EGL Ref: 9430

Oceana Gold (New Zealand) Limited
Macraes Operation
Otago, New Zealand

20 February 2024

Attention: Marty Hughes

OCEANA GOLD (NEW ZEALAND) LIMITED
FRASERS TAILINGS STORAGE FACILITY – STAGE 1 AND STAGE 2
TSF PEER REVIEW COMMENTS

Oceana Gold (New Zealand) Limited (OceanaGold) engaged Engineering Geology Limited (EGL) to provide peer review of the WSP design of Frasers Tailing Storage Facility (FTSF) – Stage 1 and Stage 2. FTSF is a in pit tailing storage facility constructed by forming a large backfill (called Frasers Backfill) between Frasers and Innes Mills Pits and discharging tailings into Frasers Pit behind Frasers Backfill.

WSP has prepared the following reports and supporting documents which EGL have been provided:

- WSP 2023, Macraes Gold Mine Frasers Backfill Stage 1 Design to Support Resource Consent Application, PS204746-REP-006, Revision 0, 14 December 2023
- WSP 2024, Macraes Gold Mine Frasers Backfill Stage 2 Design to Support Resource Consent Application, PS204746, Revision A, 7 February 2024, Draft
- WSP 2024, Macraes Gold Mine Frasers TSF Failure Modes and Effects Analysis (FMEA), PS204746-MNG-REP-008, Revision A, February 2024
- WSP 2024, Frasers TSF Responses to Comments Made by 3rd Party Reviewer Macraes Gold Mine, PS204746-REP-010, Revision B, 12 February 2024

Richard Davidson of RRD LLC has also provided peer review comments in a draft letter 3 Feb 2024, RRD Project No. OM-002.

OceanaGold is to submit for resource consent. Generally, the resource consent design is suitable for the assessment of effects. WSP proceeding with detailed design and EGL has the following comments for OceanaGold and WSP, for consideration.

- **Measures to mitigate risks related to supernatant water recovery**
  OceanaGold noted the potential for direct connection of seepage flows from the open pit to the Frasers Underground (FRUG), with the potential to loose decant supernatant water. EGL agree that there is real potential for this to occur as the FRUG drives and panels intersect with the deformed east high wall landslide and may be hydraulically connected with the highly deformed north wall. High seepage to the underground would under drain

any rockfill that is end tipped to form the Fraser Backfill, as the backfill would have coarse zones which can be highly permeable. Frasers Backfill extends across the floor and against the highly deformed west wall landslide providing potential connection not the decant pond. Supernatant water in the decant is at risk of being lost through the west wall landside mass and Frasers Backfill to FRUG through seepage connection. Potential mitigation measures exist to minimise this risk:

1. Construction of an engineered fill zone on the upstream face and floor of the Frasers Backfill which has a consistent moderately low permeability. This prevents any backwater at the end pipe discharge locations being lost to the backfill. The primary benefit of this is during the early stages of discharge until an effective beach can be achieved at higher levels. This zone could be similar to Zone B1 on TTTSF. Insitu permeability testing and inspection of Zone B1 at TTTSF for suitability is recommended if this is to be used.

2. Construction of an engineered fill zone on the inside of the decant pond against the pit walls. This is to mitigate high seepage flows directly from the decant pond to the floor backfill and to FRUG.

3. Sloping the Frasers Backfill floor to promote and early beach and control decant position.

4. Use of a spigot line instead of an end pipe discharge arrangement to reduce the potential for backwater against the upstream face of Frasers Backfill.

The design should also include sealing of the portals as these are a direct seepage path to FRUG.

- **Stability of the east highwall**
  The initial discharge of tailings results in a 40m rise in tailings level in pit over the first year. The tailings in this initial discharge will be very weak and have a very high water content, near to a fluid. Saturation of the toe of the east high wall presents a potential mechanism for activation of a high wall landslide failure. The consequences of failure are within the pit only (as noted by WSP). However, there is risk to people operating around the TSF impoundment, around the decant or discharge line. It also presents a risk to infrastructure such as the decant pumps and barge. OceanaGold can manage this risk to people through operational controls such as exclusion zones and full-time radar on the slope, however, there are other mitigation measures that could be applied in design including:

  1. Buttressing of the toe of the slope with backfill. This could also be used to limit seepage into eastern high wall.

  2. Activating failure of the high wall at the end of mining through saturation of the slope. EGL is not sure how feasible this is and expert advice from others, such as PSM would need to be sort.

  Richard Davidson noted that remote controlled plant could be used when working below the high wall. This seems to be a prudent risk mitigation worth consideration.

- **Monitoring of the Frasers West Wall Landslide**
  Monitoring of the Fraser West Wall is recommended during backfilling and discharge of tailings into the pit. The backfill of the pit floor and Fraser Backfill embankment will

improve stability of the Frasers West Wall Landslide. However, discharge of tailings initially will saturate the toe which could results in increased movement of the west wall. Monitoring of the west wall should continue during operation of the TSF.

- **Level of the closure overflow channel**
  Ideally the closure overflow channel from Frasers Pit to Innes Mills Pit will be over rock and located lower if possible. Situating the overflow channel lower between pits results in the pit lakes equalising in level sooner in closure and reduces seepages through Frasers Backfill. This needs to be balanced by freeboard requirements in operation to protect operations in Innes Mills Pit from seiche waves from a high wall failure. EGL recommend Frasers Backfill target geometry should be review in detailed design to reduced future costs of modifying the backfill.

- **Dam Safety Review Recommendation**
  FTSF is assessed as Low Potential Impact Classification, as there is not a catastrophic failure mode where impounded contents are released into Innes Mills Pit. This is because Frasers Backfill is very large and high relative to the impounded contents. EGL recommend that key minimum criteria for freeboard and backfill width are set in the design and included in the Operation, Maintenance and Surveillance Manual. If the operation deviated from this proposed arrangement, then the PIC could be medium or high. Even though FTSF is Low PIC it is recommended that an Intermediate Dam Safety Review (IDSR) is undertaken yearly, and a Comprehensive Dam Safety Review is undertaken every five years during operation. The PIC should be reviewed every five years. In closure the frequency of dam safety review should be reviewed and specifically set based on the performance and risks that present at this time.

These comments are provided for the benefit of OceanaGold. EGL recommend they are shared with the designer WSP for their consideration.

Yours Sincerely
ENGINEERING GEOLOGY LIMITED

E. Torvelainen
Senior Geotechnical Engineer
EGL Director
BE (Hons), MEngNZ