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SUBJECT: Tomingley Gold Extension Project – Response to RFI-9176045 – Resources Regulator Additional Information Request

☐ ***Confidential*** ☐ ***Please Reply*** ☐ ***For Follow-up*** ☐ ***Urgent*** ■ ***For your information***

MESSAGE:

Greetings Emily

I refer to the Department's Request for Information RFI-9176045 in relation the Tomingley Gold Project (the Project) and correspondence from the Resources Regulator dated 10 June 2022. This memo provides a response to the matters raised by the Resources Regulator. To assist the Department, we have reproduced the Resources Regulator's commentary in *italics* and provided a response to each of the matters raised in normal text.

Progressive Rehabilitation

A schedule of rehabilitation activities (areas) mapped against key production milestones/mine layout sequence is required to demonstrate that opportunities for progressive rehabilitation are maximised. This could form part of a Rehabilitation Strategy requested as a condition of the Development Consent.

Response

This requirement is consistent with the requirements of Section 6.1 of the document *Form and Way – Rehabilitation Management Plan for Large Mines* and the required information would therefore be included in any *Rehabilitation Management Plan* for the Project. As a result, the Applicant acknowledges the requirement to include a schedule of rehabilitation activities but requests that this be a requirement of the *Rehabilitation Management* Plan, not the *Rehabilitation Strategy* to limit duplication.

Conceptual Final Landform Design

The preliminary design of the drop structure/spillway in the Tailings Storage Facility (Residue Storage Facility) is required. This is reasonable and is consistent with the provision of design of emergency operational spillways in the EIS. The preliminary design of the drop structure/spillway will inform what considerations are required during the facility construction and material management associated with the mine. This will inform consideration of closure of the facility through the full mine life cycle, including appropriate management/quarantining of materials in appropriate quantities, which may be in short supply.

Response

The Applicant has engaged GHD to complete a detailed closure plan for the combined Residue Storage Facility. That study is expected to be completed in the coming months, nominally during Q4 2022 and will address the following components.

- An initial gap analysis.

- Develop the basis of design and the conceptual design for the closure of the facility, including a closure options assessment, to enable the facility to be closed efficiently and effectively
- Analyse the longevity of the final closure landform, including but not limited to:
  - a hydrological and hydraulic assessment;
  - a seepage and infiltration assessment; and
  - stability assessments for the closed structure, including short- and long-term stability and seismic stability assessment.

The detailed design of the spillway/drop structure from the Residue Storage Facility final landform to natural surface has yet to be completed. While potentially subject to change during detailed design, GHD advise that the structure would indicatively:

- be a "wide" structure located on the southern face of the Facility;
- include erosion control measures at the crest of the spillway/drop structure;
- have a slope and that would be shallower than 1:3 (V:H); and
- be constructed of non-erodible material.

The final landform/closure design report will include landform evolution modelling of the entire facility, including the spillway/drop structure. The report would also identify the quantities and classes of materials required for rehabilitation and closure of the facility, with those materials to be stockpiled and quarantined within Waste Rock Emplacement 1 or elsewhere during the life of the Project.

Tailings Management

A constraints and opportunity analysis for tailings management specifically for in-pit disposal of tailings requires further consideration, rather than referring to a position provided by the EPA in 2016 for a separate project modification as the justification as to why this option is not assessed further.

Response

The Resources Regulator's comment in relation to the 2016 application is noted, however, there has been no change in the NSW Government's policy in relation to lining of tailings storage facilities and no change in the nature of the tailings to be managed or the understanding of the hydrological setting of the TGO Mine Site. As a result, the Applicant anticipates that an application for in-pit tailings would be unlikely to receive development consent.

To summarise, the EPA's *Tailings Dam Liner Policy*, which remains unchanged since 2016, requires that Tailings Storage Facilities must include a constructed clay liner to achieve hydraulic conductivity of $1x10^{-9}$ m/s or less with a thickness of at least 1000mm, or a geosynthetic liner providing equivalent or better protection. A liner with higher conductivity than the benchmark requirement may be accepted where a robust hydrogeological investigation and impact assessment as well as adequate justification is provided to prove the efficacy of the liner system and to demonstrate the construction will be adequate to prevent the pollution of waters. The Policy does not contemplate unlined Tailings Storage Facilities.

The EPA in applying the Policy provided the following advice in relation to the Applicant's prior application for in-pit tailings on 25 January 2017.

> "Based on the nature of the tailings, fractured rock geological setting and risks posed to groundwater underlying the site, the EPA are of the view that a fully lined RSF (pit floor and all walls) is required in this situation. If TGO and its technical experts are of the view that the natural geology of the site in conjunction with a constructed liner is considered sufficient in terms of containment, demonstrating compliance with the EPA's liner requirements and an equivalent level of protection to groundwater, sufficient evidence must be provided in support of this to demonstrate the construction will be adequate to prevent pollution of groundwater (e.g. Geological evidence, groundwater modelling etc)."

The Applicant was unable, despite its best efforts, to demonstrate to the satisfaction of the EPA that the natural geology alone would provide adequate containment and protection of groundwater. In addition, lining the walls of the Wyoming 3 Open Cut was not considered feasible. As a result, the application was withdrawn as it became clear that there was no realistic path to obtaining development consent.

In addition to, a range of other matters justify the Applicant's conclusion that in-pit tailings would not be feasible as described below.

Notwithstanding the fact that the Applicant contends that there is no realistic path to obtaining development consent for in-pit tailings within the TGO Mine Site above, the following presents a constraints and opportunity analysis for in-pit tailings storage for each of the existing and proposed open cuts.[1]

Each of the open cuts would be backfilled with waste rock, with the exception of the Wyoming 1 Open Cut and SAR Open Cut North Pit. The following briefly outlines the current or planned uses for those open cuts to be backfilled and justifies why these uses are preferred over in-pit tailings storage:

- The Wyoming 3 Open Cut has largely been backfilled with waste rock and is currently and will continue to be used for water storage for the life of the Project, with a capacity of approximately 1.3GL. At closure, the Open Cut will be backfilled with material within the TGO Mine Site, including the ROM Pad and other hardstand and materials. Use of the Wyoming 3 Open Cut for in-pit tailings would require an alternate water storage to be constructed. Assuming an average depth of 8m, this would require disturbance of a further approximately 20ha of land. There is no suitable location within the TGO Mine Site for such a dam. In addition, evaporative losses would be substantially higher than the current arrangement, resulting in increased makeup water requirements. Finally, the Wyoming 3 Open Cut would only take a small proportion of the approximately 8.9Mm^3 of tailings likely to be produced during the life of the Project. As a result, use of the Wyoming 3 Open Cut for in-pit tailings would be a non-optimal use of that open cut.
- The Caloma 1 and 2 Open Cuts are currently used for active mining operations and waste rock placement. The open cuts are underlaid by underground workings and a ventilation decline is also present within the Caloma 1 Open Cut. The combined volume of the open cuts are proposed to be completely backfilled with waste rock from the SAR Open Cut. The combined volume of the open cuts is approximately 16.0Mm^3. As a result, even if all tailings produced during the life of the Project were placed within the Caloma 1 and 2 Open Cuts, the open cuts would be only partially backfilled. The volume shortfall could potentially be made up by commingling tailings and waste rock. However, the Applicant contends that drying of the full tailing stream to create a paste to allow commingling would not be economically feasible. Issues around placing of tailings above active underground mining operations and recovery of bleed water would also remain. As a result, use of the Caloma 1 and 2 Open Cuts for in-pit tailings is a non-optimal use of those open cuts.
- SAR Open Cut South and Central Pits are proposed to be backfilled with waste rock from the SAR Open Cut North Pit. If these pits were unavailable for waste rock placement, then the proposed SAR Waste Rock Emplacement would have a substantially larger surface footprint with the subsequent loss of biodiversity and agriculturally productive. The Applicant made the conscious decision to place waste rock back into these voids as to minimise this outcome. In addition, use of those open cut voids for tailings placement could not commence until mining of them is complete in FY25 (South Pit) and FY26 (Central Pit). The South and Central Pits have a combined volume of approximately 20.3m^3. From July 2024, only approximately 6.1Mm^3 of tailings would be produced. In addition, previously discussed issues with dewatering of tailings to permit co-mingling with waste rock, placement of tailings above active mining operations and recovery of bleed water would remain. As a result, use of the South and Central Pits for in-pit tailings would be a non-optimal use of those open cuts.

[1] See also Section 4.2.10.4 of the TGEP *Submissions Report.*

In addition to the above, the Applicant notes that the SAR Open Cut North Pit (North Pit) would be the last open cut mined. As a result, backfilling of that open cut with tailings material would not be feasible because processing operations would largely be complete at the time that the open cut became available.

In light of the above, the only open cut that could potentially be used for in-pit tailings placement would be the Wyoming 1 Open Cut. That open cut is currently and would continue to be used for access to the TGO Underground Mine and proposed SAR Underground Mine until late in the life of the Project (late 2020s, early 2030s). Issues associated with backfilling of the open cut generally are presented in the following subsection. The remainder of this subsection addresses matters related specifically to use of the open cut for in-pit tailings storage.

Compliance with the *Tailings Dam Liner Policy* for the Wyoming 1 Open Cut could potentially be achieved by fully lining the open cut. That option is, however not considered feasible for the following reasons:

- The open cut has wall angles up to 75° (see for example Figures 6 and 7 of the *Submissions Report)* with areas that are currently not accessible. Constructing a clay or other liner on the existing open cut walls is simply not practicable or feasible from an engineering, safety, operational or cost perspective.
- The open cut could potentially be backfilled to achieve slopes suitable for constructing a liner that would comply with the *Tailings Dam Liner Policy*. Partial backfilling of the Wyoming 1 Open Cut is not considered feasible for engineering and cost reasons as follows:
  - Allowing for backfilled slopes of 1:2 (V:H), equivalent to the approved inner face of the embankment of RSF2, approximately 3.6Mm^3 of waste rock would be required to provide a surface suitable for constructing a liner. The resulting void would be approximately 6.8Mm^3, or less than the anticipated 8.9Mm^3 of tailings to be produced by the Project. As a result, RSF2 would still be required.
  - Backfilled waste rock material would be up to 50m thick and would be expected to settle and move with time. As a result, any liner constructed on the backfilled surface would be unlikely to retain its integrity.
  - The NSW Resources Regulator Rehabilitation Cost Estimate tool identifies a cost of $6.88/m^3 to push, load, transport (between 2km and 5km) and place waste rock.[2] Allowing approximately 3.6Mm^3 of material for backfilling, the cost for placement alone would be approximately $24.8 million. Substantial additional costs would then be required to compact, line and commission any in-pit facility. Further costs would also be incurred for the construction of RSF2 to cater for the approximately 2.1Mm^{3}of tailings that could not be placed within the in-pit facility, with approximately $18 million already committed for Stage 1. As a result, the Applicant anticipates that construction of an in-pit Tailings Storage Facility within the Wyoming 1 Open Cut, as well as Stage 1 of RSF2, as a total cost well in excess of $43 million would not be economically viable.

Assuming that compliance with the NSW *Tailings Dam Liner Policy* could be waived or the policy amended, the Applicant contends that the use of the open cut for in-pit tailings would not be the preferred option for the following reasons.

- In-pit placement of tailings would unlikely meet the tailings dewatering and consolidation requirements for the following reasons:
  - Recovery of water from the surface of in-pit tailings would be challenging because the steep walls of the open cuts and limited access to the existing ramps would make the establishment of suitable decant infrastructure difficult.
  - Tailings would accumulate at a rate substantially greater than the 2m vertically per year required to provide for adequate consolidation of the material.

[2] Source: NSW Resources Regulator Rehabilitation Cost Estimate tool – accessed 1 July 2022. Cost Schedule tab, row 143.

  - The aerial extent of an in-pit tailings storage facility would not permit solar drying of the placed tailings.
  - Dewatering of the base of the tailings pile would need to rely on an effective underdrainage system. Failure of that system would result in that material simply not releasing the contained water or releasing it over a very extended period.
- Substantial subsidence of the final tailings surface would be expected. Studies undertaken for the abandoned 2016 application for in-pit tailings identified the following rates of consolidation-related subsidence of the tailings surface:
  - Approximately 22m of vertical subsidence during tailings deposition.
  - Between approximately 0.6m and 1.9m of vertical subsidence during the first 12 months post mining.
  - Between approximately 1m and 7m of vertical subsidence during the period of several decades to 543 years post mining.
- Inadequate dewatering and consolidation of the tailings would result in substantial challenges during capping and rehabilitating the facility. Indeed, it is possible that capping the tailings surface post mining may not be possible for a very substantial period following mine closure, if at all, because of the low strength of the inadequately dewatered and consolidated tailings.
- The Applicant has a responsibility to ensure the safety of persons working at the TGO Mine Site. The Applicant has considered the risk of inrush of tailings to underground workings underlying the Wyoming 1 and Caloma 1 and 2 Open Cuts. Of particular relevance is the existence of:
  - four portals within the Wyoming 1 Open Cut; and
  - numerous open exploration drill holes and fractures between the Wyoming 1 and Caloma Open Cuts and the underground workings.
  - The Applicant's senior management team have prior experience with unplanned inrush of in-pit tailings into underground workings. As a result, none of the current management team would be willing to act in the role of statutory Mine Manger for any operation involving in-pit placement of tailings above an active underground mine. As the SAR and TGO Underground Mines are an integrated operation with a drive linking the workings, this would apply until such time as the SAR Underground Mine ceased to operate.

As a result, the Applicant contends that even in the absence of the requirement to line an in-pit Tailings Storage Facility, placement of unconsolidated tailings into the Wyoming 1 Open Cut would result in unacceptable risks for workers, unjustifiable difficulties rehabilitating the facility and ongoing environmental and safety risks post mining as a result of the presence of unconsolidated / poorly consolidated tailings within the Wyoming 1 Open Cut.

Finally, the Applicant is aware of three mining operations in NSW with approved in-pit tailings operations. The following presents an overview of each and a discussion of how those operations differ from TGO and the Project.

- Cadia Valley Operations – the Applicant is advised that approval for in-pit tailings storage was provided prior to introduction of the *Tailings Dam Liner Policy*. The nature of the tailings produced are also different, with cyanide leaching not undertaken at that site. In addition, the Applicant also understands that underground openings within the Cadia Hill Open Cut are not connected to the current active underground workings.
- Northparkes Mine – similarly, the Applicant is advised that approval for in-pit tailings storage was provided prior to introduction of the *Tailings Dam Liner Policy*. The nature of the tailings produced are also different, with cyanide leaching not undertaken at that site.

- Rasp Mine – approval for in-pit tailings was granted as part of Modification 6 of MP07_0018 on 16 March 2022. The tailings to be placed are dried tailings harvested from an existing Tailings Storage Facility for placement into a former, non-active open cut. Dried tailings are placed with waste rock in nominal 250mm lifts, with each layer roller compacted to achieve a dry density ratio of at least 95% standard compaction. Seepage from the in-pit Tailings Storage Facility is collected within the existing underground workings for reuse in mining operations.

  The following factors differentiate the approved in-pit tailings deposition at the Rasp Mine from potential in-pit tailing deposition within the TGO or SAR Mine Site:

  – The Rasp Mine is harvesting dry tailings and placing them by truck into the existing Kintore Open Cut. The tailings within the TGO Mine Site are a slurry that is dewatered via subaerial deposition onto a tailings beach. Dewatering all or a substantial proportion of the TGO tailings stream and transporting this material via truck to be placed back in pit would not be economically feasible. In addition, vehicular access to the base of the open cut is no longer available via the pit ramp, with vehicles required to enter the TGO Underground Mine and exit at one of the Secondary Portals. As a result, placing of dewatered in a manner that would allow compaction would significantly impact on the operation of the TGO Underground haulage operations.
  – The Rasp Mine achieves adequate tailings consolidation by depositing the harvested dry tailings in thin layers and roller compacting the material. Tailings at TGO achieve the required dewatering, compaction and consolidation through cyclical placement onto a tailings surface with an area of approximately 35ha. This provides a sufficiently large area to permit settlement, dewatering and solar drying. Placement into the Wyoming 1 Open Cut would not permit the dewatering, compaction and consolidation required to achieve a stable final landform.
  – The Applicant understands that the Kintore Open Cut does not include opening to the Rasp Underground Mine. By contrast, the Wyoming 1 Open Cut has four portals and numerous open exploration holes linking it to the TGO Underground Mine.

In light of the above, each of the approved in-pit tailings operations in NSW a sufficiently different from any potential TGO in-pit tailings operation that none may be considered a suitable analogue.

Final Void

A constraints and opportunity analysis for the final voids options requires further consideration, including backfilling the Wyoming 1 pit to justify that the proposed design is the most feasible and environmentally sustainable option to minimise the sterilisation of land post-mining. The justification for not backfilling Wyoming 1 final void needs further assessment, including consideration of backfill with tailings (refer to separate point on tailing management) and options to construct separate access to the mine workings (i.e. box-cut with drift or potentially shaft) and to verify why the access is required during the proposed life of the extension project.

Response

Introduction

As discussed above, the Project would result in backfilling of the Caloma 1 and 2 and the Wyoming 3 Open Cuts, as well as the SAR Open Cut South and Central Pits. The option of fully or partially backfilling those open cuts with tailings or a combination of tailings and waste rock is also addressed above, with the Applicant contending that use of tailings for backfilling is not permissible, practicable, safe or cost effective. As a result, no further analysis of backfilling of those open cuts is provided.

The following subsections provide a constraints and opportunity analysis for backfilling of the SAR Open Cut North Pit (North Pit) and the Wyoming 1 Open Cut final voids.

At the outset, it is noted that the approved final landform for the Wyoming 1 and Caloma 1 and 2 Open Cuts is a final void. The project would result in the backfilling of the Caloma 1 and Caloma 2 Open Cuts, resulting in a reduction in the area of final void within the TGO Mine Site by 44ha. The Project would also result in the backfilling of the South and Central Pits, with the North Pit final void expected to be approximately 44ha in size. As a result, the Project would not result in an increase in the area of approved final voids.

It is also noted that final voids do not "sterilise" subsequent post-mining land uses. Section A4.5.3.1 of Appendix 4 of the EIS identifies the final land use options considered by the Applicant include water storage or backfilling with suitable material. Additional uses could include pumped hydro or continued mining-related uses. As a result, the Applicant notes that the final voids are not "sterilised" from a land use perspective. Rather those landforms are available for a range of alternate land uses at the end of mining, with the preferred land use to be determined and subjected to required approval processes at the time. In the interim the only land use permissible without further development consent is water storage, in its self a highly valuable land use given the paucity of large capacity, deep water storages with low evaporative losses in the surrounding area.

SAR Open Cut North Pit

The North Pit would be the last open cut mined and, following establishment of a portal in the early 2030s, would continue to provide access to the SAR Underground Mine until the end of the life of the Project in December 2032 or later, pending a subsequent application to extend the life of the Project. As a result, substantial backfilling operations, if they were to occur, would be unable to commence until after the completion of underground mining operations within the SAR Underground Mine.

The final volume of the North Pit would be approximately 37.4Mm^3. The final void could potentially be backfilled with previously emplaced waste rock from the SAR Waste Rock Emplacement. Based in the NSW Resources Regulator estimated cost to push, load, transport (between 2km and 5km) and place waste rock of \$6.88/m^3, the cost to backfill the North Pit to surface would be approximately \$257.3 million. The Applicant contends that this expenditure would likely make the entire Project unviable and would, in any case, provide limited benefit, with an additional 44ha of land reclaimed for agricultural operations. Table 8 of the *Agricultural Impact Assessment* presented as Part 8 of the *Specialist Consultant Studied Compendium* that accompanied the EIS identified that post-mining, agricultural gross margin return would be \$1.2 million per annum or \$614/ha/annum. Increasing the area of agricultural land by 44ha would increase the annual agricultural gross margin return by approximately \$27,000. In addition, alternate land uses, including backfilling with suitable materials, water storage or pumped hydro, potentially with much higher annual returns, would be lost.

As a result, the Applicant contends that the alternative of backfilling the North Pit to achieve a final agricultural land use would not be feasible and would result in a sub-optimal outcome when compared with the proposed final land use of a final void.

Wyoming 1 Open Cut

As identified above, the Wyoming 1 Open Cut is currently and would continue to be used for access to the TGO Underground Mine and proposed SAR Underground Mine, potentially until the end of the life of the Project. Any final void treatment options within the Wyoming 1 Open Cut prior to 2031 would be required to ensure continued access to those workings, as well as the safety of personnel working underground. The option of backfilling the Wyoming 1 Open Cut with tailings has been addressed above. This subsection described measures to ensure compliance with the existing final void conditional requirements in MP09_0155 and provides a constraints and opportunity analysis for the final void, including consideration of backfilling options and establishment of an alternate access to the TGO and SAR Underground Mines.

Compliance with Conditional Requirements

In preparing the constraints and opportunities analysis for the Wyoming 1 Open Cut, the Applicant has taken into consideration the following requirements of Condition 51 of Schedule 3 of MP09_0155. For ease of reference the relevant text from that condition is reproduced below.

> The Proponent shall rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the Project under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA (as reproduced in Appendix 6) and must comply with the objectives in Table 10.
>
> Table 10: Rehabilitation Objectives

Final voids	• Negligible instability risk • Minimise the size and depth of the final voids as far as is reasonable and feasible • Minimise the drainage catchment of the final voids as far as reasonable and feasible

The following includes a brief commentary on the measures currently in place to ensure compliance with these requirements.

- Negligible instability risk

  The Applicant's geotechnical advisor since at least 2015 is Ms Lianne McKenzie, Principal Engineering Geologist with SMEC and formally with AMC Consultants and WSP. Ms McKenzie has extensive and long-term knowledge of the geotechnical setting of the TGO Mine Site generally and the Wyoming 1 Open Cut specifically. Ms McKenzie has prepared advice, presented as Appendix 6 of the EIS, that identifies that the potential long-term outward migration of the Wyoming 1 Open Cut crest that would achieve a factor of safety (FoS) of 1.5 consistent with a "high risk" setting as described in Read and Stacey (2009). That assessment determined that on the eastern, southern and western perimeters of the Wyoming 1 Open Cut, potential outward migration may be up to approximately 36m, 64m and 23m respectively (**Figure A**).

  Further analysis of potential outward migration of the Wyoming 1 Open Cut crest as a result of erosion was undertaken by Landloch Pty Limited, presented as Appendix 7 of the EIS. Figure 6 of that report identifies negligible outward migration in the first 100 years post closure, with modelling of a 1,000-year period post closure indicating that erosion would be expected to result in outward migration of the Wyoming 1 Open Cut crest of 20m or less for each of the transects modelled.

  Taking the results of the analysis by AMC and Landloch cumulatively, the expected outward migration of the eastern, southern and western Wyoming 1 Open Cut crests would be 56m, 84m and 43m respectively (**Figure A**). The Applicant anticipates that these distances would be used to establish the location of a Relinquishment Bund for the Wyoming 1 Open Cut.

  As a result, the Applicant contends that the Wyoming 1 Open Cut final void, as it currently exists, would present a negligible instability risk.

- Minimise the size and depth of the final voids as far as is reasonable and feasible.

  The Applicant notes that the size and depth of the Wyoming 1 Open Cut has been minimised to the extent practicable while ensuring that extraction of the State-owned resource has been maximised. A limited volume of waste rock has been placed within the Open Cut, however, further placement of waste rock is constrained by the requirement to provide an adequate sump to prevent inrush of water to the underground workings.

  As a result, the Applicant contends that the Wyoming 1 Open Cut has the minimum practicable size and depth.

- Minimise the drainage catchment of the final voids as far as reasonable and feasible.

  The Applicant maintains an exclusion bund around the Wyoming 1 Open Cut and would establish a long-term Relinquishment Bund at mine closure. As a result, the Applicant contends that the drainage catchment around the Wyoming 1 Open Cut has been minimised to the extent practicable.

As a result, the Applicant contends that the Wyoming 1 Open Cut currently and would comply with the approved closure requirements identified by Condition 51 of Schedule 3 of MP09_0155.

Overview of Constraints and Opportunities for Wyoming 1 Final Void

The Resources Regulator has requested an opportunities and constraints assessment of final void options, including backfilling of the Wyoming 1 Open Cut. The option of backfilling the Open Cut with tailings has been addressed in the previous subsection. **Table A** present a range of the options considered by the Applicant, the opportunities provided by each option, the constraints that limit the Applicant's ability to implement each of the identified options and potential actions to overcome the identified constraints. The following subsections provide an assessment of the identified actions to overcome the identified constraints.

Table A
Alternate Wyoming 1 Open Cut Final Void Options

Backfilling Option	Opportunity	Constraint	Potential Actions to Overcome Constraint(s)
1 – Buttressing of the Eastern Wall	• Increased stability of the eastern wall of the Open Cut	• Availability and costs to mine and safely place fresh, unweathered waste rock • Challenges placing material safely and without impacting on existing assess ramp or portals. • Loss of in-pit sump and increased risk of inrush to underground • Loss of ventilation and emergency egress infrastructure	• Source fresh competent waste rock from SAR Open Cut. • Harvest waste rock from one or more Waste Rock Emplacements • Manage the risk of inrush. • Install additional ventilation / emergency egress infrastructure
2 – Partial Backfill	• Increased stability of all Open Cut walls	• Availability and costs to mine and safely place fresh, unweathered waste rock • Loss of access to TGO and SAR Underground • Loss of in-pit sump and increased risk of inrush • Loss of ventilation and emergency egress infrastructure	• Source waste rock from SAR Open Cut. • Harvest waste rock from one or more Waste Rock Emplacements • Establish alternate access to TGO and SAR Underground • Manage the risk of inrush. • Install additional ventilation / emergency egress infrastructure
3 – Complete Backfill	• Increased stability of all Open Cut walls • Final void available for final agricultural/industrial land use	• Availability and costs to mine and safely place waste rock • Loss of access to TGO and SAR Underground • Loss of in-pit sump and increased risk of inrush • Loss of ventilation and emergency egress infrastructure	• Source waste rock from SAR Open Cut. • Harvest waste rock from one or more Waste Rock Emplacements • Establish alternate access to TGO and SAR Underground • Manage the risk of inrush. • Install additional ventilation / emergency egress infrastructure

Volume of Waste Rock Required for Backfilling of Wyoming 1 Open Cut

Each of the backfilling options would require a substantial volume of waste rock as follows.

- Option 1 - Buttressing of Eastern Wall ..... >1.0Mlcm
- Option 2 – Partial Backfill ..... >3.0Mlcm
- Option 3 – Complete Backfill ..... >10.5Mlcm

Tables B and **C** present the anticipated volumes of material expected to be produced from the SAR Open Cut and the currently proposed destination for that material. In summary, the SAR Open Cut is expected to generate approximately 83.7Mlcm of waste rock, including 21.4Mlcm of fresh waste rock. A minimum of 43.2Mlcm of waste rock is required for:

- construction of Project infrastructure;
- construction and capping of the Residue Storage Facilities; and
- backfilling of the Caloma 1 and 2 Open Cuts and the SAR Open Cut South and Central Pits.

Table B
Indicative SAR Open Cut Waste Rock Volumes

Class	South and Central Pits		North Pit		Total
Units	**Mbcm[1]**	**Mlcm[1]**	**Mbcm[1]**	**Mlcm[1]**	**Mlcm[1]**
Alluvium	15.1	18.9	15.4	19.2	38.1
Saprolite	4.8	6.0	4.6	5.7	11.7
Transitional(?)	4.0	5.0	6.0	7.5	12.5
Fresh	5.0	6.3	12.1	15.1	21.4
TOTAL	**28.9**	**36.2**	**38.1**	**47.5**	**83.7**
Note 1: Mbcm = million bank cubic metres Mlcm = million loose cubic metres					
Source: Tomingley Gold Operations Pty Limited					

Table C
Indicative SAR Open Cut Waste Rock Commitments

Destination	Required Material Class	Indicative Volume (Mlcm)
Haul Road – sub-base	Any	0.2
Haul Road – Sheeting	Fresh	0.2
Amenity Bund	Any	0.7
SAR Administration Area	Fresh	0.2
Other hardstand	Fresh	0.2
Residue Storage Facility - embankments	Any	1.8
Residue Storage Facility - Capping	Saprolite	1.0
	Fresh	1.0
Caloma Waste Rock Emplacement	Any	17.6
SAR Waste Rock Emplacement	In-pit - Any	20.3
	Total	**43.2**
Source: Tomingley Gold Operations Pty Limited		

In light of the above, approximately 40.5Mlcm of waste rock would be available for other purposes. Currently that material is proposed to be placed into the SAR out-of-pit Waste Rock Emplacement, however, a proportion could be available for backfilling of the Wyoming 1 Open Cut.

Source Waste Rock from SAR Open Cut

Table D presents an assessment of the additional costs for each of the backfilling scenarios identified above. The following summarises the assumptions used to establish the additional costs of this option.

- The Project currently allows for transportation of waste rock from the SAR Open Cut to the SAR out-of-pit Waste Rock Emplacement, a one-way distance of less than 2km.
- The use of SAR Open Cut waste rock for backfilling of the Wyoming 1 Open Cut would require transportation of that material for a one-way distance of approximately 6.5km.
- The NSW Resources Regulator Rehabilitation Cost Estimate tool identifies a cost of \$5.22/m^3 to push, load, transport and place waste rock a distance of between 1km and 2km. For longer distances of up to 7.5km the tool estimates a cost of \$9.13/m^3.*[3]
- As a result, the differential cost between transporting waste rock to the SAR Waste Rock Emplacement and transporting that material to the Wyoming 1 Open Cut would be the difference between these rates, namely \$3.91/m^3.
- This assumption does not take into account the additional substantial costs of placing waste rock in a manner that allows partial or complete backfilling of the Wyoming 1 Open Cut. As a result, the anticipated additional costs identified in **Table D** are likely to underestimate actual additional costs associated with this option.

Table D
Anticipated Additional Costs for Backfilling of the Wyoming 1 Open Cut

Option	Minimum Volume of Material Required	Additional Transportation Cost[1]	Total Additional Cost
1 – Buttressing of the Eastern Wall	>1.0Mlcm	\$3.91/m^3	>\$3.91 million
2 – Partial Backfill	>3.0Mlcm	\$3.91/m^3	>\$11.71 million
3 – Complete Backfill	10.4Mlcm	\$3.91/m^3	\$40.67 million
Note 1: Additional transportation costs = differential between Resources Regulator-determined rates of \$5.22/m^3 to push, load, transport and place waste rock a distance of between 1km and 2km and \$9.13/m^3 for distances of up to 7.5km.			
Source: Tomingley Gold Operations Pty Limited			

The Applicant contends that these costs would be unjustified considering that, in its opinion, the Wyoming 1 Open Cut currently and would continue to comply with the final void conditional requirements.

In addition to the extra costs that transporting waste rock from the SAR Open Cut the Wyoming 1 Open Cut, the following additional negative impacts would also be experienced.

- Substantially greater noise and air quality impacts on surrounding residents than would otherwise be the case.
- Additional greenhouse gas emissions.

Finally, it is noted that direct transportation of waste rock from the SAR Open Cut would result in removal of the sump in the bottom of the Wyoming 1 Open Cut and could not be undertaken while that open cut is being used as the primary access for the TGO and SAR Underground Mines.

As a result, and taking into account the Applicant's position that the Wyoming 1 Open Cut currently and would continue to comply with the approved closure criteria, the Applicant contends that backfilling of the Wyoming1 Open Cut during mining of the SAR Open Cut would not be reasonable or feasible.

[3] Source: NSW Resources Regulator Rehabilitation Cost Estimate tool – accessed 1 July 2022. Cost Schedule tab, row 144.

Harvest Waste Rock from Waste Rock Emplacement

An alternate to transporting waste rock from the SAR Open Cut could be to harvest that material from one or more waste rock emplacements. The closest potential source would be the rehabilitated Waste Rock Emplacement 2, a distance of approximately 1km. However, Waste Rock Emplacement 2 has been successfully rehabilitated and any harvesting operations would destroy that rehabilitation, with the disturbed areas then needing to be rehabilitated again. This would be both inconsistent with the Regulator's approach to rehabilitation and a disincentive to the Applicant and the wider industry to undertake progressive rehabilitation.

An alternative could be to harvest waste rock from the SAR out-of-pit Waste Rock Emplacement before it is rehabilitated. This would permit backfilling operations to be undertaken one the Wyoming 1 Open Cut is no longer required for access, to the TGO or SAR Underground Mines, but would include substantial additional cost. **Tables E** and **F** present the anticipated cost for each of these harvesting options based on rates presented in the Resources Regulator's Rehabilitation Cost Estimate tool.

Table E
Anticipated Costs for Harvesting Waste Rock – Waste Rock Emplacement 2

Option	Minimum Volume of Material Required	Additional Transportation Cost[1]	Total Additional Cost
1 – Buttressing of the Eastern Wall	>1.0Mlcm	$5.22/m^3	>$5.2 million
2 – Partial Backfill	>3.0Mlcm	$5.22/m^3	>$15.7 million
3 – Complete Backfill	10.4Mlcm	$5.22/m^3	$54.3 million
Note 1: NSW Resources Regulator Rehabilitation Cost Estimate tool – accessed 1 July 2022. Cost Schedule tab, row 142. Transportation 1km to 2km			
Source: Tomingley Gold Operations Pty Limited			

Table F
Anticipated Costs for Harvesting Waste Rock – SAR Waste Rock Emplacement

Option	Minimum Volume of Material Required	Additional Transportation Cost[1]	Total Additional Cost
1 – Buttressing of the Eastern Wall	>1.0Mlcm	$9.13/m^3	>$9.1 million
2 – Partial Backfill	>3.0Mlcm	$9.13/m^3	>$27.4 million
3 – Complete Backfill	10.4Mlcm	$9.13/m^3	$95.0 million
Note 1: NSW Resources Regulator Rehabilitation Cost Estimate tool – accessed 1 July 2022. Cost Schedule tab, row 144. Transportation >5km			
Source: Tomingley Gold Operations Pty Limited			

As a result, and taking into account the Applicant's position that the Wyoming 1 Open Cut currently and would comply with the approved closure criteria, the Applicant contends that backfilling of the Wyoming1 Open Cut with waste rock harvested from Waste Rock Emplacement 2 or the SAR out-of-pit Waste Rock Emplacement would not be reasonable or feasible.

Establish alternate access to TGO and SAR Underground

The Resources Regulator has requested that the Applicant assess potential alternate access options for the TGO and SAR Underground Mines. In summary, the Applicant has assessed the following options.

- Establishment of a portal in the Caloma 1 Open Cut.

  The Caloma 1 Open Cut is required for placement of waste rock from the SAR Open Cut and use for access to the TGO and SAR Underground Mines would be a suboptimal use of that void.

- Establishment of a portal within the SAR Open Cut South or Central Pits.

  The South and Central Pits are required for placement of waste rock from the North Pit and use for access to the SAR Underground Mine would be a suboptimal use of those voids.

- Bringing forward establishment of a portal within the North Pit.

  The Applicant proposes to establish a portal within the North Pit, likely in the early 2030s once terminal faces in fresh rock have been established. Establishment of that portal could potentially be bought forward through the construction of a box cut within the footprint to the North Pit. However, that would very substantially constrain open cut operations within the North Pit and would impose significant safety and stability risks for workers. Finally, such a portal would only permit access to the SAR Underground Mine. The TGO Underground Mine will require ongoing access until at least 31 December 2025. As a result, the option is not considered to be viable.

- Construction of Standalone Box Cut.

  In assessing the option for a standalone box cut, the Applicant assessed a range of potential locations for the box cut, with the only potential location being to the south of Wyoming 1 Open Cut and west of the Newell Highway. The current Main Portal within the Wyoming 1 Open Cut is located immediately below the base of oxidation at an elevation of approximately 204m AHD or 65m below surface. The Applicant has assumed that any alternate box cut and portal would be located at a similar depth.

  The Applicant has previously (in 2019) assessed the option for a standalone box cut and portal based on the following design criteria.

  – Wall angle ..... 36°
  – Maximum depth 70m
  – Haul road width..... 15m
  – Haul road slope ..... 1:10 (V:H)

  Based on these design criteria, the box cut would have the following dimensions.

  – Box cut width at surface ..... approximately 207m
  – Box cut length at surface..... approximately 796m
  – Box cut area ..... approximately 8.52ha
  – Box cut volume ..... approximately 2.4Mbcm

- The study also included the following, each of which would be required for construction of any box cut to the south of the Wyoming 1 Open Cut.

  – Approximately 750m of decline development to link the box cut to existing workings.
  – A ventilation shaft to replace three ventilation portals within the Wyoming 1 Open Cut.

  The study determined that the box cut would require approximately 18 to 20 months to compete and would cost approximately $28.6 million (in 2019 dollars).

  In addition, the Applicant notes the following additional impediments to such a proposal.

  – The box cut would extend the haulage distance for ore and waste rock from the TGO and SAR Underground Mines, with the resulting increase in operational costs.
  – The box cut would be located in an area of substantial overland flow during substantial rainfall events. Figure 6.6.6 of the EIS identifies that this area is expected to experience overland flows of up to 0.5m deep under a 5% Annual Exceedance Probability (AEP) rainfall event. A box cut in that location would likely result in substantially higher water levels and likely overtopping of the Newell Highway, a result that Transport for NSW would not accept. In addition, the Applicant states that the risk of inrush to the workings under such a scenario would be unacceptable.

- Residence R6, located to the south of the TGO Mine Site would be expected to experience additional noise, air quality and visual amenity-related impacts during construction and operation of the box cut.
- The box cut would remain as final void and would occupy an area that would be approximately 40% of the area of the Wyoming 1 Open Cut and 150m longer than the diameter of the open cut.

In light of the above, the Applicant contends that a standalone box cut would result in additional safety risks, environmental impacts and costs for limited benefit. As a result, a standalone box cut is not considered viable.

- Construction of a Shaft

  The Resources Regulator has also identified construction of a shaft as a potential alternate access to the TGO Underground Mine.

  Construction of a shaft through approximately 70m of variably unconsolidated to poorly consolidated alluvial and saprolite material is simply not feasible from an engineering or cost perspective. In addition, even if construction of a shaft was feasible it would not be operationally feasible for the following reasons.

  - Shaft operations are only competitive from an operational cost perspective for deep underground mines when the cost per vertical meter for shaft haulage becomes less than for decline haulage. This is typically where mine depth exceeds 1000m or production tonnage exceeds 4Mtpa at shallower depths. The TGO Underground Mine is substantially less than 1000m in depth and planned annual underground production is substantially less than 4Mtpa.
  - The TGO Underground Mine has been designed and constructed for decline operations and the Applicant has recently substantially upgraded its underground haulage fleet to support those operations until the end of the Project in 2032. The mine design and equipment are not compatible with a shaft operation.

In light of the above, shaft operations at the TGO and SAR Underground Mines would not be viable.

Manage the Risk of Inrush

Inrush is the sudden flooding of underground workings by water or other materials via portals or other openings and poses a very significant risk to the safety of workers underground. The Applicant manages that risk by maintaining adequate freeboard in the Wyoming 1 Open Cut sump below the secondary portals (**Figure A**).

Any backfilling operations would completely backfill the current sump and remove the Applicant's ability to maintain water levels at a safe level below the invert of the portals. Potential exists to install submersible pumps within dedicated dewatering infrastructure and to install barriers within the lower portals. However, prior experience of fatalities associated with engineering failures of such pumping and barrier infrastructure indicates unacceptable safety risks. As a result, the Applicant contends that the risk of inrush to the TGO Underground Mine cannot be adequately managed without the existing sump and that backfilling of that sump would be an unacceptable safety risk.

Install Additional Ventilation / Emergency Egress Infrastructure

The secondary portals located within the Wyoming 1 Open Cut provide ventilation and emergency egress for the TGO Underground Mine. Backfilling of the Open Cut would result in loss of this infrastructure and the requirement to establish additional ventilation rises within the TGO Mine Site.

The Applicant has recently installed a ventilation rise for the SAR Exploration Drive, at a budget cost of approximately $2 million, including the installation of fans and electrical infrastructure. Additional costs of approximately $0.5 million would be required for additional escape ladderways.

Conclusion

In light of the above, the Applicant concludes the following.

- Backfilling the North Pit to achieve a final agricultural land use would not be feasible and would result in a sub-optimal outcome when compared with the proposed final land use of a final void.
- A constraints and opportunities analysis for the Wyoming 1 Open Cut concluded that:
  - the open cut currently and would continue to meet the approved closure criteria;
  - a range of options to partially or fully backfill the open cut would result in substantial additional environmental, safety or cost impacts for limited benefit; and
  - a box cut or shaft option to establish alternate access would not be viable.

Adoption of Closure Criteria for Final Voids

Information provided to justify the adoption of various Factors of Safety (FoS) for the stability of final void slopes for different final voids is noted. The Regulator will seek further advice on the appropriateness of the FoS proposed, coupled with consideration of other landform stability risks controls in order to achieve a final void landform with negligible instability risk, which is a condition of the current development consent.

Response

The Applicant notes the Regulator's comments and will work with the Regulator and the Department to determine suitable closure criteria that would incorporate SMART principles for the final voids.

The Applicant notes that that the Regulator, to the Applicant's knowledge, does not have a Policy that quantifies closure criteria for final voids, effectively the "Measurable" aspect of the SMART principles. It would be the Applicant's very strong preference that the Regulator develop a draft Policy, undertake the required industry and community consultation, and finalise such a Policy before a "one off" criteria is applied to the Project.

In light of the above, the Applicant respectively requests that the Department consider conditioning the required studies and reviews to establish the required SMART criteria as part of any consent for the Project to enable activities unrelated to final void closure, including road construction and site establishment, to commence as currently scheduled in January 2023. In support of this request, the Applicant notes the following:

- that the Project would result in the reduction in the number of final voids from three to two.
- That it has a long history of working cooperatively with all government agencies to resolve concerns and issues as they arise, including spending substantial funds as required to address matters of concern.
- The Project would result in mining operations continuing until at least 31 December 2032, and that the final void closure criteria would be unlikely to become relevant until after that date.

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

MBland.

Mitchell Bland
Managing Director / Principal

Attached: Figure A

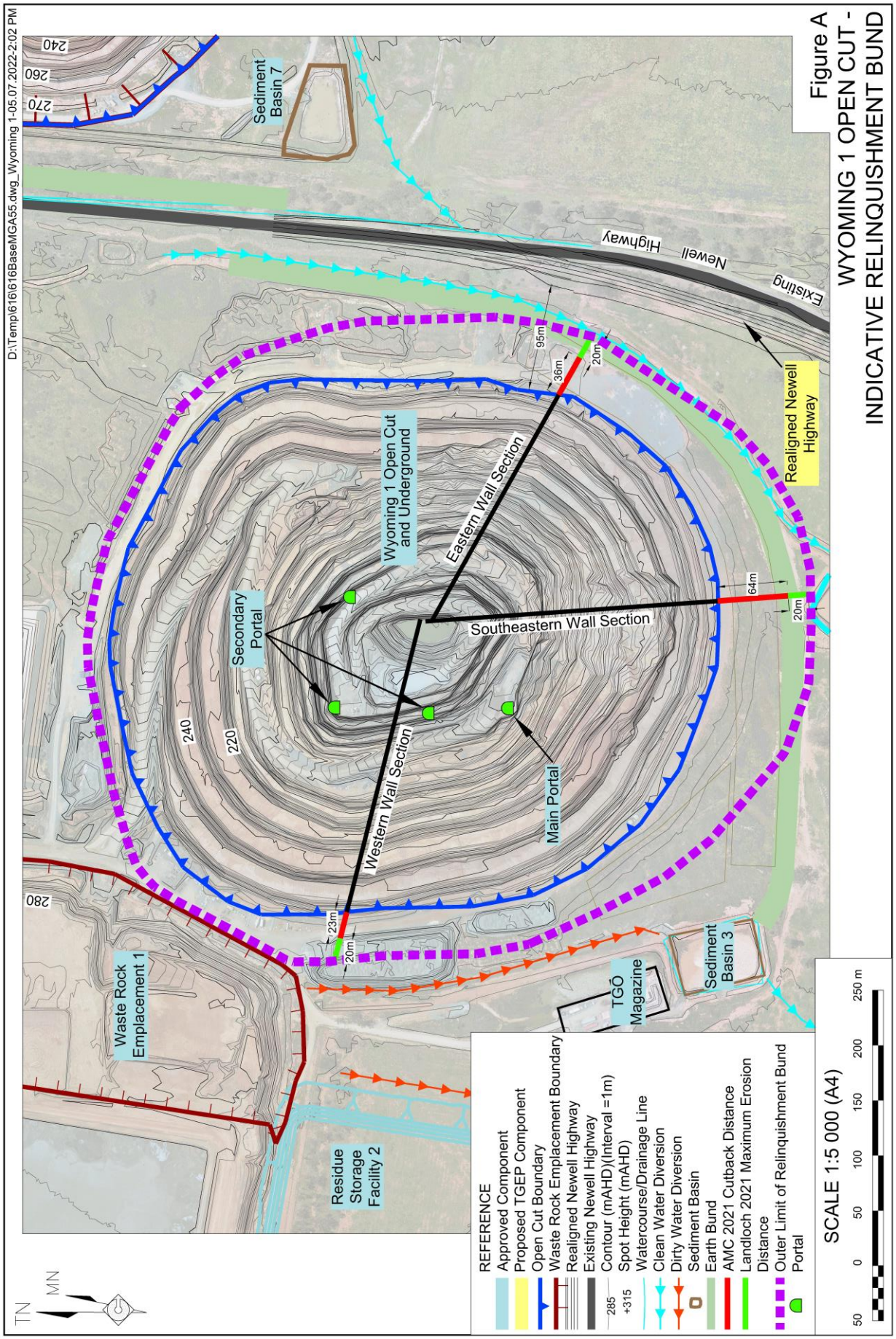
Figure A
WYOMING 1 OPEN CUT - INDICATIVE RELINQUISHMENT BUND
D:\Temp\616\616BaseMGA55.dwg_Wyoming 1-05.07.2022-2:02 PM
Sediment Basin 7
Newell Highway
Existing
Realigned Newell Highway
Wyoming 1 Open Cut and Underground
Eastern Wall Section
Southeastern Wall Section
Western Wall Section
Secondary Portal
Main Portal
95m
36m
20m
64m
23m
240
220
280
260
270
Waste Rock Emplacement 1
Residue Storage Facility 2
TGO Magazine
Sediment Basin 3
REFERENCE
Approved Component
Proposed TGEP Component
Open Cut Boundary
Waste Rock Emplacement Boundary
Realigned Newell Highway
Existing Newell Highway
Contour (mAHD)(Interval =1m)
Spot Height (mAHD)
Watercourse/Drainage Line
Clean Water Diversion
Dirty Water Diversion
Sediment Basin
Earth Bund
AMC 2021 Cutback Distance
Landloch 2021 Maximum Erosion Distance
Outer Limit of Relinquishment Bund
Portal
SCALE 1:5 000 (A4)
50 0 50 100 150 200 250 m
TN MN