FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

September 13, 2021

Certified Mail #91719999917035799627785
Return Receipt Requested

Mr. Kurt Vollbrecht, Manager
New Mexico Environment Department
Groundwater Quality Bureau
Mining Environmental Compliance Section
P.O. Box 5469
Santa Fe, NM 87502

Certified Mail #91719999917035799627792
Return Receipt Requested

Mr. David Ohori
Energy, Minerals & Natural Resources Dept
Mining and Minerals Division
Mining Act Reclamation Program
1220 South St. Francis Drive
Santa Fe, NM 87505

Dear Messrs. Vollbrecht and Ohori:

Re: Freeport-McMoRan Tyrone Inc., Emma Expansion Project – Selection of Mine Configuration for Closure Planning (General Cost Analysis)

On August 30, 2021, Freeport-McMoRan Tyrone Inc. (Tyrone) and Golder Associates Inc. presented the referenced information to the New Mexico Environment Department (NMED) and Mining and Minerals Division (MMD). During the meeting NMED and MMD requested the information be submitted formally for review and approval.

This letter transmits the results of the evaluation completed by Golder Associates, Inc. Tyrone is in the process of permitting the proposed Emma Expansion Project of the Tyrone Mine, a new unit to an existing mine. As part of this permitting process, Tyrone is developing a Closure/Closeout Plan (CCP) for the Emma Expansion Project. As part of the New Mexico Agencies' CCP process, Tyrone is required to base their financial assurance reclamation cost estimate (RCE) upon the mine configuration in the year with the highest reclamation cost for the upcoming 5-year mine plan period. The attached technical memorandum summarizes the approach, process, and results of this evaluation.

Should you have questions or comments regarding this report, please contact Ms. Mandy Lilla at (575) 912-5388.

Sincerely,

Thomas L. Shelley

Thomas L Shelley
Environmental Manager
Environmental Services

TLS
Attachments
20210913-101

TECHNICAL MEMORANDUM

DATE September 13, 2021 **Project No.** 21476949

TO Mandy Lilla - Senior Engineer
Freeport-McMoRan Tyrone, Inc.

CC

FROM Todd Stein, PG **EMAIL tstein@golder.com**

EMMA EXPANSION PROJECT – SELECTION OF MINE CONFIGURATION FOR CLOSURE PLANNING (GENERAL COST ANALYSIS)

1.0 INTRODUCTION

Freeport-McMoRan Tyrone, Inc. (Tyrone) is in the process of permitting the proposed Emma Expansion Project (Emma) of the Tyrone Mine as a new unit of an existing mine. As part of this permitting process, Tyrone is developing a Closure/Closeout Plan (CCP) for the Emma. As part of the New Mexico Agencies'[1] CCP process, Tyrone is required to base their CCP and financial assurance reclamation cost estimate (RCE) upon the mine configuration with the highest reclamation cost for the upcoming 5-year mine plan period. This technical memorandum summarizes the approach, process, and results of the selection of the mine configuration expected to require the highest reclamation cost as completed by Golder Associates, Inc. (Golder).

2.0 APPROACH

Highest reclamation cost year calculations are typically only based on the earthwork RCE since water management/water treatment is typically a consistent cost irrespective of the closure year in a 5-year period. For Emma, groundwater will first be encountered in year 5. This will require additional water management that is unique compared to the first four years of mining at Emma when groundwater is not present. We are taking this into consideration in our final assessment of the highest reclamation cost year following our initial assessment of the relative reclamation costs for each of the 5 years. Rather than run a full RCE for each year of the 5-year mine plan, a screening method is used to determine the highest reclamation cost year. This method has been accepted historically by state agencies. The screening method applies a weighting factor (relative cost index value; RCIV) to the reclamation area acreages for each year of the 5-year mine plan in calculation of the reclamation cost index. Reclamation cost indexes for each mine plan year are then compared to determine the highest reclamation cost year.

The RCIV method is effective in calculating the highest reclamation cost year because it gives more weight to areas that require more effort to close. Reclamation areas considered typically include:

- Flat areas & roads

[1] New Mexico Environmental Department, Ground Water Quality Bureau, Mining Environmental Compliance Section, and New Mexico Mining and Minerals Division, Mining Act Reclamation Program

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  - Tops of stockpiles
  - Roads
- Sloped areas constructed near reclamation grades
  - Stockpiles constructed at 3:1 to 3.5:1 overall outslope grade
- Steeply sloped areas
  - Angle of repose stockpile outslopes
  - Large cut embankments

The RCIV values for each facility are estimated based on previous RCE closure costs at the Tyrone and Little Rock mines for each reclamation area type. Table 1 shows typical, historical RCIV ranges and those utilized for the Tyrone and Little Rock mine RCEs.

Table 1: Relative Cost Index Values Applied for Emma

Area	Historical RCIV Ranges	EMMA 2021 RCIV	Applicable EMMA Facility
Flat Areas & Roads	0.2 to 0.5	0.4	Accessible flat areas and haul roads in the pit, EMW and 6HW Waste Stockpile top surfaces, haul roads
Reclamation Grade Slopes	0.4 to 0.9	0.7	NA
Steep Slopes	1 to 2	1	EMW and 6HW Waste Stockpile outslopes
Pit Lake	0	0	NA

Note: NA – not applicable for Emma

3.0 CALCULATIONS AND RESULTS

The first step in determining the highest reclamation cost year was to complete mine plans for each of the 5 subsequent mining years. These 5 mine plans were then used to determine reclamation acreages for each reclamation area type for the respective mining year. Mine plans and reclamation areas for Emma (years 2022-2026) are attached as Figures 1 through 5. It is assumed that surface water and groundwater that accumulates at the bottom of the pit under the year 5 mine plan will be pumped from the pit sump and conveyed to Tyrone's process water management system. For the purpose of this evaluation, it is assumed that a pit lake is not allowed to form during operations, nor in mine plan year 5 after groundwater is intercepted.

Reclamation acreages as shown in Table 2 were totaled, and weighted totals were calculated following Equation 1.

Equation 1: Weighted Total

$$Weighted\ Total = Flat\ Area\ (ac)\ x\ Flat\ Area\ (RCI) + Reclamation\ Grade\ Slopes\ (ac)\ x\ Reclamation\ Grade\ Slopes\ (RCI) + Steep\ Slope\ (ac)\ x\ Steep\ Slope\ (RCI) + Pit\ Lake\ (ac)\ x\ Pit\ Lake\ (RCI)$$

The reclamation cost index for each mine plan year was then calculated following Equation 2.

Equation 2: Reclamation Cost Index

$$Reclamation\ Cost\ Index = Weighted\ Total/1{,}000$$

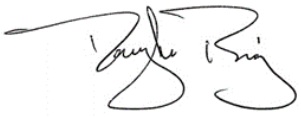
Table 2: Highest Reclamation Cost Year Calculation Results

Year	Flat Area (ac)	Reclamation Grade Slopes (ac)	Steep Slopes (ac)	Pit Lake (ac)	Total Reclamation Area (ac)	Weighted Total	Reclamation Cost Index
RCIV	0.4	0.7	1	0	---	---	---
2022	126.3	0	0.0	0	126.3	50.5	0.0505
2023	128.4	0	14.7	0	143.1	66.1	0.0661
2024	140.6	0	19.7	0	160.3	75.9	0.0759
2025	116.2	0	54.4	0	170.6	100.9	0.1009
2026	115.2	0	60.6	0	175.8	106.7	0.1067

4.0 DISCUSSION AND CONCLUSIONS

As shown in Table 2 and on Figure 6, mine plan year 5 (2026) had the highest reclamation cost index and was therefore determined to be the highest reclamation cost year. Since mine plan year 5 also had the largest total reclamation area (175.8 acres) and the largest area of steep slopes (60.6 acres) which have been determined in earlier RCEs to have the highest relative reclamation costs, it would be expected that mine plan year 5 would be the highest reclamation cost year. An additional cost factor exclusive to mine plan year 5 that is not included in the above analysis is that groundwater will first be encountered during this year and will continue to be managed from this point forward. Therefore, water management costs become more complex beginning in mine plan year 5 for this and other reasons. Given all of these factors, it is clear that mine plan year 5 is the year with the highest reclamation cost and the mine configuration selected for closure/closeout planning.

Golder Associates Inc.



Todd Stein
Project Manager / Senior Hydrologist

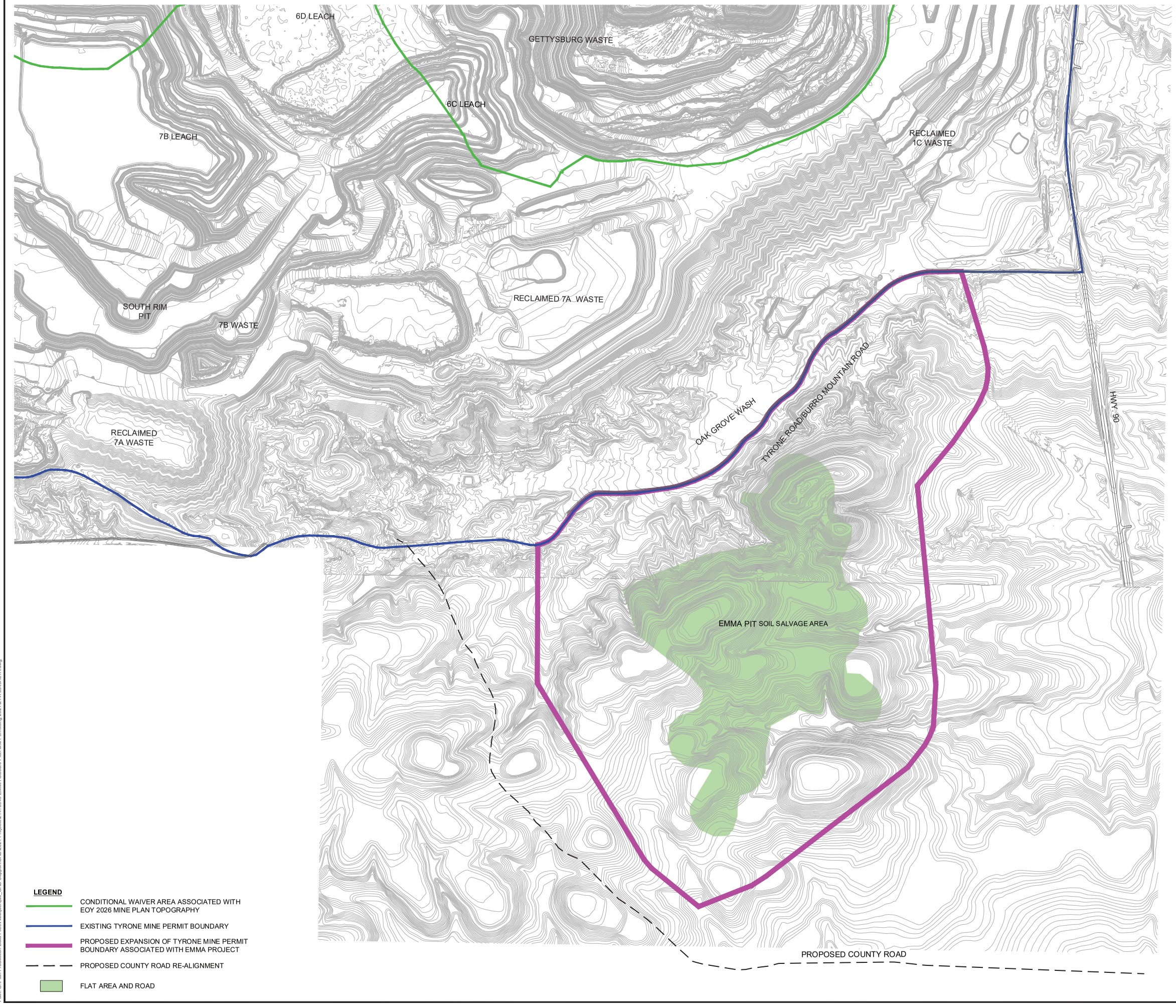
Doug Romig
Associate / Senior Scientist

TS/DR/js

Attachments: Figures

https://golderassociates.sharepoint.com/sites/149301/project files/6 deliverables/001-tm-emma_permit_revision/rev0/21476949-001-tm-rev0-emma_highest_liability_tm-13sept2021.docx

Figures



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SEAL

CLIENT
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GOLDER
MEMBER OF WSP

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SUITE 200
RICHMOND, VA 23227
(804) 358-7900
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PROJECT
EMMA EXPANSION PROJECT

TITLE
YEAR 1 MINE PLAN CLOSURE AREAS

PROJECT NO.
21-476949

REV. 0 of FIGURE 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

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Path: G:\Pen Production Data Files\Albuquerque_CAD_Support\CAD\2021 Projects\21476949 EMMA Closure Plan and Permitting 2021\21476949001A.dwg

6D LEACH
GETTYSBURG WASTE
6C LEACH
7B LEACH
RECLAIMED 1C WASTE
6HW WASTE
SOUTH RIM PIT
7B WASTE
RECLAIMED 7A WASTE
NORTH HAUL ROAD
OAK GROVE WASH
TYRONE ROAD/BURRO MOUNTAIN ROAD
HWY 90
RECLAIMED 7A WASTE
EMMA PIT
PROPOSED COUNTY ROAD

LEGEND

- CONDITIONAL WAIVER AREA ASSOCIATED WITH EOY 2026 MINE PLAN TOPOGRAPHY
- EXISTING TYRONE MINE PERMIT BOUNDARY
- PROPOSED EXPANSION OF TYRONE MINE PERMIT BOUNDARY ASSOCIATED WITH EMMA PROJECT
- PROPOSED COUNTY ROAD RE-ALIGNMENT
- FLAT AREA AND ROAD
- SLOPED AREA

SCALE 150 0 150 300 FEET

REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
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PROJECT
EMMA EXPANSION PROJECT

TITLE
YEAR 2 MINE PLAN CLOSURE AREAS

PROJECT NO.
21-476949

REV. 0 of FIGURE 2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

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6D LEACH

GETTYSBURG WASTE

6C LEACH

7B LEACH

RECLAIMED 1C WASTE

6HW WASTE

SOUTH RIM PIT

7B WASTE

RECLAIMED 7A WASTE

EMW WASTE

TYRONE ROAD/BURRO MOUNTAIN ROAD

OAK GROVE WASH

HWY 90

RECLAIMED 7A WASTE

NORTH HAUL ROAD

SOUTH HAUL ROAD

EMMA PIT

PROPOSED COUNTY ROAD

LEGEND

- CONDITIONAL WAIVER AREA ASSOCIATED WITH EOY 2026 MINE PLAN TOPOGRAPHY
- EXISTING TYRONE MINE PERMIT BOUNDARY
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- PROPOSED COUNTY ROAD RE-ALIGNMENT
- FLAT AREA AND ROAD
- SLOPED AREA

SCALE 150 0 150 300 FEET

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PROJECT
EMMA EXPANSION PROJECT

TITLE
YEAR 3 MINE PLAN CLOSURE AREAS

PROJECT NO.
21-476949

REV. 0 of FIGURE 3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

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6D LEACH

GETTYSBURG WASTE

6C LEACH

7B LEACH

RECLAIMED
1C WASTE

6HW WASTE

SOUTH RIM
PIT

7B WASTE

RECLAIMED 7A WASTE

HWY 96

EMW WASTE

NORTH HAUL ROAD

OAK GROVE WASH

TYRONE ROAD/BURRO MOUNTAIN ROAD

RECLAIMED
7A WASTE

SOUTH HAUL ROAD

EMMA PIT

PROPOSED COUNTY ROAD

LEGEND

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- EXISTING TYRONE MINE PERMIT BOUNDARY
- PROPOSED EXPANSION OF TYRONE MINE PERMIT BOUNDARY ASSOCIATED WITH EMMA PROJECT
- PROPOSED COUNTY ROAD RE-ALIGNMENT
- FLAT AREA AND ROAD
- SLOPED AREA

N

150 0 150 300
SCALE FEET

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
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MEMBER OF WSP

PROJECT
EMMA EXPANSION PROJECT

TITLE
YEAR 4 MINE PLAN CLOSURE AREAS

PROJECT NO.
21-476949

REV. 0 of FIGURE 4

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

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6D LEACH
GETTYSBURG WASTE
6C LEACH
7B LEACH
6HW WASTE
RECLAIMED 1C WASTE
SOUTH RIM PIT
7B WASTE
RECLAIMED 7A WASTE
NORTH HAUL ROAD
OAK GROVE WASH
SOUTHERN HAUL ROAD
TYRONE ROAD/BURRO MOUNTAIN ROAD
EMMA WASTE STOCKPILE
HWY 90
RECLAIMED 7A WASTE
EMMA PIT
PROPOSED COUNTY ROAD

LEGEND

- CONDITIONAL WAIVER AREA ASSOCIATED WITH EOY 2026 MINE PLAN TOPOGRAPHY
- EXISTING TYRONE MINE PERMIT BOUNDARY
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- PROPOSED COUNTY ROAD RE-ALIGNMENT
- FLAT AREA AND ROAD
- SLOPED AREA

N

150 0 150 300
SCALE FEET

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
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PROJECT
EMMA EXPANSION PROJECT

TITLE
YEAR 5 MINE PLAN CLOSURE AREAS

PROJECT NO.
21-476949

REV. 0 of FIGURE 5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

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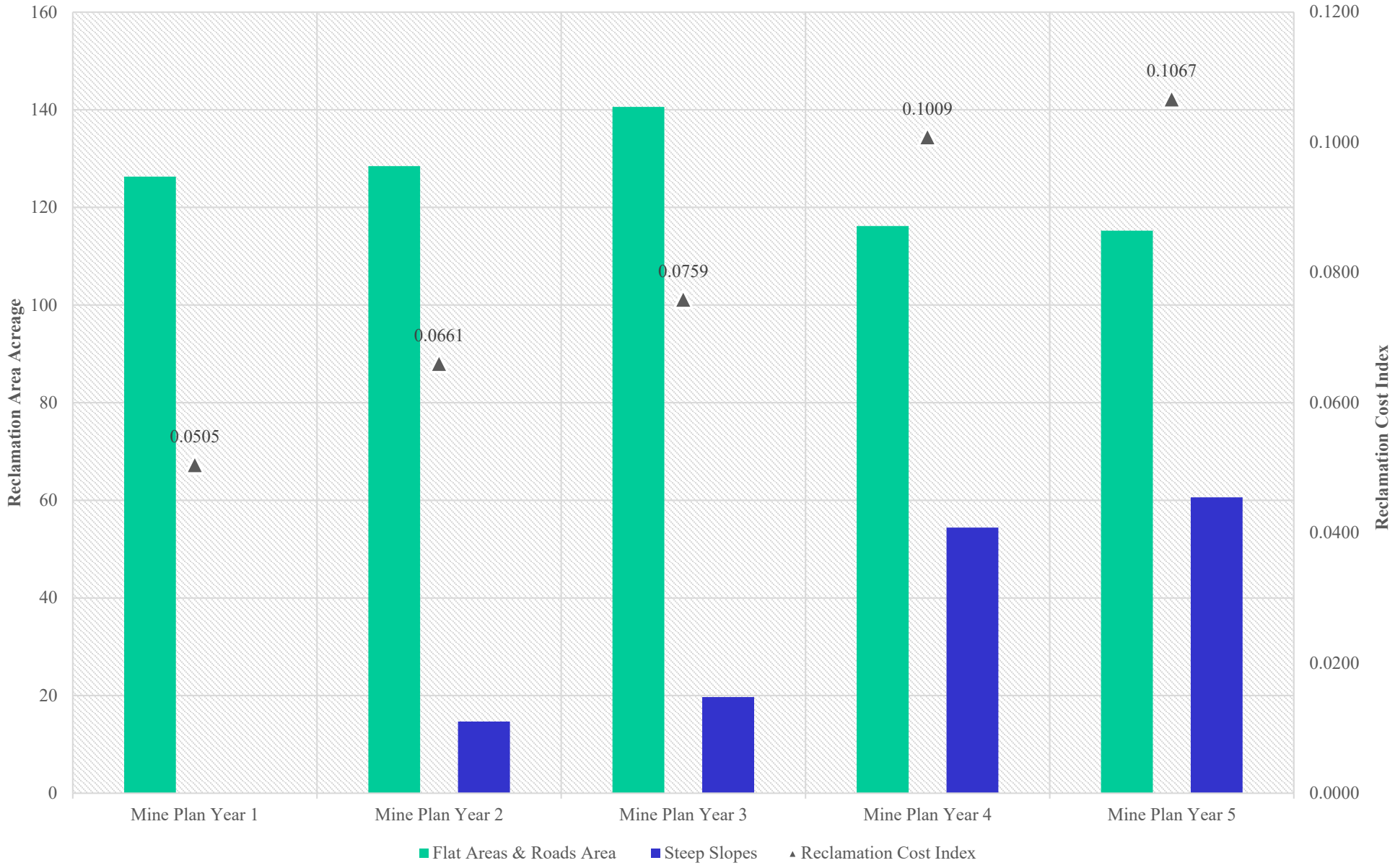

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CLIENT/PROJECT

EMMA EXPANSION PROJECT
FREEPORT-MCMORAN TYRONE INC.

TITLE

HIGHEST RECLAMATION COST YEAR CALCULATION RESULTS

DRAWN	CHECKED	REVIEWED	DATE	SCALE	JOB NO.	DWG NO.	SUBTITLE	REV. NO.	FIGURE
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