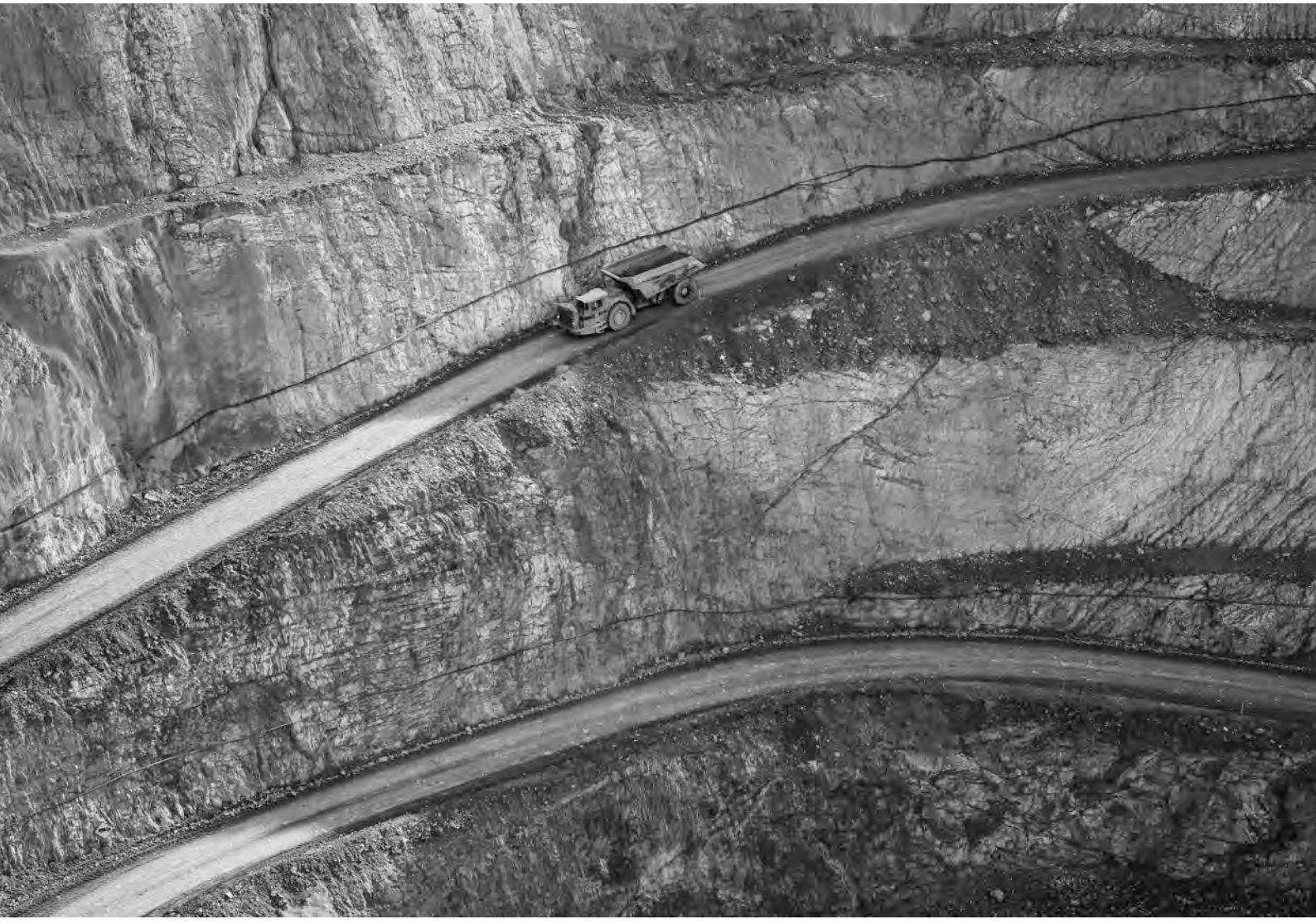
Appendix F

Addendum to the rehabilitation and landscape management strategy



EMM
creating opportunities

aurelia
METALS Ltd.

Level 3, 175 Scott Street
Newcastle NSW 2300

T 02 4907 4800
E info@emmconsulting.com.au

www.emmconsulting.com.au

19 August 2021

Jonathon Thompson
Group Manager - Environment
Peak Gold Mines Pty Ltd

Re: New Cobar Complex Project Response to Submissions - Rehabilitation

Dear Jonathon,

1 Background

EMM Consulting Pty Limited (EMM) was engaged by Peak Gold Mines Pty Ltd (PGM) to prepare a rehabilitation and landscape management strategy (RLMS) (EMM 2020) to support the Environmental Impact Statement (EIS) (EMM 2021a) for the New Cobar Complex Project (the Project).

The Project EIS was publicly exhibited from 25 February to 24 March 2021, and the NSW Department of Planning, Industry and Environment (DPIE) wrote to PGM on 31 March 2021 requesting responses to the matters raised by NSW Government agencies, local government authorities and the community that were received during the public exhibition of the EIS.

The NSW Resources Regulator requested further clarification on elements of the RLMS.

2 Resources Regulator Submission

2.1 Resources Regulator submission request 1 – post mining land use

2.1.1 Comment

The nominated final land use of 'modified ecosystem' is unclear. Further detail is required to clarify what ecosystem(s) will comprise post mining landscape and to what extent these ecosystems will be modified. The target rehabilitation outcomes, including vegetation types, are required to be nominated in the EIS (consistent with the approved Mining Operations Plan).

2.1.2 Response

Several post-mining land-uses are described in the RLMS, as summarised in Table 2.1 below (as per Table 5.2 EMM 2020).

Table 2.1 Primary and secondary domains

Primary domain	Project element	Secondary domain
1. Voids and portals	New Cobar Complex open cut Chesney void Southern void Box cut void New Cobar portal Chesney portal	A – LSC class 6 grazing C – Final void (New Cobar only)
2. Historical shafts	Gladstone and Tharsis shafts and other historical shafts	B – Modified ecosystem
3. Infrastructure	Workshop/Laydown Yard Administration Carpark Explosives magazine ROM Pad Haul roads Access roads Ventilation Fans Water Lines Bathhouse	A – LSC class 6 grazing
4. Water management	'The Salty' Spain's Dam Young Australia 2a, 2b, 2c, 2ddams Young Australia 1 dam Young Australia 3 dam NC1 NC2 NC3 NC4	D – Water management (Salty's, Spains and Young Australia dams) A – LSC class 6 grazing
5. Mineral waste emplacement	WRE	B – Modified ecosystem
6. Tailings storage	N/A – located at Peak Complex	N/A
7. Other (disturbed land)	Historical tailings (Pinkie/ Chesney)	A – LSC class 6 grazing B – Modified ecosystem (Chesney tailings)
8. Processing Plant	N/A – located at Peak Complex	N/A
9. Soil Stockpile	Soil stockpiles T15, T16, T17 and T18	A – LSC class 6 grazing

The modified ecosystem post-mining land use IS proposed for the following areas:

- Domain 2 – historical shafts;
- Domain 5 – waste rock emplacement; and
- Part of Domain 7 - historical tailings.

Section 5.2.3 of Appendix N (EMM 2020) in Table 5.4 provides a list of the structural dominant species that will be used to rehabilitate Domain 2 to Plant Community Type 108 – *Gum Coolabah – Mulga woodland on gravel ridges of the Cobar Peneplain Bioregion* (PCT 108).

Section 5.2.6 of Appendix N in Table 5.5 provides a list of the structural dominant species that will be used to rehabilitate Domain 5 to PCT 72 – *White Cypress Pine-Poplar Box woodland on footslopes and peneplains mainly in the Cobar Peneplain Bioregion*.

EMM also noted that the species list will be refined based species present at PGM's existing rehabilitation analogue monitoring sites. Consultation with PGM's independent rehabilitation monitoring consultant Dr Donna Johnstone from DnA Environmental during the development of the post-mining land use criteria indicated that a combination of species from Both PCT72 and PCT108 were present at the analogue monitoring sites however neither had sufficient species to be entirely considered PCT72 or PCT108 (pers.comm D.Johnston).

In October 2020 DPIE determined that the project was unlikely to have significant impact on biodiversity values due primarily to the lack of PCTs within the project area and presence of exotic species due to extensive historical disturbance from mining, human settlement and agriculture (EMM 2021).

PGM has committed to seeding/planting structural dominant species from PCT72 and PCT108 for areas of biodiversity post-mine land use but cannot commit to establishing the PCTs as there are no suitable analogues sites to assess rehabilitation performance.

2.2 Resources Regulator submission request 2 – conceptual final landform design

2.2.1 Comment

Table 1.2 of Appendix N states that no new landform will be constructed as part of the proposal however, both Sections 1.4 and 4.2.5 of Appendix N outline that a substantial portion of the WRE material from the project area will be removed for use in underground operations.

Further information is required in relation to the extent of change to the final landform of the WRE, including strategies to ensure that exposed Potentially Acid Forming material will be encapsulated to ensure that the landform is stable in the long term.

Development of a conceptual final landform plan may not be feasible at this stage given the unknowns about the quantity of material to be removed. A commitment is required that geomorphic landform design principles will be considered and implemented where practicable as part of the final landform to achieve long term stability.

It is noted that the Proponent has commitment to undertake additional waste rock and soil characterisation studies and that a Landform Evolution Model will be used to scope the degree of re-work required on both the northern and eastern batters of the existing WRE to address erosion and vegetation failure issues that have occurred.

The commitment that geomorphic landform design principles be considered and implemented where practicable is also required in relation to these areas.

2.2.2 Response

Subsequent to this comment, the Resources Regulator has undertaken a targeted assessment program (TAP) of landform establishment across PGM's sites at Cobar. The Resources Regulator proposes to issue direction under Section 240 of the *Mining Act* as detailed in an email from Christine Fawcett, Manager Environmental

Operations to PGM dated 16 July 2021. As a result of this proposed direction, PGM has committed to the following actions and timing regarding the geochemistry and design of the WRE:

i Geochemistry

PGM will engage a suitably qualified expert in waste material characterisation to undertake a detailed investigation of the WRE. This will include drilling of the WRE to determine the spatial extent and volumes of potentially acid forming (PAF) waste rock and non-acid forming (NAF) waste rock. A detailed report will be prepared within 12 months of receiving the direction from the Resources Regulator which will address the following:

- detailed geochemical characterisation of the WRE;
- discussion and justification of sampling procedure, spatial extent, density, and analytical testing undertaken;
- evaluation of the suitability and availability of waste rock for use in rehabilitation (incl. volumetric estimates of the proportion of PAF and NAF contained in the WRE);
- rehabilitation material requirements and inventories. This inventory will include consideration of capping requirements for all tailings storage facilities and waste rock emplacements, as well material required for tailings storage raises, additional buttressing and surface water management construction.

It is important to note that water sampling downstream demonstrates no evidence of acid rock drainage from the WRE.

ii Erosion modelling and landform design

Completion of the geochemical assessment described in section 2.2.2i above will provide PGM with a detailed understanding of the quantities of waste rock that will remain in the WRE and rehabilitation requirements for encapsulation of the mapped PAF waste rock and providing a logical point for the redesign of the WRE.

Material characterisation of NAF waste rock and soil as well as simulated rainfall studies will be used to develop parameters for the Water Erosion Prediction Program (WEPP) erosion model to develop slope gradient and design rules for the WRE. WEPP is a 2-dimensional batter slope erosion model used to develop stable batter shapes and is used to refine stable batter surfaces.

Vegetation is commonly used to stabilise WREs against erosion and this approach is generally appropriate for high rainfall environments. However, in lower rainfall environment, the impacts of vegetation on erosion are generally minimal because the prevailing rain cannot sustain sufficient vegetation cover to control erosion.

The cover response curved developed by Kirby (1969) (Figure 2.1) shows that the impact of contact cover on erosion is not adequate until a cover level greater than approximately 30% is achieved.

Data from the United States of America (USA) suggests that peak erosion rates occur where annual rainfall is in the order of 300mm-350mm/h (Figure 2.2) which corresponds with the annual average rainfall at Cobar of 350mm/y (BOM 2021).

This means that other forms of soil surface cover such as timber debris or rock in combination with vegetation will be required to provide adequate erosion protection on the WRE.

Rock/soil matrices have been used successfully on other mine sites in Australia with these climatic constraints, the most relevant being Cowal Gold in NSW. They consist of a ratio of approximately three parts rock to one part soil with proportions adjusted such that it is close to the optimal packing density for binary mixture (pers.comm. R Loch).

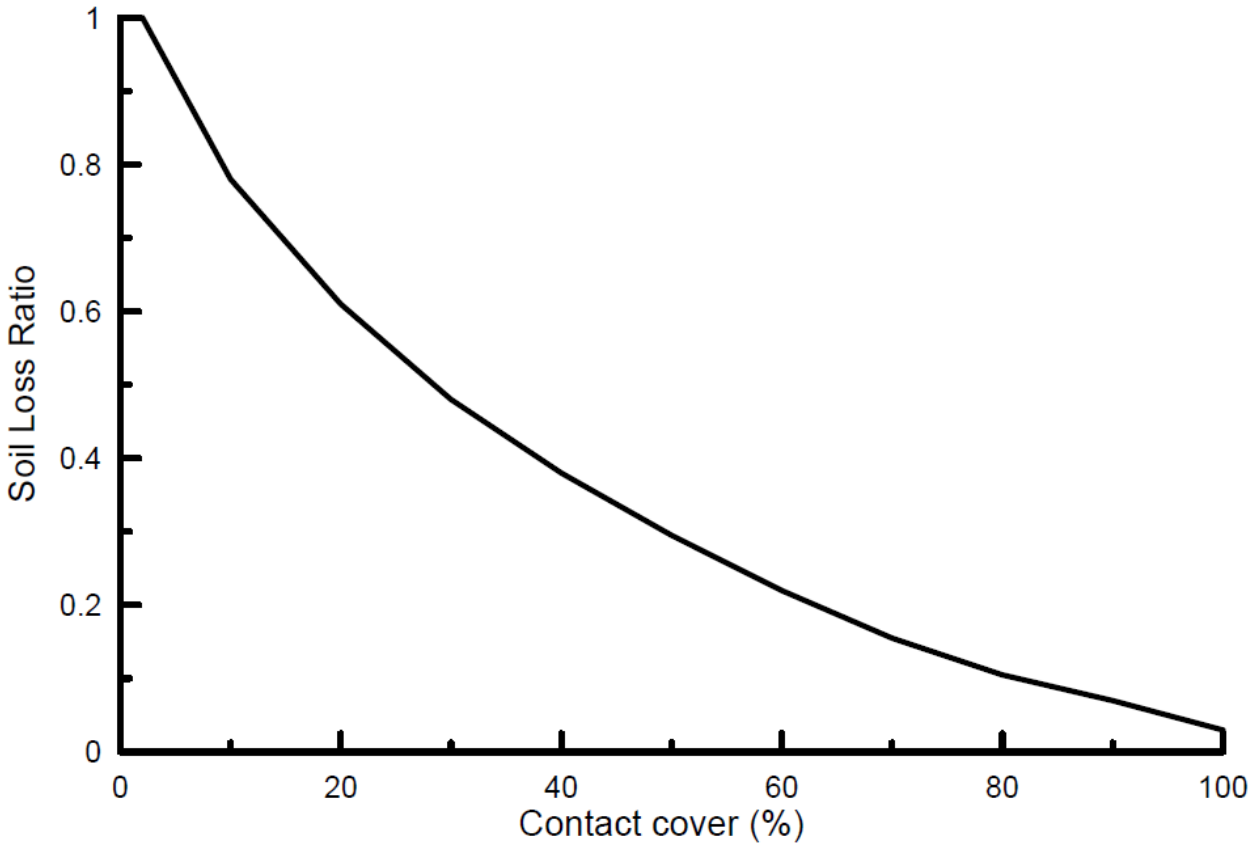


Figure 2.1 Relationship between contact cover and soil loss (Kirby 1969)

Because of its high level of erosion resistance and low rates of erosion, the rock/soil matrix layer only needs to be 300 – 500mm deep. Importantly:

- the rock/ soil matrices move with the underlying waste rock and is unaffected by any settlement or movement that may occur;
- vegetation growth is vigorous when sufficient soil is mixed with the rock and the properties of the rock are not detrimental to vegetation growth (non-acid forming, non-saline);
- high surface roughness means that cross-slope concentration of flow is minimised or eliminated and therefore gully formation is unlikely; and
- erosion control and stability of the rock/ soil matrices are predictable and reliable.

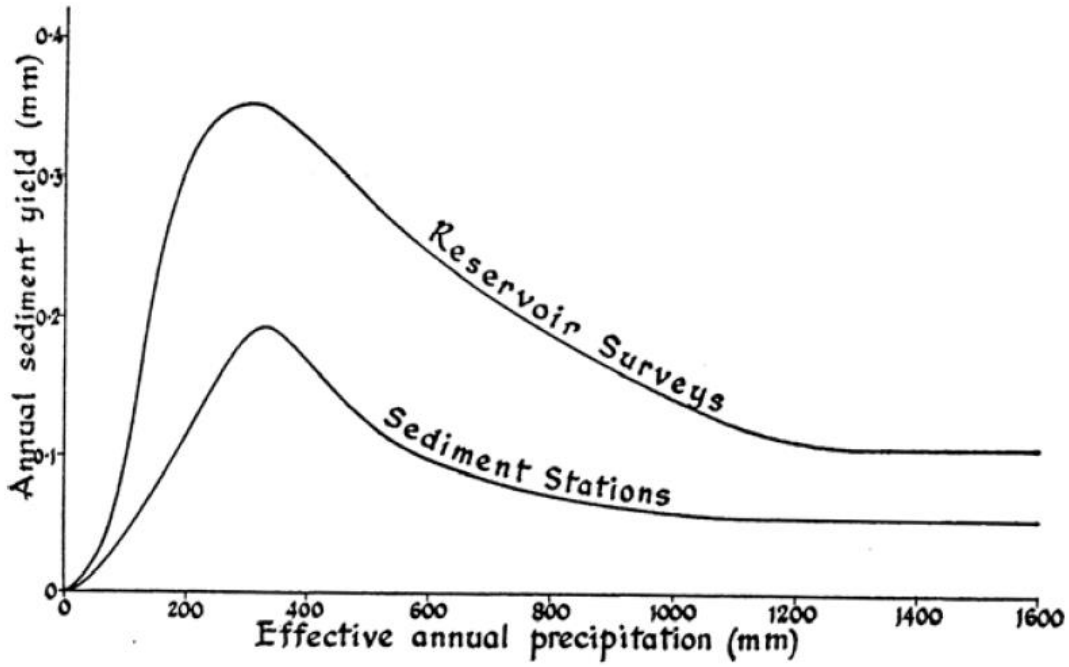


Figure 2.2 Relationship between annual rain and erosion (Kirby 1969)

The landform design will aim to include geomorphic features such ridges and drainage depression provided there are adequate quantities of NAF waste rock to allow the required encapsulation of the PAF waste rock however, a 'Geofluv™'WRE design is considered inappropriate due to:

- the gully erosion risk and subsequent risk to the encapsulated PAF waste rock due to a design that maximises the concentration of flow; and
- insufficient space within the project area and anticipated insufficient NAF waste rock, to build such a landform given the relatively flat gradients necessary to achieve critical shear stress values below levels capable of being withstood by site soils and waste materials in the concentrated flow paths.

The 2-dimensional batter slopes derived from WEPP are then used to develop a final 3-D landform shape that will then be input to the SIBERIA model (with parameters developed from WEPP output) to assess issues of flow concentration and interactions with the surrounding landscape.

SIBERIA is a sophisticated, 3-dimensional topographic evolution model that simulates runoff, erosion and deposition. It predicts the long-term evolution of channels and slopes within a landform and is used to map and quantify the rate of rill and gully development. This provides a method for predicting the long term stability of the WRE including how long the PAF cell would be protected from erosion within the WRE.

The material characterisation, erosion modelling, landform design and landform evolution modelling will be completed within 18 months of the completion of the geochemistry report discussed in section 2.2.2, and will continue in parallel to the EIS approval process.

3 References

BOM (Bureau of Meteorology), 2021 *Climate of Cobar*, viewed 4 August 2021, http://www.bom.gov.au/nsw/cobar/climate.shtml#:~:text=Cobar%20has%20a%20semi%2Darid,for%20Cobar%20MO%20of%20390mm.

EMM 2020, *New Cobar Complex Project, State Significant Development (SSD10419) – Rehabilitation and Landscape Management Strategy*. Prepared by EMM on behalf of PGM.

EMM 2021, *New Cobar Complex Project, State Significant Development (SSD10419) – Environmental Impact Assessment*. Prepared by EMM on behalf of PGM.

Kirby, M.J. (1969) *Erosion by water on hillslopes.* In *"Introduction to fluvial process"*, ed. R.J. Chorley. Methuen and Co. Ltd, London.

Yours sincerely

Michael Frankcombe
National Technical Leader - Land, Water and Rehabilitation
mfrankcombe@emmconsulting.com.au