

EGL Ref: 9544

**OCEANA GOLD (NEW ZEALAND) LIMITED
MACRAES OPERATION
MACRAES PHASE 4 PROJECT
EROSION AND SEDIMENT CONTROL REPORT**

Prepared for:

25 January 2024

Oceana Gold (New Zealand) Limited
P O Box 5442
Dunedin
OTAGO

DOCUMENT CONTROL

Document information

Title	Martha Phase 4 Project Erosion and Sediment Control Plan
Revision	2
Date	25 January 2024
EGL Reference	9544
Client Reference	-
File Name	EGL9544 MP4 Project Erosion and Sediment Control Report Rev 2.docx

Document roles and approvals

Role	Name	Credentials	Signature	Doc. Rev.	Date
Author	E. Torvelainen	BE (Hons), MEngNZ		2	25/01/2024
Author	A. Hope	BE (Hons), MEngNZ, CPEng,		2	25/01/2024
Reviewer	A. Fairclough	NZCE, BE, MEngSt (with merit) CPEng, IntPE, FEngNZ, FEngAu.		2	25/01/2024
EGL Approval	E. Torvelainen	EGL Director		2	25/01/2024

Final copy issue requires signatures.

Document revision and issue record

Revision.	Date	Revision Description	Issue by
0	11/07/2023	Final Issue	E. Torvelainen
1	02/10/2023	Revised Project Description	E. Torvelainen
2	25/01/2024	Revised Project Description – ESC Updates	E. Torvelainen

Draft revisions are given alphabetic characters. The final copy issue and subsequent revisions are given numeric characters.

Document applicability and disclaimers

This report has been prepared by EGL (Engineering Geology Limited) solely for the benefit of Oceana Gold (New Zealand) Limited as our client with respect to the particular brief given to us.

The content of this report and any advice given in undertaking this work cannot be relied on by any person or parties other than the above client, or for any purpose other than the above client's particular brief, without EGL's prior written agreement.

The report contents shall only be read in its entirety.

Where this report is issued as a draft version its contents shall be for initial information and review purposes only and the reader must note that such content is subject to change and shall not be relied upon.

CONTENTS

	Page No.
1.0 INTRODUCTION	1
2.0 SITE DESCRIPTION	2
2.1. Location	2
2.2. Site Grid	3
3.0 CLIMATE	3
4.0 PROPOSED MP4 DEVELOPMENT	3
5.0 EROSION AND SEDIMENT CONTROL PLANS	4
6.0 SITE SOILS AND EROSION POTENTIAL	4
7.0 EXISTING EROSION AND SEDIMENT CONTROL	5
8.0 MP4 EARTHWORKS	7
9.0 PROPOSED EROSION AND SEDIMENT CONTROL PRACTICE	8
9.1. General	8
9.2. Waste Rock Stacks	9
9.3. Tailings Storage Facilities	9
10.0 SUMMARY AND CONCLUSIONS	9
REFERENCES	11
<u>ATTACHMENTS</u>	
• TABLES 1 to 3	
• FIGURES 1 to 8	
• PLATES 1 to 8	

List of Tables

Table 1	High Intensity Rainfall Database (HIRDS) – Summary of historic rainfall depths
Table 2	High Intensity Rainfall Database (HIRDS) – Summary of historic rainfall intensity estimates

List of Figures

Figure 1	Locality Plan
Figure 2	Existing Site Layout
Figure 3	Macraes Phase 4 – Site Plan
Figure 4	Waste Rock Stack Schematic of Erosion and Sediment Control Features
Figure 5	Coronation Area Erosion and Sediment Control Features
Figure 6	Golden Point Erosion and Sediment Control Features
Figure 7	Innes Mills and Frasers Erosion and Sediment Control Features
Figure 8	Golden Bar Area Erosion and Sediment Control Features

List of Plates

Plate 1	Clydesdale Silt Pond
Plate 2	Deepdell North Silt Pond
Plate 3	Deepdell South Silt Pond
Plate 4	Fraser's West Silt Pond
Plate 5	Murphys Creek Silt Pond
Plate 6	Typical Silt Pond Decant Structure
Plate 7	Rock Stack Tip Face (initial lift)
Plate 8	Rock Stack showing segregation of waste with coarse rock at base of lift

Terminology Abbreviations

AEE	Assessment of Environmental Effects
BRWRS	Backroad Waste Rock Stack
CO6	Coronation Stage 6
ECAN	Environment Canterbury Regional Council
ESCP	Erosion and Sediment Control Plan
EGL	Engineering Geology Limited
ESC	Erosion and sediment control
FEWD	Frasers East Waste Dump
FRBF	Frasers Backfill
FSBF	Frasers South Backfill
FSWRS	Frasers South Waste Rock Stack
FTSF	Frasers Tailings Storage Facility
GB2	Golden Bar Stage 2
GPBF	Golden Point Backfill
IM	Innes Mills Pit
IMBF	Innes Mills Pit Backfill
MGP	Macraes Gold Project
MP3	Macraes Phase III
MP4	Macraes Phase 4
OGNZL	Oceana Gold (New Zealand) Limited
ORC	Otago Regional Council
RH	Round Hill Pit
TSF	Tailings Storage Facility
WRS	Waste Rock Stack

**OCEANA GOLD (NEW ZEALAND) LIMITED
MACRAES OPERATION
MACRAES PHASE 4 PROJECT
EROSION AND SEDIMENT CONTROL REPORT**

1.0 INTRODUCTION

Engineering Geology Ltd (EGL) has been engaged by Oceana Gold (New Zealand) Limited (OGNZL) to prepare this erosion and sediment control report for the new Macraes Phase 4 (MP4) Project. The MP4 Project aims to extend the life of the OGNZL Macraes Operation until approximately 2030.

The Macraes Operation (Macraes) is located at Macraes Flat in East Otago as shown on Figure 1 (attached). Gold and scheelite were initially produced at Macraes by underground mining between the 1890's and 1920's. Gold production recommenced in 1990 with open pit mining, and subsequent open pit and underground mine developments, continuing up to the present time (and beyond).

Constructions that are associated with the current mining operations include waste rock stack (WRS) areas and open pit backfills for disposal of the pit overburden material, tailings storage facilities (TSFs), haul roads, road re-alignments, and administration, workshop, and processing areas. An overall layout of the current mine site is shown on Figure 2 (attached).

The location of the primary elements that make up the MP4 Project are shown on Figure 3 (attached).

The purpose of this report is to provide preliminary information and present a concept design for the proposed erosion and sediment control works that will be constructed as part of the MP4 Project.

This report has been written to support the Assessment of Environmental Effects (AEE) consent application process for the MP4 Project. Sufficient detail is provided to demonstrate to the regional consenting authority (Otago Regional Council (ORC)) that appropriate measures will be implemented in a timely manner to ensure the erosion and sediment effects that are associated with the MP4 Project will be no more than minor.

OGNZL is to prepare a site-specific Erosion and Sediment Control Plan (ESCP) for each individual element of the MP4 Project where a risk of erosion and/or sedimentation is present. It is recommended that these plans are submitted to ORC, for their review and certification, as the project advances and prior to commencing the construction of each element. With respect to this statement, it should be noted that not all elements of the MP4 Project will require an ESCP.

Finally, the reader must note that erosion and sediment control which is associated with runoff from the existing site is covered by existing Resource Consent conditions.

2.0 SITE DESCRIPTION

2.1. Location

The Macraes Operation is located at Macraes Flat in East Otago as shown on Figure 1. An overall layout of the current mine site is shown on Figure 2 and the new elements that are associated with the proposed MP4 Project are summarised on Figure 3.

Referring to Figures 1 and 2, from north to south the primary Macraes surface operations comprise:

- The Coronation open pit and waste rock stack (WRS) area which is located partially north of the Taieri Ridge, which is the dividing ridge line between the Taieri River and Deepdell Creek (Shag River) catchments. This area includes Coronation Pit, Coronation North Pit, Coronation WRS and Coronation North WRS.
- The Deepdell North open pit and WRS area which is located south of the Taieri Ridge, on Horse Flat, which flows to Deepdell Creek via Highlay Creek and Camp Creek. This area includes Deepdell West WRS, Deepdell North Open Pit and Deepdell East WRS.
- The Round Hill area which naturally reports to Deepdell Creek. This area includes the Mixed Tailings Impoundment (MTI) Tailings Storage Facilities (TSF), Southern Pit Option 11A (SP11A) TSF, Northern Gully WRS and Southern Extension, the existing Back Road WRS, Round Hill Pit Backfill and Golden Point Open Pit.
- The Frasers area, which naturally reports to the Waikouaiti River North Branch, either directly or via Murphys Creek. This area includes the Innes Mills Open Pit (currently backfilled), Frasers Open Pit, Frasers West WRS, Frasers South WRS, and Frasers East WRS.
- The Top Tipperary TSF area which is part of the upper branches of Cranky Jims and Tipperary Creeks. The Cranky Jims and Tipperary Creeks are part of the Shag River catchment.
- The Golden Bar open pit and WRS area, that naturally flows to Murphys Creek, and which is part of the Waikouaiti River North Branch.

The existing erosion and sedimentation controls for the Macraes Operation treat stormwater runoff prior to discharge into the following tributaries (listed north to south):

- Trimbells Gully Creek.
- Maori Hen Creek.
- Coal Creek.
- Camp Creek.
- Highlay Creek.
- Deepdell Creek.
- Cranky Jims Creek.
- Tipperary Creek.
- North Branch Waikouaiti River.
- Murphys Creek.

2.2. Site Grid

All plan grids and references for the wider Macraes Operation are based on mine north which is approximately 45 degrees anti-clockwise from true north.

3.0 CLIMATE

The Glendale Station Site is the closest rain gauge to the Macraes Operation. It is located at the northwestern end of the Top Tipperary Tailings Storage Facility (TTTSF). Figure 2 shows the location of the TTTSF.

The mean annual rainfall at the Glendale Station Site, which was monitored from 1959 to 2008, is 634 mm. The maximum and minimum annual rainfall is 950 mm and 395 mm respectively (Ref. 7). The Golden Point Station, which was monitored from 1991 to 2022, recorded a mean annual rainfall depth of 665 mm, with a maximum and minimum of 1034 mm and 414 mm respectively.

The mean annual pan evaporation is estimated from pan evaporation data which was collected at the site between 1991 and 2018. The mean annual pan evaporation is estimated to be 952mm (Ref. 7).

Statistical rainfall depth and intensity values for the Macraes Operation location, which are reproduced from the national High Intensity Rainfall Database (HIRD), are summarised in Table 1 and 2 (attached).

4.0 PROPOSED MP4 DEVELOPMENT

The proposed MP4 project primarily comprises the following three areas of pit development and waste rock placement:

Coronation Area:

- Further development of the Coronation Pit.
- Backfilling of the Coronation North Pit with waste rock from the Coronation Pit.

Innes Mills Pit and Frasers Pit Area:

- Further development of the Innes Mills Pit.
- Placement of waste rock from the Innes Mills Pit in the following locations:
 - Frasers South Backfill/Waste Rock Stack.
 - Frasers Backfill, and,
 - Frasers East Backfill.
- Development of the Frasers TSF.

Golden Point Pit Backfill

- Relocation of waste rock material from the Innes Mills and North Gully WRS areas to partially infill the Golden Point Pit and the existing waste rock stacks west of the pit limit.