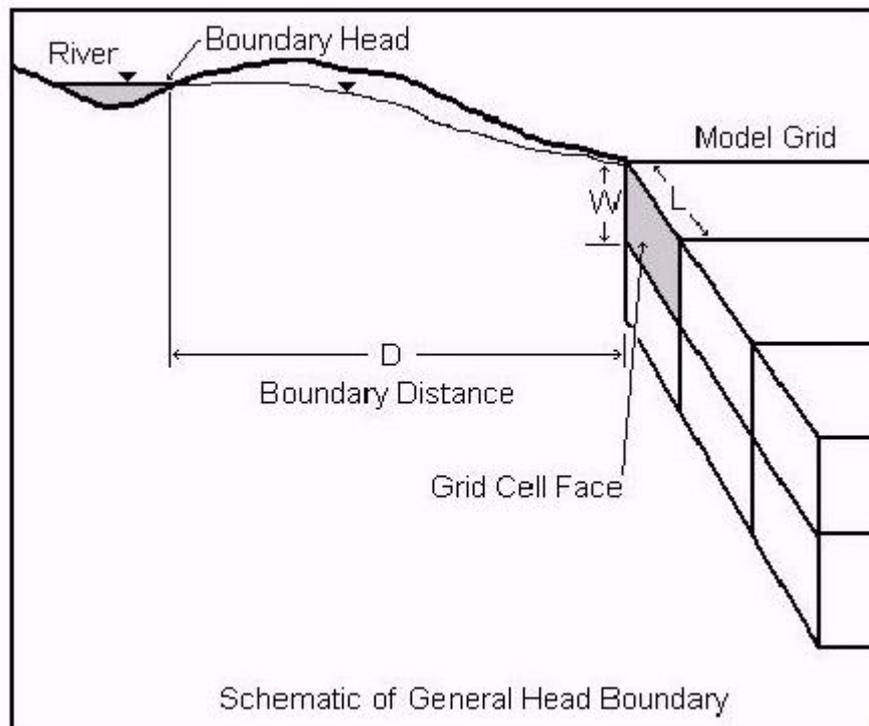
³⁵ Transcript 4-74, line 32 to 4-75, line 2 (Mr Stewart XXN).

35. Mr Stewart explained during cross-examination that the southern and northern boundaries of the numerical groundwater model were set as constant head boundaries within the MODFLOW groundwater modelling software used for the numerical model.³⁶ Such boundary conditions allow infinite water to flow into and out of the model and have a significant influence on the results:

“The Constant Head boundary condition is used to fix the head value in selected grid cells regardless of the system conditions in the surrounding grid cells, thus acting as an infinite source of water entering the system, or as an infinite sink for water leaving the system. Therefore, Constant Head boundary conditions can have a significant influence on the results of a simulation, and may lead to unrealistic predictions, particularly when used in locations close to the area of interest.”³⁷

36. In contrast, the model could have adopted a General Head boundary, which were explained as follows:

“The function of the General-Head Boundary (GHB) Package is mathematically similar to that of the River, Drain, and ET Packages. Flow into or out of a cell from an external source is provided in proportion to the difference between the head in the cell and the reference head assigned to the external source. The application of this boundary condition is intended to be general, as indicated by its name, but the typical application of this boundary conditions is to represent heads in a model that are influenced by a large surface water body outside the model domain with a known water elevation. The purpose of using this boundary condition is to avoid unnecessarily extending the model domain outward to meet the element influencing the head in the model. As a result, the General Head boundary condition is usually assigned along the outside edges of the model domain. This scenario is illustrated in the following figure.



³⁶ Transcript 4-44 to 4-45 (Mr Stewart XXN).

³⁷ Exhibit 82 (Screengrab of MODFLOW help website: Section 4.6 (Boundary Conditions)), which Mr Stewart agreed with at Transcript 4-77, lines 30-45.

The primary differences between the General-Head boundary and the Constant Head boundary are:

- the model solves for the head values in the General-Head grid cells whereas the head values are specified in Constant Head cells.
- the General-Head grid cells do not act as infinite sources of water whereas Constant Head cells can provide an infinite amount of water as required to maintain the specified head. Therefore, under some circumstances, the General-Head grid cells may become dry cells.”³⁸

37. Dr Webb recommended changing the northern boundary to a “decreasing” or “falling” head, which is the equivalent of a General Head boundary in MODFLOW, because such a significant amount of the groundwater flow across the site will be intercepted by the mine.³⁹
38. Water flowing predominantly from the south and west of the mine will be substantially captured by the mining void and lost.⁴⁰ Mr Stewart accepted in cross-examination that the mine will “basically captur[e] everything ... on the eastern side of the Great Dividing Range”.⁴¹ The details and implications of this will be discussed in more detail below.
39. As noted earlier, at [34], the selection of correct model boundary conditions is critical and the step in model design that is most subject to serious error. In such circumstances where the model boundaries do not reflect reality, the model cannot be relied upon to accurately predict impacts.⁴²

GROUNDWATER EVIDENCE – OTHER ISSUES

With few exceptions the groundwater evidence is materially the same as in Alpha

40. Mr Stewart was clear in his evidence that the same model was used for the Alpha and Kevin’s Corner mines, and that all key features including boundaries, groundwater heads and parameters were the same.⁴³ He stated in the first joint expert report that the latest model was the 2012 version presented in the Kevin’s Corner SEIS groundwater report.⁴⁴
41. With a few exceptions addressed in the following sections, the groundwater evidence presented in these proceedings is materially the same as in the *Alpha* case.⁴⁵

³⁸ Exhibit 82 (Screengrab of MODFLOW help website: Section 4.6 (Boundary Conditions)), which Mr Stewart agreed with at Transcript 4-80, line 10 to 4-81, line 35.

³⁹ Exhibit 57 (Dr Webb’s first report), p 14, para [24] and p 33, paras [70]-[72].

⁴⁰ See Exhibit 57 (Dr Webb’s first report), p 33, para [70].

⁴¹ Transcript 4-83, lines 25-35 (Stewart XXN).

⁴² See Exhibit 57 (Dr Webb’s first report), p 33, paras [70]-[72].

⁴³ Transcript 3-57 line 46 to 3-58 line 22 (Stewart XXN).

⁴⁴ Exhibit 39 (Groundwater JER1), p 7 [17]. The Kevin’s Corner SEIS groundwater report is behind Tab 26 in Vol 3 of the EIS Bundle (Exhibit 52.3).

⁴⁵ *Alpha* case [2014] QLC 12 (Smith M).

The final void will intercept the majority of northern flow, such that the northern boundary must inevitably lead to significant underestimation of impacts to the north of Kevin’s Corner

- 42. Dr Webb identified in the Alpha case and in his first expert report that the constant head northern boundary will lead to the underestimation of the mine’s impacts to the north. This is essentially because the mine will intercept the majority of the flow coming from the south of the mine, and the loss of the source of northwards groundwater flow will inevitably result in a drop in the groundwater head to the north of the mine over time.⁴⁶
- 43. Figure 12-6 in the SEIS Groundwater Report⁴⁷ and reproduced in Figure 5-17 in Mr Stewart’s first expert report,⁴⁸ shows the extent of the influence of the final void on the regional groundwater flow patterns 300 years after mining using a constant head northern boundary.

Figure 12-6 Projected groundwater levels in D seam after 300 years

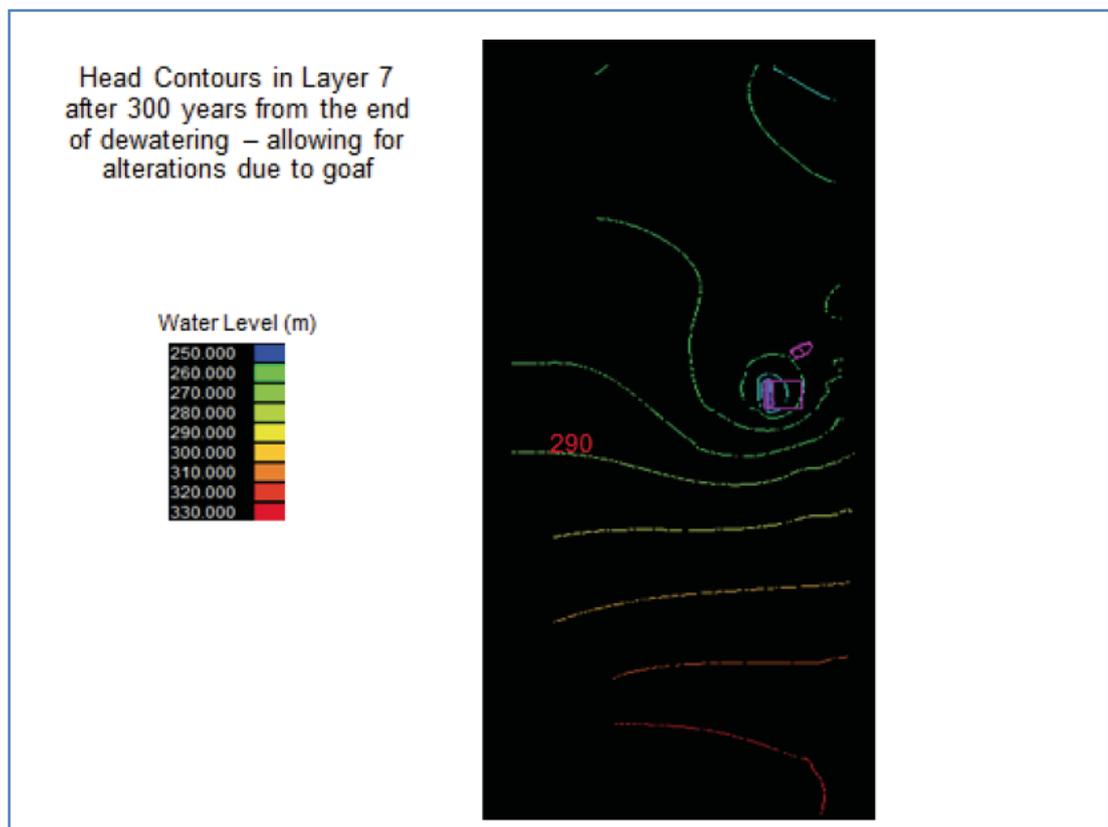


Figure 12-6 in Exhibit 52-3, Tab 26, p 1995 (SEIS Groundwater Report)

- 44. Mr Stewart accepted in cross-examination that a constant head boundary could be an unrealistic assumption:

⁴⁶ See Exhibit 57 (Dr Webb’s first report), p 33, paras [69]-[74].

⁴⁷ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1938.

⁴⁸ Exhibit 38 (Mr Stewart’s First Report), Figure 5-17 (Projected groundwater levels in D seam after 300 years), p 95.

So it could be an unrealistic assumption?---If they were too close – if you found your drawdown was getting too close to that boundary.⁴⁹

45. The Court sought clarification from Mr Stewart in cross-examination about the extent of the drawdown as indicated in Figure 12-6:

So what you're really saying, though, if I read this and allow for those figures, is that the drawdown contours are experiencing drawdown some 40 or 50 kilometres away from the pit site?---So they're influencing the 270 contour – capture the 260 and then further north is the 260 again.

And that's about 50 kilometres away?---And that's near the end of the model domain.

And that's about 50 kilometres away?---Fifty kilometres as you estimate.⁵⁰

46. Mr Stewart gave evidence that the mine would capture 'basically everything' on the eastern side of the Great Dividing Range, which equates to about 7 litres per second (l/s):

The mine is capturing the vast bulk of the water moving in that direction?---The majority of the water is coming out of storage. Yes.

Yes?---But there is a small amount of through flows of the very low groundwater flow velocity.

But you're basically capturing everything - - -?---Capturing the water. Yes.

- - - everything on the eastern side of the Great Dividing Range in the mine?--
-Which equates to about seven litres a second. So it's not a vast amount of water that we're taking out of the system.⁵¹

47. The 7 l/s being removed from the system by the final void equates to 220.752 megalitres (ML) per year.⁵²

48. The simulated mass balance for the steady state model, included at Table 9-4 in the SEIS Groundwater Report⁵³ and reproduced in Table 5-5 in Mr Stewart's first expert report,⁵⁴ provides some figures for ready comparison with the amount of water being taken out of the system.⁵⁵

⁴⁹ Transcript 4-78, lines 27-28 (Stewart XXN).

⁵⁰ Transcript 4-85, lines 30-38 (Stewart XXN).

⁵¹ Transcript 4-83, lines 25-35 (Stewart XXN).

⁵² Based on 31,536,000 seconds in a standard 365 day calendar year.

⁵³ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1938.

⁵⁴ Exhibit 38 (Mr Stewart's First Report), Table 5-5 (Simulated mass balance for the steady state model), p 47. Note that 1m³ of water is equal to 1000 l.

⁵⁵ Note that the volumes given in m³ in Table 9-4 are multiplied by 1000 to give litres and divided by 1000 to give megalitres – 1m³ = 1000 litres.

Table 9-4 Simulated mass balance for the steady-state model

| Budget Component | Annual Groundwater Inflow (m ³) | Annual Groundwater Outflow (m ³) |
|--------------------|---|--|
| Horizontal flow | 175629 | 192369 |
| Recharge | 19149 | 0 |
| Evapotranspiration | 0 | 2613 |
| Total | 194778 | 194982 |
| Discrepancy (%) | -0.1% | |

Table 9-4 in Exhibit 52-3, Tab 26, p 1938 (SEIS Groundwater Report)

49. When compared to the amounts of water flowing into and out of the calibrated steady state model, the 220 MI of water lost from the system annually is in fact:
- (a) more than the 194.778 MI total annual groundwater inflow to the system in the calibrated steady state model;
 - (b) more than the 194.982 MI total annual groundwater outflow from the system in the calibrated steady state model; and
 - (c) more than an order of magnitude greater than 19.149 MI of water added to the calibrated steady state model system in recharge each year.
50. Clearly, if this amount of water is going to be lost from the system each and every year, in perpetuity, the head at the northern boundary must eventually be affected. As such, a constant head northern boundary cannot be justified and will have resulted in the numerical model underestimating the mine's impacts to the north.

Impacts on springs

51. Dr Webb sets out in his first expert report evidence that the Albro Springs and the Degulla Lagoon are likely to be fed from the Permian aquifers, in which case they are likely to be impacted by the mine.⁵⁶
52. Mr Stewart gave evidence that he doesn't know exactly where the groundwater is coming from that is feeding the Albro Springs, and that if the source aquifer for the springs is the Colinlea sandstone, there could be a very quick impact on those springs.⁵⁷
53. Mr Stewart previously held the view, as indicated in the first Groundwater Joint Experts' report,⁵⁸ that the Albro springs located north of the Kevin's Corner Mine are seasonal, not perennial.

⁵⁶ See Exhibit 57 (Dr Webb's first report), p 33, paras [61]-[64].

⁵⁷ Transcript 4-92, lines 8-19 (Stewart XXN).

⁵⁸ Exhibit 52.3 (First Joint Report - Hydrogeology), p12, Lines 300-301.

54. Similar to Mr Stewart's earlier held view, the SEIS Groundwater Report states that there are "no perennial discharge springs mapped to the northeast, thus discharge of confined aquifers has not been recognised within the study area."⁵⁹
55. Mr Stewart subsequently came to accept, as expressed in cross-examination⁶⁰ and in point of agreement number 12 in the first Groundwater Joint Experts' report, that these springs are more likely to be permanent.⁶¹
56. Mr Stewart gave evidence in cross-examination that the model was extended specifically "to include the springs that are north of Kevin's Corner."⁶² However, no further modelling has been done to take account of this perennial discharge and the possibility that they are fed from the Permian aquifers.⁶³
57. As such, the modeling presented in the SEIS Groundwater Report doesn't account for outflows from,⁶⁴ or potential impacts on, the Albro Springs or Degulla Lagoon.

The Applicant omitted relevant data from its groundwater analysis

58. The Applicant emphasised during its opening that the expected groundwater impacts of the mine were assessed through groundwater models that:

... were constructed, according to Mr Stewart, using the collected data, and so incorporate the data that is known for the mine sites, together with other data. They were calibrated – that is checked, in a sense – by reference to the known data ...⁶⁵

59. However, during Mr Stewart's evidence it became apparent that the hydraulic head data from bore AVP-14 was not included in numerous figures purporting to show groundwater flow in the D-E sandstone across the site in both the Alpha and the Kevin's Corner EIS documents, and Mr Stewart's own reports. The hydraulic head level of 304 mAHD for AVP-14 was omitted from the following figures (in chronological order spanning 2011 – 2015):
 - (a) Kevin's Corner EIS (2011), Volume 1, Section 12 (Groundwater), Figure 12-11 (Potentiometric surface map for D-E sands) in Exhibit 51.1 (EIS Bundle, Vol 1, Tab 8), p 445;
 - (b) Hancock's Groundwater Modelling Report for the Alpha Coal Project, dated 28 March 2012, Figure 4-13 (Water Level Monitoring Bores), (Exhibit 75) p 20;
 - (c) Kevin's Corner SEIS, Appendix L (Groundwater Report), dated 18 May 2012, Figure 4-16 (Water Level Data from Monitoring Bores) in Exhibit 52.3 (EIS Bundle, Vol 3, Tab 26), p 1871; and

⁵⁹ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p1887.

⁶⁰ Transcript 4-92, lines 21-22 (Stewart XXN).

⁶¹ Exhibit 52.3 (First Joint Report - Hydrogeology), p11 line 288 to P12 line 301.

⁶² Transcript 4-83, lines 13-14 (Stewart XXN).

⁶³ See [40] above.

⁶⁴ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1938. Note that Table 9-4 does not account for any spring outflows.

⁶⁵ Transcript 1-47, lines 27-30 (Applicant's opening).

(d) Mr Stewart's supplementary report, dated 23 April 2015, Figures 4-6 and 4-10, pp 13 and 21 (Exhibit 40).

60. The first three of these figures are materially identical. Figure 4-16 from the Kevin's Corner SEIS Groundwater Report is reproduced on the following page showing the approximate location of bore AVP-14, which Mr Stewart agreed had a hydraulic head in the D-E sandstone of 304 mAHD.
61. In discussing how the omission occurred in Figure 4-16 of the Kevin's Corner SEIS Groundwater Report, which was dated 18 May 2012,⁶⁶ Mr Stewart noted that the third figure was generated using data from April 2010 and that AVP-14 only became operational in that month.⁶⁷ He agreed, however, that it was an omission not to update this figure with the data from AVP-14 for use in later reports:

Why didn't you update it to include AVP-14?---I don't think it was a conscious thing. We just – as – as the modelling advanced or as the study progressed, we discussed the – the background data and moved forward with the additional data, but I – I acknowledge I didn't regenerate a new contour map.⁶⁸

62. CCAQ notes in relation to this issue that it does not submit that the omission of the AVP-14 bore data from any of these figures was a deliberate attempt to mislead. CCAQ submits that the Court should accept Mr Stewart's statement that the omission "was not a conscious thing."⁶⁹
63. While accepting that the omission was not deliberate, it is troubling that the same omission occurred repeatedly across reports written in 2011, 2012 and in Mr Stewart's supplementary report to the Court, dated 23 April 2015. In relation to this document, Mr Stewart admitted that the figures of groundwater flow did not include the data from AVP-14:

DR MCGRATH ... Mr Stewart, your contours are drawn excluding relevant data points, aren't they?---That's correct.⁷⁰

64. Mr Stewart admitted that if the groundwater contours presented in the SEIS and his reports had been done using all available data, they would have been materially different:

[DR MCGRATH] ... But if you actually include all of the data points that you have for the mining lease area for the heads, particularly AVP-14, then these contours are wrong, aren't they?---Just the 300 one, yes.

Just the 300, but that's – if it's showing flow coming in from the west, that's exactly where Dr Webb says there's recharge areas, doesn't he?---His recharge areas are along the west, north and south of the 300 contour.⁷¹

⁶⁶ Kevin's Corner SEIS (dated 18 May 2012), Appendix L (Groundwater Report), Figure 4-16 (Water Level Data from Monitoring Bores) in Exhibit 52.3 (EIS Bundle, Vol 3, Tab 26), p 1871.

⁶⁷ Transcript 4-49, lines 20 to 40.

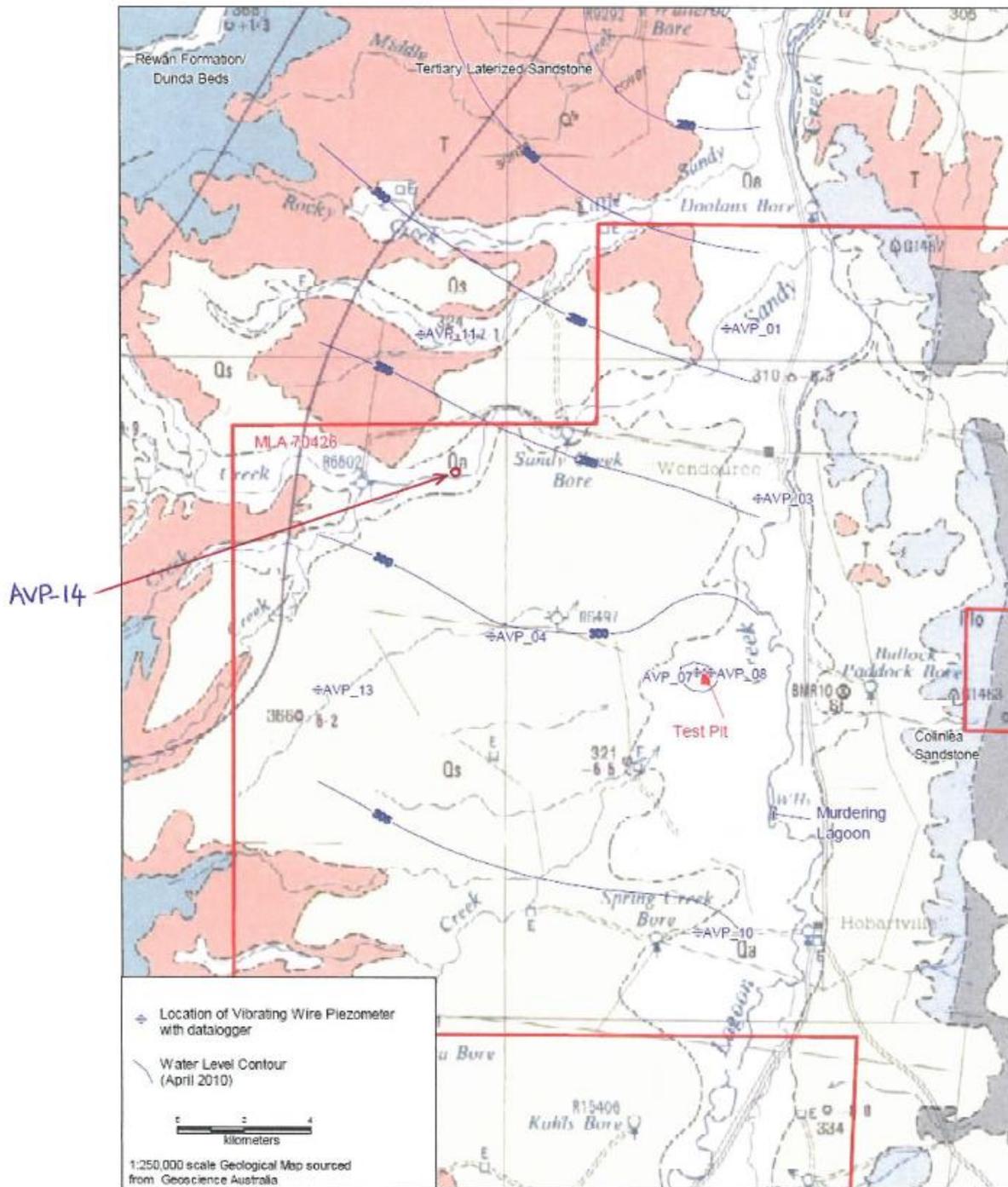
⁶⁸ Transcript 4-51, lines 32 to 35.

⁶⁹ Transcript 4-51, lines 32 to 33.

⁷⁰ Transcript 4-63, lines 11-12 (Mr Stewart XXN).

⁷¹ Transcript 4-58, lines 30-35 (Mr Stewart XXN).

Figure 4-16 Water Level Data from Monitoring Bores



Location of bore AVP-15 on Figure 4-16 of the Kevin’s Corner SEIS Groundwater Report⁷² based on the locations of bores shown in Exhibit 77 (Alpha Monitoring Bore Network) and Exhibit 79 (Map of bores showing hydraulic head in D-E sandstone).

⁷² Kevin’s Corner SEIS, Appendix L (Groundwater Report), dated 18 May 2012, Figure 4-16 (Water Level Data from Monitoring Bores) in Exhibit 52.3 (EIS Bundle, Vol 3, Tab 26), p 1871

65. The omission of the hydraulic head data from AVP-14 in the groundwater flow patterns presented in the SEIS Groundwater Report was not recognised in the Alpha case, although the same omissions appeared in the figures presented in that case, as noted above at paragraph 59.
66. Mr Stewart’s admissions raise troubling questions about the extent to which this data was omitted during the modelling of the expected impacts. The fact that the hydraulic head data from AVP-14 was omitted in numerous figures for groundwater flow presented in the Applicant’s material suggests that is claim that it incorporated the “known data” was incorrect.
67. It may be material that the omission of the hydraulic head data from AVP-14 occurred repeatedly⁷³ when discussing the hydrogeological setting and data in the EIS and SEIS for both the Alpha and Kevin’s Corner mines. This chapter precedes the development of the conceptual hydrological model and the numerical model in both the Alpha and Kevin’s Corner SEIS groundwater reports.⁷⁴ The omission of this data may explain the later choices in the modelling to ignore recharge from the west of the mine.
68. Accepting Mr Stewart’s statement that this omission was “not a conscious thing”⁷⁵ this omission can, logically, be inferred to have influenced the choice of model parameters if the modellers were only viewing the inaccurate flow patterns in the D-E sandstone presented in Figure 4-16 of the SEIS Groundwater Report and similar figures.
69. To repeat Mr Stewart’s statement about the omission:

I don’t think it was a conscious thing. We just – as – as the modelling advanced or as the study progressed, we discussed the – the background data and moved forward with the additional data, but I – I acknowledge I didn’t regenerate a new contour map.⁷⁶

70. The extent to which the omission of the hydraulic head in the D-E sandstone for bore AVP-14 affected the subsequent choices in model parameters is, at best for the Applicant, unclear.

An adverse inference should be drawn against the Applicant for failing to re-examine Mr Stewart in relation to the omission of relevant data during the groundwater analysis

71. Despite Mr Stewart’s rather startling admissions that relevant data from the groundwater monitoring network had been omitted, the Applicant chose not to re-examine him in relation to this matter to:
 - (a) present more accurate (computer generated) bore hydrograph data; or
 - (b) correct any errors that had been made by using the printed versions of the hydrographs;
or

⁷³ In the reports noted above at paragraph 59.

⁷⁴ Exhibits 75 (Alpha SEIS groundwater report) and Exhibit 52.3 (EIS Bundle, Vol 3, Tab 26, Kevin’s Corner SEIS Groundwater Report).

⁷⁵ Transcript 4-51, lines 32 to 35.

⁷⁶ Transcript 4-51, lines 32 to 35.

- (c) correct any errors that had been made by Mr Stewart in drawing the contours by hand; or
 - (d) establish that the data from monitoring bore AVP-14 had been validly excluded due to some error in the equipment or for some other reason; or
 - (e) prove that the absence of the data from monitoring bore AVP-14 in parts of the groundwater analysis had not occurred in other areas; or
 - (f) prove that all relevant data had ultimately been incorporated into the groundwater model and not influenced the choice of model parameters.
72. Mr Storrs, who was called by the Applicant after Mr Stewart in relation to cumulative impacts was listed as the reviewer for the SEIS Groundwater Report.⁷⁷ He was not asked in his evidence-in-chief or re-examination by the Applicant to address the omission of relevant data from the groundwater analysis.
73. Nor did the Applicant seek leave to call another witness, such Daymion Jenkins (URS Geoscience Group Leader), who was listed as the Principal-in-Charge for the SEIS Groundwater Report of which Mr Stewart was the lead author.⁷⁸
74. The Court should infer from the Applicant's decisions not to re-examine Mr Stewart, or to examine Mr Storrs, or to seek leave to call another witness on these issues that their evidence would not have assisted the Applicant's case.
75. In *Commercial Union Assurance Co of Australia Ltd v Ferrcom Pty Ltd* (1991) 22 NSWLR 389 at 418-419, Handley JA drew adverse inferences against a party for failing to examine a witness in chief or in reply on topics that the evidence would have been unfavourable to the party. This approach was adopted by Goldberg J in *White Industries (Qld) Pty Ltd v Flower & Hart (a firm)* [1998] FCA 806; (1998) 156 ALR 169 at ALR 226-228. In that case his Honour drew adverse inferences against witnesses who did not address in their evidence-in-chief issues that they were put on notice of. Both of these cases drew on the well-known principles in *Jones v Dunkel* (1959) 101 CLR 298 that where a party fails to call a witness that is presumed to be favourable, an inference can be drawn that their evidence would not have been favourable

The relevant data excluded by Mr Stewart/Hancock supports Dr Webb's opinion of significant recharge occurring to the D-E sandstone to the west of the proposed mine site.

76. As noted above, Mr Stewart admitted that the data from monitoring bore AVP-14 showed more flow in the D-E sandstone from the west of the mine site, which is consistent with Dr Webb's opinion.⁷⁹
77. Dr Webb expressed the view the changes to the groundwater contours following Mr Stewart's admission that relevant data from AVP-14 had been omitted and resultant changes to the direction of groundwater flow from the west of the mine lease area reinforced his belief that there is a significant amount of recharge coming from the west:

⁷⁷ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p1828.

⁷⁸ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p1828.

⁷⁹ Transcript 4-58, lines 29-31 (Mark Stewart XXN).

... how do the changes to the groundwater contours suggested Mr Stewart in exhibits 79 and 80 affect your views?---They reinforce my belief that there's a significant amount of recharge coming from the west.⁸⁰

The Applicant's conceptual hydrological model was confused and unrealistic, as shown by Mr Stewart's conflicting evidence regarding recharge to the D-E sandstone through the Rewan

78. The confusion in the Applicant's evidence regarding the conceptual hydrogeological model adopted as the basis for the predictive numerical modelling was intertwined with Mr Stewart's conflicting evidence regarding recharge to the D-E sandstone through the Rewan Formation.
79. The importance of the conceptual hydrogeological model was not disputed. As noted earlier, at [28], Mr Stewart agreed that groundwater modelling involves two broad steps of developing:
- (a) a conceptual hydrological model; and
 - (b) a numerical model (computerised model).⁸¹
80. Mr Stewart accepts that it is standard practice to consider stratigraphy and subsequently analyse structural features such as folding or faulting that affect groundwater flow.⁸²
81. Mr Stewart adopted and agreed with the national groundwater modelling guidelines published in 2001 and 2012.⁸³ The 2001 modelling guidelines explain the importance and role of the conceptual hydrological model as follows (emphasis added).⁸⁴

2.4 DEVELOP CONCEPTUAL MODEL

Development of a valid conceptual model is **the most important step** in a computer modelling study.

A conceptual model is a simplified representation of the essential features of the physical hydrogeological system, and its hydrological behaviour, to an adequate degree of detail. **The conceptual model is usually presented graphically as a cross-section or block diagram ..., with supporting documentation outlining in descriptive and quantitative terms the essential system features It forms the foundation upon which the interactive, site-specific model is built, and is itself based on an initial literature review, data collation and hydrogeological interpretation**

While the conceptual model is an idealised summary of the current understanding of catchment conditions, and **the key aspects of how the flow system works**, it is subject to some simplifying assumptions. The assumptions are required partly because a complete reconstruction of the field system is not feasible, and partly because there is rarely sufficient data to completely describe the system in comprehensive detail. However, the conceptual model should be developed using the principle of simplicity (or parsimony), **such that the model is as simple as possible, while retaining sufficient complexity to adequately represent the physical elements of the system, and to reproduce system behaviour.**

⁸⁰ Transcript 5-84, lines 39-41 (Dr Webb XN).

⁸¹ Transcript 3-48, lines 37-43 (Mr Stewart XXN).

⁸² Transcript 3-33, line 32 to 3-34 line 7 (Stewart XXN).

⁸³ Exhibit 38 (Mr Stewart's first expert report), p 105; Transcript 3-49, lines 1-10.

⁸⁴ Exhibit 72 (Murray-Darling Basin Commission (2001) *Groundwater Flow Modelling Guidelines*), s 2.4 at pp 18 – 21.

... In developing an adequate (parsimonious) conceptual model, however, sufficient degrees of freedom must be incorporated to the model features to allow simulation of a broad range of responses. **It must be possible for the model to predict system responses ranging from desired to undesired outcomes. In other words, the model must not be configured or constrained such that it artificially produces a restricted range of prediction outcomes.**

... A conceptual model needs to be developed and documented in the Model Study Plan (refer Section 2.6), and then subject to review by the client, appropriate government agency representatives and the study reviewer (refer Section 7). The review may result in the need to revise or refine the conceptual model prior to the initiation of the model construction and calibration tasks. **Graphics and descriptive text should be used to present the conceptual model**, so that all parties have the opportunity to assess whether it is considered valid and complete for the purposes of the study.

82. The 2012 groundwater modelling guidelines also emphasise the importance of the conceptual hydrological model (emphasis added):

Conceptualisation is a process that provides the basis for model design and communicates how the system works to a wide range of audiences. The conceptual model should be developed collaboratively across relevant disciplines and project stakeholders.

A conceptual (hydrogeological) model is a descriptive representation of a groundwater system that incorporates an interpretation of the geological and hydrological conditions (Anderson and Woessner 1992). **It consolidates the current understanding of the key processes of the groundwater system, including the influence of stresses, and assists in the understanding of possible future changes.**

This chapter outlines the process of developing a conceptual model as a prelude to designing and constructing a model of the groundwater system, which broadly involves using **all existing information** to create an understanding of how the system operates.⁸⁵

83. The Applicant's initial conceptual geological model was adopted from a 2009 report by Salva Resources (Exhibit 74), which showed the strata dipping uniformly to the west:

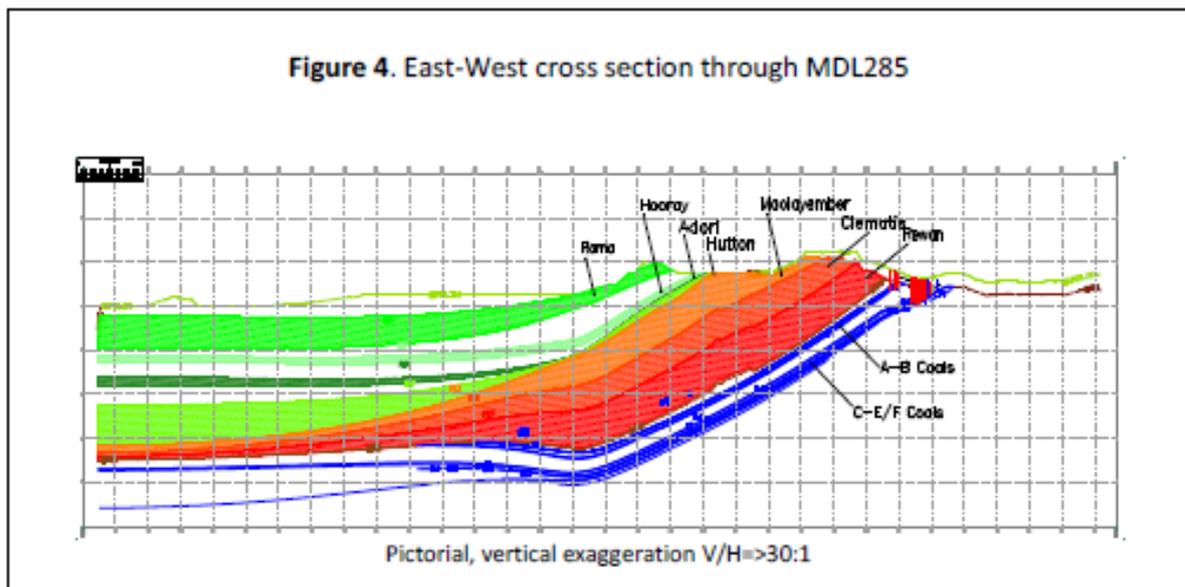


Figure 4 from Salva Resources (2009) (Exhibit 74)

⁸⁵ Exhibit 73 (The Australian Groundwater Modelling Guidelines 2012 by Barnett et al), s 3.1 at pp 24-25.

84. The Salva report warned of a lack of precision and the limited intended use of the conceptual model:

Due to the very large geographical coverage and arrangement of data, the system has been allowed to model with a large degree of freedom. This has resulted in a broadly trending 'regional' scale model. The GAB model is intended for use on the regional basis; high precision work must be carried out on the Alpha and KC resource models.⁸⁶

85. Mr Stewart gave evidence in re-examination that the work referred to above had been carried out⁸⁷ – that is, high precision work on the Alpha and KC **resource models**. There is no evidence that any further work has been conducted on the **conceptual hydrogeological model**, and, as set out above Mr Stewart indeed gave evidence that the 2009 Salva Resources conceptualisation has not been revisited.⁸⁸
86. Despite this warning:
- (a) the 2009 Salva Resources conceptualisation was the basis of the regional geology in the EIS and SEIS reports for both Alpha and Kevin's Corner projects;⁸⁹
 - (b) The 2009 Salva Resources conceptualisation was not reconsidered until Dr Webb raised issues in the Alpha case;⁹⁰ and
 - (c) The stratigraphic conceptualisation has otherwise never been revisited.⁹¹
87. The geological conceptualisation became the basis for the conceptual hydrological model, which was presented in Figure 4-14 in the SEIS Groundwater Report.

⁸⁶ Exhibit 74, page 6.

⁸⁷ Transcript 5-67, lines 31-39 (Stewart XXN).

⁸⁸ Transcript 3-54, line 26 (Stewart XXN).

⁸⁹ Transcript 3-53, lines 7-26 (Stewart XXN).

⁹⁰ Transcript 3-53, lines 33-34 (Stewart XXN).

⁹¹ Transcript 3-54, line 26 (Stewart XXN).

Figure 4-14 Schematic Section through Galilee Basin and GAB

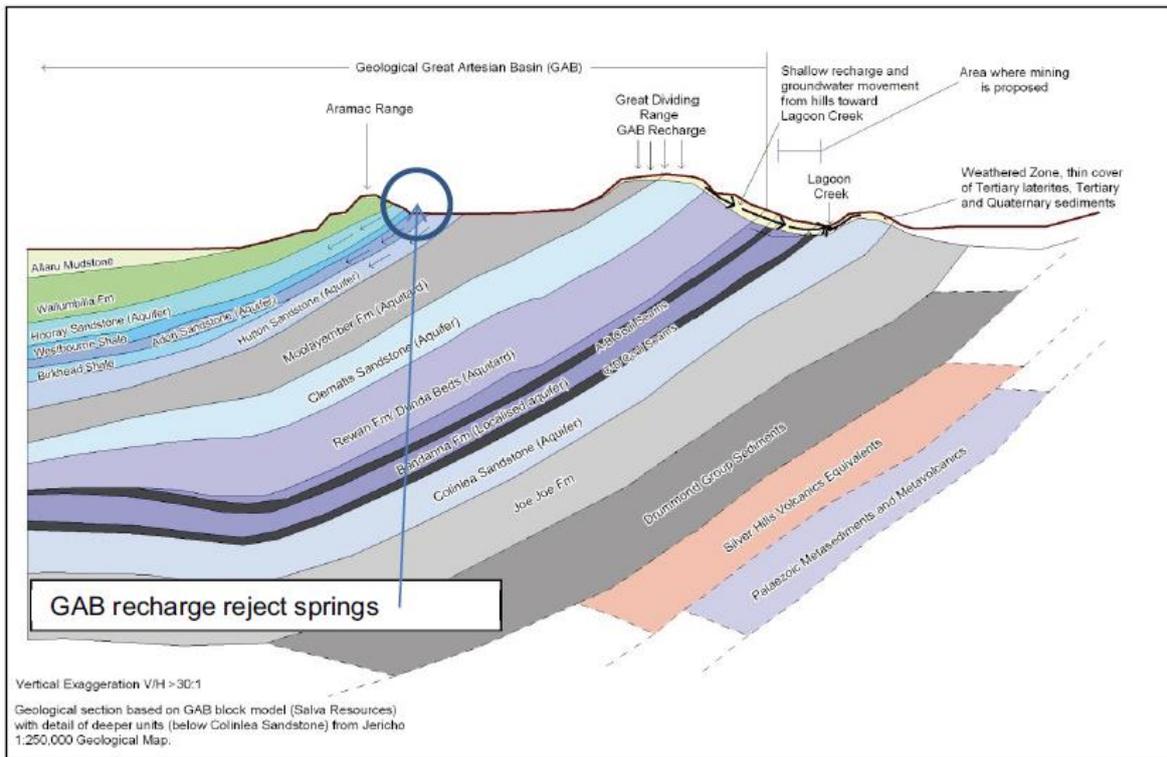


Figure 4-14 in the SEIS Groundwater Report⁹²

88. The text accompanying Figure 4-14 in the SEIS Groundwater Report stated:

The concept of diffuse groundwater recharge within Great Dividing Range to the Colinlea Sediments is presented in Figure 4-14.⁹³

89. It may be noted that Figure 4-14 of the SEIS Groundwater Report did not show a raised potentiometric surface in the D-E sandstone as later came to be depicted in a conceptual hydrological model by Mr Stewart (Exhibit 76).

90. The conceptual hydrological model changed in the evidence given by Mr Stewart. He gave conflicting evidence regarding recharge to the D-E sandstone through the Rewan. He adopted two, contradictory positions.

91. Indeed, Mr Stewart accepted that in this respect his evidence in this case is different from his evidence in the Alpha case.⁹⁴

Position 1: No significant recharge through the Rewan

92. His first position (or conceptual hydrological model) was that there was no recharge, or negligible recharge, or no significant recharge through the Rewan, including on the Great Dividing Range.

⁹² Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p1869.

⁹³ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p1869.

⁹⁴ Transcript 5-15 line 44 to 5-15 line 24 (Stewart XXN).

93. Mr Stewart adopted this position in his evidence in the Alpha Case:

Literature and field data (from the drill stem tests) indicate very low permeability within the Rewan Formation. These data support the URS conceptualisation of the Rewan Formation acting as an aquitard. No site specific data is available to support the theory of significant recharge through the Rewan Formation.⁹⁵

94. Mr Stewart adopted this position in some of his evidence in the current proceedings regarding the Kevin's Corner Mine:

(a) In the SEIS Groundwater Report, of which he was the lead author:

Based on the evaluation it was considered that the dominant recharge mechanism is diffuse recharge along the Great Dividing Range; however, the net effective recharge to the confined Permian aquifers is negligible.⁹⁶

(b) In his supplementary report he stated there is "negligible potential for vertical connectivity across the Rewan".⁹⁷

(c) In answer to questions during cross-examination by Bruce Currie:

MR CURRIE: ... Would you agree that between the Alpha case and this case you've changed your evidence about the ability of the Rewan Formation to transmit water?--- Well, I've always claimed that the Rewan is an aquitard, so it doesn't preclude groundwater flow through, it just inhibits it. So it's a very slow moving system.⁹⁸

(d) He stated in a subsequent answer to another question by Mr Currie:

MR CURRIE: Do you agree in the Alpha case you said there would be no recharge in the Colinlea sandstone through the Rewan Formation?---A very small amount, yes.

But in this – in this, the Kevin's Corner case, you seem to accept that there will be recharge through the Rewan?---That's correct.⁹⁹

Position 2: Small but significant recharge through the Rewan where overlain by Clematis sandstone to maintain a groundwater divide along the Great Dividing Range

95. Mr Stewart adopted a second position (or conceptual hydrological model) that recharge occurs through the Rewan where overlain by Clematis sandstone on the Great Dividing Range and this contributes to a raised potentiometric head in the D-E sandstone causing a groundwater divide along the Great Dividing Range to the West of the proposed mine site:

DR McGRATH: Well, let's just come back to that. You've shown the highest head directly under the range between D and B, haven't you?---Yeah. I've estimated it there, yes.

⁹⁵ Transcript 5-21 lines 29 to 33 (Stewart XXN).

⁹⁶ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p1841.

⁹⁷ Exhibit 40 (Mr Stewart's supplementary report), p 33.

⁹⁸ Transcript 5-8, lines 31-35 (Stewart XXN).

⁹⁹ Transcript 5-9, lines 10-15 (Stewart XXN).

Yes. So that must be where it's getting the most recharge, isn't it?---Yes. Well, in this concept is where there's the vertical groundwater gradient downwards.

Yes. So that most recharge is occurring between D and B to maintain the head that you show in the DE sandstone potentiometric surface?---In this specific area, yes.¹⁰⁰

96. He stated this second position when shown his conceptual hydrological model for the groundwater divide (Exhibit 76), which he had presented in the Alpha case but which he omitted in his evidence in the current proceedings, and the regional groundwater flow patterns presented in Figure 4-10 of this supplementary report.

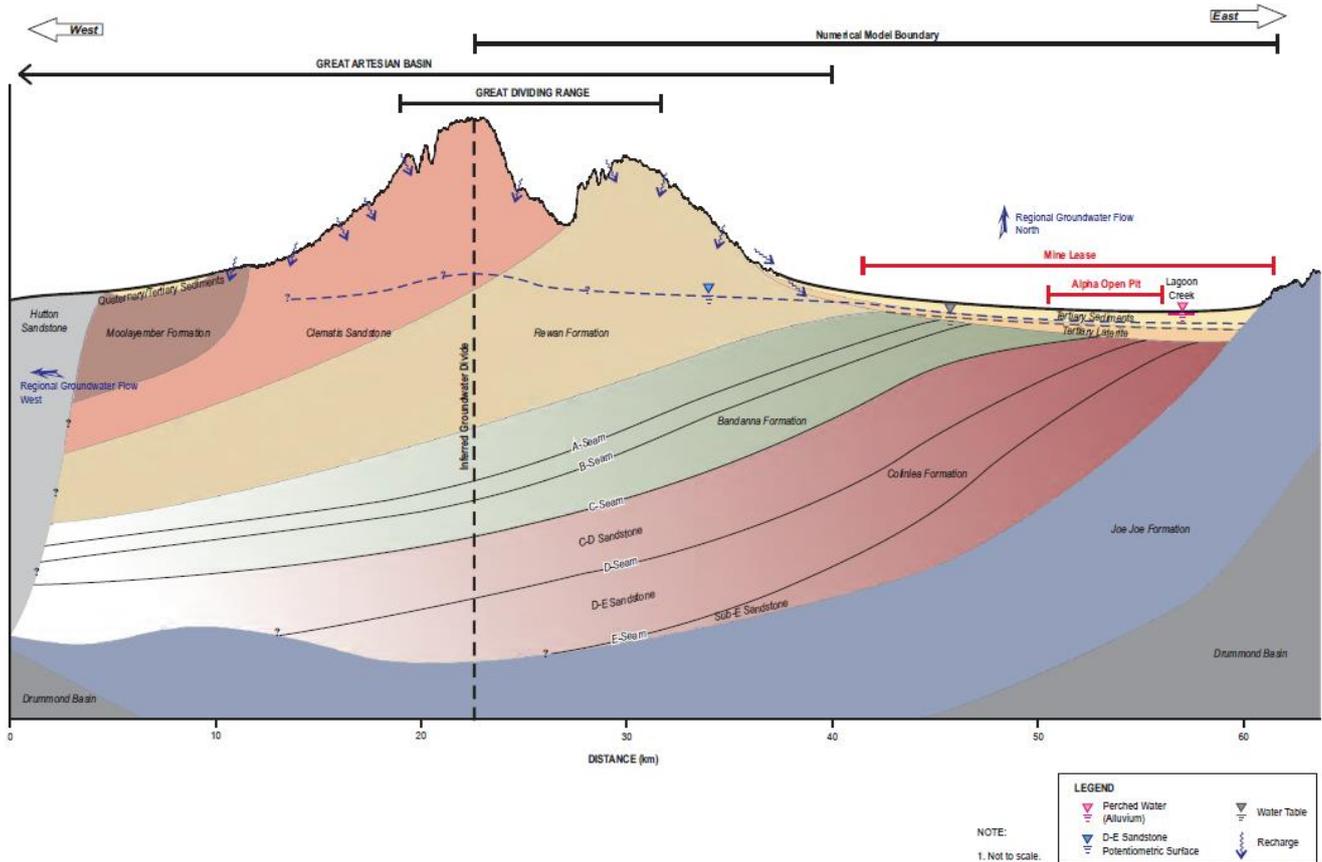


Exhibit 76 (Mr Stewart's conceptual hydrological model of the groundwater divide on the Great Dividing Range in the Alpha trial)

Figure 4-10 Regional groundwater flow and final void

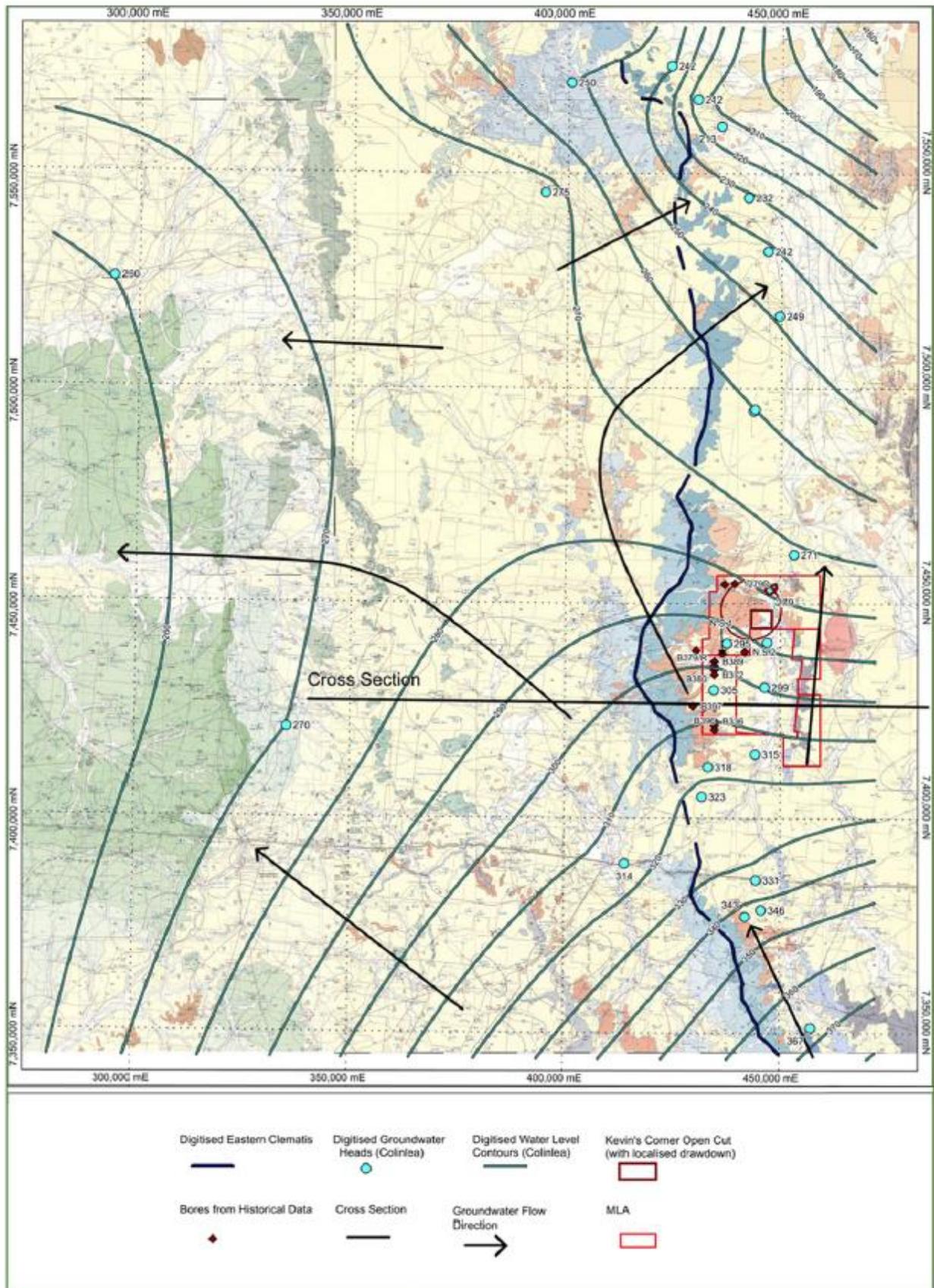


Figure 4-10 from Exhibit 40, p 23 (Mr Stewart's supplementary expert report)

97. While in both positions he states the recharge through the Rewan is, at most, small, in the second position he views it as *significant* because, according to him, it contributes to maintaining the groundwater divide. This is contrary to his first position. The significance of recharge through the Rewan in his second position is evident in his answers to cross-examination with reference to Figure 4-10 in Exhibit 40:

[WITNESS] ... So the groundwater is moving, and there's a divide, so flow is to the north-east and also then to the north-west. And as it occurs in the elevated areas, we're still getting some flow from the south to north, but we're also getting contribution along the dividing range, which we see as that divide.

DR McGRATH: Can I just record that for the transcript. So you just indicated we're still getting recharge along the Great Dividing Range, and that's – you indicated with your finger – essentially the blue area immediately to the west of the mining leases. Up and down at that point was the movement you were making. Was that - - -?---If we take the – yes, the groundwater divide to match the top of the Great Dividing Range - - -

Yes?--- - - - map area, yes.¹⁰¹

98. This second position was sometimes put by Mr Stewart as being a consequence of the vertical gradient.¹⁰² However, the key problem with this as an explanation is expressed by Mr Stewart in his evidence in Alpha:

Considering that the GAB aquifer, the Clematis sandstone aquifer has high permeability relative to the Rewan Formation, groundwater is more likely to flow horizontally within the Clematis sandstone aquifer rather than downward through the Rewan Formation aquitard.¹⁰³

99. The significance that Mr Stewart attributed to the recharge through the Rewan where it is overlain by Clematis was evident in his answer to questions from the Court with reference to Exhibit 76:

[DR McGRATH] ... So there would be the most recharge to the Clematis sandstones - - -

Yes, but - - -

HIS HONOUR: Is that because of its porosity?---That's because of the nature of the unit. So that would have the highest potential head to drive the vertical flow within that groundwater divide. What I'm saying is there's still recharge in the other units but it's much less. And it doesn't affect the head in the DE.

DR McGRATH: But this diagram [Exhibit 76] shows the head is raised in that area and that's what gives you the divide?---That's right, in that area.

Yes, above the main part of the range. That's where you would get the groundwater divide because there's the most recharge in that region?---To the Colinlea, yes.¹⁰⁴

100. There is a contradiction inherent in Mr Stewart's response here, in that he says recharge "doesn't affect the head in the DE", yet he subsequently agrees the location of the

¹⁰¹ Transcript 3-81, lines 5-17 (Stewart XXN). Note: Mr Stewart was describing groundwater flow in the D-E sandstone by reference to Exhibit 40 (Mr Stewart's Supplementary Report), Figure 4-10 (Regional Groundwater Flow and Final Void), p 21.

¹⁰² Transcript 3-83, lines 34-35; 3-93 lines 10-12 (Stewart XXN).

¹⁰³ Transcript 5-17, lines 25-28 (Stewart XXN).

¹⁰⁴ Transcript 3-83, lines 18-32 (Stewart XXN).

groundwater divide in the Colinlea (i.e. the head in the D-E sandstone) is “because there’s the most recharge [to the Colinlea] in that region”.

Mr Stewart made a number of mistakes in the application of important hydrogeological concepts but presented as an honest witness attempting to assist the Court

101. Mr Stewart made a number of mistakes in the application of fundamental hydrogeological concepts:

- (a) He did not draw groundwater flow directions across groundwater contours at right angles to the contours in Figure 4-10 of this supplementary expert report and admitted during cross-examination that this was a mistake on his part.¹⁰⁵
- (b) He confused a raised potentiometric surface as being maintained by weight of mountains above it¹⁰⁶ when “potentiometric surface” is determined, relevantly, by hydraulic head, not weight of non-water above it according to the definition that Mr Stewart accepted,¹⁰⁷ subject to disagreeing that it is an “imaginary line”:

Head (or hydraulic head):

- The elevation of the water level in a bore/well. Technically it is the potential energy of the groundwater at the screened interval in the bore produced by water pressure at that point, and due to the elevation of the recharge area of the aquifer and the elevation of the screened interval.¹⁰⁸

...

potentiometric surface / piezometric surface:

- An imaginary surface representing the static head of *groundwater* and defined by the level to which water will rise in a tightly cased bore/well.

...¹⁰⁹

- (c) He has previously suggested that the groundwater in the Permian strata at the mine site had been there since the rock was formed 250 million years before present.¹¹⁰
- (d) He confused argillaceous and arenaceous,¹¹¹ which are fundamental concepts to the qualities of aquifers and aquitards, and defined in the glossary to Mr Stewart’s first expert report as follows:

ARENACEOUS - A general descriptive term for all coarse to medium grained clastic particulate rocks, such as sand, sandstone, siltstone or conglomerate. Arenites generally behave as aquifers

ARGILLACEOUS - Characteristic of a fine-grained clay-rich rock, e.g. mudstone, shale or marl. Argillites behave as aquitards¹¹²

102. As discussed earlier, at [59]–[61], Mr Stewart also conceded that the hydraulic head data from AVP-14 was not included in numerous figures purporting to show

¹⁰⁵ Transcript 4-67, lines 15-42 (Mr Stewart XXN).

¹⁰⁶ See, e.g., transcript 3-69, lines 30-40 (Mr Stewart XXN).

¹⁰⁷ Transcript 3-89, lines 40-46 (Mr Stewart XXN).

¹⁰⁸ As defined in the glossary to Dr Webb’s report (Exhibit 57, p 82), as amended by Dr Webb (at Transcript 5-83, lines 7-13) and agreed by Mr Stewart (at Transcript 3-91, line 9) (footnote omitted).

¹⁰⁹ As defined in the glossary to Dr Webb’s report (Exhibit 57, p 85), which Mr Stewart accepted at Transcript 3-89, lines 40-46 (Mr Stewart XXN).

¹¹⁰ Transcript 4-90, lines 18-43 (Mr Stewart XXN).

¹¹¹ Transcript 3-60, lines 3-14 (Mr Stewart XXN).

¹¹² Exhibit 38, p118, lines 3181-3184.

groundwater flow in the D-E sandstone across the site in both the Alpha and the Kevin's Corner EIS documents, and Mr Stewart's own reports.

103. CCAQ does not contend that any of these mistakes were anything more than honest errors made in the course of Mr Stewart attempting to assist the Court to the best of his ability. This is similar to the Alpha case where Mr Stewart was found to have made errors but being willing to correct himself.¹¹³
104. The fact that Mr Stewart was an honest witness is evident from the fact that he accepted Dr Webb's hypothesis on the recharge mechanism to the D-E sandstone to the west of the mine was "plausible", as discussed in the following section.

Dr Webb's evidence

Mr Stewart agrees Dr Webb's hypothesis is "plausible"

105. The Applicant's expert, Mr Stewart, agreed that Dr Webb's hypothesis (of subtle folding and fractures in the range to the west of the mine having created recharge areas through the Rewan to the D-E sandstone) is **plausible**. Mr Stewart acknowledged this twice:

- (a) Firstly, on day 3:

And it's a plausible hypothesis, isn't it?---It is, in the case of if you could maintain a fracture that would stay open from the surface all the way to the D.¹¹⁴

- (b) And again the following day:

DR McGRATH: ... You've already said that it's a plausible explanation?---That there could be folding. Yes.

Yes. And - - -?---We don't have hard data in that area.

That's it, of course. We don't have hard data. Dr Webb agrees with that. But it's a plausible explanation for how recharges reaching the Colinlea and coming, then, to the east and onto the mine site?---And explain the - the groundwater flow patterns.

Yes.¹¹⁵

106. This is similar to his evidence in the Alpha case where Mr Stewart was careful on day two of the hearing to comment that he does not say that Dr Webb is wrong as to his hypothesis.¹¹⁶
107. Mr Stewart also acknowledged that there is no drilling data showing the structure of the units to the west of the mine.¹¹⁷ Again, this is consistent with the Alpha case where Mr Stewart was willing to point out that the modelling for groundwater off the minesite is not as rigorous as that which has been done on the minesite.¹¹⁸

¹¹³ *Hancock Coal Pty v Kelly & Ors (No 4)* [2014] QLC 12 at [158]-[164].

¹¹⁴ Transcript 3-84, lines 1-2 (Stewart XXN).

¹¹⁵ Transcript 4-95, line 45 to 4-96, line 6 (Stewart XXN).

¹¹⁶ *Hancock Coal Pty v Kelly & Ors (No 4)* [2014] QLC 12 at [160].

¹¹⁷ Transcript 4-94, line 44 to 4-95, line 3 (Stewart XXN).

¹¹⁸ *Hancock Coal Pty v Kelly & Ors (No 4)* [2014] QLC 12 at [161].

108. Mr Stewart accepted that Dr Webb had used methods in addition to those he had used, and that there was nothing unusual about his methodology.¹¹⁹
109. Mr Stewart also accepted that Dr Webb had:
- (a) considered all the bore data and groundwater head data gather across the site by him and earlier consultants;¹²⁰ and
 - (b) assessed the surficial geology through remote sensing and geophysical evidence, and considered the seismic data.¹²¹

Dr Webb used standard methodology in hydrogeology

110. Mr Stewart accepts that it is standard practice to consider stratigraphy and subsequently analyse structural features such as folding or faulting that affect groundwater flow, as Dr Webb had done.¹²²

Recharge area

111. As noted above, at [99], one of the explanations Mr Stewart gave for recharge to the Colinlea (D-E) sandstone to the west of the mine along the Great Dividing Range was that recharge occurs through the Rewan where it is overlain by Clematis:

[DR McGRATH] ... So there would be the most recharge to the Clematis sandstones - - -

Yes, but - - -

HIS HONOUR: Is that because of its porosity?---That's because of the nature of the unit. So that would have the highest potential head to drive the vertical flow within that groundwater divide. What I'm saying is there's still recharge in the other units but it's much less. And it doesn't affect the head in the DE.

DR McGRATH: But this diagram [Exhibit 76] shows the head is raised in that area and that's what gives you the divide?---That's right, in that area.

Yes, above the main part of the range. That's where you would get the groundwater divide because there's the most recharge in that region?---To the Colinlea, yes.¹²³

112. The area of the Clematis sandstone along the crest of the Great Dividing Range is exactly the same area that Dr Webb states recharge is occurring, although his hypothesis is that subtle folding is necessary to provide a mechanism for “fractures ... to penetrate through the Rewan Formation, which would otherwise act as an aquitard.”¹²⁴
113. Dr Webb became confused in cross-examination about the area he used to calculate the figure of ~400km² for the recharge area of Clematis sandstone to the west of the mine on the Great Dividing Range.

¹¹⁹ Transcript 3-36, lines 16-21 (Stewart XXN).

¹²⁰ Transcript 3-34, lines 28-32 (Stewart XXN).

¹²¹ Transcript 3-34, lines 12-21 (Stewart XXN).

¹²² Transcript 3-33, line 32 to 3-34 line 7 (Stewart XXN).

¹²³ Transcript 3-83, lines 18-32 (Stewart XXN), with reference to Exhibit 76 (Mr Stewart's conceptual hydrological model for the raised potentiometric head in the D-E sandstone to the west of the mine).

¹²⁴ Exhibit 57 (Dr Webb's report), p 26, para [49].

114. Dr Webb explained in his report (Exhibit 57) that this area was calculated as follows:

[49] Instead the main recharge areas for the Bandanna/Colinlea aquifer in the proposed mine area are likely to be along the crest of the Great Dividing Range, where the anticline axes are located ...

[50] Therefore the crests of the anticlines, which define the crest of the Great Dividing Range in this area, probably also mark the westwards limit of recharge to the mine area (Figure 10a). Because there are two anticline axes and two associated areas of broken topography, there are two separate recharge areas, one to the west of the Alpha lease, and one to the west and north of the Kevin's Corner lease. ...

[56] The main recharge areas along the crest of the Great Dividing Range are the areas of broken topography as defined above. These have an area of ~400 km² and would, using a recharge of ~2mm/year, provide recharge of ~780 ML/year. ...

115. During cross-examination, when asked about how the recharge area was calculated, Dr Webb stated:

Now, is – I'm trying to understand the 400 square kilometre figure. Is it broadly the areas to the east of the anticlines which are outlined in figure 10A?--It's – I think the entire northern recharge area and the area to the east of the anticline in the southern recharge area.¹²⁵

...

All right. So just to be clear, the 400 square kilometres you calculated by reference to the whole of the outlined northern recharge area - - -?---Yes.

- - - is that just the red outline or the red and the white outline?---Just the red outline.

All right. And the eastern section, the eastern red outline of the southern recharge area. Is that right?---No. I, in fact, included the entire southern recharge area on the basis that it was along the axis of the anticline.¹²⁶

...

So on that basis, the 400 is an overestimate?---Most likely. It was – it was a very approximate guess and I never pretended anything else.¹²⁷

116. In re-examination Dr Webb confessed he couldn't remember how he calculated the recharge area and was confused when giving his answers on this topic in cross-examination:

DR McGRATH: Dr Webb, leaving aside exactly where the recharge areas are – we can address that in submissions by reference to the scale – the area that you have given of approximately 400 square kilometres, you said it was approximate; has anything arisen from cross-examination that causes you to recalculate the area of the recharge area?---To be frank, I just can't remember how I calculated the 400.

HIS HONOUR: Well, why didn't you - - -?---And that's why I gave - - -

¹²⁵ Transcript 5-96, lines 30-34.

¹²⁶ Transcript 5-96, line 44 to 5-97, line 3.

¹²⁷ Transcript 5-97, lines 30-31.

Why didn't you tell Mr Clothier that?---That's why I gave contradictory answers; I was confused at the time. I apologise, your Honour. I would have to go back to my program and check the values.¹²⁸

117. The scale on Dr Webb's Figure 10 allows the Court to determine for itself that the areas Dr Webb in fact used to calculate the recharge areas.
118. An extract from Figure 10(a) and the scale from Dr Webb's report showing in a dashed white square an area of ~20 km x ~20 km (~400km²) according to the scale is shown on the following page. His statement during cross-examination that he included in the recharge area to calculate the figure of ~400km² "included the entire southern recharge area" cannot be correct as the entire southern recharge area itself is far larger than ~400km². It would appear that the areas Dr Webb used to calculate the figure of ~400km² was in fact the area to the east of the crests of the anticlines, which define the crest of the Great Dividing Range in this area, as explained in paragraph 50 of his report.
119. Dr Webb's forgetfulness on how he calculated the recharge areas is unfortunate but seen in the context that he originally did the calculation in 2013 for the Alpha trial¹²⁹ and this matter is one part of a large, complex task that he has undertaken in preparing his evidence, this is understandable. He should have simply said he couldn't remember exactly how he calculated it during cross-examination.
120. The effect of Dr Webb's forgetfulness is lessened by the fact that, as note above at [99] and [111], at least on one explanation Mr Stewart agrees that recharge to the Colinlea (D-E) sandstone to the west of the mine along the Great Dividing Range occurs through the Rewan where it is overlain by Clematis.¹³⁰ The area of the Clematis sandstone along the crest of the Great Dividing Range is exactly the same area that Dr Webb states recharge is occurring, although by a different mechanism than proposed by Mr Stewart.
121. In contrast to Dr Webb's endeavours to base recharge estimates on the available data, it is noteworthy that Mr Stewart simply disregarded it in his model as negligible.¹³¹
122. Further, Mr Stewart described in re-examination that the recharge applied in the model was determined by the outputs of model calibration, notwithstanding that it is in fact a model input:

That's what I was going to ask. So you have there the budget which identifies the recharge. So can I ask – going back a step - - -?---Yes.

- - - is the recharge in the model something that's an input into the model, or is it something that's an output from the model?---It's an output from the calibration process.

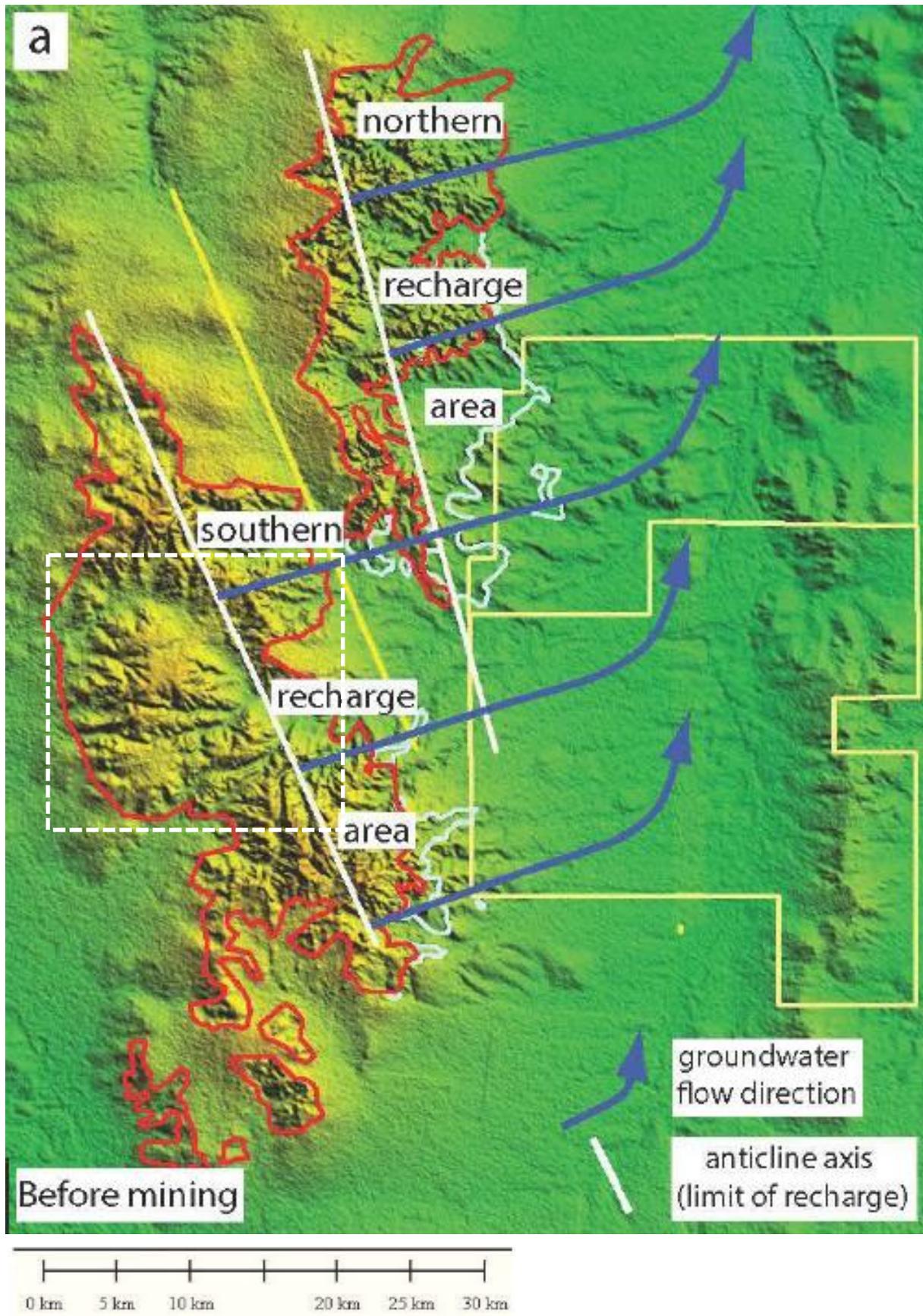
Right?---But it's an input in the model.

¹²⁸ Transcript 6-83, line 45 to 6-84, line 9 (Dr Webb RXN).

¹²⁹ See Exhibit 87 (Dr Webb's report in the Alpha case), p 19, paras [48]-[52].

¹³⁰ Transcript 3-83, lines 18-32 (Mr Stewart XXN), with reference to Exhibit 76 (Mr Stewart's conceptual hydrological model for the raised potentiometric head in the D-E sandstone to the west of the mine).

¹³¹ Exhibit 52.3 (EIS Bundle – Volume 3), Tab 26 (SEIS Groundwater Report), p 1841.



Extract from Figure 10(a) and scale from Dr Webb's report (Exhibit 57, p 31) showing in a dashed white square an area of ~20 km x ~20 km (~400km²) according to the scale.

123. In contrast, chapter 3 of the 2012 groundwater modelling guidelines, which address conceptualisation, state the following with respect to the quantification of recharge:

The data collection and analysis stage of the modelling process involves:

- quantification of any flow processes or stresses (e.g. recharge, abstraction).¹³²

The processes affecting groundwater flow ... in the aquifer will need to be understood and adequately documented in the model reporting process. ...

Additional tasks related to describing the flow processes include:...

- quantifying the components of recharge and discharge to the hydrogeological domain, including all those related to point and diffuse recharge and discharge¹³³

Cross-examination on past errors that were corrected

124. Dr Webb was also cross-examined on a number of past errors he had made over the course of preparing and giving his evidence in the Alpha trial and in these proceedings, namely:

(a) changes to cross-sections:

- (i) eastern syncline shown in Alpha Report doesn't exist;¹³⁴
- (ii) change to adopt non-conformity between Permian and Triassic;¹³⁵
- (iii) removal of eastern synclines and anticlines and omission/misplotting of Wendouree bores and Bridge Oil data – timing & competence;¹³⁶
- (iv) convergence and absence of folding in China First Mine;¹³⁷

(b) changes to his views on recharge:

- (i) Suggested higher recharge of 0.6 to 1.25 % MAP in single page supplementary report in Alpha;¹³⁸
- (ii) Use salinity as a proxy for chloride (Cl) concentrations in chloride mass balance method;¹³⁹
- (iii) criticism of chloride mass balance generally;¹⁴⁰
- (iv) impossibility of recharge being 0.1% of mean annual precipitation;¹⁴¹
- (v) recharge area of ~400km² applied to the chloride mass balance calculations;¹⁴²

¹³² Exhibit 73 (The Australian Groundwater Modelling Guidelines 2012 by Barnett et al), s 3.1 at pp 27.

¹³³ Exhibit 73 (The Australian Groundwater Modelling Guidelines 2012 by Barnett et al), s 3.1 at pp 32.

¹³⁴ Transcript 5-88, line 45 to 5-89, line 6 (Dr Webb XXN).

¹³⁵ Transcript 5-101, line 16 to 5-101, line 25 (Dr Webb XXN).

¹³⁶ Transcript 5-101, line 31 to 5-103, line 32; and 6-10, line 12 to 6-43, line 10 (Dr Webb XXN).

¹³⁷ Transcript 6-47, line 21 to 6-59, line 43 (Dr Webb XXN).

¹³⁸ Transcript 5-91, lines 11-35 (Dr Webb XXN).

¹³⁹ Transcript 5-91, line 37 to 5-93, line 8 (Dr Webb XXN).

¹⁴⁰ Transcript 5-93, lines 10 – 31 (Dr Webb XXN).

¹⁴¹ Transcript 5-94, line 9 to 5-95, line 6 (Dr Webb XXN).

¹⁴² Transcript 5-93, line 33; and 5-95, line 35 to 5-99, line 47 (Dr Webb XXN).

- (vi) accuracy with respect to recharge calculations and overstatement of precision of chloride mass balance method and in recharge area calculation;¹⁴³
 - (c) other issues:
 - (i) changed view regarding the adequacy of the southern boundary;¹⁴⁴
 - (ii) assessment of cumulative impacts of Alpha and Kevin's Corner;¹⁴⁵
 - (iii) rate of recharge through the Rewan and Mark Stewart's calculations;¹⁴⁶
 - (iv) relevance of Carmichael evidence, timing of further meetings with Mark Stewart in this respect;¹⁴⁷
 - (v) similarity between regional flow in Figure adopted in Joint Expert Report for Carmichael Coal Mine case;¹⁴⁸
 - (vi) springs impacts to northwards flow;¹⁴⁹ and
 - (vii) possible filling of the final void, additional information on impacts as mining progresses.¹⁵⁰
125. Many of these errors were addressed in the Alpha case, where the Court found Dr Webb was found wanting in some respects during cross-examination but still accepted his evidence overall.¹⁵¹
126. Dr Webb accepted in cross-examination that a number of his errors would not have been made by a competent hydrogeologist¹⁵² but the standard he applied in accepting this point was that a "competent hydrogeologist" was, "[o]ne that never makes a mistake."¹⁵³
127. That is too high a bar for "competence". It sets perfection from the outset as the test for competence, which is entirely unrealistic in any field let alone the analysis of complex hydrogeological issues where the available information changes and knowledge evolves over time.
128. Dr Webb went on to explain the standards for competence he sets for himself are:
- I do my best never to make a mistake, but I would say that I frequently do, and when they're pointed out, I do my best to correct them.¹⁵⁴
129. That is a realistic standard and the many corrections that Dr Webb made to his views since first becoming involved in the Alpha proceedings in 2013 to the present time show that he applied it to the best of his ability.

¹⁴³ Transcript 6-2, line 25 to 6-10, line 6 (Dr Webb XXN).

¹⁴⁴ Transcript 5-90, lines 41 to 47 (Dr Webb XXN).

¹⁴⁵ Transcript 5-100, line 44 to 5-101, line 11 (Dr Webb XXN).

¹⁴⁶ Transcript 6-43, line 16 to 6-47, line 16 (Dr Webb XXN).

¹⁴⁷ Transcript 6-62, line 10 to 6-65, line 37 (Dr Webb XXN).

¹⁴⁸ Transcript 6-65, line 38 to 6-68, line 32 (Dr Webb XXN).

¹⁴⁹ Transcript 6-68, line 38 to 6-69, line 44 (Dr Webb XXN).

¹⁵⁰ Transcript 6-69, line 46 to 6-71, line 40 (Dr Webb XXN).

¹⁵¹ *Hancock Coal Pty v Kelly & Ors (No 4)* [2014] QLC 12 at [171]-[177].

¹⁵² E.g. Transcript 6-26, lines 30-33; and 6-34, lines 45-46 (Dr Webb XXN).

¹⁵³ Transcript 6-93, lines 15-18 (Dr Webb RXN).

¹⁵⁴ Transcript 6-93, lines 20-22 (Dr Webb RXN).

130. The evolution of Dr Webb’s views as new information became available should be seen as absolutely necessary to both the proper application of the scientific method and the proper discharge of his duties as an expert witness.
131. None of the evidence in this case establishes that the corrections or errors made by Dr Webb materially affect the Court’s findings in *Alpha*. It should further be noted that there were two further groundwater expert witnesses in the *Alpha* case that were not called in the present proceedings.

The Applicant’s conceptual hydrological model does not provide a plausible explanation for groundwater flow patterns on the site and Dr Webb’s hypothesis was simply an attempt to provide a plausible explanation for this

132. Dr Webb was challenged during the Alpha trial that he “did not see [his] role as to put both sides of the story” and he replied:

My role is to come up with a hypothesis that best explains the data available, and in this case, there are two hypotheses, one of which is untenable and the other of which, mine, may be right, but the other hypothesis – the one in the URS report cannot be correct.¹⁵⁵

133. Dr Webb made a similar point repeatedly during cross-examination explaining why he proposed a hypothesis that there must be a recharge area to the west of the mine was the hydraulic head data from the mine site:

I believe there’s clear evidence of recharge along the crest of the range.

Yes. The “discussion above” is the discussion about your calculations based upon 400 square kilometres and salinity, isn’t it?---It was partially based on that. But the evidence – the clear evidence for recharge along the crest of the range is the hydraulic head data.¹⁵⁶

...

So I still think recharge along the Great Dividing Range is significant and it’s demonstrated to be significant by the hydraulic head data.¹⁵⁷

134. Dr Webb was asked in cross-examination if folding in the strata sufficient give a topographic high under the Great Dividing Range to the west of the mine site was a “core component” of his conceptualisation. He replied:

Not really, no. All that’s required – so what the data, the groundwater data show, is that underneath the axis of the Great Dividing Range there’s higher hydraulic heads.

Yes?---And so these higher hydraulic heads indicate enhanced recharge and that enhanced recharge has to be coming through the Rewan information. If the base of the Rewan information is topographically higher, then it makes that enhanced recharge easier to explain but it’s not required for it, no.

It’s not essential. That is, I think in Alpha I asked you the question, if you assume no folding, what might explain the flow of water across these sites and your response

¹⁵⁵ *Hancock Coal Pty v Kelly & Ors (No 4)* [2014] QLC 12 at [175] quoting from the transcript in that case.

¹⁵⁶ Transcript 6-6, lines 27-33.

¹⁵⁷ Transcript 6-9, lines 26-28.

was recharge through the Rewan; is that correct?---There has to be recharge through the Rewan.

Okay. So it's possible to have an explanation which involves recharge through the Rewan without folding?---Correct.

HIS HONOUR: Mr Stewart told us that recharge was very slow. Does that accord with your view?---The recharge may be very slow, but it's sufficient to give you the elevated hydraulic heads underneath the range.¹⁵⁸

135. Dr Webb commented how unusual the groundwater flow patterns in the Colinlea sandstone observed on the mine site are because the flow is up the dip of the strata:

The eastwards flow of the groundwater in the Colinlea Sandstone is up the dip of the sandstone and that is very unusual.

Yes?---So this has been commented on several times. It's been commented on by this EIS for China First. It was commented on by GL Survey Geologists as well, and I found it remarkable myself, because in most cases the groundwater flow goes down the dip. So for the Clematis sandstone the groundwater flow goes down the dip from low pressure under the Great Dividing Range to high pressure out in the Great Artesian Basin. In this particular case the groundwater flow is in the opposite direction, which is very unusual. And it requires recharge to the Colinlea Sandstone where you get that divergence in groundwater flow directions. The people that put together the China First EIS thought one way of explaining this was to have folding that brought the Colinlea Sandstone close to the surface or closer to the surface under the Great Dividing Range. And that was initially for Alpha my interpretation as well. Because it made sense at the time. Subsequent data has shown, clearly, that that's not correct. But, nevertheless, you do still see this enhanced recharge under the Great Dividing Range.¹⁵⁹

136. Dr Webb explained he did not have a definitive view on how the recharge through the Rewan is occurring:

So I don't think I say definitively anywhere how I think the recharge is getting into the Rewan, although I think it's most likely that the fractures associated with the folding are the conduits. I just reiterate the elevated hydraulic heads indicate there is enhanced recharge there.¹⁶⁰

137. Dr Webb readily accepted that his hypothesis may not be correct:

The folding conceptualisation, the folding hypothesis, is a way of creating fractures through the Rewan that would allow this recharge. It may or may not be correct but, nevertheless, this recharge to the Rewan is occurring – out through the Rewan is occurring.¹⁶¹

138. It is clear from these statements that Dr Webb advances his hypothesis of subtle folding under the Great Dividing Range to the west of the mine creating fractures in the Rewan in an attempt to provide a plausible explanation for the groundwater flow patterns observed on the mine site in the context of the regional geology. His view is that the

¹⁵⁸ Transcript 6-43, line 43 to 6-44, line 16.

¹⁵⁹ Transcript 6-52, line 33 to 6-53, line 2.

¹⁶⁰ Transcript 6-46, lines 5-9.

¹⁶¹ Transcript 6-53, lines 16-19.

Applicant's conceptual hydrological model does not provide a plausible explanation for groundwater flow patterns on the site.

FINDINGS OF FACT THE COURT SHOULD MAKE REGARDING GROUNDWATER

139. Based on the evidence presented in this case, CCAQ submits that the Court should make the following findings regarding groundwater:
- (a) The hydraulic heads measured by the groundwater monitoring network on the Alpha and Kevin's Corner mine sites show recharge to the D-E sandstone is occurring to the west of the mine along the Great Dividing Range and to the south.
 - (b) The Applicant's groundwater numerical model defies reality by:
 - (i) not including recharge to the D-E sandstone to the west of the mine along the Great Dividing Range and instead applies recharge uniformly across the entire modelled area; and
 - (ii) assuming infinite water can flow from the south and north of the mine.
 - (c) The deficiencies and inconsistencies in the Applicant's groundwater modelling mean that the impacts of the mine on groundwater are uncertain but likely to be significantly greater than presented in the Applicant's EIS and SEIS, particularly to the north of the mine.
140. CCAQ submits that, while both Mr Stewart and Dr Webb made errors in preparing their reports for the Alpha trial and in these proceedings, both witnesses appeared to be honest witnesses attempting to assist the Court to the best of their abilities.

ECONOMICS

Economic Assessment undertaken excludes adverse impacts

141. The purported economic benefits of the project¹⁶² were based on the assessment undertaken by Mr Brown, the expert witness in economics for the Applicant, in 2011 and located in Appendix V of Volume 2 of the EIS.¹⁶³
142. The assessment methodology relied on by Mr Brown is the Input-Output (**IO**) methodology which suffers from known limitations. These limitations are acknowledged by Mr Brown in section 5.1.1 of the Appendix V¹⁶⁴ prepared as part of the Kevin's Corner Coal Project (**the Project**) EIS, where it is noted:

The input-output approach has a number of limitations, which may result in overestimation of impacts:

¹⁶² Exhibit 52 (EIS Bundle - Volume 2), Tab 21 (Appendix V - Economics), pp xi-xiv.

¹⁶³ Exhibit 52 (EIS Bundle - Volume 2), Tab 21 (Appendix V - Economics).

¹⁶⁴ Exhibit 52 (EIS Bundle - Volume 2), Tab 21 (Appendix V - Economics), p 1488.

- a) The absence of capacity constraints such that the supply of each good is perfectly elastic, implying that each industry can supply whatever quantity is demanded of it and there are no budget constraints.
- b) The assumed linearity and homogeneity of the input function, which implies constant returns to scale and no substitution between inputs. This occurs because the approach assumes inputs purchased by each industry are a function only of the level of output of that industry.
- c) Each commodity, or type of commodity, is supplied by a single industry sector, implying there is only one method used to produce each commodity and each sector has only a single primary output.
- d) Multipliers are derived from the 2005-06 Input-Output tables and reflect the structural dependence of the economy at that time. These tables have been augmented to reflect broad level structural change across the national economy by industry sector. The Queensland tables prepared for this analysis reflect regional variation from the national tables as at 2006. As such, the tables do not reflect any intensification or deterioration in regional competitive advantage in specific industry sector that may have occurred since 2005-06.
- e) The assumption that the economy is in equilibrium at given prices and that the economy is not subject to other external influences.
- f) The additivity assumption suggests the total effect of carrying on several types of production is the sum of the separate effects, which is not a true reflection of economic systems.¹⁶⁵

143. Mr Rod Campbell, the expert witness in economics called by the Fourth Respondent, shared the concerns of the Productivity Commission that IO models are subject to “well recognised abuses”, expressed by the Productivity Commission as follows:

[T]here is unlimited labour and capital available at fixed prices — so that, any change in the demand for productive factors will not induce any change in their cost.¹⁶⁶

...

Abuse primarily relates to overstating the economic importance of specific sectoral or regional activities. It is likely that if all such analyses were to be aggregated, they would sum to much more than the total for the Australian economy. Claims that jobs ‘gained’ directly from the cause being promoted will lead to cascading gains in the wider economy often fail to give any consideration to the restrictive nature of the assumptions required for input-output multiplier exercises to be valid. In particular, these applications fail to consider the opportunity cost of both spending measures and alternate uses of resources, and may misinform policy-makers.¹⁶⁷

144. In Mr Campbell’s view a lack of constraints is the key shortcoming for the IO model: “the IO model in the Kevin’s Corner EIS suffers from the limitations of most IO models, particularly the assumption that there are unlimited resources in the economy. This is not realistic”.¹⁶⁸

145. Mr Campbell explains: “the IO model assumes there is an unlimited supply of resources in the economy, such as skilled labour, unlimited arable land, unlimited water. Further,

¹⁶⁵ Exhibit 52 (EIS Bundle - Volume 2), Tab 21 (Appendix V - Economics), p 1488.

¹⁶⁶ Gretton, P, Productivity Commission, “*On input-output tables: uses and abuses*” (2014) at <http://www.pc.gov.au/research/completed/input-output-tables/input-output-tables.pdf>, p 4; Exhibit 60 (Expert Report by Mr Campbell) p 14, para 66.

¹⁶⁷ Ibid, p 1; Exhibit 60 (Expert Report by Mr Campbell) p 14-15, para 67.

¹⁶⁸ Exhibit 60 (Expert Report by Mr Campbell) p 14, para 65.

having no budget constraints assumes that firms and households can spend as much as they need to supply or consume what the model scenario requires”.¹⁶⁹

146. The Applicant’s economic expert, Mr Marcus Brown states that the IO model “assesses the impacts of the project in terms of what’s the additional demand in the economy that the project creates”.¹⁷⁰ In relation to issues like “increasing the supply of coal, driving down coal prices and affecting other mines that might be struggling in Queensland”¹⁷¹ Mr Brown stated that “Cost-benefit analysis and input-output analysis are both forms of what’s called partial equilibrium analysis and neither of them deal with that issue that you raised at all.”¹⁷²

147. After identifying the limitations of the IO approach in section 5.1.1 of Appendix V of the EIS, Mr Brown, goes on to nonetheless assert:

The economic impact analysis contained in this report presents results which are indicative of the scale of the economic impact resulting from the proposed Project.¹⁷³

148. Mr Campbell argues the shortcoming of the IO model are not adequately explained within section 5.1.1 of Appendix V the EIS.

[W]hile it is clearly stated in that one paragraph, I don’t think the shortcomings of this model are adequately explained to decision-makers who are reading the entire EIS.¹⁷⁴

I’m concerned that inflated job figures are put in front of decision-makers and the public with the author’s full knowledge and occasional acknowledgement that the methods of calculating them are flawed. But those shortcomings aren’t given nearly the emphasis that they need and that decision-makers and the public deserve, in my opinion.¹⁷⁵

The problem with the model affects pretty much every number throughout this assessment and yet there is one paragraph on page 38 that says, by the way, it’s all overstated. And at the bottom of that section, it says it doesn’t matter; this is indicatively right anyway. So my criticism is – of this document that a general reader doesn’t understand that it’s mathematically certain that this type of modelling is overstating these results.¹⁷⁶

149. When asked about the models particular shortcomings, Mr Campbell responded:

---It assumes that there’s a limitless amount of water, arable land – you name it. The assumption in the model is that you can build a mine without taking anyone or anything away from any other project or industry.¹⁷⁷

150. Mr Brown agrees that, at least in relation to employment, the IO model does not generate a negative number:

HIS HONOUR: Looking at page 1488 in section 5.1, the economic impact assessment, I’m just trying to understand your answers, Mr Brown. If I look at table 5.1?---Yes.

¹⁶⁹ Exhibit 60 (Expert Report by Mr Campbell) p 14, para 66.

¹⁷⁰ Transcript 7-7, lines 12-14 (Marcus Brown XXN).

¹⁷¹ Transcript 7-7, line 40 (Dr McGrath).

¹⁷² Transcript 7-7, lines 45-47 (Marcus Brown XXN).

¹⁷³ Exhibit 52 (EIS Bundle - Volume 2), Tab 21 (Appendix V - Economics), p 1488.

¹⁷⁴ Transcript 7-46, lines 34-36 (Rod Campbell XXN).

¹⁷⁵ Transcript 7-46, line 47 to 7-47, lines 1-4 (Rod Campbell XXN).

¹⁷⁶ Transcript 7-47, lines 12-17 (Rod Campbell XXN).

¹⁷⁷ Transcript 7-46, lines 17-19 (Rod Campbell XXN).

Is there anywhere in that table that there are negative measures?---Well, it doesn't generate a – a negative number. As I said, it estimates a demand response.

So the answer is no?---No. It doesn't generate a negative number.¹⁷⁸

Industry practice does not detract from statutory duty

151. It was sought to be said against Mr Campbell that the use of input/output modelling is the normal practice in Queensland.¹⁷⁹

152. 'Normal practice' is not part of the statutory regime for assessment and certainly does not excuse any inadequacy of the assessment in providing the decision maker with sufficient information to undertake their statutory task. A poor practice is not made any more adequate by its ubiquity.

153. Mr Campbell's response during cross-examination, is as follows:

Well, Mr Campbell, you accept that the use of input/output modelling is the normal practice in Queensland, not just to Mr Brown, not just to this project, but across the board for this modelling?---It – it's a source of deep concern to me.¹⁸⁰

Terms of Reference do not detract from statutory duty

154. It may be said that the Terms of Reference (**ToR**) do not require a particular assessment methodology – i.e. IO or cost benefit analysis. That is true.¹⁸¹

155. What the ToR did state is that the existing economy in which the project is located and the economies materially impacted by the project should be described¹⁸² and under section 5.1.2:

...the potential impacts should consider local, regional, state and national perspectives appropriate to the scale of the project ... the analysis should describe both the potential and direct economic impacts including estimated costs, if material, on industry and the community.¹⁸³

156. The ToR do not in their terms, or as a matter of law, detract from the obligation of the statutory regime to provide enough information for the decision maker to consider the potential adverse economic impacts of the Project.

Potential employment impacts on other mines and industries unaccounted for

157. Under cross examination Mr Campbell explained:

I'd rather that decision makers didn't put their faith in any particular model. I'd rather that they used their brains and looked at how many people would be directly employed on a project, can the local economy or state economy supply that or handle it, and will there be any policy issues around that? I – I think models are more often used to deceive than inform,

¹⁷⁸ Transcript 7-9, lines 1-5.

¹⁷⁹ Transcript 7-48, lines 45 to 7-49 lines 1-2 (Rod Campbell XXN).

¹⁸⁰ Transcript 7-48, lines 45 to 7-49 lines 1-2 (Rod Campbell XXN).

¹⁸¹ See for example Exhibit 43 (Joint Report – Economics) Issue 2, page 4 as per Mr Brown in relation to cost benefit analysis.

¹⁸² Exhibit 52 (EIS Bundle - Volume 2), Tab 14 (Appendix A-Final terms of Reference), p 51.

¹⁸³ Ibid.

and I – I encourage decision-makers to make – make their decisions based on direct effects and their understanding of the economy and the wider environment.¹⁸⁴

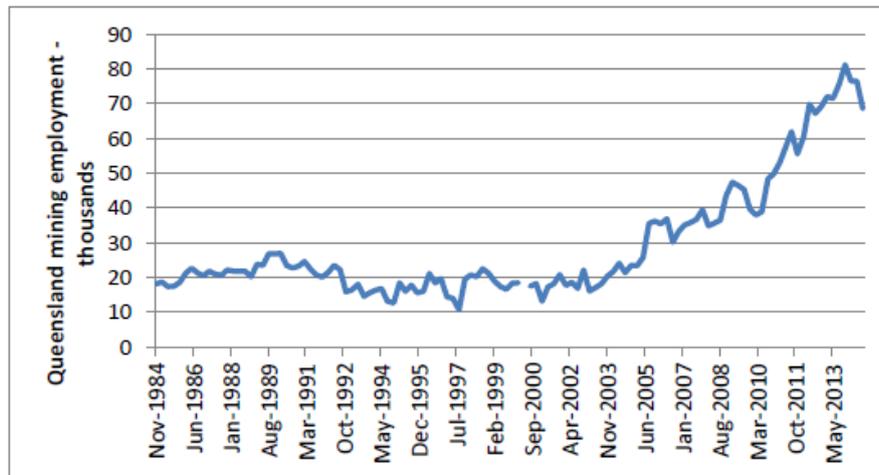
158. Mr Campbell argues the Project will compete with other mining projects and other industries for resources.¹⁸⁵ He states the IO model ignores this reality and so overstates the impacts of the project in general and ignores negative impacts on other industries:¹⁸⁶

One of the concerns you express in relation to employment more specifically is a concern about possible effects on – of the mine on manufacturing or employment in the manufacturing sector; is that right?

---I think a shortcoming of this assessment is that it heavily overstates estimated employment impacts of the manufacturing sector.¹⁸⁷

159. Mr Brown claims in his expert report that due to a recent increase in unemployment, these criticisms of IO models should not apply in this case.¹⁸⁸
160. Mr Campbell disagrees with Mr Brown and ABS data shows that mining employment remains high and the industry has the lowest level of underemployment of all industry classifications.¹⁸⁹

Figure 1: Queensland mining employment



Source: ABS 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly

Figure 1 from Rod Campbell's First Expert Report, p 18.

¹⁸⁴ Transcript 7-49, lines 24-29 (Rod Campbell XXN).

¹⁸⁵ Exhibit 60 (Expert Report of Rod Campbell), p 3, para 13 and p 15-16, para 70.

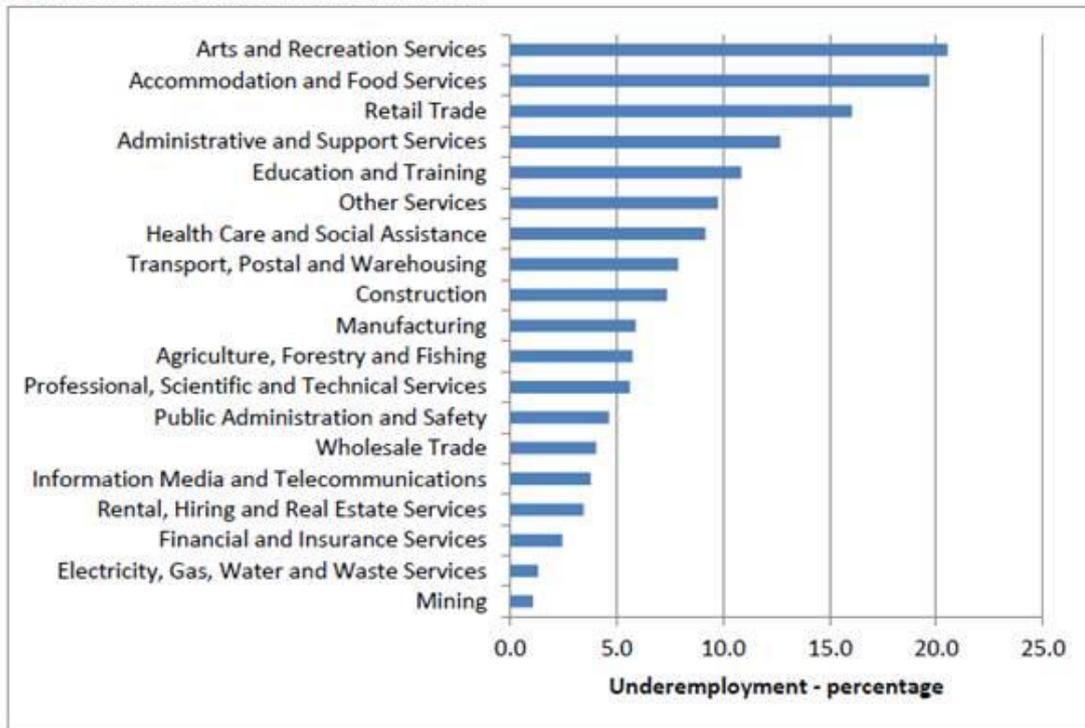
¹⁸⁶ Exhibit 60 (Expert Report of Rod Campbell), p 15, para 70.

¹⁸⁷ Transcript 7-54, lines 10-14 (Rod Campbell XXN).

¹⁸⁸ Exhibit 42 (Expert Report of Marcus Brown) p 10, para 4.3 (c).

¹⁸⁹ Exhibit 42 (Expert Report of Marcus Brown) p 19, para 79.

Figure 3: Underemployment by industry



Source: ABS 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly

Figure 3 from Rod Campbell's First Expert Report, p 19

161. Mr Brown also claims that negative impacts on other industries will not eventuate.¹⁹⁰
162. Mr Campbell disagrees. He indicates in his Expert Report that “ABS data shows that manufacturing employment has been stagnant or declining despite huge increases in mining investment. Similarly, Queensland agricultural employment has declined through periods of record mining investment, while agricultural employment in non-mining states has increased.”¹⁹¹
163. Under cross examination Mr Campbell responded as follows:

and I think you agree also that the EIS terms of reference, in this case, didn't require a cost-benefit analysis to be performed; is that right?

---No, they didn't require but nor did they preclude it. And, in my opinion, they – in my opinion, there should have been cost-benefit analysis to give decision-makers an idea of if the project's actually likely to make Queensland better off and, in fact, if it's actually likely to be financially profitable to a sufficient degree for the proponents to give some idea of whether or not it'll actually go ahead and whether or not the benefits or impacts that Mr Brown has predicted as to whether any of them will ever be achieved. I think cost-benefit analysis could have helped with that and that's why I think that would have been a better approach.¹⁹²

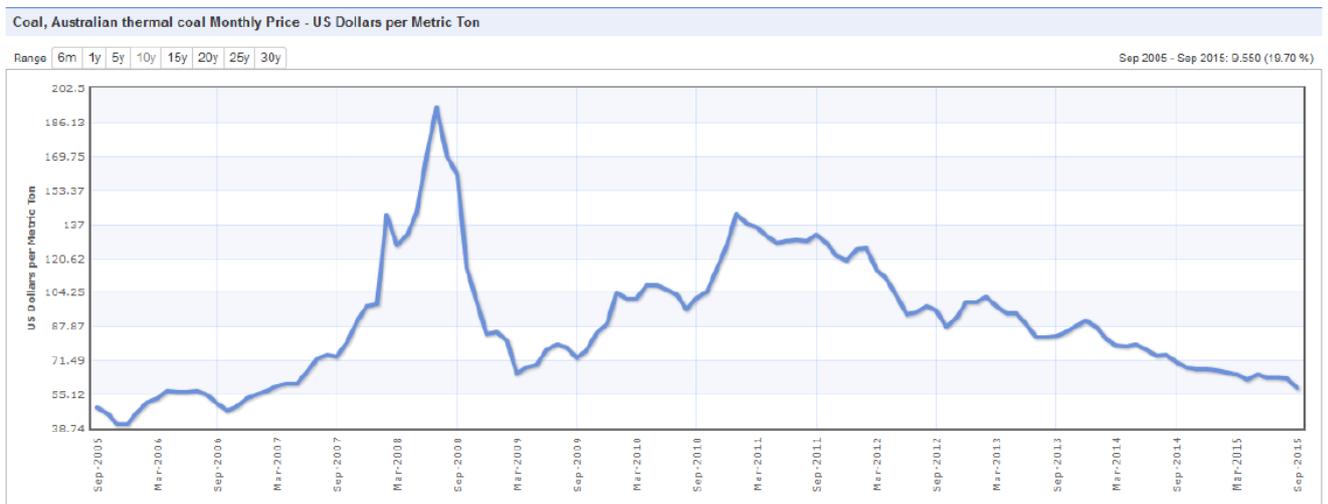
¹⁹⁰ Exhibit 42 (Expert Report of Marcus Brown) p 10, para 4.3(b)(iii).

¹⁹¹ Exhibit 60 (Expert Report of Rod Campbell) p 3, paras 15-16.

¹⁹² Transcript 7-55, lines 8-18 (Rod Campbell XXN).

Effect of mine on coal price

- 164. The Applicant failed to take into consideration the adverse effects that the mine would have on coal prices in the current thermal coal market downturn.
- 165. There is a general agreement between the economic experts that the Kevin’s Corner mine represents an increase of 2.7 per cent of world seaborne coal supply.¹⁹³
- 166. By applying the basic principles of supply and demand, this would therefore increase worldwide supply by 2.7 per cent. The Applicant’s expert agreed that if demand stays the same, this would create a downward pressure on the coal price.¹⁹⁴
- 167. Mr Brown agreed that this has already been seen in the case of iron ore - where huge Western Australian companies are producing mass amounts of iron ore, resulting in driving down the price.¹⁹⁵
- 168. When put to Mr Brown during cross-examination, the question about whether there had been a major collapse in the coal price since 2011, Mr Brown confirmed that “the price has fallen since 2011, yes”¹⁹⁶ and that this was a major collapse “from historical highs”.¹⁹⁷
- 169. A graph which represents the coal price over the past 10 years was presented to both Mr Brown and Hancock’s executive general manager of developments of the Kevin’s Corner Project, Mr Andy Mifflin.



Description: Coal, Australian thermal coal, 12000- btu/pound, less than 1% sulfur, 14% ash, FOB Newcastle/Port Kembla, US Dollars per Metric Ton

Unit: US Dollars per Metric Ton

Currency: US Dollar

Most recent price: Sep 2015, 58.03, -7.54%

Exhibit 67 Australian Thermal Coal Price Index (as at September 2015)

¹⁹³ Exhibit 43 (Joint Report - Economics), p12, Issue 6; Transcript 7-14, lines 42-44 (Marcus Brown XXN).

¹⁹⁴ Transcript 7-15, lines 12-14 (Marcus Brown XXN).

¹⁹⁵ Transcript 7-15, lines 16-19 (Marcus Brown XXN).

¹⁹⁶ Transcript 7-15, lines 21-22 (Marcus Brown XXN).

¹⁹⁷ Transcript 7-15, lines 24-25 (Marcus Brown XXN).

170. When questioned about the graph, Mr Mifflin agreed that since 2011, the price of coal has changed from over US\$137 a tonne to the current price of about US\$58.¹⁹⁸
171. Mr Mifflin also conceded during cross-examination that the graph depicted a collapse in the coal price.¹⁹⁹
172. On the day that Mr Brown was cross-examined, Tuesday, 27 October 2015, he was shown a copy of the Australian Financial Review which contained the globalCOAL NEWC Index price to be at US\$51.85 a tonne.²⁰⁰
173. Mr Brown agreed that this was the current coal price on this day.²⁰¹
174. However, Mr Brown, in his first expert report on economics, dated 17 October 2014, stated that:
- (a) “At the time of drafting the thermal coal price was sitting at approximately \$80 a tonne”;²⁰² and
- (b) “There has been speculation that the thermal coal price could bottom out to US\$60-US\$65/tonne”²⁰³
175. A year after Mr Brown’s report was written, it is now clear that the mere “speculation” of the thermal coal price bottoming out to US\$60-US\$65/tonne has now been well surpassed. Mr Brown agreed we have gone past it.²⁰⁴
176. It can therefore be concluded that the Applicant’s analysis is based on a coal price well above the current market. Some caution must therefore be placed on the benefits derived from the earlier coal price.
177. From the evidence outlined above, it is clear that it is difficult to predict what the coal prices will be for the life of the mine, that being 30 years.
178. Overall, the failure of Hancock to take into account the uncertainties of coal price predictions, and subsequent fall in price, as a part of their economic assessment and the risks associated to the Project as a result, undermines the ability of this Court to adequately assessed the beneficial and adverse economic impacts of the project.

Adequate assessment and an obligation on the Applicant not objector

179. It was sought to be said against Mr Campbell that he had not undertaken a cost benefit analysis of the project or sought to do so.²⁰⁵
180. The structure of the statutory regime²⁰⁶ is such that it is the obligation of the Applicant to provide sufficient information for the decision maker to decide the application.

¹⁹⁸ Transcript 2-72, lines 39-40 (Andy Mifflin XXN).

¹⁹⁹ Transcript 2-72, line 42 (Andy Mifflin XXN).

²⁰⁰ Transcript 7-17, lines 10-18 (Marcus Brown XXN).

²⁰¹ Transcript 7-17, lines 24-25 (Marcus Brown XXN).

²⁰² Exhibit 42 (Marcus Brown’s First Expert Report - Economics), pp16-17. Note: There was confusion as to whether Mr Brown had meant US\$80 per tonne, and Mr Brown admitted “Yeah...that’s probably an oversight there – I should have been clearer” and that “yes, it probably is US dollars. I probably should have been a bit more careful”. See Transcript 7-16, lines 6-7 and 18-19.

²⁰³ Exhibit 42 (Marcus Brown’s First Expert Report - Economics), pp16-17.

²⁰⁴ Transcript 7-17, lines 41-45 (Marcus Brown XXN).

²⁰⁵ Transcript 7-49, lines 44-45 (Rod Campbell XXN).

²⁰⁶ In particular section ss 154(2), 203 and 223(b) of the EPA.

181. There is no provision of the regime that required an objector, having identified deficiencies in the Applicant's assessment, to undertake a superior assessment of the Project.
182. Accordingly it cannot be read against Mr Campbell that he has not performed a full assessment of the costs and benefits of the project.
183. In any case Mr Campbell responds to the criticism as follows:
- I don't think you need a model to say this is clearly taking jobs away from other parts of the coal industry, and that – that is the result – if it was to go ahead, and I have my doubts about its financial viability, but if it was to go ahead, I – I think certainly this project would be taking some jobs away from mines somewhere else, and that – that possibility – you – you can't – you can't – that possibility isn't even considered in the EIS or the input/output model that Mr Brown has used.²⁰⁷

Summary submission on Economics - Applicant's IO analysis is not adequate to assist the Court in identifying potential adverse economic impacts

184. In deciding whether to recommend the grant of the mining lease and environmental authority this Court must have regard to both the beneficial and adverse economic impacts of the Project.
185. The Applicant has relied upon a form of economic assessment which has known deficiencies which does not generate a negative number, in particular;
- (a) It does not consider the potential adverse affect of drawing labour from other mines and industries;
 - (b) It does not consider the potential adverse affect of any depressive affect on coal price of adding 2.7% to global supply of coal, or any consequential affect that may have on coal mines in Queensland;
 - (c) It does not consider the risks to purported benefits of the project if the coal prices are substantially lower than predicted.
186. As a result of these deficiencies the economic assessment is not adequate to alert the decision maker to potential adverse economic impacts and the purported economic benefits must be treated with great caution in absences of any information on those potential countervailing adverse effects.

STATUTORY TESTS TO BE APPLIED BY THE COURT

Overview

187. The Court has considered the application of the EPA and MRA to proposed mines, and their relationships with the SDPWOA and the *Water Act* 2000 (Qld) (***Water Act***), in previous judgments.²⁰⁸

²⁰⁷ Transcript 7-50, lines 3-9 (Rod Campbell XXN).

²⁰⁸ Noting particularly, *De Lacey v Kagara Pty Ltd* (2009) 30 QLCR 57; [2009] QLC 77 (Smith M); *Donovan v Struber* (2011) 32 QLRC 226; [2011] QLC 45 (Smith M); *Xstrata Coal Queensland Pty Ltd & Ors v Friends of the Earth – Brisbane Co-Op and DERM* [2012] QLC 013; (2012) 33 QLCR 79 (MacDonald P) concerning the proposed Wandoan Coal Mine (*Xstrata*); and *Hancock Coal Pty Ltd v Kelly & Ors & DEHP (No. 4)* [2014] QLC 12 (Smith M), concerning the proposed Alpha Coal Mine (*Alpha*).

188. The EPA was substantially amended on 31 March 2013,²⁰⁹ including renumbering of relevant chapters and sections and amending the standard criteria. However, s 683 of the EPA as currently in force provides a transitional provision that requires the processing of the application for the environmental authority²¹⁰ and all matters incidental to the processing to proceed as if the amending Act had not been enacted.
189. Section 683 of the EPA does not apply to the mining lease application under the MRA. It is not straightforward to determine whether the law as currently in force, or in force when the mining lease was applied for, when the objections were lodged, or when the matter was referred to the Land Court, should be applied by the Land Court in these proceedings.²¹¹ However, there have been no material amendments to the MRA since the application was lodged so it is unnecessary to resolve this issue.
190. In relation to the *Water Act*, the *Water Reform and Other Legislation Amendment Act 2014* (Act No. 64 of 2014) (**WROLAA**), amongst other things, removed the requirement for mines approved under the MRA to obtain a further, separate water licence under the *Water Act 2000* (Qld). While the relevant parts of the WROLAA have not yet commenced, they will commence automatically on 6 December 2015 if the government does not extend the commencement date.²¹² The current law is therefore, while the Applicant currently requires a water licence to carry out its mining activities, it will not require a water licence from 6 December 2015 onwards. The implications of this for the Court's recommendations in relation to the mine are discussed further below.

Onus of proof

191. A preliminary issue to clarify is which party, if any, carries the onus of proof in the objections hearing. This issue has not been resolved in previous decisions of the Court.²¹³
192. There may be a tendency for Queensland practitioners familiar with the Planning and Environment (P&E) Court to assume that the Applicant for the mine bears the onus of proving that the mine should be approved, as is the case for applicants for development approval in appeals in the P&E Court. However, the onus for appeals in the P&E Court is expressly provided by s 493 the *Sustainable Planning Act 2009* (Qld). There is no equivalent provision in the *Land Court Act 2000* (Qld), the EPA or the MRA for objections hearings in the Land Court.
193. The principles used in courts of law regarding the onus of proof should be approached with great caution in administrative decisions and administrative appeals, particularly

²⁰⁹ By the commencement of the *Environmental Protection (Greentape Reduction) and Other Legislation Amendment Act 2012*.

²¹⁰ Which was lodged on 18 December 2009.

²¹¹ See *Kentlee Pty Ltd v Prince Consort Pty Ltd* [1998] 1 Qd R 162 at 173, lines 45-50 per Fitzgerald P.

²¹² Section 15DA of the *Acts Interpretation Act 1954* (Qld) provides for automatic commencement a year after its assent date (subject to extension under a regulation). The WROLAA's date of assent was 5 December 2014.

²¹³ In the *Xstrata* case [2012] QLC 013; (2012) 33 QLCR 79 at [572] the Court noted that the Applicant miner submitted in that case in relation to assessing the public interest that "the onus lies with the party contending that there should be a refusal to satisfy the Court that there is prejudice to that interest" without deciding that point specifically. No other cases appear to have considered this issue in relation to objections hearings under the MRA and EPA.

where a decision-maker is not bound by the rules of evidence and may inform itself on any matter in such manner as it thinks appropriate,²¹⁴ as is the case for the Land Court.²¹⁵

194. The complications and questions raised regarding the Court's powers in objections hearings under the MRA and EPA by the recent judgment of Philip McMurdo J in *BHP Billiton Mitsui Coal Pty Ltd v Isdale & Ors* [2015] QSC 107 (*BHP Billiton*) do not appear to apply to the Court's general power stated in s 7 of the *Land Court Act 2000* (Qld). His Honour held in that case that the Court did not have power under r 13 of the *Land Court Rules 2000* to order disclosure in an objections hearing under the MRA and EPA as such a hearing was administrative in nature and, therefore, not a "proceeding" in the Land Court that enlivened the power in r 13. However, the Court's general power stated in s 7 of the *Land Court Act 2000* (Qld) refers to "In the exercise of its jurisdiction ..."²¹⁶ and contains no reference to "a proceeding" before the Court. This general power, therefore, does not appear to be affected by the decision in *BHP Billiton*.
195. His Honour's reasoning in *BHP Billiton* supports the conclusion that there is no onus of proof on any party in an objections hearing under the MRA and EPA because the Land Court must have regard to considerations which extend beyond the respective interests of the applicant and the objectors. After discussing how disclosure is normally limited to the issues in dispute between parties, his Honour stated:

But in referrals to the Land Court of the present kind [under the MRA and EPA], the scope of the court's factual inquiry is not defined by the parties. Their respective arguments and the evidence which they present are to be considered. But the Land Court must have regard to considerations which extend beyond the respective interests of the applicant and the objectors. In particular, it must consider the public interest.²¹⁷

196. CCAQ submits that, consistently with the approach to administrative decisions generally,²¹⁸ the general powers of the Court "to inform itself in the way it considers appropriate",²¹⁹ and the recent decision in *BHP Billiton*, no party bears a legal or evidential onus of proof in relation to any issue.

Environmental Protection Act

Statutory context of objections decision under the EPA

197. The object of the EPA, stated in s 3, is to protect Queensland's environment while allowing for ecologically sustainable development (ESD).
198. As the Court is performing a function and exercising a power under the EPA, s 5 places a mandatory obligation on it to "perform the function or exercise the power in the way that best achieves the object of this Act". The duty in s 5 of the EPA emphasises the distinction between the Court's role in assessing the mining lease application under the MRA, where there is no such duty, and the Court's role in assessing the environmental authority under the EPA.²²⁰

²¹⁴ *McDonald v Director-General of Social Security* (1984) 1 FCR 354 at 356 (Woodward J).

²¹⁵ *Land Court Act 2000* (Qld), s 7.

²¹⁶ This is clearly to be read by reference to the Court's jurisdiction stated in s 5 of the *Land Court Act* as "the jurisdiction given to it under this Act or another Act".

²¹⁷ *BHP Billiton Mitsui Coal Pty Ltd v Isdale & Ors* [2015] QSC 107 at [42].

²¹⁸ *McDonald v Director-General of Social Security* (1984) 1 FCR 354 at 356-359 (Woodward J).

²¹⁹ *Land Court Act 2000* (Qld), s 7.

²²⁰ A function or power conferred by s 219(3) and s 223 of the EPA.

199. The objects of the Act and the reason for imposing the obligation in s 5 was explained further in the *Environmental Protection Bill 1994 Explanatory Notes* as follows (emphasis in underlining added):

Reasons for the Bill

Existing environmental legislation in Queensland is generally outdated. Despite amendments, the present legislation does not reflect modern environmental management practices, or community expectations for a clean and safe environment. This Bill supersedes the *Clean Air Act 1963*, *Clean Waters Act 1971*, *Noise Abatement Act 1978*, *Litter Act 1971*, *Fig Tree Pocket Noise Emission Act 1984* and the *State Environment Act 1988*. The Bill provides for a range of innovative regulatory mechanisms which enhance accountability, public participation and self-regulation. By providing greater certainty in enforcement and operation, both industry and the community understand their rights and obligations regarding environmental protection. Protection of the environment is ensured by requiring economic development to be ecologically sustainable...

NOTES ON PROVISIONS ...

Section 3 defines the object of the Act in the terms of ecologically sustainable development (ESD). ESD is the agreed Government policy for achieving development both in Queensland and nationally in a manner that does not lead to irreversible environmental degradation ...

Section 5 requires all people who are given power under this Act, to use that power to protect the Queensland environment and to do so consistent with the principles of ESD.

200. Reflecting its importance to the scope of the EPA, the concept of ESD is woven throughout the Act. It not only appears in ss 3 and 5 but by the principles of ESD being stated as the first of the standard criteria it is brought into every section that refers to them. There are 32 sections of the EPA, including s 223, that refer to the standard criteria.²²¹ This means that the principles of ESD are incorporated into all of the major administrative decisions under the Act.²²²
201. To achieve its object, the scheme of the EPA provides a number of mechanisms to reduce “environmental harm”, a concept defined in s 14. Sections 437 and 438 of the EPA provide criminal offences for unlawfully causing serious or material environmental harm.²²³
202. Chapter 5, ss 146-309, of the EPA provides the process for applying for, and amending, environmental authorities for mining activities, including an environmental authority (mining lease). Sections 147 and 149 of the Act define “mining activity” and “mining project”.
203. The application for the Kevin’s Corner Coal Mine was for a non-code compliant level 1 mining activity, which was dealt with in Part 6 of Chapter 5 of the EPA as in force when the application was lodged on 18 December 2009.²²⁴ The EPA provides for any person to object to the amendment of an environmental authority (mining lease) under Part 6

²²¹ EPA, ss 58, 73A, 73O, 162, 163, 163B, 170, 171, 173, 176, 192, 193, 206, 207, 210, 223, 246, 247, 257, 262, 266K, 278, 309Y, 310E, 310N, 310V, 311Q, 338, 359, 424, 616Q, and 616U.

²²² EPA, s 73A.

²²³ Material and serious environmental harm are defined in ss 16 and 17 of the EPA.

²²⁴ See the discussion at [188] above regarding recent amendments of the EPA and the transitional provision in s 683 requiring the application to be assessed based on the Act prior to the amendments.

of Chapter 5. The right to object and the process for the objections decision hearing is set out in ss 216-226. Section 222 states the nature of the objections decision to be made by the Court.

204. Section 223 states the matters to be considered, including the “standard criteria”. The “standard criteria” are defined in the dictionary of the EPA to include 12 matters, the following of which are relevant to the issues raised by CCAQ’s objection to the grant of the environmental authority:
- (a) the principles of ESD as set out in the *National Strategy for Ecologically Sustainable Development*;
 - (b) the character, resilience and values of the receiving environment; and
 - (c) the public interest.
205. While neither s 223 nor the standard criteria expressly refer to the environmental harm that a proposed activity will cause as a relevant consideration for the grant of an environmental authority, it is apparent from the structure of the EPA that this is the case. As noted above, the structure of the EPA is built around the concept of environmental harm, including s 493A which makes serious or material environmental harm lawful if it is authorised under an environmental authority. Therefore, the environmental harm that an activity will cause must be considered in granting any such authority. Was this not the case, the absurd result would be that the decision to grant the authority would authorise something that was not considered in making the decision.²²⁵ Therefore, having regard to the subject matter, scope and purpose of the EPA and the grant of an environmental authority, it is apparent that enumerated factors in s 223 are not an exhaustive list and the environmental harm that any activity may cause is a *relevant consideration* for the grant of an environmental authority that the Court is bound to consider.²²⁶

Precautionary principle

206. The Court has considered the application of the precautionary principle on a number of occasions in the past.²²⁷ The precautionary principle is engaged when two conditions are satisfied:
- (a) there is a risk of serious or irreversible environmental harm; and
 - (b) uncertainty about the likelihood, nature or scope of that harm.²²⁸
207. Here, these conditions are plainly satisfied regarding the potential impacts on groundwater.

²²⁵ Where the operation of a statute is “absurd” or “irrational”, that is a ground to depart from the literal meaning and prefer an alternative construction: *Cooper Brookes (Wollongong) Pty Ltd v Federal Commissioner of Taxation* (1981) 147 CLR 297 at 321 (Mason and Wilson JJ).

²²⁶ *Minister for Aboriginal Affairs v Peko-Wallsend Ltd* (1986) 162 CLR 24 at 39-40 (Mason J).

²²⁷ Particularly, *DeLacey v Kagara Pty Ltd* [2009] QLC 77, [172]–[177]; the *Xstrata* case [2012] QLC 013; (2012) 33 QLCR 79 at [253], [256] & [347]; and *Alpha* [2014] QLC 12 at [70].

²²⁸ *Telstra Corporation Ltd v Hornsby Shire Council* (2006) 67 NSWLR 256, [128].

The public interest

208. The public interest involves a discretionary balancing exercise of the widest import confined only so far as the subject matter and the scope and purpose of the statute may enable.²²⁹
209. While the public interest is a relevant consideration under both the EPA and the MRA, it should be noted again that they are two very different Acts with two very different objects. This means there are different frameworks for considering the public interest under the two Acts. The MRA provides a system aimed at promoting the development of the mineral resources of the State while the EPA is very much focused on the protection of the environment. These objects overlap to some extent, but they are quite different and it would be wrong to assume that the consideration of the public interest aspect of the mining lease application under the MRA and the consideration of public interest in the application for the environmental authority under the EPA are the same.

Mineral Resources Act

210. The MRA has different objects to the EPA. While the two Acts are interrelated to an extent, it is trite that they must each be applied by reference to their own terms.
211. The object and statutory framework of the MRA are very different from the EPA. The object of the MRA, stated in s 2, is to encourage mining and financial returns to the State through royalties, while also encouraging environmental responsibility.
212. The major considerations for the Court to have regard to under the MRA in assessing the mining lease application are the objects of the Act stated in s 2 and the considerations listed in s 269(4). These include whether:
- (a) there will be any adverse environmental impact caused by those operations (s 269(4)(j));
 - (b) the public right and interest will be prejudiced (s 269(4)(k)); and
 - (c) any good reason has been shown for a refusal to grant the mining lease (s 269(4)(l)).
213. The Land Court's decision on the objection hearing for a mining lease does not finally determine the application for it. The Land Court makes a recommendation to the Minister administering the MRA and the Minister is not bound to follow the recommendation.²³⁰

Section 269(4)(j) – “any adverse environmental impact”

214. Section 269(4)(j) of the MRA provides that the Land Court “when making a recommendation to the Minister that an application for a mining lease be granted in whole or in part, shall take into account and consider whether there will be any adverse environmental impact caused by those operations and, if so, the extent thereof”. It is clear from the terms of the preceding paragraph, paragraph 269(4)(i), that “operations”

²²⁹ *Sinclair v Mining Warden at Maryborough* (1975) 132 CLR 473 at 487 (Taylor J); *McKinnon v Secretary, Department of Treasury* (2005) 145 FCR 70 at [8]-[12] (Tamberlin J); *McKinnon v Secretary, Department of Treasury* (2006) 228 CLR 423 at [55]-[56] (Hayne J).

²³⁰ MRA, ss 271 and 271A.

means the “operations to be carried on under the authority of the proposed mining lease”. Thus, the consideration required by paragraph 269(4)(j) of the MRA is the consideration of “adverse environmental impact caused by [the operations to be carried on under the authority of the proposed mining lease]”.²³¹ In the context of the present case, “operations” in paragraphs 269(4)(i) and (j) means the physical activities associated with winning and extracting the coal product.²³²

Section 269(4)(k) – “the public right and interest will be prejudiced”

215. As noted earlier, the requirement to consider whether the public right and interest will be prejudiced²³³ involves a discretionary balancing exercise of the widest import confined only so far as the subject matter and the scope and purpose of the statute may enable.²³⁴
216. Even though the MRA is not focused on environmental protection, it is submitted that the reference to “encourage environmental responsibility in prospecting, exploring and mining” as one of the objects of the MRA in paragraph 2(a) of the MRA militates in favour of not restricting “public right and interest” in paragraph 269(4)(k) from extending to a consideration of the relationship between the resource sought to be exploited and very significant global problems to which the removal and use of the resource will contribute and ways in which that contribution can be mitigated.²³⁵ Equally, the more narrow context of paragraph 269(4)(k) of the MRA includes paragraph 269(4)(j), with its express comprehension of “any adverse environmental impact”. This also suggests that the phrase, which is of widest import should not be construed restrictively, in the context of environmental impacts.

Section 269(4)(l) – “any good reason has been shown for a refusal”

217. Section 269(4)(l) of the MRA is extremely wide and limited only by the subject matter, scope and purposes of the Act.²³⁶ Clearly, there must be a *good* reason, as opposed to a reason that is extraneous to the purposes of the Act.²³⁷ The question of whether good reason has been shown must depend on all the circumstances of the particular case.²³⁸

²³¹ The definition of “mine” in s 6A and the purposes for which a mining lease may be granted under s 234 of the MRA indicate what operations may be carried on under the authority of a mining lease.

²³² Applying “adverse environmental impact caused by those operations” in its most narrow and direct sense, it includes the impacts on groundwater and due to carbon dioxide and other greenhouse gases released by carrying out those physical activities (i.e. scope 1 emissions).

²³³ There is no material distinction between a public right or the public interest for the purposes of this hearing but these submissions will focus on the public interest as the more relevant term. There are public rights to a healthy and pleasant environment, protected through the tort of public nuisance, as well as a public interest in a healthy and pleasant environment.

²³⁴ *Sinclair v Mining Warden at Maryborough* (1975) 132 CLR 473 at 487 (Taylor J); *McKinnon v Secretary, Department of Treasury* (2005) 145 FCR 70 at [8]-[12] (Tamberlin J); *McKinnon v Secretary, Department of Treasury* (2006) 228 CLR 423 at [55]-[56] (Hayne J).

²³⁵ In *Telstra v Hornsby* [2006] NSWLEC 133; (2006) 146 LGERA 10, at [121]-[124], Preston CJ used the subject matter, scope and purpose of the environmental assessment legislation being applied by him to conclude that “public interest” included consideration of the principles of ESD.

²³⁶ See *Minister for Aboriginal Affairs v Peko-Wallsend Ltd* (1986) 162 CLR 24 at 39-40 (Mason J).

²³⁷ *Water Conservation and Irrigation Commission (NSW) v Browning* (1947) 74 CLR 492 at 505 (Dixon J).

²³⁸ See *Campbell v United Pacific Transport* [1966] Qd R 465, at 472 (Gibbs J) in the context of considering whether “good reason” had been shown by an applicant plaintiff for leave to proceed after six years without a step in the proceedings.

Relationship between the EPA and MRA

218. The legislative history of both Acts is of assistance in understanding the relationship between the EPA and the MRA. As originally enacted in 1989, the MRA was intended to provide the principal regime for the approval and regulation of mining in Queensland. The enactment of the EPA in 1994 provided another layer of regulation of mining as an environmentally relevant activity. In 2000, the Acts were amended²³⁹ to separate the promotion of mining and tenure issues from the regulation of the environmental impacts of mining.²⁴⁰ While the 2000 amendments focused the MRA on the tenure aspects of mining, environmental impacts of mining remain relevant to the objects of the MRA and s 269(4) considerations for the grant of a mining lease.
219. The EPA and the MRA are two very different Acts with two very different objects.²⁴¹ The EPA focuses on the protection of the environment while the MRA provides a system aimed at promoting the development of the mineral resources of the State. These objects overlap to some extent, but they are quite different and it would be wrong to assume that the consideration of the application for the environmental authority under the EPA and the consideration mining lease application under the MRA are the same. A particular feature that distinguishes the two Acts is that the duty under s 5 of the EPA is to perform a function and exercise the powers conferred by the Act “in the way that best achieved the object of the Act” of ecologically sustainable development. There is no such duty under the MRA.

Relationship between the EPA, MRA and Water Act

220. The Court has analysed the need for an applicant for a mine to obtain a water licence under the *Water Act 2000* (Qld) (*Water Act*) in previous decisions in circumstances similar to the present case where the mine has been declared a coordinated project under the SDPWOA. The Court has held that it is necessary to consider the impacts of a mine on ground and surface water when assessing the applications for the mining lease under the MRA and the environmental authority under the EPA, but there are limits to which the Court can recommend further conditions addressing water issues.²⁴²
221. As in previous cases, the Applicant has not yet applied for a water licence for dewatering for the mine²⁴³ but when it does so, an appeal will lie against the grant of a water licence to the Land Court (subject to pending amendments discussed in the following paragraphs).²⁴⁴ In effect, while there is considerable overlap in the issues that must be considered regarding the impacts of the mine on water under the MRA, EPA and *Water Act*, the application for a water licence is a separate, future approvals process for the mine.
222. However, the Court should aware of changes to the requirement for mines to hold a water licence to take or interfere with groundwater.

²³⁹ By the *Environmental Protection and Other Legislation Amendment Act 2000* (Qld).

²⁴⁰ *Environmental Protection and Other Legislation Amendment Bill 2000 – Explanatory Notes*, p 2.

²⁴¹ As recognised in the *Alpha* case [2014] QLC 12 at [63] citing the earlier decision in *Donovan v Struber & Ors* (2011) 32 QLCR 226; [2011] QLC 45.

²⁴² *Xstrata* case [2012] QLC 013; (2012) 22 QLCR 79 at [205]-[215] and [606]-[610]; *Alpha* case [2014] QLC 12 at [81]-[130].

²⁴³ Transcript 2-68, line 40 to 2-29, line 10.

²⁴⁴ *Alpha* case [2014] QLC 12 at [103].

223. On 5 December 2014 the Queensland Parliament passed the *Water Reform and Other Legislation Amendment Act 2014* (Act No. 64 of 2014) (**WROLAA**), which, amongst other things, removed the requirement for mines approved under the MRA to obtain a further, separate water licence under the *Water Act 2000* (Qld).
224. Part 4 of the WROLAA inserted a new Chapter 12A (Provisions about water for mineral Development licences and mining leases) in the MRA, which provided, amongst other things:
- 334ZP Entitlement to use underground water**
 (1) The holder of a mineral development licence or mining lease may take or interfere with underground water in the area of the licence or lease if the taking or interference happens during the course of, or results from, the carrying out of an authorised activity for the licence or lease. ...
- 334ZR Authorisation for Water Act**
 Taking, interfering with, or using underground water under section 334ZP is authorised for the Water Act. ...
225. The relevant parts of the WROLAA have not yet commenced; however, they will commence automatically on 6 December 2015 if the government does not extend the commencement date.²⁴⁵ The current law is therefore, while the Applicant currently requires a water licence to carry out its mining activities, it will not require a water licence from 6 December 2015 onwards. This has important implications for the reliance that the Court may place on later approvals under the *Water Act* should the Court be unsatisfied with the groundwater evidence as occurred in the *Alpha* case.

Relationship between the EPA, MRA and SDPWOA

226. As with the interaction with the *Water Act*, the Court has previously considered the relationship between the EPA, MRA and the SDPWOA for applications involving mines that have been declared to be coordinated projects (prior to 2012 referred to as “significant projects”), particularly the requirement that the Court may not recommend a condition that is “inconsistent” with a condition imposed by the Coordinator-General.²⁴⁶ The Court has held that:
- ... the Court has power under the EPA to recommend conditions for the draft EA dealing with the same subject matter as conditions imposed by the Coordinator-General, provided that the Court's recommended conditions do not contradict or lack harmony with the Coordinator-General's conditions.²⁴⁷
227. With respect, CCAQ agrees with this conclusion.
228. However it places the Court in a difficult position if it is that satisfied conditions imposed by the Coordinator-General are inadequate to address a significant harm, an unable to be remedied by consistent conditions, as it leaves the Court with little option but to recommend refusal.

²⁴⁵ Section 15DA of the *Acts Interpretation Act 1954* (Qld) provides for automatic commencement a year after its assent date (subject to extension under a regulation). The WROLAA's date of assent was 5 December 2014.

²⁴⁶ *Xstrata* case [2012] QLC 013; (2012) 22 QLCR 79 at [24]-[50] and [606]-[610]; *Alpha* case [2014] QLC 12 at [71]-[80].

²⁴⁷ *Xstrata* case [2012] QLC 013; (2012) 22 QLCR 79 at [47].

Statutory framework requires assessment of beneficial and adverse economic impacts

229. Grounds 1(e) of the Fourth Respondent’s Objection to the grant of the Mining Lease and Ground 1(e) of the Fourth Respondent’s Objection to the grant of the Environmental Authority are that “it has not been adequately demonstrated that the Project will not have adverse economic impacts”.²⁴⁸
230. When making a recommendation that an application for a mining lease be granted in whole or in part, the Land Court shall take into account and consider whether “there will be any adverse environmental impact caused by those operations and, if so, the extent thereof”.²⁴⁹
231. The MRA defines “environment” as having the same meaning as the EPA.²⁵⁰ The definition of environment in the EPA is expansive and includes, amongst other things, social and economic conditions that affect, or are affected by, other aspects of the environment as defined.
232. Similarly, under the EPA²⁵¹ the Land Court must consider the standard criteria which include:²⁵²
- (a) the principles of ecologically sustainable development as set out in the ‘National Strategy for Ecologically Sustainable Development’,²⁵³ including: “decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations”,²⁵⁴ and
 - (b) the character, resilience and values of the receiving environment²⁵⁵ which relies, in turn, on the expansive definition of environment referred to above.
233. To assist the administering authority and the Court in reaching a conclusion about whether there will be any adverse environmental impact caused by the operations, the proponent is obliged to:
- (a) provide enough supporting information to allow the administering authority to decide the application;²⁵⁶ and
 - (b) submit an environmental management plan²⁵⁷ to help the administering authority prepare the draft environmental authority for the application²⁵⁸ which describes “the potential adverse and beneficial impacts of the mining activities on the environmental values”.²⁵⁹

²⁴⁸ Exhibit 1 (CCAQ Objection to Kevin’s Corner ML) p 2, Ground 1(e); Exhibit 2 (CCAQ Objection to Kevin’s Corner ML) p 3, Ground 1(e)

²⁴⁹ MRA, s 269(4)(j).

²⁵⁰ MRA, Schedule 2.

²⁵¹ EPA, s 223(c).

²⁵² EPA, Schedule 4, definition of ‘standard criteria’.

²⁵³ EPA, Schedule 4, standard criteria (a).

²⁵⁴ Exhibit 92; (Extract from National Strategy for Ecological Sustainable Development), pp 8-9.

²⁵⁵ EPA, Schedule 4, standard criteria (e).

²⁵⁶ EPA, s 154(2).

²⁵⁷ EPAct, s 201.

²⁵⁸ EP Act, s 202.

²⁵⁹ EP Act, ss 201(2) and 203(1)(b)(v).

234. Compliance with these regulatory requirements are themselves a matter which this Court must consider.²⁶⁰
235. Taken together, this framework requires the Applicant to provide enough supporting information to allow the decision maker to consider the adverse and beneficial impacts of the mining project on the environment, including economic and social conditions.

The role and limits of conditions

236. Conditions fill an important role under both the EPA and MRA in managing the harm caused by an activity for which an environmental authority or mining lease is granted; however, conditions have important limits.
237. There are two issues in relation to conditions:
- (a) The first is the scope of the Court's power to impose conditions, particularly in relation to groundwater.
 - (b) The second is the appropriateness of imposing conditions in situations where there is inadequate information available.

The Court's power to recommend conditions in relation to groundwater

238. The Court has considered previously whether it can recommend conditions on the mining lease or the environmental authority which might otherwise be contained in a water licence issued under the *Water Act 2000* (Qld) separately to the applications currently before the Court.
239. In *Xstrata*, the Court held that it could not recommend conditions relating to the diversion or appropriation of water on a mining lease or an environmental authority.²⁶¹ The Court reached this conclusion on the basis of s 235(3) of the MRA, which provides:
- Where any Act provides that water may be diverted or appropriated only under authority granted under that Act, the holder of a mining lease shall not divert or appropriate water unless the holder holds that authority.
240. In *Xstrata*, the Court held that, because a further approval was required under the *Water Act*, the diversion or appropriation of water were not matters authorised under either the mining lease or the environmental authority and, hence, no conditions in relation to those matters could be recommended.²⁶²
241. CCAQ submits that, contrary to the decision in *Xstrata*, the Court may recommend conditions be imposed relating to groundwater on a mining lease or an environmental authority. This is based on two premises:
- (a) First, that the Court has a broad power, under both the MRA and the EPA, to recommend conditions that fairly and reasonably relate to development being approved; and

²⁶⁰ EP Act, s 223(b).

²⁶¹ *Xstrata* case [2012] QLC 013; (2012) 33 QLCR 79 at [205]–[215].

²⁶² *Xstrata* case [2012] QLC 013; (2012) 33 QLCR 79 at [205]–[215].

- (b) Second, the fact that a further approval is required before an action is taken does not prevent the powers conferred on the Court under the MRA and EPA from being exercised.
242. The Court has a broad power to recommend conditions on a mining lease. Section 269(3) of the MRA confers on the Court the power to recommend approval of a mining lease subject to conditions which it “considers appropriate”. Although the phrase “considers appropriate” has not been the subject of significant judicial consideration,²⁶³ in substance, it is equivalent to impose such conditions as a decision-maker “thinks fit”. That phrase has been considered on many occasions.²⁶⁴ Such a power is not absolute, as it must be exercised for the purposes for which it is conferred, but, within that, it is very broad.²⁶⁵ As Gillard J observed in *Protean (Holdings) Ltd v Environmental Protection Authority*, such a test provides limited practical assistance in determining whether a particular condition is within power.²⁶⁶ In that case, his Honour considered the more useful test was that advocated by Lord Denning in *Pyx Granite Co Ltd v Ministry of Housing and Local Government*, which asks whether the condition imposed “fairly and reasonably relates” to the proposed development.²⁶⁷ If it did, then the condition was within power.
243. The Court has a similarly broad power under the EPA. The power to recommend conditions under the EPA depends on whether a draft environmental authority has been issued for a project. Where, as here, a draft environmental authority has been issued, the Court may recommend approval either subject to any draft conditions contained in the environmental authority or subject to “stated conditions”.²⁶⁸ The only express constraint on this Court’s power to recommend conditions is that the conditions stated must not contradict those imposed by the Coordinator-General.²⁶⁹ In the absence of any further limitations on the kind of conditions that might be imposed, CCAQ submits that a broad approach should be taken to the power to recommend conditions. Such an approach is consistent with the text of the EPA and more likely to promote the purposes of the Act than a narrow conception.
244. In light of the above, CCAQ’s position is that the Court has a broad power to recommend conditions on a mining lease or environmental authority provided those conditions “fairly and reasonably relate” to what is being authorised by the relevant instrument.
245. The requirement to obtain an approval under the *Water Act* does not exclude the Court recommending conditions relating to groundwater take as part of other approvals processes:
- (a) The Court’s reasoning in *Xstrata* appears to be premised on the view that, because the taking of groundwater specifically requires authorisation under the *Water Act*

²⁶³ *The Appellants v Council of the Law Society of the ACT and the Legal Practitioner* [2011] ACTSC 133, [77].

²⁶⁴ See, e.g., *Shrimpton v The Commonwealth* (1945) 69 CLR 613, at 619-620.

²⁶⁵ *Shrimpton v The Commonwealth* (1945) 69 CLR 613, at 619-620.

²⁶⁶ [1977] VR 51, at 59.

²⁶⁷ [1958] 1 QB 554, at 572.

²⁶⁸ EPA, s 222(1)(b).

²⁶⁹ EPA, s 222(2)(b).

in order to be lawful, then the taking of groundwater is not authorised under either a mining lease or an environmental authority.

- (b) CCAQ respectfully disagrees with this view. It submits that the better view is that the EPA, the MRA and the *Water Act* form a series of “multiple controls”, all of which must be complied with in order for the taking of groundwater to lawfully occur. Such controls operate in parallel, rather than to the exclusion of one another.

246. The concept of “multiple controls” has been endorsed by the Privy Council, in *Associated Minerals Consolidated Ltd v Wyong Shire Council*,²⁷⁰ and the High Court in *South Australia v Tanner*.²⁷¹ In *Wyong*, the Privy Council considered whether planning permission was required for mining where a mining lease had been granted under the *Mining Act 1906* (NSW). Their Lordships concluded that planning permission was required:

Both Acts apply, or are capable of being applied, with complete generality to land in the State of New South Wales. Can they, in relation to a given piece of land, coexist? In their Lordships' opinion they clearly can, and do. The Acts have different purposes, each of which is capable of being fulfilled.²⁷²

247. Similarly, in *Tanner*, the High Court rejected an argument that a prohibition on zoos contained in regulations under the *Waterworks Act 1932* (SA) was inconsistent with the provisions of the *Planning Act 1982* (SA), which, it was said, provided a complete code for development. In rejecting this argument, the High Court accepted a submission by the Attorney-General for South Australia that:

Both pieces of legislation can stand together and operate cumulatively. They can do this because each Act has a distinct purpose, different from the other.²⁷³

248. Here, as in *Wyong* and *Tanner*, each of the EPA, the MRA and the *Water Act* has a separate and distinct purpose and those Acts can and should be treated as operating cumulatively. No single Act has precedence over the other two. Rather, it is necessary to obtain permission under each of those Acts in order to lawfully conduct mining operations which involve the diversion or appropriation of water.
249. Understood in this light, s 235(3) of the MRA does no more than confirm what would otherwise be true: namely, that the mere conferral of a mining lease does not, without more, authorising the taking of groundwater for which permission is required under the *Water Act*, at least until the relevant provisions of the WROLAA commence.
250. It follows that s 235(3) does not operate to exclude the taking of groundwater from consideration under the EPA and MRA. By extension, if taking of groundwater is a relevant consideration under those Acts, then the power to recommend conditions on

²⁷⁰ [1974] 2 NSWLR 681. *Wyong* was recently referred to with approval by Crennan, Kiefel and Bell JJ in the decision of *Commissioner of Police (NSW) v Eaton* (2013) 252 CLR 1 at 18-19, [45]-[46], regarding the need to construe the legislative intent when determining the relationship between two statutes.

²⁷¹ (1989) 166 CLR 161.

²⁷² [1974] 2 NSWLR 686, 686.

²⁷³ (1989) 166 CLR 161, at 170.

instruments under those Acts extends to a power to recommend conditions in relation to the taking of groundwater.

The appropriateness of imposing conditions

251. Leaving aside the issue of power, however, it is CCAQ's position that the purpose of conditions on a permit is to avoid or manage impacts once they have been identified.
252. This requires the Court to have some confidence that it knows what the impacts of granting approval will be and, further, to have confidence that the conditions imposed will be able to manage those impacts. In all the circumstances of this case, the Court cannot have that confidence. Accordingly, rather than seek to regulate unknown impacts through stringent conditions, it is appropriate to simply recommend refusal of the applications.
253. These propositions are consistent with recent academic and professional commentary and analysis of groundwater conditions imposed in Australia purporting to apply "adaptive management" principles,²⁷⁴ including specific criticism of the EPBC Act conditions imposed on the Kevins Corner Coal Mine in the Galilee Basin.²⁷⁵ This analysis indicates that:
- (a) "Good adaptive management requires thorough front-end EIA in order to determine ecosystem baselines, identify uncertainties and make informed decisions on planning and management. It also requires transparency in both its upfront design and its implementation."²⁷⁶
 - (b) "Adaptive management should not be used as a tool to defer tough planning and management decisions and upfront EIA to opaque post-approval processes. Good adaptive management requires thorough front-end EIA and transparency in both its upfront design and its implementation."²⁷⁷
 - (c) "Without substantive limits to guide and constrain it, adaptive management can become nothing more than mere process that fails to deliver substantive environmental outcomes."²⁷⁸
 - (d) "Prior to the grant of a project approval, there should be, at least, a clear definition of the management problem and baseline conditions, and an effective numerical model to predict the impacts of the project and identify areas of uncertainty."²⁷⁹
254. This academic and professional analysis emphasise the need to set substantive limits and triggers in the conditions of approval when using adaptive management, something that is conspicuously absent from the conditions imposed on the Kevin's Corner Mine.

²⁷⁴ Lee J, "Theory to practice: Adaptive management of the groundwater impacts of Australian mining projects" (2014) 31 *Environmental and Planning Law Journal* 251-287.

²⁷⁵ Lee J and Gardner A, "A peek around Kevin's Corner: adapting away substantive limits?" (2014) 31 *Environmental and Planning Law Journal* 247-250.

²⁷⁶ Lee, above n 274, p 257.

²⁷⁷ Lee, above n 274, p 282

²⁷⁸ Lee and Gardner, above n 275, p 247.

²⁷⁹ Lee and Gardner, above n 275, p 247.

RECOMMENDATIONS THE COURT SHOULD MAKE

255. The Court faces a difficult choice if it finds that the Applicant's evidence on groundwater impacts is unsatisfactory.
256. Due to the WROLAA removing the requirement for a water licence after 6 December 2015, the Court cannot simply adopt the approach in the *Alpha* case of deferring resolution groundwater issues to be resolved under the *Water Act*.
257. However, it is apparent from the decision of Douglas J dismissing the judicial review proceedings in *Alpha* that the Court has a wide discretion to craft recommendations that best suit the circumstances and assist the Ministers to make appropriate decisions.²⁸⁰
258. CCAQ submits that in considering its recommendations, the Court could take the approach of making two different sets of recommendations depending on whether the WROLAA removes the requirement for the holder of a mining lease to also hold a water licence under the *Water Act* or not.
259. Adopting this approach, the Court may make recommendations:
- (a) on the basis that the relevant parts of the WROLAA do not commence and the requirement for a water licence under the *Water Act* remains in the future; or, alternatively,
 - (b) on the basis that the relevant parts of the WROLAA commence and the Applicant will not require a water licence under the *Water Act* for the de-watering of the D-E sandstone for the mine.
260. The first of these approaches would allow the Court to make recommendations in a similar manner to the Court in *Alpha*, that the applications be refused or, alternatively, granted subject to groundwater issues being resolved under the *Water Act*.
261. On the second approach, if the Court considers the groundwater evidence is too uncertain, the Court should simply recommend that the applications be refused as there will not be the safety net of a future application under the *Water Act*.

CONCLUSION

262. The Court is far better informed of the likely costs, benefits and risks of the mine to Queensland than any of the previous decision-makers who have assessed these applications. Even with the far greater amount of information and expert analysis available to the Court, there remain very grave uncertainties and risks. The trial process has served to uncover these uncertainties and risks, which had been ignored or papered over in the EIS and SEIS process by the Applicant and its consultants.

²⁸⁰ *Coast and Country Association of Queensland Inc v Smith & Anor; Coast and Country Association of Queensland Inc v Minister for Environment and Heritage & Ors* [2015] QSC 260 at [8]-[17] (Douglas J).

263. In the circumstances, the risks of this proposal are just too great to justify it, particularly in the light of the dramatically reduced economic benefits. Consequently, the Court should recommend either:
- (a) in a similar manner to the Court in *Alpha*, that the applications be refused or, alternatively, granted subject to groundwater issues being resolved under the *Water Act*; and
 - (b) if the WROLAA commences and removes the requirement for a water licence, that the applications be refused as there will not be the safety net of a future application under the *Water Act*.

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29 October 2015