

In the Planning and Environment Court  
Held at: Brisbane

No. 137 of 2020

Between:	<b>GRAEME ASHLEY HOFFMANN AND CHUDA KAEWONGKHON ATF HOFFMANN DRILLING PTY LTD SUPERANNUATION FUND 716 001 453</b>	Appellant
And:	<b>GOLD COAST CITY COUNCIL</b>	Respondent
And:	<b>CATHERINE CERIS ASH</b>	First Co-Respondent by Election
And:	<b>AUSTRALIAN RAINFOREST CONSERVATION SOCIETY INC</b>	Second Co- Respondent by Election
And:	<b>GECKO ENVIRONMENT COUNCIL ASSOCIATION INC</b>	Third Co- Respondent by Election
And:	<b>BERNIE WINTER AND GINA WINTER</b>	Fourth and Fifth Co- Respondents by Election
And:	<b>CHARLES CONIN ALEX ORSINI</b>	Sixth Co- Respondent by Election

#### AFFIDAVIT

Matthew Currell, Professor at the School of Engineering, RMIT Melbourne, 124 La Trobe St, Melbourne, in the State of Victoria, being under oath, says:

1. I am engaged as an expert in hydrogeology for the Second Co-Respondent by Election in these proceedings.
2. As part of these proceedings, I have participated in:
  - (a) two joint expert report conclaves that resulted in the production of two (2) Joint Expert Reports, namely:

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Deponent:   
AFFIDAVIT

Filed on behalf of the Second Co-Respondent by  
Election  
Form PEC-4

Solicitor: 

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Ltd  
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- (i) Between 16 and 23 October 2020 I participated in a joint expert meeting process for groundwater with Dr Trevor Johnson (TJ) and Tony McAlister (TM), which resulted in the Groundwater Joint Expert Report (eTrial Doc 01.02).
  - (ii) In late July and early August 2021 I participated in a joint expert meeting on groundwater and ecology with TJ, TM, Dr Robert Kooyman, Mr Wayne Moffit and John Delaney, which resulted in the Groundwater-Ecology JER, dated 3 August 2021 (eTrial Doc 01.10); and
- (b) an individual expert report, dated 3 December 20210 (**Individual Expert Report**) (eTrial Doc 08.01).
3. On Friday 11 February 2022 I was sent by email a copy of the Affidavit of Iain Donald Hair dated 10 February 2022 (**Hair Affidavit**).
4. I have reviewed the Hair Affidavit and read the documents attached to it.

**Groundwater expertise**

5. I have been informed that the Appellant has nominated Mr Hair as “an expert in the field of groundwater testing and data collection”.
6. Technical skills and expertise are required to competently collect groundwater data during pumping tests. The mere technical aspects of this involve some expertise.
7. However, the design of groundwater monitoring, analysis and interpretation of results require expertise in hydrogeology beyond mere technical skills in operating monitoring equipment. Expertise as a groundwater expert is generally required to design pump testing in a way that it can be meaningfully used to assess the potential impacts of a development on a site and surrounding areas (as opposed to merely technical expertise to competently carry out pump testing designed by a groundwater expert, e.g. by recording and reporting data obtained from sensors and dataloggers). To ensure the data are meaningful from a pumping test, the design of the pumping test should include consideration of the following:
- (a) the choice of which bores to pump and monitor (I note that among 10 bores on the property, the pumping tests in the Hair Affidavit utilised two pumping bores and reported monitoring data from four bores on the site, but it is unclear why four other bores were not monitored);
  - (b) the location of monitoring bores, such that the response to pumping can be determined in different directions, including towards important environmental receptors (in this case, to the east and west of the pumping bores). This is particularly important in an aquifer (such as that on the site) which is known to be fractured and heterogeneous.
  - (c) the depth to which the bores are drilled, and depth interval over which they are screened (for pumping bores, this is the depth from which water will be extracted; in monitoring bores this determines the aquifer that will be monitored by the test) and how this may affect the interpretation of results;

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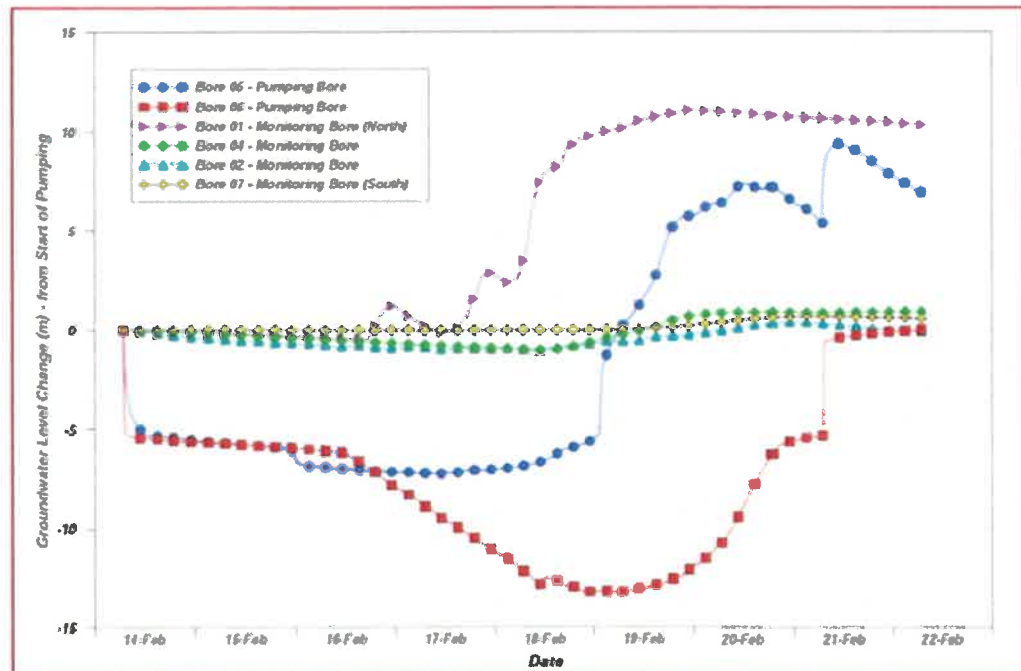
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- (d) any special considerations about designing the pumping test to assess impacts on the site and surrounding areas, resulting due to the fractured nature of the rock strata (e.g., as noted in:
  - (i) Kruseman, G.P. and de Ridder, N.A., 2000. Analysis and Evaluation of Pumping Test Data. (2nd Edition) International Institute for Land Reclamation and Improvement. **(Kruseman and de Ridder (2000))**; and
  - (ii) Cook, P. G., 2003. A guide to regional groundwater flow in fractured rock aquifers. Australia: CSIRO Land and Water. **(Cook (2003))**
- (e) the impact of heavy rainfall during the pumping test (as referenced in the Second JER at 18(d), Tony McAlister's Independent Expert Report and Kruseman and de Ridder (2000)).

**Substantial new information**

- 8. Document 5 of the Hair Affidavit is a document that was provided by TJ during the Groundwater-Ecology JER process in late July and early August 2021 **(Hair Report)**.
- 9. Document 6 of the Hair Affidavit contains substantial new information.
- 10. The substantial new information can be understood by reference to Figure 2 of Hair Report of the February 2021 pumping test, in which the changes in the water levels were presented without any indication of the (very different) absolute levels of groundwater in each bore relative to the Australian Height Datum (AHD).

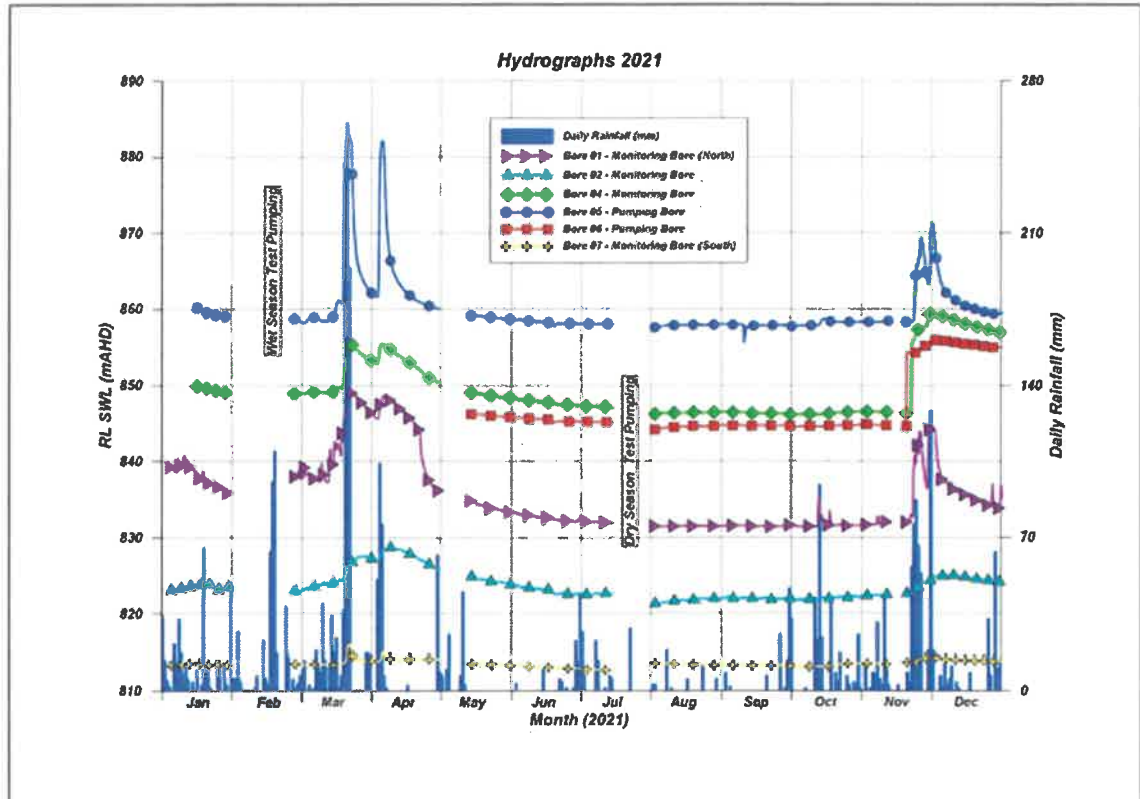


**Figure 2: Groundwater Levels recorded in Production (Pumping) and Monitoring Bores over the Period 14 to 22 February (inclusive).**

Deponent: *M. Cundell*

Solicitor: *[Signature]*

11. Figure 2 of Document 6 indicates that there are major differences in the water levels across the site:



**Figure 2: Daily Rainfall & Recorded Groundwater Levels - 2021**

12. A substantial impediment to interpreting the data, similar to the impediment that I noted in the Groundwater-Ecology JER at 18(e), is that bore construction details and lithology logs have not been provided. This means it is unclear how representative the monitoring bore water levels are of the aquifer drawdown caused by the pumping wells within a given depth/layer of the geology - i.e., it is unclear whether the monitoring and pumping bores are tapping the same depth and lithology within the aquifer. As TJ noted in his report, the aquifer is fractured and likely to be heterogeneous, and as such the geology needs to be carefully characterised to determine if monitoring bores are screening a horizon which is connected with the zone being pumped. If this is not the case, then the bore will not be suitable to monitor the impact of the extraction within the pumped aquifer.
13. Data are presented for only 6 of the 10 bores on the site (bores 1, 2, 4, 5, 6 and 7. No data are presented for the other four bores (bores 3, 8, 9 and 10). Given the limited information available for the site, any data available from those four bores would assist me in forming my opinions for the Court.
14. Within the constraint of not having basic, standard information of the bore construction and lithology logs, the new information now provided in Document 6 of the Hair Affidavit indicates that the water levels vary substantially across the site, by up to 40 metres between two bores approximately 70 metres apart, in a south-north line. This reinforces

Deponent: *M Curdell*

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my view of the complexity of the site and the need for more information to understand the possible impacts of the proposed extraction.

15. It would assist me in forming my opinions about the potential impact of the proposed development to have any additional groundwater monitoring data and bore construction data, and discussing the monitoring with Mr Hair, TJ and TM in a further groundwater expert joint meeting process, where Mr Hair participated in the limited field he is nominated for.

**Other comments on Hair Affidavit**

16. With the constraints and limitations discussed above, I further make the following observations and conclusions from the Hair Affidavit:
  - (a) Drawdown in the monitoring bores during the Dry Season Test, shown in Figure 1 on p. 3993 of the Hair Affidavit, varied depending on bore location. Monitoring bore data from this test are shown in Figure 4 (p. 3996). Bore 02, located between the two pumping bores used in the test (Bore 05 and Bore 06), showed the largest drawdown, reaching approximately 1.5 m below the starting level, six to seven days after pumping commenced.
  - (b) Drawdown of approximately 0.4 m was also recorded in Bore 01, to the north of the extraction bores, at the northern boundary of the site.
  - (c) I extracted the figure below from the Hair Affidavit Document 5, Figure 1, amending the Figure with the circle around Bore 1 to demonstrate its location clearly.

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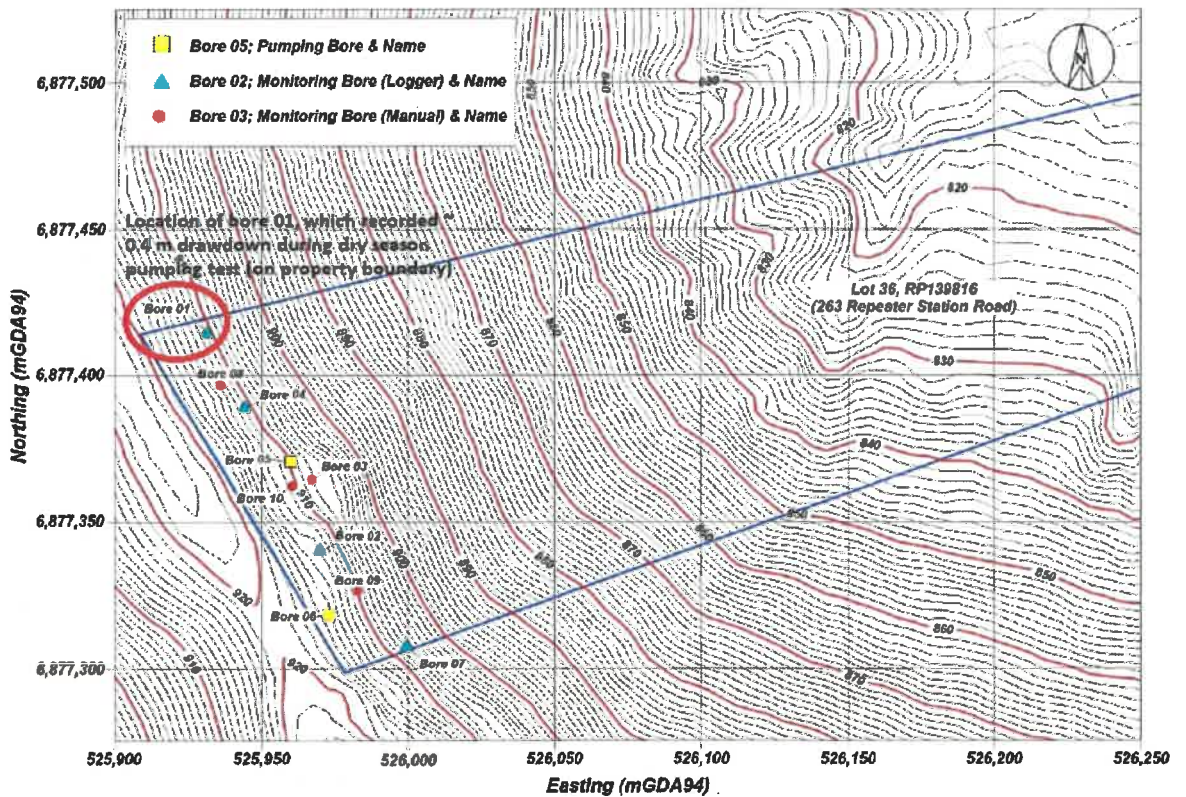


Figure 1: Location of bores with Bore 01 shown in red circle

- (d) In my opinion, the reported drawdown indicates that groundwater extraction at approximately the same rate proposed by the Appellant for the ongoing commercial extraction, is very likely to impact on the water table level outside the property boundary during dry periods, causing drawdown in the aquifer's water level on the adjacent property.
- (e) The pumping in Bore 06 during the Dry Season Test was interrupted by power outages on 25th July, which calls into question the ability for the test to indicate whether drawdown during the test had reached a stable level, or whether it would continue to increase over time with further pumping at this rate.
- (f) Monitoring of groundwater levels during the pumping tests has only occurred along a North-northwest/South-southeast line, approximately following the 910 m AHD elevation contour across the property (see figure above). There has been no monitoring of the response of the water table to the west or east of the extraction bores; for example, where groundwater dependent ecosystems (GDEs), springs and groundwater-fed streams occur (mostly at elevations between 830 and 840 m Australian Height Datum (AHD)).
- (g) Notwithstanding the lack of monitoring data to confirm, in my opinion, it is likely that drawdown of the aquifer will extend beyond the property boundary to the west of Repeater Station Rd as well as to the north, particularly during pumping in dry periods. While it is not likely (due to the aquifer being composed of fractured rock) groundwater drawdown extends from the point of extraction in a perfect radial pattern at this site, the data show transmission of drawdown to the

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north which well exceeds the distance to the property boundary to the west, and thus if drawdown travels a similar distance to the west, it will travel well beyond the site boundary. The correspondence between the topographic elevation of springs and seeps on the east and west of the ridge line where the property is located, implies some degree of hydraulic connectivity within the basalt between these features.

- (h) The groundwater elevations in Bores 1 and 2, which both experienced drawdown during the Dry Season Test, were generally between 820 and 840 m AHD throughout most of 2021 (see Figure 2, p. 3994). This elevation is the critical range within which most of the GDEs at the site (and outside the site to the west of the property) receive flows from the aquifer, as confirmed by evidence of groundwater discharge points during site visits (e.g. in the Affidavit of Elanor Fenge dated 5 November 2021). The Dry Season Test demonstrates that water levels within this critical elevation range are affected by groundwater extraction during dry periods substantially, and this effect is likely to be greater than during wet periods.
- (i) The information from the Hair Affidavit supports the opinion I expressed in the First JER and Second JER and my Individual Expert Report, that negative impacts to GDEs, springs and streams to the east and west of the bores are (highly) likely to occur as a result of the proposed groundwater extraction. As discussed in my Individual Expert Report, I do not believe adequate or effective monitoring or mitigation plans have been proposed to detect or prevent negative impacts to these groundwater dependent sites.
- (j) Little or no drawdown was observed at Bore 07 during the Dry Season Test or during a 7-day pumping test during February 2021 reported on in Documents 5 and 6 (**Wet Season Test**). This bore is located to the south-southeast of the extraction bores, but it is closer to one of these extraction bores than Bore 01 (which did experience drawdown). This confirms that the aquifer is heterogeneous and cannot be adequately characterised as responding uniformly in a radial pattern, as per the evidence given in Dr Johnson's individual expert report in these proceedings (figures included in paragraphs 12 and 13 of that report).
- (k) Notwithstanding, the data show that groundwater extraction results in drawdown that extends a significant radius from the extraction bores (e.g. to the north of the bores to Bore 01), and would likely not be confined only to their immediate vicinity.
- (l) This suggests that while the aquifers are highly heterogeneous, there is some hydraulic connectivity between the area selected for extracting groundwater, and areas monitored both to the north and south; therefore, the impacts of groundwater drawdown cannot be assumed to be localised.
- (m) Bore construction information, including lithology and screening information, for the pumping and monitoring bores used in the pumping tests has still not been included in the updated report. In my view, this is critical information and the ongoing absence of this data from all bores on site creates ongoing uncertainty regarding the applicability of the results and quality of the data obtained from

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the test. This is particularly the case for Bore 07, where drawdown was not observed, despite its close proximity to one of the pumping bores - a somewhat unexpected result. It has not been adequately demonstrated that this monitoring bore, or indeed the others on the site, accesses the aquifer within the same depth range and/or lithology as the pumping bores. It is a basic requirement of a pumping test that bore construction and lithological information be documented, along with the water level monitoring data (Stallman, 1976; Fetter, 2001), and this has not been done.

17. I referred to the following references in supporting my opinion in the preceding paragraph:
  - (a) Fetter, C.W., 2001. Applied Hydrogeology 4th Edition (International). Prentice Hall, 598pp.
  - (b) Stallman, R.W., 1976. Aquifer-test design, observation and data analysis. US Geological Survey Techniques of Water Resources Investigations, Book 3 (2nd edition).
18. Further, it is unclear whether monitoring bores utilised in the testing reported in Document 5 and Document 6 have been drilled for the purpose of ongoing monitoring of the impacts of extraction on groundwater, or whether they have also been drilled to facilitate pumping at other locations. The design of the bores will impact on their ability to provide appropriate monitoring data – i.e., bores drilled for the primary purpose of extracting groundwater are typically not ideally suited for the purpose of monitoring groundwater levels and quality in an area of groundwater development.
19. I confirm and verify that:
  - (a) the factual matters stated in this affidavit are, as far as I know, true;
  - (b) I have made all enquiries I consider appropriate with the information I have been provided; however, it would assist me to have the bore logs and any further monitoring data from the site and to discuss the monitoring with Mr Hair, TJ and TM in a further groundwater expert joint meeting process, where Mr Hair participated in the limited field he is nominated for;
  - (c) the opinions stated in this affidavit are genuinely held by me;
  - (d) this affidavit contains reference to all matters I consider significant;
  - (e) I understand my duty to the Court and I have complied with the duty;
  - (f) access to the bore logs and any further monitoring data from the site would assist me in reaching a more reliable conclusion but otherwise, no readily ascertainable additional facts would assist me;
  - (g) I have not received or accepted instructions to adopt or reject a particular opinion in relation to an issue in dispute in this P&E Court proceeding.

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Deponent:



Solicitor:





This affidavit was made, signed and witnessed in accordance with the *Justice Legislation (COVID-19) Emergency Response – Documents and Oaths) Regulation 2020* (Qld). The contents of this affidavit are true to the best of my knowledge, stated on the basis of my information and belief. I understand that providing false statements in this affidavit is an offence.

This affidavit was made in the form of an electronic document and electronically signed and affirmed by Matthew Currell on 14 February 2022. It was witnessed, by audio-visual link on 14 February 2022, by Revel Pointon, Solicitor, at Brisbane.

Signed:

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Deponent: 

Solicitor: 