Before the Hearing Panel appointed by Canterbury Regional Council and Selwyn District Council

IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Applications CRC184166, CRC200500, CRC201366, CRC201367, CRC201368, CRC203016, CRC214320 and CRC214321 by Bathurst Coal Limited for a suite of resource consents to operate, rehabilitate and close the Canterbury Coal Mine.

SUMMARY STATEMENT

SECTION 42A REPORTING OFFICER CANTERBURY REGIONAL COUNCIL HYDROGEOLOGY – FOUAD ALKHAIER

DATED: 27 OCTOBER 2021

INTRODUCTION

1. My full name is Fouad Alkhaier. I am employed by Canterbury Regional Council as a Senior Groundwater Scientist. I hold a Bachelor of Science and post graduate diploma in civil engineering, a Master of Science in watershed management conservation and river basin planning, and a Doctorate in water resources.

2. While this is a Council Hearing, I acknowledge that I have read the Environment Court's Code of Conduct for Expert Witnesses as contained in section 7 of the Environment Court Practice Note 2014 and have complied with it in the preparation of this summary.

SCOPE OF REPORT

3. This report is an addendum to my primary Section 42A report which is included as Appendix 6 of the Section 42A Officer's Report circulated on 24 September 2021. The purpose of this addendum is to provide a summary of my report and respond to matters raised in the Applicant's evidence and submitter evidence.

4. In preparing my report, I have reviewed the following information:

    a. The *assessment* of environmental effects report, its appendices and accompanying technical reports:

        i. Response to the RFI dated 17 December 2019 and its attachments, Specifically:

            1. Boffa Miskell 15 March 2019: Canterbury Coal Mine RFI Response: Ecological Impact Assessment Report

2. *JH Rekker Consulting Limited 16 December 2019: Response on Hydrological Matters*

b. *BATHURST COAL LIMITED, CANTERBURY COAL MINE, Addendum AEE for Closure and Rehabilitation, 6 April 2021*

c. *Bathurst Resources Limited, Canterbury Coal Mine DRAFT Closure and Rehabilitation Strategy, September 2020*

d. *Bathurst Resources Limited (05/07/2018). Canterbury Coal Mine – Open Cut Geotechnical Report – Update Revision 1.*

e. *Canterbury Coal Mine, Final Engineered Landform Geotechnical Review, 16 March 2021*

f. *Canterbury Coal Mine Closure – hydrology, Memo, 16 March 2021, James Griffiths, NIWA*

g. *Applicants pre circulated evidence of James Griffiths – Hydrology, Paul Weber – Mine Waste Management, and Eden Sinclair for Bathurst Coal Limited.*

SECTION 42A REPORT SUMMARY

5. My s42A report comments on the potential effect of the mining activities on the subsurface flow into the seeps and wetlands surrounding the mining site. Specifically, I considered these effects on:

   a. The raised spring wetland on the north-west ridge catchment; and

   b. The seepage wetlands on the north-west ridge catchment.

6. I have also been asked to consider whether the applicant's water treatment system will capture all mine influenced groundwater.

7. The soil map (S-map) and the field inspection shows that the soil profile on top of this geological formation is moderately deep silty loam, with moderate infiltration horizon over slow infiltration horizon. This type of soil would promote slow lateral subsurface flow in the slope direction and would be able to support feeding seepage wetlands on the slopes.

8. The prevailing soil, geology and groundwater conditions explain the hydrological conditions contributing to the presence and survival of these wetlands. Based on the information from the above-mentioned reports and memos, from my field visit and my own analysis, I think that:

   a. the raised spring wetland on the north-west ridge is fed by a combination of three water sources: deep confined groundwater, slow shallow subsurface water flow and quick surface water flow from the upgradient slopes. It is difficult to quantify how much each one of these sources contributes to the wetland inflow; and

   b. the seepage wetlands on the north-west ridge are fed by a combination of slow shallow subsurface water flow and quick surface water flow from the upgradient slopes.

9. I think that the surface/subsurface flow from the upgradient catchment has two functionalities: the first is providing the wetland with slow seeps that can happen on prolonged time frames, the second is recharging groundwater below the wetland.

10. The available length/extent of slopes and soils upgradient of the wetlands contributes to the continuity and the quantity of water that seeps into these wetlands.

11. For the raised spring wetland, the excavations have reduced the contributing area of the upgradient catchment to one-third of the original catchment. This means that the wetland now is receiving only one-third of the original surface/ and shallow subsurface flow. This makes the wetland more fragile in face of droughts.

12. The deep groundwater source that feeds into the wetland may have been affected but to a lesser extent than the surface and subsurface water flow to the wetland.

13. Disturbing the original slopes and removing parts of the soils that were upgradient of the current mine edge has probably decreased the amount of water seepage to the wetland but not to the extent of drying it up.

14. As mentioned in "Canterbury Coal Mine Closure – hydrology, Memo, 16 March 2021, James Griffiths, NIWA", the recent inspection of the site indicates that seepage to the raised spring area has not been severely impacted. However, in my opinion there is uncertainty about the future survival of the wetland.

15. For the seepage wetlands in the small catchment delineated in Figures 1-4 of my S42 report, the excavations have reduced the contributing area of the upgradient catchment to half of the original catchment. This means that the seepage wetlands within this catchment (Figures 1-4) now are receiving only half of the original surface/ and shallow subsurface flow. This makes these wetlands more susceptible to dry conditions.

16. To consider whether the applicant's water treatment system will capture all mine influenced groundwater, I looked at the topography of the site and the preferred flow paths down the slopes. I think that the system is mostly likely capable of capturing any water affected by the mine operations from the entire site.

17. The raised spring wetland on the north-west ridge is the only groundwater feature on site that I am aware of. All surface water flows, shallow subsurface flows and potential deep groundwater seeps on both sides of the ridge join at the outlets of the main streams that come out of the ridge. Hence, if there is any concern of water quality issues affecting water flow of any type (surface, subsurface and groundwater), the effect on water quality can be captured by surface water monitoring at the outlets of the main streams. Those points can be indicated by surface water scientists.

CONCLUSIONS

18. I recommend that the raised spring wetland in the north-west ridge catchment is put under monitoring program for vegetation/habitats. Vegetation health is a primary indicator that water is still emerging/ flowing to and residing in these wetlands. This monitoring would determine to what extent the hydrology/hydrogeology of the raised spring wetland have changed because of reducing the contributing area of the upgradient catchment and would ensure that it will sustain the varying climate patterns in the future. More details about this monitoring are in the S42A Supplementary report of my CRC colleague Dr Philip Grove.

19. Suitable procedures to support the wetland should be thought of and be ready to be applied in case the monitoring shows it has been affected or endangered.

Signed: _____ Date: _____

Name: Fouad Alkhaier.
Senior Scientist,
Groundwater Science