ATTN: Alison Cummings

Manager
Department of Environment and Science
Coal and Central Compliance

Email: Alison.Cummings@des.qld.gov.au

28 August 2023

Dear Alison,

Re: Spring Creek North Continuation Project Information Request Response

1 Request for Information Summary

This letter has been prepared to address the Departments request for information (RFI) to assess the application to amend environmental authority EPML00370013 (application reference A-EA-AMD-100430427), issued to Rolleston Coal Holdings Pty Ltd (RCH) on 19th July 2023.

Table 1 of this letter contains the RFI as provided by the Department, and the relevant response from RCH, incorporating information and advice from technical specialists. Section 2 contains additional supporting information, referenced within the **Table 1** responses.

As agreed with the department, this letter provides the first part of a two-part response. Information request line items that will be addressed in the second submission are clearly identified in **Table 1** below.

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Table 1 RFI Table

Item	Issue	Request	Response
1	**Offsets** Section 5.4.1 of the supporting information document states that "In order to facilitate the Project, RCH will require the clearing of all land and flora species within the Project area (592.2 ha)." Additionally, section 5.4.14.3 states "It is likely that approval for the project will be conditional on the provision of offsets in accordance with the EPBC Act and/or the Queensland framework.". Further, section 5.4.15 discusses the 'Mitigation Measures' and references 'a number of management plans' which will need to be updated. However, under section 14 of the Environmental Offsets Act 2014 (Offsets Act), 'The administering agency may impose the offset condition only if satisfied …(b) all reasonable on-site mitigation measures for the prescribed activity have been, or will be, undertaken.' An on-site mitigation measure means a measure undertaken to avoid or minimise significant adverse impacts on prescribed environmental matters. Given the substantial area of approved mining to the west and south of the current mining areas, which are yet to be mined/impacted, it's unclear to the department why the area subject to the application is currently required for mining. Specifically, the opportunity to 'avoid' the impacts under the	To satisfy the requirements of the Offsets Act and the department's consideration to impose an offset condition on the EA, provide further justification regarding the need for the project in consideration of the current authorised mining extent at Rolleston Mine.	As per Section 3.1 of the supporting information document, the Project is designed to enable RCH to implement an improved post mining land use (PMLU) for the current Spring Creek pit within the ROC Progressive Rehabilitation and Closure Plan (PRCP). ROC is required to submit the PRCP to the Department by April 2024. Ramp 1, in the existing Spring Creek mining area, has been mined out leaving a highwall that cannot be battered down without extending the slope outside of the current approval limit and into the Project footprint. The current Ramp 1 final landform would not support the proposed PMLU of grazing, and so would require classification as a Non-Use Management Area (NUMA). Should the Project be approved for mining, the current Spring Creek pit would be extended north, and the existing Ramp 1 void filled with waste rock. A buffer has been included in the Project area to provide the ability to reshape the highwall batter to a grade that would support the proposed PMLU of grazing and prevent the final landform from being required to be classified as a NUMA. Due to the nature of open cut mining, all matters included within the Project footprint will be impacted, with offsets likely to be the most effective method of mitigating these impacts. The final land use of any mined areas will be grazing, with potential offset sites currently under investigation within RCH owned land currently utilised for grazing. As such, following the implementation of offsets, it is anticipated that a net positive area of the relevant RE's and protected matters will be protected. Due to the refinement of the mine plan within the approved areas to the west and south of current mining areas, the Project is not anticipated to increase the mine's production rate or extend the life of the ROC. The current ROC EA (EPML00370013 - Condition A2) authorises the mining of up

Item	Issue	Request	Response
	principles of the Offsets Act, have not been clearly demonstrated.		to 19 million tonnes of ROM coal per annum. RCH is not seeking to amend this condition as part of the SCNCP amendment application. No change in the method of mining is proposed, with the Project designed to utilise existing approved ROC infrastructure wherever practical to minimise the Project disturbance footprint. This infrastructure includes existing electricity lines, water supply pipelines, coal handling facilities, train load out facilities, haul roads and rail infrastructure. Although the Project will be able to largely utilise existing infrastructure, some additional mine infrastructure, as well as upgrades to some existing mine infrastructure, will be required, as described throughout the supporting information document.
2	**Accommodation Camp** Section 3.1 of the application's supporting information document states "The north- eastern corner of the proposed Project pit footprint overlaps with the existing ROC accommodation camp, located within the north-eastern area of ML70415. The section of pit which overlaps with the camp is not currently scheduled to be mined until around 13 years into mining activities within the Project pit. Alternative accommodation options are being considered and approval will be sought through a separate specific approval process, as required". Additionally, after the site visit undertaken on 21 June 2023, the department understands that any impacts from the project on the accommodation camp are likely to minimal, as the impacts will occur when the camp is considerably reduced in	Provide further information regarding the timing and scale of impacts on the accommodation camp and an assessment of the potential social impacts, if the workforce is relocated to neighbouring communities. The department notes the commitments made in the 2016 EIS regarding social impacts, which may require re-evaluation, depending on the extent of workforce rehousing required.	Development of the north-eastern corner of the SCNCP area will take place towards the end of life of mine at ROC, and only if deemed economically viable at that time. During this period, operations at the ROC are anticipated to be winding down, with reduced numbers of coal mine workers requiring housing within the accommodation village. Until such time, no changes to the accommodation village and its use are proposed. Evaluation of mining in the north-eastern corner will include an assessment of workforce numbers and accommodation village demand over the associated period. Workforce accommodation solutions will be considered in the context of proposed mining activities, including production rates, at that time. As per Section 3.1 of the supporting information document, several options are likely to be considered, including retention of a portion of the camp *in situ*, relocation of the accommodation village within the approved ROC footprint, or accommodating the remaining workforce within existing RCH owned housing within the neighbouring towns of Rolleston and Springsure.

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	numbers/beds – i.e.: towards to end of the mine's life.		As discussed previously, it is anticipated that these options will be evaluated in the context of a significantly reduced workforce at the time. A determination as to whether a social impact assessment is required will be made at the time when the PRCP is amended to schedule coal extraction from within the current accommodation village footprint. The potential impacts to the surrounding towns and services will be contingent on the number of personnel, if any, to be located into the neighbouring towns of Rolleston and Springsure.
3	**Great Barrier Reef** The department acknowledges section 5.2 of the supporting information document, and its reference to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (the 'EPP Water'). However, there is no reference or consideration of the EPP water's 'Great Barrier Reef River Basins End-of-Basin Load Water Quality Objectives '. While Appendix A, Surface Water Assessment, identifies that the 'catchment areas of Bootes Creek and Meteor Creek will be reduced by 4.5% and 0.9% respectively', no other information regarding the total contribution, or reduction, in sediment and nutrient loads to the GBR catchment has been provided. In deciding the application, the department must comply with (amongst others) section 41AA of the Environmental Protection Regulation 2019 (EP Regulation). In short, the application must be refused if the activity will, or may, have a residual impact;	Provide further information regarding the total volumes of fine sediment, and dissolved inorganic nitrogen, which will be released from the proposed project. The following guidance material will assist: Reef discharge standards for industrial activities Point Source Water Quality Offsets Policy 2019	As per Section 4.3.2.1 of the SCNCP Surface Water Assessment, Rolleston Open Cut are currently authorised to release mine affected water from locations outlined in Table D1 of the EA. Releases from these locations can only occur if certain water quality limits are met and are monitored to ensure receiving waters contaminant trigger levels are not exceeded as defined in Table D5 of the EA. There are no changes to the authorised frequency or volume of mine affected water releases from ROC as a result of the SCNCP. Given Spring Creek North Pit is internally draining, dewatering will be actively managed through the existing mine water management system and there are no expected changes to releases of mine affected water or the relevant EA conditions, the discharge of dissolved inorganic nitrogen and fine sediments are not expected to increase and therefore no residual impact is expected. Stormwater runoff that contains sediment only, will continue to be managed with the ROC Water Management Plan and assessment against Section 41AA of the EP Regulation for these waters is not required (DES, 2023).

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	and the residual impact will not be adequately counterbalanced by offset measures for the relevant activity. The application has not provided sufficient information allow the department to address this requirement.		
4	**Air and Noise** The supporting information document relies on the outcomes of the 2013 Air and Noise assessments. The relevance of these assessments is unclear to the department, given the proposed activity for this application will extend closer to some sensitive places. Additionally, the 2013 assessments would have pre-dated the neighbouring Meteor Down South (MDS) Mine and associated rail loadout facility. Therefore, an assessment and consideration of the cumulative impacts of the proposed activity, along with the MDS activities, is necessary to better under the potential impacts and satisfy the requirements under Schedule 8 of the EP Regulation.	Either (1) provide the 2013 air and noise assessments and clarify their appropriateness/relevance for the proposed project, or (2) provide updated modelling that incorporates the proposed project and any additional noise generating activities since the 2013 assessments. The following guidance material may assist: Guideline Application requirements for activities with impacts to air Guideline Application requirements for activities with noise impacts	Currently being prepared by Vipac and will be provided as part of the 2nd submission
5	**Air and Noise** a) Table 24 in the supporting information document shows a list of 'nominated' sensitive receptors. It's unclear if this table represents all identified sensitive or commercial places that could be impacted by the proposed project.	a) Confirm if table 24 represents all identified sensitive or commercial places that could be impacted by the proposed project, and update as necessary. b) Advise to the extent Albinia National Park has	Currently being prepared by Vipac and will be provided as part of the 2nd submission

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	b) It's also noted that Albinia National Park is not listed in table. A 'National park' meets the definition of 'sensitive place' under the EA "a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area", and therefore must be considered in the air and noise assessment for this amendment application.	been considered in the air and noise assessments.	
6	**Rehabilitation and Final Landform** Section 6 of the supporting information document states that "Upon approval of the proposed Project, the Rehabilitation Management Plan (Glencore Coal Assets Australia (GCAA), 2020) will be updated to include the strategy for the rehabilitation of the Project area." Although a final land use of grazing is indicated, no specific rehabilitation completion criteria has been proposed. Additionally, 'Figure 5.2: SCN Final Void Catchment' in the supporting information document (surface water assessment) indicates two final voids may be present in the post mining landform. However, section 5.5.1.1 and Figure 5.20 in the Umwelt groundwater assessment indicates that four voids (Voids 7,8,9, and 10) may be present.	Further information regarding the proposed final rehabilitation criteria, including the post mining land use, is necessary to allow the department to address the requirements in Schedule 8 (Environmental objective assessment) of the EP Regulation. Any response should consider the PRCP guideline requirements, as this reflects the department's standards regarding the rehabilitation of mining activities in Queensland.	Currently being prepared and will be provided as part of the 2nd submission.
7	**Offsets** Table 22 'Summary of SIA for MNES and MSES occurring within the Project area (E2M, 2023)' in the supporting information document identifies that	Provide a breakdown of the 20.5ha of "prescribed REs within a defined distance from the defining banks of a relevant watercourse".	A detailed breakdown of the 20.5 ha of "prescribed REs within a defined distance from the defining banks of a relevant watercourse" to show specific regional ecosystems has been provided by Ecological Australia and

<table>
<tr><th>Item</th><th>Issue</th><th>Request</th><th>Response</th></tr>
<tr><td></td><td>there will be a significant residual impact to 20.5ha of ‘Prescribed REs within a defined distance from the defining banks of a relevant watercourse’. However, a breakdown of the specific regional ecosystems (REs) is not provided. This information will be necessary to amend Table K1 in the EA, if the application is approved.</td><td></td><td>is provided below. Section 2.1 provides a Figure depicting the location of each RE, along each relevant watercourse.

An update to EA Table K1 to incorporate these values is included in Section 2.2.

<table><tr><th>Regional Ecosystem</th><th>Area (ha)</th></tr><tr><td>11.3.25d</td><td>1.7</td></tr><tr><td>11.4.7</td><td>0.1</td></tr><tr><td>11.8.11</td><td>6.9</td></tr><tr><td>11.8.4</td><td>0.8</td></tr><tr><td>11.8.5</td><td>9.3</td></tr><tr><td>Non-remnant</td><td>1.7</td></tr><tr><td>Total</td><td>20.5</td></tr></table></td></tr>
<tr><td>8</td><td>Sodium Trigger

a) Section 3.2 of the supporting information document seeks to amend the trigger investigation levels of sodium within table D3 (Release contaminant trigger investigation levels) of the EA. It’s recognised that the EA, via table D2 (Mine affected water release limits), contains release limits for Electrical conductivity (EC), and EC could be considered an appropriate analyte for sodium where a sufficient historical correlation can be made. This</td><td>a) Provide a detailed summary of, and all raw historic data, relating to mine water releases for sodium and EC, including a correlation analysis.
b) Pending the outcome of item a) above, clarify if the sodium trigger value sought from the amendment is appropriate when compared to the</td><td>A summary of historic mine water releases for the ROC is contained within Table 5, with the correlation between sodium and EC within ROC release waters discussed in Section 2.3.

As per Section 2.3, it is believed that the sodium level is demonstrated to align with the EC maximum release limits as stated within EA Table D4. As such, ROC seek to remove sodium trigger limits from surface water trigger limits within EPML00370013.</td></tr>
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	could result in the removal of sodium from table D3. b) There is also inconsistencies regarding the proposed trigger for sodium. Some sections of the supporting information document states 264,000µg/L, while other areas seek 300,000µg/L.	maximum release EC of 1,800 µS/cm.	
9	**Groundwater - Transient Model Calibration 2001 to 2022** a) The report identifies how the spoil was represented in the predictive modelling, but it is not clear if it was represented in the calibration model. Appendix B Figures 3.19 and 3.21 demonstrate significant areas of spoil currently existing at the mine. b) It is also not clear if the Meteor Downs South (MDS) mine was represented in the model calibration given its proximity to Rolleston Coal Mine and in particular the proposed project area. Appendix B Section 3.3.2 notes that some of the basalt monitoring bores at Rolleston Coal mine are being impacted by Meteor Downs South mining. c) It's noted there is a licence at MDS to take 300 ML/year from basalt bores for construction purposes. These bores (believed to be 165503 PB02, 165502 PB01, 165504, PB03) don't appear to be identified in Appendix B section 3.5.1 groundwater users. d) Appendix B Section 3.1 presents water level data from geotechnical holes in existing	a) Clarify whether the spoil was represented in the model calibration and if not, the reasoning. b) Clarify whether the mining at Meteor Downs South was represented in the model calibration and if not, the reasoning. c) Clarify if the MDS groundwater bores have been considered in the modelling and if not, the reasoning. d) Clarify whether these geotechnical holes have been used in the model calibration and if not, the reasoning.	a) Umwelt confirm spoil was represented in the calibration model consistent with representation in the predictive model. Within the calibration model, mining was represented using the drain (DRN) package and time variant materials (TVM) to represent pre-stripping, progression of mining and backfilling of spoil. Replication of mining followed the annual progression of mining from 2004 to 2022. The timing of progression is shown in Umwelt (2023) Appendix B Figure 2.10 Historical Mine Progression (Calibration Period). Refer to Section 2.4 for a copy of the map. The model drain cells were kept active for five years, after which time, where mining had progressed ahead, the drain cells were deactivated and the properties of the cell changed to spoil or void properties, dependent on the landform design. The spoil properties were assigned with a horizontal hydraulic conductivity of 0.1 m/day, a vertical hydraulic conductivity of 0.1 m/day, a specific yield of 0.1 and specific storage of 1.3 x 10-5 m-1. There is currently no site specific data on spoil properties at the site. Therefore the horizontal hydraulic conductivity was applied based on research by Vosolo (2017) on spoil samples collected from a coal mine in Queensland, which recorded a permeability of 0.10 m/day and 0.12 m/day for fresh and near surface spoil. The research by Vosolo (2017) also showed a reduction in permeability to 0.057 m/day and 0.005 m/day with an increase in pressure, to

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	spoil areas (PZ holes) but these holes don't appear to have been used in the calibration.		600 kPa and 900 kPa respectively. This increase in pressure reflects permeability changes with compaction and settlement of spoil over time. The influence on predictions of changes in spoil properties was captured in the model scenario analysis, with changes in the spoil hydraulic conductivity between 1.0 m/day and 0.01 m/day. b) Mining at MDS was included in the model, with the mining commenced from 2018 and targeting the D Seam of the Blackwater Group. The modelled mine progression and timing for MDS is presented in Umwelt (2023) Appendix B Figure 2.10 Historical Mine Progression (Calibration Period). As shown in the figure mining commenced from stress period 66, represented in the model as the first quarter of 2018. The modelled mine progression for the predictive scenarios are also presented in Appendix B of Umwelt (2023) Figure 2.11 Proposed Mine Progression and Dewatering for the Entire Length of Simulation. Refer to Section 2.4 for a copy of the map. c) MDS bores were included in the conceptualisation and modelling, with the bores presented in the model calibration results in Appendix B of Umwelt (2023), under Appendix 1 Calibration Residuals. The bores are shown in the table as: • 165502 PB01 – represented as MPB01: absolute average residual of 0.0188 layer 4. • 165503 PB02 – represented as MPB02: absolute average residual of 4.2043 layer 4.

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			• 165504, PB03 – represented as MPB03: absolute average residual of 9.978 layer 4. The bores are located on Glencore owned land so were not included in the initial bore summary report table, but have been included in Table 6 of this document. The three bores are located outside of the extent of predicted drawdown due to the SCNCP. The bores are located approximately 1.7 km to 2.5 km from the edge of the 1 m drawdown extent for the Project as shown Umwelt (2023) Figure 5.7 Predicted Maximum Drawdown: Project Only (top) and Proposed (lower) – Layer 4. Refer to Section 2.5 for a copy of the maps with the bores labelled. d) Details on the geotechnical spoil holes were provided following completion of the model calibration. This data was provided prior to recovery modelling and was used to verify the ability of the model to replicate current groundwater conditions in the spoil. Further details on this are provided in Section 2.6.
10	**Groundwater - Final Voids Modelling** a) Appendix B, Section 5.5.1 states: "Recharge to the final voids was increased to 150% of annual rainfall to account for overland flow plus surface water diversion." However, it's unclear what surface water assessment was utilised to investigate and assess catchment size and run off to support the assumptions made. b) Section 5.3.10.2 of the supporting information document states: "Water quality within the final voids will change	a) Justify using the figure of 150% and clarify the surface water assessment undertaken to support the final void modelling, including the proportion attributable to the proposed amendment. b) Provide an assessment of the water quality to remain in any final void/s. c) Present each void in figure 5.19 on an individual	Currently being prepared and will be provided as part of the 2nd submission.

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	over time with groundwater inflows, spoil recharge and evaporative processes. However, as discussed in Section 5.3.5, unlike other areas in the Bowen Basin, groundwater within the Study area is generally of good quality, with fresh to brackish salinity. The periodic recharge events associated with La Niña episodes would also contribute fresh water." However, an assessment of final void water quality has not been provided. c) Appendix B Figure 5.19 provides predicted long term water level elevations in the final voids, all on one graph, for the base case. It would be beneficial if these voids could be presented on individual graphs and compared to the predicted groundwater levels at those locations to clearly demonstrate the likely source or sink attributes of each final void. This is particularly the case when the predicted water levels in the voids appear to be very similar to predicted long term groundwater levels.	graph and compare to the predicted groundwater levels at each location.	
11	**Groundwater - Elevation Contours** Appendix B Figures 4.1 to 4.10 provide predicted water level elevations in various layers at the end of mining, are presented at 50 m contour intervals and at a scale difficult to interpret around the mine and void areas.	Provide more detailed maps to allow the department to better understand the predicted groundwater level elevations at the end of mining.	Updated maps with greater resolution are presented in Section 2.7.

Item	Issue	Request	Response
12	**Greenhouse gas emissions** No information regarding the project's greenhouse gas emissions has been provided, and as a result it's unclear how the proposed project will contribute to the climate targets outlined in the Queensland Climate Action Plan 2020-2030.	Provide further information regarding the project's projected greenhouse gas emissions, specifically: • Provide an inventory of projected annual Scope 1 and Scope 2 emissions for each greenhouse gas over the life of the project; • Provide an estimate of annual Scope 3 greenhouse gas emissions for the life of the project; • Provide a plan that outlines the avoidance, mitigation or offsets measures that will be implemented, and how these measures will contribute to Queensland's climate targets.	Currently being prepared by METServe/ Glencore and will be provided as part of the 2nd submission
13	**Determining Offsets as a Suitable Outcome** Pending the response to item 1, should a significant residual impact remain for any prescribed environmental matters (PEMs), it must be demonstrated that an offset is a 'suitable outcome'. As per section 3.6 of the General guide for the Queensland Environmental Offsets Framework the department must have a high level of confidence that a suitable offset can be selected, designed and	a) Provide additional details of the availability and viability of land-based offsets for each impacted matter to deliver a conservation outcome. Please note that an available offset area must demonstrate the known sightings of the species	A number of RCH owned properties have been identified with the potential to acquit MSES offsets required for the SCNCP. Specifically, the potential offset areas include: • Meteor Downs (comprising Lot 2 on RP618664, Lot 2 on RP616045, Lot 4 on SP170740, Lot 12 on RP616044, Lots 10 and 11 on RP617702, Lot 5 on RP617702, Lot 4 on RP617695, Lot 4 on RP617701, Lot 18 on RP617697 and Lot 1 on SP164068) • Mt Kelman (Lot 505 on SP276918) • Meteor Park (Lot 1 on SP293499); and

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	managed, to achieve a conservation outcome and maintain the viability of the PEMs to be offset.	and that the landholder is willing and able to implement conservation management to improve the conservation outcome for the species population within the proposed offset area. b) Pending the response to (a), provide an assessment of the area in hectares (ha) of each PEM which is available to be used as an offset in the bioregion and subregion. Areas available for offsets include those which contain the PEM in question, are on freehold or leasehold land, are not already protected, are not at risk from completing land uses (e.g. mining, quarrying or forestry) and are not otherwise inappropriate for use as an offset area. The assessment must include a spreadsheet and shapefiles of lot-on-plans	• Lot 3 (Lot 3 on SP293498). ROC has successfully implemented offsets management plans for both MNES and MSES within the lots listed above for previous stages of the ROC mine. Ecological assessments are currently underway within these lots to determine the specific areas to be selected for offsetting the impacts to MSES as a result of the SCNCP. RCH proposes to implement offsets for SCNCP impacts within RCH owned land. If there are any MSES that are unable to be fully offset through land-based offsets through this area, RCH may seek to secure through financial offsets. As a result, a response to part (b) is not believed to be applicable to the SCNCP and therefore not required.

Item	Issue	Request	Response
		identified as suitable for offsets and available to deliver a conservation outcome.	

2 Further Details

2.1 Prescribed REs within a defined distance from the defining banks of a relevant watercourse

Figure 1 provides the location of prescribed regional ecosystems within a defined distance from the defining banks of the relevant watercourses.

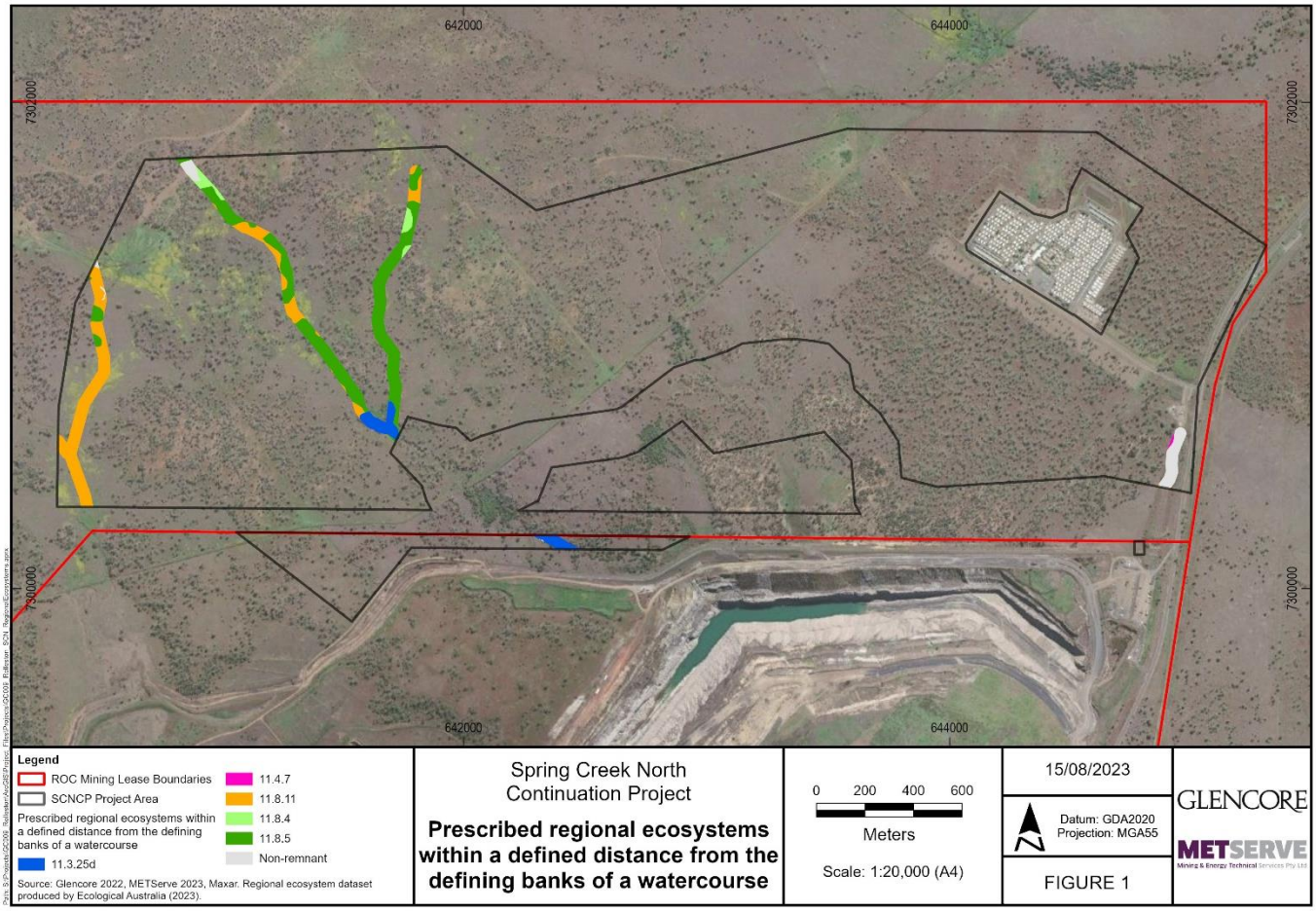


Figure 1 Prescribed regional ecosystems within a defined distance from the defining banks of a relevant watercourse.

2.2 Updated Table K1

Table 2 contains updated impact to prescribed environmental matters for EPML00370013 Table K1. These have been updated to include all impacts resulting from the SCNCP, inclusive of the 20.5 ha of "prescribed REs within a defined distance from the defining banks of a relevant watercourse" within the SCNCP footprint.

Table 2 Updated Table K1

Prescribed Environmental Matters	Maximum Extent of Impact (ha)	Offset Requirement
Endangered Regional Ecosystem 11.4.9*	39	No
Endangered Regional Ecosystem 11.3.21*	73	Yes **
Endangered Regional Ecosystem 11.4.7	7	Yes
Of concern Regional Ecosystem 11.3.2	45	Yes
Of concern Regional Ecosystem 11.3.3*	62	Yes **
Of concern Regional Ecosystem 11.8.11*	1358.1	Yes **
Of concern Regional Ecosystem 11.9.4*	1	No
Regional ecosystems that intersect a wetland on the vegetation management wetlands map: RE 11.3.27	23	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.3.25	125.7	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.3.27	6.6	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.3.3	7.3	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.3.4	0.3	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.3.6	48.6	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.3.6/11.3.2	0.7	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.4.4	1.8	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.4.7	0.1	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.4.9	0.8	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.8.11	141.9	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.8.4	0.8	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.8.5	33.8	Yes

Prescribed Environmental Matters	Maximum Extent of Impact (ha)	Offset Requirement
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.8.5/11.8.11	0.26	Yes
Regional ecosystems within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map: RE 11.8.11/11.8.5	2	Yes
Connectivity area	78	Yes
Habitat for an animal that is endangered wildlife – Koala – *Phascolarctos cinereus**	424.8	No
Habitat for an animal that is vulnerable wildlife – Squatter pigeon – *Geophaps scripta scripta**	1518	No
Habitat for an animal that is vulnerable wildlife – Black-breasted button-quail– *Turnix melanogaster**	50	No
Habitat for an animal that vulnerable wildlife – Ornamental snake – *Denisonia maculata**	148	No
Habitat for a plant that is endangered – Belyando cobbler's pegs – *Trioncinia retroflexa*	124.1	Yes
Habitat for a plant that is vulnerable – King blue grass – *Dichanthium queenslandicum**	1573.2	No
Habitat for a plant that is vulnerable – *Cyperus Clarus*	536.2	Yes

* These matters will be offset under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) approval conditions.

**Partial offset requirement – The following impacts on Matters of State Environmental Significance are authorised under EPBC 2011/5965 as they partially overlap with Matters of National Environmental Significance: RE 11.3.3 – 26.5ha, RE 11.8.11 – 693.2ha and RE 11.3.21 – 25.61ha.

2.3 Sodium EC Correlation Analysis

2.3.1 Background

As part of the SCNCP EA amendment application, RCH has sought to amend the trigger levels for sodium within EA Table D3 – Release contaminant trigger investigation levels. This amendment will apply to release trigger levels for all mine affected water dams across site.

Although an amended EA was issued to RCH in October 2022, which updated the trigger limits for sodium across ROC's surface water monitoring points, an administrative error meant that the value for Table D5 – Receiving waters contaminant trigger levels was replicated in Table D3.

As part of the SCNCP EA amendment application, RCH proposed that the trigger level for sodium in EA Table D3 (Table 3) be raised to 300,000 µg/L across the broader ROC. This value is derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000. Table 5.2.3 of the guideline states water quality guidelines for recreational purposes. Within Table 5.2.3 a value of 300,000 µg/L is given for Sodium.

The current EA trigger levels stated within Table D5 are also derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000 (the guideline). Table 4.2.8 of the guideline states trigger levels for prevention of foliar injury due to sodium in irrigation water. The most restrictive value of 115,000 µg/L for sodium sensitive plants was chosen as stakeholders downstream from the ROC may require the use of downstream waters for irrigation purposes.

The current trigger level imposed within EA Table D3 of 115,000 µg/L represents the 22nd percentile of sample results to date, which is considered inadequate for the effective management of mine affected water on site.

When compared to sample results for the ROC from 2008 through to 2023 (Appendix A), the value of 300,000 µg/L represents the 87th percentile of Sodium results. As such it is believed that this value is better representative of the water conditions within the ROC water storages.

As the trigger level for receiving waters (EA Table D5) will remain at 115,000 µg/L, it is not anticipated that the amendment to release trigger levels will have any impact on the downstream environment or downstream stakeholders. Should any of the ROC's downstream monitoring points detect levels of sodium above 115 mg/L, and the downstream level is higher than levels at the relevant upstream monitoring point, any releases will cease, and an investigation conducted as per EA condition D18.

Table 3 MAW release Trigger Levels (EA Tables D2 and D3 Combined)

MAW Release Trigger Levels		
Electrical Conductivity (EC)	µS/cm	Bootes Creek: 280 – 1800 (Dependant on flow rate)
		Meteor Creek: 324 – 1800 (Dependant on flow rate)
pH	pH Units	Low flow: 6.5 – 9.0
		Medium and high flow: 6.5 – 9.5
Turbidity	NTU	NA
Suspended Solids	mg/L	Bootes Creek: 1050
		Meteor Creek: 1200
Sulphate (SO42-)	mg/L	250
Aluminium	µg/L	270
Arsenic	µg/L	13
Cadmium	µg/L	0.2
Chromium	µg/L	2
Copper	µg/L	5
Iron	µg/L	300
Zinc	µg/L	58
Molybdenum	µg/L	34
Selenium	µg/L	10
Silver	µg/L	1
Uranium	µg/L	1
Vanadium	µg/L	10
Ammonia	µg/L	900
Nitrate	µg/L	1100
Petroleum hydrocarbons (C6-C9)	µg/L	20
Petroleum hydrocarbons (C10-C36)	µg/L	100
Fluoride (total)	µg/L	2000
Sodium	µg/L	115,000*

* Subject to EA Amendment

2.3.2 Administrative Error

An administrative error was identified within the EA amendment supporting information document, where a both 264,000 µg/L and 300,000 µg/L were proposed for the sodium release limit within EA Table D3. The 264,000 µg/L value is a relic from an earlier draft of the supporting information document, where 264,000 µg/L represents the 80th percentile of samples to date.

This value was amended following review of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000* (Table 5.2.3) as outlined above. ROC can confirm that the value being sought for sodium within EA Table D3 is 300,000 µg/L as per water quality guidelines for recreational purposes.

2.3.3 SCNCP RFI

As part of the SCNCP EA amendment application process, DES issued a request for information (RFI) relating to the application. One of the items within the RFIs queried the amendment to the sodium levels within EA Table D3. DES have stated that:

It's recognised that the EA, via table D2 (Mine affected water release limits), contains release limits for Electrical conductivity (EC), and EC could be considered an appropriate analyte for sodium where a sufficient historical correlation can be made. This could result in the removal of sodium from table D3.

a) *Provide a detailed summary of, and all raw historic data, relating to mine water releases for sodium and EC, including a correlation analysis.*

b) *Pending the outcome of item a) above, clarify if the sodium trigger value sought from the amendment is appropriate when compared to the maximum release EC of 1,800 µS/cm.*

The following correlation analysis has been undertaken with the aim of satisfying the above request from DES to determine whether the sodium value sought for EA Table D3 of 300,000 µg/L is appropriate, when compared to the maximum release limit for EC across the ROC of 1,800 µS/cm. If this is found to be the case, it is ROC's preference that trigger levels for sodium be removed from the ROC EA, and instead be managed through the monitoring of Electrical Conductivity (EC).

2.3.4 Relationship Between Sodium and EC

According to the NSW Department of Primary Industries, "Water salinity is measured by passing an electric current between the two electrodes of a salinity meter in a sample of water. The electrical conductivity (EC) of a water sample is influenced by the concentration and composition of dissolved salts. These salts increase the ability of a solution to conduct an electrical current, so a high EC value indicates a high salinity level".

While salinity represents the quantity of all dissolved salt within a water sample, including other compounds such as sulphate and fluoride, which are also included in the release trigger levels within Table D3, sodium usually makes up a significantly larger portion of the dissolved salts within a water sample (alongside Chloride), which enables EC to be utilised to provide an indication of sodium levels.

2.3.5 Correlation Analysis

ROC has undertaken monitoring of waters released from the various mine affected water dams across site since 2008, with sodium levels within these waters ranging from 4,000 µg/L to 539,000 µg/L, with an average across 676 sample events completed to date of 192,000 µg/L.

Of these 676 sample events, 580 were able to be directly compared to an in-field EC reading taken at the same time.

These 580 samples also demonstrate sodium levels within ROC release waters ranging from 9,000 µg/L to 539,000 µg/L, however, with a smaller sample size of 580 sample events, the average sodium level across these releases rises to 197,000 µg/L.

EC measurements taken across the same period within ROC release waters range from 71 µS/cm to 2454 µS/cm, with an average EC of 1084 µS/cm across ROC releases to date.

The ratio of EC to Na within ROC release waters averages 5.8 x EC to Na, with a max of up to 10.6 x EC to Na, and a minimum of 2.7 x EC to Na. These are minimum and maximum values and so include several anomalous results which could be attributed to sampling or administrative errors, however the 10^{th} and 90^{th} percentiles of 4.7 x and 7.6 x respectively, indicate that there is a clear correlation between EC recorded and sodium limits within ROC release waters.

A sodium level of 300,000 µg/L represents the 86th percentile of the 580 samples used for this correlation analysis (down from 87th percentile for all 676 sample events). As per **Table 3**, the 86th percentile for EC samples across site is 1541 µS/cm.

While this 1541 µS/cm value is lower than the 1,800 µS/cm release limit for EC within the ROC EA Table D4 (**Table 4**), it is important to note that the 1,800 µS/cm limit on EC is only applicable to high flow release events, where receiving waters are flowing at up to 5m³/s for Bootes Creek, and more than 15m³/s for Meteor Creek. An EC release limit of 1,600 µS/cm is in place for medium flow release events, where receiving waters are flowing from between 1m³/s and 2.5m³/s for Bootes Creek, and 2.5m³/s and 7.5m³/s for Meteor Creek. As the proposed 300,000 µg/L release limit for sodium within EA Table D3 will apply across all releases, even low flow releases where EC release limits can be as low as 280 µS/cm for Bootes Creek (under 1m³/s flow rate) and 324 µS/cm for Meteor Creek (under 2.5m³/s flow rate), using trigger levels for EC rather than sodium within EA Table D3 could be considered considerably more conservative.

The ratio of EC to Na within ROC release waters averages 5.8x EC to Na, with a max of up to 10.6x EC to Na, and a minimum of 2.7x EC to Na. These minimum and maximum values include several anomalous results which could be attributed to sampling or administrative errors, with 10th and 90th percentiles of 4.7x and 7.6x respectively, showing a much narrower band of ratios of EC to sodium. **Figure 2** shows a plot of EC and sodium for all 580 results taken across the life of ROC. Using a ratio of 6x EC to Na for scale we are able to demonstrate a clear correlation between EC measurements and sodium levels within ROC release waters over a period of 15 years.

Table 4 Mine Affected Water Release During Flow Events (EA Table D4)

Receiving waters	Release Point (RP)	Gauging Station	Gauging Station Easting (GDA2020)	Gauging Station Northing (GDA2020)	Receiving water flow recording frequency	Receiving water flow criteria for discharge (m³/s)	Maximum release rate (for all combined RP flows) (m3/s)	Electrical conductivity release limits (µs/cm)
Bootes Creek	RP1 RP3 RP4 RP6	MP1a	33648	293044	Continuous (minimum daily)	Low flow <1.0m³/s for a period of 28 days after natural flow Events that exceed 1.0m³/s	0.5	280
						Medium 1.0	1.0	1600
						2.5	2.5	1600
						High 5.0	5.0	1800
Meteor Creek	RP5	MP2a	638622	7286202	Continuous (minimum daily)	Low flow <2.5m³/s for a period of 28 days after natural flow Events that exceed 1.0m³/s	0.5	324
						Medium 2.5	1.4	1600
						7.5	4.0	1600
						High 15.0	6.5	1800

Table 5 Sample Data ROC MAW Releases 2008 - 2023

Sample Site	Date/Time Sampled	Field Electrical Conductivity (µS/cm)	Dissolved Sodium (µg/L)	Ratio (EC v Na)
Min	2008 - 2023	71	9,000	2.8
Max		2454	539,000	10.7
Mean		1084.4	196,800	5.8
Percentile (86th)		1541	301,000	7.0
Percentile (90th)		1612.2	322,100	7.6
Percentile (10th)		465.8	65,900	4.7

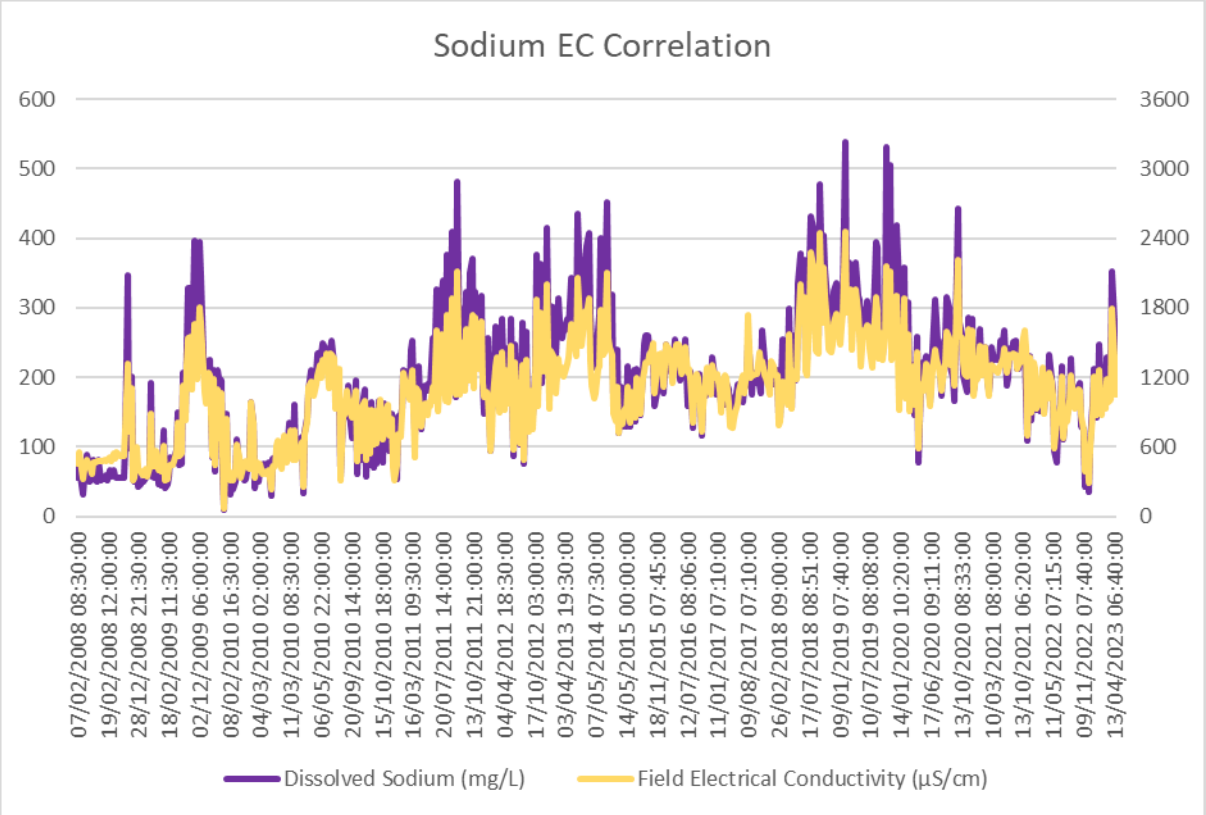


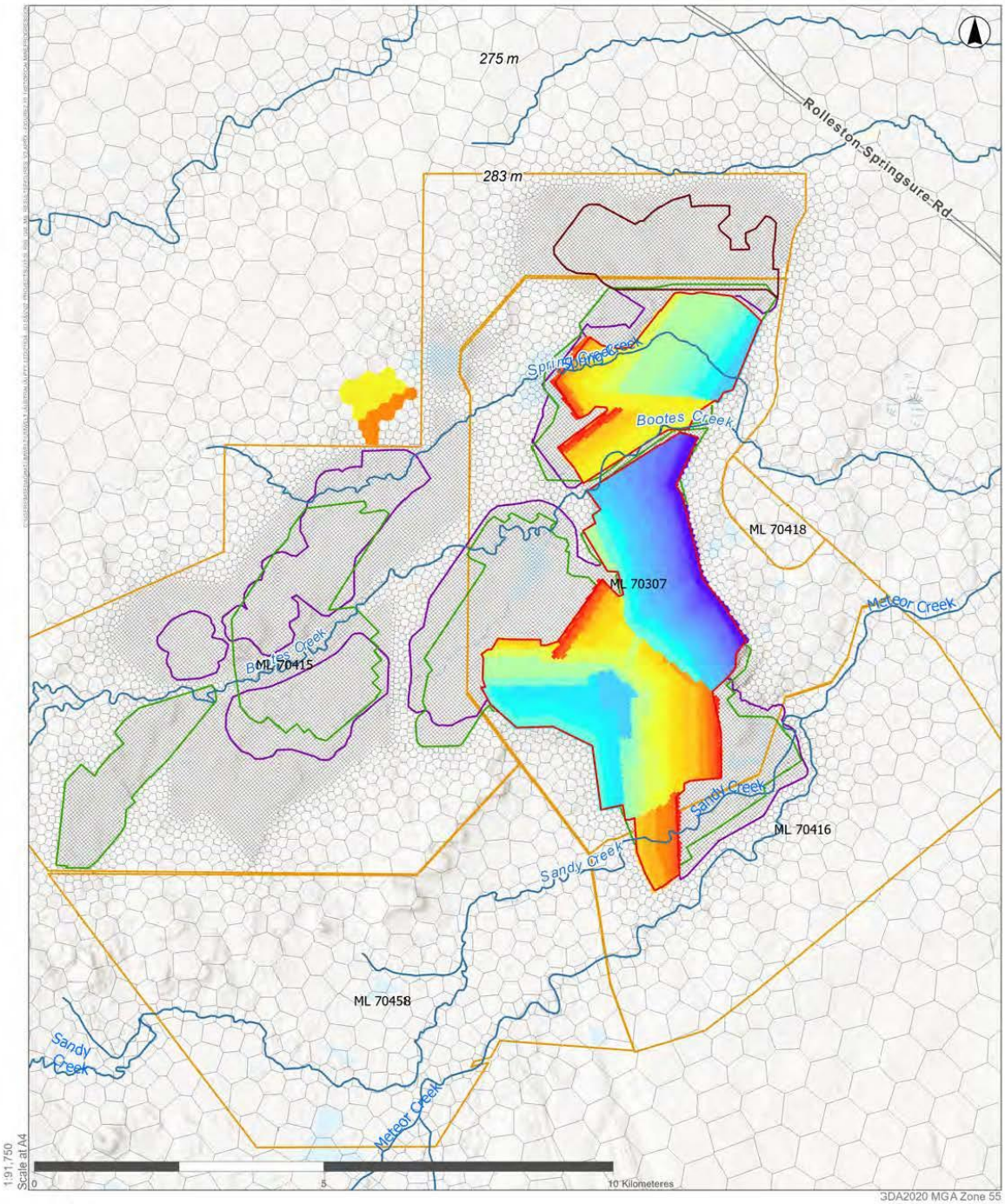
Figure 2 ROC All Sites EC Sodium Correlation

2.4 Modelled Mine Progression

In response to the request for information in **Table 1**, figures from Umwelt (2023) Appendix B are included below, representing:

- Figure 2.10 Historical Mine Progression (Calibration Period).
- Figure 2.11 Proposed Mine Progression and Dewatering for the Entire Length of Simulation.

umwelt



Legend

- Existing Disturbance Extent
- SCNCP Pit
- Approved ROC [AGE 2014]
- Current LOM Pit Extent
- ROC Mining Lease Boundaries
- Watercourses

Mine Progression - Starting Stress Period

14, 16, 18, 20, 22, 26, 30, 34, 36, 38, 42, 46, 50, 54, 55, 57, 58, 62, 66, 70, 74, 76, 77, 78, 81, 82, 83

FIGURE 2.10

Historical Mine Progression (Calibration Period)

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022), NPWS Estate (2022)

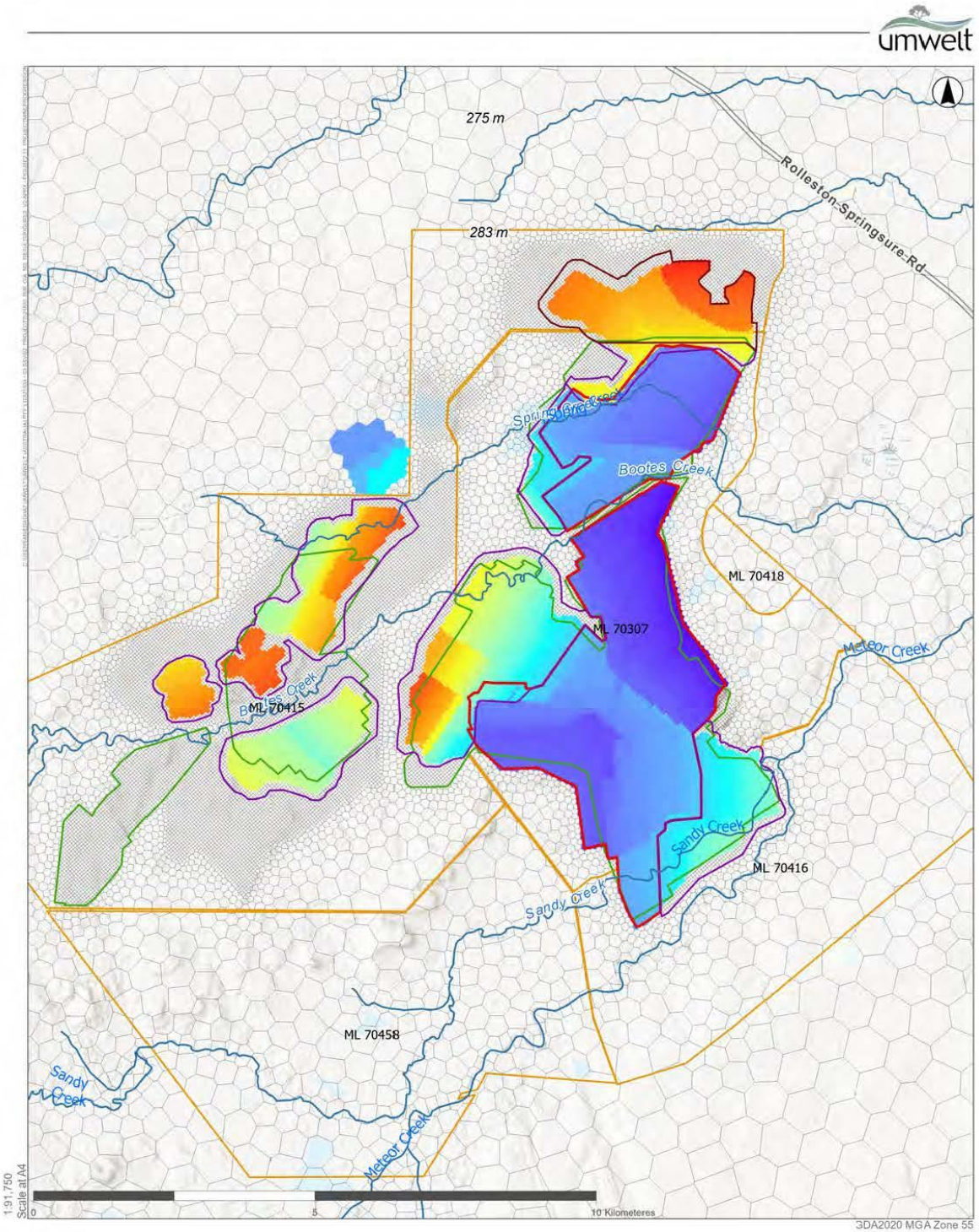


FIGURE 2.11

Proposed Mine Progression and Dewatering for the Entire Length of Simulation

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022), NPWS Estate (2022)

2.5 Meteor Downs South Bores

Further details on the Meteor Downs South bores are included in **Table 6**.

The predicted drawdown figure (Figure 5.7) relevant to the bores is also included below with the bore locations annotated. The bores are located outside the extent of predicted drawdown for the SCNCP, therefore no additional drawdown is predicted due to the Project. The bores are also outside the 2m extent predicted drawdown for the Project plus the Rolleston Open Cut Life of Mine (ROC LOM) plan, which is referred to in the figure as “Proposed”.

Table 6 Meteor Downs South Bore Details

Bore	Easting	Northing	Source	Geology	Property	Elevation	Bore Depth (m)	Use	Status	Comment	Census
RN165502 (MPB01)	636797	7298049	RCH	Basalt	Meteor Downs	271	40.4	Mine Water Supply	-	-	Census bore
RN165503 (MPB02)	637137	7298539	RCH	Basalt	Meteor Downs	260.7	32.13	Mine Water Supply	-	-	Census bore
RN165504 (MPB03)	637120	7298927	RCH	Basalt	Meteor Downs	264.4	63.2	Mine Water Supply	-	-	Census bore

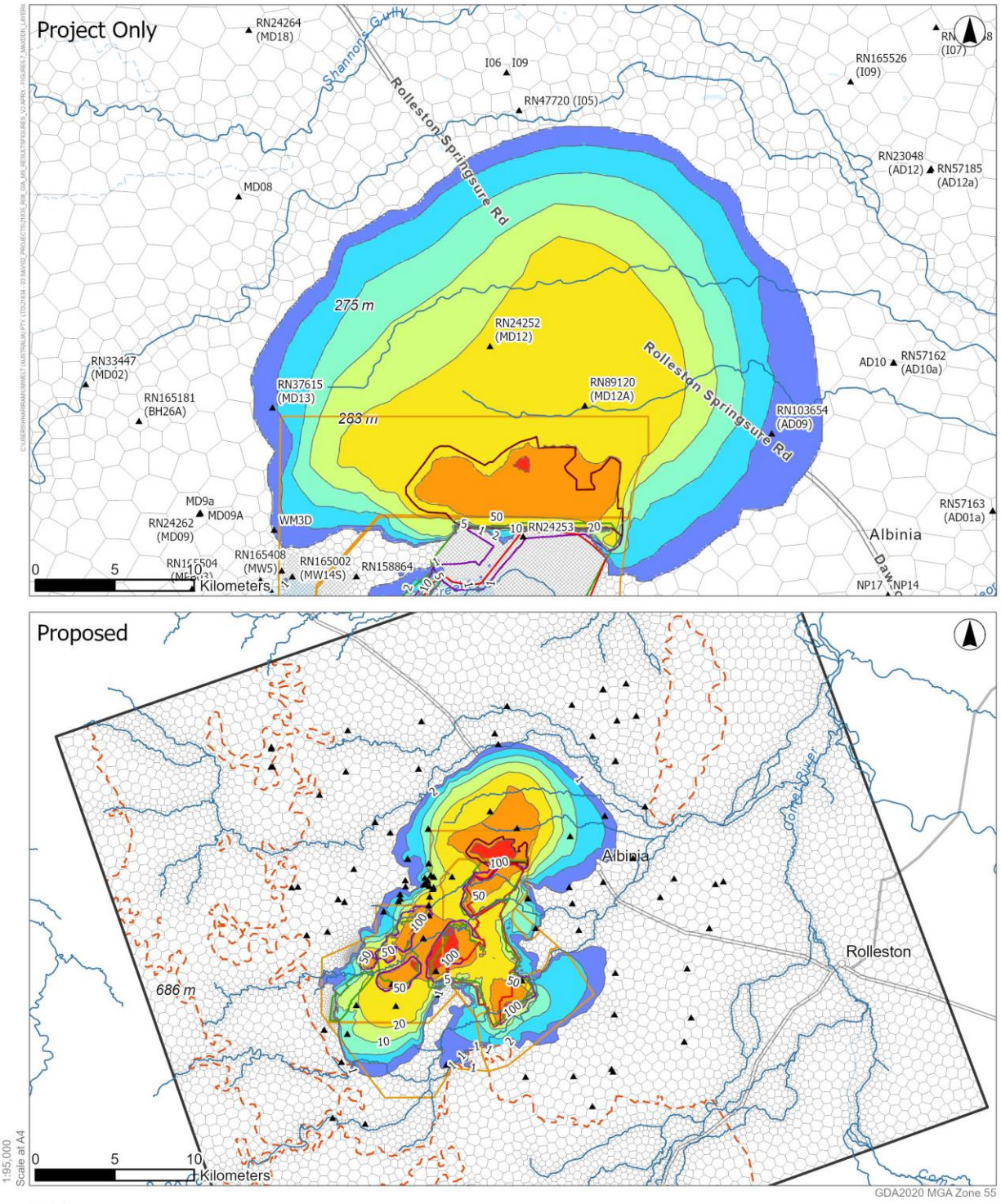


FIGURE 5.7

Predicted Maximum Drawdown: Project Only (top) and Proposed (lower) – Layer 4

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

2.6 Geotechnical Holes

Information from five spoil holes and water level for 2022 were derived from the Geotechnical Reference Report (WK Geotechnical 2022), as summarised in Table 7. This information was provided subsequent to completion of the model calibration, but was used to verify the performance of the model to replicate the spoil properties prior to initiating the recovery modelling.

The reported water levels were included in the Umwelt (2023) groundwater assessment to illustrate the current conditions at the site, as presented in Figure 3.10 Permian Coal Measures – Inferred Groundwater Levels and Flow. The predicted water levels within the mine spoil (layer 10) at the end of calibration are presented in Table 7. As shown in **Table 7** the model shows a reasonable fit between the observed and modelled water levels in the spoil, with the predicted levels generally within 5 m of the observed water levels.

Table 7 Geotechnical Spoil Hole Data

Hole ID	Easting	Northing	Geology	Model Layer	Approx. Ground Level (mAHD)	Observed SWL in 2022 (mAHD)	Predicted SWL end of calibration (mAHD)
PZ013	641981	7298212	3 m below D Seam floor - Spoil	10	230	169	172
PZ014	642657	7292204	4 m above D Seam - Spoil	10	270	179	175
PZ015	642172	7292218	14 m above D Seam Floor - Spoil	10	70	215	202
PZ016	640704	7293097	4.5 m above D Seam - Spoil	10	297	221	216
PZ017	640287	7293078	D Seam Floor - Spoil	11	299	227	230

Note: SWL standing water level from dipped levels recorded November 2022.

2.7 Predicted Heads Maps

Modelled groundwater levels at the end of the mining are represented in Figure 4.1 to Figure 4.5 below. This is based on the 'Approved' mine plan that represents the original mine plan modelled by AGE (2014) and approved operations at MDS, and extracted for Alluvium-Regolith (Layer 2) Tertiary Basalt (Layer 5) and D seam (Layer 11).

Modelled groundwater levels at the end of the mining for the Project are represented in Figure 4.6 to Figure 4.10 below, for Alluvium-Regolith (Layer 2) Tertiary Basalt (Layer 5) and D seam (Layer 11). The graphs have been updated to 1:100,000 mapping and include 10 m contours for the predicted groundwater head.

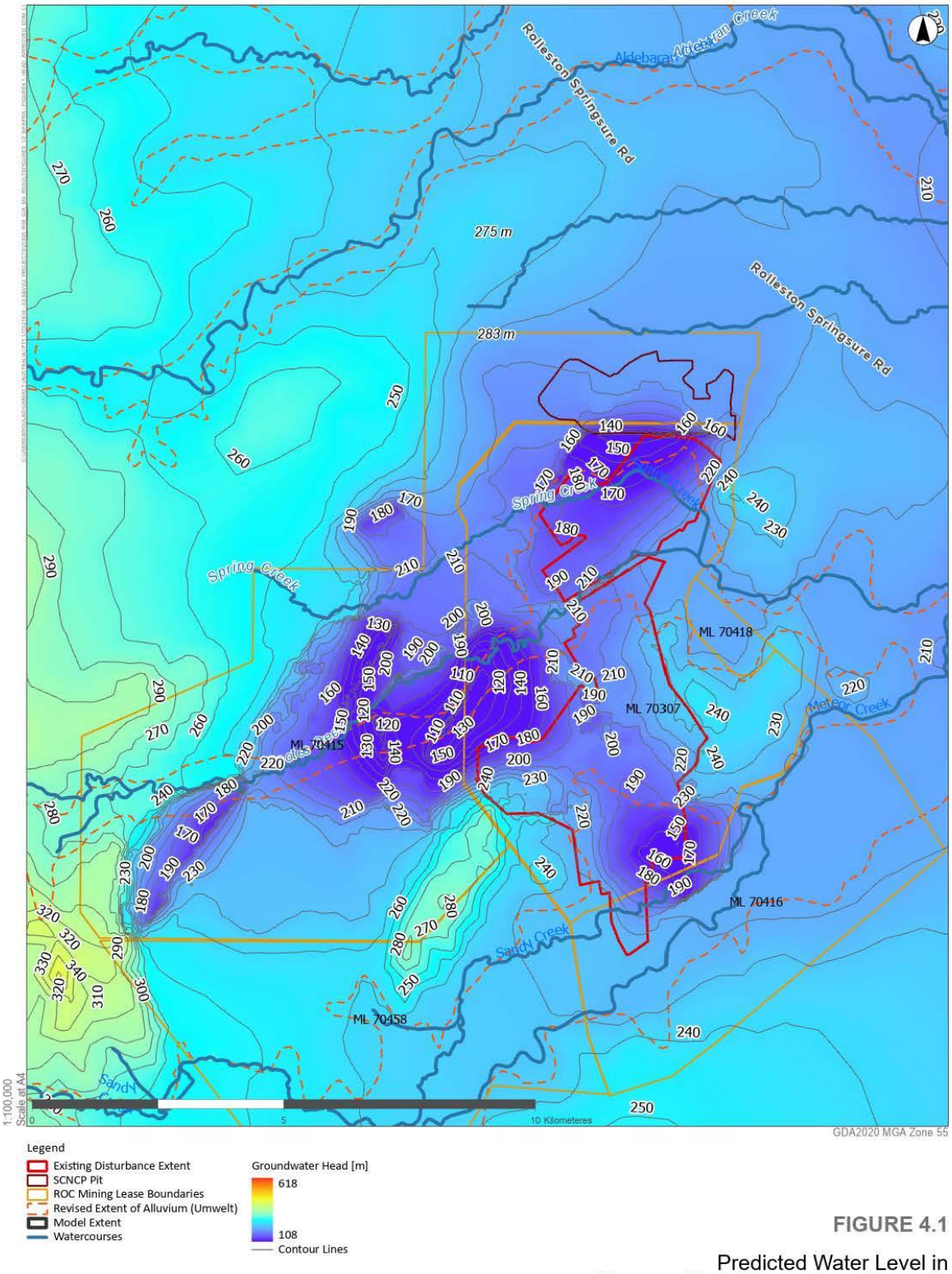


FIGURE 4.1

Predicted Water Level in Unconsolidated Layer 1 and Layer 2: End of Mining – Approved Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

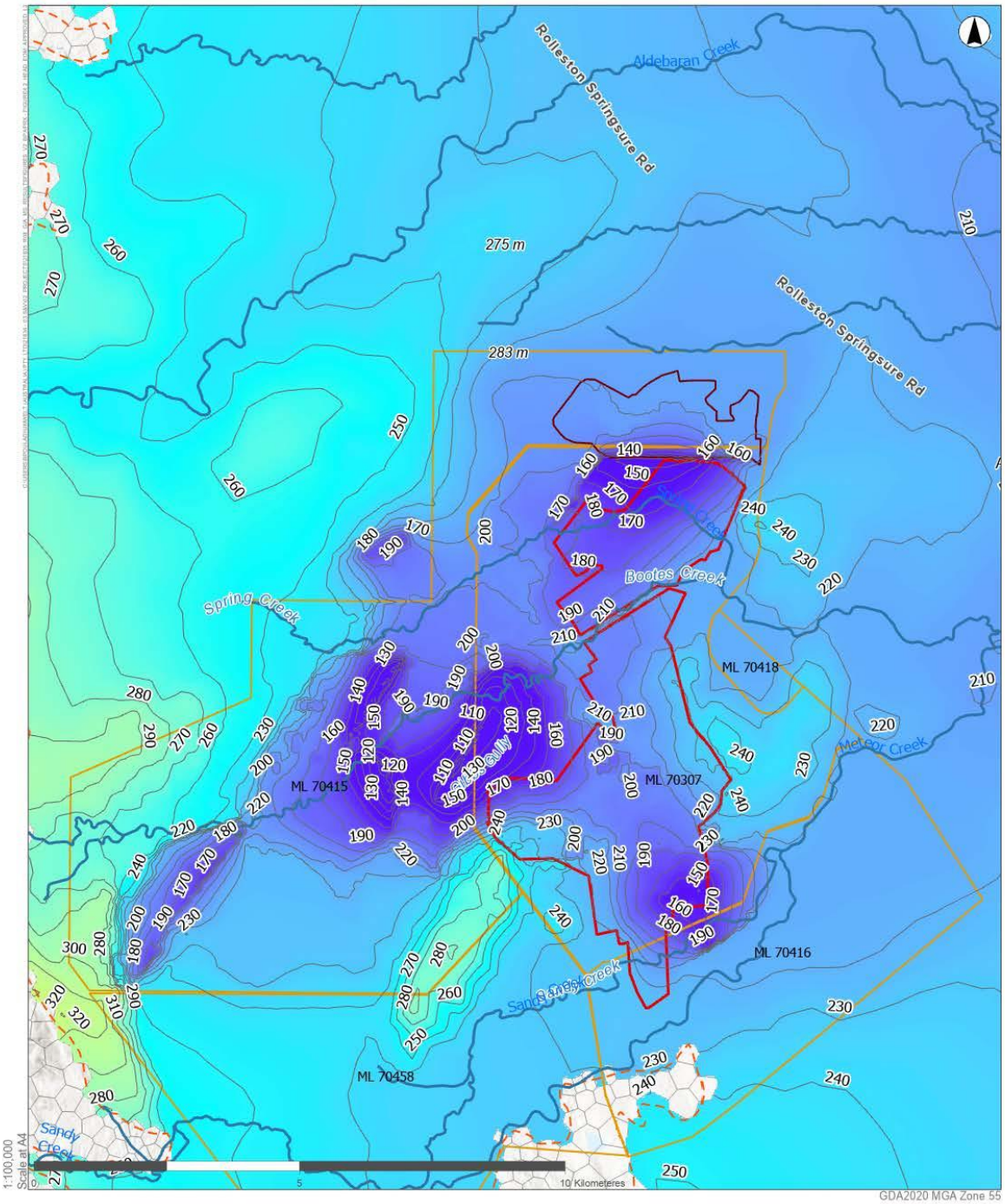


FIGURE 4.2

Predicted Water Level in Tertiary Basalt Layer 3: End of Mining – Approved Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

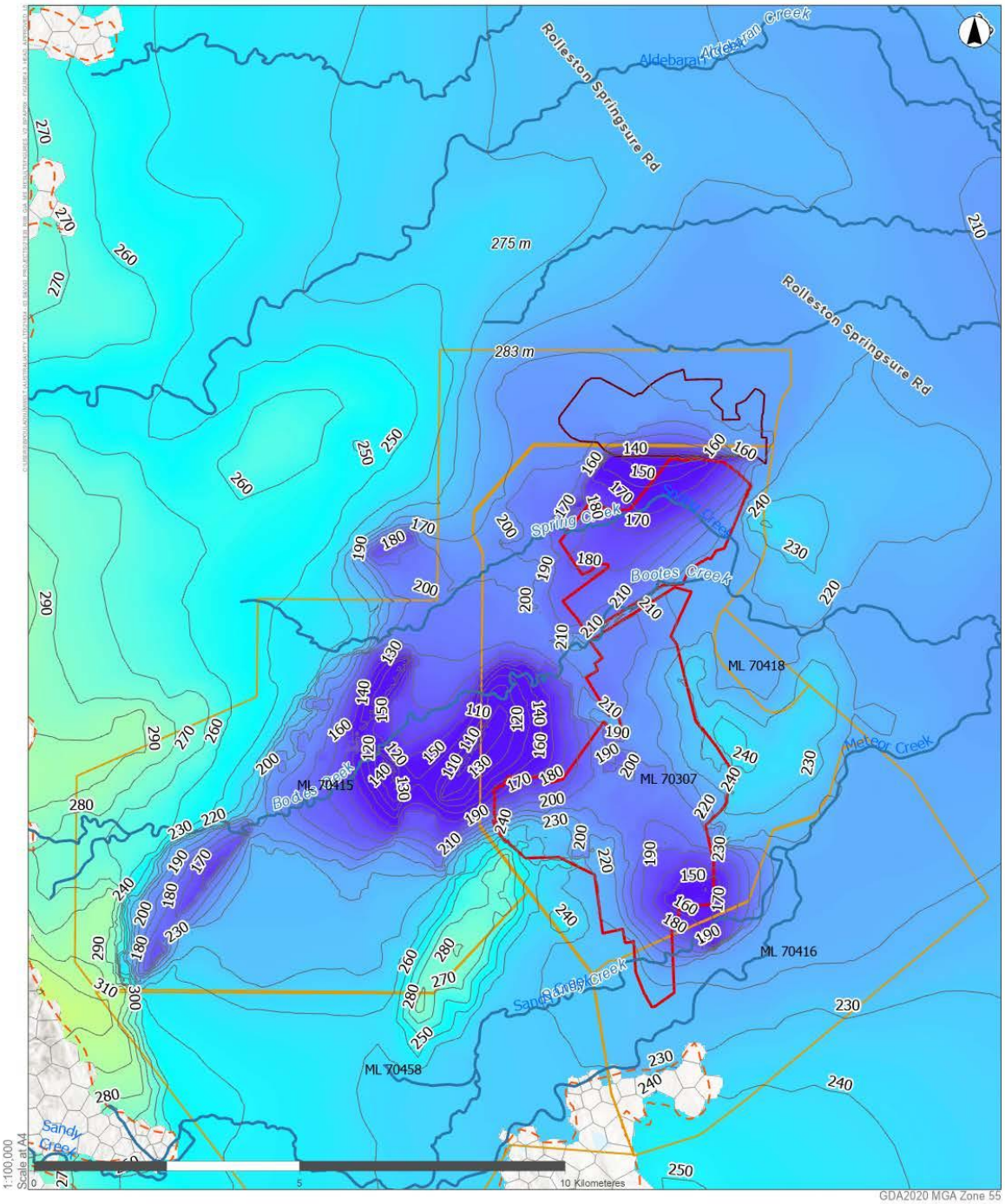


FIGURE 4.3

Predicted Water Level in Tertiary Basalt Layer 5: End of Mining – Approved Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

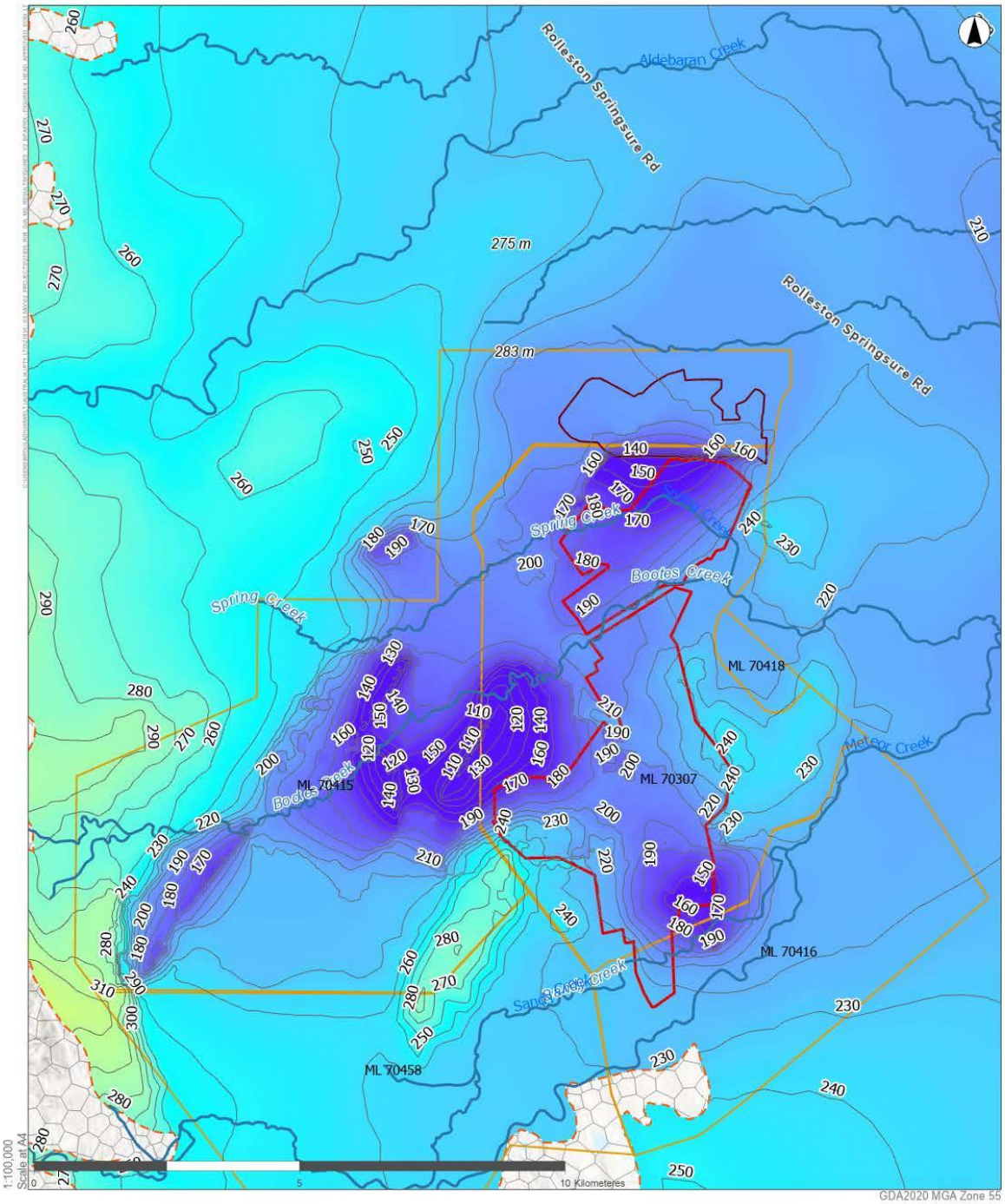


FIGURE 4.4

Predicted Water Level in Tertiary Basalt Layer 7: End of Mining – Approved Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

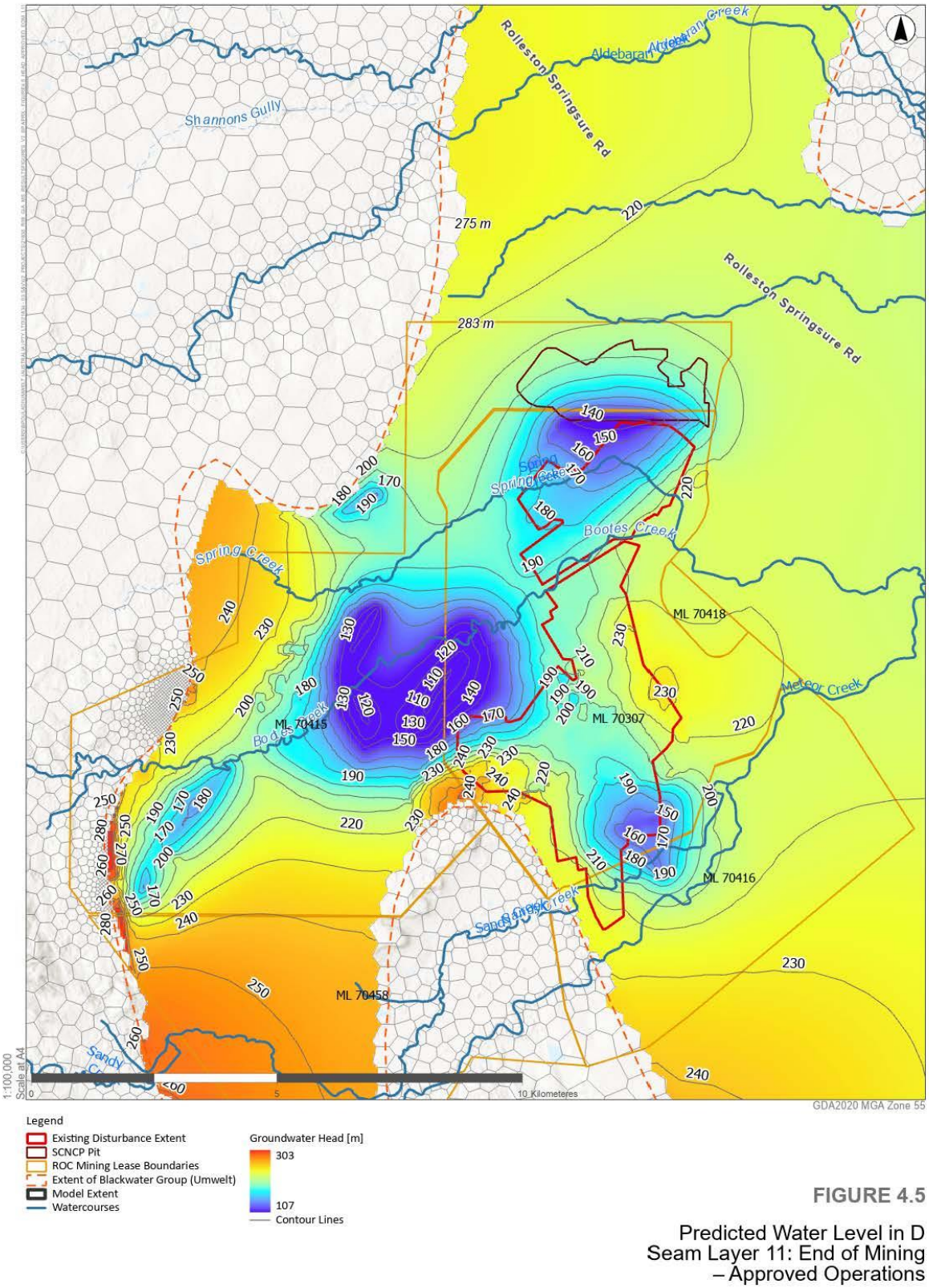


FIGURE 4.5

Predicted Water Level in D Seam Layer 11: End of Mining – Approved Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

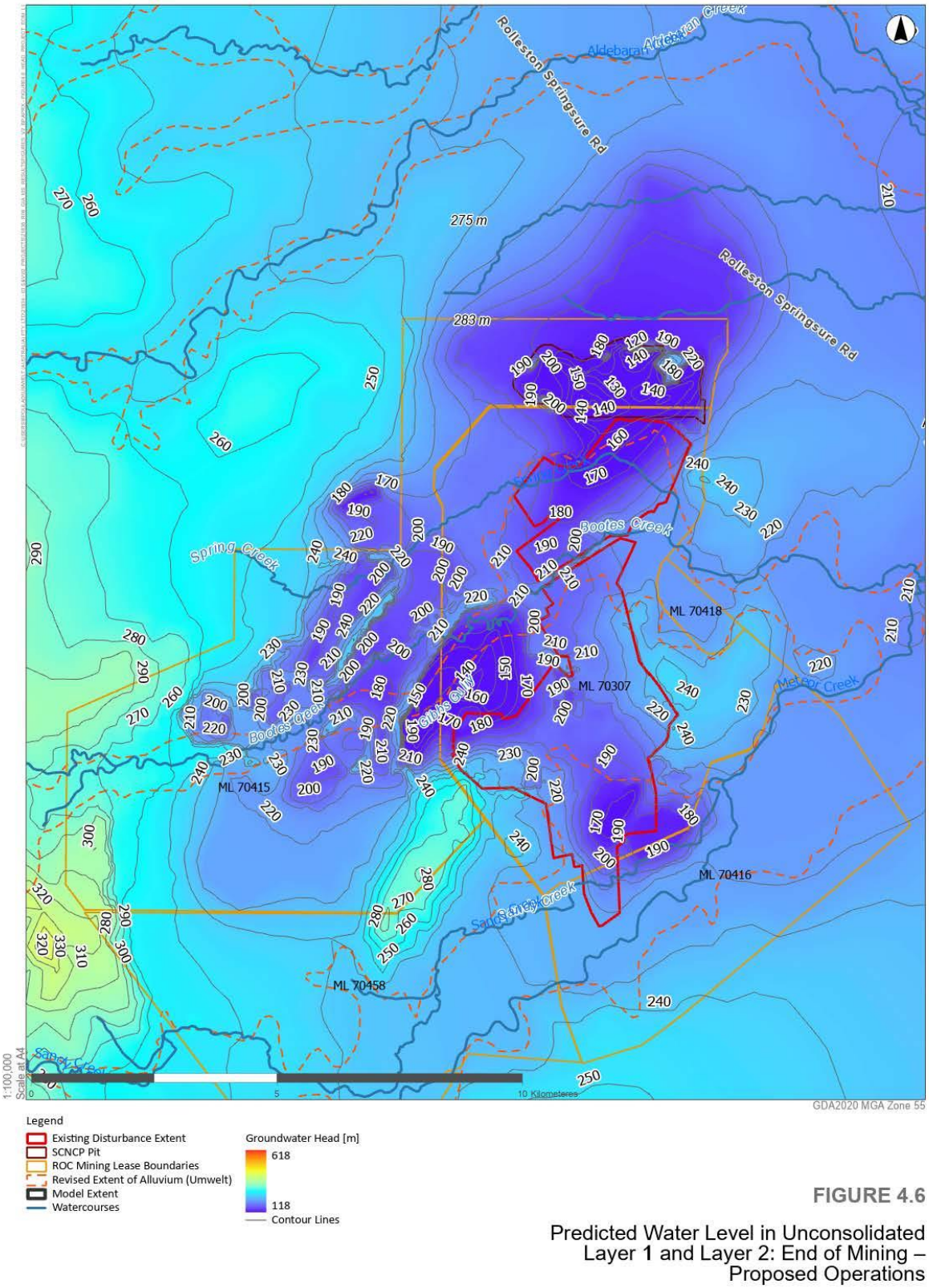


FIGURE 4.6

Predicted Water Level in Unconsolidated Layer 1 and Layer 2: End of Mining – Proposed Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

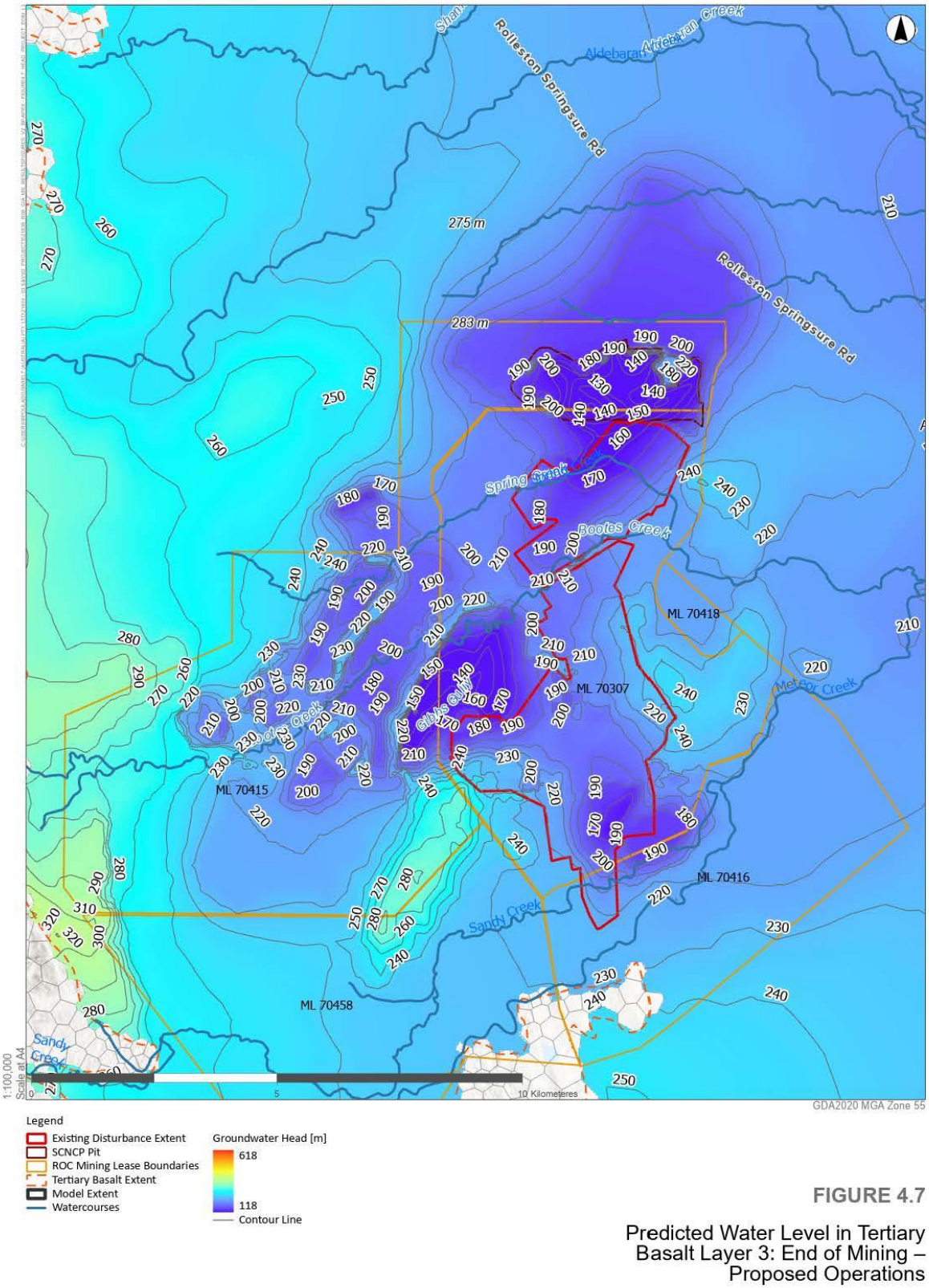


FIGURE 4.7

Predicted Water Level in Tertiary Basalt Layer 3: End of Mining – Proposed Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

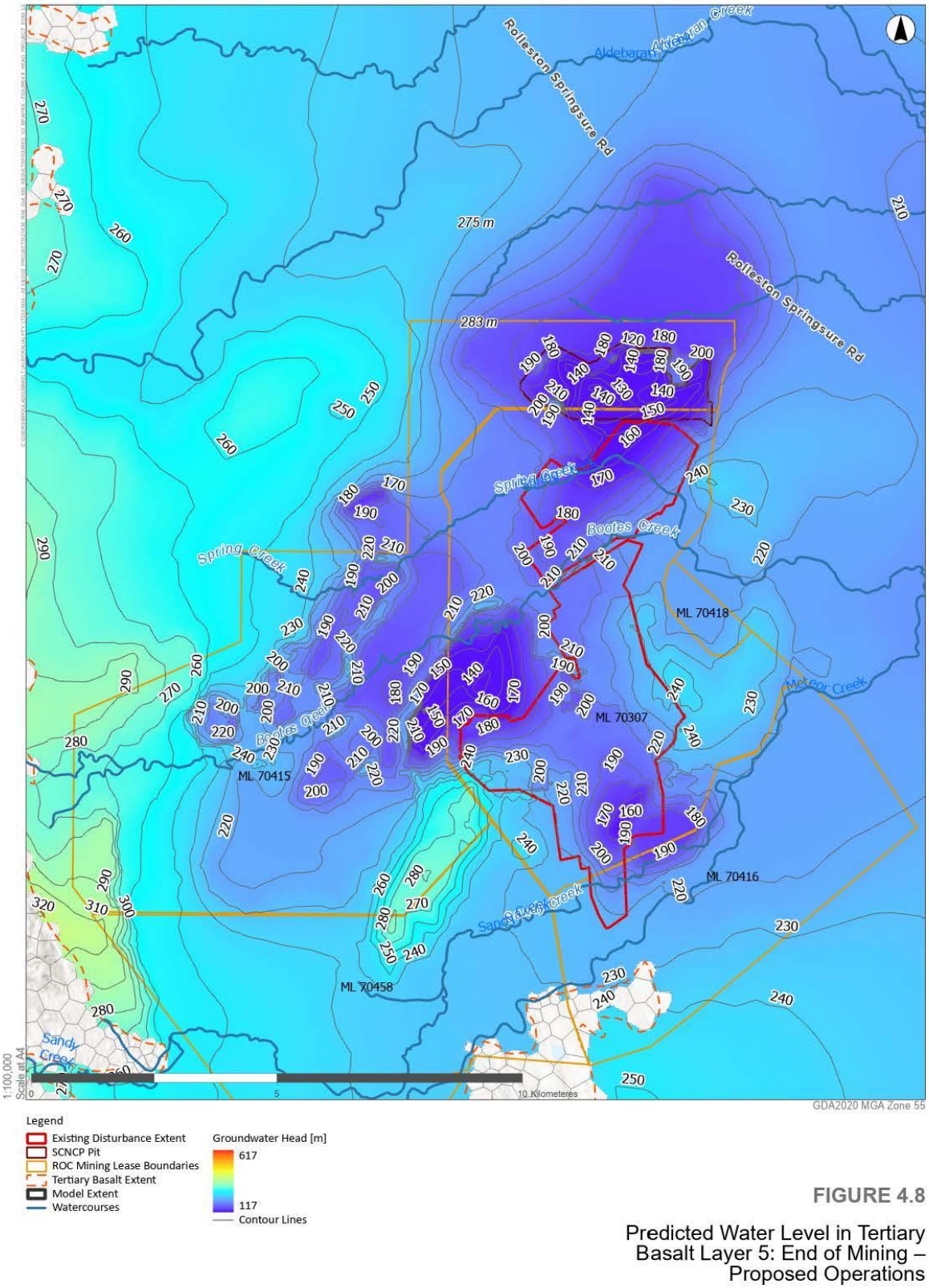


FIGURE 4.8

Predicted Water Level in Tertiary Basalt Layer 5: End of Mining – Proposed Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

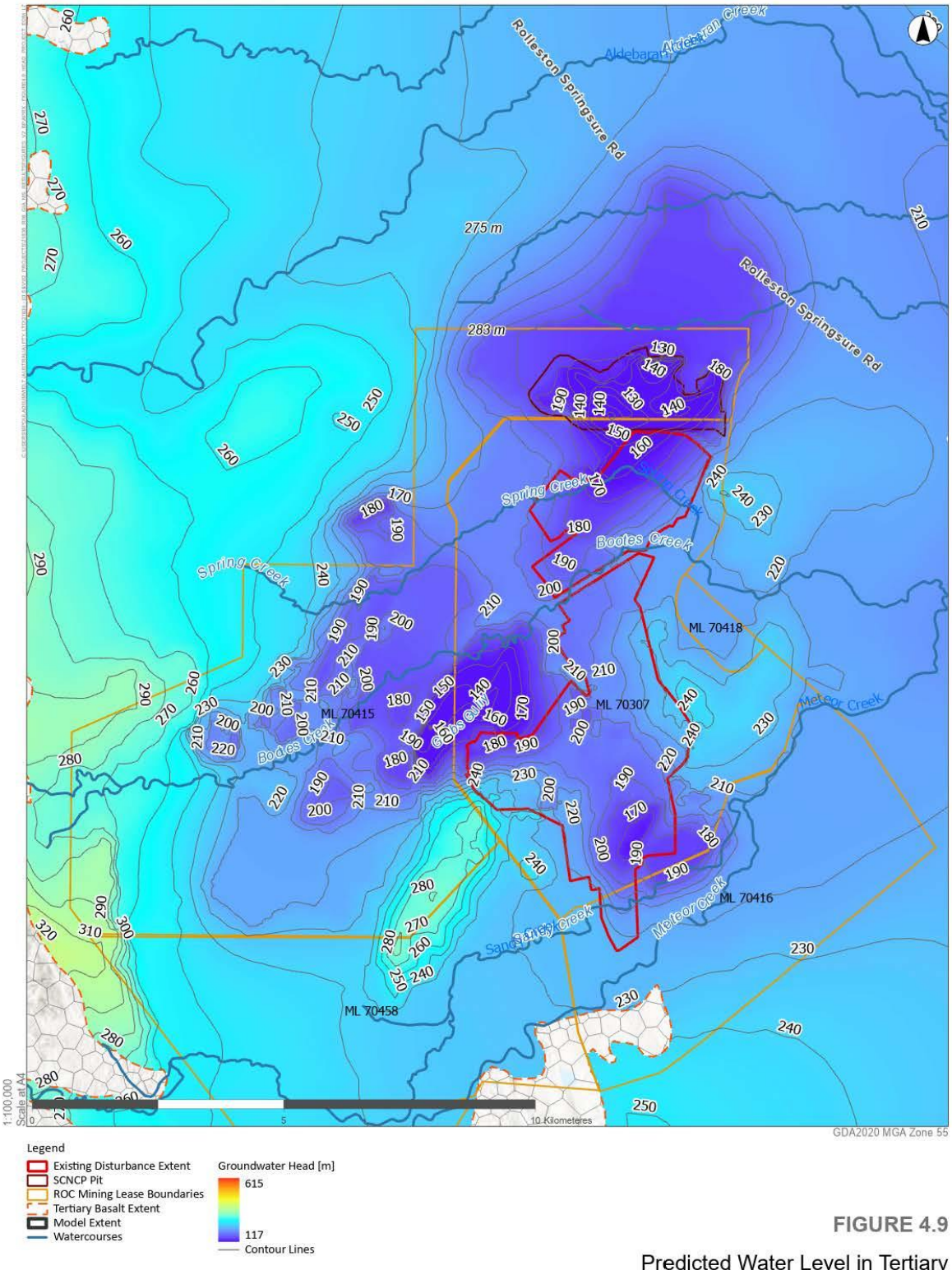


FIGURE 4.9

Predicted Water Level in Tertiary Basalt Layer 7: End of Mining – Proposed Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

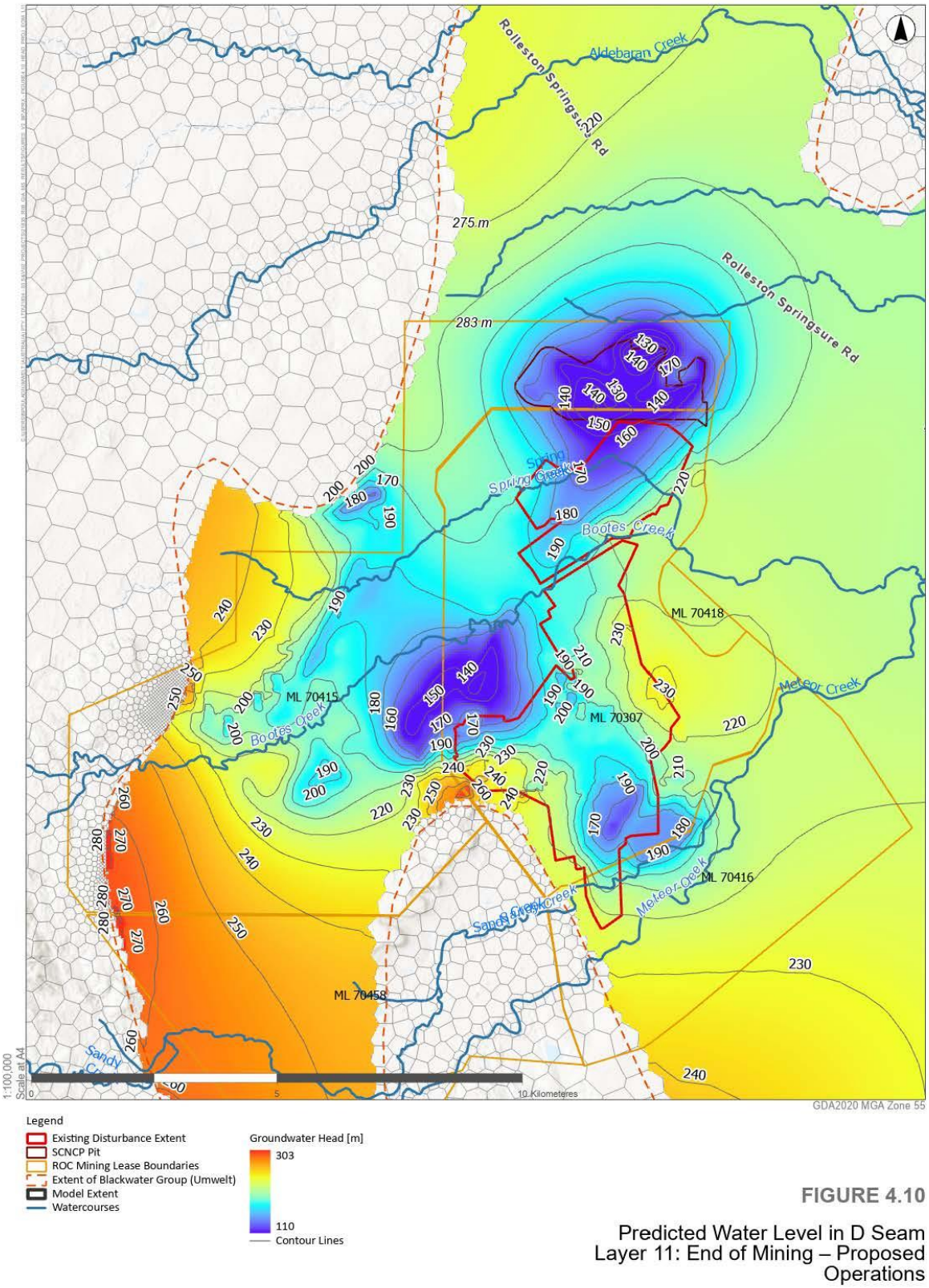


FIGURE 4.10

Predicted Water Level in D Seam Layer 11: End of Mining – Proposed Operations

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

3 References

METServe (2023), Supporting Information for Application for Amendment to EPML00370013, Prepared for Rolleston Coal Holdings Pty Ltd, May 2023.

Umwelt (2023), Spring Creek North Continuation Project Groundwater Assessment, prepared for Glencore, May 2023.

Vosolo, D. (2017), Investigation on Geotechnical Engineering Properties of Coal Mine Spoil Subjected to Slaking, PhD Thesis, School of Civil Engineering & Built Environment, Science and Engineering Faculty, Queensland University of Technology.

WK Geotechnical (2022), Rolleston Open Cut Geotechnical Reference Report, prepared for Rolleston Coal Holdings Pty Ltd, pages 64 to 73.