Ref: D000016

10 June 2021

Joe Ranford
Andromeda Industrial Minerals
PO Box 1210
UNLEY SA 5061
joe.ranford@andromet.com.au

Dear Mr Ranford,

REQUEST FOR RESPONSE DOCUMENT TO CONSULTATION – APPLICATION OVER MINERAL CLAIM 4510 AND ASSOCIATED MISCELLANEOUS PURPOSES LICENCES - GREAT WHITE KAOLIN PROJECT

I am pleased to advise that your application is progressing, and the public consultation stage has closed.

In accordance with Section 56H of the *Mining Act 1971* (the Act), the tenement applications for the Great White Kaolin Project submitted by Andromeda Industrial Minerals Pty Ltd underwent a period of public consultation. The applications submitted with your application was publicly advertised on 17 March 2021 with a closing date for public submissions of 29 April 2021. The was applications were also circulated to relevant government departments, the landholder and the local council with an invitation to provide comment.

The Department for Energy and Mining (DEM) seeks further information from Andromeda Industrial Minerals Pty Ltd on the matters raised by the SA government during the public consultation period. A consolidated list of matters raised and requested information is provided in **Attachment 2**.

In addition to comments from SA Government Departments, 16 submissions were received from the public. In accordance with Section 56H(4)(a), copies of the public submissions are provided as **Attachment 3** to this letter. **Attachment 1** includes guidance on how to address the public submissions.

In accordance with Sections 36(2), 49(2) and 56H(4)(b) of the Act, DEM requests Andromeda Industrial Minerals Pty Ltd provides a formal written response document for both applications, within in 2 months of the date of this letter, addressing the matters raised.

The public submissions and your response document will directly contribute to the assessment process and is required prior to DEM making final recommendations on whether to grant or refuse the lease application, and what terms and conditions are appropriate should a lease be granted.

DEM reserves the right to request further information as required during the assessment period.

If you require a longer time to review the responses, or have any enquiries please contact me on 0427 601 955 or email: erik.lock@sa.gov.au.

Yours sincerely

Erik Lock
PRINCIPAL MINING ASSESSMENT OFFICER
DELEGATE OF THE MINISTER FOR ENERGY AND MINING

Attachments:
1. Guidance on responding to Public Submissions
2. Matters raised by SA Government to be addressed in the Response Document
3. Copies of Public Submission(s)

Attachment 1 – Guidance on responding to Public Submission

During the statutory circulation period the applications were available for the public to review and provide comment. 16 public submissions were received. Andromeda Industrial Minerals Pty Ltd/Great White Kaolin Pty Ltd is to review the submissions, identify the matters raised and provide a response addressing all relevant matters raised. A template is provided below should you wish to use it.

Submitter	Summary of relevant matters raised	Andromeda Industrial Minerals Pty Ltd/GWK Pty Ltd response
Jason McEvoy	• Benefits to region • Support for project	
Clint McEvoy	• Noting potential benefits to region • Maintenance of continuity of water supply to existing users including stock water • Capacity of local road network to cope with additional road use due to mine traffic • Impacts to nearby residences from mine operations • Support for project	
Ken Dickson	• Support for project • Benefits to region • Potential impacts to the environment adequately identified	
Paul Lynch	Road surfaces and Safety • Impact of additional traffic use of dirt roads not appropriately determined. Dust from truck movements, damage to road surfaces • Safety of all road users • Intersections at Streaky Bay Road and Poochera and Eyre Highway School Bus • Potential for compromise to safe operation of school bus due to mine traffic. Water	

	• Above ground - continuity of water supply (SA Water) to existing users • Above Ground - Monitoring of performance Management strategies to ensure continuity of water supplies sufficient to support agricultural and livestock production • Below Ground – Assurance that underground water supplies will not be impacted by mining operations including loss of groundwater due to blasting • Provisions for compensation to groundwater users should groundwater supplies be negatively impacted due to mining. Dust Impact on Grain Quality • Assessment of potential for dust contamination to grain	
Clint Tomney	Engagement • noting local community groups, including the Inkster Community Group (ICG) and landholders adjoining proposed mining tenements were not contacted or engaged with by Andromeda in the preparation of the mining proposal Roads • the Poochera to Pt Kenny Rd is not proposed to be sealed despite being the main route for mine vehicles. Council funds should not be used for upkeep of the road due to damage done by mine vehicles. • ICG feel the road should be sealed Concerns related to Roads • Interactions between the school bus and mine vehicles • Dust • Slow moving vehicles – 60-70km/h • All weather capability	

	• Road closures for maintenance • Maintenance of access to roads for oversize farm machinery • Harvest heavy vehicle traffic Water • Uncertainty of advice from SA Water on likely extent of impact to existing SA Water users due to proposed water use by the mine • The mining proposal states that groundwater extraction by the mine is "not likely to affect local groundwater users" Concerns related to groundwater • Reduced water levels (at existing users of groundwater) • Supply of groundwater (for existing users) • Increase of salinity (groundwater) Dust • Proposed dust monitoring is inadequate • Concern the mining operation will not be able to manage dust due to mining operations • Concern that impact to farming including wool production, meat production, pasture for feed and growing and spraying of crops due to dust from the mine will impact farm production and the ability to produce cereal grains, wool and livestock at current levels should continue.	
Trevor Gilmore	• Support for project	
Geoff and Bronwyn Hull	• Mine traffic on local roads – proposed vehicle movements per day – suitability of road surfaces to cope with additional traffic due to mine operations	

Leroy and Kelsey Hull Rohan and Tegan Hull	• Interactions between mine traffic and other road users including the school bus on local road network • SA water mains water usage by mine and potential for pressure and supply reduction during water demand by the mine, including potential for impact to Streaky bay water SA Water supplies. • Interactions between shifting or droving stock and mine traffic on public roads • Road safety for road users associated with mine traffic entering or leaving Eyre Highway and the Poochera to Port Kenny Road	
DC Streaky Bay	General Matters: • Air quality and monitoring of dust raised from local roads due to vehicles using the road • Management strategies for dust including bituminising the Poochera Port Kenny Road • Matters raised by Inkster community (attached to DC Streaky Bay submission) • Engagement with stakeholders, including the Inkster Community and landowners adjoining mining tenements under application Noise • Noise impacts to local stakeholders due to blasting • Noise impacts to local stakeholders due to changes to local ambient noise Dust • Impacts to air quality of stakeholders due to mine operations and activities	

	Vibration • Impacts to buildings and assets due to ground vibration from blasting at the mine Roads • Safety of road users due to increase in vehicle movements on the Eyre Highway due to mine traffic • Management of dust generated by vehicle use on the Poochera – Port Kenny Rd – use of SA Water mains water for dust suppression • Road maintenance responsibility whilst Poochera – Port Kenny Rd utilised by mine vehicles. Safety • Interaction between school bus and mine vehicles • Interaction between farm vehicles and oversize agricultural equipment and mine vehicles Water • Potential impact on existing users of SA Water mains water including Streaky bay township due to water use by mine. Matters to be addressed by Andromeda Metals, as proposed by DC Streaky Bay: 1. Andromeda Metals must respond to the concerns raised by the Careys regarding their proximity to the mine site, including noise, dust and structural damage. Note: Carey submission attached to Council submission. 2. Andromeda Metals must take responsibility for air quality and noise testing to ensure farmers affected by the operations (those on the Careys' farms, those adjacent to the perimeter of those	

	farms and those adjacent to the Poochera Port Kenny Road) are taken at least daily during operational and high use times. These tests should be made public to ensure transparency of operation. 3. Consultation regarding the bituminising of the Poochera Port Kenny Road and Haul Out Road should be facilitated between the Council and Inkster community with a view to reaching a satisfactory outcome for all parties. Consultation regarding this matter is seen as an extremely high priority for this community. 4. Water cannot be wasted in this area. There simply is not enough water to support wastage of the type described. An alternate option may be discussed during the consultation noted above. 5. Both Andromeda Metals and SA Water need to assure water users in the area that their access and pressures will not be affected by the duplication of the line through to the Great White Kaolin Project site.	
Ingrid Stewart	Support for project	
Tony Griffin	Support for project	
Greg Walters	Support for project	
SG & PE Carey	Matters Raised • Roads – dust, traffic, safety and maintenance • Dust – roads, visual, safety, livestock, residual on crops • Noise – effects on lifestyle and livestock • Water – wastage, impact to existing customers pressure and stock water • Visual Aesthetics – what will we see from house and neighbouring paddocks	

	• Blasting – frequency, noise, potential impact to infrastructure Issues raised: • Potential Acid Mine Drainage • Water runoff & Erosion • Presence of West Coast Mint Bush • Lack of recognition of loss of cropping land to the landholder • Dust Impacts not mentioned in relation to housing • Location of private infrastructure - pipelines. • No mention of vegetation heritage agreement areas • Hours of operation • Diesel powered generators to be utilised • Stage 1 supply of water through road tankers • Potential impact on water supply to existing SA water customers • Water conservation and dust suppression • Mining – operations machinery & blasting details • Lack of detailed Rehabilitation plan • Location of dewatered sand stockpile • Local employment figures • Continued Exploration throughout the development • Location and size of stockpiles • Size of overburden stockpile and potential erosion • Rehabilitation of the Overburden stockpile • ROM stockpile • Frequency of explosives use	

	• Mine Dewatering – collecting of water during high rainfall events for use in dust suppression • Lack of detail in Rehabilitation operations • Operating hours on site • Processing plant operation times • Process water management • Rehabilitation strategies • Disposal of salt from processing • Access roads remaining unsealed • Use of diesel generators • Supply of water for stage One of project • Closure of water pipeline at end of mining • Lack of visual screening • Water run-off onto lower lying area • Perceived minimised disturbance to agricultural land • Mine site at completion • Post closure pit • Appropriate level of stakeholder engagement • Drop in day attendance • Stakeholder benefits & issues register • Outcome development • Compliance in traffic control and management • Road safety assurance with such high number of traffic predicted • Heavy Vehicle movements and local school bus route • Frequency of heavy vehicle movements especially on the unsealed Poochera – Port Kenny road	

	• Outcomes and measurement criteria – adverse impacts to agricultural productivity for third party land users • Lack of design measures to minimise impacts to air quality • Inconsistencies in information provided under emissions sources and characteristics of the proposed development (Table 12-4) • Mobile crushing plant • Residential receptors • Inaccuracy of figure 12-2 – commercial receptors • Overview of potential impact • Impacts and Risks • Improper justification of impacts and risks to residences • Proposed measurement criteria of draft outcomes (Table 12-17) • Lack of impact reduction to closest receptors • Noise • Noise impacts • Predicted construction noise and impacts of • Operations noise levels • Noise findings and conclusion generalised • Inaccurate statement • Strategies to mitigate soil degradation • Accuracy of viewpoints • Control measures to visual amenity • Visual amenity to community as result of the development • Visual amenity for local residents	

Carey Brothers Ray and Ellen Carey Matthew and Mary Carey Damian Carey	Comment Themes: • Dust – confidence that dust emissions due to mine operations will not cause significant impact to local sensitive receivers • Noise – Appropriateness of noise modelling assumptions – including categorisation of sensitive receivers and location of features that may affect results i.e. stockpile locations etc. • Maintenance of primary production from the land - shelter for stock • Road sealing Other issues • Acid forming material • Voids – site hazards • West coast mint bush • Description of impact to landowner – loss of productive land • Location of sensitive receivers • Location of conservation areas – Heritage agreements • Inconsistency of proposed working times • Location of bunds and screening • Impacts associated with rockbreaking • Blasting • Rehabilitation and closure • Water storage • Operating times • Pit Dewatering • Power generation and use of onsite gensets • Maintenance of mains water supplies to existing users • Cumulative impacts to primary production due to future mine expansion	

	• Description of site at closure – dimensions of mine void • Post mining land use • Interaction between mine vehicles and school bus • Water consumption • Consultation process used in developing proposal • Management strategies to achieve environmental outcomes • Maintenance of primary production • Impacts to the environment due to increased dust from roads due to mine traffic • Road maintenance • EPBC listed species • Basis for acceptable dust deposition standards • Contamination of rainwater supplies with dust • Impacts of dust from mine operations on crop production • Dust management • Air quality – silica • Assumptions associated with risk and impact assessment	

Attachment 2 - Matters raised by SA Government

During the statutory circulation period the applications were circulated to SA government departments deemed relevant to the proposal based on the information provided. A list of the matters raised by SA Government departments (including comments from DEM) during the statutory consultation period is presented below. It also outlines information that must be provided to respond to matters raised.

#	Reference	Description of Matter Raised by SA Government	Further Information or Clarification Required
1	Section 3.1 General description page 104 and Section 3.6.1 Waste rock and tailings storage facilities	Tailings and waste rock. TOR006 - clause 2.6.1 DEM notes the proposal states that after processing, tailings will be placed back into the mine void after mining. No information is provided on potential environmental impacts associated with the placement of tails into the mine void. Consideration should be given to: • geochemistry of tailings and potential interactions with the environment after mine closure. • effect on ground water flows by placing a porous medium back where an aquitard was.	Provide all relevant information to satisfy TOR006 – clause 2.6.1
2	Figure 3-1 Site layout of the proposed development (ML and access road MPL) page 107, Figure 3-7 Stages of mining in open pits and indicative pit design page 134.	*"The background image in Figure 3-3 is colour stretched to identify zones of halloysite +5% (teal) and ISO B +84% (red) and demonstrates the heterogeneity of the deposit." From page 113* DEM notes the proposed disturbance footprint for the mine and processing area are tightly constrained, minimising disturbance to agricultural production and minimising clearance of native vegetation. Resource model information (proposal Sec 3.2) suggests the kaolin grade (quality, form and quantity) is variable throughout the orebody. Variability of kaolin grade within the orebody may require additional ROM stockpiles at the processing plant to support blending to achieve product specifications.	• Provide information on the likelihood that the proposed disturbance footprint for the mine will remain as proposed. • Provide supporting information on how product specification will be maintained throughout the mining sequence • Will more than one active mining area be required to blend ore sources to meet specification.

3	Table 3-3 Great White Kaolin Mineral Resource minus 45µm, page 113	Mass balance – Table 3-3 There appears to be an 8% discrepancy in the mass balance presented.	Review Table 3-3 "Mineral Resource minus 45µm" for mass balance. Provide information on the approximately 8% of the mass that is not Kaolinite or Halloysite
4	3.4.6 Use of explosives, page 141	Uncertainty associated with thickness of calcrete capping. Proposal does not describe potential for calcrete cap thickness to vary across the orebody. Variability of calcrete cap thickness may influence strategies required to remove the cap overlying the orebody and resultant impacts to sensitive receivers due to blasting. Section 3.1.1 proposes blasting will be required no more than once a month. The Resonate preliminary blasting vibration assessment states blast modelling was undertaken using data from blasting activities undertaken in similar geological conditions, not known data from the site.	Given uncertainty associated with information on calcrete cap thickness and blasting modelling assumptions, provide an assessment of confidence associated with vibration and airblast modelling for this site.
5	3.4.6 Use of explosives, page 142	Editing Distances of dwellinghouses and street, road or thoroughfares may have been transposed.	Review safety distances per SA Explosive Regulations 2011
6	3.9.1 Description of mine site at completion Figure 3-27 Representation of area on completion of closure activities, page 179	TOR006 – clauses 2.4.9 and 2.4.9.1 MG2a Guidelines state: 'If a pit lake is likely to occur, identify any potential end uses for it. Based on the proposed end land use, identify what investigations are required to further understand the processes that will occur during development of the pit lake and once it achieves steady state. Consider and provide evidence of, for example but not limited to: • the final shape of the pit • the final water level of the pit lake and length of time to achieve this water level • water level fluctuations and likely water quality over the period of time it takes for the pit lake to develop and achieve a steady state • potential impact of wave action on the pit walls' long-term stability • potential changes to groundwater • potential impact to public health and safety.'	Provide an assessment as to the likelihood that a pit lake may occur after mining. Consider strategies for eliminating the final pit void. i.e. starter WRD adjacent the final pit void.

7	3.10.2 Energy sources, page 181	TOR006 – clause 2.10.2 'estimates of total annual energy usage (from all sources, including personnel transport and ore transport to point of sale)'	• Provide estimates on the amount of gas required to dry the noodles, • how much gas is used to generate electricity? Noting 70 GJ per hour required for electricity generation equates to a lot more than 2.5MW of power generation.
8	3.10.2 Energy sources, Table 3-20 Energy usage and associated GHG emissions (annual), page 181	TOR006 – clause 2.10.2 'equivalent annual CO2 generated'	Review table 3-20 for unit errors, Units - Diesel use is litres per day not kL/d? Review assumptions and calculations
9	3.11 Effective and efficient mining, page 184	*"Conventional processing techniques proposed on site will extract the kaolin product from the ore and produce a final product for sale to proven markets."*	Provide clarification on mine gate location. Will additional processing of kaolin be required away from the mine?
10	DEM mine closure	Rehabilitation - overburden stockpile will be approximately 18 m high at its highest point. It also states that 'Final rehabilitation will include placing a surface cover on the crest of any remaining stockpile'. Provide more detail on how much is proposed to go back into the pit. A 18m high overburden stockpile is essentially a WRD. It's clear by the figure 3 – 28 that they are doing a reasonable level of backfill. Given that they have all the volumes etc they should be able to detail what the WRD will look like. It is implied on pg 177 that is will be an irregular shape but is expected to be approximately 550 m long, 300 m wide and 18 m high.	Provide information on strategies proposed to achieve proposed final land use. Noting it is proposed to leave an overburden stockpile and a small pit void after mining

11	DEM mine closure	• Risk of AMD • Acid risk assessment was based on small sample size without long term leach testing. Proposal refers to a Conceptual Acid and Metalliferous Drainage Management Plan (CAMDMP), which includes an Acid and Metalliferous Drainage Assessment that was has been completed by the University of Adelaide (Thomas 2020).	Describe confidence in the assessment of risk of AMD associated with project from the acid Risk assessment. Noting the Conceptual Acid and Metalliferous Drainage Management Plan (Thomas 2020) was not included with the proposal.
12	DEM Noise Sec 2.16 and Chapter 13 Appendix L Noise and Vibration assessment	TOR 006 – clause 1.17 and MG2a Page 34 Noise - Provide a description and measurement data of the existing levels of noise and contributors to noise (both natural and anthropogenic). Section 2.16 and chapter 13 of the proposal describe existing levels of noise and contributors of noise, both natural and anthropocentric. Existing noise levels are described as "quiet". The proposal does not provide measurement data of the existing levels of noise for the site or at sensitive receivers. The Noise and Vibration assessment, appendix L states *"it is not considered necessary to undertake background noise logging at noise sensitive receivers. The existing noise environment can already be characterised as 'quiet', typical of a remote rural location."* TOR006 and MG2a require measurement data for existing levels of noise and contributors to that noise. Existing (pre mining) noise level data provides baseline information which supports a fulsome description and understanding of the impacts to sensitive receivers due to noise..	Provide a description and measurement data of existing levels of noise as required by TOR 006 – clause 1.17
13	DEM *Water 3.7.3*	*Mains Water supply* *Page 164 states that SA Water have indicated it is possible for a water supply to be made available to support the Proposed development. The proposal goes on to state the water supply network would be subject to any required network upgrades to ensure existing customers are not impacted.* *In order to assess confidence that an environmental outcome can be achieved, aspects required by Regulation 46 must be addressed.*	*Provide information (reports, studies or communications) supporting claim that existing customers would not be impacted by SA water supplying mains water to the mine.*

			Include reference to minimum standards of SA Water mains water supply.
14	DEM Groundwater MP S2.6.1	The description of the Garford Formation is inconsistent with those provided in Appendix J and Figure 2-10. In Section 2.6.1, Under "Hydrogeology identification" the Garford Formation is described as *clay/mudstone Tertiary sediments*. Appendix J, Section 3.4.1, however, describes the Garford Formation as "…*consists of a basal unit of coarser grained and cleaner yellow-orange sand ranging in thickness from 1 m to 4 m overlain by 4 m to 8 m of fine grained orange silty sands with ferruginous mottles toward the base and an increase in clay content to the west (i.e. sandier to the east).* There is a large difference, from a hydrogeological perspective, between clay/mudstone and sand. The description provided in Appendix J seems to be accurate and should be followed in the MP. *"The aquifer is unsaturated over most of the proposed pit, with saturation inferred to occur in a narrow trough-like area along the north eastern portion of the proposed pit."* An aquifer, by definition, is saturated and there is no "*unsaturated aquifer*". Suggestion: the Garford Formation may be unsaturated in places. TOR006 1.6	Revise description of the Garford formation to ensure consistency between main document and Appendices.
15	MP S2.6.1 Fig 2-18 and S 3.4.8 Fig 3-13 of the MP	The conceptual hydrogeology block diagrams could benefit from displaying the water table and the proposed pit outlines; and perhaps colour coding the units according to their anticipated hydraulic conductivity (aquifer, aquitard, aquiclude). TOR006 1.6	Review diagrams for clarity if required.
16	MP S11	No groundwater specific outcomes and associated criteria are proposed on the grounds that no SPR was confirmed. Dewatering (working beneath the water table) is proposed in an open pit therefore there will be impacts on the groundwater environment in the vicinity of the pit, even if users or GDEs are absent.	Review Source Pathway Receptor analysis for groundwater

		In addition, an uncertainty analysis, yet to be completed for the groundwater model, may predict an enlarged range of drawdown influence zone around the pit. It is possible that this zone extends to the nearest well or potential future users. TOR 006 Section 4	Provide an uncertainty analysis for the groundwater model
17	S 3.4.2	The top section of the fresh granite may have appreciable hydraulic conductivity, i.e. could be an aquitard or even an aquifer as opposed to the aquiclude classification used.	Provide a justification for the aquiclude classification or amend the text.
18	S 3.4.4	The effective porosities (0.2 or 0.5) appear to be very large for the strata described and need further justification or changing. If smaller effective porosities are used, the radius of influence may be larger, and the estimated inflow smaller than those estimated in Figure 18. The Thiem Equation is steady-state while the Weber is transient. The radius of influence from Weber, after one year, was used as an entry to the steady-state calculations. Why was one year selected?	Provide a justification for the effective porosity values used and the explain use of one year in the Weber Equation.
19	S 4.3 and Fig 24	The text refers to "*The constant head cell values were set based on the interpolation of measured groundwater levels from monitoring wells within the proposed pit area (upstream cells), and by inspection of regional WaterConnect historical water level data (downstream cells).*" A model-independent groundwater elevation contour map, with datapoints and labels (m AHD) should precede Fig 24. A 'composite' (all times and formations) map may suffice. TOR006 1.6 and 5.1.1.3	Provide a groundwater elevation contour map, with datapoints and labels (m AHD).
20	S 3.3.1, 4.4 and Figure 26	CWMW004 was previously referred to as incomplete in Section 3.3.1. Section 4.4 refers to a groundwater head measurement from that well. These inconsistencies (how can a measurement be made in an incomplete well?) require explanation.	Clarify the status of CWMW004.
21	Tbl 4	Explain the logic and provide justification for the choice of Kv/Kh = 100 for Layer 2. This is a rather uncommon choice.	Provide justification
22	S 4.4	*"The modelled layer 3 heads approximate the observed heads in monitoring wells within an adopted variation of +/-2m, and also produced a groundwater flow direction inferred by the field data (site and regional) and consistent with the conceptual hydrogeological model."*	Amend the statement as requested.

		Figure 25 indicates no measurements to the E, SE of the pit hence the statement should be restricted to the pit surrounds and where data are available. The head contours in Figure 25 in the SE, and further away from the pit seem to reflect boundary conditions rather than observations.	
23	Fig 25, 27 and 28	These maps seem to suggest a small downward vertical hydraulic gradient from Layer 1 to Layer 3. Please refer to comment # 14 for another comment on the vertical hydraulic gradients. At this (early) stage, it is unclear to me what the best conceptualisation of the kaolinised granite (KG) is. It is also unclear if the conceptualisation presented here is the only one feasible. Sections 3.4.1 and 3.4.2 appear to describe the KG as an aquiclude but the groundwater elevations do not seem to indicate much confinement. Hence keeping an option, that it may allow some leakage (KG k is > clays) may be the best for future work. Understanding the regional hydrogeological setting better would also help. In some settings, between the recharge and discharge areas, groundwater heads from different depths may be similar even if the intervening layers are aquicludes. Such zones are characterised by, and named horizontal flow. Is this setting perhaps an example for such an area?	If appropriate, a description/explanation for the small downward vertical hydraulic gradient is required. To note and incorporate the possibility of alternative conceptualisations into further work.
24	Fig 32 to 35	These figures need a timestamp, ie when were the measurements made; or are the measurements composite (from different times)? Figure 35 - the hydraulic gradient/flow could be interpreted as more towards the NE, as opposed to the inferred flow to the E. The contour lines as they are drawn at present assume no flow between CW20WB003 (92.4 m AHD) and CW20MB003 and CW20MB006 (at just over 90 m AHD). This alternative interpretation, more consistent with that of Figure 34, may need to be commented.	Provide a comment, amend text and figure if appropriate
25	Sec 5.3 and Fig 35	There appears to be a steeper horizontal gradient between GWMW003 and two granite basement wells than the gradient from kaolinized granite wells. Is there a possibility that a downward vertical hydraulic gradient, between the kaolinized granite and the granite basement unit contributes to this steepness or is it the result of lateral (horizontal) changes?	Provide a comment/clarify
26	Tbl 9	Matrix k > fracture k for CW20WB003? Normally it is the other way around. Text refers to a hydraulic conductivity, which should be stated for CW20WB002 in Table 9.	Address points raised

		How can both Sy and Ss be shown for CW20WB002? The Garfield Formation is referred to elsewhere (Section 8.2) as unconfined; if so how can Ss (specific storage for a confined aquifer) be assessed from a pump test?	
27	Fig 49	"*calibration*" is not necessarily an evidence that there is a high k zone in Layer 3 because of the non-uniqueness of groundwater models. The logic of the relationship between the fault traces and the location of the high k zone needs to be explained/justified.	Explain the relationship/justify the correlation between the fault traces and the location of the high k zone
28	Appendix J	There are no sensitivity and uncertainty analysis for the groundwater model in Appendix J. These analyses are integral part of any numerical model and should be completed to get a better appreciation about a range of outcomes.	Provide a sensitivity and uncertainty analysis for the numerical model.

#	Reference	Comment	Further Information or Clarification Required
29	DEW Groundwater	Groundwater potential impact context: • Water supply (pressure and quality) for other users identified within the expected groundwater area of influence due to mining activities. • Degrading of groundwater within the PDG-fractured granite aquifer by surficial processes such as drought and contamination when the kaolinised granite, which is the confining layer and acts as a protective cover, is removed. • Creation of post-mining sand aquifer (surrounded by relatively low permeable material), its water quality, local groundwater mounding after heavy rainfall. (Note that sand may be returned to the open pit following separation from the ore during processing activities). • Non-GDE native vegetation communities (e.g. the Mallee woodland vegetation) impacted as a result of saline groundwater elevation due to seepage from deposited sand. • Although not explicitly stated, the implication is that the proposed mining operation is unlikely to impact the Robinson Lens, a historical water resource used by SA Water, but currently not in use. The Robinson Lens is located approximately 15 km away to the east from the proposed operations. In the context of the information presented this appears to be a valid assumption, however a sensitivity and uncertainty analysis would help establish this further. With respect to the general description of hydrogeology, the following points require clarification: ○ Whilst there are two laboratory-derived coefficient of permeability values for the kaolinised granite, only one is used and quoted as representative. Please explain why the other result, which is greater than the adopted value by approximately two orders of magnitude, is not used. If it is a valid result, please rectify assessment to include this result. Alternatively, please highlight or add the explanation as to why it was not used. ○ By extension, the kaolinised granite is generally described as an aquitard or a confining layer, although the possibility of limited hydraulic communication through this unit is acknowledged. The current conceptualisation is consistent	Provide a sensitivity and uncertainty analysis of the potential for mine operations impact the Robinson Lens

		with features of the hydrogeology such as generally equal heads in various aquifers as well as observed water table intersects that are not confined by stratigraphy and also inclusive of the kaolinised granite. However, an alternative conceptualisation that describes the kaolinised granite as a leaky aquitard is also supportable. There is currently no uncertainty or sensitivity analysis within presented modelling to determine whether such alternative conceptualisations present any variance in risk profile. o The presence of calcrete and silcrete sheets in the near surface and at depth suggests in some places groundwater ingress and flow may not be completely diffuse, but may have fractured rock or karstic aquifer characteristics. Whilst this is recognised as a possibility, the favoured conceptualisation is one of predominantly diffuse groundwater ingress. Backfilling of the pit after removal of a low K kaolinite ore with a higher K sand by-product may also cause increased recharge localised to the pit and therefore pit-related groundwater mounding. Further discussion on the likelihood (or otherwise) of focussed recharge across the site and the uncertainty this alternative conceptualisation may present would be helpful to clarify risks. With respect to numerical modelling, the following points require clarification: o The structure of the numerical model reports should follow the Australian Groundwater Modelling Guidelines. o Model structure in terms of tops/bottoms of model layers (including the top and base of the model) is not adequately presented and described. o Brief description the software and the Graphical user interface (GUI) used and why/how it is suitable for mine dewatering and recovery simulations after the end of dewatering is lacking in the report. o Simulated contours (Figures 61, 64 and 67, Appendix J) extended to lateral limits of numerical model domain after 26 years; this indicate that the lateral extent of the model domain is inadequate. o Open-pit mine dewatering conceptual model has not completely been translated into the numerical groundwater flow model. The proposed mining method is ‘cut-and-fill’ as mining progresses, however, filling of the pits as	Provide analysis and additional information as required on interaction between backfilled pit and local groundwater – contributing to understanding risks due to backfilled pits and how they will function in the post mining landscape

		mining operations are completed in various pit stages were not simulated in the pit dewatering model.	
30	Section 2.6, pg 42	. A map showing the Robinson Lens, the Kappawanta and Bramfield Basins and the Polda lens in relation to the site would help visualise the distances between and therefore the relative risk the development has on these particular groundwater resources	Provide a map or plan showing regional groundwater formations.
31		Although not explicitly stated, the implication is that the proposed mining operation is unlikely to impact the Robinson Lens, a historical water resource used by SA Water, but currently not in use. The Robinson Lens is located approximately 15 km away to the east from the proposed operations. In the context of the information presented this appears to be a valid assumption, however a sensitivity and uncertainty analysis would help establish this further.	Provide a sensitivity and uncertainty analysis of the potential for mine operations impact the Robinson Lens
32	Section 2.6.1. pg 43	. "The KG likely functions as an aquitard between the PDG-granite basement rock and the Garford Formation." In contrast, on Pg 46 ". Some vertical leakage between hydrogeological units is possible". Appendix J, section 3.3.2 and Section 3.4.2. The paragraph prior to figure 6 suggests that the water table is not restricted stratigraphically but is continuous (and therefore implied connected) across the Garford Formation and the Kaolinised Granite "*The green dashed line indicates approximately where the water table transitions from within the kaolinised granite to the west, to within the Garford Formation to the east….*" Note also that Table 7, and Figures 32 and 33 suggest water levels in the Garford Formation and underlying Granitic aquifers are very similar and not particularly suggestive of a vertical gradient between the two. However, Section 3.4.2, dot point 9 conceptually describes the kaolinised granite as "*a confining layer separating the underlying partially decomposed granite layer from the overlying Garford Formation.*" The current conceptualisation is consistent with features of the hydrogeology such as generally equal heads in various aquifers as well as observed water table intersects that are not confined by stratigraphy and also inclusive of the kaolinised granite. However, an alternative conceptualisation that describes the kaolinised granite as a leaky aquitard is also supportable. There is currently no uncertainty or sensitivity analysis within presented modelling to determine whether such alternative conceptualisations present any variance in risk profile.	Provide a modelling analysis of uncertainty and sensitivity with respect to the hydraulics of the study area so the risks regarding uncertain K values can be better appreciated.
33	Section 2.6.1, figure 1-	The conceptual block diagrams throughout the document do not clearly indicate the following observations concerning the hydrogeology of the site	Review and update relevant diagrams.

	18; Section 3.8, figure 3-13; Appendix J, Section 5.6, figure 36.	a) The Garford Formation for the most part is unsaturated ("dry"), with only a small portion with any notable permanent saturation found near the northern corner of the pit. b) The water table level in the cross-sectional view of the block diagram. c) Based on Comment 3 an acknowledgement of possible limited communication through the Kaolinised Granite d) Likewise, acknowledgement recharge could be localised through dissolution features in the Bridgewater Formation calcrete sheet horizons.	
34	5Section 2.7, pg 51.	"*The recharge process is assumed to be predominantly diffuse; however, where geological features such as dissolution features at the surface or within the shallow subsurface allow, the recharge process may be localised.*" Appendix I, Section 8.2 The recharge process is "*…assumed to be predominantly diffuse but may be localised in areas where geological features such as dissolution features at the surface or within the shallow subsurface allow.*" Appendix J, Section 3.4.2.dot point 16; Section 5.7, pg. 56. Statement made that "*Recharge / infiltration through the calcrete (of the Bridgewater Formation) horizons occurs uniformly across the model domain.*" However, In Appendix M, section 2.2.2.3, the statement is made that *"…the calcrete of the Bridgewater formation is highly transmissive due to solution features and fractures in the brittle rock and pooling at topographical lows would form recharge points."* In the next paragraph in Appendix M, Section 2.2.2.3, differences in groundwater salinity are speculated to " *… indicate a structural change in the surface geology which is controlling the salinity of the groundwater.*" Appendix J, section 3.3.1 and section 3.3.9 suggest there is a notable variance in salinity values across the site notwithstanding suspected erroneous readings in historical data. Further justification for the conceptualisation of predominantly diffuse recharge is required. Comment how extensive these calcrete sheets are known to be and therefore the likelihood of focussed recharge via karstic or structurally controlled fracture features versus diffuse. Further, comment on the implications this may have for groundwater management during the operational life of the mine.	Review groundwater recharge explanation for consistency.
34	Section 11.	Provide a statement regarding the predicted impacts (or otherwise) on the basis of current conceptual and numerical modelling on the specific groundwater resources of the Robinson Lens, the Kappawanta and Bramfield Basins and the Polda lens. Provide a summary of supporting evidence.	Review source pathway receptor relationship between mining operations and regional groundwater basins

35	Appendix J:	The structure of reporting is not conducive to producing a cohesive and understandable message. Note that whilst the structure of this appendix is interesting with respect to seeing how the conceptualisation has changed and developed over time, it diminishes comprehension of the final conclusions. The structure of the numerical model reports should follow the Australian Groundwater Modelling Guidelines (Barnett et al. 2012). http://www.groundwater.com.au/media/W1siZiIsIjIwMTIvMTAvMTcvMjFfNDFfMzZfOTYwX0F1c3RyYWxpYW5fZ3JvdW5kd2F0ZXJfbW9kZWxsaW5nX2d1aWRlbGluZXMucGRmIl1d/Australian-groundwater-modelling-guidelines.pdf	For noting
36	Appendix J, section 3.3.2. Figure 6.	The presentation does not make it clear as to whether the Garford Formation is continuous across the study area or not. Note that Section 3.4.2 states that the Garford Formation is indeed present across the entire study area. Suggest a different presentation, perhaps via the use of dashed contours or imagery, to clarify this.	Review and revise for consistency
37	Appendix J, page 22, section 3.4.1. of MP49639 28A-V3	'*… Kaolinised granite intervals are generally of very low hydraulic conductivity. In a groundwater context, they act as confining layers to aquifers, forming a barrier to the (vertical) movement of water. At Great White, it is likely that the kaolinised granite is acting as a confining layer and separating water in the partially decomposed granite and granite basement from water (where it exists) in the Garford Formation.*' Notwithstanding comments regarding the K values used for the Kaolinised Granite and assuming they are indeed uniformly low, stripping the kaolinised granite would potentially expose the PDG-Granite aquifer to pollution/contamination and potential for aquifer intercommunication and co-mingling of groundwater from the Garford and PDG-Granite aquifers.	Provide comment on the likely distance any local groundwater contamination could travel within these aquifers given K values?
38	Appendix J page 25, section 3.4.4 of MP49639 28A-V3:	Preliminary assessments of a possible range of groundwater inflows to pit excavations. Figure 18 – analytical equations Conceptually the radius of influence (RoI) would increase as horizontal hydraulic conductivity of the aquifer, mine penetration of the water table, and mine radius increases; and would decrease as aquifer recharge increases would decrease as aquifer recharge increases a. Was sensitivity analysis of RoI to K and RCH carried out? Table 3: Sub-pit Parameters Were the hydraulic conductivity (K) values used equivalent Ks?	a. There are lots of different equations available to estimate the Radius of Influence (RoI). Why was the Weber equation selected? b. Why was 1 year (365 days) used in estimating RoI when mining would last 26 years?

			c. How were the numerical values of the radii of the pits determined? Are they equivalent radii? d. Please provide the assumptions underlying the analytical models used, including • Was the aquifer assumed unconfined? • Was recharge assumed negligible? • Was flow from the base of pit assumed negligible? • Was the base of the pit coincident with the base of the aquifer (or top of fresh unfractured granite)? e. 50% effective porosity or specific yield of the aquifer is not considered reasonable. Provide justification for this assumption
39	Appendix J, Section 5.5, Table 10; Section 8.3, Table 16; Section 8.4, pg 76;	There are two coefficient of permeability results obtained: 0.06m/d (CW20WB002) and 0.0001 m/d (CW20WB003) there is approximately two orders of magnitude difference between these values. Both results in Table 10 are described as being obtained from a "*kaolinised granite*" There is a difference in described lithology, with the former described as a clayey sand and the latter as a sandy clay. The rest of the report uses only the result from CW20WB003 as representative of k values for the Kaolinised granite. There is inadequate explanation for only choosing the lower of the two values, rather than using an average of the two, or the higher of the two.	Provide an explanation as to why only one result was used to characterise k for the kaolinised granite

	Section 8.5, pg. 88;		
40	Page 270	Although the no dinosaur Ants were observed, the applicant is asked to repeat (possibly on a number of occasions) the Dinosaur Ant (*Nothomyrmecia macrops*) survey work undertaken by Ecological Horizons to ascertain with more confidence if these ants are found in the mining lease area or not.	Consider ongoing monitoring for presence of Dinosaur Ant (*Nothomyrmecia macrops*)
41		Groundwater mounding may have a negative impact on adjacent mallee vegetation.	Review impact and risk assessment for the potential of groundwater mounding to impact native vegetation.
	EPA		
42	42	**Air Quality Impact Assessment (Northstar)** The air quality modelling report appears to have been undertaken with appropriate conservatism and covers both stages of development more than adequately. Our only concern relates to the proximity of the nearest sensitive receiver (R1) at 800m, and that the maxima predicted PM2.5 (annual) and PM10 (24-hour) are elevated (near the compliance criteria). We understand that these results may reflect the modelling conservatism, including the adopted backgrounds, but we raise the question of whether the organisation is considering a fine particle monitoring programme beyond what we understand as the baseline monitoring proposed. If monitoring of PM2.5 and PM10 will occur during operations, we suggest triangulation (at least 3 monitors) with co-located meteorology that provides enough data to determine dust origin, coupled with a proactive (using weather forecasting) and reactive (using actual wind direction and fine particle levels) operational system. The system can the inform management to adapt daily activities to ensure dust generation is kept to a minimum.	Is a fine particle monitoring programme, to be used as a trigger, action and response plan (TARP), being considered?
43		**Section 13 Noise and Vibration and Resonate noise report** Mining proposal erroneously claims construction noise provisions of Noise EPP apply. Construction noise provisions of Noise EPP do not apply to this project as the site is not the subject of development consent. The mining proposal claims there may be an issue with non-compliance between the hours of 6am and 7am during the construction phase. This is not correct, there are no issues with predicted noise levels, as they are predicted to meet the relevant Indicative Noise Limit (INL) for the site.	No action required.

	44	**Potential non-compliance with INLs at Receiver R1 between the hours of 6am and 7am Monday to Friday** There is some discussion in the document about potential non-compliance with INL's at Receiver R1 between the hours of 6am and 7am Monday to Friday. This risk is not considered significant, but there should be recognition that noise levels may be elevated at R1 due to weather conditions on occasion. Predicted noise levels during the operational phase (all equipment and processing plant) are predicted to meet the day-time and night-time INLs set under the Noise Policy at all locations (R2-R13) except R1. Noise at R1 may exceed the Noise EPP INL for night-time (50dB(A) for a Rural area) for the operational times between 6am and 7am Monday to Friday if a penalty for a modulating noise characteristic is included. It should be noted that these predictions are based on worst case weather conditions meaning that they will not occur continuously, but rather will occur occasionally and are beyond the control of the proponent. The guidelines to using the Noise Policy state that the proponent should demonstrate that the weather conditions do not occur for a significant portion of the year (10% of the year, or 30% of any season), and if this is the case, then these results should not be used for direct comparison against the Noise Policy. The logical application of this requirement is that it applies to a continuous noise risk, and noise is only considered a risk of being excessive if it occurs for more than 10% of the total time. Weather conditions (wind less than 5m/s from a South Easterly direction) appear to occur between 10 to 15% of the year as indicated in the Resonate report (page 24 of 43). However, the risk of excessive noise is not greater than 10% of the year, or 30% of any season, as the time and duration of potential concern is only between 6am and 7am Monday to Friday (i.e. 1/24 of a day). Noise is considered to be compliant for day-time operational hours, so the relevant period of risk is far below the 10% of the year that would be considered to be relevant for weather affected noise. In addition, the application of a characteristic penalty at a distance of 800m is considered highly conservative, and there is reasonable doubt that noise at this distance would be dominated by noise modulation as is required for a penalty to apply.	No action required.