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SUBJECT: Tomingley Gold Operations – Proposed SAR Open Cut Final Void – Further Response
to Resources Regulator advice

☐ Confidential ☐ Please Reply ☐ For Follow-up ☒ Urgent ☒ For your information

MESSAGE:

Greetings Steve and Emily

I refer to your letter dated 20 December 2022 entitled *Request for Additional Information – Resources Regulator advice* as well as the following correspondence.

- Letter from the Resources Regulator dated 16 December 2022 (Resources Regulator Letter).
- Memorandum prepared by Douglas Partners entitled *Consideration of Stability for Tomingley Gold Operations – Proposed SAR Open Cut Final Void: Review of Applicant's response to the original Review Report* dated 21 December 2022 (Douglas Partners Memo).
- Report prepared by Aquaterra International Pty Limited entitled *Tomingley Gold Operations Proposed SAR Open Cut Final Void - Report to Dept Planning & Environment post Meeting 14 December 2022* dated 11 January 2023 (Aquaterra Report)

This letter has been prepared in satisfaction of the Department's request to provide a response each of the above documents. For ease of reference, extracted text from each is presented in *italics*, with the response provided in normal text. A consolidated summary of the Applicant's position in relation to the proposed SAR Open Cut final void is also provided for the Department's consideration.

Summary of the Applicant's position re the SAR Open Cut

The Applicant acknowledges and recognises the Department and Resources Regulator's concerns in relation to the long-term post mining stability of the SAR Open Cut final void. The following presents a high-level summary of the Applicant's position in relation to this matter.

- Based on the schedule presented in Section 3.5.4 of the Environmental Impact Statement (EIS) the Applicant notes the following.
 - The SAR Open Cut final void is expected to be the last of a number of pits to be constructed for as part of the SAR Open Cut, with each of the preliminary pits to be backfilled with waste rock from the subsequent pit.
 - Mining of the SAR Open Cut is not expected to commence until FY2024 or later. Mining of the final void is expected to commence no earlier than the late 2020's.
- The Applicant has engaged highly experienced experts to advise the Company on operational and post closure aspects of the existing and proposed open cuts. Each of these experts has expertise and experience across a wide range of projects within Australia and elsewhere. Similarly, the

Department/Regulator have engaged experts with a range of experience related to their fields of expertise through the University of Newcastle.. While there are substantial areas of agreement, there remain areas of professional disagreement. The Applicant contends that such disagreement does not preclude determination of the application, particularly considering the fact that the SAR Open Cut final void is not expected to commence until the late 2020's, allowing adequate time for those disagreements to be addressed.

- The Applicant would collect and analyse additional geotechnical and erosion-related data prior to commencing mining of the SAR Open Cut final void. In addition, the Applicant would continue to explore for additional resources within and surrounding the SAR Mine Site during that period. Finally, the economic and regulatory environment will continue to evolve throughout that period. The Applicant would use this additional information when preparing the design of the SAR Open Cut final void, with the design to be presented to the Department at least 6 months prior to commencement of mining of the final void. The Applicant anticipates that that design would be subject to review by the Department.
- In light of the above, the Applicant contends that determination of the Project as proposed, subject to conditions consistent with the Applicant's commitments in our letter of 6 December 2022, would not preclude implementation of any particular final void design concept. As a result, the Regulator's concerns in this regard are, in the Applicant's opinion, unfounded.
- The Applicant also contends that to "lock in" a final design concept for the SAR Open Cut final void at this stage would result in a sub-optimal design and would limit future flexibility for both the Applicant and the Department. In particular, it is almost certain that circumstances applicable in the late 2020's will be markedly different to those that apply today. Examples may include the following.
 - Commodity prices and mining costs, with associated impacts on open cut optimisation and design.
 - Future discoveries which may impact on open cut design or final land use.
 - Additional data and knowledge in relation to the geotechnical and erosion setting of the SAR Open Cut.
 - Alternate treatment options which may be identified in the future.
- The Applicant notes that the NSW Government's policy position in relation to final voids would appear to focus on final voids simply being "safe, stable and non-polluting." In the absence of a more detailed policy position, the current criterion of "stable" in particular is poorly defined and open to contrary interpretations, as evidenced by the professional differences between the Applicant's and Department's experts. The Applicant anticipates and would welcome further published policy guidance in this regard, with suitable industry consultation during preparation of any such policy.
- Finally, the Applicant notes that determination of the Project is required to permit underground mining within the SAR Mine Site, scheduled to commence in Q4 2023. Further delays in determination of the Project would place this schedule in doubt.

Resources Regulator Letter

The Regulator does not concur with the statement on Page 2 of the RWC Corkery response that the geotechnical component is a secondary issue for final void stability. Based on our site observations and through discussions with the independent experts (Douglas Partners and Aquaterra) it is the view of the Regulator that addressing both geotechnical and erosional components is critical for the stability of the final void.

As such it is considered that the analysis undertaken on permutations 1 to 9 is deficient as it has been limited to the erosional component only.

The statement in our letter dated 6 December 2022 simply reflected statements made by the Department's experts during our meeting of 1 November 2022 where this question was raised explicitly, and an explicit response consistent with the statement made was provided. Notwithstanding this, the Applicant concurs that both geotechnical and erosional components are critical for the stability of the final void

It is also noted that those present at the meeting, neither the Applicant's and Departments expert's were aware of a mechanism whereby erosional and geotechnical aspects can be assessed together. Furthermore, the proposed modelling approach was clarified and agreed during the meeting and input from the Department's experts was sought in scoping and designing the modelling. As a result, the Applicant does not concur with the Resources Regulator comments that analysis of permutations 1 to 9 are deficient.

The Regulator notes that throughout the RWC Corkery response there are general statements that outline that further data and analysis is required to confirm both the geotechnical and erosional models.

Based on the above limitations and uncertainty, the Regulator considers that the conclusions provided with respect to permutations 1 to 9 are premature.

The Regulator is concerned that the premature conclusions have been used as the basis by the proponent not to consider any further the option of mining the SAR open cut to an angle of 20°. As a consequence the proponent has only considered the establishment of a 20° slope and associated erosional control treatment (i.e. soil/rock cover) to the post construction phase of the void.

The Applicant contends that the conclusions provided in our correspondence dated 6 December 2022 are based on the best available data at this stage of the Project, noting that the proposed Open Cut is a greenfield location and limited data is available pending commencement of mining operations. More detailed and meaningful data can only be obtained during the initial phases of open cut mining, prior to commencement of the final void. As the Regulator and its experts note, modelling based on the data currently available provides indicative findings only. In light of this, the Applicant has committed to obtaining additional data during early mining operations and that that data would be used to further refine the modelling and associated conclusions.

The Applicant does not concur with the Resources Regulator's statement that the option of mining the SAR Open Cut at 20° has not been considered. All options were considered and, in the Applicant's opinion, mining of the Open Cut at a 20° would be a suboptimal outcome. This does not preclude the potential that future investigations may change this conclusion.

Finally, the Applicant notes that it was agreed with the Departments experts at the meeting on 1 November 2022 that the modelling would provide general information in relation to final void concepts. The modelling was not intended to provide definitive designs for the final void. The conclusions presented therefore are based on the best information available at the present time and would be expected to be updated and refined based on further information obtained during mining of the initial pits.

As stated on page 4 of the RWC Corkery response, the proponent has serious concerns in relation to the constructability of a proposed 20° face and erosional treatment post construction.

The Applicant acknowledges the challenges of pushing down the face of the proposed Open Cut to achieve a 20° slope. However, the option of mining the Open Cut at 20° also has very substantial challenges including the following.

- Safety – to mine the saprolites at 20° would, assuming an 80m vertical thickness of saprolite, require an approximately 230m long slope. Such a slope, without catch berms, with personnel working below would likely pose an unacceptable safety risk. Furthermore, installation of catch berms would further increase the size of the Open Cut and volume of material to be mined as well as concentrate surface water flows and exacerbate the erosion risks.

Mining the saprolites at 20° would also substantially increase the surface area of the Open Cut, increasing the volume of water that would flow over the cut face and increasing the risk of in rush to the Open Cut and challenges evacuating personnel via flooded ramps.

- Ramp – to mine the proposed Open Cut at 20° would still require a ramp to allow vehicular access for mining purposes. The ramp would remain in the final void and would concentrate water flows which would likely exacerbate erosion of the final landform.

- Volume of material to be mined – Based on the design concept assessed by Landloch and presented in our correspondence dated 6 December 2022, this option would require mining of an additional approximately 4Mbcm of saprolite and alluvial material. This material would require placement into an out-of-pit waste rock emplacement, substantially increasing the volume of waste rock emplacement required, likely increasing the area or height of the emplacement.
- Limitation on flexibility - Open cut mines are invariably subject to cutbacks for a range of reasons that are not foreseeable at the time of commencement of the Project. Reasons can include identification of additional ore, refinement in design or reuse for another purpose. Examples include all four open cuts at TGO, Cadia Valley Operations, Northparkes, Lake Cowal and almost all other open cuts in NSW. Requiring “final” shaping to 20° and rock mulching at the outset will very likely result in that work being torn up at a later date. This is both extremely inefficient, not cost effective and a disincentive to further optimisation of the SAR Open Cut because doing so would destroy “final” rehabilitation.
- Limitation on the final use of the SAR Open Cut – The Applicant has identified a number of potentially open cuttable exploration targets in the vicinity of the SAR Mine Site.¹ It is highly likely that waste rock from those deposits could be placed into the SAR Open Cut final void. Mining the SAR Open Cut to 20° and rock mulching from the outset would limit future development opportunities within the SAR Mine Site.
- Efficiency and cost, environmental impacts and viability
 - Based on the same assumptions used in our advice dated 6 December 2022, the Applicant has assumed that an additional approximately 4Mbcm of material would be required to be mined and transported to the Caloma Waste Rock Emplacement. Estimated costs for this would be between approximately \$35 million and \$40 million. This compares with the cost to push that same volume of material at the end of mine life of between approximately \$6 million and \$8 million. While these figures are indicative, mining of the Open Cut to a 20° final slope is approximately 4 times more costly than pushing that material down. These additional mining costs would represent a substantial and material additional cost for the Open Cut.
 - Transportation of an additional 4Mbcm of material would result in additional noise, dust and greenhouse gas emissions when compare with pushing that material down.
 - In addition to the above, an optimisation study was undertaken using the Whittle Optimisation software based on a 20° slope in the saprolite and alluvium and a gold price of A\$2,500/oz and A\$3,000/oz with all other inputs remaining unchanged. Spot gold price throughout 2022 varied between A\$2,475 and A\$2,800. That study determined the following.
 - The Roswell pit would be uneconomic at either A\$2500 or A\$3000/oz if mined at a 20° slope.
 - Cash flow for the San Antonio deposits would be reduced by between 20% and 35% if mined at a 20° slope compared with the Project as proposed.

In light of the above, the Applicant contends that the challenges associated with mining the SAR Open Cut at 20° are more substantial than pushing the slope down to 20° to achieve the same outcome. As a result, the Applicant continues to maintain that mining of the SAR Open Cut at 20° remains a suboptimal outcome.

Based on the uncertainties above and the geotechnical and erosional issues evident with the current voids at Tomingley Gold Mine, it is the Regulator's view that proceeding with the proponents preferred approach to mine the SAR open cut represents a potential residual risk relating to landform stability post closure.

In general, it is the Regulator's preference that uncertainties such as those listed above are addressed as far as reasonably practicable as part of the environmental assessment phase and before the grant of a development consent for a mining operation. The objective being to provide a greater opportunity to achieve sustainable rehabilitation outcomes through mine design.

¹ See for example <https://investors.alkane.com.au/site/pdf/d41de9fd-40f0-4ab9-87c3-c29cb3ad15b8/Significant-Gold-Intercepts-Outside-Resource-at-Tomingley.pdf>

Where uncertainties in regard to mine design issues are deferred to a post approval phase, it is the Regulator's view that this is done on the provision that the implementation of alternative design options are not precluded where revised modelling/analysis identify that sustainable rehabilitation cannot be achieved by the original approved design.

Noting that the proponent has raised serious concerns in regard to the constructability of a 20° slope and associated rock armouring post construction of the void, it could be inferred that alternative options may be limited if further modelling identifies that preferred mine design cannot achieve a stable post mining landform. As such, should the extension project be approved in its current form, it is recommended that conditions be imposed to address the knowledge gaps and confirm the design criteria as soon as reasonably practicable so as not to exclude alternative options

The Applicant notes and supports the Resources Regulator's comments that where uncertainties in relation to final landform designs are left to the post approval stage, that future rehabilitation options should not be limited or precluded. Similarly, the Applicant contends that very substantial additional costs should not be imposed on the Project based on incomplete information and "gut feel." Particularly when the Applicant has committed to collecting a range of additional data during mining of the initial SAR Open Cut pits and preparing a final Open Cut design prior to commencing the final open cut that would achieve the stable and non-polluting criteria for the post mining final void. It is also noted that the final open cut is not expected to commence until the late 2020's, allowing many years to collect additional data, as well as for future amendments to the Project in light of additional discoveries or changes in economic circumstances.

Finally, the Applicant does not agree that the current commitments provided would preclude implementation of any of the proposed final void options, or indeed other options, including partial or complete backfilling, that have not been assessed.

Key considerations for conditioning of the development consent to address the above issues include, but are not necessarily limited to the following:

- 1. The engagement of independent and suitably qualified experts to the satisfaction of the DPE (in consultation with the Resources Regulator) to undertake further sampling, modelling and analysis to address the knowledge gaps and confirm the most appropriate strategy to achieve a long-term stable landform post closure.*
- 2. Monitoring of the MOD7 ramp construction on the Wyoming 1 void to assess the effectiveness of geotechnical and erosional controls implemented to achieve long term landform stability. The outcomes of this assessment is to be incorporated into the assessment under point 1 above.*
- 3. Submission of a final design for the final void landform (verified by an independent and suitably qualified experts to the satisfaction of the DPE (in consultation with the Resources Regulator)) that minimises the long-term instability risks post closure.*

These requirements are consistent with commitments already made by the Applicant. The Applicant would consent to imposition of a conditional requirement consistent with the above.

Douglas Partners Memo

The Douglas Partners Memo has been reviewed by SMEC and the following response has been prepared based on their advice.

SMEC states that following a detailed review of the Douglas Partners Memo that the advice provided in the SMEC memorandum 30013226-GEO-MEM-002 A dated 5 December 2022 remains unchanged. SMEC also notes the following.

- Page 2 – bullet point 5

... "At this stage, SMEC does not consider that additional analyses are required to re-assess long-term stabilities, as there is no additional data refining the parameters adopted in the AMC analyses."

The review report recommended that additional data could be derived from more specific interpretation and analysis of the numerous failures in different materials exposed in the existing TGO pits. We note that the approach taken in additional work could be to either:

- Retain the simple circular failure models previously employed in analyses, and fit strength parameters to achieve a factor of safety of 1.0 for known failures (regardless of whether other structural factors were involved), or*
- If specific structural features were complicit in observed failures, undertake detailed geological mapping to characterise these features, adopt different, more appropriate failure model, derive parameters accordingly, and then make allowance for the likely occurrence of similar structural features in the SAR pits for TGEP.*

Whichever approach is taken, the parameters adopted and the model used should be able to consistently account for the failures that have occurred.

SMEC notes that the Applicant and its consultants have typically adopted an approach consistent to that recommended by Douglas Partners. In particular, TGO's *Ground Control Management Plan* states that geological and geotechnical data is to be routinely collected and that each wall collapse/failure is to be appropriately investigated and understood. Typically, this has included a geotechnical assessment, including back analyses, completed by external geotechnical consultants to

- assess mitigation measures; and
- revise material strength parameters.

The revised strength parameters derived from over 8 years of open cut mining experience at TGO have been used to derive preliminary design parameters for the SAR Open Cut, noting that a similar process will be required to be completed for the SAR Open Cut during mining of the initial pits prior to commencement of the final pit.

There is a body of work that supports anticipated failure modes and the assessment of alluvium and saprolite strength parameters at TGO. This work was considered in the assessment of the SAR Open Cut slope design. Furthermore, the consultant (WSP) has recommended that during mining of the initial pits, prior to commencement of the final pit, the Applicant collect data, interpret this data and completed analyses to validate the SAR design. This data collection, interpret and analyses process is consistent with Douglas Partners recommended approach.

- *It [SMEC's advice] suggests that there is "work which can be done prior to the commencement of mining operations to reduce the uncertainties in these characteristics" and that "subsequently, based on the updated data and models, the proposed and long-term pit slope designs can be re-assessed." It would seem that the time to do this (prior to the commencement of mining) is at the time the additional data is being requested to support reliable long term stability predictions, in support of mining approval.*

SMEC concurs with the above statement. SMEC has previously recommended that material strength parameters adopted in stability analyses for the SAR final void, should be based on data collected in the initial SAR pits, which will be backfilled, prior to commencement of the final pit.

SMEC notes that the Douglas Partners Memo focuses on the assessment of material shear strengths for the alluvium and saprolite and the results of slope stability analyses. Assessment of shear strength parameters to be adopted in slope stability analyses is one step in assessing an appropriate design. Material shear strength parameters do not determine design. Results of slope stability analyses are considered in the assessment of an appropriate design, but it is not the only aspect considered in assessing the design. There are many other factors, including, discontinuity orientation and persistence, the proposed life of mine, the nominal factor of safety and the level of geotechnical risk. SMEC anticipated that the SAR Open Cut will have its own unique geotechnical conditions, these conditions will need to be considered in assessing an appropriate pit slope design. The Applicant's proposed approach to collect geotechnical data prior to commencement of mining of the final void, is consistent with the approach recommended by Douglas Partners.

Aquaterra Report

The Aquaterra Report has been reviewed by Mr Isaac Kelder of Landloch and the following response has been prepared based on advice provided by Mr Kelder.

The review approach adopted by Aquaterra was to develop a synthetic landscape representative of both the Wyoming and SAR pits, and to model this using Landloch's SIBERIA parameters for the saprolite. Three scenarios were considered by Aquaterra:

1. No drainage control structure/safety bund at the edge of the void;
2. A 2m high drainage control structure/safety bund at the edge of the void; and
3. Piping/tunnelling under the drainage control structure/safety bund at the edge of the void.

The predicted results from Aquaterra's SIBERIA modelling appear to generally support the conclusions of Landloch's assessment presented in the addendum report provided with our response on 6 December 2022. The rates of pit crest retreat (gully erosion) predicted by Aquaterra for Scenarios 1 and 2 are broadly in line with those predicted by Landloch. We note that Aquaterra reached a similar conclusion based on the results of the Scenario 1 and 2 modelling, namely that *'Runoff and sediment control structures have a short-term effect in reducing erosion and pit edge expansion, but over the long-term make no significant difference to that of having no drainage control'*. Notwithstanding this, Landloch still recommend that drainage control structures/safety bunds should be constructed, and that those structures should be constructed of materials not prone to erosion, rather than the saprolite (as modelled).

Capturing the impact of the difference in materials between the pit and the drainage control structure with SIBERIA was an issue identified in Landloch's report that was unable to be addressed, and we note it is also not addressed in the review.

Scenario 3 (tunnel erosion) was not included in Landloch's modelling, and as such a direct comparison with Landloch's work is not possible. The results predicted by Aquaterra for Scenario 3 indicate rapid erosion of the pit crest within 100 years of simulation. Aquaterra note that 'further modelling with a larger domain would demonstrate the extent of the gulying' for the tunnel erosion scenario.

Landloch have previously recommended that additional modelling be undertaken based on additional data collected during mining of the initial SAR pits prior to commencement of the SAR Open Cut final void. The approach used by Aquaterra with respect to tunnel erosion may provide a basis for such modelling.

Finally, the Applicant notes that both the Landloch and Aquaterra SIBERIA modelling that there is no management of the final void and surrounding landform post-mining. In reality, it will be in the interests of the Applicant and any subsequent landholder to continue to manage surface water flows and evolution of the final void, including development of tunnel erosion and gulying. As a result, the results of both the Landloch and Aquaterra modelling are likely to be conservative.

I trust that this provides you with the information that you require at this stage. Please do not hesitate to contact me should you required additional information.

Regards



Mitchell Bland
Managing Director / Principal