**REPORT**

# 2013 TYRONE MINE CLOSURE/CLOSEOUT PLAN UPDATE

*Freeport-McMoran Tyrone, Inc.*

Submitted to:

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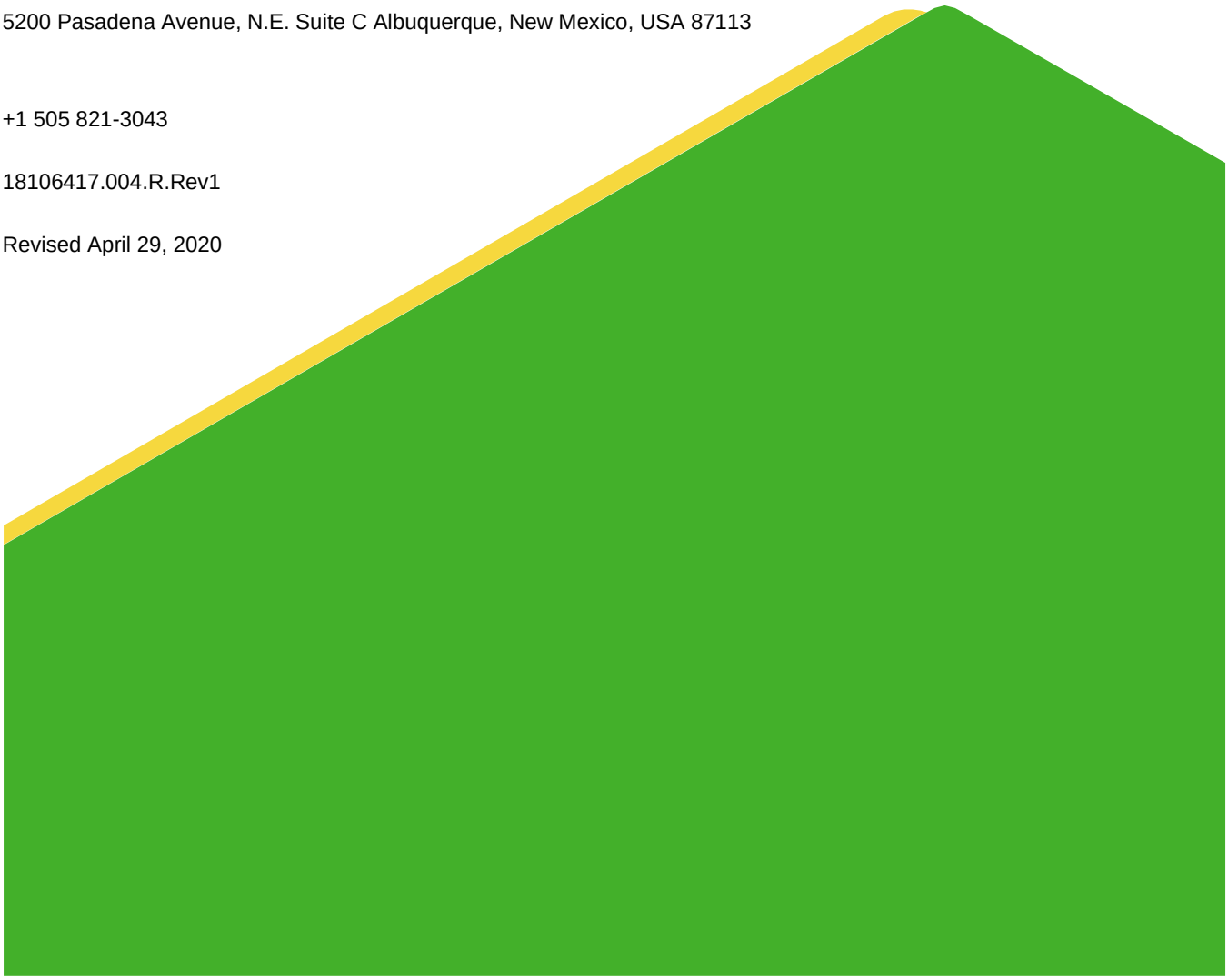

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# List of Acronyms and Abbreviations

| | |
|---|---|
| °C | degree Celsius |
| ABA | acid-base accounting |
| APP | Abatement Plan Proposal |
| AWHC | available water holding capacity |
| BER | Basic Engineering Report |
| BLM | Bureau of Land Management |
| BMI | Borrow Materials Investigation |
| BMP | Best Management Practices |
| CCP | Closure/Closeout Plan |
| CDQA | Construction design quality assurance (Final Design) |
| CDQAP | Construction Design Quality Assurance Plan (Final Design) |
| CFR | Code of Federal Regulations |
| CMSPE | Copper Mountain South Pit Expansion |
| COC | Chain of Custody |
| CQA | Construction Quality Assurance (Construction Quality Assurance/Construction Quality Control Plan) |
| CQAR | Construction Quality Assurance Report |
| Current | Assumes End of Year 2014 Mine Configuration unless otherwise noted |
| CY | cubic yards |
| DBS&A | Daniel B. Stephens and Associates, Inc. |
| DP | Discharge Permit |
| EC | electrical conductivity |
| ETS | Evaporative Treatment System |
| EnviroGroup | EnviroGroup Limited |
| EOY | end of year |
| Golder | Golder Associates Inc. |
| HDPE | high density polyethylene |
| HDS | high-density sludge |
| M3 | M3 Engineering & Technology Corp. |
| MA | mining area |
| MAP | mean annual precipitation |
| MF | microfiltration |
| Mg/L | milligrams per liter |
| mm | millimeters |
| MMD | Mining and Minerals Division |
| MPO | Mine Plan of Operations |
| msl | mean sea level |
| NMAC | New Mexico Administrative Code |
| NMED | New Mexico Environment Department |
| NMMA | New Mexico Mining Act |
| NMOSE | New Mexico Office of the State Engineer |

| | |
|---|---|
| NMWQA | New Mexico Water Quality Act |
| NMWQCC | New Mexico Water Quality Control Commission |
| O&M | Operation and Maintenance |
| OPSDA | Open Pit Surface Drainage Area |
| PDTI | Phelps Dodge Tyrone, Inc. |
| PLS | pregnant leach solution (economic copper-bearing leach solution) |
| PMLU | post-mining land use |
| QC | Quality Control |
| RCM | reclamation cover material |
| RO | reverse osmosis |
| Rules | New Mexico Mining Rules |
| SDF | sludge disposal facility |
| SPCC | Spill Prevention Control and Countermeasures |
| SX/EW | solution extraction-electrowinning |
| SWMP | Stormwater Management Plan |
| TDS | total dissolved solids |
| TTS | Tyrone Treatment System |
| Tyrone | Freeport-McMoRan Tyrone, Inc. |

# 1.0 INTRODUCTION

Freeport-McMoRan Tyrone, Inc. (Tyrone) is an open pit copper mine located just off State Highway 90, approximately 10 miles southwest of Silver City in Grant County, New Mexico (Figure 1-1). This Closure/Closeout Plan (CCP) is an update of the 2003 Tyrone Closure/Closeout Plan and renewal application submitted to the New Mexico Environment Department Groundwater Quality Bureau Mining Environmental Compliance Section (NMED) and the Mining and Minerals Division (MMD) of the Energy of the Minerals, and Natural Resources Department, which was approved by the agencies on April 8, 2003 (NMED, 2003a) and April 12, 2004 (MMD, 2004). In addition, in December 2013 the Water Quality Control Commission adopted the Copper Rule, 20.6.7 New Mexico Administrative Code (NMAC). This CCP reflects the applicable requirements of the Copper Rule and includes the current CCP and associated reclamation cost estimate for the Tyrone Mine.

## 1.1 Purpose of Plan

The purpose of this CCP is to present a reclamation plan (technical scope of work) consistent with all applicable federal and state regulatory requirements and permit conditions so that a financial assurance cost estimate can be calculated to meet the financial assurance requirements of Part 19.10.12 NMAC and Discharge Permit 1341 (DP-1341). Applicable requirements for the Tyrone Mine area in general include the conditions of Tyrone's permits issued under the Mining Act and the Mining Act Rules, GR010RE, and Tyrone's Supplemental Discharge Permit for Closure, DP-1341. Portions of the mine area are subject to additional conditions related to revisions and modifications of GR0010E and other applicable discharge permits. The permit conditions are based upon the requirements of the Mining Act Rules, 19.10 NMAC, and the Water Quality Control Commission Rules, 20.6.2 NMAC.

This CCP Update also incorporates the new requirements of the Copper Mine Rule, 20.6.7 NMAC. As this CCP supplements Tyrone's pending application for renewal of DP-1341, Tyrone contemplates that upon renewal, a new version of DP-1341 will be issued containing conditions consistent with 20.6.7 NMAC. In addition, for those portions of the Tyrone Mine on federal public lands that are operated under a Mine Plan of Operations (MPO), the CCP addresses the requirements of the MPO and 43 C.F.R. Part 3809.

The CCP incorporates previously approved closure and reclamation measures designed and intended to address all applicable requirements of 19.10.5 and 20.6.2 NMAC, as well as any additional measures needed to address the requirements of 20.6.7 NMAC and, where applicable, an approved MPO and 43 C.F.R. Part 3809. The CCP includes the reclamation designs and reclamation design criteria to meet those requirements. It also provides for water management, water treatment, monitoring, maintenance and reporting requirements in anticipation of, during, and following closure and reclamation, including the post-closure period.

A cost estimate for the purpose of determining the value of the financial assurance performance bond for the earthwork portion of this CCP was prepared and submitted to the agencies on May 6, 2019 and was subsequently revised in April 2020 based on comments received from the agencies. The basis upon which these cost estimates were developed are outlined in Section 8.0 and in the Earthwork Cost Estimate Summary report submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and associated April 2020 revisions. The updated 2020 Earthwork Cost Estimate Summary report is included in **Appendix C**. A detailed scope of work for the proposed water management and water treatment systems is provided in **Appendix D** along with the financial assurance cost estimate associated with this component of the CCP.

## 1.2 Plan Organization

This section describes the purpose and scope of the CCP Update and its overall organization. The main body of the CCP consists of the following sections:

- **Section 1.0** provides an overview of the updated CCP for Tyrone;
- **Section 2.0** describes the existing facilities and current (EOY 2014, unless otherwise noted) environmental setting at the Tyrone Mine including geology, fauna, flora, mine history, current (EOY 2014, unless otherwise noted) disturbances, and discharge permits associated with the mine;
- **Section 3.0** describes the ongoing and completed reclamation projects at Tyrone, including reclamation projects planned up through the end of year (EOY) 2014;
- **Section 4.0** describes the proposed reclamation design criteria and performance objectives for surface reclamation and water management and treatment;
- **Section 5.0** provides details on the reclamation plans for each of the three major facility areas at Tyrone;
- **Section 6.0** describes the closure and post-closure monitoring plans for Tyrone along with contingency plans and reporting schedules;
- **Section 7.0** provides details of the proposed post-mining land uses for the Tyrone and the associated requirements for the individual areas;
- **Section 8.0** presents a summary of the capital cost estimate associated with the proposed reclamation and post-closure monitoring plans presented in Sections 5.0 and 6.0, and the operating and maintenance costs associated with the proposed reclamation and post-closure monitoring plans;
- **Section 9.0** presents the proposed reclamation schedule associated with this CCP;
- **Section 10.0** is the signature page for the CCP update; and
- **Section 11.0** lists the references used in preparation of this CCP.

The following appendices are also included in the updated CCP:

- **Appendix A** includes the reclamation design drawings that illustrate the updated CCP;
- **Appendix B** provides the updated facility characteristic forms;
- **Appendix C** includes the updated 2020 earthworks cost estimates summary report;
- **Appendix D** includes the scope of work for the proposed water management and water treatment systems and includes the updated cost estimate for water management and treatment.
- **Appendix E** includes the 2019 Borrow Materials Investigation Report; and
- **Appendix F** includes the 2019 Slope Stability Report

## 1.3 Regulatory Authority

The New Mexico legislature enacted the New Mexico Mining Act (NMMA) requiring that closeout plans be put in place for applicable mines within the State in 1993. Rules to implement the requirements of the NMMA were

promulgated in 1994. This CCP was prepared to comply with applicable regulations and requirements stipulated in the NMMA and NMAC Title 19, Chapter 10, Part 5, New Mexico Water Quality Act (NMWQA), and the New Mexico Water Quality Control Commission (NMWQCC) Regulations (NMAC Title 20, Chapter 6, Parts 2 and 7).

The requirements of those laws are addressed in the conditions of Tyrone's permits GR0010E and DP-1341. In 2013, NMED adopted new rules for the copper mining industry. Applicable conditions of these new rules (Copper Mine Rule Section 20.6.7 NMAC) have been addressed in this CCP. Table 1-1 provides a summary of the closure and post-closure requirements in the Copper Rule and the associated sections of this CCP Update for which they are addressed.

## 1.4 History of Closure/Closeout Plan Submittal

Prior to the legislative activities that led to the establishment of the NMMA, Tyrone submitted various closure plans and implemented tailing test plots for closure as part of operational DP requirements. The following summary focuses on activities that occurred after the implementation of the NMMA.

In 1994 Tyrone submitted a mining operations site assessment and an existing mining operation permit application. The permit application was approved by the MMD on July 10, 1996. The following list provides a chronology of the more recent progress leading to this updated CCP:

- Tyrone submitted a preliminary CCP in December of 1997 (DBS&A, 1997c);
- Tyrone applied for and was granted an extension by the MMD for closeout plan approval until December 31, 1999;
- Tyrone submitted a revised CCP in April 1999 (DBS&A, 1999) and secured an interim financial assurance with the NMED;
- In 1999 Tyrone applied for and was granted an extension for closeout plan approval until December 31, 2001;
- Tyrone submitted the EOY 2001 Through Year 2008 CCP for the Tyrone Mine in May 2001, which was updated in July 2001 (M3, 2001);
- Supplemental Discharge Permit for Closure DP-1341 was issued by the NMED on April 8, 2003 (NMED, 2003a);
- Permit Revision 01-1 to Permit No. GR010RE was issued by the MMD on April 12, 2004 (MMD, 2004);
- Tyrone submitted a CCP Update in October 2007 (Golder, 2007e);
- In 2010, NMED and Tyrone signed the Settlement Agreement and Stipulated Final Order (NMED and Freeport McMoRan Tyrone, Inc., 2010);
- In December 2012, the Tyrone DP-1341 Settlement Agreement and Stipulated Final Order was amended (NMED, 2012);
- In August 2012, Permit Revision 10-1 to Permit GR010RE was issued by MMD, which contained a conditional waiver for open pits and interior stockpile slopes (MMD, 2012);

- In October 2014, Permit Modification 14-1 to Permit GR010RE was issued by MMD, which approves an expansion of the No. 9A stockpile at Tyrone (designated as the No. 9AX waste rock stockpile) by an additional 64 acres, and the closeout plan and financial assurance for the No.9AX waste rock stockpile. (MMD, 2014);
- Tyrone submitted a CCP Update in July 2013 in support of Tyrone's application to renew DP-1341 and to modify Tyrone's closeout plan under Permit GR010RE (Golder, 2013). Both the NMED and MMD provided comments on the 2013 CCP Update. This CCP Update supplements the 2007 CCP Update;
- Tyrone submitted a CCP Update in June 2015 that included changes made to the proposed 2013 CCP Update for the Tyrone Mine based on the comments received by the MMD and NMED;
- Tyrone submitted the updated Reclamation Cost Estimate Process, Earthwork, Demolition, and Earthwork Operations and Maintenance Cost Estimate, and Earthwork Site Engineering Drawings and Material Takeoffs in May 2019 that included changes made to the 2015 submittal based on comments received by the MMD and NMED and recent permit modifications; and
- Tyrone submitted a CCP Update in July 2019 that included changes made to the 2015 CCP Update for the Tyrone Mine based on the comments received by the MMD and NMED.

Throughout the development of the CCPs, the naming of individual facilities has changed over time. A summary of the names previously used for individual facilities along with the current facility names used in this CCP Update is provided in Table 1-2. Additionally, the individual facility names used in the recent Tyrone Master Document (DBS&A, 2017) are also provided in Table 1-2 for completeness.

## 1.5 Description of Updated Plan

The MMD and NMED require that existing mines prepare a CCP and the entity responsible for the mine must post financial assurance "*sufficient to assure the completion of the performance requirements of the permit, including closure and reclamation, if the work had to be performed by the director or a third party contractor.*"

This update to the CCP revises the CCP Update submitted in October 2007 (Golder, 2007e) with refined closure/closeout conceptual designs that account for changes in site-specific conditions, ongoing and completed reclamation projects, and 2012 through 2017 mine plans. Like the original 2001 CCP (M3, 2001) and 2007 CCP Update (Golder, 2007e), this updated plan is a "snapshot in time" that reflects the most expensive closure scenario within the 5 year period covered by this CCP based on the Tyrone mine plans and site conditions. Details of facility changes that have occurred since the last CCP and those projected in the subsequent planning period are provided in this CCP. The facility characteristics and reclamation designs presented in this CCP are referenced to conditions at Tyrone at the EOY 2014 as well as the projected status of ongoing and planned reclamation projects prior to the EOY 2014, unless otherwise noted. The proposed reclamation and post-closure monitoring plans for the principal mine facilities and seven operational DP areas (see **Table 2-2**) are described in Sections 5.0 and 6.0.

This updated CCP supports financial assurance cost estimates for closure/closeout based on the EOY 2014 mine plan. Use of the EOY 2014 mine plan is consistent with the snapshot in time philosophy that was adopted by Tyrone and the Agencies early in the closure planning process and represents the year with the greatest volume of regrading and cover placement required between 2012 and 2017. If mining activities were to cease between the years 2012 and 2017, the highest reclamation cost scenario would be associated with the EOY 2014

conditions. Additionally, Tyrone recently evaluated the current mine plans through year 2022. This analysis also showed that the EOY 2014 mine plan represents the year with the greatest volume of regrading and cover placement required between 2012 and 2022. Thus, the EOY 2014 plan is expected to represent the most onerous condition from a cost perspective.

## 1.6 Modifications to Mine Permit Boundary

As presented in the Updated CCP for the Little Rock Mine (Golder, 2014), Tyrone proposed to expand the existing Little Rock Mine Permit Boundary by approximately 68 acres to account for the projected expansion of the open pit and associated disturbance areas outside the current permit boundary limits. Approximately 40 acres of the proposed 68-acre Little Rock mine permit boundary expansion lies within the existing Tyrone Mine Permit Boundary. MMD Permit Revision 14-1 to Permit No. GR007RE was issued by the MMD on March 7, 2016 approving the expansion of the Little Rock Mine Permit Area from approximately 612 acres to 680 acres, including an approximate 40-acre area formerly within the Tyrone Mine Permit Area (MMD, 2016). The proposed updated Tyrone Mine Permit Boundary changes are shown on **Plate 1**.

## 1.7 Development of CCP Cost Estimate

This CCP Update provides the basis for a third-party financial assurance cost estimate of the proposed reclamation, closure and post-closure under 19.10.12.1205 NMAC, Permit GR010RE and DP-1341. The CCP includes descriptions of the scope of work to be performed, reclamation schedule, federal and state permit requirements, topographic maps of the current and future surface conditions, monitoring schedules, and other pertinent information required by specific rules and permit conditions. The CCP is in support of and relies on the knowledge and experience of site-specific studies, reports and CCP submittals, and closure and reclamation work performed on portions of the Tyrone Mine.

Capital costs, operating costs, and maintenance costs for post-closure/closeout care have been developed for this updated plan and are summarized in the table below. These costs are outlined in Section 8.0, and detailed in the updated Earthwork Cost Estimate Summary report provided in **Appendix C**, and the water management and treatment cost basis document and associated cost estimate provided in **Appendix D**. The EOY 2014 scenario used to develop the reclamation cost estimate reflects the highest reclamation cost scenario for closure/closeout in the time period between 2012 and 2022.

| Cost Summary | | | |
|---|---|---|---|
| **Item** | **Subtotal Direct Costs** | **Subtotal Indirect Costs** | **Total (Current Cost)** |
| **Capital Cost Summary** | | | |
| Earthwork | $74,286,554 | $22,285,966 | $96,572,521 |
| Water Management and Treatment | $11,913,245 | $3,573,974 | $15,487,219 |
| **Subtotal Capital Costs** | **$86,199,799** | **$25,859,940** | **$112,059,740** |

| Cost Summary | | | |
|---|---|---|---|
| **Item** | **Subtotal Direct Costs** | **Subtotal Indirect Costs** | **Total (Current Cost)** |
| **Operating and Maintenance (O&M) Cost Summary** | | | |
| Earthwork | $7,568,083 | $1,324,415 | $8,892,498 |
| Water Management and Treatment | $263,931,548 | $46,188,021 | $310,119,569 |
| **Subtotal O&M Costs** | **$271,499,631** | **$47,512,436** | **$319,012,067** |
| **TOTAL COST** | **$357,699,430** | **$73,372,376** | **$431,071,807** |

# 2.0 EXISTING FACILITIES AND CONDITIONS

The following sections describe the Tyrone mining facilities and operations, ownership history, past and current land uses, environmental setting, and mine material characteristics. In addition, pertinent permits and operational DPs are summarized herein.

## 2.1 Description of Mining Facilities

For the purposes of the updated CCP, the Tyrone Mine was separated into three geographical areas including the Mining Area, East Mine Area, and Mangas Valley Tailing Area (**Figure 2-1**). The three areas are described as follows:

- The Mining Area includes the Main (West Main II, West Main II, and Valencia sub-pits), Savanna, Gettysburg, Copper Mountain, and partially backfilled San Salvador Pit and South Rim Pits; stockpiles; Copper Mt. Reclamation Area, the solution extraction-electrowinning (SX/EW) Plant Area; process and storm water management systems; maintenance and lubrication shops; reclaimed facilities; and associated facilities (**Figure 2-2** and **Plate 3**);
- The East Mine Area includes the reclaimed facilities, acid unloading facility, and former precipitation plant area (**Figure 2-3**); and
- The Mangas Valley Tailing Area includes the reclaimed tailing impoundments, partially reclaimed tailing launder, other borrow areas, and associated facilities (**Figure 2-4** and **Plate 2**).

The general layout of the mine facilities at Tyrone is presented in **Figure 2-1** and **Plate 1**. The principal mine facilities and main mine components are discussed in Sections 2.1.1 through 2.1.10 and include:

- Open pits;
- Waste rock, leach ore, and overburden stockpiles;
- Mine operation facilities (e.g., warehouse, shop, and office buildings, and power plant);

- SX/EW Plant;
- Lubrication shop area;
- Acid-unloading facility and former precipitation plant;
- Reclaimed mill and concentrator area;
- Reclaimed tailing impoundments and repositories;
- Water management system (including wells, tanks, pipelines, process water ponds); and
- Ancillary infrastructure (roads/railway, fuel storage tanks, power lines, storm water controls).

Additional information concerning the site facilities and operations can be found in the Tyrone operational discharge permits issued by NMED.

### 2.1.1 Open Pits

The location of active open pit mining has shifted over time resulting in a number of distinct, but adjoining open pits. The open pits are developed in a series of 50-foot benches by blasting, excavation, and hauling of waste rock and ore. To minimize excavation and total land disturbance open pits are developed as steep as possible based on geotechnical and geologic evaluations; therefore, the overall slope angle will vary from area to area within the pit(s).

The open pit complex at Tyrone encompasses approximately 1,516 acres in 2014, including the Main (West Main II, West Main III, and Valencia sub-pits), Gettysburg, Copper Mountain, South Rim, Savanna, and San Salvador pits. Mining is currently focused in the Valencia sub-pit. The Main Pit, near the center of the Mining Area, is about 1,200 feet deep. The West Main II, West Main III, and Valencia pits are considered by Tyrone to be part of the Main Pit. The Main, Copper Mountain, and Gettysburg pits are currently being dewatered to maintain mining access, provide process makeup water, and maintain open-pit groundwater capture zones. Where operationally feasible, Tyrone has backfilled portions of the Main Pit and other pits at the mine to facilitate mining and reclamation.

On April 12, 2004, the MMD granted a conditional waiver from the requirements to achieve a self-sustaining ecosystem for the Main, Savanna, Gettysburg, and Copper Mountain Pits. A waiver was not granted for the San Salvador and South Rim Pits as part of the current closeout plan approval.

Under the Settlement Agreement between Tyrone and the NMED, the Supplemental Discharge Permit for Closure (DP-1341), as renewed, will not require Tyrone to regrade and cover the side slopes of leach stockpiles and waste rock piles within the approved Open Pit Surface Drainage Area (OPSDA).

This aspect of the Settlement Agreement was contingent, in part, on MMD granting a conditional waiver for the areas identified within the OPSDA. As part of Permit Revision 10-1 to MMD Permit GR010RE, the MMD granted a conditional waiver from the requirements to achieve a self-sustaining ecosystem. The current approved conditional waiver area is depicted on Figure 3R in Permit Revision 10-1 to MMD Permit GR010RE (MMD, 2012), and the revised conditional waiver area associated with the EOY 2014 mine plan topography is shown on **Plate 1** herein. This CCP Update is based upon the Copper Rule requirements that stockpile outslopes located within the revised OPSDA do not require grading and covering (20.6.7.33.C(3)(b)), and the revised conditional waiver area both associated with the EOY 2014 mine plan topography.

### 2.1.2 Leach, Waste Rock, and Overburden Stockpiles

The Tyrone permit area contains a number of stockpiles in the Mining Area and East Mine Area. The stockpiles generally fall into three types: 1) leach stockpiles, which apply a low concentration of acid solution to extract copper from ore; 2) waste rock stockpiles, which store excavated rock moved to access the ore body and that may contain copper, but are currently not economic to process; and 3) overburden stockpiles, which contain materials suitable for future reclamation purposes. Combined, the stockpiles encompass approximately 3,480 acres in 2014.

The leach stockpiles include the Reclaimed 1 Leach, 1A Leach, 1B Leach, 2 Leach (which includes the 2C Leach, 4A Leach, 4B Leach, 4C Leach and 4D Leach), 2A Leach, 2B Leach, 3A Leach, 6A Leach, 6B Leach, 6C Leach, 6D Leach, and 7B Leach. The former USNR Leach stockpile (historically known as Copper Mountain Leach Stockpile) was leached by a previous operator and was removed and placed on the 2B Leach stockpile by Tyrone. The reclaimed USNR site is located along the northwest perimeter of the Copper Mountain Pit and is included within the Copper Mt. Reclamation Area. One additional leach stockpile (Valencia In-Pit Leach) was permitted in 2019 under DP-166 and is included in the figures and plates in this report for reference.

Waste rock stockpiles include the Reclaimed 1C Waste, 2B Waste, 3B Waste, Reclaimed 7A Waste, 7B Waste, 7C Waste, 8A Waste, 8C Waste, and portions of the 6A Leach stockpile. Two additional waste rock stockpiles were permitted after 2014 and are included in the figures and plates in this report for reference. These two stockpiles include the Gettysburg Waste and the CSG Waste stockpiles and are shown in **Plate 1**.

Although the 5A Waste, 9A Waste, 9AX Waste, and CSG Waste stockpiles are designated herein as waste rock stockpiles, they contain overburden material that may be used for reclamation cover material (RCM) at closure following further testing and analysis and approval of these materials by the agencies for use as RCM. The 9AX Waste is a 64-acre overburden stockpile located directly north of the 9A Waste stockpile. The 9AX stockpile reclamation plan was approved by the MMD in Permit Modification 14-1 to Permit GR010RE (MMD, 2014). The 5A Waste and CSG Waste stockpiles are comprised primarily of Gila Conglomerate, and the 9A Waste and 9AX Waste are comprised of Precambrian Granite excavated from the Little Rock mine.

Several stockpiles have been fully reclaimed including the Reclaimed 1 Leach, Reclaimed 1C Waste, and Reclaimed 7A Waste (including the 7A and 7A Far West). Pullback of the 1A Leach stockpile and placement of the pullback material along the toe of the 1B Leach stockpile is currently ongoing and is projected to be completed prior to the EOY 2014. Additional reclamation work required at the Copper Mountain South Pit Expansion (CMSPE) Area is projected to be completed by the EOY 2014.

### 2.1.3 Main Mine Facilities

The main mine operations facilities area is located along the north ends of the 3A Leach and 5A Waste stockpiles along the upper reach of Mangas Wash (**Figure 2-5**). Facilities and structures located in the main mine operations area include:

- MM-01 General Office
- MM-02 Mine Operations Office
- MM-03 Security
- MM-04 Safety Building

- MM-05 Human Resources/Training
- MM-06 Jerome Building
- MM-07 Plant Warehouse
- MM-08 Truck Shop/Machine Shop/Welding Shop
- MM-09 Electric Shop
- MM-10 Pipe Shop
- MM-11 Carpenter Shop
- MM-12 Lumber Storage
- MM-13 Shovel Repair
- MM-14 Environmental Lab (Environmental field office)
- MM-15 Chapel
- MM-16 Electrical Building & Chlorine Shack
- MM-18 Analytical Lab (training building)
- MM-19 Car Wash
- MM-20 Diesel Tank Farm
- MM-21 Electrical Power Substation
- MM-24 Fire Truck Barn
- MM-25 Ambulance Barn

### 2.1.4 SX/EW Plant

The SX/EW Plant is located northwest of the Main Pit, between the 3B Waste and 2A Leach stockpiles (**Figure 2-6**). PLS from the leach stockpiles is sent to the SX/EW Plant where the copper is extracted. After copper extraction, the remaining solution is recycled by adding a low concentration of acid to produce raffinate, which is then re-circulated through the leach stockpiles to collect additional copper. Facilities and structures located in the SX/EW Plant include:

- Tankhouse
- SX/EW Plant Area Shop
- Leach Crew Office
- SX/EW Warehouse
- Substation
- Raffinate Storage Tanks (2)

- Gonzales Cells
- Jamison Cells
- Organic Tanks (4)
- Mixer/Settler Tanks (8)
- Tank Farm (5)
- Water Tank
- PLS Feed Pond
- Raffinate Overflow Pond
- Acid Tanks (2)
- MCC Building
- Tool Room and Storage
- Chlorinator Room
- 2A West Raffinate Booster Tank
- Rectifiers
- Workroom
- Pump Mixer Control Room
- Cobalt Sulfate Tank
- Reagent Tanks
- Tool Room
- Diluent Storage Tank
- Pacesetter Filters (2)
- Wash Pad
- Other miscellaneous (e.g., tanks and pipelines)

### 2.1.5 Former Mill and Concentrator

The former mill and concentrator area is located east of the 3A Leach stockpile (**Figure 2-7**). Demolition activities at the site began in August 2004, and reclamation of the mill and concentrator area was completed in 2007. The CSG Waste stockpile is located over the reclaimed mill and concentrator area and partially over the 5A Waste stockpile, in the area between the 5A Waste stockpile, 3A Leach stockpile, and the tailing thickeners (**Plate 1**). The buildings and facilities that remain in the vicinity of the Mill include:

- MC-01 Tailing Thickeners (8)

- MC-02 Reclaim Water Storage Tanks (3)
- MC-04 Reclaim Water Pump House
- MC-05 Terminal Tanks (3)
- MC-15 Mill Warehouse (Warehouse and Core Storage)
- MC-17 Radiators/Power Plant (Power House)
- MC-20 Reagent Building
- MC-21 Fuel Station
- MC-22 Tire Shop
- MC-24 Spigot Underflow Pump House
- MC-25 Tailing Pump House, and
- MC-27 Inactive Diesel Storage Tanks (2) – these tanks have been decommissioned and are rendered inoperable as tanks

The buildings and facilities presented below were demolished, removed, and/or buried according to an approved building removal plan. Further details on the mill and concentrator reclamation project are provided in Section 3.2.

- MC-06 Flotation Units (3)
- MC-07 Secondary Crusher
- MC-08 Mill Pumphouse
- MC-09 SX/EW Change room
- MC-10 Intermediate Ore Storage
- MC-11 Primary Crusher
- MC-12 Process Water Tanks
- MC-13 Concentrator-Filter Plant & Dryer
- MC-14 Lime Storage
- MC-16 Warehouse/Concentrate Unloading
- MC-19 Concentrator Building

### 2.1.6 Lubrication Shop Area

The lubrication shop area is located east/southeast of the Main Pit area, between the 1B Leach and 5A Waste stockpiles (**Figure 2-8**). An undisturbed cemetery is located east of the lube shop. Other facilities in this area include the Southwest Energy building and electrical substation. A storm water collection pond (Lubrication Shop Pond) is located north and northwest of the Southwest Energy building. Explosives and blasting supplies are stored at secured, isolated facilities in this area, including the prill tanks, which contain powdered ammonium

nitrate, and the powder magazines, which contain primers, blasting caps, cord, and delays. One prill tank has since been moved adjacent to the 9A Waste stockpile.

### 2.1.7 Acid-Unloading Facility and Former Precipitation Plant

The acid unloading facility and former precipitation plant are located within the East Mine Area, southeast of the main mine facilities area, and west of and adjacent to Highway 90 in the upper reach of Brick Kiln Gulch (**Figure 2-9**). In the past, the area was used to produce copper precipitate, but the precipitation plant was decommissioned in 1996. Presently, the north end of the area is used to unload train cars of sulfuric acid used in the leaching process. Ancillary facilities in the area include the railroad tracks, a small permitted solid-waste landfill, and various pump stations for process water and storm water handling.

### 2.1.8 Reclaimed Tailing Impoundments

The reclaimed tailing impoundments at the Tyrone Mine consist of the historic Burro Mountain Tailing Impoundment located in the East Mine Area and six tailing impoundments in the Mangas Valley Tailing Area referred to herein as the Mangas Valley Tailing Impoundments. The Burro Mountain Tailing Impoundment received tailing from the Burro Chief Mill that operated from 1916 to 1921. Reclamation of the Burro Mountain Tailing Impoundment began in 2004 and was completed in 2005.

The Mangas Valley Tailing Area contains the Reclaimed 1Tailing Impoundment, Reclaimed 1A Tailing Impoundment, and Reclaimed 1X Tailing Impoundment (a.k.a., 1 Series Tailings); Reclaimed 2 Tailing Impoundment, Reclaimed 3 Tailing Impoundment and Reclaimed 3X Tailing Impoundment (**Figure 2-4**). The reclaimed tailing impoundments cover about 2,300 acres. Additional facilities that have been reclaimed within the Mangas Valley Tailing Area include portions of the tailing launder and approximately 72 storm water catchments. Reclamation of the Mangas Valley Tailing Impoundments began in 2004 with the initial grading of the 3X Tailing Impoundment. Reclamation of the 3X Tailing Impoundment was completed in 2005, and the 3 Tailing Impoundment was completed in 2006. The 1 Series Tailings were completed in 2008. The 2 Tailing Impoundment was completed in 2007.

### 2.1.9 Water Management System and Ponds

**Figure 2-10** presents a generalized schematic of the water supply and use cycle at the mine. Various surface impoundments are used during current operations for temporary storage of both impacted and non-impacted process waters, surface waters, and seep water. Surface impoundments at Tyrone were originally identified in Table 5.6 of the EOY 2001 through 2008 CCP (M3, 2001) and subsequently updated as part of the Condition 87 Surface Impoundment Study Work Plan (DBS&A, 2006) and 2007 CCP Update (Golder, 2007e). The locations of the existing surface impoundments at Tyrone have been further updated based on information within the Tyrone Master Document (DBS&A, 2017) and DPs that have been renewed following submittal of the Master Document. The locations of the surface impoundments at the mine are shown on **Figures 2-11 and 2-12**. **Table 2-1** summarizes the type and operational status of the surface impoundments at the mine.

### 2.1.10 Other Ancillary Facilities, Structures, and Systems

In addition to the major mine components identified above, there are a number of key ancillary facilities dispersed across the mine or that cross facility boundaries that support the operations at Tyrone. Some of the more important ancillary facilities that require consideration at closure are listed below:

- Haul and access roads;

- No. 1 fuel dock, No. 2 fuel dock, tire shop area;
- Electrical power transmission lines and substations;
- Storm water structures for drainage, diversion, and sediment control;
- Fencing and security systems; and
- Miscellaneous pipelines.

## 2.2 Past and Current Land Uses

Surface lands in and adjacent to the mine have historically been used for mining, livestock grazing, timber and fuel wood harvesting, recreation, and wildlife habitat. Ponderosa pine was logged in the Big Burro Mountains south of the Tyrone Mine, and fuel wood has been cut from woodlands in this area for at least a century. Recreation in the area includes camping, picnicking, hunting, off-road vehicle use, hiking, horseback riding, and bicycling. Current surrounding land uses include private residences, grazing, mining, and recreation. Grazing is the predominant land use surrounding the mine.

## 2.3 Environmental Setting

The following sections present various aspects of the mine site, including its topography, geology, climate, hydrology, soils and vegetation, wildlife, and material characteristics.

### 2.3.1 Topography

The Tyrone Mine area straddles the Continental Divide between the Big Burro and Little Burro Mountains. The mine is located on the northeastern slopes of the east end of the Big Burro Mountains, a northwest-southeast trending range approximately 22 miles long and 4 to 12 miles wide. The Little Burro Mountains are situated northeast of the Big Burro Mountains and are separated from the Big Burro Mountains by the mine and the Mangas Valley (**Figures 2-13 and 2-14**). The Mangas Valley and the Little Burro Mountains are located within a structurally controlled regional topographic feature that trends northwest to southeast. The Little Burro Mountains have a steep southwestern front and gentle northeastern slopes.

The topography in the vicinity of the Tyrone Mine reflects the relatively gentle northeastern slopes of the Big Burro Mountains (**Figures 2-13 and 2-14**). Burro Peak, on the Continental Divide, rises to an elevation of 8,035 feet above mean sea level (msl). The trace of the Continental Divide is to the northeast through the Tyrone Mine, crossing the Mangas Valley at an elevation of 5,825 feet above msl. The Divide separates Mangas Wash from the southeasterly-draining Brick Kiln Gulch and Oak Grove Wash. The Continental Divide crosses the Little Burro Mountains northwest of Tyrone Peak at a maximum elevation of 6,439 feet above msl.

### 2.3.2 Geology

The geology of the Tyrone copper deposit and surrounding area has been summarized by DuHamel et al. (1993), Kolessar (1982), and Paige (1922), and geologic maps were prepared by Hedlund (1978a, 1978b, 1978c, 1978d). Data from these sources, as well as from ongoing Tyrone operation and exploration activities, were used to develop the geologic map of the pre-mining surface and mine permit area shown in **Figure 2-15**.

It should be noted that the fault systems illustrated in **Figure 2-15** are based on results of geologic mapping conducted by Tyrone geologists. Consequently, the fault systems differ somewhat from those presented in previous reports. One of the most notable differences is the division of the Burro Chief fault into two separate

faults: the West Main Fault, which trends 45 degrees northeast, and the Burro Chief fault, which splays off the West Main at an orientation of 15 degrees northeast. Two additional northwest-southeast trending faults have also been identified, one that extends from the vicinity of the Gettysburg Pit to the northeast corner of the Main Pit, and a second that extends from the northeast corner of the Gettysburg Pit to the northeast corner of the Main Pit (Townsite Fault).

The Tyrone copper deposit is a porphyry copper deposit. The Tyrone deposit is generally confined to a triangular area at the southeast end of the Big Burro Mountains and is bounded by the Burro Chief and West Main Fault systems on the west, the Sprouse-Copeland Fault on the east, and the San Salvador fault system on the south.

### *Rock Units*

The rocks that crop out in the Big Burro Mountains, the Mangas Valley, and the Little Burro Mountains range in age from Precambrian to Quaternary and are shown in generalized cross sections in **Figure 2-16**. The Big Burro Mountains are dominantly composed of the Precambrian Burro Mountain granite; this batholith was subsequently intruded by the Tyrone stock nearly 56 million years ago. The Tyrone laccolith consists of a Tertiary quartz monzonite that is composed of four stages of porphyry intrusions, each of which differs in composition, texture, and age.

Exposures of Cretaceous rocks are limited to the Little Burro Mountains. The Cretaceous units are predominantly sedimentary and metamorphic rocks that include the Beartooth quartzite and the Colorado Formation. The Beartooth quartzite is a thin-bedded to massive fine-grained sandstone that unconformably overlies Precambrian granite. The Colorado Formation is a sandy shale that conformably overlies the Beartooth quartzite. Cretaceous and Tertiary volcanic rocks, primarily andesites and rhyolites, overlie the Cretaceous sedimentary units.

The youngest rocks in the area are of late Tertiary and Quaternary age and consist mostly of consolidated and weakly lithified sands, gravels, and conglomerates. The Gila Conglomerate Formation, the oldest of the younger sedimentary rocks, is a semi-consolidated unit that was deposited as basin fill and fan sediments derived from late Tertiary and earlier uplifts. The youngest sedimentary units are unconsolidated and were deposited unconformably on Gila Conglomerate and as valley fill along present-day drainages.

### *Geologic Structures*

The main geologic structures in the Big Burro Mountains, the Mangas Valley, and the Little Burro Mountains are northeast- and northwest-trending faults. Within the Mining Area, numerous intrusions or vein swarms have contributed to the development of a complex jointing and fracture network. The main regional faults include, but are not limited to: the Sprouse-Copeland, Austin-Amazon, West Main, Burro Chief, Southern Star, and Mangas Fault systems (**Figures 2-17 and 2-18**). The traces of two of these regional faults, the Mangas Fault and the Sprouse-Copeland Fault, are shown in **Figures 2-15 and 2-16**. The Mangas Fault strikes northwest-southeast with a dip of about 60 degrees southwest forming a prominent scarp on the Little Burro Mountains. Along the fault trace, Gila Conglomerate and bolson fill deposits have been juxtaposed against the older rocks of the Little Burro Mountains. Near Oak Grove Wash, the Sprouse-Copeland Fault strikes north along the eastern boundary of the Mining Area and is nearly vertical, with displacement on the order of hundreds of feet. This fault has juxtaposed the Gila Conglomerate, downthrown to the east, and the Precambrian Burro Mountain granite.

The Mangas Fault is a high-angle fault that separates the Little Burro Mountains from the Big Burro Mountains. Rotation of the down-dropped block has tilted the Tyrone ore body about 8 degrees toward the plane of the fault. This rotation has also preserved a wedge of the Gila Conglomerate and possibly Cretaceous rocks in the down-

dropped block. The Gila Conglomerate section in the down-dropped block is thickest on the northeastern side of the Mangas Valley and thins to a few feet thick on the southwest side.

Tyrone continues to refine the geologic understanding at the Tyrone Mine. The fracture density and vein mineralogy has recently been measured in connection with mine operations located just north of the Copper Mountain pit area. The results of these measurements show that the majority of the fractures in the area are filled with supergene kaolinite and are expected to have relatively low hydraulic conductivity.

### 2.3.3 Climate

The Tyrone Mine is located in a semiarid region in southwestern New Mexico, with elevations ranging from about 5,100 to 8,000 feet above msl. The climate at Tyrone is warm and dry, with mean annual precipitation of about 16 inches (400 millimeters [mm]) and a mean annual temperature near 50°F (10°C). Precipitation falls mainly as rain, but snow may occur from November to March. Most of the precipitation in the area falls during July through October in the form of rain during short, intense, thunderstorms. About 60 percent of the precipitation falls during the summer months. Precipitation is characterized mostly by small magnitude events ranging from less than 0.1 to 0.25 inches (2.5 to 6.4 mm) per day. Larger magnitude rainfall events (greater than one inch) also occur in the summer months, but at a much lower frequency. For example, the probability of exceeding one-inch of rainfall in a 24-hour period is less than one percent. Monthly precipitation is generally less than an inch per month from November through June, peaks in July, August, and September with between 2 and 3 inches per month, and generally falls to about 1 inch in October. Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation.

Seven weather stations are located at the Tyrone Mine each with varying periods of record. Of those stations, the Tyrone Mine General Office station has the longest period of record (i.e., 1954 to the present), while shorter records (7 to 15 years) are available for the other Tyrone Mine stations.

- Longer-term records (more than 40 years) are available from five weather stations located near the mine. The five stations with the longest periods of record are:
- The Tyrone Mine General Office station, located at the mine at an elevation of 5,960 feet above msl;
- The White Signal station, located approximately 7 miles south at an elevation of 6,066 feet above msl;
- The Santa Rita station, located approximately 20 miles east-northeast at an elevation of 6,312 feet above msl;
- The Hurley station, located approximately 15 miles east at an elevation of 5,700 feet above msl; and
- The Fort Bayard station, located approximately 20 miles northeast at an elevation of 6,149 feet above msl.

These stations are considered fairly representative of the range of climate conditions at Tyrone. Long-term climatic records (spanning more than 100 years) are available for Fort Bayard. Weather stations installed at the Tyrone test plots (Reclaimed 3X Tailing Impoundment and Reclaimed 1 Leach Stockpile) in 2005 provide a wider range of meteorological data (e.g., wind speed and direction, relative humidity, solar radiation, air temperature, and rainfall) than those previously measured at the mine. These two stations along with automated rain fall measurement stations at the Reclaimed 1A Tailing Impoundment and Laney Canyon are the defined measurement points used for erosion monitoring purposes.

### 2.3.4 Hydrology

The surface-water and groundwater hydrologic setting at the Tyrone Mine are presented below.

#### *Surface-Water Hydrology*

The Tyrone Mine occupies only a portion of two large watersheds: Mangas Wash and Oak Grove Wash. A key feature of the Tyrone property is that the continental divide segments the facility into the two watersheds. Mangas Wash drains to the northwest and Oak Grove Wash drains to the southeast. For purposes of discussion, the four major drainage basins in the area of Tyrone include Mangas Wash, Deadman Canyon, Brick Kiln Gulch, and Oak Grove Wash (**Figure 2-14**). Deadman Canyon is a tributary to Mangas Wash and was diverted by Tyrone around the reclaimed 1 Series Tailings into the Whitewater Canyon tributary of Mangas Wash. Mangas Wash is ephemeral at the mine site and drains to the Gila River. Brick Kiln Gulch is a tributary to Oak Grove Wash, which is also ephemeral and drains to the San Vicente Arroyo and then to the Mimbres River.

#### *Groundwater Hydrology*

Groundwater in the Tyrone Mine area is present in both regional and perched systems. Regional groundwater occurs within the granite and quartz monzonite. The two rocks types have been combined into a single hydrostratigraphic unit based on similar geologic and hydraulic properties such as fractures and fracture zones (DBS&A, 2012). In addition, perched zones occur in several areas. The nature and extent of impacts to regional and perched groundwater are documented in detail in the Tyrone Mine Stage 1 Abatement Plan Final Site Investigation Report (DBS&A, 2011) and the Stage 2 APP (DBS&A, 2012). This section provides a brief summary based on those documents.

The primary water-bearing units at the Tyrone Mine include the Precambrian Burro Mountain granite, the Tertiary quartz monzonite, the Gila Conglomerate, and the Quaternary alluvium. The Quaternary alluvium occurs along surface drainages and lies above regional groundwater at most locations around Tyrone, with the exception of the Mangas Valley. The alluvium along most parts of the major axis of the Mangas Valley contains regional groundwater. Regional groundwater occurs within the igneous rocks throughout most of the Mining Area and East Mine Area.

The regional groundwater flow regime in the area of the Tyrone Mine prior to surface mining was characterized by the presence of a regional groundwater flow divide, which was nearly coincident with the Continental Divide (Trauger, 1972). Groundwater flowed northwest into the Gila-San Francisco underground basin or to the southeast into the Mimbres Valley underground basin. While regional groundwater still flows to both basins from some portions of the mine area today, surface mining and groundwater pumping over the past 35 years have substantially altered the original groundwater flow direction.

Regional aquifer water-level elevations for the northern and southern portions of the mine, compiled from data collected in the second quarter of 2019, are shown on **Figures 2-17** and **2-18**, respectively. The arrows on the figures show the general direction of groundwater flow. Groundwater in the Mangas Valley Tailing Area flows predominately toward the northwest (**Figure 2-17**). Groundwater in the Mangas Valley Tailing Area occurs in Gila Conglomerate or in alluvium that is contiguous with groundwater in the underlying Gila Conglomerate. Most monitor wells in this study area meet Section 20.6.2.3103 NMAC standards. Groundwater standards for sulfate and total dissolved solids (TDS) are exceeded within limited areas at or immediately adjacent to the toe of several reclaimed tailing impoundments.

Within the Mining Area, groundwater occurs primarily in fractured igneous rock (either quartz monzonite or granite). In some limited areas, such as the northern portion of the 3A Leach stockpile, the former concentrator area, and the 5A Waste stockpile, groundwater occurs in Gila Conglomerate that overlies igneous rock. Groundwater in the Mining Area flows predominately from the southwest to the northeast, until it is intercepted at one of the open pits (Copper Mountain, Gettysburg, and Main) from which groundwater is extracted (**Figure 2-18**). Each of these open pits has a hydrologic capture zone associated with it, but the largest hydrologic capture zone is associated with the Main Pit. Due to pumping from the open pits, the majority of groundwater within the Mining Area is captured and utilized as part of mine operations. Within the East Mine Area, regional groundwater flows to the north/northeast on the west side of the Sprouse-Copeland Fault, but turns to the southeast once it reaches the thick section of Gila Conglomerate that adjoins the Mangas Fault. On the east side of the Sprouse-Copeland Fault, groundwater flows predominately east-southeast (**Figure 2-18**).

Observation wells in the Mining Area often exceed Section 20.6.2.3103 NMAC standards for sulfate and TDS near mine facilities, and wells near leach stockpiles often exceed Section 20.6.2.3103 NMAC standards for multiple other constituents such as aluminum, cadmium, cobalt, copper, fluoride, iron, manganese, pH, and zinc. In the far southwest corner of the mine, regional water quality generally meets all Section 20.6.2.3103 NMAC standards or exceeds only a single standard, such as that for fluoride or manganese, due to natural background conditions. Immediately south of the mine, several wells adjacent to waste rock stockpiles exceed standards for TDS and sulfate, and farther to the east, in a limited area near the former corner of the Reclaimed 1C Waste stockpile, regional groundwater exceeds Section 20.6.2.3103 NMAC standards for TDS, sulfate, aluminum, cadmium, cobalt, copper, fluoride, manganese, pH, and zinc. Regional groundwater within the East Mine Area, on the east side of the Sprouse-Copeland Fault, generally meets Section 20.6.2.3103 NMAC standards, but several monitor wells exceed standards for sulfate and TDS.

Perched water occurs within alluvium-filled channels incised into the Gila Conglomerate or igneous bedrock in the upper Mangas Wash, Deadman Canyon, Brick Kiln Gulch and Oak Grove drainages. In various areas adjacent to mine facilities, the perched zone water quality has been impacted by mine solutions. Impacted water within these alluvium-filled channels is collected by various seepage collection and interceptor systems installed along the toes of individual stockpiles. Additional perched water zones occur beneath the major drainages at the mine and flows are generally located along the major axes of the drainages.

Deadman Canyon perched groundwater refers to shallow water in the alluvium (about 10 feet deep or less) of Deadman Canyon, which borders the western side of the Mining Area. The alluvium overlies quartz monzonite, which is saturated below the base of the alluvium. Perched zone water level elevations and associated groundwater flow directions for the Deadman Canyon area based on second quarter 2019 data are shown on **Figure 2-19.** Perched water in Deadman Canyon, from about the location of well TWS-36 and points south (upstream for alluvial groundwater), meets Section 20.6.2.3103 NMAC standards for sulfate and TDS.

Perched water occurs in the southeastern portion of the Mining Area and East Mine Area in Oak Grove Wash or Brick Kiln Gulch alluvium within about 30 to 90 feet of land surface; the alluvium gets thicker moving downstream along these drainages. Regional groundwater occurs in Gila Conglomerate, and the regional aquifer water table is about 400 to more than 500 feet below the base of the perched water in the alluvium. Perched zone water level elevations and associated groundwater flow directions for the Oak Grove Wash/Brick Kiln Gulch areas, compiled from data collected in in the second quarter of 2019, are shown on **Figure 2-20**. Where perched water occurs in Oak Grove Wash and Brick Kiln Gulch, it is generally impacted by multiple constituents that exceed Section 20.6.2.3103 NMAC standards (DBS&A, 2011 and 2012).

Perched and regional groundwater in the 3A Leach stockpile area, north of the Main Pit, has been impacted by seepage of leach solutions. In this area, Quaternary alluvium has filled drainage channels eroded into the Gila Conglomerate. The channels are referred to as “canyons” at the 3A Leach stockpile because the stockpile was built on top of the pre-existing drainage pattern and the canyons (drainages) are the mechanism used to channel and collect leach solutions at the base of the stockpile. Perched fluids exist in the alluvium; most of these fluids appear to be leach solutions, although there is some limited mixing with meteoric water. Impacted perched seepage zones have been identified in alluvial sediments beneath 10 of the 11 PLS surface catchments. Regional groundwater occurs about 100 to 200 feet below the base of the alluvial channels in Gila Conglomerate. Impacted perched groundwater in this area is captured by existing pumping wells and seepage collection trenches. Impacted regional groundwater in this area is captured by existing regional aquifer pumping systems located near the toe of the 3A Leach stockpile, in Mangas Wash, and North of Canyons 7 through 11. **Figure 2-21** shows the first quarter 2019 water level elevations for the perched zones adjacent to the 3A Leach stockpile. **Figure 2-18** shows the second quarter 2019 regional groundwater elevations in the vicinity of the 3A Leach stockpile.

### 2.3.5 Soils and Vegetation

The soils in Grant County were previously mapped by the Forest Service and Soil Conservation Service (Parnham et. al., 1983). Site-specific soil and vegetation surveys were conducted at Tyrone in 1997 as part of the closure/closeout studies (DBS&A 1997c). The distribution of soils at the Tyrone Mine is controlled by the climate, geology, age of the land surfaces, and physiography of the area. The vegetation is indicative of the regional climate modified by soil and topographic factors. The distribution of the existing vegetation is locally complex and reflects the influence of both environmental gradients and land management practices. The vegetation in the permit area is not unique relative to the surrounding area and represents a minor fraction of plant communities that are locally and regionally extensive. No threatened or endangered plant species are recognized as occurring in the permit area.

Four soil-vegetation associations have been identified within the mine permit area as shown on **Figure 2-22.** These include the: (1) alluvial grassland association; (2) piedmont scrub savanna association; (3) mountain slope scrub savanna association; and (4) mountain slope mixed evergreen woodland association. The individual associations are described below.

#### *Alluvial Grassland Association*

The dominant soils in the alluvial grassland association include coarse-loamy and sandy families of Haplustolls. The soils are very deep, nonsaline, nonsodic, and coarse-textured and were formed in thick, stratified alluvial deposits composed predominantly of mixed igneous rocks. This association includes two consociations that occupy the nearly level to gently sloping floodplains and alluvial terraces of the major drainages in the permit area. The vegetation in this map unit is representative of an alluvial grassland with a minor riparian component.

The potential plant community at the site would probably be dominated by warm season grama grasses *(Bouteloua spp.)* with a minor shrub component of soaptree yucca *(Yucca elata)* and honey mesquite *(Prosopis glandulosa).* Important cool season grasses likely include lovegrasses *(Era grostis spp.),* junegrass *(Koeleria cristata),* muttongrass *(Poa fendleriana),* New Mexico needlegrass *(Stipa neomexicana),* and bottlebrush squirreltail *(Sitanion hystrix).* Desert willow *(Chilopsis linearis)* was presumably the dominant tree in the riparian corridor along the active floodplain.

The existing vegetation is dominated by a variety of annual and perennial grasses and forbs. Sideoats grama *(Bouteloua curtipendula)* and purple three-awn *(Aristida purpurea)* are the dominant perennial grasses, while

honey mesquite, Apache plume *(Fallugia paradoxa),* and California bricklebush *(Brickellia californica)* are important shrubs. Mat muhly *(Muhlenbergia torreyi),* cholla *(Opuntia spp)* and Russian thistle *(Salsola kali)* are locally prevalent in disturbed areas. Desert willow is primarily restricted to the Wind Canyon drainage upstream of its confluence with Mangas Wash.

### *Piedmont Scrub Savanna Association*

The soils in the piedmont scrub savanna association are included in loamy-skeletal, clayey-skeletal, and fine families of Aridic Haplustalfs. The soils are very deep, nonsaline, nonsodic, medium- to fine-textured, and calcareous in the lower solum and substratum. These soils were formed in residuum composed of regionally derived Gila Conglomerate and local fan terrace deposits from the Little Burro Mountains. This association includes three consociations that occur on the gently sloping to steep pediments and fan terrace remnants north and east of the mine pits and stockpiles.

The scrub savanna vegetative community at the Tyrone Mine is characteristic of the transition between an open grassland and mixed evergreen woodland. The potential plant community was probably dominated by mixed graina and associated grasses with a moderate component of honey mesquite and gray oak *(Quercus grisea).* Pinyon pine *(Pinus edulis)* one-seed *(Juniperus monosperma)* and alligator juniper *(J. deppeana),* and Emory oak *(Q. emoryi)* were probably important minor elements in the community.

Currently, the dominant perennial grasses are sideoats grama, hairy grama *(B. hirsuta)* rough bentgrass *(Agrostis scabra),* and tobosa *(Hilaria mutica)* Honey mesquite, gray oak, beargrass *(Nolina microcarpa),* broom snakeweed *(Gutierrezia sarothrrae),* and catclaw mimosa *(Mimosa biuncifera)* constitute the primary shrub species. Pinyon pine, one-seed and alligator juniper, and Emory oak are important woody species on slopes with north- and east-facing aspects.

### *Mountain Slope Scrub Savanna*

The soils in the mountain slope scrub savanna association are comprised largely of loamy-skeletal Haplustalfs. The soils are shallow, medium-textured, and contain relatively high amounts of coarse fragments. These soils formed in residuum and colluvium from quartzite and mixed igneous rocks. This association includes a single consociation that is restricted to the steep and very steep western slope of the Little Burro Mountains.

The vegetation in this map unit represents the kinds of vegetation found on high-gradient west-facing slopes. The potential plant community was probably dominated by mixed grama grasses with a moderate component of beargrass, gray oak, mountain mahogany *(Cercocarpus montanus),* and sotol *(Dasyflrion wheeleri).* One-seed and alligator juniper were probably important minor elements in the community.

Because of the steep slopes, the vegetation in this association has probably been only minimally influenced by management. The existing vegetation is characterized by a relatively open shrub canopy. Rough bentgrass, sideoats grama, and blue grama *(B. gracilis)* are the dominant perennial understory grasses. The overstory is dominated by Emory and gray oak, beargrass, sotol, and one-seed juniper, with a minor representation of honey mesquite and pinyon pine.

### *Mountain Slope Mixed Evergreen Woodland*

The soils in the mountain slope mixed evergreen woodland association are mostly loamy-skeletal Haplustolls. These soils are shallow, noncalcareous, and medium- to coarse-textured with moderate to high amounts of coarse fragments. These soils formed in residuum and colluvium from competent igneous rocks composed of quartz monzonite and granite. Minor areas of bedrock are exposed at the surface in this map unit. This

association corresponds to a single consociation map unit that occupies the strongly sloping to very steep backslopes and ridges of the Big Burro Mountains.

Vegetation within the mountain slope mixed evergreen woodland association represents the lower elevation ranges of this community regionally. The potential plant community in this zone was probably dominated by a relatively open stand of pinyon pine and evergreen oaks with one-seed and alligator juniper occurring as locally important representatives. Mixed grama and associated grasses probably dominated the sparsely vegetated understory with mountain mahogany, point-leaf manzanita *(Arctostaphylos pun gens),* and squawberry *(Rhus trilobata)* occurring as important shrub components. Ponderosa pine *(Pinus ponderosa)* and Gambel oak *(Quercus gambelii)* are locally important subordinates in this community that may dominate in minor sheltered topographic positions. The riparian corridor associated with the upper reaches of Deadman Canyon is included in this association; thus, Fremont cottonwood *(Populus fremontii)* may occur as an incidental species.

### 2.3.6 Wildlife

The habitat near the Tyrone Mine supports a diversity of wildlife species. Previous studies in the Tyrone Mine Area have recorded at least 18 mammals, 79 bird species, and 5 reptiles (DBS&A 1997c; Metric Corporation 1993 and 1996; and Dames & Moore 1994). Metric Corporation (1993 and 1996) conducted surveys to identify federal and state threatened, endangered, and special status wildlife species in the Tyrone Mine area, and none were detected.

The habitat around the mine is composed predominantly of pinon-juniper woodland with a substantial oak component. Within this major habitat type are patches of riparian vegetation, ponderosa pine woodland, and rock outcrop. Large grassland areas are absent from the project area, but several grass species are prevalent providing ground cover within the woodland and in forest openings. The mine stockpiles are currently characterized by sparsely vegetated seral communities of volunteer vegetation. The reclaimed area will be dominated by grasses, forbs, and shrubs, and will increase the diversity of the area.

The main goals for reclamation at the Tyrone Mine are to stabilize the tailing impoundment and stockpile areas from erosion, reduce water entry into the underlying wastes, and support the development of a self-sustaining ecosystem. The entire area of tailing and selected areas of the mine and stockpiles are, or will be, covered with suitable soils and seeded with native and adapted grasses, shrubs, and forbs. During the bond-release period, the vegetation on the reclaimed areas is expected to represent a grass-shrub plant community. Initially, the contrast in vegetation between the reclaimed lands and surrounding undisturbed lands will provide edge habitat. Over time, the vegetation on the reclaimed areas will become more complex, both structurally and compositionally, which may increase habitat diversity for wildlife.

Limited wildlife features have been constructed of locally available materials (e.g., rock or slash) on the tailing and stockpile reclamation areas to provide additional cover and vertical diversity for wildlife. These wildlife features will continue to be constructed on the remaining stockpile areas to be reclaimed and are expected to provide cover and nest sites for wildlife in the reclaimed areas.

### 2.3.7 Material Characteristics

Stockpiles, tailings, and borrow materials found at the Tyrone mine site have been characterized with respect to their chemical composition and physical properties. The characteristics of the mineral assemblages identified at Tyrone as well as the stockpiles, tailing impoundments, and potential cover materials are described below.

### Mineral Assemblages

The Tyrone ore, waste rock, and overburden have been thoroughly characterized for acid-base accounting (ABA) (Sobek,1978), synthetic precipitation leachate procedure, whole rock constituent concentrations, soil pH, mineralogy, and kinetic testing of sulfide oxidation using humidity cells (DBS&A 1997a and 1997b; SARB, 1999) according to procedures recommended by the NMED (1996). Tyrone developed a mineralogical classification that groups copper-and iron-bearing minerals into distinct mineral assemblages. The mineral assemblage approach was developed to characterize ore deposits because of the implications that mineralogy has for copper extraction and environmental issues. The most frequent copper ore types identified at Tyrone include one or a combination of oxide, chalcocite, or chalcopyrite mineral assemblages.

Results of the geochemical analyses were used to further categorize the waste rock and leach ore into two broad groups, A and B, through statistical analysis of variability (DBS&A 1997a and 1997b). Group A consists primarily of sulfide-bearing mineral assemblages having significant acid-generation potential, and Group B comprises leached cap and oxide mineral assemblages that are near neutral with respect to acid generating potential. Whole rock composition data show that copper, iron, cobalt, lead, cadmium, and zinc are significantly more concentrated in the Group A mineral assemblages than in the Group B assemblages.

### Stockpile Material Characteristics

The Tyrone mine materials characterization data was reported in three principal reports as part of the EOY 2001 through 2008 CCP (M3, 2001), and in four additional reports prepared to satisfy the *Supplemental Materials Characterization Study* which was required by Condition 80 of DP-1341 (Greystone, 2004a and 2004b; and EnviroGroup, 2005a and 2005b). Information from these studies show that waste rock stockpiles contain a significant proportion of materials designated as Precambrian Granite (leach cap), but also may contain some copper and sulfide minerals, which have a wide range of ABA characteristics. The ore in the leach stockpiles generally have consistently negative ABAs (DBS&A 1997a and 1997b; SARB 1999).

Comparisons of data from newly mined materials with those of older stockpiled materials conducted as part of the *Supplemental Materials Characterization Study* showed that the materials properties are highly variable and that the variability of stockpile material properties is similar to that of the fresh mine materials. The sulfate content in the stockpiled materials was significantly higher than that of fresh mine materials owing to the effects of pyrite oxidation and the application of raffinate on the leach stockpiles. The leach ore stockpiles appear to be more reactive and release higher concentrations of constituents than waste rock stockpiles.

The stockpile materials at Tyrone are geochemically stable with respect to silicate matrix mineral reaction with water, air and acidity. The levels of acidity produced in the stockpiles are relatively low and most paste pH results are 4 and above. These conditions do not result in pervasive weathering and leaching of the primary minerals at Tyrone. The geologic materials were subjected to hypogene and supergene alteration as part of the ore forming processes that occurred over the course of millions of years and significant alteration from their present state in the stockpiles will take very long periods of time.

### Tailing Material Characteristics

The long-term geochemical behavior of Tyrone's tailing impoundments has been evaluated using drill core and mineral assemblage data. The tailing impoundments contain stratified layers of sands to silts (slimes). The degree of saturation varies between layers, but the fine-grained layers appear to be generally wetter, which may inhibit oxygen flow, acid generation, and the rate of contaminant migration within the tailing dams. The tailing impoundments are composed of Group A mineral assemblage material, originally derived from high-grade sulfide

ore. Gangue minerals dominate the mineralogy, but sulfides are also found throughout the tailing impoundments. Tailing layers near the surface are oxidized and generally acidic. The pH becomes near neutral to alkaline with depth. The tailing impoundments have an overall acid generation potential with limited acid neutralization potential.

### *Borrow Materials*

Agency approved borrow material will be used as RCM and will meet all regulatory requirements listed in permit GR010RE and section 20.6.7.33.F of the Copper Mine Rule. Potential RCM identified at Tyrone include native soils, alluvium, in-situ Gila Conglomerate, Precambrian Granite overburden from the Little Rock Mine, and Tertiary Quartz Monzonite from the Copper Mountain Pit Expansion Area. RCMs are tested in accordance with the agency approved borrow material handling plans. Tyrone plans on updating the material handling plan to include additional RCM in the near future.

The characteristics and suitability of the cover materials at Tyrone have been previously evaluated in the *Borrow Materials Investigation* (BMI) (DBS&A, 1997c), Soil *and Rock Suitability Assessment* (DBS&A, 1997a), *Preliminary Materials Characterization* (DBS&A, 1997a), *Supplemental Materials Characterization* (DBS&A, 1997b), *Little Rock Mine Cover Design Report and Test Plot Work Plan* (Golder, 2004), *Copper Mountain Pit Expansion Leached Cap and Waste Rock Management Plan* (PDTI, 2005a), and *Leached Cap Analysis and Vegetation Summary* (Golder, 2005c). The most recent comprehensive evaluation of the borrow materials at Tyrone was completed in 2005 and 2006 as part of Condition 79 of DP-1341, the borrow source materials investigation, and Condition L.5 of the Revision 01-1 to MMD Permit No. GR010RE (Golder 2005d and 2006a).

On December 27, 2017, Tyrone received comments on the Updated CCP from the MMD and NMED requesting an update of the 2005 and 2006 borrow material investigations (Golder 2005d and 2006a). Specifically, the MMD requested additional information on the chemical and physical properties of Gila Conglomerate found in the Lubrication Shop area and an estimate of the volume of Gila Conglomerate available from this area.

MMD also requested that Tyrone confirm there is sufficient Gila Conglomerate RCM at the Mining Area because portions of one of the previously identified borrow areas (Borrow Source A) had been covered by the 9A Waste and 9AX Waste stockpiles and another borrow area (Borrow Source E) was no longer a practical source of cover material since reclamation of the Reclaimed 1 Leach Stockpile was completed in 2009. An additional borrow material investigation was recently completed and is included in **Appendix E**.

The Gila Conglomerate and associated soils and Precambrian Granite overburden are the principal RCM identified by Tyrone for use at the mine. The MMD conditionally approved Gila Conglomerate as RCM in 2004 prior to completion of the test plot studies. Tyrone proposes that MMD consider at this time conditionally approving the Precambrian Granite overburden as RCM and associated intrusive rocks mined from the Little Rock Mine based on the USNR test plot preliminary results.

The Gila Conglomerate Formation is a mid-Miocene and mid-Pleistocene continental deposit that is widespread in southern New Mexico and Arizona. The composition of the Gila Conglomerate Formation varies locally depending on the source area lithology at the time of stripping and deposition. The Gila Conglomerate in the Mining Area consists largely of igneous intrusive rocks originating from the ancestral Big Burro Mountains, while the Gila Conglomerate in the Mangas Valley Tailing Area reflects the influence of volcanic and meta-sedimentary rocks from the Little Burro Mountains.

Physically, the fine-earth fraction (i.e., <2mm) of the Gila Conglomerate and associated soils is dominantly moderately coarse-textured and mainly represented by loamy sand and sandy loam textures. Fine-, moderately fine- and coarse-textured soils occur locally. In general, the coarse textured soils are more prevalent in and around the mine area, and the somewhat finer textured soils tend to occur on the flanks of the Little Burro Mountains east of the tailing dams. The soils around Tyrone typically contain about 30 to 50 percent rock fragments (>2 mm diameter) by volume. Saturation percentages for the soils generally range from 18 to 75 percent.

Chemically, the Gila Conglomerate and associated soils have few inherent limitations. The pH of the soils range from about 5.0 to 7.8 and the salinity levels are low (0.2 to 3.8 deciSiemens per meter). These materials are universally nonsodic and have favorable calcium to magnesium ratios. Soluble selenium and boron levels are low. The materials range from noncalcareous to calcareous and contain 0.5 to 9.2 percent calcium carbonate equivalent. The highest levels of $CaCO_3$ are found in the subsurface of the soils in the Mangas Valley.

In the Tyrone Mine Area, the Precambrian Granite is altered igneous intrusive rock (hypogene mineralization) that generally has low copper values and is considered waste rock from a mining perspective. The chemical and physical characteristics of this Precambrian Granite make it potentially suitable for use as a RCM. Tertiary Quartz Monzonite overburden from the Copper Mountain Pit Expansion and Precambrian Granite overburden from the Little Rock Mine area have been extensively characterized and were tentatively approved (with conditions) for use as cover in some portions of the mine (PDTI, 2005a and Golder, 2005c). Besides the Little Rock Area, Precambrian Granite occurs in the West Main II, West Main III, and Valencia Pit Areas, and on the 6A Leach stockpile.

Overall, the materials from the Copper Mountain Area and Little Rock Mine are net-neutralizing and non-acid generating. Laboratory analyses indicate that the overburden from the Copper Mountain and Little Rock areas is relatively uniform and has few apparent limitations as a plant growth media when compared to the surrounding native soils. There are no apparent chemical limitations with respect to salinity in either the overburden or the native soils and the pH and extractable nitrate concentrations occur at similar levels in both materials. The overburden is moderately coarse textured and contains moderate volumes of rock fragments. The native soils exhibited similar characteristics and are moderately coarse textured with moderate amounts of rock fragments (PDTI, 2000 and 2005a; Golder 2020b). Thus, the overburden material from the Copper Mountain and Little Rock Mine areas is considered to be a reasonable substitute for native soils. Tyrone believes the results of reclamation and test plot studies will provide additional information on the adequacy of these materials for cover.

The cover requirement for the Tyrone mine is approximately 12.6 million CY based on the current permit requirements. More than 23.6 million CY of Gila Conglomerate and 32 million CY of Precambrian Granite overburden have been conservatively identified for use as RCM at Tyrone (Golder, 2020b). Thus, the total volume of RCM designated for the Mining Area is more than that needed to cover these facilities.

## 2.4 Permits and Discharge Plans

Tyrone currently conducts its mining operations pursuant to numerous state and federal regulations covering groundwater, surface water, air, solid and hazardous wastes. **Table 2-2** lists all federal and state permits, and permit numbers required for the CCP. **Table 2-3** summarizes the NMED Discharge Plans associated with the Tyrone Mine.

# 3.0 DESCRIPTION OF COMPLETED, ONGOING, AND PLANNED RECLAMATION PROJECTS

As previously noted, a substantial amount of reclamation work has been conducted at the Tyrone Mine since the issuance of DP-1341 and MMD Permit Revision 01-1 to Permit No. GR010RE. Reclamation activities have primarily been focused on the tailing impoundments in the Mangas Valley Tailing Area, but a substantial amount of reclamation work has also occurred in the Mining Area and East Mine Area. The following sections describe the ongoing and completed reclamation activities that have occurred since the issuance of DP-1341 and MMD Permit Revision 01-1 to Permit No. GR010RE, and reclamation projects initiated prior to the EOY 2014.

Facilities where reclamation is complete include: the Reclaimed 1 Leach stockpile, and Reclaimed 1C Waste and Reclaimed 7A Waste (including the 7A Far West Waste) stockpile; Mangas Valley Tailing Impoundments (including associated repositories); Reclaimed Burro Mountain Tailing Impoundment; Reclaimed Former Mill & Concentrator Area located east of the 3A Leach stockpile; and impacted soils along Brick Kiln Gulch. Areas projected to be completed prior to the EOY 2014 include the CMSPE Area and USNR site within the Copper Mt. Reclamation Area, and pullback of the 1A Leach stockpile and placement of the excavated material as a buttress along the toe of the 1B Leach stockpile. Areas projected to be partially completed prior to the EOY 2014 include the remaining launder line earthwork, a short run of tailings pipeline and associated features located northwest of tailing thickeners, and impacted soils in and around the tailing thickeners. A summary of the completed and ongoing reclamation projects conducted at the Tyrone Mine is provided in **Table 3-1** and detailed in the following sections.

## 3.1 Reclamation Projects Within the Mangas Valley Tailing Area

Reclamation work has been completed on the Mangas Valley Tailing Impoundments. A minimum two-foot thick Gila Conglomerate cover was placed on the Mangas Valley Tailing Impoundments in accordance with DP-27SA (NMED, 2003b), although thicker covers exist in many areas. The following sections provide details of the planned and completed reclamation activities at the individual facilities in the Mangas Valley Tailing Area.

### 3.1.1 Reclaimed 3X Tailing Impoundment

A Basic Engineering Report (BER) for the 3X Tailing Impoundment was submitted to NMED and MMD in June 2004 (M3, 2004d) prior to the initiation of reclamation activities at the site. Reclamation activities commenced at the 3X Tailing Impoundment in September 2004 and included: outslope and top surface grading, construction of storm water diversions, top surface drainages, outslope drainage conveyances, and placement of suitable cover sub-base on both top and outslope surfaces. Rip-rap placement began on the top and outslope drainage conveyances. Starting in the fourth quarter of 2006, corrective actions were implemented on the primary storm water conveyance channel on the top surface of the 3X Tailing Impoundment. Seeding of the 3X Tailing Impoundment was completed in December 2005. Reclamation of the 3X Tailing Impoundment was completed in the fourth quarter of 2005, and the corrective actions conducted on the primary storm water conveyance channel on the top surface were completed during the first quarter of 2007. The Construction Quality Assurance Report (CQAR) for the facility was submitted in August 2008 (M3, 2008a).

### 3.1.2 Reclaimed 3 Tailing Impoundment

A sitewide BER for tailing impoundments 1, 1A, 1X, 2, and 3 was submitted in May 2005 (PDTI, 2005b; M3, 2005a), and regrading activities began on the 3 Tailing Impoundment shortly thereafter. In December 2005, PDTI submitted Amendments to the BER for the Top Surface Overland Flow Requirements for the Tyrone Mine's tailing impoundments 3, 2, 1A, 1, and 1X (PDTI, 2005c). Cover placement, seeding and mulching activities began during

the first quarter of 2006 and cover placement was completed during the fourth quarter of 2006. Seeding of the 3 Tailing Impoundment was completed in 2006. Reclamation of the 3 Tailing Impoundment was completed 2006, and the CQAR for the facility was submitted in December 2008 (M3, 2008b). Reclamation of tailing repositories associated with the historic release of tailings from the 3 Tailing Impoundment embankment failure were reclaimed immediately after the release in 1981 and enhancements to that reclamation were completed in 2004 through 2005.

### 3.1.3 Reclaimed 2 Tailing Impoundment

Reclamation activities commenced at the 2 Tailing Impoundment during the first quarter of 2006 and included rough grading of the outslopes and the top surfaces. Grading of the tailing outslope and top surface were completed during the third and fourth quarters of 2006, respectively. During the first quarter 2007, all regrading activities were completed; placement of the top surface sub-base material was completed; seeding and mulching activities were initiated; and placement of the cover material was initiated. By September 2007, all cover had been placed on the top surface and outslopes, and the top surface and side slope channels had been completed. Seeding of the 2 Tailing Impoundment was completed in April 2009. Reclamation of the 2 Tailing Impoundment was completed during the third quarter of 2007, and the CQAR for the facility was submitted in July 2009 (M3, 2009a).

### 3.1.4 Reclaimed 1 Series Tailing Impoundments

Reclamation activities commenced at the 1 series tailing impoundments in June 2006 with the construction of access roads and storm water controls on the tailing dams. In the fourth quarter of 2006, regrading of the 1A Tailing Impoundment outslope was initiated, and the construction access road was completed. During the first quarter of 2007, regrading activities along the crest perimeters of the 1 and 1X tailing impoundments and regrading of the 1A rock dam were completed. Also, placement of a limited thickness of Gila Conglomerate was completed along the northwest side of the 1X Tailing Impoundment. In April 2007, the Final Construction Design Quality Assurance Plan (CDQAP) was submitted for Agency approval (MWH, 2007). By December 2008, all cover had been placed on the top surfaces and outslopes of the 1 series tailing impoundments, and the top surface and side slope channels had been completed. Reclamation of the 1 series tailing impoundments was completed by the end of 2008, and seeding was completed in July 2009. The CQAR for the 1A Tailing Impoundment was submitted in January 2009 (MWH, 2009a), and the CQAR for the 1 and 1X tailing impoundments was submitted in April 2009 (MWH, 2009b).

### 3.1.5 Reclaimed Tailing Launder

Demolition of the launder was initiated in the fourth quarter of 2004 as part of pre-cover reclamation activities on the 3X Tailing Impoundment (M3, 2008a). Closure of the launder and pipeline included crushing the concrete structure, removal of buried Ameron pipe and concrete from the embankment sections, and burial of demolition materials in trenches and repositories. Golder (2008b) conducted a post-demolition field investigation of the launder corridor that included digging test pits, establishing surface transects, and a comprehensive foot survey to identify impacted areas and any tasks needed to complete closure. Based on that investigation, the total area impacted by tailing along the launder corridor south of the Reclaimed 2 Tailing Impoundment was determined to cover about 6 acres including the catch basins, and approximately 3 acres of existing debris trenches and repositories required additional cover (Golder, 2008b). A closure plan and associated CDQAP for the additional impacted areas, areas requiring additional cover, demolition and removal of approximately 800 feet of concrete launder and Ameron pipe, and breaching of existing embankments that intersect existing drainages along the launder corridor was submitted for agency approval in June 2008 (Golder, 2008c). As of March 2018, the only

items that need to still be closed include removal of the existing embankments and associated culverts, and removal of an approximate 300 foot section of launder trestle crossing the Redrock diversion between the Reclaimed 2 and Reclaimed 3X tailing impoundments.

## 3.2 Reclamation Activities Within the Mining Area

Reclamation work has been completed for the Reclaimed 1C Waste and Reclaimed 7A Waste (including the 7A Far West Waste) stockpile, portions of the 3A Leach stockpile (see Section 3.2.5), and the Mill/Concentrator area within the Mining Area. Additional areas projected to be completed by the EOY 2014 include the Copper Mt. Reclamation Area and portions of the 1A Leach and 1B Leach stockpiles. The following sections provide details of the planned and completed reclamation activities at the individual facilities in the Mining Area.

### 3.2.1 Mill/Concentrator Reclamation Activities

The original Tyrone Mill Demolition Plan was submitted to the NMED and MMD in June 2004 (PDTI, 2004d), and demolition activities at the site began in August 2004. The BER for reclamation of the site was submitted to the NMED and MMD in January 2005 (Golder, 2005b). Grading and cover placement activities began during the second quarter of 2006 and were completed during the fourth quarter of 2006. Construction of the drainage channels were initiated upon completion of grading and cover placement at the site. Reclamation of the Former Mill & Concentrator Area was completed during the fourth quarter of 2007 along with cover thickness quality control (QC) testing performed by the NMED. Seeding and mulching of the site was completed in April 2007. The as-built design set and CQAR were submitted to the NMED and MMD in January 2008 (Golder, 2008a).

### 3.2.2 Reclaimed 1C Waste Stockpile

Removal of material from the original 1C Waste stockpile footprint from Oak Grove Wash was initiated in March 2004 and completed in first quarter 2005. The original CDQAP for the Oak Grove Stockpiles (Reclaimed 1C Waste and Reclaimed 7A Waste stockpiles) was submitted in July 2006 (PDTI, 2006), and on December 14, 2006, Tyrone received from NMED and MMD conditional approval of the CDQAP (NMED and MMD, 2006).

Construction of seepage collection and cutoff trenches within three ancestral drainages located along the toe of the Reclaimed 1C Waste stockpile began in the second quarter of 2005, and they were operational by the end of the fourth quarter. During that same quarter, regrading and shaping of the ridge and valley outslope design was initiated. Regrading activities were completed during the first quarter of 2007 and placement of Copper Mountain Leach Cap (Tertiary Quartz Monzonite) cover material on the outslope began. During the second quarter of 2006 Gila Conglomerate from the 5A Waste stockpile started to be loaded to the top of Reclaimed 1C Waste stockpile for future placement on the stockpile outslope. Hauling and loading of Gila Conglomerate material from the 5A Waste stockpile was completed during the fourth quarter 2006. The placement of additional cover material on the outslope was completed in July 2007, and placement of riprap within the valley outslopes was completed in 2011. Four additional seepage collection systems were constructed along the regraded stockpile toe between May 2008 and October 2012 and are fully operational. Reclamation of the Reclaimed 1C Waste stockpile was completed in November 2012 and the draft CQAR was submitted to the agencies for review in March 2013 (M3, 2013).

### 3.2.3 Reclaimed 7A Waste Stockpile

Reclamation activities at the 7A Waste stockpile began in the fourth quarter of 2005 with the construction of storm water best management practices (BMPs) along the toe of the stockpile (surface dikes). Additionally, during the fourth quarter of 2005, the 3H:1V and 2.5H:1V test plots on the 7A Waste stockpile were completed, with the exception of the vadose zone monitoring instrumentation installations. Regrading of the 7A Far West portion of

the 7A Waste stockpile began during the first quarter of 2006 and outslope grading was completed during the second quarter. Also, during the second quarter of 2006, a series of six seepage collection systems were installed along the toe of the 7A Waste stockpile. Placement of Gila Conglomerate cover material also began on the outslope of the 7A Far West portion of the 7A Waste stockpile during the second quarter of 2006. Placement of cover material on the outslope of the 7A Far West portion of the 7A Waste stockpile was completed during the third quarter of 2006. Loading and hauling of Gila Conglomerate cover material to the crest of the 7A West/East Wing segment was conducted during the fourth quarter of 2006 to provide an additional one-foot of cover on the stockpile. Placement of the additional one-foot of Gila Conglomerate cover over the 7A West/East Wings was completed in the second quarter of 2009. Channel armoring commenced during the third quarter of 2009. Three additional shallow seepage collection systems were constructed in the spring of 2009 as replacements to existing collection systems. Reclamation of the 7A Waste stockpile was completed in November 2012 and the draft CQAR was submitted to the agencies for review in March 2013 (M3, 2013).

### 3.2.4 1A Leach and 1B Leach Stockpiles

Mining of the 1A Leach stockpile outslope began in the first quarter of 2006 as part of the stockpile pull-back, and was temporarily halted in the fourth quarter of 2006 with the shovel moving back into production in the West Main Pit. Mining of waste rock and leach ore material from the outslope of the 1A Leach stockpile resumed in the first quarter of 2012. Material from the 1A Leach stockpile outslope is currently being placed along the toe of the 1B Leach stockpile. The outslope of the 1B Leach stockpile will then be regraded to a 3H:1V slope, and the entire existing PLS collection system will be covered with waste rock. The existing 1B PLS collection system was modified in 2006, 2007, and 2011 to ensure that the system continues to operate effectively following placement of the waste rock in the area. All existing piezometers, monitor wells, and extraction wells located within the regrade footprint of the 1B Leach stockpile were plugged and abandoned between August and September 2006 in accordance with NMED Monitor Well Completion and Abandonment guidelines. Construction of the modified PLS collection system began in September 2006 and was completed in February 2007. The 1B Stockpile PLS Collection System Relocation As-Built design set was completed in May 2007 and submitted to the NMED in July 2007 (PDTI, 2007).

### 3.2.5 3A Leach Stockpile

The current reclamation plan for the 3A Leach stockpile is based on an overall outslope slope gradient of 3.5H:1V, 32-foot wide terrace benches, and 200-foot inter-bench slope lengths to allow for flexibility in the final design of the terrace benches and associated surface water conveyance channels. With these designs, several of the existing collection systems and a significant number of monitor wells located near the existing toe of the stockpile will be covered. Well abandonment and installation activities were initiated during the first quarter of 2007 for the wells that would be impacted by stockpile regrading. A total of 49 wells have been plugged and abandoned in accordance with NMED Monitor Well Completion and Abandonment guidelines, including 23 perched zone and 26 regional groundwater monitor wells. A total of 25 5-inch-diameter extraction wells and 34 4-inch-diameter monitor wells were also installed. The new wells were placed immediately north of the projected reclaimed stockpile footprint. The 3A Leach stockpile well program activities were conducted between November 2006 and May 2007. The new seepage collection system installations and remaining well abandonment and installation activities will be conducted in the future.

### 3.2.6 Copper Mt. Reclamation Area

The Copper Mt. Reclamation Area includes the Reclaimed USNR site (historically known as the Copper Mountain Leach Stockpile) and the southwestern-most portion of the Copper Mountain Pit (CMSPE Area). The Reclaimed

USNR Leach stockpile and underlying asphalt liner were removed in 2000. The area was regraded, partially covered and seeded to test various reclamation methods in July 2001. Benches were graded into the hillsides to reduce storm water runoff. Below the benches the former stockpile footprint was covered with 0 to 12 inches of cover from the adjacent haul road. The cover was installed to act as a growth medium for vegetation and the underlying material would act as a secondary root zone medium. The stockpile materials in this area will be further reclaimed by grading, covering, and seeding. The USNR Site is projected to be reclaimed by the EOY 2014.

The CMSPE Area includes the southern-most portion of the Copper Mountain Pit that is partially administered by the Bureau of Land Management (BLM). This area consists of two benches located just southwest of the Copper Mountain Pit (the two southern most benches) and two benches in the southwest corner of Copper Mountain Pit. The reclamation plan for this area includes grading, maintaining and/or installing safety berms, ripping, and revegetation. The CMSPE Area reclamation is projected to be reclaimed by the EOY 2014.

## 3.3 Reclamation Activities Within the East Mine Area

Reclamation work has been completed for the Reclaimed 1 Leach Stockpile, Burro Mountain Tailing Impoundment, and impacted soils located along Brick Kiln Gulch within the East Mine Area. The following sections provide details of the completed reclamation activities at the individual facilities in the East Mine Area.

### 3.3.1 Reclaimed Burro Mountain Tailing Impoundment

Design work for closure/closeout activities began during the second quarter of 2004; and regrading, cover placement, and fencing of the Burro Mountain Tailing Impoundment was initiated in the third quarter. Regrading, cover placement, and fencing were completed during the fourth quarter of 2004. Seeding of the Burro Mountain Tailing Impoundment was completed in December 2004. Reclamation of the Burro Mountain Tailing Impoundment was completed in February 2005. The CQAR for the Burro Mountain Tailing Impoundment was submitted in September 2005 (M3, 2005b).

### 3.3.2 Reclaimed 1 Leach Stockpile

The CDQAP for the Reclaimed 1 Leach stockpile was submitted in April 2006 (M3, 2006b). Reclamation activities at the Reclaimed 1 Leach stockpile began in February 2005 with the construction of the test plots on the west side of the stockpile. The existing seepage collection systems and monitor wells located within the projected regraded footprint of the stockpile were plugged and abandoned in May 2005 in accordance with NMED Monitor Well Completion and Abandonment guidelines. Removal of the existing non-functional pipelines in the Reclaimed 1 Leach stockpile area was completed in June 2006, and relocation of the existing functional pipelines was completed in July 2006. The C Sump Pond closure and seepage collection system installations were completed during the fourth quarter of 2006. Rough grading on the top surface was initiated in the second quarter of 2006 and regrading activities on the stockpile outslope were initiated in July 2007. Regrading activities on both the top surface and outslope were completed in the second quarter of 2008. Reclamation of the former PLS Pond (B Sump) was completed in February 2009. Cover placement was completed in the second quarter of 2009. Armoring of all on-site and off-site channels and seeding of all reclaimed areas was completed in the third quarter of 2009. Reclamation of the Reclaimed 1 Leach stockpile was completed in July 2009. The CQAR for the Reclaimed 1 Leach stockpile was submitted in December 2009 (M3, 2009b).

### 3.3.3 Impacted Soils Along Brick Kiln Gulch

Stained soils that generally lacked vegetation were identified in 2007 along the county road that parallels Brick Kiln Gulch. The stained soils were generally characterized by impacted acidic soils with little to no vegetation. An investigation of the identified areas was conducted by Golder in 2007 and reclamation plans for impacted soil areas along Brick Kiln Gulch were submitted to the agencies in December 27, 2007 (Golder, 2007f). The stained soils areas were reclaimed between February and April 2008 by covering the areas with a minimum of 3 feet of clean cover, grading them to create positive drainage from the covered areas, and seeding the reclaimed areas. The CQAR for the impacted soil areas along Brick Kiln Gulch was included as part of the 1 Leach stockpile reclamation CQAR that was submitted in December 2009 (M3, 2009b).

# 4.0 FACILITY CHARACTERISTICS, RECLAMATION PERFORMANCE OBJECTIVES AND DESIGN CRITERIA

This section presents the characteristics of the major facilities to be reclaimed and the performance objectives and design criteria for closure/closeout of the Tyrone Mine facilities. The performance objectives presented herein for closure closeout of the facilities were developed based upon the current requirements of Permit GR010RE, DP-1341, and the Copper Mine Rule, with the intent of meeting rules and requirements associated with the NMWQA, NMWQCC Regulations, Copper Mine Rule, NMMA, and, for the mine areas located on federal public lands, applicable elements of 40 CFR Part 3809. This plan ensures that stormwater and sediment are managed appropriately during and following reclamation in accordance with 20.6.7.33.E NMAC. The primary performance objectives for closure closeout of the Tyrone Mine include: re-establishment of a self-sustaining ecosystem; stabilize the reclaimed areas, and to control discharges of process waters.

Descriptions of the facilities covered by the reclamation designs and their design criteria are included in Section 4.1. The performance objectives and reclamation designs for closure/closeout of the facilities are included in Section 4.2, and the water management and treatment methodologies are outlined in Section 4.3. The existing and planned closure/closeout activities for Tyrone are presented in association with each of the three main mine facility areas in Section 5.0.

## 4.1 Facility Characteristics and Classification

To standardize the development of the financial assurance cost estimate associated with this CCP, facilities with common characteristics and mine function have been grouped together in this section. The reclamation plans and facilities are also grouped by the three main mine facility areas in Section 5.0. Thus, the tailing impoundments, stockpiles, open pits, surface impoundments, disturbed areas, and water management and treatment are identified as the primary reclamation facility groups. Sections 4.1.1 through 4.1.7 provide general descriptions of these facility groups.

The characteristics of individual tailing impoundments, stockpiles, open pits, surface impoundments, and other disturbed areas at Tyrone are summarized on facility characteristics forms (**Appendix B**). The general areas of disturbance and associated major facilities to be reclaimed at Tyrone are summarized in the following sections.

### 4.1.1 Tailing Impoundments

As described in Section 3.1, the tailing impoundments at Tyrone have been fully reclaimed. Portions of Mangas Valley Tailing Impoundments have two feet of cover, which was consistent with DP-27SA but less than the 3-feet required in the Copper Rule (Section 20.6.7.33.F NMAC). Pending demonstration of the effectiveness of the 2-

foot thick covers, an additional seven years of cover maintenance are added to the earthwork O&M costs to address cover-specific maintenance for areas with less than three feet of cover.

### 4.1.2 Stockpiles

A total of approximately 2,700 acres of stockpile surfaces are targeted for reclamation under this (EOY 2014) plan. Reclamation criteria for the newly permitted 9AX Waste stockpile is covered under Permit Modification 14-1 to Permit GR010RE (MMD, 2014) and is not described herein. One additional leach stockpile was permitted in 2019 under DP-166 (Valencia In-Pit Leach), and two additional stockpiles were permitted after 2014 (CSG Waste and Gettysburg Waste) and are included in the figures and plates in this report for reference but are not included in the reclamation plan. Reclamation has been completed for several stockpiles, see **Plate 1**.

Stockpile surfaces targeted for reclamation under this plan include the top surfaces and outslopes of all stockpiles, with the exception of the stockpile outslopes located inside both the revised OPSDA and areas that are covered by the revised conditional waiver from achieving a post mining land use or self-sustaining ecosystem. Water management and treatment for groundwater and surface water captured within the mine permit area is described in the water management and treatment sections of this plan.

Additionally, as part of this CCP update, Tyrone has included a leach stockpile located within the Savanna Pit, who's construction began in 2013. This facility, the 6A Leach stockpile, covers an area of approximately 172 acres at the EOY 2014 and is identified to be within the conditional waiver area in this CCP.

Because the 5A Waste stockpile contains both suitable RCM and some sulfide-bearing materials, the CCP update includes a cover plan; however, it is likely that sufficient suitable RCM will remain in the stockpile at closure and additional cover will not be required. This will be evaluated at closure and described in the final design. The 9A Waste stockpile is comprised of Precambrian Granite overburden materials. The top surface and outslopes will be regraded, covered with one foot of Gila Conglomerate, and revegetated at closure.

The top surfaces of stockpiles and other level areas of significant size located both within the revised OPSDA and the revised conditional waiver area will be regraded to a slope of between 1 and 5 percent, covered, and revegetated. Impacted surface water runoff from the stockpiles located both within the revised OPSDA and the revised conditional waiver area will be collected in the pit sumps and PLS collection sumps and conveyed to the proposed water treatment plant. Impacted stockpile seepage will be collected from the existing and planned new seepage collection systems and interceptor systems and conveyed to either the proposed evaporative treatment system (ETS) or the proposed water treatment plant.

The leach stockpiles located both within the revised OPSDA and the revised conditional waiver area include the 6A Leach; and the interior slopes of the 1A Leach, 1B Leach, 2B Leach, portions of the 2 Leach (Area 2), 6B Leach, 6C Leach, and Copper Mountain Leach (reclaimed). The waste rock stockpiles located both within the revised OPSDA and the revised conditional waiver area include the 8A Waste and 8C Waste, the interior slopes of the 3B Waste, and the western portion of the 5A Waste. The leach stockpiles located outside both the revised OPSDA and the revised conditional waiver area include: the Reclaimed 1 Leach, 2A Leach, 3A Leach, 2 Leach (Area 1), 6D Leach, and 7B Leach; and all but the interior slopes of the 1A Leach, 1B Leach, 2B Leach, 2 Leach (Area 2), 6B Leach, 6C Leach, and Copper Mountain Leach (reclaimed). The waste rock stockpiles located outside both the revised OPSDA and the revised conditional waiver area include the Reclaimed 1C Waste, 2B Waste, Reclaimed 7A Waste, 7B Waste, 7C Waste, 9A Waste, and 9AX Waste; all but the interior slopes of the 3B Waste and all but the western portion of the 5A Waste.

### 4.1.3 Open Pits

The open pits at the Tyrone Mine Facility encompass approximately 1,516 acres at the EOY 2014. The open pit areas include the Main (West Main II, West Main III, and Valencia sub-pits), Gettysburg, Copper Mountain, South Rim, Savanna, and San Salvador pits. The West Main II, West Main III, and Valencia pits are considered by Tyrone to be part of the Main Pit. Of the existing open pits at the mine, the Main, West Main II, West Main III, Valencia, Savanna, and Gettysburg Pits are contiguous. These pits, which by the EOY 2014 will cover an area of about 1,240 acres, have been granted a conditional waiver (see **Plate 3**) from the requirement of achieving a self-sustaining ecosystem, and will not be covered during mine closure. The Copper Mountain Pit (excluding the CMPSE area), covering approximately 132 acres by the EOY 2014, has also been granted a conditional waiver from the requirement of achieving a self-sustaining ecosystem, and will not be regraded and covered during mine closure. The water that accumulates in the pits with the revised conditional waiver will be managed through combined processes of evaporation and pumping. The pits form a hydrologic sink capturing groundwater flowing from all directions. Surface water conveyed from the stockpiles located both within the revised OPSDA and the revised conditional waiver area will be directed to the individual pit sumps and/or PLS sump collections for incorporation into the mine process water circuit while the mine is still operational, and to the water treatment system circuit during closure and post-closure. Those sections of the mine where stormwater can be feasibly diverted by gravity outside the pit perimeter will be reclaimed in accordance with 20.6.7.2.33 NMAC.

The two remaining pits (the South Rim Pit and the San Salvador Pit) cover areas of approximately 22 and 115 acres in 2014, respectively (see **Plate 3**). The San Salvador Waste Backfill (located in the San Salvador Pit)is projected to be partially completed at the EOY 2014 and the South Rim Pit is projected to be fully backfilled (with construction of 7B Waste, 7C Waste stockpiles). During reclamation, these areas will be regraded such that drainage is directed toward the Oak Grove Drainage and any surface ponding is minimized, and then covered and revegetated in accordance with Appendix C of MMD Permit GR010RE and applicable modifications.

### 4.1.4 Surface Impoundments, Tanks, and Catchments

A survey of the surface impoundments, tanks, and storm water catchments at the Tyrone Mine was compiled as part of the Tyrone Master Document (DBS&A, 2017). **Table 2-1** in this plan presents an updated summary of the existing surface impoundments tanks, and storm water catchments listed in the Tyrone Master Document. This table also includes information within DPs that have been renewed following submittal of the Master Document. According to this summary, there are 61 surface impoundments, tanks, and catchments present at Tyrone.

### 4.1.5 Disturbed Areas

A miscellaneous group of disturbed areas such as haul roads and operational roads, existing borrow areas, facilities such as the SX/EW Plant area, Acid Unloading, Lube Shop, equipment storage areas, and pipeline and utility corridors are present at the Tyrone Mine. Performance objectives for disturbed areas include creation of a self-sustaining ecosystem and erosion control for all areas located outside both the revised OPSDA and the revised conditional waiver area.

Reclamation of the disturbed areas located outside both the revised OPSDA and the revised conditional waiver areas or the footprint of regraded stockpiles will be accomplished by removing or burying utility and structure foundations, pipelines, power lines, and buildings and providing erosion and drainage control and revegetation. Compacted soils in areas such as haul roads and mine access roads, outside the revised OPSDA and revised conditional waiver, not covered by stockpile regrading, and not used for post-closure purposes will be loosened by

ripping on an as needed basis. Where possible, the ripping and grading of compacted areas will be accomplished during near-closure operational phases.

Disturbed sites located outside both the revised OPSDA and the revised conditional waiver area or the footprint of regraded stockpiles and on non-acid generating material will be ripped to a depth of 24 inches and revegetated. Disturbed sites located outside both the revised OPSDA and the revised conditional waiver area or the footprint of regraded stockpiles and on acid generating material will be covered with 36 inches of Gila Conglomerate (or other suitable RCM) and revegetated. Revegetation will be achieved by seeding with a variety of grasses, shrubs, and forbs in accordance with Appendix C of MMD Permit GR010RE and applicable modifications.

Examples of temporary erosion and drainage control practices may include rough grading and installation of water bars, minor diversions, sediment containment structures, mulching, straw bales, and silt fences. The need for these practices will be evaluated on a site-specific basis at closure.

### 4.1.6 Facility Demolition

Those facilities not designated for industrial post-mining land use (PMLU) will be demolished, removed, and/or buried or otherwise closed in accordance with an approved construction design and quality assurance plan. The list of facilities that are scheduled to be removed is provided in **Table 4-1**. Where footings, slabs, walls, pavement, manholes, vaults, storm water controls, and other foundations are abandoned in place over native material (not demolished), they will be covered with topdressing to a depth of 36 inches and revegetated in accordance with Appendix C of MMD Permit GR010RE and applicable modifications. All structures to be removed and visually affected soil in unpaved areas will be disposed of in an approved manner or covered with 36 inches of suitable RCM, and revegetated in accordance with Appendix C of MMD Permit GR010RE and applicable modifications.

### 4.1.7 Industrial Facilities

The infrastructure (shops, buildings, roads and utilities) associated with the Industrial PMLU areas will be adapted for non-mining industrial applications. NMED requires abatement of contaminated soils that are potential source areas for groundwater and surface water contamination in accordance with NMAC Sections 20.6.2.1203, 20.6.2.3109.E.1, and 20.6.2.4103 in and around all facilities and structures approved by MMD to be left for an Industrial PMLU. Abatement of contaminated soils in and around all structures necessary for post-closure treatment and disposal of groundwater and/or surface water is also required. Tyrone will maintain erosion controls, structures, equipment, and utilities within the Industrial PMLU areas until they are occupied by tenants. Tyrone proposes to cover impacted areas located within the Industrial PMLU areas with 36-inches of RCM and revegetate the areas in accordance with Appendix C of MMD Permit GR010RE and applicable modifications.

## 4.2 Performance Objectives and Design Criteria

Performance objectives and design criteria were developed with the intent of meeting rules and requirements associated with the NMWQA, NMWQCC Regulations, NMMA, and the Copper Rule. This section presents the reclamation design criteria in accordance with these objectives. The closure or reclamation designs are depicted in the drawing set provided in **Appendix A**. The designs were developed to provide enough information to calculate the financial assurance cost estimate. The following sections present the performance objectives and reclamation design criteria for the major facilities at the mine. A summary of the key design criteria for the facilities to be closed is presented in **Table 4-2**.

### 4.2.1 Tailing Impoundments

The tailing impoundments at the Tyrone Mine have been fully reclaimed. The performance objectives for the top surface and exterior outslopes of the reclaimed tailing impoundments include establishment of a self-sustaining ecosystem, control of fugitive dust, control of run-on and runoff and erosion, prevention of overtopping, and the reduction of infiltration of meteoric water.

### 4.2.2 Stockpiles

The performance objectives for closure/closeout of the stockpile facilities and interior stockpile slopes located within the revised OPSDA and the revised conditional waiver area include: limit future access to the conditional waiver stockpile areas to authorized personnel only, minimize adverse impacts to waterfowl and other wildlife resulting from ponding or water impounded in the revised conditional waiver stockpile areas, prevent stormwater from running onto reclaimed areas from the revised conditional waiver areas, establishment of a self- sustaining ecosystem on the covered top surfaces, and construction of water collection ponds as needed for water treatment.

The performance objectives for closure/closeout of the stockpile areas located outside the revised OPSDA and revised conditional waiver areas include: re-establishment of a self-sustaining ecosystem; stabilize the reclaimed areas to minimize future impacts to the environment and to protect air and water resources; limit ponding on the final cover surfaces; reduction of infiltration; containment of seeps and sediment transport; and control of run-on, runoff, and releases to perched and regional groundwater.

A summary of the key design criteria for the stockpile facilities to be closed is presented in **Table 4-2**. The conceptual designs and associated earthwork cost estimate presented in this CCP for the stockpiles located outside the revised OPSDA and revised conditional waiver area are in accordance with Section 20.6.7.33.C NMAC and are based on an inter-bench slope of 3H:1V, 32-foot wide terrace benches, and 200-foot inter-bench slope lengths to allow for flexibility in the final design of the terrace benches and associated surface water conveyance channels. With these designs, the overall outslope gradient from the crest to toe is generally 3.5H:1V. Precise designs for each reclamation unit will be prepared and submitted to the agencies at final design in accordance with Section 20.6.7.34.B NMAC and may alter the 3.5H:1V overall slope in this conceptual design.

#### *Structural Stability*

The existing stockpiles at Tyrone are composed of blasted rock placed on 30-to-50-foot high lifts through end-dumping at angle of repose that results in benches with overall slopes less than angle of repose with catch benches on each lift. The gross stability of the stockpiles was previously determined to be adequate and is expected to remain stable under post-closure conditions (Golder 2006b, 2006c, 2006d, 2007a, 2007b, and 2007c).

The portions of the stockpiles to be regraded and covered will be reclaimed in a manner that ensures that the slope stability requirements listed in Section 20.6.7.33.B NMAC and Permit GR010RE are met. Tyrone recently completed a stockpile stability analysis associated with the current reclamation plan (Golder, 2020a) and the report is included in **Appendix F**. The results of this analysis indicate that the stockpiles are stable for long term conditions reflecting the post-closure stockpile configurations and strength conditions (**Table 4-3**).

#### *Stockpile Erosion and Drainage Control*

For the stockpile surfaces located outside the revised OPSDA and revised conditional waiver area, the surfaces will be graded and covered to direct non-impacted water to designated discharge areas. The stockpile top

surfaces will be graded to slopes of between 1 and 5 percent. The slopes will be graded to engineer designed storm water conveyance structures. The stockpile inter-bench outslopes will be graded to 3H:1V with uninterrupted slope lengths of no greater than 200 feet. Storm water will be controlled using conventional terrace channels integrated to downdrains for facilities to be reclaimed. For the Reclaimed 1 Leach, Reclaimed 1C Waste, and 7A Waste stockpiles, the outslopes were primarily constructed with the ridge-valley design and generally no benches are present (with the exception of portions of the Reclaimed 1 Leach and Reclaimed 7A Waste stockpiles that were constructed with benches). Run-off drainage and erosion control for the stockpiles will be achieved by storm water conveyance channels, stable outslopes, suitable cover material and revegetation. Channels, perimeter berms, and hydraulic structures will be designed to control erosion on the top surfaces and outslopes and safely convey storm water for release in accordance with 20.6.7.33.A NMAC.

For the stockpiles located inside the revised OPSDA and revised conditional waiver area, the outslopes will remain at/near angle-of-repose. The top surfaces of the stockpiles located inside the revised OPSDA and revised conditional waiver area will be regraded to a slope of between 1 and 5 percent and covered. Storm water within the revised OPSDA and revised conditional waiver area will be controlled using constructed downdrains and/or existing surface conveyance channels that will direct storm water to existing surface impoundments or mine pit sumps where water can be collected for evaporation and/or treatment.

Energy dissipation structures may be constructed at channel outlets if engineering designs warrant them to reduce erosive velocities where necessary. Where possible, channels will be constructed to incorporate existing topography, grade controls, and exposed inert bedrock thus, promoting long-term integrity of the structures. The final design will be adjusted for local conditions.

With the exception of in-pit stockpiles, run-on is not expected to be a post-closure concern for the stockpiles because they are constructed above the surrounding terrain. The need for run-on protection for the in-pit stockpiles will be fully evaluated in the final design process.

Temporary erosion control measures may be provided during the construction and early vegetation establishment periods for the stockpiles located outside the revised OPSDA and revised conditional waiver area and the top surfaces of the stockpiles located within the revised OPSDA and revised conditional waiver area. These measures may include, but are not limited to, berms, mulch, straw bales, silt fences, and minor corrective regrading. All construction will be in compliance with state regulations for temporary storm water control.

### *Stockpile Cover and Revegetation*

Finish grading of the stockpile subgrade will be performed based on pre-construction surveys. Earth moving equipment such as bulldozers and motor graders will be used to smooth the surfaces and facilitate access for supplemental cover placement and mulching/seeding. Most stockpile covers will be placed according to the following criteria:

| Inside Revised OPSDA and Revised Conditional Waiver Area | |
|---|---|
| Top Surface Cover Thickness | 36 inches |
| Outslope Cover Thickness | 0 inches |
| Top Surface Grade | 1.0 to 5% |

| Inside Revised OPSDA and Revised Conditional Waiver Area | |
|---|---|
| Slope (overall) | Existing (approx. angle of repose) |
| **Outside Revised OPSDA and Revised Conditional Waiver Area** | |
| Top Surface Cover Thickness (all but 9A Waste and 9AX Waste) | 36 inches |
| Top Surface Cover Thickness (9A Waste and 9AX Waste) | 12 inches |
| Outslope Cover Thickness (all but 9A Waste and 9AX Waste) | 36 inches |
| Outslope Cover Thickness (9A Waste and 9AX Waste) | 12 inches |
| Top Surface Grade | 1.0 to 5% |
| Slope (Inter-Bench Slope) | 3H:1V max. |

The recently completed reclamation designs presented in **Appendix A** and the associated Earthwork Cost Estimate included in **Appendix C** indicate that the RCM requirement for the Mining Area at Tyrone is approximately 12.6 million CY based on the current permit requirements. More than 23.6 million CY of Gila Conglomerate and 32 million CY of Precambrian Granite overburden have been conservatively identified for use as RCM at Tyrone (Golder, 2020b). Thus, the total volume of RCM designated for the Mining Area is more than that needed to cover these facilities. Under this CCP, the borrow sources for stockpile cover are assumed to be in-situ Gila Conglomerate in the Lube Shop area and Gila Conglomerate from the 5A Waste stockpile.

Ongoing regrading and ripping during mining operations will result in top surfaces with minor irregularities. Thus, only finish grading to achieve 1 to 5 percent slopes is planned on the top surfaces to facilitate cover placement and/or storm water run-off controls. Substantial grading is planned for the stockpile outslopes located outside the revised OPSDA and revised conditional waiver area. Terraced benches will be constructed to control erosion from run-off. These benches will be constructed on inter-bench outslope angles of 3H:1V at slope lengths no greater than about 200 feet in compliance with Section 20.6.7.33.C NMAC.

Revegetation of the stockpile top surfaces, and stockpile outslopes located outside the revised OPSDA and revised conditional waiver area will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of the MMD Permit and applicable modifications. The planned seed mix is discussed in Section 7.0.

### *Stockpile Surface Water, Groundwater, and Sediment Containment*

The existing and planned surface impoundments, berms, sumps, collector pipes, seepage and PLS collection systems, and groundwater pump-back systems will be integrated into a new overall system to control releases to surface water, perched water, and groundwater. Impacted waters will be directed to the proposed evaporation treatment system and/or the water treatment plant described in Section 4.3.

### 4.2.3 Open Pits

Tyrone received a conditional waiver from the requirements of achieving a self-sustaining ecosystem pursuant to Section F of the MMD Permit (MMD, 2010; 2012). Based on this conditional waiver, the pits at Tyrone are divided into two categories: conditional waiver and non-waiver pits. The conditional waiver pits at Tyrone are the Main (West Main II, West Main III, and Valencia sub-pits), Savanna, Gettysburg, and Copper Mountain Pits. The non-waiver pits are the San Salvador and South Rim Pits. The San Salvador Waste Backfill is projected to be partially completed at the EOY 2014 and the South Rim Pit (7B Waste, 7C Waste stockpiles) is projected to be fully backfilled as part of mine operations. The conditional waiver pits form areas of hydrologic containment, capturing ground water flowing from all directions.

Site access will be controlled by new 6-foot high chain link fences installed around the perimeter of the pits. Signs will be posted on the fencing at 500·foot intervals and at all access points, and warnings of potential hazards present.

The performance objectives for closure/closeout of the non-waived open pit facilities include establishment of a self-sustaining ecosystem; reduction of infiltration; containment of seeps and sediment; and control of run-on, runoff, and releases to perched and regional groundwater. The South Rim Pit (7B Waste, 7C Waste) and San Salvador Waste Backfill will be graded in a manner that ensures positive drainage from the areas to be covered and revegetated and to eliminate, to the extent practicable, ponding on final cover surfaces.

Top surfaces of the South Rim (7B Waste, 7C Waste) and San Salvador Waste Backfill will be graded to a slope of between 1 and 5 percent to direct non-affected water to designated discharge areas. Channels, perimeter berms, and hydraulic structures will be designed to control erosion on the top surfaces and convey storm water for release in accordance with Section 20.6.7.33.A NMAC. The existing berms on the backfilled portions of the pits will be improved, where necessary, and maintained to prevent the concentration of flow onto the top surfaces from the pit slopes.

Energy dissipation structures may be constructed at channel outlets if engineering designs warrant them to reduce erosive velocities where necessary. Where possible, channels will be constructed to incorporate existing topography, grade controls, and exposed inert bedrock thus, promoting long-term integrity of the structures. The final design will be adjusted for local conditions. Temporary erosion control measures will be provided during the construction and early vegetation establishment periods. These measures include, but are not limited to, berms, mulch, straw bales, silt fences, and minor corrective regrading. All construction will be in compliance with state regulations for temporary storm water control.

Revegetation of the non-waived pit top surfaces will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of the MMD Permit and applicable modifications. The planned seed mix is discussed in Section 7.0.

### 4.2.4 Surface Impoundments

The performance objectives for surface impoundments facilities are to retain, evaporate, or convey process waters, seepage collection waters, extracted groundwater and pit water, and surface water. For the purposes of this plan, surface impoundments include: storage tanks for process waters, seepage collection waters, and extracted groundwater/pit water; storm water catchments; and lined and unlined surface impoundments. The surface impoundment facilities are planned to be the last features to be closed following the establishment of vegetation and site stabilization on the other facilities. Impoundments that serve PMLU functions or are

associated with the stockpile toe perimeter and groundwater control systems are planned to be permanent parts of the reclamation system and will be maintained throughout the post-closure period. The disposition of specific facilities with respect to closure/closeout is discussed in Section 5.0.

The impoundments to be closed will be characterized sequentially, by facility and will include the definition of the drainage of the surface impoundment, characterization and abatement of sediments that could potentially impact groundwater quality, and characterization of groundwater to determine if abatement is necessary. Closure and reclamation of surface impoundments not designated for PMLU will be conducted in accordance with Section 20.6.7.33.I NMAC and may involve removal of contaminated material if present and/or grading to achieve drainage, followed by capping with 36 inches of suitable RCM and revegetation. RCM will be applied only where contamination is present and for impoundment areas located outside the regrade toe of stockpile facilities. Synthetic liners (if present and outside the regrade toe of stockpile facilities) will either be removed and disposed of, or ripped, and completely covered with 36-inches of suitable RCM. Revegetation will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of the MMD Permit and applicable modifications.

### 4.2.5 Disturbed Areas

Performance objectives for disturbed areas located outside the revised OPSDA and revised conditional waiver area include creation of a self-sustaining ecosystem, erosion and stormwater control, and reduction of infiltration of incident precipitation. Reclamation of the disturbed areas outside the revised OPSDA and revised conditional waiver area or regrade footprint of stockpiles will be accomplished by removing or burying utility and structure foundations, power lines, and buildings and providing erosion and drainage control and revegetation. Pipeline corridors located outside the regrade footprint of stockpiles and outside the revised OPSDA and revised conditional waiver area will be inspected and characterized for evidence of past spills that could potentially cause exceedances of water quality standards of Section 20.6.1 NMAC and Section 20.6.2.3103 NMAC. If the pipelines do not constitute a source of contamination (defined as exceedances of standards), they can be left in place and buried after they have been rinsed and capped if they contain contaminated materials in accordance with Section 20.6.7.33.J NMAC. If soils have been impacted, the material will be removed or covered with 36-inches of suitable RCM. Where pipelines are removed or buried, the pipeline corridor will be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications.

Haul roads and access roads not needed for closure and post closure access will be reclaimed if not located within the revised OPSDA and revised conditional waiver area or regrade footprint of stockpiles. If the roads are located on non-acid generating material, compacted road material will be loosened by ripping to a depth of 24 inches and revegetated. For haul roads located on acid-generating material, the roads will be ripped, covered with 36 inches of the suitable RCM and revegetated. All culverts will be removed unless they serve a post-closure purpose.

The necessity for removing utility structures will be determined on a site-specific basis. Buildings will be demolished or converted to an alternative industrial use. Footings, slabs, walls, pavement, manholes, vaults, storm water controls and other foundations located outside the revised OPSDA and revised conditional waiver area that are not included in the Industrial PMLU, and are located on non-acid generating materials will be abandoned in place and covered with 36 inches of topdressing. For footings, slabs, walls, pavement, manholes, vaults, storm water controls and other foundations located outside the revised OPSDA and revised conditional waiver area that are not included in the Industrial PMLU and are located on impacted soils that could potentially cause exceedances of water quality standards of Sections 20.6.1 NMAC and Section 20.6.2.3103 NMAC, the

structures and impacted soils will be removed or covered in place with 36 inches of Gila Conglomerate (or other suitable RCM).

Temporary erosion and drainage control practices may include but are not be limited to rough grading and installation of water bars, minor diversions, sediment containment structures, mulching, straw bales, and silt fences. The need for these practices will be evaluated on a site-specific basis at closure. The seed mix to be used is presented in Section 7.0. Revegetation will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of the MMD Permit and applicable modifications.

### 4.2.6 Borrow Areas

Tyrone's experience with cover excavation and placement on the tailing impoundments, Reclaimed 1 Leach, Reclaimed 1C Waste, and 7A Waste stockpiles revealed that flexibility in materials handling is critical to achieving quality control objectives and efficient management of cover soil resources. As previously described, the borrow sources for stockpile cover are assumed to be in-situ Gila Conglomerate in the Lube Shop area and Gila Conglomerate from the 5A Waste stockpile. The exact location and configuration of the borrow areas will ultimately be determined during the final design and construction phases of the reclamation.

The top surface and outslopes of the 5A Waste stockpile, which will be only partially consumed, will be reclaimed using methods similar to those described for the other stockpiles located outside the revised OPSDA and conditional waived area (Section 4.2.2).

Any additional borrow areas that may be utilized in the future, will have borrow pits with 3H:1V maximum side slopes as a result of the specified excavation plan. Borrow pit side slopes and bottoms will be ripped where required and revegetated with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of the MMD Permit and applicable modifications.

## 4.3 Water Management and Treatment Performance Objectives

The proposed water management and treatment plan included in **Appendix D** was developed in accordance with Section 20.6.7.33.H NMAC. The plan provides an engineering document that describes the processes and methods that will be used at Tyrone for long-term management and treatment of process water. The plan includes an analysis of the expected operational life of each water management and water treatment system throughout the post-closure period. The plan describes the proposed water management and water treatment systems in detail, including locations of key components, expected operational life, material take-offs, and the basis for which capital, operational and maintenance costs were prepared for financial assurance.

The plan identifies five sources of process water that are likely to be sent to the proposed water management and treatment systems. The sources of process water have been separated into both high TDS and sulfate source waters and low TDS and sulfate waters for water management and treatment optimization. Following closure there will be major physical reclamation activities that will result in significant source control and this source control will reduce the mass of pollutants that will have to be removed via water management and treatment over time. The process water streams that are likely to be sent to the proposed water management and treatment systems include the following:

- Residual process solutions from the leach operation;
- Meteoric water that infiltrates through the acid-generating stockpiles to seepage collection;

- Storm water runoff that comes into contact with un-reclaimed stockpiles and storm water that falls within the revised Open Pit Surface Drainage Area (OPSDA);
- Dewatering water from the existing open pits; and
- Impacted groundwater captured in seepage collection and interceptor well systems.

The primary performance objective for water management and treatment is to collect process waters associated with mine operations and to treat these waters to meet the applicable New Mexico Water Quality Control Commission (NMWQCC) criteria for discharge. To meet the performance objectives the following strategies will be utilized:

- A short-term ETS will be utilized to evaporate all process waters beginning in year 1 and continuing through year 9 following closure. The process water will be evaporated on the top surfaces of the existing leach stockpiles and within the existing pits and surface impoundments. The short-term ETS system will be shut down at the end of the 9th year following closure;
- A long-term ETS will be utilized to evaporate all process waters beginning in year 10 and continuing through year 14 following closure. The process waters will be evaporated at two new high-density polyethylene (HDPE) lined spray evaporation ponds and within the existing pits and surface impoundments. Beginning in year 15 and continuing through year 100 following closure, the long-term ETS will only receive high TDS and sulfate process waters and brine reject from the membrane system described below;
- A combined lime-high density sludge (HDS) and membrane (hyper filtration) system will be utilized beginning in year 15 and continuing through year 100 following closure to treat all the lower TDS and sulfate process waters at the mine;
- Stormwater runoff will be managed through surface reclamation to preclude potential for contact with uncovered stockpiles, thus minimizing the amount of impacted surface runoff requiring treatment. Impacted storm water runoff from within the revised OPSDA and revised conditional waiver area will be collected and treated for a period of 100 years following closure;
- Diversion of non-impacted meteoric water and storm water surface runoff away from potentially impacted sources, which will allow for discharge to an approved surface discharge area in accordance with state regulations. Non-impacted water sources will not require treatment prior to discharge; and
- Pit water will be pumped to the ETS through the first 14 years following closure and to the water treatment plant from years 15 through 100 following closure.

# 5.0 RECLAMATION PLAN

The objective of the Tyrone CCP is to provide a design engineering document that describes the processes and methods that are expected to be used for reclamation activities at the Tyrone Mine including long-term management and/or treatment of process water, based the anticipated configuration of the mine at EOY 2014. The CCP supplies sufficient detail to estimate financial assurance activities including estimate capital and operating costs in the unlikely scenario that the mine will close under a forfeiture scenario. The CCP and associated design criteria conform to the closure requirements described in DP-1341 and 20.6.7 NMAC, and closeout requirements described in MMD Permit GR010RE. The reclamation will provide for the establishment of

a self-sustaining ecosystem consistent with the designated post-mining land uses. The PMLU designations for the mine are wildlife habitat or, for certain portions of the mine, industrial use.

The reclamation plan was developed with consideration of the site-specific conditions that will exist at the Tyrone Mine at the EOY 2014. The plan includes an analysis of the expected operational life of each long-term water management and/or water treatment system, including interceptor systems, until each system is no longer needed to protect groundwater quality and applicable standards are met. The plan describes the long-term water management and water treatment systems with sufficient detail, including locations of key components, expected operational life, and material take-offs that were used to develop capital, operational and maintenance costs for an engineering-level cost estimate. The closure or reclamation designs are presented in the drawing set provided in **Appendix A**.

The plans and methods developed herein represent designs for reclamation of the facilities based on an anticipated configuration. More specific plans will be developed and submitted prior to mine closure in accordance with Section 20.6.7.34 NMAC and Permit GR010RE. A final CQA/CQC plan for reclamation and closure will be prepared by Tyrone for submittal to and approval by the NMED and MMD at least 180 days prior to submission of a notice of intent to implement the CCP. The CQA/CQC plan will provide a detailed description of the work proposed to be performed to close the site in accordance with Section 20.6.7.33 NMAC. Monitoring and maintenance activities will follow primary reclamation and will continue throughout the post-closure period as described in Section 6.0. As previously described in Section 3.0, several facilities have already been reclaimed. Erosion and vegetation establishment monitoring will continue at these facilities in accordance with Permit GR010RE and NMED requirements.

The following sections describe the specific facilities that will still have components to be closed at the EOY 2014, components that will be retained for further use during the closure/post-closure period, and the design criteria for the facilities to be reclaimed. The reclamation proposed for each of the major facilities in the Mangas Valley Tailing Area, Mining Area, and East Mine Area is discussed in Sections 5.1 (Mangas Valley Tailing Area), 5.2 (Mining Area), and 5.3 (East Mine Area). The proposed plan for the management and treatment of process water throughout site reclamation activities and for a duration of 100 years following cessation of mining operations is described in Section 5.5. A summary of the key design criteria for the facilities to be closed is presented in **Table 4-2**.

## 5.1 Mangas Valley Tailing Area

The facilities located within the Mangas Valley Tailing Area are regulated under the DP-27SA (NMED, 2003b), DP-1341 (NMED, 2003a), and Revision 01-1 to MMD Permit GR010RE (MMD, 2004). As previously noted, reclamation work has been completed for the Mangas Valley Tailing Impoundments and the majority of the tailing launder.

As of March 2018, the only items that need to still be closed include removal of the existing embankments and associated culverts along the launder corridor, and removal of an approximate 300-foot section of launder trestle crossing the Redrock diversion between the reclaimed 2 and 3X tailing impoundments. Portions of the reclaimed 1, 1A, 2, 3 and 3X tailing impoundments have a 2-foot thick cover. Cover maintenance financial assurance for these areas is described in Section 8.3.

The 1X tailing interceptor system, 1A tailing seepage collection system, 1X Tailing Seepage Collection Pond (1X-1), and associated pumps and pipelines will continue to be operated until applicable groundwater standards are met at each system. The general setting of the Mangas Valley Tailing Area is shown on **Plate 2**.

## 5.2 Mining Area

The primary facilities to be closed and/or maintained in the Mining Area include: 1) leach stockpiles; 2) waste rock stockpiles; 3) the Main (West Main II, West Main III, and Valencia sub-pits), Gettysburg, Copper Mountain, South Rim, Savanna, and San Salvador pits; 4) the SX/EW Plant and associated facilities; 5) the main mine facilities; 6) the lubrication shop area which includes the fuel dock, explosives storage building and prill (ammonium nitrate) tanks; 7) various lined and unlined surface impoundments; 8) various seepage and PLS collection/interceptor systems; 9) various tanks; 10) regional and perched groundwater extraction systems, and 11) booster pump stations.

Reclamation has been completed for the Reclaimed 1C Waste and 7A Waste stockpiles, and a substantial amount of reclamation work is currently being conducted in the area. The CMSPE Area and the USNR Site reclamation design projects are projected to be reclaimed by the EOY 2014. As such, the following CCP applies only to those facility components that will not be fully reclaimed by the EOY 2014.

The general setting of the Mining Area is shown on **Plates 3 and 4** and the reclamation areas are presented on the facility characteristic forms in **Appendix B**. The following sections describe the specific facilities that will still have components to be closed at the EOY 2014 and the components that will be retained for further use during the closure/post-closure period. Additionally, as previously described in Section 4.1.2, reclamation of the newly permitted 9AX Waste stockpile (including financial assurance for the 9AX Waste stockpile closeout plan) is covered under Permit Modification 14-1 to Permit GR010RE (MMD, 2014) and is not described herein.

### 5.2.1 Stockpiles Located Outside the Revised OPSDA and Revised Conditional Waiver Area

#### *Stockpile Facilities Located Outside Revised OPSDA and Revised Conditional Waiver Area*

Stockpile facilities (partially or fully) located outside the revised OPSDA and revised conditional waiver Area include the:

- 2A Leach, 3A Leach, 2 Leach (Area 1), 6D Leach, and 7B Leach;
- 1A Leach, 1B Leach, 2B Leach, 2 Leach (Area 2), 6B Leach, and 6C Leach
- 2B Waste, 7B Waste, 7C Waste, 9A Waste, and 9AX Waste;
- 5A Waste; and
- 3B Waste,

The location of these stockpiles are shown on **Plate 3.**

#### *Existing Components That Will Be Used for Post-Closure Purposes*

The existing closure components and related engineering controls associated with the stockpiles and stockpile areas located outside the revised OPSDA and revised conditional waived area that will be used for post-closure purposes include:

- Maintenance of existing berms at the toes of the stockpiles;
- Operation and maintenance of six existing seepage collection systems (seep collection systems 2, 3 replacement, 4 replacement, 5E replacement, DC2-1 replacement, and new collection system within

Deadman Canyon) and associated pipelines in the Deadman Canyon area (note, replacement systems and new collection system within Deadman Canyon are projected to be installed by the EOY 2014);

- Operation and maintenance of eight existing seepage collection systems (original 7R1A, new 7R1A, original 7R1B, new 7R1B, 7R2A, 7R2B, 7R3A, and 7R4A) and associated pipelines along the Reclaimed 7A Waste stockpile;
- Operation and maintenance of three existing seepage collection/cutoff systems (collections 1C-1, 1C-2, 1C-3), eight existing shallow toe seepage collection systems (1C-1, 1C-2, 1C-3A, 1C-3B, 1C-3C, 1C-3D, 1C-3E, #4), and associated pumps and pipelines located along the toe of the Reclaimed 1C Waste stockpile;
- Operation and maintenance of three existing seepage collection/cutoff systems (1AGFT-1, 1AGFT-2, and OGTU-1) and associated pumps and pipelines located around the 1A Leach stockpile;
- Operation and maintenance of two existing seepage collection/cutoff systems (1BU-1 and 1BU-2) and associated pumps and pipelines located down gradient of the 1B Leach stockpile;
- Operation and maintenance of existing perched seepage zone collection well systems and associated pumps and pipelines located in Oak Grove Wash;
- Operation and maintenance of nine existing seepage collection/cutoff systems (canyon 4, canyon 5, canyon 6, canyon 7, upper canyon 8, lower canyon 8, upper canyon 10, lower canyon 10, canyon 11) and associated pumps and pipelines located down gradient of the 3A Leach stockpile;
- Operation and maintenance of existing perched seepage and regional aquifer collection systems and associated pumps and pipelines located down gradient of the 3A Leach stockpile;
- Operation and maintenance of existing PLS collection systems and associated pumps, pipelines and impoundments associated with the leach stockpiles;
- Operation and maintenance of pipeline alignment #1 and #2 (primary and backup pipelines) for conveyance of seepage water from the Little Rock Mine to the lined 1X1 Pond at Tyrone (applies to pipeline segments within the Tyrone Mine permit boundary).
- Construction and maintenance of storm water controls in the Copper Mt. Reclamation Area;
- Placement of waste material from the 1A Leach stockpile pullback as a buttress along the exterior toe of the 1B Leach stockpile;
- Abandonment of non-essential wells located within the regrade footprint of the 3A Leach stockpile; and
- Installation of replacement monitor wells located outside the projected footprint of the 3A Leach stockpile.

### *Planned Closure/Closeout Activities*

The design criteria for the stockpiles and stockpile areas located outside the revised OPSDA and revised conditional waiver area are summarized in **Table 4-2** and the planned approaches for closure of these facilities are described below. Reclamation design drawings for the facilities are presented in **Appendix A**. The planned approaches for closure of the stockpiles located outside the revised OPSDA and revised conditional waiver area include:

- Flushing of process water, PLS and raffinate pipelines located outside the regrade footprint of the stockpiles that will not be part of the post-closure water management and water treatment system to remove residual solutions and dispose of them (or cap and cover) in an approved manner;
- Process water, PLS and raffinate pipelines located within the regraded footprint of the stockpiles that will not be part of the post-closure water management and water treatment system will be crushed and covered as part of the stockpile regrading and cover placement of these facilities;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used in the industrial PMLU or not necessary for site O&M, including water management and treatment;
- Grading of the stockpile top surfaces to a final grade of between 1 and 5% to direct storm water to slope drainage channels;
- Grading of the stockpile outslopes down to interbench slopes of 3.0H:1V;
- Construction of 32-foot wide terrace benches on the outslopes at maximum slope lengths of 200 feet;
- Covering of the top surfaces and outslopes of the stockpiles with 36 inches of Gila Conglomerate (or other suitable RCM);
- Covering of the top surfaces and outslopes of the 9A Waste and 9AX Waste stockpiles with 12 inches of Gila Conglomerate (may be used as a borrow source if the material is approved for use as RCM in the future)
- Construction of surface water conveyance channels on the top surfaces (where required) and terrace benches to direct surface water off the covered stockpile surfaces in accordance with Section 20.6.7.33.A NMAC;
- Grading of the disturbed areas associated with the stockpiles to provide positive drainage;
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications;
- Plugging and abandonment of any unneeded monitor wells;
- Plugging and abandonment of exploration drill holes;
- Replacement of monitor wells that are abandoned that are required to be monitored as part of operation DPs;
- Breaching of existing seepage collection systems that will be covered by stockpile regrading and replacing these systems outside the regrade footprint of the facility (as needed);
- Providing additional channels, sumps, wells, pumps, and pipelines to direct impacted water to a site-wide water treatment facility; channels may have energy dissipaters if engineering designs warrant them; and
- Providing facilities to discharge non-impacted stockpile runoff.

### 5.2.2 Stockpiles Located Inside the Revised OPSDA and Revised Conditional Waiver Area

As previously described, the OPSDA is defined as the stockpiles and disturbed areas adjacent to the open pits where surface water cannot feasibly flow out to the perimeter of the Mining Area due to existing topographic constraints, and hydrologic containment is maintained as a result of pumping and/or evaporation of water from the open pits.

The current approved OPSDA is depicted on Map 1 in Exhibit A of the amended Settlement Agreement. This aspect of the Settlement Agreement was contingent, in part, on MMD granting a conditional waiver for the areas identified within the OPSDA. The current approved conditional waiver area is depicted on Figure 3R in Permit Revision 10-1 to MMD Permit GR010RE (MMD, 2012), and the revised conditional waiver area associated with the EOY 2014 mine plan topography is shown on **Plate 1** herein.

#### *Stockpile Facilities Within Revised OPSDA & Revised Conditional Waiver Area*

Stockpile facilities (partially or fully) located inside the revised OPSDA and revised conditional waiver area include the:

- 6A Leach;
- 8A Waste and 8C Waste;
- Interior slopes of the 1A Leach, 1B Leach, 2B Leach, portions of the 2 Leach (Area 1), portions of the 2 Leach (Area 2), 6B Leach, and 6C Leach;
- Western portion of the 5A Waste; and
- Interior slopes of the 3B Waste.

The location of these stockpiles are shown on **Plate 3.**

#### *Existing Components to be used for Post-Closure Purposes*

The existing closure components and related engineering controls associated with the stockpiles and stockpile areas located inside the revised OPSDA and revised conditional waiver area that will be used for post-closure purposes include:

- Maintenance of existing berms at the toes of the stockpiles;
- Operation and maintenance of existing PLS collection systems and associated pumps, pipelines, and impoundments associated with the leach stockpiles; and
- Maintenance of existing storm water controls in the area.

#### *Planned Closure/Closeout Activities*

The design criteria for the stockpiles located inside the revised OPSDA and revised conditional waiver area are summarized in **Table 4-2** and the planned approaches for closure of these facilities are described below. The planned approaches for closure of the stockpiles and stockpile areas located inside the revised OPSDA and revised conditional waiver area include:

- Flushing of process water, PLS and raffinate pipelines that will not be part of the post-closure water management and water treatment system to remove residual solutions and dispose of them (or cap in place) in an approved manner;
- Process water, PLS and raffinate pipelines located within the regrade footprint of the stockpiles that will not be part of the post-closure water management and water treatment system will be crushed and covered as part of the stockpile regrading and cover placement of these facilities;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used in the industrial PMLU or not necessary for site O&M, including water management and treatment;
- Grading of the stockpile top surfaces to a final grade of between 1 and 5% to direct storm water to slope drainage channels;
- Covering of the top surfaces of the stockpiles with 36 inches of Gila Conglomerate (or other suitable RCM);
- Construction of surface water conveyance channels on the top surfaces and outslopes (where required) to direct surface water off the stockpile surfaces and to the nearest open pit sump in accordance with Section 20.6.7.33.A NMAC;
- Seeding of covered top surfaces to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications;
- Stockpile outslopes to remain at approximate angle of repose;
- Plugging and abandonment of any unneeded monitor wells; and
- Providing additional channels, sumps, wells, pumps, and pipelines to direct impacted water to a site-wide water treatment facility; channels may have energy dissipaters if engineering designs warrant them.

### 5.2.3 Open Pits (Non-Waiver Areas)

The San Salvador Pit is projected to be partially backfilled at the EOY 2014 and the South Rim Pit is projected to be fully backfilled (7B Waste, 7C Waste). During reclamation, these areas will be regraded such that drainage is directed toward the Oak Grove Drainage and any surface ponding is minimized, and then covered and revegetated. The South Rim and San Salvador pits are shown on **Plate 3**, and their reclamation areas are presented on the facility characteristic forms in **Appendix B**. The existing closure components and the planned closure activities for the non-waiver pits are described below.

#### *Existing Components to be used for Post-Closure Purposes*

The existing closure components and related engineering controls associated with the non-waiver pits that will be used for post-closure purposes include:

- Construction and maintenance of pit perimeter berms;
- San Salvador Waste Backfill; and
- Complete backfilling of the South Rim Pit with waste rock (7B Waste, 7C Waste).

### *Planned Closure/Closeout Activities*

The design criteria for the non-waiver pits are summarized in **Table 4-2** and the planned approaches for closure of these facilities are described below. Reclamation design drawings for the facilities are presented in **Appendix A**. The planned approaches for closure of the non-waiver pits include:

- Flushing of process water, PLS and raffinate pipelines that will not be part of the post-closure water management and water treatment system to remove residual solutions and dispose of them (or cap and cover) in an approved manner;
- Process water, PLS and raffinate pipelines located within the regrade footprint of the non-waived pits that will not be part of the post-closure water management and water treatment system will be crushed and covered as part of the regrading and cover placement of these facilities;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used in the industrial PMLU or not necessary for site O&M , including water management and treatment;
- Completion of backfilling of the San Salvador Pit with available waste rock to a point that will allow for surface water flows to be directed to the Oak Grove Wash drainage;
- Grading of the backfill over the pit walls to maximum inter-bench slopes of 3.0H:1V;
- Construction of 32-foot wide terrace benches on the pit slopes at maximum slope lengths of 200 feet;
- Grading of the top surfaces of the backfill material to a final grade of between 1 and 5% to direct storm water to drainage channels;
- Covering of the top surfaces of the backfill and the remaining pit slopes with 36 inches of Gila Conglomerate (or other suitable material);
- Construction of surface water conveyance channels on the top surfaces of the covered backfill and terrace benches (where required) to direct surface water off the covered surfaces in accordance with Section 20.6.7.33.A NMAC;
- Construction of spillways and down chutes to divert excess water off the covered top surfaces and into natural drainages;
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications; and
- Providing facilities to discharge non-impacted runoff into natural drainages.

## 5.2.4 Open Pits (Conditional Waiver Areas)

The Main (West Main II, West Main III, and Valencia sub-pits), Savanna, Gettysburg, and Copper Mountain pits have been granted a conditional waiver from the requirement of achieving a self-sustaining ecosystem, so closure/closeout activities will focus on safety measures, water management and some limited reclamation of accessible flat areas. These pits are shown on **Plate 3**, and the existing closure components and the planned closure activities for the revised conditional waiver pits are described below.

### *Existing Components to be used for Post-Closure Purposes*

The existing closure components and related engineering controls associated with the revised conditional waiver pits that will be used for post-closure purposes include:

- Maintenance of existing pit perimeter berms;
- Operation and maintenance of existing Main Pit dewatering system and Decant Ponds (five main pit production wells, decant ponds, and associated electrical distribution and piping systems);
- Operation and maintenance of existing Gettysburg Pit dewatering system (pit production wells and associated electrical distribution and piping systems);
- Operation and maintenance of existing Savanna Pit dewatering system (pit production wells and associated electrical distribution and piping systems);
- Operation and maintenance of existing Copper Mountain Pit dewatering system (pit production wells and associated electrical distribution and piping systems);
- Operation and maintenance of HDPE-lined Land Bridge Booster pond; and
- Operation and maintenance of HDPE-lined North Racket PLS Pond and Copper Mt. Decant Ponds located on the south side of the Copper Mountain Pit.

The existing pit dewatering and stormwater management systems (sumps, pumps, electrical distribution and pipeline systems) will continue to be operated and maintained to reduce surface water impacts, to the maximum extent practicable, and capture and transfer impacted groundwater and surface water to the site-wide water treatment facility.

### *Planned Closure/Closeout Activities*

The design criteria for the revised conditional waiver pits are summarized in **Table 4-2** and the planned approaches for closure of these facilities are described below. The planned approaches for closure of the revised conditional waiver pits include:

- Construction of a 6-foot high continuous chain-link security fence around the perimeter of the open pits to control access. Vehicle gates installed at 1-mile intervals and warning signs posted every 500 feet;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used in the industrial PMLU or not necessary for site O&M, including water management and treatment; and
- Reclamation of certain flat stockpile surface areas within the revised OPSDA as described in Section 4.2.3.

## 5.2.5 Surface Impoundments and Tanks

**Table 2-1** presents an updated summary of the surface impoundment list and shows the surface impoundments grouped by the operational DP areas from the Tyrone Master Document (DBS&A, 2017). As previously mentioned, for the purposes of this plan, surface impoundments include: storage tanks for process waters, seepage collection waters, and extracted groundwater/pit water; storm water catchments; dams; reservoirs; and surface impoundments.

The surface impoundment facilities that contain process waters are planned to be the last features closed following the establishment of vegetation and site stabilization on the other facilities. Impoundments that serve PMLU functions or are associated with the stockpile toe perimeter and groundwater control systems are planned to be permanent parts of the reclamation system and will be maintained throughout the post-closure period. A summary of the surface impoundments to be utilized throughout the post-closure period are presented in **Table 5-1**.

All operational impoundments were characterized, constructed and are operated under existing DPs. The impoundment water levels and water quality data are routinely monitored and the results are submitted for review in accordance with the individual DP monitoring plans. Surface impoundments not designated for PMLU will be closed in accordance with Section 20.6.7.33.I NMAC and MMD Permit GR010RE. For impoundments located outside the revised OPSDA or the revised conditional waiver area, a reclamation cover system will be constructed. Synthetic liners (if present and outside the regraded toe of stockpile facilities) will either be removed or ripped, and completely covered with 36-inches of suitable RCM in accordance with 20.6.7.33.F NMAC.

Tanks will be removed and disposed of in an approved manner. Revegetation will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of MMD Permit GR010RE and applicable modifications. For impoundments located within the revised OPSDA or the revised conditional waiver area, the impoundment areas will be graded to drain.

All remaining surface impoundments and tanks listed in **Table 2-1** that are not included in **Table 5-1** will be closed during the post closure period, and the surface impoundments listed in **Table 5-1** will be closed at the end of the post-closure period. The existing closure components and the planned closure activities for the surface impoundments and tanks are described below.

### *Existing Components to be used for Post-Closure Purposes*

The existing closure components and related engineering controls associated with the surface impoundments that will be used for post-closure purposes include:

*Systems required to convey process solutions onto the tops of leach stockpiles and to designated surface impoundments throughout the 9-year short-term ETS period (**Figure 2 in Appendix D**):*

- Operation, and maintenance of the existing raffinate distribution system at the top of the 1A Leach, 1B Leach, 2A Leach, 2 Leach (Areas 1 and 2), 3A Leach, 6A Leach, 6B Leach, 6C Leach, 6D Leach, and 7B Leach stockpiles. Includes associated booster stations and tanks, raffinate application drip line systems, and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing pit dewatering systems and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing seepage collection and groundwater interceptor systems and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of existing surface impoundments designated for the short-term ETS (see **Table 2 in Appendix D**) and associated pumps, electrical distribution and pipeline systems; and
- Operation, and maintenance of the PLS Feed Pond, raffinate tanks, and lined overflow pond located at the SX/EW Plant area; and associated pumps and pipelines.

*Systems required to convey process solutions into designated surface impoundments throughout the long-term ETS period (closure years 10 through 100, see **Figures 3 and 4 in Appendix D**):*

- Operation, and maintenance of the existing pit dewatering systems and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing and planned seepage collection and groundwater interceptor systems and associated pumps, electrical distribution and pipeline systems; and
- Operation, and maintenance of existing surface impoundments designated for the long-term ETS (see **Tables 3 and 4 in Appendix D**) and associated pumps, electrical distribution and pipeline systems.

*Systems required to collect and convey long-term seepage from the stockpiles, intercepted groundwater, open pit dewatering water to the site-wide water treatment plant (closure years 15 through 100, see **Figure 5 in Appendix D**):*

- Operation, and maintenance of the existing pit dewatering systems and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing and planned seepage collection and groundwater interceptor systems and associated pumps, electrical distribution and pipeline systems; and
- Operation, and maintenance of existing surface impoundments designated for the TTS (see **Table 4 in Appendix D**) and associated pumps, electrical distribution and pipeline systems.

*Systems required for post-closure stormwater management:*

- Operation, and maintenance of the 1A Stormwater Pond, 1C Stormwater Pond, Lube Shop Pond, POPE Ponds, Spill Prevention Control and Countermeasures (SPCC) Pond, Savanna Pit Sump, and associated pumps, electrical distribution, pipeline systems, and conveyance channels.

These surface impoundments will be an integral part of the post-closure sediment, seepage, groundwater, and surface water management system at the mine. The few auxiliary structures not needed to operate these systems (unused power lines and pipelines) will be removed and salvaged or buried upon closure. Power poles may be left in place as bird habitat in support of the wildlife PMLU. The remaining surface impoundments that will not be used for industrial purposes will be closed at the end of the post-closure period, or after the completion of the ETS operational period (for those impoundments that will only be used for ETS purposes).

### *Planned Closure/Closeout Activities*

All surface impoundments that will not be used for post-closure purposes will be closed in accordance with Section 20.6.7.33.I NMAC and MMD Permit GR010RE. Several of these impoundments will be utilized during portions of the short-term ETS period but will ultimately be covered over by stockpile regrading. These surface impoundments will be closed by ripping HDPE liners (if present), removing the tanks (if present), removal or burial of existing pipelines, and removing all aboveground electrical systems, and infrastructure prior to regrading. The closure/closeout activities planned for the remaining surface impoundments located outside the regrade footprint of the stockpiles and not used for post-closure purposes consist of:

- Pipelines will be disposed on-site and in accordance with Section 20.6.7.33.J NMAC;
- Capping all non-functional buried process water pipelines as needed;

- Pumping of remaining water in the surface impoundments to an approved discharge point, water treatment plant, or allowed to evaporate;
- Ripping HDPE liners (if present);
- Grading the impoundment areas to drain;
- Covering of impoundments with 36 inches of RCM where impacted materials remain beyond the regrade toe of the stockpile and are determined to be a potential source of groundwater contamination outside the revised OPSDA and revised conditional waiver area;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used for industrial or wildlife PMLU purposes or not necessary for site O&M, including water treatment; and
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications (note, seeding will be conducted as part of stockpile closure).

### 5.2.6 Buildings and Structures

Those facilities not designated for industrial PMLU will be demolished, removed, and/or buried. A total of approximately 71 buildings/tanks/structures covering approximately 8.9 million cubic feet will be demolished and removed under this plan. The list of facilities that are scheduled to be removed is provided in **Table 4-1**. The existing closure components and the planned closure activities for the buildings and structures are described below.

#### *Existing Components to be used for Post-Closure Purposes*

The existing closure activities and related engineering controls associated with the mine buildings and structures that are not part of the Industrial PMLU that will be used for post-closure purposes include diversion of storm water runoff from paved areas and along access roads at the Mine Maintenance Facilities area, SX/EW Plant area, lubrication shop area, and Reclaimed Former Mill & Concentrator Area through ditches and culverts to existing sediment/storm water control ponds.

#### *Planned Closure/Closeout Activities*

All buildings and structures that will not be used for post-closure purposes will be closed. The closure/closeout activities planned for these buildings and structures consist of:

- Salvaging and demolition of the buildings, tanks and structures listed in **Table 4-1**;
- Removal and disposal of waste requiring special handling;
- Removal of all debris and visually affected soil at or near the surface in unpaved areas, disposal of debris or affected soil in an approved manner, and covering impacted areas with 36 inches of suitable RCM;
- Collection of confirmation samples from areas where soils were removed, as necessary;
- Where footings, slabs, walls, pavement, manholes, vaults, storm water controls, and other foundations are abandoned in place over non-acid-generating material, and not demolished, they will be covered with topdressing to a depth of 18- 24 inches minimum;

- Process water pipelines (if they contained contaminated materials) that will not be part of the post-closure water management and water treatment system will be closed in accordance with Section 20.6.7.33.J NMAC;
- Capping all non-functional buried process water pipelines;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used in the industrial or wildlife PMLU or not necessary for O&M, including water treatment;
- Maintaining and improving existing culverts and surface water conveyance structures (if required);
- Placement of 18 to 24 inches of suitable RCM over disturbed areas on non-acid-generating material (unless suitable cover material already exists in the case of a buried pipe approved to remain in place); and
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications.

## 5.3 East Mine Area

The facilities located within the East Mine Area are regulated under operation DP-896. A substantial amount of reclamation work has been completed in the area. As such, the following CCP applies only to those facility components that will not be fully reclaimed by the EOY 2014. The primary facilities to be closed in the East Mine Area include the acid-unloading and former precipitation plant area. The general setting of the East Mine Area is shown on **Plate 3**. The following section describes planned closure activities for the acid-unloading and former precipitation plant area, and the components within the East Mine Area that will be retained for further use during the closure/post-closure period.

### *Existing Components to be used for Post-Closure Purposes*

The existing closure components and related engineering controls associated with the East Mine Area that will be used for post-closure purposes include:

- Maintenance of existing berms and stormwater conveyance channels at the Reclaimed 1 Leach stockpile and Reclaimed Burro Mountain Tailing Impoundment;
- Operation and maintenance of existing seepage collection/cutoff systems around the perimeter of the Reclaimed 1 Leach stockpile;
- Maintenance of existing above-ground fiberglass storage tank, booster pumps/station, and HDPE-lined overflow pond to handle all seepage waters and convey them to the 1B PLS tank; and
- Diversion of storm water runoff from parking areas and along access roads through existing ditches and culverts to existing sediment/storm water control structures in the acid-unloading facility area.

### *Planned Closure/Closeout Activities*

The planned approaches for closure of the acid-unloading and former precipitation plant area will support a self-sustaining ecosystem in the post-mining era. All buildings and structures that will not be used for post-closure purposes will be closed. Pursuant to Section 9.G.3a of Revision 10-1 of the MMD Permit, Condition 18 of DP-1341, and the Copper Mine Rule. In accordance with Section 20.6.7.34.F NMAC, Tyrone will submit a final design and CQA/CQC plan to the NMED and MMD for approval at least 60 days prior to construction, including commencement of any surface regrading of the facility and placement of any RCM for final closure. The final

design and CQA will provide specific details of the facility closure, including sampling and analysis plans for the collection of confirmation samples described below.

The closure/closeout activities planned for this area consists of:

- Flushing of the above-ground acid or process water pipelines and tanks and former precipitation plant cells with water to remove residual solutions and dispose of them in an approved manner;
- Salvaging and demolition of the acid-unloading and former precipitation plant buildings/structures (**Table 4-1**);
- Removal of all debris and visually affected soil at or near the surface in unpaved areas, disposal of debris or affected soil in an approved manner, and covering with 36 inches of suitable RCM;
- Collection of confirmation samples from areas where soils were removed, as necessary;
- Flushing of above-ground process water, PLS and raffinate pipelines (if they contained contaminated materials) that will not be part of the post-closure water management and water treatment system will be closed in accordance with Section 20.6.7.33.J NMAC;
- Capping all non-functional buried process water, PLS and raffinate pipelines;
- Filling and grading the acid-unloading and former precipitation plant area to promote positive drainage;
- Where footings, slabs, walls, pavement, manholes, vaults, storm water controls, and other foundations are abandoned in place over non-acid-generating material, and not demolished, they will be covered with topdressing to a depth of 18- 24 inches minimum;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used in the industrial or wildlife PMLU or not necessary for O&M, including water treatment;
- Maintaining and improving existing culverts and surface water conveyance structures (if required);
- Placement of 18 to 24 inches of suitable RCM over disturbed areas on non-acid-generating material (unless suitable cover material already exists in the case of a buried pipe approved to remain in place); and
- Seeding covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications.

## 5.4 Borrow Areas

Gila Conglomerate within the 5A Waste stockpile and residual Gila Conglomerate on the east side of the Main Pit (Lube Shop area) are considered the two primary sources of RCM for this CCP. Other borrows associated with reclaimed areas were developed and the majority have been reclaimed (there are a few active borrow areas). More information on the these borrow area and maps of their locations can be found in Borrow Pit Inventory and Status Report, dated March 30, 2018.

Additional proposed borrow areas include Precambrian Granite and Tertiary Quartz Monzonite overburden from the Little Rock Mine and the Copper Mountain Pit. In 2015, Tyrone constructed Precambrian Granite test pits and 4 vegetation studies have been completed as of January 2020. These initial results indicate the Precambrian Granite is a suitable cover material with the ability to resist erosion and support vegetation. The Precambrian

Granite and Tertiary Quartz Monzonite overburden materials have not been approved as a RCM at the time of this Tyrone CCP and therefore are not used as a borrow source for this Tyrone CCP.

These borrow areas, with the exception of the east side of the Main Pit, will have low-angle side slopes (3H:1V max.) as a result of the specified excavation plans. The closure/closeout activities planned for these areas consist of:

- Grading of borrow areas to create positive drainage from them;
- Installation of storm water controls with slopes not steeper than 3H:1V;
- Ripping of the borrow area bottoms and slopes, and the top surface and slopes of the 9A Waste stockpile to a depth of 24 inches, when necessary;
- Covering of the top surface and slopes of the 9A Waste stockpile with 12 inches of Gila Conglomerate;
- Covering of the top surface and all but the western portion (within the revised OPSDA) of the outslopes of the 5A Waste stockpile in areas exhibiting potentially acid-generating material with 36 inches of Gila Conglomerate (or other suitable material);
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications; and
- If practical, incorporation of the borrow pits into the post-closure water management system.

## 5.5 Water Management and Treatment Plan

The proposed water management and treatment plan included in **Appendix D** was developed in accordance with Section 20.6.7.33.H NMAC. The plan provides an engineering document that describes the processes and methods that will be used at Tyrone for long-term management and treatment of process water. The plan includes an analysis of the expected operational life of each water management and water treatment system throughout the post-closure period. The plan describes the proposed water management and water treatment systems in detail, including locations of key components, expected operational life, material take-offs, and the basis for which capital, operational and maintenance costs were prepared for financial assurance.

There are five sources of water that are likely to be sent to the proposed water treatment system and include the following:

- Residual process solutions from the leach operation;
- Meteoric water that infiltrates through the acid-generating stockpiles to seepage collection;
- Storm water runoff that comes into contact with un-reclaimed stockpiles;
- Dewatering water from the existing open pits; and
- Impacted groundwater captured in seepage collection and interceptor well systems.

Estimated flows for the individual sources contributing process water to the water management and treatment system are detailed in **Appendix D**. The estimates of the flow rates and sulfate concentrations for the individual seepage collection and interceptor well systems at the Tyrone Mine was based on existing flow and water quality data collected between January 2018 and the end of December 2019 for the individual systems that is recorded

by Tyrone in accordance with applicable operational discharge plans. Sources of water in-flow to the system related to open pit dewatering were based on the DBS&A Stage 2 Abatement Plan Proposal (APP) groundwater flow model (DBS&A, 2012) that was updated with the 2014 base case mine plan configuration and associated regrade plan. DBS&A developed geochemical mixing models using PHREEQC Interactive (version 3.0) (Parkhurst and Appelo, 1999) to support the Tyrone CCP Update (DBS&A, 2019). The mixing models estimate future water quality at the open pits at 15, 50, and 100 years post-closure. Initial (year zero) water quality for each of the open pits was based on 2018 water quality data. A linear interpolation was subsequently performed by Golder to estimate the water quality of the open pits between the Year 0, 15, 50, and 100 mixing models estimates.

Surface water runoff flows and sulfate concentration estimates were derived from implementation of a conceptual mathematical dynamic system model (DSM) using the GoldSim simulation software platform and the proposed reclamation plan presented in this updated CCP report. The DSM is a dynamic, probabilistic simulation model that projects the behavior of the mine system and the influence of various closure activities have on its performance. Runoff sources are segregated into impacted and non-impacted flows in the DSM. Runoff from reclaimed stockpile surfaces is non-impacted and can be discharged to the environment and is not conveyed to the ETS or water treatment system. These sources will be managed and or treated throughout site reclamation activities and for a duration of 100 years following cessation of mining operations consistent with the existing requirements of DP-1341. The following methods are proposed for management and treatment of impacted surface water and groundwater.

### 5.5.1 Water Management and Water Treatment Considerations

To meet the performance objectives, elements have been designed to segregate affected and non-affected waters as close to the source as possible. Non-impacted waters are to be released at approved points of discharge, and impacted waters are treated to meet NMWQCC water quality standards (Title 20, Chapter 6, Part 2, Subpart III, Section 3103, Standards for Groundwater of 10,000 milligrams per liter [mg/L] TDS concentrations or less). The basis of the design of water management and treatment operations considers the following:

- Quantity and quality of water to be managed through segregation from impact areas allowing for direct discharge;
- Quantity and quality of water to be treated (design basis influent);
- Water quality requirements for managed waters (direct discharge) and treated waters (treatment plant effluent);
- Water treatment unit process configuration;
- Treatment facility performance;
- Treatment facility location(s); and
- Sludge management.

### 5.5.2 Management and Treatment Processes

The five sources of water requiring management and or treatment through the 100-year period following cessation of mining operations will be handled as follows:

- A short-term ETS will be utilized to evaporate all process and non-process waters for the first 9 years following closure;
- A long-term ETS will be utilized to evaporate all high TDS and high sulfate source waters captured in seepage collection and interceptor well systems in the mining area (MA) beginning in Year 10 and continuing through Year 100 after closure. The long-term ETS will also be utilized to evaporate brine reject waters from the membrane system beginning in Year 15 and continuing through Year 100 after closure;
- A combined HDS and membrane system will be utilized beginning in year 15 and continuing to year 100 following closure to treat impacted waters collected in the MA. This system is referred to as the Tyrone Treatment System (TTS);
- Minimization of impacted surface runoff requiring treatment. Storm water runoff will be managed through surface reclamation to preclude potential for contact with stockpiles. Impacted storm water runoff will be collected and treated for a period of 100 years following closure;
- Minimization of impacted pit water requiring treatment through the installation and operation of a groundwater interceptor well system located on the western/northwestern slope of the Main Pit;
- Diversion of non-impacted meteoric water and storm water surface runoff, to the extents practicable, away from potentially impacted sources, which will allow for discharge to an approved surface discharge area in accordance with state regulations. Non-impacted water sources will not require treatment prior to discharge;
- Storage of stockpile seep water and groundwater from seepage collection and interceptor systems in surface impoundments and tanks will allow for sampling and analysis prior to final disposition. Water that is shown to be in compliance with applicable NMWQCC water quality standards (Title 20, Chapter 6, Part 2, Subparts II and III), will be discharged. Impacted water will be conveyed to the proposed water treatment systems; and
- Pit water will be pumped to the short-term ETS through Year 14, and to the TTS beginning in Year 15.

This strategy will maximize the quantity of non-impacted water and minimize the quantity of impacted water that must be treated prior to release. These sources will be managed and/or treated during reclamation activities and for a duration of 100 years following cessation of mining operations. The ETS and proposed STS water treatment facilities are described in more detail in the following sections and could change when implemented.

### *Evaporative Treatment System*

The ETS will include both a short-term program (through the first 9 years following closure) and a long-term program (years 10 through 100) for treating process waters at Tyrone. A detailed description of the ETS programs are included in **Appendix D** and are summarized below.

There are two ETS programs and associated operational periods. The short-term ETS program is based on an operational period of Years 1 through 9. For Years 1 through 9 the leach stockpiles will largely be unreclaimed and the short-term ETS will include recirculation of all process solutions with drip irrigation systems, operational spigots, and forced spray evaporation systems. As part of the recirculation system at the Tyrone Mine, the existing mine process solution distribution system (drip system) will be utilized to recirculate all residual process solutions to the top surface areas of the leach stockpiles (1A Leach, 1B Leach, 2A Leach, 2 Leach (Areas 1 and 2), 3A Leach, 6A Leach, 6B Leach, 6C Leach, 6D Leach, and 7B Leach) for a period of nine years. These waters will be collected and treated by evaporation by the short-term ETS system to allow time for construction of the TTS and to reduce the volume of impacted waters requiring treatment with the TTS during the initial years of

closure. Using the short-term ETS for residual process solutions allows for minimization of secondary waste (sludge) generation and associated optimization of operational costs. Evaporation during this nine-year period will mostly occur at the top surface of the leach stockpiles and to a lesser amount at the PMLU surface impoundments, overflow ponds, and tanks. The residual process solutions will drain through the leach stockpiles and then will be recirculated through the existing mine process solution distribution system.

Initiation of leach stockpile reclamation will begin at the 6A Leach at the EOY 5, and reclamation of the remaining leach stockpiles will be initiated in the beginning of the second quarter of Year 10. Beginning in Year 9, two new HDPE-lined spray evaporation ponds will be constructed (one 7-acre pond in the footprint of the Decant Ponds, and one 3.2-acre pond constructed in the SX/EW Plant area). The long-term ETS will be initiated at the beginning of Year 10. The long-term ETS from Year 10 through Year 14 will include forced spray evaporation systems installed at the two new HDPE-lined spray evaporation ponds. All the high TDS and sulfate sources will also be distributed within this system for the duration of the long-term ETS operation. Beginning in Year 15 and continuing through Year 100 following closure, all of the low TDS and sulfate non-process and process waters will be conveyed to the TTS, and the long-term ETS will be used to evaporate all high TDS and sulfate process waters and brine reject waters from the TTS membrane system.

### *Long-Term Water Treatment Facility*

The Tyrone long-term water treatment system will include a membrane filtration and HDS lime precipitation system located at within the SX/EW Plant area, which is detailed in **Appendix D**. Both the ETS and the HDS systems will provide long-term metals and sulfate removal for the 100-year closure period. This treatment configuration results in a single plant site, increasing operating efficiency. This conceptual treatment configuration optimizes capital and operating costs while meeting regulatory limits for discharge of treated effluent. The concept and process development of the HDS and membrane filtration treatment components and associated primary and ancillary equipment sizing is based on the treatability studies conducted by Van Riper Consulting (VRC 2002 and 2008), Hazen Research (VRC, 2008), and HW Process Technologies (VRC, 2008).

All low TDS and sulfate non-process water streams will be sent to the HDS system to increase the pH and remove metals and sulfate. Most of the treated water from the HDS system will be further treated in a membrane system for final total suspended solids polishing in a microfiltration (MF) system and for sulfate removal in a reverse osmosis (RO) system. A portion of the treated effluent from the HDS will bypass the membrane treatment system and be recombined prior to effluent equalization to add minerality back to the final effluent and prevent effluent toxicity due to extremely low conductivity. The MF unit provides suspended solids removal to prevent fouling of the RO membrane. Treated effluent (permeate) from the MF unit will be sent to the RO unit. The RO unit uses a series of semi-permeable membranes that removes dissolved monovalent and divalent (and higher valences) constituents including some metals and sulfate.

The MF and RO reject streams will be sent to the long-term ETS to reduce the overall lime demand of the TTS. Chemical precipitation is a conventional and widely used treatment for the removal of metals. A portion of the sulfate concentration will also be removed. With the addition of lime, the pH is adjusted to the range of approximately 10 to 11 in order to achieve the minimum solubility for the target compounds. The dissolved contaminant forms an insoluble precipitate which can then be removed from the water by clarification. A flocculent is added to increase the settling rate of precipitated solids.

A portion of the HDS effluent will bypass the membrane treatment system and be recombined with the RO permeate prior to effluent equalization to ensure compliance with applicable NMWQCC water quality standards

(Title 20, Chapter 6, Part 2, Subparts II and III) for discharge. Acid will be added to the clarified process stream to reduce the pH to the target range (7.5 to 9) prior to discharge.

### *Sludge and Salt Management*

The sludge disposal facility (SDF) will be developed on top of the 3A Leach stockpile. Precipitated solids removed during clarification will be further dewatered by pressure filtration as detailed in **Appendix D**. The treatment of the highest concentration sulfate solutions in the ETS reduces the sulfate load to the HDS plant reducing overall chemical requirements and the quantity of sludge produced. Based on operations of similar HDS systems and the Van Riper Consulting test work, it is expected that dewatering in a filter press will achieve approximately 50% solids by weight in the dewatered sludge. Dewatered sludge will be sent to the on-site SDF.

The proposed SDF will cover an area of approximately 25 acres on the top surface of the 3A Leach stockpile, and the TTS will be located nearby within the SX/EW Plant area. The sludge volume is calculated based on the results of HDS treatability studies conducted by Hazen Research under the direction of Van Riper Consulting (VRC, 2008). The quantities are scaled based on revised projections of flow and sulfate concentrations. The predictions show lower flow rates and changes in water chemistry, which decrease the rate of sludge production through the operational life of the treatment plant. The capacity of the disposal facility is adequate for sludge produced for 85 years of operation of lime/HDS treatment plant. Estimated sludge volumes to be sent to the SDF were calculated from the projected sulfate concentrations. Based on these calculations, it is estimated that 1,635,108 CY of sludge (50% solids by weight) will require storage at the SDF during the 85-year TTS operation period.

The proposed salt disposal facility will be constructed immediately north of spray evaporation pond #1 in the 2A Flat area. Approximately 15 acres of the flat area located directly east of the 2A Leach stockpile will be lined with 80-mil HDPE and an earthen berm will be constructed around the perimeter. Salts generated from the evaporation of the high TDS and sulfate process waters and brine reject waters as part of the ETS will be hauled to and stored at the HDPE-lined salt disposal facility. The total estimated amount of salts produced annually is summarized in **Appendix D**, and is based on the estimated water quality and flows associated with the high TDS and sulfate process water and brine reject streams over the 100 year post-closure period.

An estimated 1,265,300 CY salt will require storage at the salt disposal facility during the 90-year ETS operational period (Years 10 through 100 of the long-term ETS). The capacity of the disposal facility is adequate for salt produced for 90 years of operation of ETS. Salt generation rates and volumes are based on the estimated water quality of the combined flow stream from high TDS and sulfate non-process waters and brine reject waters and the estimated amount of evaporation from the mechanical spray systems and surface impoundments over 90 years of ETS operation. The amount of salt generation begins to drop off in Year 15 when the TTS comes online.

The closure/closeout activities planned for the SDF and HDPE-lined salt disposal facility are the same as those described for the stockpiles in Section 5.2.1. Revegetation of these facilities will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with Appendix C of the MMD Permit and applicable modifications. The planned seed mix is discussed in Section 7.0.

# 6.0 CLOSURE & POST- CLOSURE MONITORING, REPORTING, AND CONTINGENCY PLANS

Closure and post-closure monitoring will be conducted at the Tyrone mine to ensure that the closed facilities are performing as designed, are protective of water quality, and will allow for the establishment of a self-sustaining ecosystem. Closure and post-closure monitoring, reporting, and contingency planning will be conducted in

accordance with the Copper Mine Rule, Section 20.6.7.35 NMAC, DP-1341 and the MMD Permit GR010RE. The costs associated with the closure and post-closure monitoring are included in the CCP financial assurance cost estimate using an assumed third party to complete all the monitoring listed in Sections 6.0 through 7.0.

All the closure and post-closure groundwater, surface water, seep, spring, interceptor system, tailings draindown, and piezometer monitoring data will be reported in accordance with 20.6.7.35 NMAC and DP-1341. Additionally, as specified in Section 20.6.7.35.D NMAC, Tyrone will submit to the NMED and MMD semi-annual reports summarizing reclamation and post-closure activities each year. Tyrone will also prepare potentiometric maps that include data from all monitoring wells, extraction wells, piezometers, seeps, and springs and submit them annually to the NMED in accordance with Section 20.6.7.35.B NMAC.

Tyrone has also submitted annual reports to MMD beginning in year two of the test plot studies in accordance with Condition L.1.d of the MMD Permit (MMD, 2004). The MMD guidelines require monitoring of revegetation during the responsibility period to evaluate revegetation success, and NMWQCC Regulation 3107.A.11 requires the development of post-closure monitoring and contingency plans that are consistent with the terms and conditions of the applicable DP. Additional monitoring and reporting requirements associated with public health and safety, revised conditional waiver area and revised OPSDA, and construction quality assurance plans are specified in the Copper Mine Rule and the MMD Permit (MMD, 2004). The following sections summarize the general approach that will used to meet these requirements.

## 6.1 Erosion and Drainage Control Structures

All closure components requiring a cover system will be visually inspected for signs of excessive erosion and significant erosion features that may compromise the functional integrity of the cover system or drainage channels in accordance with 20.6.7.35 NMAC and Section 9.N.1 of the MMD Permit. In accordance with Section 20.6.7.35.C NMAC, Tyrone will conduct inspections and submit reports of the reclaimed facilities monthly for the first year following submission of the final CQA/CQC for the unit, and quarterly thereafter. Additional erosion inspections will also be conducted after a one inch or more precipitation event within a 24-hour period. Tyrone will report evidence of excessive erosion and/or structural failures to the appropriate agencies (MMD, NMED, or New Mexico Office of the State Engineer [NMOSE]) in a timely manner. A written report detailing the nature and extent of the problem and a corrective action plan will be developed after the problem is identified in accordance with Section 20.6.7.30.I NMAC.

As specified in 20.6.7.35.C NMAC, Tyrone will routinely inspect and maintain all drainage channels, diversion structures, retention impoundments, and auxiliary erosion control features in accordance with professionally recognized standards, such as the Natural Resources Conservation Service.

## 6.2 Groundwater and Surface Water Control Facilities

In accordance with DP-1341 (NMED, 2003a) and 20.6.7.35.A NMAC, Tyrone will perform quarterly inspections and annual evaluations of all groundwater abatement systems, including the seepage interceptor systems, and perform maintenance as necessary to ensure that all water contaminants are managed in a manner that is protective of groundwater quality. Monitoring of site water quality will be accomplished through sampling and analysis of potentially impacted water at site locations. Groundwater quality will be monitored throughout the post-closure period. The intent of the groundwater monitoring is to evaluate the effectiveness of the groundwater containment systems and demonstrate compliance with applicable regulations and standards. The monitoring schedule, analytical requirements, location, and construction specifications for the monitoring wells will be

determined in consultation with NMED. The analytical results will be reported to the NMED as specified in DP-1341 and 20.6.7.35.B NMAC.

Contingency Plans and Emergency Response Plans were submitted in December 2003 (PDTI, 2003c), April 2004 (PDTI, 2004a), and June 2017 (DBS&A, 2017) that present details for addressing potential failures of individual components of the Tyrone Mine closure plan, including an increase in the extent or magnitude of groundwater and/or surface water contamination, potential failures associated with interceptor systems and impoundments, and potential failures of various components of closed lands. The emergency response plans outline operational parameters and contingencies to address operation failures at Tyrone associated with pumping water from the open pits, sumps, and other impoundments that may contain affected water. Accordingly, Tyrone will verify any potential discharges not approved in DP-1341. If an unapproved discharge is identified, Tyrone will perform appropriate corrective actions in accordance with 20.6.7.30 NMAC.

Perennial surface waters of the state will be monitored to determine the effectiveness of the reclamation. Post closure surface water monitoring locations and schedules will be established in consultation with NMED. Surface water quality around the perimeter of closed facilities will be monitored according to the Tyrone Mine Storm Water Pollution Prevention Plan (Freeport McMoRan Tyrone, Inc., 2012), Sitewide Water Management Plan (DBS&A, 2020), and 20.6.7.35.B NMAC. Tyrone proposes to monitor water quality in several of the surface impoundments designated for post-closure stormwater control in **Table 5-1** as well as NPDES outfall sample points. These data will be reported according to the Tyrone NPDES permit, DP-1341, and 20.6.7.35.B NMAC.

Samples will be collected in accordance with 20.6.7.28 and 20.6.7.29 NMAC and applicable DP-1341 conditions in all groundwater monitoring wells, seep and spring monitoring points, seepage interceptor ponds, and surface impoundments used to store and convey process solutions that are required to be monitored during the closure and post-closure period, and in all new monitoring wells installed after closure for compliance monitoring purposes. Sample collection will be done in-house or under contract by an independent environmental engineering firm. Collected samples will be shipped to an independent analytical laboratory for analysis.

The water treatment plant will be on a continuous schedule of sampling and recording for operational control. Automatic samplers will be employed to collect composite samples of influent and effluent streams. Each month, one composite sample of water treatment plant influent and one composite sample of water treatment plant effluent will be shipped to an independent analytical laboratory for analysis of contaminants of concern. A report will be prepared to document the sampling and analysis for review and recording by site management and review by regulatory authorities in accordance with 20.6.7.35.C NMAC.

## 6.3 Revegetation Success Monitoring

The reclaimed areas will be monitored in accordance with 20.6.7.35.C NMAC and Section 9.N.2 of Revision 01-1 of the MMD Permit and more current permit modifications (e.g., permit modifications 10-1 and 12-1) after the final grading and the initial establishment of vegetation on the reclaimed lands. Tyrone will conduct vegetation monitoring of both volunteer revegetation and re-seeded areas in accordance with MMD permit conditions. The revegetation monitoring will be conducted to meet statistical adequacy under the vegetation monitoring schedule prior to bond release. Revegetation monitoring will include canopy cover, plant diversity, and woody stem density as specified in Section 9.N.2 of the MMD Permit (MMD, 2004).

## 6.4 Wildlife Monitoring

Pursuant to Section 9.N.3 of Revision 01-1 of the MMD Permit, Tyrone submitted a wildlife monitoring plan for post closure in December 2005 (Golder, 2005e). This plan was approved by the MMD and New Mexico Department of Game and Fish February 15, 2006. The monitoring plan provides a description of the proposed reclamation plan as it applies to wildlife and wildlife habitat, an overview of the existing species and wildlife habitat within the vicinity of the Tyrone Mine, and the proposed methods for deer pellet group counts and bird surveys.

Tyrone will continue to perform wildlife monitoring in accordance with the approved wildlife monitoring plan and the MMD permit and applicable modifications. Results of the monitoring will be evaluated to determine wildlife use trends during re-establishment of a self-sustaining ecosystem. The results of the surveys will not be a condition of, or given consideration with regard to financial assurance release.

## 6.5 Public Health and Safety

Pursuant to Sections 9.E.1.2 and 9.F.2 of Revision 10-1 of the MMD Permit (MMD, 2012), Tyrone will submit written details and maps showing the locations of berms and fences that will be placed at the interface of the revised conditional waiver stockpile areas and the non-waived stockpile areas; and around the pits to restrict access by unauthorized personnel and provide for public safety within 180 days of cessation of operations. Annual visual inspections of the interface of the revised conditional waiver stockpile areas and the non-waived stockpile areas, and quarterly visual inspections of the stability of the pit walls will be conducted to identify potential failure areas which may adversely impact the environment and public health or safety. If failure areas are identified, Tyrone will propose measures to mitigate the hazard within 30 days of identification for MMD approval. Any evidence of stockpile or tailing impoundment instability that could potentially result in a slope failure or an unauthorized discharge will be reported to the NMED as soon as possible, but not later than 24 hours after discovery and corrected pursuant to 20.6.7.30.I NMAC.

## 6.6 Adjustment of Revised OPSDA and Revised Conditional Waiver Area

In accordance with DP-1341 and 20.6.7.35.B NMAC, Tyrone will prepare potentiometric maps annually. Tyrone proposes to include an updated delineation of the OPSDA (NMED) and associated MMD's conditional waiver area (as approved in MMD Permit GR010RE) with the annual submittal of the potentiometric maps.

## 6.7 Construction Quality Assurance Plan

Pursuant to Sections 9.G.3a of Revision 01-1 of the MMD Permit and 20.6.7.34.A, 20.6.7.34.B and 20.6.7.34.F NMAC, Tyrone will submit a final design and CQA/CQC Plan to the NMED and MMD for approval no less than 180 days of submission of a notice of intent to implement the closure plan and 60 days prior to construction. In accordance with 20.6.7.34.G NMAC, a CQA/CQC report will be supplemented with a CQAR to be submitted to the MMD within 180 days after completion of construction.

## 6.8 Alternative Abatement Standards

In accordance with DP-1341 and 20.6.2.4103 NMAC, Tyrone may submit a petition for alternative abatement standards. The petition will be prepared in accordance with Section 20.6.2.4103.F NMAC. Tyrone's petition will identify proposed alternative abatement standards for constituents that are predicted to exceed the abatement standards in 20.6.2.4101.B and 4103.A and .B NMAC after implementation of approved closure measures and schedules.

# 7.0 POST-MINING LAND USE DESIGNATION

This section provides the post-mining land use (PMLU) for the permit area as a whole and for specific facilities at Tyrone based upon the requirements of the MMD Permit, NMMA Section 69-36-11.6, and Subparts 507.A and 507.B of the NMMA Rules (MMD, 1996). PMLUs are specified in Section 3.G. of the MMD Permit. The approved PMLUs for Tyrone are wildlife habitat and industrial (MMD, 2004 and 2012). The selection of the wildlife habitat and industrial PMLUs for purposes of the NMMA does not preclude multiple beneficial uses (e.g., grazing, recreation, and watershed) in the post-closure period by the surface landowners (e.g., BLM and USFS). Wildlife habitat is the primary PMLU for the majority of the permit area, with an industrial PMLU designated for the Mine Maintenance Facilities Area, including the SX/EW Plant area, and several of the remaining buildings located within the Reclaimed Former Mill & Concentrator Area. The proposed PMLU areas are shown on **Figure 7-1**.

## 7.1 Wildlife Habitat Post-Mining Land Use

Reclamation will result in the development of an early-stage grass/shrub community that will provide a locally important increase in community-level diversity. Some infrastructure may have a post-mining wildlife use such as main roads for land management, and modified mine openings for use by ringtail cats, bats, and other wildlife. Native vegetation will be established on the reclaimed areas at Tyrone resulting in increased erosion protection, direct habitat improvement, and reduced percolation of water into the underlying materials relative to current conditions. The proposed reclamation seed mix and seeding rates for the Tyrone Mine are presented in **Table 7-1** and are in accordance with Appendix C of the MMD Permit and applicable modifications. These species have broad ecological amplitudes and provide structural diversity.

The proposed seed mix was selected to provide a long-term sustainable ground cover, erosion control, and diversity in growth forms. The species selected for Tyrone have been successfully used in mine reclamation and range improvement projects in many parts of New Mexico, including the Tyrone Mine. The primary reclamation seed mix proposed for the wildlife habitat PMLU areas at Tyrone include native and adapted grasses, shrubs, and forbs. Depending on availability, alternate species may be substituted for the primary species. The seed mixes were designed for application prior to the summer rains.

**Table 7-2** lists some of the major attributes of the vegetation selected for use at the Tyrone Mine. The selected vegetation will provide erosion control, promote soil development, and provide forage, seeds, and cover for small mammals and birds. The seed mixes include a number of valuable, nutritious forage and browse species that could be used by wildlife.

## 7.2 Industrial Post-Mining Land Use

The industrial PMLU designation of buildings and structures are summarized in **Table 7-3**. This table includes buildings and facilities approved for industrial PMLU in the MMD Permit, with the exception of certain buildings that have since been removed as part mine operations and ongoing reclamation activities at the mine. NMED requires abatement of contaminated soils that are potential source areas for groundwater and surface water contamination in accordance with 20.6.2.1203, 20.6.2.3109.E.1, and 20.6.2.4103 NMAC in and around all facilities and structures approved by MMD to be left for an industrial PMLU or structures necessary for post-closure treatment and disposal of groundwater and/or surface water.

The areas approved for industrial PMLU have the infrastructure necessary to support a variety of future industrial uses. The buildings are currently being used and are well maintained and most of the areas have significant shop facilities and warehouse storage capacity. The Maintenance Facilities Area Mine, including the SX/EW Plant area,

and several of the remaining buildings located within the Reclaimed Former Mill & Concentrator Area are accessible by roads. Electrical power is available in each area, and stormwater runoff from the areas is contained within the on-site stormwater ponds. Finally, ample water resources are available due to the water rights that Tyrone controls.

Tyrone will maintain erosion controls, structures, equipment, and utilities within the industrial PMLU areas until they are occupied by tenants. The areas identified for the industrial PMLU are currently used for industrial purposes such as water treatment, warehousing, heavy equipment repairs, metals recovery, electrical distribution and repairs, welding, machining, plumbing, and training. Although the industrial PMLU will continue the existing type of use, the specific industry will change. Possible industrial uses that may be recruited were described in previous justifications for the industrial PMLU for these sites.

## 7.3 Site-Specific Revegetation Success Standards

Section 507.A of the NMMA rules (MMD, 1996) requires that the permit area of an existing mine be reclaimed to a condition that allows the establishment of a self-sustaining ecosystem appropriate for the life zone of the surrounding area unless it conflicts with the approved PMLU. Demonstration of the establishment of a self-sustaining ecosystem is made by comparison of the vegetation on the reclaimed areas to vegetation attributes on a reference area and/or technical standards (MMD, 1996).

The MMD recognizes that replication of the pre-mining plant communities after mining is not practical (MMD, 1996). The intent of the reference area characterization is to provide a site-specific, quantitative basis for determining revegetation success. More importantly, the reference area provides an “ecological barometer” that integrates normal climatic variations to aid in the evaluation of temporal changes or trends in the reclaimed ecosystem. Thus, the reference areas do not represent model plant communities that will be replicated in detail, but rather local indications of the ecological potential of the reclaimed plant communities.

The reclamation success standards required by the MMD vary depending on the PMLU. Canopy cover, shrub density, and vegetation diversity are the revegetation success standards that are typically used to judge revegetation success on lands designated as wildlife habitat. The vegetation success standards include numerical standards to address the canopy cover and shrub density requirements of the NMMA.

The plant diversity standards are addressed through a technical standard and are complemented by a qualitative assessment of plant colonization and regeneration to corroborate the establishment of a self-sustaining ecosystem. A detailed description of the vegetation success standards is included in DBS&A (1999). The approved standards for revegetation success that apply to Tyrone are discussed in sections 7.3.1 through 7.3.3.

### 7.3.1 Canopy Cover

Because of its broad implications for erosion control and ecologically based PMLUs, canopy cover is one of the primary criteria for determining reclamation success. Tyrone has a proportional success standard for total canopy cover equal to 70 percent of the measured reference area value. The proportional standard was determined based on the interpretation of the community structure and ecological conditions in the reference area. The proportional standard reflects the view that the typical 12-year bond release period does not allow enough time for full maturation of the reclaimed plant community relative to the native sites. The numerical standard derived from the proportional standard will vary over time to account for temporal differences in canopy cover associated with climatic variations. Thus, the numerical standard may increase or decrease based on reference area measurements, but the proportional standard will remain fixed.

### 7.3.2 Shrub Density

Shrubs are important components of many reclaimed landscapes. A proportional success standard of 60 percent (of the reference area) has been accepted by the MMD for shrub density in the reclaimed areas. As with canopy cover, the shrub density standard was determined based on the interpretation of the ecological conditions of the reference areas.

### 7.3.3 Plant Diversity

Species diversity is commonly thought to increase the stability of plant communities. The perceived enhancement of ecological stability is related to the buffering effect that species with different ecological amplitudes provide in response to environmental stresses. A technical, rather than proportional, standard will be proposed for plant diversity.

The plant diversity standards for Tyrone are based on the assumption that site stability is improved by establishing plants with different ecological amplitudes to buffer seasonal and annual fluctuations in climate. Tyrone understands that creating a monoculture on the reclaimed lands is not desirable, while at the same time, recognizing that the benefits of increased diversity diminish beyond subjective threshold levels that are defined by the reclamation objectives. Thus, the diversity stand for Tyrone was developed from a functional perspective, whereby site stability and erosion control are primary performance objectives. In addition, these standards were developed in recognition of the limitations associated with the sampling and statistical evaluation of plant communities whereby minor components are often not represented in the monitoring data.

The proposed numerical diversity standards for the Tyrone mine are listed in **Table 7-4**. The current diversity standard would be met if the reclaimed area contains at least three warm season grasses and two shrubs, with individual cover levels of at least 1 percent, and one perennial, cool season grass with a minimum cover level of 0.5 percent. For the purposes of this current standard, intermediate-season grasses such as plains lovegrass are considered the functional equivalent of the more traditionally defined cool season grasses. In addition, one non-weedy forb species should occur at a minimum cover level of at least 0.1 percent to meet the proposed diversity standard. The forb standard is unqualified with respect to seasonality and could include a perennial, biannual, or annual species.

Additional work at Chino and Tyrone has been completed since the CCP submittal in 2013. As shown on **Table 7-4**, Tyrone proposes to change the numerical standard of perennial cool season grasses from 2 to 0 (eliminating the cool-season grass standard), based on the results of the test plots and vegetation monitoring studies at Chino and Tyrone. The elimination of the cool-season grasses is consistent with the surrounding ecosystem and will not negatively affect the PMLU.

Species diversity on the reclaimed areas is expected to increase with time; however, this process is likely to be slow. Successful colonization depends on the convergence of a seed source and the proper weather conditions; however, even with such an ideal convergence, inter-specific competition, predation, and dispersion mechanisms may limit the establishment of new plants on the reclaimed area. Because of the strong climatic influence on seed production and plant establishment, the rate of colonization is expected to be erratic and potentially slow for many species, with the highest rates of colonization expected to be concentrated in the reclaimed/undisturbed ecotone. Evidence of colonization will complement the numerical diversity standards listed in **Table 7-4**. No numerical standard is proposed for colonization, which would be demonstrated by increases in the number of species recognized in the reclaimed area. Information on colonization will be collected and reported to provide evidence of the ability of the reclaimed landscape to support native plants from the surrounding communities. Secondarily,

observations of colonization provide evidence of regeneration and thus help demonstrate the establishment of a self-sustaining ecosystem required in the NMMA.

The intent of the colonization standard is to provide evidence of the ability of the reclaimed landscape to support plants from the surrounding communities. In addition, observations of colonization provide evidence of regeneration and thus support the demonstration of the establishment of a self-sustaining ecosystem. No numerical standard is proposed for colonization, which will instead be demonstrated by increases in the number of species recognized in the reclaimed area. This information will be obtained from the relative cover data or documented observations along the margins of the reclaimed areas.

# 8.0 CAPITAL AND OPERATION AND MAINTENANCE COST ESTIMATES

This section provides a brief description of the material take-offs and factors that were applied in the capital and O&M cost estimates associated with the Tyrone reclamation plan, and a summary of the cost estimates themselves. The Earthwork Cost Estimate Summary report associated with this CCP was submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and was subsequently revised in April 2020 based on comments received by the agencies. The revised Earthwork Cost Estimate Summary report associated with this CCP is included in **Appendix C**. A detailed scope of work, cost basis, and cost estimate for the proposed water management and water treatment systems is also provided in **Appendix D** and serves as the financial assurance cost estimate associated with this component of the CCP.

## 8.1 Basis for Capital Cost Estimates

The material takeoffs for reclamation of the Tyrone Mine were prepared in accordance with standard engineering practice. The material takeoffs for the major reclamation earthwork components are summarized in the table below.

| Earthwork Material Take-Off Summary | | |
|---|---|---|
| **Item** | **Quantity** | **Units** |
| **Earthwork** | | |
| Stockpile & Pit Reclamation<br>Stockpile Reclamation Only | 2,701<br>2,521 | acres<br>acres |
| Stockpile Grading | 28.1 | million cubic yards |
| Stockpile Bench Grading | 295,500 | feet |
| Stockpile Cover Material | 11.9 | million cubic yards |
| Stockpile Cover and Revegetate | 2,586 | acres |
| Stockpile Surface Water Conveyance Channels and Downdrains | 376,905 | feet |
| Open Pit Grading | 1.6 | million cubic yards |
| Open Pit Cover Material | 556,600 | cubic yards |
| Open Pit Cover and Revegetate | 115 | acres |
| Disturbed Areas[1] | 200 | acres |
| Building Demolition | 13.2<br>9,448<br>473,770 | million cubic feet<br>square feet<br>gallons |

[1-] Includes 200 acres of miscellaneous disturbed areas present at the Tyrone Mine to facilitate minor changes to disturbances that may occur over the next five years, so that the financial assurance is in place without having to modify the permit every time a small change is required to sustain mine operations.

### 8.1.1 Basis for Earthworks Capital Cost Estimates

The earthwork reclamation cost estimate developed by Telesto Solutions Inc. in May 2019 was based on a template originally created by the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD, 1996). The estimate includes reclamation earthwork and site O&M costs and was based on the reclamation designs for the Tyrone Mine included in **Appendix A.** The basis for which the earthwork capital cost estimate was developed was included in the Earthwork Cost Estimate Summary report associated with this CCP that was submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and was

subsequently revised in April 2020 based on comments received by the agencies. The updated 2020 Earthwork Cost Estimate Summary report is included in **Appendix C**.

### 8.1.2 Basis for Water Treatment Capital Cost Estimates

The basis for the capital cost estimate details associated with water management and treatment are provided in **Appendix D**. Specific details of the influent design basis, proposed water management and treatment system designs, quantity takeoffs, calculations, and supporting documentation are included in **Appendix D**.

## 8.2 Basis for Operation and Maintenance Cost Estimates

A summary of the basis for O&M cost estimates along with supporting documentation are provided below.

### 8.2.1 Basis for Earthworks Operation and Maintenance Cost Estimates

Earthwork O&M costs are related to necessary erosion control, road maintenance, and vegetation maintenance. O&M costs are assumed to diminish with time and are allocated over time periods of years 0 to 19, years 20 to 39, and years 40 to 99 as follows:

- **Years 1 to 19**: erosion control work will be required 30 days per year; road maintenance will be required monthly during the monsoon season; and vegetation maintenance is based on an assumed 2% failure every year for a total of 12 years, starting the year reclamation is completed.
- **Years 20 to 39**: erosion control work will be required 24 days per year; road maintenance will be required monthly during the monsoon season; and vegetation maintenance is assumed to not be required.
- **Years 40 to 99**: erosion control work will be required 15 days per year; road maintenance will be required monthly during the monsoon season; and vegetation maintenance is assumed to not be required.

Further details on the basis of the operation and maintenance cost estimates for earthworks are provided in the Earthwork Cost Estimate Summary report associated with this CCP that was submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and subsequent April 2020 revisions based on comments received by the agencies included in **Appendix C**.

### 8.2.2 Basis for Water Management and Treatment Operation and Maintenance Cost Estimates

O&M costs for water management and treatment were estimated annually for the 100-year post-closure period. The O&M costs for water management and treatment include labor, capital for equipment replacement, routine maintenance parts costs, utilities (power costs), chemical reagents, sludge disposal, salt disposal, water treatment and handling, and sampling and analysis. Further details on the water management and treatment system and the associated basis of the operation and maintenance cost estimates are provided in **Appendix D**.

## 8.3 Capital Cost Estimates

The cost estimate has been prepared in accordance with standard engineering practice and is supported with data from various references and is fully documented in the Earthwork Cost Estimate Summary report associated with this CCP that was submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and subsequent April 2020 revisions based on comments received by the agencies included in **Appendix C**, and **Appendix D** (Water Management and Treatment). The capital costs for closure are summarized in the following table:

| Capital Cost Summary | | | |
|---|---|---|---|
| **Item** | **Subtotal Direct Costs** | **Subtotal Indirect Costs[1]** | **Total (Current Cost)** |
| **Earthwork** | | | |
| Facility and Structure Removal | $5,272,482 | $1,581,745 | $6,854,227 |
| Earthmoving | $44,570,234 | $13,371,070 | $57,941,304 |
| Revegetation | $2,481,685 | $744,506 | $3,226,191 |
| Other[2] | $21,962,153 | $6,588,646 | $28,550,798 |
| **Earthwork Capital Subtotal** | **$74,286,554** | **$22,285,966** | **$96,572,521** |
| **Water Management and Treatment** | | | |
| Short-Term Evaporative Treatment System | $1,331,300 | $399,390 | $1,730,690 |
| Long-Term Evaporative Treatment System | $1,257,312 | $377,194 | $1,634,506 |
| Water Treatment Facility (Including Water Collection and Conveyance) | $8,192,306 | $2,457,692 | $10,649,998 |
| Sludge Disposal | $142,305 | $42,692 | $184,997 |
| Salt Disposal | $990,022 | $297,007 | $1,287,029 |
| **Water Management and Treatment Capital Subtotal** | **$11,913,245** | **$3,573,974** | **$15,487,219** |
| **Total Capital Cost** | **$86,199,799** | **$25,859,940** | **$112,059,740** |

**Notes:**
[1] –It is assumed that indirect costs, for capital, is 30% of the estimated direct capital cost based on the 2018 FA Work Group meetings and agreement and the associated approval letter issued by the State of New Mexico in January 2019.

[2]–Other includes well replacements, well abandonments, fencing and gates, signage, bench grading, conveyance channels, downdrains and berms.

## 8.4 Operation and Maintenance Cost Estimates

The operations and maintenance (O&M) cost estimate details and supporting documentation are provided in the Earthwork Cost Estimate Summary report associated with this CCP that was submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and subsequent April 2020 revisions based on comments received by the agencies included in **Appendix C**, and **Appendix D** (Water Management and Treatment). A summary of these details is provided below.

### 8.4.1 Earthwork

O&M estimated costs relate to periodic erosion control, road maintenance, and vegetation maintenance are included in the Earthwork Cost Estimate Summary report associated with this CCP that was submitted to the NMED and MMD in May 2019 (Telesto Solutions, Inc., 2019) and was subsequently revised in April 2020 based on comments received by the agencies. The updated 2020 Earthwork Cost Estimate Summary report is included in **Appendix C**. O&M costs for closure are summarized in the following table:

| Earthwork O&M Cost Summary | | | |
|---|---|---|---|
| **Item** | **Subtotal Direct Costs** | **Subtotal Indirect Costs[1]** | **Total (Current Cost)** |
| Road Maintenance | $2,361,820 | $413,319 | $2,775,139 |
| Erosion Control | $2,031,171 | $355,455 | $2,386,626 |
| Vegetation Maintenance | $1,103,097 | $193,042 | $1,296,139 |
| Tailing Cover Maintenance | $150,101 | $26,268 | $176,368 |
| Groundwater Monitoring | $1,921,894 | $336,331 | $2,258,226 |
| **Earthwork O&M Subtotal** | **$7,568,083** | **$1,324,415** | **$8,892,498** |

**Note:**
[1] –It is assumed that indirect O&M costs in total are 17.5% of the estimated direct O&M cost based on the 2018 FA Work Group meetings and agreement and the associated approval letter issued by the State of New Mexico in January 2019.

### 8.4.2 Water Management and Treatment

O&M costs for water management and treatment are estimated annually for the 100-year post-closure period. O&M estimated costs for the major components of the water management and treatment system over the 100-year period are summarized in the following table:

| Water Treatment O&M Cost Summary | | | |
|---|---|---|---|
| **Item** | **Subtotal Direct Costs** | **Subtotal Indirect Costs[1]** | **Total (Current Cost)** |
| Short-Term Evaporative Treatment System | $18,399,918 | $3,219,986 | $21,619,904 |
| Long-Term Evaporative Treatment System | $13,910,403 | $2,434,321 | $16,344,724 |
| Water Treatment Facility (Including Water Collection and Conveyance) | $219,126,626 | $38,347,160 | $257,473,786 |
| Sludge Disposal | $5,142,346 | $899,911 | $6,042,257 |
| Salt Disposal | $7,352,255 | $1,286,645 | $8,638,900 |
| **Water Treatment O&M Subtotal** | **$263,931,548** | **$46,188,021** | **$310,119,569** |

**Note:**
[1] - It is assumed that indirect O&M costs in total are 17.5% of the estimated direct O&M cost based on the 2018 FA Work Group meetings and agreement and the associated approval letter issued by the State of New Mexico in January 2019.

## 9.0 CLOSURE SCHEDULE

The proposed reclamation schedule is an integral component for the development of the financial assurance cost estimate based on a total site-wide mine default scenario. The schedule assumes a walk away scenario and all mining operations are terminated at the EOY 2014. The EOY 2014 was chosen for the development of the CCP in that it represents the most conservative earthwork takeoff volumes and thus the highest reclamation cost estimate for the five-year period under evaluation. Additionally, Tyrone recently evaluated the current mine plans through

year 2022. This analysis also showed that the EOY 2014 mine plan represents the year with the greatest volume of regrading and cover placement required between 2012 and 2022. The anticipated durations for reclamation presented in **Table 9-1** include earthwork and reseeding, but do not include vegetation success/O&M/monitoring.

**Table 9-1** presents the anticipated schedule for implementation of closure activities based on best available information and forecasts based on the progress of ongoing reclamation efforts at the mine. The proposed schedule summarizes Tyrone's understanding of the existing near-term mine operation and reclamation commitments and longer-term projections. More specifically, the schedule is based on the following considerations:

- Ongoing reclamation projects and previous schedule commitments;
- Practical phasing of the reclamation projects to account for water management, water treatment and the anticipated labor, equipment and other resources that would be necessary to complete these projects based on current conditions;
- Sequential closure of facilities in a phased cost-efficient manner (i.e., closure of select leach and waste rock piles as mining operations cease followed by closure of the leach stockpiles utilized as part of the evaporative treatment system); and
- Total annual acreages that would be reclaimed over this period.

For clarity, the financial assurance cost estimate and the proposed reclamation schedule are explicitly linked. Tyrone expects that the planned closure of the facilities represented by the proposed schedule will be conducted in a more cost-efficient manner than that reflected in the reclamation cost estimate, which is predicated on the unlikely condition of forfeiture. As indicated earlier, implementation of the mine-for-closure concepts are expected to result in more efficient reclamation than might be considered in a forfeiture scenario.

# 10.0 USE OF THIS REPORT

Golder has compiled this CCP Update to present Tyrone Mine's 5-year update of the CCP to the NMED and the MMD of the New Mexico Energy, Minerals and Natural Resources Department. In the compilation of this plan, Golder collaborated with Stantec, who designed the closure/closeout configuration of the mine facilities, and Telesto Solutions, Inc., who prepared the earthwork cost estimate. The Tyrone Mine CCP has been updated to fulfill the requirements of the following permits:

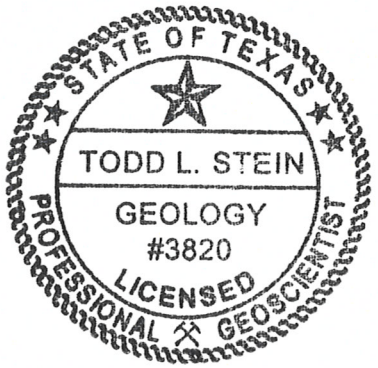
- Supplemental Discharge Plan DP-1341, Phelps Dodge Tyrone, Inc., Tyrone Mine Facility, (DP-1341), issued by the NMED on April 8, 2003 (NMED, 2003a);
- Applicable conditions of the Copper Mine Rule, 20.6.7 NMAC adopted by the New Mexico Water Quality Control Commission on December 1, 2013 (NMWQCC, 2013); and
- Permit Revisions 01-1 and 10-1 to Permit GR010RE (MMD Permit), issued by the MMD of the New Mexico Energy, Minerals and Natural Resources Department on April 4, 2004 (MMD, 2004) and August 31, 2012 (MMD, 2012), respectively.

Tyrone has completed numerous other studies required by DP-1341 and Mining Act Permit GR010RE. Information from these various studies has also been considered in preparing this CCP Update.

Please contact the undersigned with any questions or comments on the information contained in this report.

Respectfully submitted,

**Golder Associates Inc.**




Todd Stein
*Project Manager*

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# Tables

**Table 1-1: Copper Rule Section Reference to CCP**

| Copper Rule Section | Description | Tyrone CCP Update Report Section |
|---|---|---|
| **20.6.7.30** | **CONTINGENCY REQUIREMENTS FOR COPPER MINE FACILITIES** | 6.2 |
| 20.6.7.30.I | Leach Stockpiles, Tailings Impoundment or Waste Rock Stockpiles - Unstable Slopes | 6.1, 6.5 |
| **20.6.7.33** | **CLOSURE REQUIREMENTS FOR COPPER MINE FACILITIES** | 4.0, 4.1.3, 5.0 |
| 20.6.7.33.A | Design Storm Event | 4.2.2, 4.2.3, 5.2.1, 5.2.2, 5.2.3, Table 4-2 |
| 20.6.7.33.B | Slope Stability | 4.2.2 |
| 20.6.7.33.C | Surface Re-Grading | 2.1.1, 4.2.2, Table 4-2 |
| 20.6.7.33.D | Open Pits | 4.2.3 |
| 20.6.7.33.E | Surface Water Management | 4.0 |
| 20.6.7.33.F | Cover Systems | 2.3.7, 4.1.1, 5.2.5, Table 4-2 |
| 20.6.7.33.G | Process Solution Reduction Plans | Appendix D |
| 20.6.7.33.H | Closure Water Management and Treatment Plan | 4.3, 5.5 |
| 20.6.7.33.I | Impoundments | 4.2.4, 5.2.5 |
| 20.6.7.33.J | Pipelines, Tanks and Sumps | 4.2.5, 5.2.5, 5.2.6, 5.3 |
| 20.6.7.33.K | Crushing, Milling, Concentrating and Smelting | NA |
| 20.6.7.33.L | Closure Monitoring and Maintenance | 6.0 |
| 20.6.7.33.M | Exceptions to Design Criteria | NA |
| **20.6.7.34** | **IMPLEMENTATION OF CLOSURE** | 5.0 |
| 20.6.7.34.A | Notification of Intent to Close | 6.7 |
| 20.6.7.34.B | Initiation of Closure | 4.0, 4.2.2, 6.7 |
| 20.6.7.34.C | Notification of Change in Operational Status | 6.7 |
| 20.6.7.34.D | Department Notice Regarding Suspended Operations and Enforcement Action | NA |
| 20.6.7.34.E | Deferral of Closure | NA |
| 20.6.7.34.F | Final Design | 5.3, 6.7 |
| 20.6.7.34.G | CQA/CQC Report | 6.7 |
| **20.6.7.35** | **POST-CLOSURE REQUIREMENTS** | 5.0, 6.0, 6.1 |
| 20.6.7.35.A | Seepage Interceptor System Inspections | 4.3, 6.2 |
| 20.6.7.35.B | Water Quality Monitoring and Reporting | 4.3, 6.0, 6.2, 6.6 |
| 20.6.7.35.C | Reclamation Monitoring, Maintenance, and Inspections | 6.1, 6.2, 6.3 |
| 20.6.7.35.D | Reporting | 6.0 |
| 20.6.7.35.E | Contingency Requirements | 6.0 |

Notes:
NA – Not applicable

**Table 1-2: Stockpile, Pit, and Facility Names Reconciliation**

| Updated Operational Names 2020 | Operational Names Used in 2019 CCP Update [4] | Master Document [2,4] | [1,3,4]Other Historic Names |
|---|---|---|---|
| *Stockpiles* | | | |
| Reclaimed 1 Leach | 1 Leach Stockpile | Reclaimed 1 Leach | No. 1 Stockpile |
| 1A Leach, 1B Leach | 1A 1B [5] | 1A Leach, 1B Leach | |
| Reclaimed 1C Waste | 1C | Reclaimed 1C Waste | 1C/7A Stockpile Unit |
| Reclaimed 7A Waste | 7A | Reclaimed 7A Waste | 1C, 7AW, 7AFW, 7AW Upper, 7AW Lower, 7AE, 7AE Upper, 7AE Lower, 7A Test Plots, 7A, 1C/7A Stockpile Unit, No. 2 |
| | 7A Far West | Reclaimed 7A Waste | 1C/7A Stockpile Unit, 7A, No. 2, 1C |
| 2B Waste, 2A Leach, 2B Leach | 2A 2B, 2A Flat, 2B [5] | 2B Waste, 2A Leach | No. 2 |
| 2 Leach (Area 2) | 2C, 4A, 7B, 4B [5] | 2C Leach | 2B, 2A Flat, 2B Waste |
| | | 4A Leach | Gettysburg Cut Pit Stockpile, No. 2 |
| | | 4B Leach | 4D Leach, 4A Leach, No. 2 |
| 7B Leach | | 7B Leach | Gettysburg Cut Pit Stockpile |
| 2 Leach (Area 1) | 4C [5] | 4C Leach, 4D Leach | No. 2 |
| 7B Waste, 7C Waste | South Rim Pit | 7B Waste, 7C Waste | Gettysburg Cut Pit Stockpile |
| San Salvador Waste Backfill | San Salvador Pit | Not included in Master Document | San Salvador Waste Backfill Stockpile |
| 3A Leach | 3A | 3A Leach | No. 3 |
| 3B Waste | 3B | 3B Waste | No. 3B |
| 5A Waste | 5A [5] | 5A Waste | 1D, 3C, 5B, No. 5A, No. 1D |
| 6A Leach | Savanna In-Pit Leach Stockpile | 6A Leach | 6A Leach |
| 6B Leach, 6D Leach | 6B | 6B Leach, 6D Leach | Gettysburg In Pit, No. 2 |
| 6C Leach | 6C | 6C Leach | Gettysburg In Pit |
| 8A Waste, 8C Waste | 8C | 8A Waste, 8C Waste | Savanna Stockpile, Upper Main Stockpile |
| 9A Waste | 9A [5] | 9A Waste | 9A/9AX |
| 9AX Waste | 9AX | 9AX Waste | 9A/9AX, 9AX Borrow Material, 9AX Borrow, Borrow Material |
| CSG Waste | CSG | Not included in Master Document | CSG Stockpile |
| Gettysburg Waste | Gettysburg Waste Stockpile | Not included in Master Document | Gettysburg Inpit Stockpile |
| Valencia In-Pit Leach | Valencia In-Pit Stockpile | Not included in Master Document | Main Pit Stockpile |
| Copper Mt. Reclamation Area | Copper Mt. Reclamation Area | Not included in Master Document | USNR Waste, USNR Leach, CMPSE, Copper Mountain South Pit Expansion Area, Historic Leach, Copper Mountain Stockpile Units, Copper Mt. Stockpile |

**Table 1-2: Stockpile, Pit, and Facility Names Reconciliation**

| Updated Operational Names 2020 | Operational Names Used in 2019 CCP Update [4] | Master Document [2,4] | [1,3,4]Other Historic Names |
|---|---|---|---|
| *Open Pits* | | | |
| Main Pit/West Main II Pit | Main Pit | Main Pit | Main Pit |
| West Main III Pit | | West Main Pit | West Main Pit |
| Valencia Pit | Valencia Pit | Valencia Pit | Valencia Pit |
| Copper Mountain Pit | Copper Mountain Pit | Copper Mt. Pit | Copper Mountain South Pit Expansion Area, CMPSE, North Racket Pit |
| San Salvador Pit | San Salvador Pit | San Salvador Pit | No. 2, San Salvador Hill Pit |
| Gettysburg Pit | Gettysburg Pit | Gettysburg Pit | Gettysburg South Pit |
| South Rim Pit [7] | South Rim Pit | 7B Waste, 7C Waste | Gettysburg Cut Pit Stockpile |
| Savanna Pit | Savanna Pit | Savanna Pit | Savanna Pit |
| *Tailing Impoundments* | | | |
| Reclaimed 1 Tailing Impoundment | 1 Series Tailing | Reclaimed 1 Tailing Impoundment | No. 1 Tailings |
| Reclaimed 1A Tailing Impoundment | | Reclaimed 1A Tailing Impoundment | No. 1A Tailings |
| Reclaimed 1X Tailing Impoundment | | Reclaimed 1X Tailing Impoundment | No. 1X Tailings |
| Reclaimed 2 Impoundment | 2 Tailing Impoundment | Reclaimed 2 Impoundment | No. 2 Tailings |
| Reclaimed 3 Tailing Impoundment | 3 Tailing Impoundment | Reclaimed 3 Tailing Impoundment | No. 3 Tailings |
| Reclaimed 3X Tailing Impoundment | 3X Tailing Impoundment | Reclaimed 3X Tailing Impoundment | No. 3X Tailings |
| Reclaimed Burro Mountain Tailing Impoundment | Burro Mountain Tailing Impoundment | Reclaimed Burro Mountain Tailing Impoundment | Historic Burro Mountain Tailing Dam |
| *Other Facilities* | | | |
| Acid Unloading Area | Former Precipitation Plant | Acid Unloading Area | Acid Unloading Area and Former Precipitation Plant |
| Lubrication Shop Area [6] | Lubrication Shop Area [6] | Lubrication Shop, SW Energy Wash Pad, Prill Tanks | Lube Shop Area |
| Main Mine Facilities Area [6] | Main Mine Facilities Area, Former Mill and Concentrator within the Main Mine Facilities Area [6] | Shop Area, General Office (GO) | Main Mine Facilities Area, Former Mill and Concentrator |
| Reclaimed Former Mill & Concentrator Area | | | |
| Reclaimed Tailing Launder | Tailing Launder | --- | Tailing Pipeline and Launder |
| SX/EW Plant [6] | SX/EW Area [6] | SX/EW Plant | SX/EW Plant Area |
| Former Tailing Thickeners | Tailing Thickener | Former Tailing Thickeners | Existing Thickeners |

Notes:

[1]'Stockpile', 'Reclaimed', 'No.' and/or 'Rock' may appear within 'Other Historic Names' if this is the only change from 'CCP Name' and/or 'Master Document Name'.

[2]Master Document - June 9, 2017 report from Daniel B. Stephens & Associates, Inc. titled Application Requirements for Discharge Permit at a Copper Mine Facility (20.6.7.11 NMAC).

[3]Includes names from permits, master document, and historic submittals to NMED, MMD, and BLM.

[4]Comma's are used to separate the different stockpile names used in area(s).

[5]Earthwork Cost Estimate includes 'Waste' and/or 'Leach' or 'Overburden' within location name.

[6]Area consists of buildings and other structures which are individually labeled/listed within maps and the cost estimate.

[7]The South Rim Pit was completely backfilled with waste rock by 2019.

**Table 2-1: Tyrone Mine Surface Impoundments**

| Impoundment Designation[1] | Surface Area[1] (acres) | Mine Use[1] | Liner[1] | Status |
|---|---|---|---|---|
| ***DP-27 SA*** | | | | |
| ***Northern Mangas Valley Tailing Area*** | | | | |
| No Existing or Planned Surface Impoundments | | | | |
| ***Southern Mangas Valley Tailing Area*** | | | | |
| 1X1 Pond [4.] | 0.75 | Collect Water from Little Rock Mine, 1X Interceptor Wells, 1A Tailing Dam Seep | Synthetic | Existing |
| ***DP-166 Open Pits; SX/EW Plant; No. 2 Leach Stockpile; 7B, 7C, 8A, 8C, San Salvador Waste Backfill Stockpiles*** | | | | |
| DC2-1 | 0.10 | Seep | Synthetic | Existing |
| Main Pit Sump | 4.93 | Pit Dewatering | None | Existing |
| San Salvador Sump | 0.29 | PLS/Seep | None | Existing |
| Copper Mt. Pit Sump | 6.01 | Pit Dewatering | None | Existing |
| Valencia Pit Sump | 2.38 | PLS/Seep | None | Existing |
| 2 PLS Pond [3.] | 1.05 | PLS | Synthetic | Existing |
| 4C Drain [2.] | 0.00 | PLS | None | Existing |
| North Racket PLS Pond | 0.93 | PLS | Synthetic | Existing |
| Copper Mt. Decant Ponds (4) [3.] | 0.41 | PLS | None | Existing |
| SX/EW PLS Feed Pond [3.] | 0.34 | PLS | Synthetic | Existing |
| Raffinate Overflow Pond | 0.73 | Raffinate | Synthetic | Existing |
| Raffinate Tank 1 | 397,000 gal. | Raffinate | Stainless Steel | Existing |
| Raffinate Tank 2 | 2,400,000 gal. | Raffinate | Stainless Steel | Existing |
| 5E Seepage Collection Pond | 0.10 | Seep | Synthetic | Existing |
| 5E Surge Pond | 0.84 | Seep | Synthetic | Existing |

**Table 2-1: Tyrone Mine Surface Impoundments**

| Impoundment Designation[1] | Surface Area[1] (acres) | Mine Use[1] | Liner[1] | Status |
|---|---|---|---|---|
| ***DP-286 3A Leach Stockpile, 3B and 5A Waste Rock Stockpiles, and Reclaimed Mill Site*** | | | | |
| 10 Canyon Fiberglass Tanks (2) | 3,000 gal. each | Seep | Fiberglass | Existing |
| Flats Tank | 1,550 gal. | Seep | Plastic | Existing |
| L Line Tank | 1,550 gal. | Seep | Plastic | Existing |
| No. 3 PLS Collection Pond | 1.26 | PLS | Synthetic | Existing |
| No. 3 PLS Overflow Pond | 0.62 | PLS | Synthetic | Existing |
| POPE Ponds (2) | 295,280 gal. | Sewage | Clay/Concrete | Existing |
| SPCC Pond | 1.10 | Stormwater | Synthetic | Existing |
| ***DP-363 1A and 1B Leach Stockpiles*** | | | | |
| 1A PLS Tank [3.] | 0.01 | PLS/Seepage | Stainless Steel | Existing |
| 1A PLS Overflow Pond [3.] | 1.00 | PLS | Synthetic | Existing |
| 1A Stormwater Pond | 0.63 | Stormwater | Unlined w/Concrete Sump | Existing |
| 1B PLS Tank [3.] | 0.02 | PLS/Seepage | Stainless Steel | Existing |
| 1B PLS Overflow Pond | 1.37 | PLS | Synthetic | Existing |
| Lower Oak Grove Tanks (2) | 1,550/1,500 gal. | Seepage | Poly | Existing |
| Upper Oak Grove Transect 1 Tank | 1,550 gal. | Seepage | Poly | Existing |
| ***DP-396 No. 1C Waste Rock Stockpile*** | | | | |
| Oak Grove Pond [3.] | 0.25 | Stormwater | Synthetic | Existing |
| 1C Stormwater Pond | 2.05 | Stormwater | None | Existing |
| ***DP-435 2A and 2B Leach Systems, 2B and 9A Waste Rock Stockpiles*** | | | | |
| Decant Ponds (3) | 4.66 | Pit Dewatering | None | Existing |
| 2A West Raffinate Booster Tank | 74,000 gal. | Raffinate | Stainless Steel | Existing |

**Table 2-1: Tyrone Mine Surface Impoundments**

| Impoundment Designation[1] | Surface Area[1] (acres) | Mine Use[1] | Liner[1] | Status |
|---|---|---|---|---|
| ***DP-435 2A and 2B Leach Systems, 2B and 9A Waste Rock Stockpiles (cont.)*** | | | | |
| 1 Raffinate Booster Tank | 47,000 gal. | Raffinate | Stainless Steel | Existing |
| 2 Raffinate Booster Tank | 47,000 gal. | Raffinate | Stainless Steel | Existing |
| 4 Raffinate Booster Tank | 58,748 gal. | Raffinate | Stainless Steel | Existing |
| 4A Acid Raffinate Booster Tank | 12,600 gal. | Raffinate | Stainless Steel | Existing |
| 2A West PLS Tank | 150,000 gal. | PLS | Stainless Steel | Existing |
| 2A East PLS Tank | 50,000 gal. | PLS | Stainless Steel | Existing |
| Brown Tank | 72,000 gal. | Makeup | Steel | Existing |
| 2A East PLS Overflow (Pennington Pond) [3] | 0.68 | PLS | Synthetic | Existing |
| ***DP-455 Gettysburg and Savanna Pits; and 6A, 6B, 6C, 6D, and 7B Leach Stockpiles*** | | | | |
| Gettysburg Pit Collection Pond | 1.7 | PLS/Pit Dewatering | None | Existing |
| Land Bridge Booster | 0.40 | PLS | Synthetic | Existing |
| 6C-2 PLS Pond | 0.13 | PLS | Synthetic | Existing |
| 6A PLS Pond | 5.27 | PLS | None | Existing |
| 6C PLS Sump | 0.21 | PLS | Clay | Existing |
| Gettysburg Highwall Tank | 3,000 gal. | PLS | Plastic | Existing |
| ***DP-896 1 Leach Stockpile, and Acid-Unloading Facility*** | | | | |
| 1 AST Tank | 2,260 gal. | Seepage Collection | Fiberglass | Existing |
| 1 AST Overflow Pond | 0.12 | Overflow for Seepage Collection | Synthetic | Existing |
| Mixing Tank | 13,000 gal. | Raffinate | Stainless Steel | Existing |

**Table 2-1: Tyrone Mine Surface Impoundments**

| Impoundment Designation[1] | Surface Area[1] (acres) | Mine Use[1] | Liner[1] | Status |
|---|---|---|---|---|
| ***DP-896 1 Leach Stockpile, and Acid-Unloading Facility (cont.)*** | | | | |
| Acid Holding Tank | 267,000 gal | Acid | Stainless Steel | Existing |
| A Sump | --- | Stormwater | Concrete Lined | Existing |
| Acid Unloading Area Sump | 0.1 | Stormwater | Concrete Lined | Existing |

Notes:
NA = not analyzed
PLS = Pregnant leach solution storage, collection, conveyance structure
TDRW = Tailing Decant Return Water
[1] Impoundment details based on information provided in the June 9, 2016 report from Daniel B. Stephens & Associates, Inc. titled *Application Requirements for Discharge Permit at a Copper Mine Facility (20.6.7.11 NMAC),* also commonly referred to as the "Master Document" unless otherwise noted. Additional seep collection systems and PLS catchments not listed in the Master Document are included in the post closure water management and treatment plan and are detailed in the summary tables in Appendix D.
[2] The 4C Drain is actually a collection point with drains at the base and does not store PLS.
[3] Surface area from Google Earth.
[4] The 1X-1 Pond is permitted under DP-1236.

**Table 2-2: Summary of Tyrone Closure/Closeout Related Permits**

| Permit or Requirement | Agency | ID Number | Area Covered |
|---|---|---|---|
| Registration | U.S. Department of Labor, Mine Safety and Health Administration | | Mine |
| Mining Act Permit | New Mexico Mining Minerals Division | GR010RE and associated modifications and revisions | Mine |
| Groundwater Discharge Plans | NMED Ground Water Quality Bureau | DP-166, DP-286, DP-363, DP-396, DP-435, DP-455, DP-896 | Mine/Stockpile Unit & East Mine Unit |
| DP-27 Settlement Agreement | NMED Ground Water Quality Bureau | SA-27 | Mangas Valley Tailings |
| DP-1341 Settlement Agreement and Stipulated Final Order | NMED Ground Water Quality Bureau | DP-1341 | Mine |
| NPDES Stormwater General Permit | U.S. EPA (Region 6) | NMR053073 (as of December 2019) | Mine |
| Water Rights | New Mexico Office of State Engineer | GSF85, GSF85S, GSF02260, GSF3020, M02680, M04978, M04979, M04980 | Surface Water & Groundwater |
| Air Quality | NMED Air Quality Bureau<br><br>U.S. EPA (Region 6) | NSR2448-R7<br>PSD-2448A-M3 (as of December 2019)<br><br>P147-R2 (as of December 2019) | SX/EW Plant<br>Power Plant<br><br>Title V Mine-wide |
| SARA Title III | | | |
| Hazardous Waste Generator | U.S. EPA/New Mexico Department of Public Safety | NMD035806405 | Mine |
| Hazardous Materials Transporter | U.S. Department of Transportation | 062406-550-001OP | NA |
| Individual Liquid Waste Permit | NMED, Construction Industries Division | SC060183 | Mine |
| Plan of Operation | Bureau of Land Management | Approved on 9/11/03 | Copper Mountain South Pit Expansion |

Notes:
NA = Not applicable
NMED = New Mexico Environment Department
SX/EW = Solution extraction/electrowinning
U.S. EPA = United States Environmental Protection Agency

**Table 2-3. Summary of NMED Discharge Permits**

| Area | Discharge Permit (DP) Number | Pits | Leach Stockpiles | Waste Stockpiles | Reclaimed Tailing Impoundments | Ponds (associated with stockpiles, pits, and tailing impoundments) | Tanks (associated with stockpiles, pits, and tailing impoundments) | Sump (associated with stockpiles, pits, and tailing impoundments) |
|---|---|---|---|---|---|---|---|---|
| Mine Area | DP-166 | Main Pit | 2 Leach - comprised of: 4A Leach, 4B Leach, 4C Leach, 4D Leach | 7C Waste | NA | 2 PLS Pond | Raffinate Tank 1 | Main Pit Sump |
| | | West Main II Pit | | 8A Waste | | 4C Drain | Raffinate Tank 2 | Valencia Pit Sump |
| | | West Main III Pit | | 8C Waste | | 5E Seepage Collection Pond | | Copper Mt. Pit Sump |
| | | Valencia Pit | | 7B Waste | | 5E Surge Pond | | San Salvador Sump |
| | | Copper Mountain Pit | | San Salvador Waste Backfill | | North Racket PLS Pond | | |
| | | San Salvador Pit | USNR (part of Copper Mt. Reclamation Area) | | | Raffinate Overflow Pond | | |
| | | South Rim Pit | Valencia In-Pit Leach (permitted in 2019) | | | SX/EW PLS Feed Pond | | |
| | | | | | | Copper Mountain Decant Ponds (4) | | |
| | | | | | | DC2-1 | | |
| | DP-286 | NA | 3A Leach | 3B Waste | NA | No. 3 PLS Collection Pond | 10 Canyon fiberglass tanks (2 tanks) | NA |
| | | | | 5A Waste | | No. 3 PLS Overflow Pond | Flats Tanks | |
| | | | | | | SPCC Pond | L Line Tank | |
| | | | | | | POPE Ponds (2) | | |
| | DP-363 | NA | 1A Leach | NA | NA | 1A PLS Overflow Pond | 1A PLS Tank | NA |
| | | | 1B Leach | | | 1A Stormwater Pond | 1B PLS Tank | |
| | | | | | | 1B PLS Overflow Pond | Lower Oak Grove Tanks (2 tanks) | |
| | | | | | | | Upper Oak Grove Transect 1 Tank | |
| | DP-396 | NA | NA | Reclaimed 1C Waste | NA | 1C Stormwater Pond | NA | NA |
| | | | | Reclaimed 7A Waste | | Oak Grove Pond | | |
| | DP-435 | NA | 2A Leach | 2B Waste | NA | 2A East Overflow Pond | 2A East PLS Tank | NA |
| | | | 2B Leach | 9A Waste | | Decant Ponds (3 Ponds) | 2A West PLS Tank | |
| | | | | 9AX Waste | | | 2A West Raffinate Booster Tank | |
| | | | | | | | 1 Raffinate Booster Tank | |
| | | | | | | | 2 Raffinate Booster Tank | |
| | | | | | | | 4 Raffinate Booster Tank | |
| | | | | | | | 4A Acid Raffinate Booster Tank | |
| | | | | | | | Brown Tank | |
| | DP-455 | Gettysburg Pit | 6A Leach | Gettysburg Waste | NA | 6A PLS Pond | Gettysburg Highwall Tank | 6C PLS Sump |
| | | Savanna Pit | 6B Leach | | | 6C-2PLS Pond | | |
| | | | 6C Leach | | | Gettysburg Pit Collection Pond | | |
| | | | 6D Leach | | | Landbridge Booster | | |
| | | | 7B Leach | | | | | |

**Table 2-3. Summary of NMED Discharge Permits**

| Area | Discharge Permit (DP) Number | Pits | Leach Stockpiles | Waste Stockpiles | Reclaimed Tailing Impoundments | Ponds (associated with stockpiles, pits, and tailing impoundments) | Tanks (associated with stockpiles, pits, and tailing impoundments) | Sump (associated with stockpiles, pits, and tailing impoundments) |
|---|---|---|---|---|---|---|---|---|
| East Mine Area | DP-896 | NA | Reclaimed 1 Leach | NA | Reclaimed Burro Mountain Tailing Impoundment | 1 AST Overflow Pond | Acid Holding Tank | A Sump |
| | | | | | | | Mixing Tank | Acid Unloading Area Sump |
| | | | | | | | 1 AST Tank | |
| Mangas Valley Tailing Area | DP-27 | NA | NA | NA | Reclaimed 1 Tailing Impoundment | NA | NA | NA |
| | | | | | Tailing Impoundment | | | |
| | | | | | Tailing Impoundment | | | |
| | | | | | Reclaimed 2 Tailing Impoundment | | | |
| | | | | | Reclaimed 3 Tailing Impoundment | | | |
| | | | | | Tailing Impoundment | | | |
| [1]Other | DP-1236 | NA[1] | NA[1] | NA[1] | NA[1] | 1X 1 Pond | NA[1] | NA[1] |

Notes:

[1]The 1X1 Pond is located within MMD Permit GR007RE (Little Rock Mine). The pond is listed in the Tyrone CCP because the closure plan is covered under this CCP. The other facilities associated with DP-1236 are covered under the Little Rock CCP.
NA - Not applicable

**Table 3-1: EOY 2014 Status of Reclamation and Financial Assurance Reduction at the Tyrone Mine**

| Facility | Start of Reclamation | Completion of Reclamation | Seeding Completion Date | CQAR Submittal | Financial Assurance Release Request | Financial Assurance Release Approval |
|---|---|---|---|---|---|---|
| ***Mangas Valley Tailing Unit*** | | | | | | |
| Reclaimed 1 Tailing Impoundment | June 2006 | December 2008[1] | July 2009 | April 2009 | December 2008[2] | January 2010 |
| Reclaimed 1A Tailing Impoundment | June 2006 | August 2008 | July 2009 | January 2009 | December 2008[2] | January 2010 |
| Reclaimed 1X Tailing Impoundment | June 2006 | December 2008[1] | July 2009 | April 2009 | December 2008[2] | January 2010 |
| Reclaimed 2 Tailing Impoundment | January 2006 | July 2007 | April 2009 | July 2009 | December 2007[2]<br>December 2008[2] | July 2008<br>January 2010 |
| Reclaimed 3 Tailing Impoundment | June 2005 | December 2006 | December 2006 | December 2008 | December 2006[2] | March 2007 |
| Reclaimed 3X Tailing Impoundment | September 2004 | October 2005 | December 2005 | August 2008[3] | December 2006[2]<br>December 2007 | March 2007[2]<br>July 2008 |
| Reclaimed Tailing Launder[5] | December 2004 | March 2005[5] | --- | --- | --- | --- |
| ***Mine Stockpile Unit*** | | | | | | |
| Reclaimed 1C Waste, Reclaimed 7A Waste Stockpile Unit | March 2004 | November 2012 | June 2012 | March 2013[3] | October 2005[2]<br>December 2006[2],<br>December 2012[2] | December 2005<br>March 2007 |
| Copper Mountain Stockpile | June 2000<br>June 2014 | July 2001<br>June 2015 | July 2001[4]<br>June 5, 2015 | October 2017 | --- | --- |
| USNR | Early 2000's[6]<br>October 2014 | Early 2000's[6]<br>November 2015 | May 2016 | October 2017 | --- | --- |
| Reclaimed Mill/Concentrator | August 2004 | December 2007 | April 2007 | January 2008 | December 2006 | March 2007 |

**Table 3-1: EOY 2014 Status of Reclamation and Financial Assurance Reduction at the Tyrone Mine**

| Facility | Start of Reclamation | Completion of Reclamation | Seeding Completion Date | CQAR Submittal | Financial Assurance Release Request | Financial Assurance Release Approval |
|---|---|---|---|---|---|---|
| ***East Mine Unit*** | | | | | | |
| Reclaimed Burro Mountain Tailing Impoundment | July 2004 | February 2005 | December 2004 | September 2005 | December 2006[2] | March 2007 |
| Reclaimed 1 Leach Stockpile | February 2005 | July 2009 | August 2009 | December 2009 | December 2009[2] | July 2010 |

Notes:
[1] Substantial completion of facility reclamation
[2] Request for partial financial assurance reduction for facility
[3] Draft submittal
[4] Original seeding completion date, areas that were further reclaimed were re-seeded by June 5, 2015.
[5] Majority of the tailing launder has been reclaimed. As of March 2018, the only items that need to still be closed include removal of the existing embankments and associated culverts, and removal of an approximate 300 foot section of launder trestle crossing the Redrock diversion between the Reclaimed 2 and Reclaimed 3X tailing impoundments.
[6] Removed most of stockpile and liner, water management activities, grading in benches, placement of six inches to one foot of cover, and revegetation of area.

**Table 4-1: Summary of Buildings/Facilities to be Demolished**

| Tyrone Tag No. | Description | Dimensions[1] (LxWxH, feet) | Quantity (cubic feet) |
|---|---|---|---|
| ***Mine Maintenance Facilities Area*** | | | |
| MM-06 | Jerome Building | 204 x 63 x 50 | 642,600 |
| MM-07 | Plant Warehouse | 250 x 100 x 28 | 700,000 |
| MM-09 | Electric Shop | 120 x 51 x 50 | 306,000 |
| MM-10 | Pipe Shop | 145 x 41 x 40 | 237,800 |
| MM-11 | Carpenter Shop | 119 x 69 x 27 | 221,697 |
| MM-12 | Lumber Storage | 102 x 61 x 33 | 205,326 |
| MM-13 | Shovel Repair | 121 x 70 x 66 | 559,020 |
| MM-14 | Environmental Lab | 112 x 27 x 17 | 51,408 |
| ***SX/EW Plant Area*** | | | |
| -- | Tankhouse | 150 x 465 x 30 | 2,092,500 |
| -- | SX/EW Plant Area Shop | 31 x 71 x 30 | 66,030 |
| -- | Leach Crew Office | 15 x 15 x 15 | 3,375 |
| -- | SX/EW Warehouse | 48 x 150 x 20 | 144,000 |
| -- | Gonzales Cells | 25 x 52 x 10 | 13,000 |
| -- | Jamison Cells | 35 x 44 x 10 | 15,400 |
| -- | Organic Tanks (4) | 4 x 32D x 16H | 51,472 |
| -- | Mixer/Settler Tanks (8) | 200 x 366 x 10 | 732,000 |
| -- | Tank Farm (5) | 92 x 370 x 10 | 340,400 |
| -- | Water Tank | 1 x 30D x 16H | 11,310 |
| -- | Acid Tanks (2) | 2 x 20D x 16H | 10,053 |
| -- | MCC Building | 14 x 30 x 12 | 5,040 |
| -- | Tool Room and Storage | 60 x 70 x 12 | 50,400 |
| -- | Chlorinator Room | 19 x 66 x 12 | 15,048 |
| -- | 2A West Raff Tank | 30 x 46 x 16 | 22,080 |
| -- | Rectifiers | 20 x 24 x 12 | 5,760 |
| -- | Workroom | 66 x 75 x 12 | 59,400 |
| -- | Pump Mixer Control Room | 41 x 41 x 12 | 20,172 |
| -- | Cobalt Sulfate Tank | 1 x 18D x 16H | 4,071 |
| -- | Reagent Tanks (2) | 25 x 36 x 12 | 10,800 |
| -- | Tool Room | 8 x 32 x 12 | 3,072 |

**Table 4-1: Summary of Buildings/Facilities to be Demolished**

| Tyrone Tag No. | Description | Dimensions[1] (LxWxH, feet) | Quantity (cubic feet) |
|---|---|---|---|
| ***SX/EW Plant Area (cont.)*** | | | |
| -- | Diluent Storage Tank | 1 x 18H x 16D | 3,619 |
| -- | Pacesetter Filters (2) | 48 x 80 x 12 | 46,080 |
| -- | Wash Pad | 45 x 68 x -- | 3,060 |
| ***Lubrication Shop Area*** | | | |
| -- | Prill Tanks (2) | 2 x 20D x 35H | 10,996 |
| -- | Lubrication Shop | 60 x 110 x 35 | 231,000 |
| -- | Southwest Energy Building | 42 x 42 x 19 | 33,516 |
| -- | Electric Power Substation | 52 x 36 x 10 | 18,720 |
| -- | Powder Magazines (3) | 10 x 10 x 10 | 3,000 |
| -- | Storage Sheds | 110 x 60 x 10 | 66,000 |
| -- | Lube Shop Addition | 50 x 70 x 17 | 59,500 |
| -- | #2 Fuel Dock Concrete Slab | 14 x 12 x -- | 588 |
| ***Acid Unloading Facility & Former Precipitation Area*** | | | |
| -- | Acid Unloading Facility | 20 x 10 x 20 | 4,000 |
| -- | Former Precipitation Plant Building | 400 x 100 x 16[1] | 640,000 |
| ***Mill and Concentrator Area*** | | | |
| MC-04 | Reclaim Water Pumphouse | 138 x 60 x 10 | 82,800 |
| MC-15 | Warehouse and Core Storage | 235 x 101 x 33 | 783,255 |
| MC-20 | Reagent Building | 150 x 50 x 16 | 120,000 |
| MC-21 | Fuel Station | 60 x 50 x -- | 3,000 |
| MC-22 | Tire Shop | 79 x 44 x 23 | 79,948 |
| MC-27 | Inactive Diesel Tanks (2) | 2 x 20 x 15 | 9,425 |
| ***Mangas Valley Tailing Area*** | | | |
| -- | No. 1 Tailing Dam Reclaim Water Pump Station and Substation | 78 x 33 x 20 | 51,480 |
| ***2B Leach (Little Rock Haul Road Fuel Dock Area)*** | | | |
| -- | Fuel Dock | 70 x 40 x -- | 2,800 |

Notes:
1. Length and width of facility determined from facility map, height of facility assumed. For tanks, the diameter (D) and Height (H) are provided.

**Table 4-2: Summary of Key Design Criteria for Facilities to be Closed**

| |
|---|
| **Stockpile Regrading Outside OPSDA and Revised Conditional Waiver Area – applicable to the 2A Leach, 3A Leach, and 7B Leach; 2B Waste, 7B Waste, 7C Waste, 9A Waste, and 9AX Waste; all but the interior slopes of the 1A Leach, 1B Leach, Reclaimed 1C Waste (area not reclaimed on north side), 2B Leach, 2 Leach (Area 1), 2 Leach (Area 2), 6B Leach, 6C Leach, and 6D Leach; all but the interior slopes of the 3B Waste; and all but the western portion of the 5A Waste. (Reclaimed 1 Leach, Reclaimed 1C Waste, and Reclaimed 7A Waste stockpiles have been reclaimed; Copper Mt. Reclamation Area has been reclaimed).**<br>■ Outslopes to be graded to a maximum inter-bench slope of 3.0H:1V (20.6.7.33.C NMAC)<br>■ Maximum uninterrupted slope length of 200 feet for outslopes (20.6.7.33.C NMAC)<br>■ Terrace benches will have maximum bench width of 32 feet (20.6.7.33.C NMAC)<br>■ Bench longitudinal slopes at between 1 and 5 percent<br>■ Bench cross slopes and channels at a maximum of 5 percent<br>■ Top surfaces graded at 1 to 5 percent (20.6.7.33.C NMAC)<br>■ Regrading to be done in such a manner that orients surface water conveyances to the exterior perimeter of the stockpiles<br>■ Slope channels will be located where possible in natural junctions or drainage chutes, and may contain riprap and energy dissipation structures if engineering designs warrant them. Channels will be designed in accordance with 20.6.7.33.A NMAC.<br>■ Top surfaces and outslopes of all stockpiles with the exception of the 9A Waste and 9AX Waste to be covered with 36 inches of Gila Conglomerate (or other suitable RCM). Cover to meet the requirements of 20.6.7.33.F NMAC<br>■ The 9A Waste and 9AX Waste stockpiles may be used in the future as borrow source if the material is approved for use as RCM. The top surfaces and outslopes of this stockpile will be covered with 12 inches of Gila Conglomerate<br>■ Top surfaces and outslopes to be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications<br>■ A moderate maintenance program will be acceptable until cover vegetation establishes |
| **Stockpile Regrading Inside OPSDA and Revised Conditional Waiver Area– applicable to the 8A Waste, 8C Waste and 6A Leach; interior slopes of the 1A Leach, 1B Leach, 2B Leach, 2 Leach (Area 1), 2 Leach (Area 2), 6B Leach, 6C Leach, and 6D Leach; interior slopes of the 3B Waste; and western portion of 5A Waste.**<br>■ Top surfaces graded at 1 to 5 percent (20.6.7.33.C NMAC)<br>■ Top surfaces to be covered with 36 inches of Gila Conglomerate (or other suitable RCM). Cover to meet the requirements of 20.6.7.33.F NMAC<br>■ Outslopes to remain at angle of repose (20.6.7.33.C NMAC)<br>■ No terrace benches to be constructed<br>■ Surface water conveyances to be directed to the nearest pit sump<br>■ A moderate maintenance program will be acceptable until cover vegetation establishes |
| **Exempt Pits (within the Revised Conditional Waiver) – Main, Valencia, Savanna, Gettysburg, and Copper Mountain**<br>■ Surface water to be eliminated to the maximum extent practicable with the existing pit extraction systems<br>■ A 6-foot high fence will be installed around the perimeter of the open pits to restrict access to unauthorized personnel, wildlife, or livestock and/or a water diversion and vehicle exclusion berm constructed around the circumference of the pit. The berm (if constructed), will be constructed from local rock and soils, and will be a minimum of 10 feet wide and 5 to 10 feet high with side slopes angled at 1.5(H):1(V)<br>■ Signs will be posted on fencing at 500-ft intervals and all access points, warning of potential hazards present |

**Table 4-2: Summary of Key Design Criteria for Facilities to be Closed**

| |
|---|
| **Non-Exempt (Non-Waived) Pits – San Salvador (San Salvador Waste Backfill) and South Rim Pits**<br>■ Regrading/backfilling will be performed to ensure positive drainage from areas to be covered and revegetated and to ensure no ponding occurs on covered surfaces<br>■ Pit backfill to be graded to a maximum inter-bench slope of 3.0H:1V (20.6.7.33.C NMAC)<br>■ Maximum uninterrupted slope length of 200 feet for pit slopes (20.6.7.33.C NMAC)<br>■ Terrace benches will have maximum bench width of 32 feet (20.6.7.33.C NMAC)<br>■ Bench longitudinal slopes at between 1 and 5 percent<br>■ Bench cross slopes and channels at a maximum of 5 percent<br>■ Top surfaces graded between 1 and 5 percent (20.6.7.33.C NMAC)<br>■ Top surface regrading to be done in such a manner that orients surface water conveyances to the exterior perimeter of the covered surfaces<br>■ Slope channels will be located where possible in natural junctions or drainage chutes, and may contain riprap and energy dissipation structures if engineering designs warrant them. Channels will be designed in accordance with 20.6.7.33.A NMAC.<br>■ Top surfaces and pit slopes to be covered with 36 inches of Gila Conglomerate (or other suitable RCM). Cover to meet the requirements of 20.6.7.33.F NMAC<br>■ Top surfaces and pit slopes to be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications<br>■ A moderate maintenance program will be acceptable until cover vegetation establishes |
| **Pipelines (applies to process water, PLS and raffinate pipelines that will not be used in closure/post closure water management & water treatment, pipelines located outside the OPSDA and Revised Conditional Waiver Area, and pipelines located outside the regrade footprint of stockpiles)**<br>■ Residual sediments and fluids will be removed and disposed of on-site<br>■ Pipelines located within the regraded footprint of the stockpiles that will not be part of the post-closure water management and water treatment system will be crushed and covered as part of the stockpile regrading and cover placement of these facilities<br>■ Pipelines to be removed and/or buried if they are a potential source of contamination, otherwise they can be left in place, capped, and buried. (20.6.7.33.J NMAC)<br>■ Impacted soils along corridor will be removed or covered with 36 inches of RCM unless they are on a stockpile, within the OPSDA, or within the regrade footprint of these facilities<br>■ Pipelines that are left in place will be covered with 36 inches of RCM (assuming they are not already covered with 36 inches of suitable cover. Cover to meet the requirements of 20.6.7.33.F NMAC<br>■ Where pipelines are removed, corridor will be ripped and revegetated in accordance with Appendix C of the MMD Permit and applicable modifications<br>■ A moderate maintenance program will be acceptable until cover vegetation establishes |
| **Haul Roads (all haul roads except those located within OPSDA and Revised Conditional Waiver Area, or PMLU access roads)**<br>■ Culverts to be removed where practicable, unless they serve a post closure purpose<br>■ Where located on acid-generating material, surface to be covered with 36 inches of Gila Conglomerate (or other suitable RCM). Cover to meet the requirements of 20.6.7.33.F NMAC<br>■ Where located on non-acid-generating material, surface to be ripped and revegetated in accordance with Appendix C of the MMD Permit<br>■ Cover surfaces to be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications<br>■ A moderate maintenance program will be acceptable until cover vegetation establishes |

**Table 4-2: Summary of Key Design Criteria for Facilities to be Closed**

| |
|---|
| **Buildings and Structures:**<br>■ Salvaging and demolition of the buildings, tanks and structures not designated for industrial PMLU<br>■ Removal of all debris and visually affected soil at or near the surface in unpaved areas, disposal of debris or affected soil in an approved manner, and covering impacted areas with 36 inches of suitable RCM. Cover to meet the requirements of 20.6.7.33.F NMAC<br>■ Where footings, slabs, walls, pavement, manholes, vaults, storm water controls, and other foundations are abandoned in place over non-acid-generating material, and not demolished, they will be covered with RCM to a depth of 18- 24 inches minimum<br>■ Flushing of process water pipelines (if they contained contaminated materials) that will not be part of the post-closure water management and water treatment system to remove residual solutions and dispose of them in an approved manner<br>■ Capping all non-functional buried process water pipelines<br>■ Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not used for industrial or wildlife PMLU purposes or not necessary for site operations and maintenance, including water management and treatment<br>■ Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications<br>■ Maintaining and improving existing culverts and surface water conveyance structures (if required) |

Notes:
MMD = Mining and Minerals Department
PMLU = Post Mining Land Use
OPSDA = Open Pit Surface Drainage Area

**Table 4-3: Stability Analysis Results for 2019 Stockpile Reclamation Plan[1]**

| Stockpile | Minimum Static FOS | Minimum Pseudo-static FOS | Liquefied FOS |
|---|---|---|---|
| 1A Leach | 2.65 | 2.01 | 2.01 |
| 1B Leach | 1.95 | 1.32 | No liquefiable soils present |
| Reclaimed 1C Waste | 3.52 | 2.40 | 1.56 |
| 2A Leach | 2.78 | 2.02 | No liquefiable soils present |
| 2B Waste | 3.45 | 2.54 | No liquefiable soils present |
| 3A Leach | 1.85 | 1.63 | 1.51 |
| 3B Waste | 5.80 | 2.15 | No liquefiable soils present |
| 2 Leach (Area 1) | 2.56 | 1.92 | No liquefiable soils present |
| 2 Leach (Area 2), San Salvador Waste Backfill | 2.28 | 1.70 | No liquefiable soils present |
| 7B Waste | 2.45 | 1.86 | No liquefiable soils present |
| 7B Leach, 2 Leach (Area 2) | 2.78 | 2.03 | No liquefiable soils present |
| 5A Waste | 2.33 | 1.71 | 1.71 |
| 6B Leach | 2.98 | 2.20 | No liquefiable soils present |
| 6D Waste | 3.00 | 2.24 | No liquefiable soils present |
| Reclaimed 7A Waste (eastern) | 3.16 | 2.33 | No liquefiable soils present |
| Reclaimed 7A Waste (central) | 3.13 | 2.44 | No liquefiable soils present |
| Reclaimed 7A Waste (western) | 3.22 | 2.37 | No liquefiable soils present |
| 9A Waste | 3.31 | 2.43 | No liquefiable soils present |
| 9AX Waste | 2.83 | 2.24 | 1.42 |
| Little Rock West In-Pit Waste | 2.55 | 1.88 | No liquefiable soils present |
| Little Rock North In-Pit Waste | 2.56 | 1.95 | No liquefiable soils present |
| South Rim Pit (7B Waste, 7B Leach) | 2.47 | 1.79 | NA |

Notes:
[1] - Golder. 2020a. Tyrone Stockpile Stability Analysis for 2013 Closure Close-Out Plan Update (EOY 2014 Mine Configuration) Rev 1. Freeport McMoRan Tyrone Inc. April 28.
FOS – Factor of safety

**Table 5-1: Post-Closure Surface Impoundments**

| Impoundment Designation[1] | Surface Area (acres) | Calculated Surface Area[1] (acres) | Post-Closure Use | Liner[1] | Status |
|---|---|---|---|---|---|
| ***Facility Area 2 – Southern Mangas Valley Tailing Unit*** | | | | | |
| 1X1 Pond[2] | 0.75 | 0.45 | Seepage Collection | Synthetic | Existing |
| ***DP-166 Open Pits; SX/EW Plant; No. 2 Leach Stockpile; 7B, 7C, 8A, 8C, San Salvador Waste Backfill Stockpiles*** | | | | | |
| Seep Collection DC2-1 Replacement[3] | 0.02 | NA | Seepage Collection | Synthetic | Existing |
| Seep 2 Collection | 0.002 | NA | Seepage Collection | None | Existing |
| Seep 3 Replacement Collection [3] | 0.02 | NA | Seepage Collection | Synthetic | Existing |
| Seep 4 Replacement Collection [3] | 0.02 | NA | Seepage Collection | Synthetic | Existing |
| Seep 5E Replacement Collection[3] | 0.02 | NA | Seepage Collection | Synthetic | Existing |
| Main Pit Sump[2] | 4.93 | NA | Pit Dewatering | None | Existing |
| Copper Mt. Pit Sump[2] | 6.01 | NA | Pit Dewatering | None | Existing |
| Valencia Pit Sump[2] | 2.38 | NA | Pit Dewatering | None | Existing |
| Lube Shop Pond | 0.09 | NA | Stormwater | None | Existing |
| 2 PLS Pond[2,5] | 1.05 | 0.63 | Water Treatment | Synthetic | Existing |
| 4C Drain[2,4] | 0.00 | 0.00 | Water Treatment | Synthetic | Existing |
| North Racket PLS Pond[2] | 0.93 | 0.56 | Water Treatment | Synthetic | Existing |
| Copper Mt. Decant Ponds[5] | 0.41 | PLS | Water Treatment | None | Existing |
| SX/EW PLS Feed Pond[2,5] | 0.34 | 0.20 | Water Treatment | Synthetic | Existing |
| New Spray Evaporation Pond 1 | 7.00 | 5.60 | Water Treatment | Synthetic | New |
| New Spray Evaporation Pond 2 | 3.20 | 2.56 | Water Treatment | Synthetic | New |
| Raffinate Tank 1[2,5] | 0.08 | 0.08 | Water Treatment | Synthetic | Existing |
| Raffinate Tank 2[2,5] | 0.25 | 0.25 | Water Treatment | Synthetic | Existing |
| 5E Seepage Collection Pond[2] | 0.10 | 0.06 | Water Treatment | Synthetic | Existing |
| 5E Surge Pond[2] | 0.84 | 0.50 | Seepage Collection | Synthetic | Existing |

**Table 5-1: Post-Closure Surface Impoundments**

| Impoundment Designation[1] | Surface Area (acres) | Calculated Surface Area[1] (acres) | Post-Closure Use | Liner[1] | Status |
|---|---|---|---|---|---|
| ***DP-286 3 Leach Stockpile, 3B and 5A Waste Rock Stockpiles, and Reclaimed Mill Site*** | | | | | |
| No. 3 PLS Collection Pond[2] | 1.58 | 0.95 | Water Treatment | Synthetic | Existing |
| No. 3 PLS Overflow Pond[2,5] | 1.52 | 0.91 | Water Treatment (Short-Term ETS) | Synthetic | Existing |
| Tailing Thickeners[5] (six) | 11.6 | 11.6 | Water Treatment | Synthetic & Concrete lined | Existing |
| POPE Ponds[2] | 0.58 | NA | Sewage/Stormwater | Clay/Concrete | Existing |
| SPCC Pond[2] | 1.10 | NA | Stormwater | Synthetic | Existing |
| ***DP-363 1A and 1B Leach Stockpiles*** | | | | | |
| 1A Stormwater Pond[2] | 0.63 | NA | Stormwater | Clay | Existing |
| 1A PLS Tank[2,5] | 0.01 | 0.01 | Seepage Collection | Stainless Steel | Existing |
| 1A PLS Overflow Pond[2,5] | 1.00 | 0.75 | Seepage Collection | Synthetic | Existing |
| 1B PLS Tank[2,5] | 0.02 | 0.02 | Seepage Collection | Stainless Steel | Existing |
| 1B PLS Overflow Pond[2] | 1.37 | 0.82 | Seepage Collection | Synthetic | Existing |
| Lower Oak Grove Tanks (2)[2] | 0.01 | NA | Seepage Collection | Poly | Existing |
| Upper Oak Grove Transect 1 Tank[2] | 0.01 | NA | Seepage Collection | Poly | Existing |
| ***DP-396 No. 1C Waste Rock Stockpile*** | | | | | |
| Oak Grove Pond[2,5] | 0.25 | 0.15 | Seepage Collection | Synthetic | Existing |
| 1C Stormwater Pond[2] | 2.05 | NA | Stormwater | Unlined | Existing |
| ***DP-435 2A and 2B Leach Systems, 2B and 9A Waste Rock Stockpiles*** | | | | | |
| 2A East PLS Tank[2] | 0.01 | 0.01 | Water Treatment | Stainless Steel | Existing |
| 2A West PLS Tank[2] | 0.01 | 0.01 | Water Treatment | Synthetic | Existing |
| Decant Ponds (3)[2] | 4.42 | NA | Pit Dewatering | Unlined | Existing |
| 2A East PLS Overflow (Pennington Pond)[2,5] | 0.68 | 0.41 | Water Treatment | Synthetic | Existing |

**Table 5-1: Post-Closure Surface Impoundments**

| Impoundment Designation[1] | Surface Area (acres) | Calculated Surface Area[1] (acres) | Post-Closure Use | Liner[1] | Status |
|---|---|---|---|---|---|
| ***DP-455 Gettysburg and Savanna Pits; and 6A, 6B, 6C, 6D, and 7B Leach Stockpiles*** | | | | | |
| Gettysburg Pit Collection Pond[2] | 1.7 | NA | Pit Dewatering/ Water Treatment | Unlined | Existing |
| Land Bridge Booster[2] | 0.40 | 0.24 | Water Treatment | Synthetic | Existing |
| 6C-2 PLS Pond[2] | 0.13 | 0.08 | Water Treatment | Synthetic | Existing |
| Gettysburg Highwall Tank[2] | 0.001 | 0.001 | Water Treatment | Synthetic | Existing |
| Savanna Pit Sump | 0.07 | NA | Stormwater | Synthetic | Existing |
| ***DP-896 1 Leach Stockpile, and Acid-Unloading Facility*** | | | | | |
| 1 AST Overflow Pond[2] | 0.12 | 0.07 | Seepage Collection | Synthetic | Existing |
| 1 AST Tank[2,5] | 0.001 | 0.001 | Seepage Collection | Fiberglass | Existing |

Notes:
AST = Above-ground storage tank
PLS = Pregnant leach solution

[1] Operational water surface areas for impoundments/ponds is based on stage-storage curves provided by FMI[4] assuming they are at 60 percent of capacity at the start of the evaporation program. For impoundments/ponds that do not have stage-storage curves, the surface areas are assumed to be 60 percent of the reservoir surface areas, tank surface areas remain the same.

[2] Based on information provided in the June 9, 2017 report from Daniel B. Stephens & Associates, Inc. titled Application Requirements for Discharge Permit at a Copper Mine Facility (20.6.7.11 NMAC), also commonly referred to as the "Master Document" unless otherwise noted.

[3] Structure will be covered and will need to be replaced based on reclamation designs presented in Appendix D

[4] Based on Tyrone pond capacity and surface area spreadsheets provided by Bret Ashford and Dick Thornburg of FMI on 8/23/2012. The 4C Drain is actually collection points with drains at the base and does not store PLS.

[5] Reservoir surface area from Google Earth. Tailing thickeners assuming six of the eight are available.

**Table 7-1: Proposed Interim Seed Mix and Rates for the Tyrone Mine Reclamation Sites**

| Species[a] | | Life-Form | Duration[b] | Seasonality | Rate[a,c] |
|---|---|---|---|---|---|
| Scientific Name | Common Name | | | | |
| ***Primary*** | | | | | |
| *Bouteloua curtipendula* | Sideoats grama | Grass | Per | Warm | 1.50 |
| *Bouteloua eriopoda* | Black grama | Grass | Per | Warm | 0.10 |
| *Bouteloua gracilis* | Blue grama | Grass | Per | Warm | 0.50 |
| *Leptochloa dubia* | Green sprangletop | Grass | Per | Warm | 0.25 |
| *Eragrostis intermedia* | Plains lovegrass | Grass | Per | Intermediate | 0.05 |
| *Dalea candida* | White prairie clover | Forb | Per | NA | 0.25 |
| *Linum lewisii* | Blue flax | Forb | Per | NA | 0.25 |
| *Sphaeralcea spp.* | Globemallow spp. | Forb | Per | NA | 0.10 |
| *Cercocarpus montanus* | Mountain mahogany | Shrub | Per | NA | 1.50 |
| *Fallugia paradoxa* | Apache plume | Shrub | Per | NA | 0.10 |
| *Krascheninnikovia lanata* | Winterfat | Shrub | Per | NA | 1.00 |
| | | | | **Total** | **5.60** |
| ***Alternate*** | | | | | |
| *Andropogon gerardii* | Big bluestem | Grass | Per | Warm | ND |
| *Andropogon hallii* | Sand bluestem | Grass | Per | Warm | ND |
| *Andropogon saccharoides* | Silver bluestem | Grass | Per | Warm | ND |
| *Aristida purpurea* | Purple three-awn | Grass | Per | Warm | ND |
| *Bothriochloa barbinodis* | Cane beardgrass | Grass | Per | Warm | ND |
| *Bothriochloa ischaemum* | Yellow bluestem | Grass | Per | Warm | ND |
| *Buchloe dactyloides* | Buffalograss | Grass | Per | Warm | ND |
| *Digitaria californica* | Arizona cottontop | Grass | Per | Warm | ND |
| *Heterotheca contortus* | Tanglehead | Grass | Per | Warm | ND |
| *Hilaria belangeri* | Curly mesquite | Grass | Per | Warm | ND |
| *Pleuraphis mutica* | Tobosa | Grass | Per | Warm | ND |
| *Muhlenbergia montana* | Mountain muhly | Grass | Per | Warm | ND |
| *Muhlenbergia porteri* | Bush muhly | Grass | Per | Warm | ND |
| *Muhlenbergia rigens* | Deergrass | Grass | Per | Warm | ND |
| *Muhlenbergia torreyi* | Ring muhly | Grass | Per | Warm | ND |
| *Muhlenbergia wrightii* | Spike muhly | Grass | Per | Warm | ND |
| *Panicum obtusum* | Vine mesquite | Grass | Per | Warm | ND |
| *Panicum virgatum* | Switchgrass | Grass | Per | Warm | ND |
| *Pleuraphis jamesii* | Galleta grass | Grass | Per | Warm | ND |
| *Schizachyrium scoparium* | Little bluestem | Grass | Per | Warm | ND |
| *Setaria vulpiseta* | Plains bristlegrass | Grass | Per | Warm | ND |
| *Sorgastrum nutans* | Indiangrass | Grass | Per | Warm | ND |
| *Sporobolus airoides* | Alkali sacaton | Grass | Per | Warm | ND |
| *Sporobolus cryptandrus* | Sand dropseed | Grass | Per | Intermediate | ND |
| *Sporobolus giganteus* | Giant dropseed | Grass | Per | Warm | ND |
| *Sporobolus wrightii* | Sacaton | Grass | Per | Warm | ND |
| *Achillea millefolium* | Western yarrow | Forb | Per | NA | ND |
| *Baileya multiradiata* | Desert marigold | Forb | Ann | NA | ND |
| *Berlandiera lyrata* | Chocolate flower | Forb | Per | NA | ND |

**Table 7-1: Proposed Interim Seed Mix and Rates for the Tyrone Mine Reclamation Sites**

| Species[a] | | Life-Form | Duration[b] | Seasonality | Rate[a,c] |
|---|---|---|---|---|---|
| Scientific Name | Common Name | | | | |
| *Calochortus 20mbiguous* | Desert mariposa lily | Forb | Per | NA | ND |
| *Calylophus hartwegii* | Lavenderleaf primrose | Forb | Per | NA | ND |
| *Castilleja integra* | Indian paintbrush | Forb | Per | NA | ND |
| *Castilleja sessiliflora* | Downy paintbrush | Forb | Per | NA | ND |
| *Coreopsis lanceolata* | Lanceleaf tickseed | Forb | Per | NA | ND |
| *Coreopsis tinctoria* | Plains tickseed | Forb | Per | NA | ND |
| *Dalea candida* | White prairie clover | Forb | Per | NA | ND |
| *Dalea jamesii* | James' dalea | Forb | Per | NA | ND |
| *Gaillardia aristata* | Blanket flower | Forb | Per | NA | ND |
| *Gaillardia pulchella* | Firewheel | Forb | Per | NA | ND |
| *Gilia tricolor* | Bird's eyes | Forb | Per | NA | ND |
| *Glandularia gooddingii* | Desert verbena | Forb | Per | NA | ND |
| *Heliomeris multiflora* | Showy goldeneye | Forb | Per | NA | ND |
| *Ipomopsis ambiguous* | Scarlet gilia | Forb | Per | NA | ND |
| *Lesquerella gordonii* | Gordon bladderpod | Forb | Per | NA | ND |
| *Lupinus arizonicus* | Arizona lupine | Forb | Per | NA | ND |
| *Lupinus perennis* | Perennial lupine | Forb | Per | NA | ND |
| *Machaeranthera bigelovii var.bigelovii* | Bigelow's tansyaster | Forb | Per | NA | ND |
| *Machaeranthera tanacetifolia* | Tanseyleaf tansyaster | Forb | Per | NA | ND |
| *Mirabilis multiflora* | Wild Four 'O Clock | Forb | Per | NA | ND |
| *Monarda citriodora* | Lemon beebalm | Forb | Per | NA | ND |
| *Monarda fistulosa* | Wild bergamot | Forb | Per | NA | ND |
| *Oenothera elata* | Hooker evening primrose | Forb | Per | NA | ND |
| *Oenothera macrocarpa* | Missouri evening primrose | Forb | Per | NA | ND |
| *Penstemon ambiguous* | Sand penstemon | Forb | Per | NA | ND |
| *Penstemon barbatus* | Scarlet bulger | Forb | Per | NA | ND |
| *Penstemon eatonii* | Firecracker penstemon | Forb | Per | NA | ND |
| *Penstemon fendleri* | Fendler's penstemon | Forb | Per | NA | ND |
| *Penstemon palmeri* | Palmer penstemon | Forb | Per | NA | ND |
| *Penstemon pseudospectabilis* | Desert penstemon | Forb | Per | NA | ND |
| *Penstemon superbus* | Superb penstemon | Forb | Per | NA | ND |
| *Penstemon virgatus* | Wandbloom penstemon | Forb | Per | NA | ND |
| *Phacelia campanularia* | Bluebells | Forb | Per | NA | ND |
| *Phacelia crenulata* | Desert bluebells | Forb | Per | NA | ND |
| *Ratibida columnifera* | Mexican hat | Forb | Per | NA | ND |
| *Rudbeckia hirta* | Blackeyed Susan | Forb | Per | NA | ND |
| *Senecio longilobus* | Silver groundsel | Forb | Per | NA | ND |
| *Senna covesii* | Desert senna | Forb | Per | NA | ND |
| *Solidago canadensis* | Canada goldenrod | Forb | Per | NA | ND |
| *Sphaeralcea ambigua* | Desert globemallow | Forb | Per | NA | ND |
| *Sphaeralcea coccinea* | Scarlet globemallow | Forb | Per | NA | ND |

**Table 7-1: Proposed Interim Seed Mix and Rates for the Tyrone Mine Reclamation Sites**

| Species[a] | | Life-Form | Duration[b] | Seasonality | Rate[a,c] |
|---|---|---|---|---|---|
| Scientific Name | Common Name | | | | |
| *Sphaeralcea grossulariifolia* | Gooseberry globemallow | Forb | Per | NA | ND |
| *Thelesperma filifolium* | Greenthread | Forb | Per | NA | ND |
| *Agave parryi* | Parry's agave | Shrub | Per | NA | ND |
| *Amorpha fruticosa* | False indigo-bush | Shrub | Per | NA | ND |
| *Artemisia ludoviciana* | White sagebrush | Shrub | Per | NA | ND |
| *Atriplex canescens* | Fourwing saltbush | Shrub | Per | NA | ND |
| *Brickellia californica* | Canyon bricklebush | Shrub | Per | NA | ND |
| *Calliandra eriphylla* | Fairy duster | Shrub | Per | NA | ND |
| *Chilopsis linearis* | Desert willow | Shrub | Per | NA | ND |
| *Dalea formosa* | Feather dalea | Shrub | Per | NA | ND |
| *Dasylirion wheeleri* | Sotol | Shrub | Per | NA | ND |
| *Erimaceria nauseosa* | Rubber rabbitbrush | Shrub | Per | NA | ND |
| *Lycium pallidum* | Wolfberry | Shrub | Per | NA | ND |
| *Mahonia repens* | Creeping Oregon grape | Shrub | Per | NA | ND |
| *Nolina microcarpa* | Beargrass | Shrub | Per | NA | ND |
| *Rhus trilobata* | Skunkbush sumac | Shrub | Per | NA | ND |
| *Ribes leptanthum* | Canyon gooseberry | Shrub | Per | NA | ND |
| *Robinia neomexicana* | NM locust | Shrub | Per | NA | ND |
| *Yucca baccata* | Broadleaf yucca | Shrub | Per | NA | ND |
| *Yucca elata* | Soap tree yucca | Shrub | Per | NA | ND |
| *Yucca glauca* | Spanish bayonet | Shrub | Per | NA | ND |

Notes:

[a] The seed species list and associated mix will be included in the vegetation monitoring work plan and may be amended with MMD approval. Any proposed changes to the seed mix will be provided to the MMD no less than 60 days before any seeding occurs.

[b] Per - Perennial; Ann - Annual

[c] Rate is in pounds of pure live seed (PLS) per acre; substitutions may change seeding rates

Current alternate or substitute species list for the proposed seed mix is presented in Table 5 of Permit Modification 06-3 to Permit GR010RE.

lbs/ac = pounds per acre

NA = Not applicable

ND = Not determined

PLS = Pure live seed

**Table 7-2: Functions and Attributes of the Primary Plant Species Proposed for the Tyrone Mine Reclamation Sites**

| Species | Character[a] | Attributes and Function |
|---|---|---|
| Blue grama (*Bouteloua gracilis*) | N,P,W,G | Sod and bunch grass providing ground cover and forage |
| Side-oats grama (*Bouteloua curtipendula*) | N,P,W,G | Bunch grass providing ground cover and forage |
| Black grama (*Bouteloua eriopoda*) | N,P,W,G | Bunch grass providing ground cover and forage |
| Green sprangletop (*Leptochloa dubia*) | N,P,W,G | Erect bunch grass; aggressive short-lived nurse plant with forage value |
| Plains lovegrass (*Eragrostis intermedia*) | N,P,I,G | Bunch grass providing ground cover and early spring forage |
| Apache plume (*Fallugia pardoxa*) | N,P,S | Mid-height shrub providing browse, cover, and erosion control |
| Mountain mahogany (*Cercocarpus montanus*) | N,P,S | Mid-height to tall shrub providing browse and cover |
| Winterfat (*Krascheninnikovia lanata*) | N,P,HS | Low shrub providing winter browse |
| White prairie clover (*Dalea candida*) | N,P,F | Early season legume providing ground cover and forage |
| Blue flax (*Linum lewisii*) | N,P,F | Persistent forb with a pretty blue flower |
| Globemallow spp. (*Sphaeralcea spp.*) | N,P,F | Persistent mid-height forb providing browse |

Notes:
The seed species list and associated mix will be included in the vegetation monitoring work plan and may be amended with MMD approval. Any proposed changes to the seed mix will be provided to the MMD no less than 60 days before any seeding occurs.
[a] N = Native
P = Perennial
W = Warm season
I = Intermediate season
G = Grass
S = Shrub
HS = Half shrub
F = Forb

**Table 7-3: Post-Mining Land Use Designations of Tyrone Mine Buildings**

| Tyrone Tag No. | Description | Dimensions[1.] (LxWxH, feet) | PMLU[3.] | Description |
|---|---|---|---|---|
| ***Mine Maintenance Facilities Area*** | | | | |
| MM-01 | General Office | 195 x 114 x 23 | Industrial | Remain for post-closure use |
| MM-02 | Mine Operations Office | 254 x 60 x 33 | Industrial | Remain for post-closure use |
| MM-03 | Security & Addition | 41 x 26 x 17 | Industrial | Remain for post-closure use |
| MM-04 | Safety Building | 80 x 24 x 20 | Industrial | Remain for post-closure use |
| MM-05 | Human Resources/Training | 102 x 41 x 20 | Industrial | Remain for post-closure use |
| MM-06 | Jerome Building | 204 x 63 x 50 | Wildlife Habitat | To be demolished |
| MM-07 | Plant Warehouse [4.] | 250 x 100 x 28 | Wildlife Habitat | To be demolished |
| MM-08 | Truck Shop/Machine Shop/Welding Shop | 344 x 236 x 60 | Industrial | Remain for post-closure use |
| MM-09 | Electric Shop | 120 x 51 x 50 | Wildlife Habitat | To be demolished |
| MM-10 | Pipe Shop | 145 x 41 x 40 | Wildlife Habitat | To be demolished |
| MM-11 | Carpenter Shop | 119 x 69 x 27 | Wildlife Habitat | To be demolished |
| MM-12 | Lumber Storage | 102 x 61 x 33 | Wildlife Habitat | To be demolished |
| MM-13 | Shovel Repair | 121 x 70 x 66 | Wildlife Habitat | To be demolished |
| MM-14 | Environmental Lab | 112 x 27 x 17 | Wildlife Habitat | To be demolished |
| MM-15 | Chapel | 50 x 25 x ___[5] | Industrial | Potential historic building; (Poor condition rating [2.]) |
| MM-16 | Electrical Building & Chlorine Shack | 35 x 35 x 10 | Industrial | Remain for post-closure use |
| MM-18 | Analytical Lab | 120 x 50 x 14 | Industrial | Remain for post-closure use |
| MM-20 | Diesel Tank Farm | 120 x 120 x ___ | Industrial | Remain for post-closure use |

**Table 7-3: Post-Mining Land Use Designations of Tyrone Mine Buildings**

| Tyrone Tag No. | Description | Dimensions[1.] (LxWxH, feet) | PMLU[3.] | Description |
|---|---|---|---|---|
| ***Mine Maintenance Facilities Area (cont.)*** | | | | |
| MM-21 | Electrical Power Substation | 18 0 x 120 x __ | Industrial | Remain for post-closure use |
| MM-24 | Fire Truck Barn | 25 x 25 x 12 | Industrial | Remain for post-closure use |
| MM-25 | Ambulance Barn | 35 x 25 x 12 | Industrial | Remain for post-closure use |
| ***SX/ EW Area*** | | | | |
| -- | Tankhouse | 150 x 465 x 30 | Wildlife Habitat | To be demolished[3.] |
| -- | SX/EW Plant Area Shop | 31 x 71 x 30 | Wildlife Habitat | To be demolished[3.] |
| -- | Leach Crew Office | 15 x 15 x 15 | Wildlife Habitat | To be demolished[3.] |
| -- | SX/EW Warehouse | 48 x 150 x 20 | Wildlife Habitat | To be demolished[3.] |
| -- | Substation | 100 x 90 x 10 | Industrial | Remain for post-closure use |
| -- | Raffinate Storage Tanks (2) | 1 x 120D x 34H<br>1 x 65D x 16H | Industrial | Remain for post-closure use |
| -- | Gonzales Cells | 25 x 52 x 10 | Wildlife Habitat | To be demolished[3.] |
| -- | Jamison Cells | 35 x 44 x 10 | Wildlife Habitat | To be demolished[3.] |
| -- | Organic Tanks (4) | 4 x 32D x 16H | Wildlife Habitat | To be demolished[3.] |
| -- | Mixer/Settler Tanks (8) | 200 x 366 x 10 | Wildlife Habitat | To be demolished[3.] |
| -- | Tank Farm (5) | 92 x 370 x 10 | Wildlife Habitat | To be demolished[3.] |
| -- | Water Tank | 1 x 30D x 16H | Wildlife Habitat | To be demolished[3.] |
| -- | PLS Feed Pond | 130 x 130[5] | Industrial | Remain for post-closure use |
| -- | Acid Tanks (2) | 2 x 20D x 16H | Wildlife Habitat | To be demolished[3.] |
| -- | MCC Building | 14 x 30 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Tool Room and Storage | 60 x 70 x 12 | Wildlife Habitat | To be demolished[3.] |

**Table 7-3: Post-Mining Land Use Designations of Tyrone Mine Buildings**

| Tyrone Tag No. | Description | Dimensions[1.] (LxWxH, feet) | PMLU[3.] | Description |
|---|---|---|---|---|
| ***SX/ EW Area (cont.)*** | | | | |
| -- | Chlorinator Room | 19 x 66 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | 2A West Raff Tank | 30 x 46 x 16 | Wildlife Habitat | To be demolished[3.] |
| -- | Rectifiers | 20 x 24 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Workroom | 66 x 75 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Pump Mixer Control Room | 41 x 41 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Cobalt Sulfate Tank | 1 x 18D x 16H | Wildlife Habitat | To be demolished[3.] |
| -- | Reagent Tanks | 25 x 36 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Tool Room | 8 x 32 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Diluent Storage Tank | 1 x 18H x 16D | Wildlife Habitat | To be demolished[3.] |
| -- | Pacesetter Filters (2) | 48 x 80 x 12 | Wildlife Habitat | To be demolished[3.] |
| -- | Wash Pad | 45 x 68 | Wildlife Habitat | To be demolished[3.] |
| ***Lubrication Shop Area*** | | | | |
| -- | Prill Tanks (2 each) | 2 x 20D x 35H[5] | Waiver Area | To be demolished |
| -- | Lubrication Shop | 110 x 60 x 35[5] | Waiver Area | To be demolished - future borrow pit area |
| -- | Southwest Energy Building | 42 x 42 x 19[5] | Not Specified | Owned by others |
| -- | Electric Power Substation | 52 x 36 x10[5] | Waiver Area | To be demolished - future borrow pit area |
| -- | Powder Magazines (3) | 10 x 10 x 10[5] | Waiver Area | To be demolished - future borrow pit area |
| -- | Storage Sheds | 110 x 60 x 10[5] | Waiver Area | To be demolished |

**Table 7-3: Post-Mining Land Use Designations of Tyrone Mine Buildings**

| Tyrone Tag No. | Description | Dimensions[1.] (LxWxH, feet) | PMLU[3.] | Description |
|---|---|---|---|---|
| ***Lubrication Shop Area (cont.)*** | | | | |
| -- | Lube Shop Addition | 50 x 70 x 17 | Waiver Area | To be demolished |
| -- | #2 Fuel Dock Concrete Slab | 14 x 12 x -- | Waiver Area | To be demolished |
| ***Acid Unloading Facility & Former Precipitation Area*** | | | | |
| -- | Acid Unloading Facility | 20 x 10 x 20[5] | Wildlife | To be demolished[1.] |
| -- | Former Precipitation Plant Building | 400 x 100[5] | Wildlife | To be demolished[1.] |
| ***Mill and Concentrator Area*** | | | | |
| MC-01 | Tailing Thickeners (6) | 325D | Industrial | Six of the eight tailing thickeners will remain for post-closure use - reserved for water treatment. The remaining 2 thickeners will be reclaimed. |
| MC-02 | Reclaim Water Storage Tanks (3) | 1 x 60D<br>2 x 40D | Industrial | Demolished, still needs cover and revegetation |
| MC-04 | Reclaim Water Pump House | 138 x 60 x 10 | Industrial | To be demolished[2.]<br>Items to remain for post-closure use - pumps (9X), 7-ton overhead crane (trolly only) |
| MC-05 | Terminal Tanks (3 each) | 150D [5] | Industrial | Remain for post-closure use |
| MC-15 | Warehouse and Core Storage[4.] | 235 x 101 x 33 | Wildlife Habitat | To be demolished[3.] |
| MC-17 | Radiators/Power Plant (Powerhouse[4.]) | 420 x 120 x 30 | Industrial | Remain for post-closure use |
| MC-20 | Reagent Building | NA | Wildlife Habitat | To be demolished |
| MC-21 | Fuel Station | 60 x 50 | Wildlife Habitat | To be demolished[3.] |
| MC-22 | Tire Shop | 79 x 44 x 23 | Wildlife Habitat | To be demolished[3.] |
| MC-24 | Spigot Underflow Pump house | 60 x 50 x__ [5] | Industrial | Demolished, still needs cover and revegetation |

**Table 7-3: Post-Mining Land Use Designations of Tyrone Mine Buildings**

| Tyrone Tag No. | Description | Dimensions[1.] (LxWxH, feet) | PMLU[3.] | Description |
|---|---|---|---|---|
| ***Mill and Concentrator Area (cont.)*** | | | | |
| MC-25 | Tailing Pump house | 110 x 50 x__[5] | Industrial | Remain for post-closure use |
| MC-27 | Inactive Diesel Storage Tanks (2) | 1 x 20 x 15 | Wildlife Habitat | To be demolished[2,3] |
| ***Mangas Valley Tailing Area*** | | | | |
| -- | No. 1 Tailing Dam Reclaim Water Pump Station and Substation | 78 x 33 x 20 | Wildlife Habitat | To be demolished |

Notes:
LxWxH = Length by Width by Height in feet
D = Diameter in feet
[1] Identified in the 2001 CCP (M3, 2003).
[2] Modified per MMD letter (MMD Response to January 15, 2004 Building Inspection Report) to Phelps Dodge Tyrone, Inc. dated February 10, 2004.
[3] Permit Revision 01-1 to Permit GR010RE, Tyrone Mine, Appendix D. April 12, 2004
[4] Identified in "Tyrone Mine Industrial PMLU Building Use Information and Justification. March 19, 2004."
[5] Golder Associates Inc. estimate from site drawings.

**Table 7-4: Proposed Plant Diversity Guidelines for the Tyrone Mine**

| Class | Seasonality | Numbers | Minimum Occurrence (% cover) |
|---|---|---|---|
| Grasses | Warm | 3 | 1 |
| Shrubs | NA | 2 | 0.5 |
| Forbs | NA | 2 | 0.1 |

Note:
NA = Not applicable

**Table 9-1: Reclamation Schedule for Tyrone**

| Unit | Anticipated or Actual Start Date for Reclamation to Begin[a] | Anticipated Duration (Years)[b] or Completion Date |
|---|---|---|
| 1A Leach,1B Leach[c,e] | 180 days following cessation of use of facility in short-term ETS operations | 6.0 |
| 2A Leach[e] | 180 days following cessation of use of facility in short-term ETS operations | 11.0 |
| 2B Leach[c,e] | 180 days following cessation of use of facility in short-term ETS operations | 11.0 |
| 2 Leach (Area 2), 7B Leach[c, d, e] | 180 days following cessation of use of facility in short-term ETS operations | 6.0 |
| 7B Waste, 7C Waste | Two years following Cessation of Operation | 3.0 |
| 3A Leach[e] | 180 days following cessation of use of facility in short-term ETS operations | 12.0 |
| 2 Leach (Area 1)[e] | 180 days following cessation of use of facility in short-term ETS operations | 6.0 |
| 6B Leach, 6D Leach[c,e] | 180 days following cessation of use of facility in short-term ETS operations | 6.0 |
| 6C Leach[c, e] | 180 days following cessation of use of facility in short-term ETS operations | 7.0 |
| Impacted Soils and Tailings Pipeline In and Around the Tailing Thickeners [c] | 180 days following Cessation of Operation | 0.5 |
| 2B Waste | Two years following Cessation of Operation | 11.0 |
| 3B Waste[c] | Two years following Cessation of Operation | 5.0 |
| 5A Waste | 180 days following cessation of use as a borrow source for cover material | 11.0 |
| 9A Waste, 9AX Waste | 180 days following cessation of use as a borrow source for cover material | 3.0 |
| 6A Leach[c, e] | 180 days following cessation of use of facility in short-term ETS operations | 2.0 |
| San Salvador Waste Backfill | Two years following Cessation of Operation | 3.0 |
| Reclaimed 1C Waste (Haul Road) | 180 days following Cessation of Operation | 1.0 |
| Other Borrow Areas | 180 days following Cessation of Operation | 2.0 |
| Building/Structure Demolition (non-IPMLU) | Two years following Cessation of Operation | 3.0 |
| Reclamation of Roads | Two years following Cessation of Operation | 3.0 |
| Surface Impoundments (non-PMLU) | Eight years following Cessation of Operation | 5.0 |
| Short-Term Evaporative Treatment System | Immediately following Cessation of Operation | 10 |

**Table 9-1: Reclamation Schedule for Tyrone**

| Unit | Anticipated or Actual Start Date for Reclamation to Begin[a] | Anticipated Duration (Years)[b] or Completion Date |
|---|---|---|
| Long-Term Evaporative Treatment System | Beginning in Year 10 following Cessation of Operation | 90 |
| Water Treatment Plant Construction | Beginning of Year 14 following Cessation of Operation, one year prior to start of water treatment system operation | 1 |

Notes:
PMLU = post-mining land use
ETS = evaporative treatment system
TTS = Tyrone treatment system (water treatment system)

[a] Anticipated start dates are subject to modification; actual start dates are associated with facilities under current reclamation; if cessation occurred for multiple facilities at the same time, the duration for reclamation of the facilities is approximately the sum of the durations for each facility.

[b] Estimated duration for facility reclamation does not include regulatory design review and approval processes; estimated completion date for facilities with ongoing reclamation are based on existing reclamation progress and future forecast for facility completion; some borrow areas may be left open to be used in maintenance activities on the primary reclaimed facilities.

[c] Leach stockpiles located inside the OPSDA and conditional waiver area include the 6A Leach; and the interior slopes of the 1A Leach, 1B Leach, 2B Leach, portions of the 2 Leach (Area 2), 6B Leach, and 6C Leach stockpiles. The waste rock stockpiles located inside the OPSDA and conditional waiver area include the 8A Waste and 8C Waste, interior slopes of the 3B Waste, and western portion of the 5A Waste. Only the top surfaces of the stockpiles located within the OPSDA and conditional waiver area will be reclaimed.

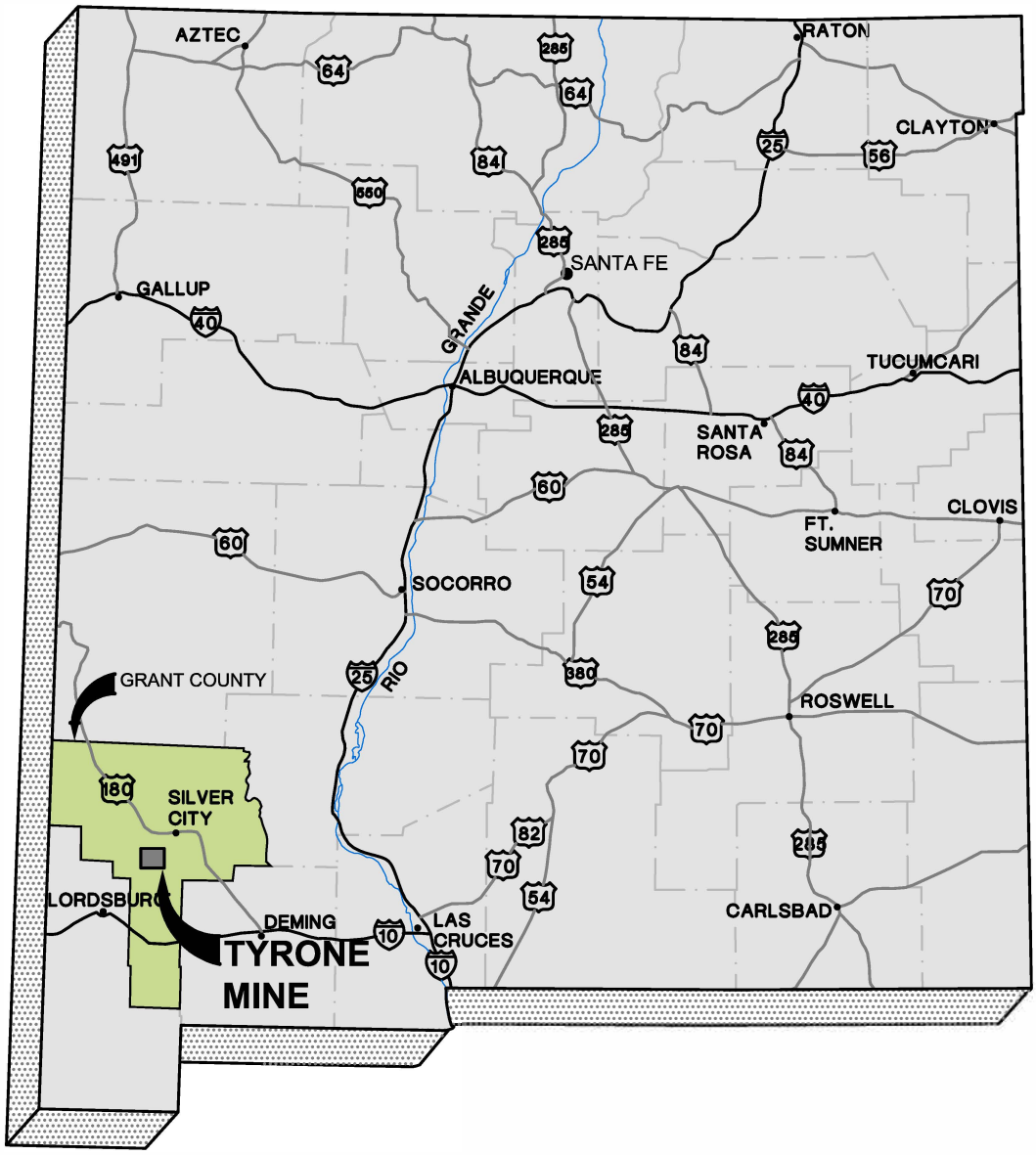
[d] The 2 Leach (Area 2) and 7B Leach stockpiles are treated as one consolidated unit for reclamation purposes based on the FMI 2014 mine plan and associated regrading plans presented in Appendix A.

[e] The top surface area of this facility (or portions thereof) will be utilized through Year 9 as part of the short-term evaporative treatment system (ETS). Cessation of Operation of this facility is considered the end of the 10-year short-term ETS period.

# Figures

# STATE OF NEW MEXICO

NOT TO SCALE




PROJECT

FREEPORT McMoRan TYRONE, INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

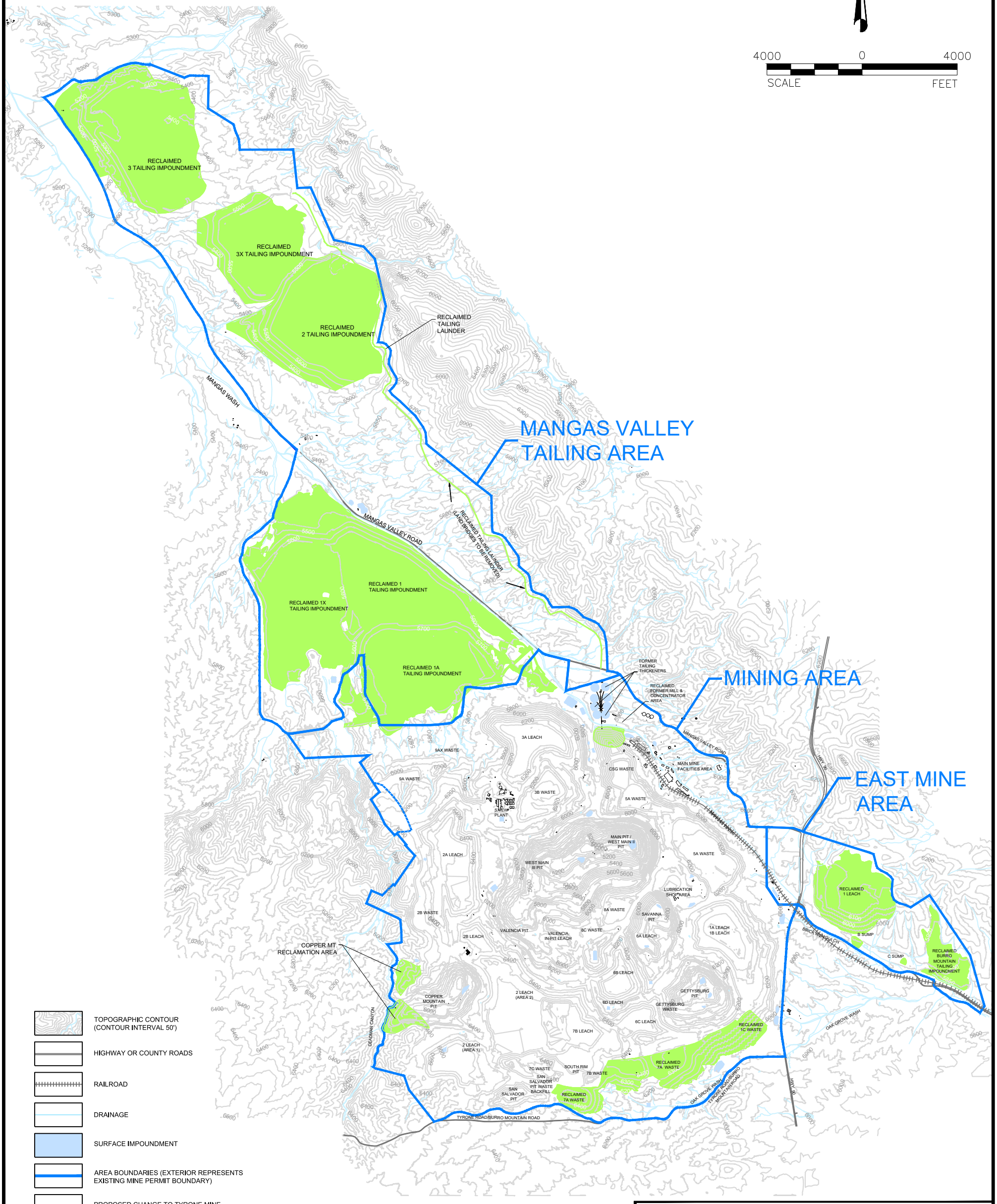
## MINE LOCATION MAP

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | 1-1 Mine Location |
| DESIGN | TS | 08/22/12 | SCALE AS SHOWN | REV. 0 |
| CADD | CM | 04/10/13 | | |
| CHECK | TS | 04/10/13 | | FIGURE 1-1 |
| REVIEW | TS | 04/10/13 | | |

Drawing file: 1-1 Mine Location Map.dwg Apr 10, 2013 - 1:46pm

Drawing file: 2-1 Site Location_Permit Bndy adjust.dwg Apr 28, 2020 - 12:37pm




NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS FIGURE FOR REFERENCE. THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT. THE LOCATION LABELS FOR THE VALENCIA IN-PIT LEACH AND GETTYSBURG WASTE STOCKPILES ARE SHOWN BUT NO DESIGN TOPOGRAPHY IS SHOWN FOR THE TWO FACILITIES.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

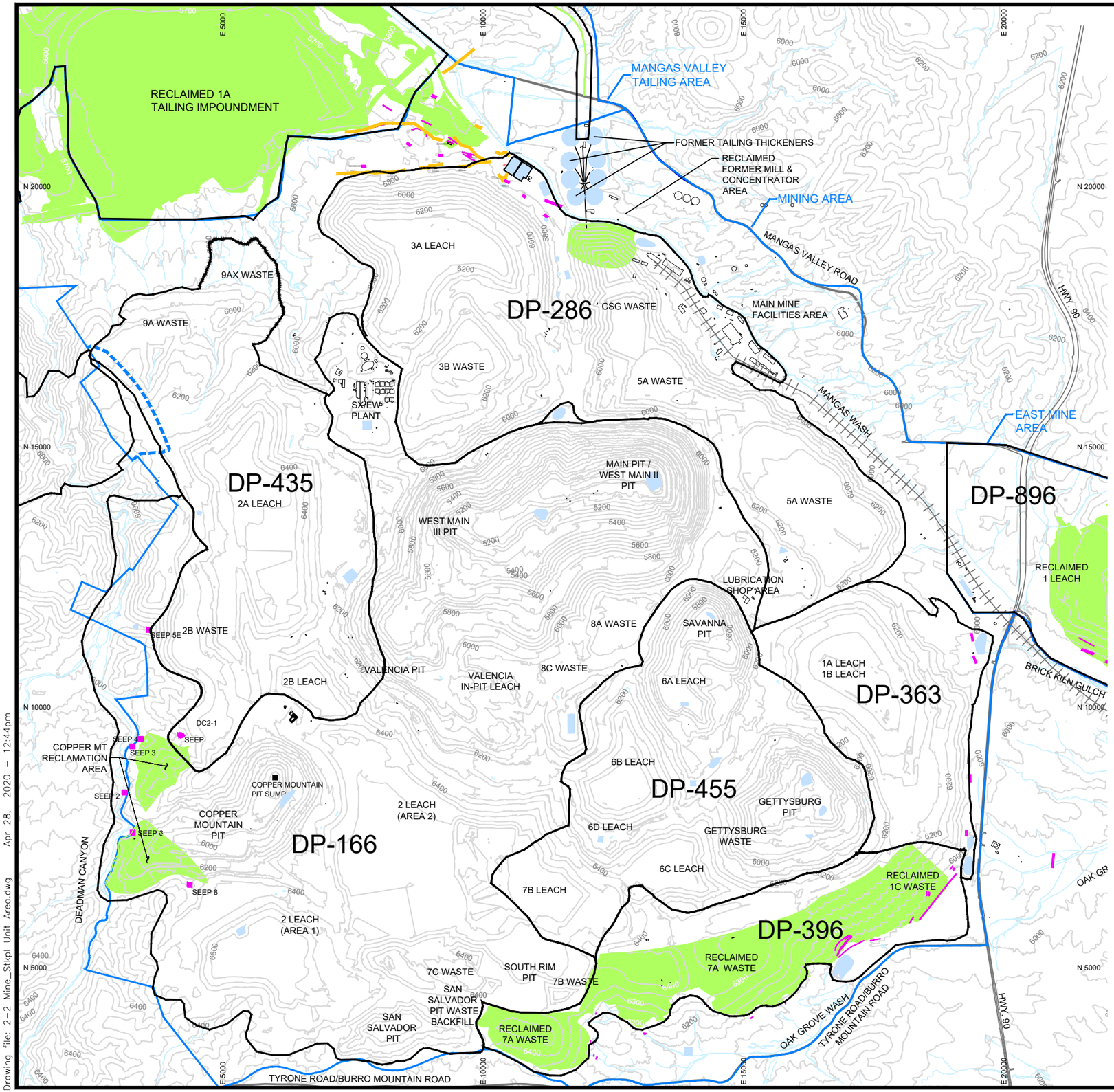
PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# TYRONE MINE AREAS AND FACILITIES

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | 2-1 Site Location |
| DESIGN | TS | 04/06/20 | SCALE AS SHOWN | REV. 1 |
| CADD | SIB | 04/06/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-1**




TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROAD

DRAINAGE

EXISTING MINE PERMIT BOUNDARY

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

APPROXIMATE OPERATIONAL DISCHARGE PLAN BOUNDARY AREA (SHOWING GENERAL DP AREA, NOT AN OFFICIAL BOUNDARY DELINEATION)

DP-286 DISCHARGE PLAN I.D. NUMBER

SURFACE IMPOUNDMENT

RECLAIMED FACILITY AND FACILITIES TO BE RECLAIMED BY THE EOY 2014

REGIONAL AQUIFER PUMPING SYSTEM

PERCHED SEEPAGE COLLECTION SYSTEM

RAILROAD

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS FIGURE FOR REFERENCE. THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT. THE LOCATION LABELS FOR THE VALENCIA IN-PIT LEACH AND GETTYSBURG WASTE STOCKPILES ARE SHOWN BUT NO DESIGN TOPOGRAPHY IS SHOWN FOR THE TWO FACILITIES.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

2000 0 2000
SCALE FEET

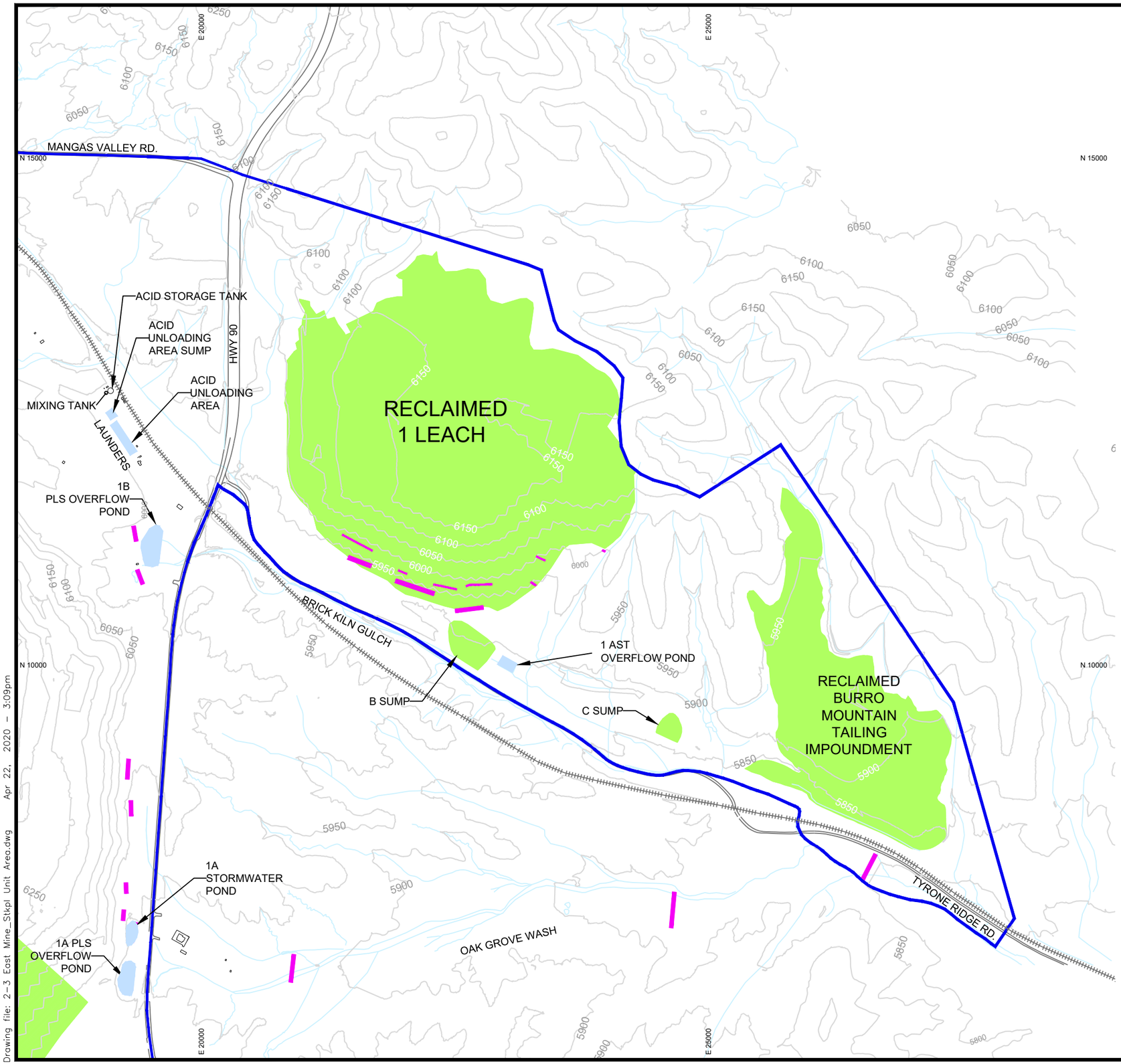
PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
**MINING AREA**

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. 2-2 Mine_Stkpl AREA | |
| DESIGN | TS | 04/06/20 | SCALE AS SHOWN | REV. 1 |
| CADD | SIB | 04/06/20 | **FIGURE 2-2** | |
| CHECK | | | | |
| REVIEW | | | | |

Drawing file: 2-2 Mine_Stkpl Unit Area.dwg Apr 28, 2020 - 12:44pm




TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROAD

RAILROAD

DRAINAGE

EXISTING MINE PERMIT BOUNDARY

RECLAIMED FACILITY

SURFACE IMPOUNDMENT

PERCHED SEEPAGE COLLECTION SYSTEM

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED.

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

1000 0 1000
SCALE FEET

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
**EAST MINE AREA**

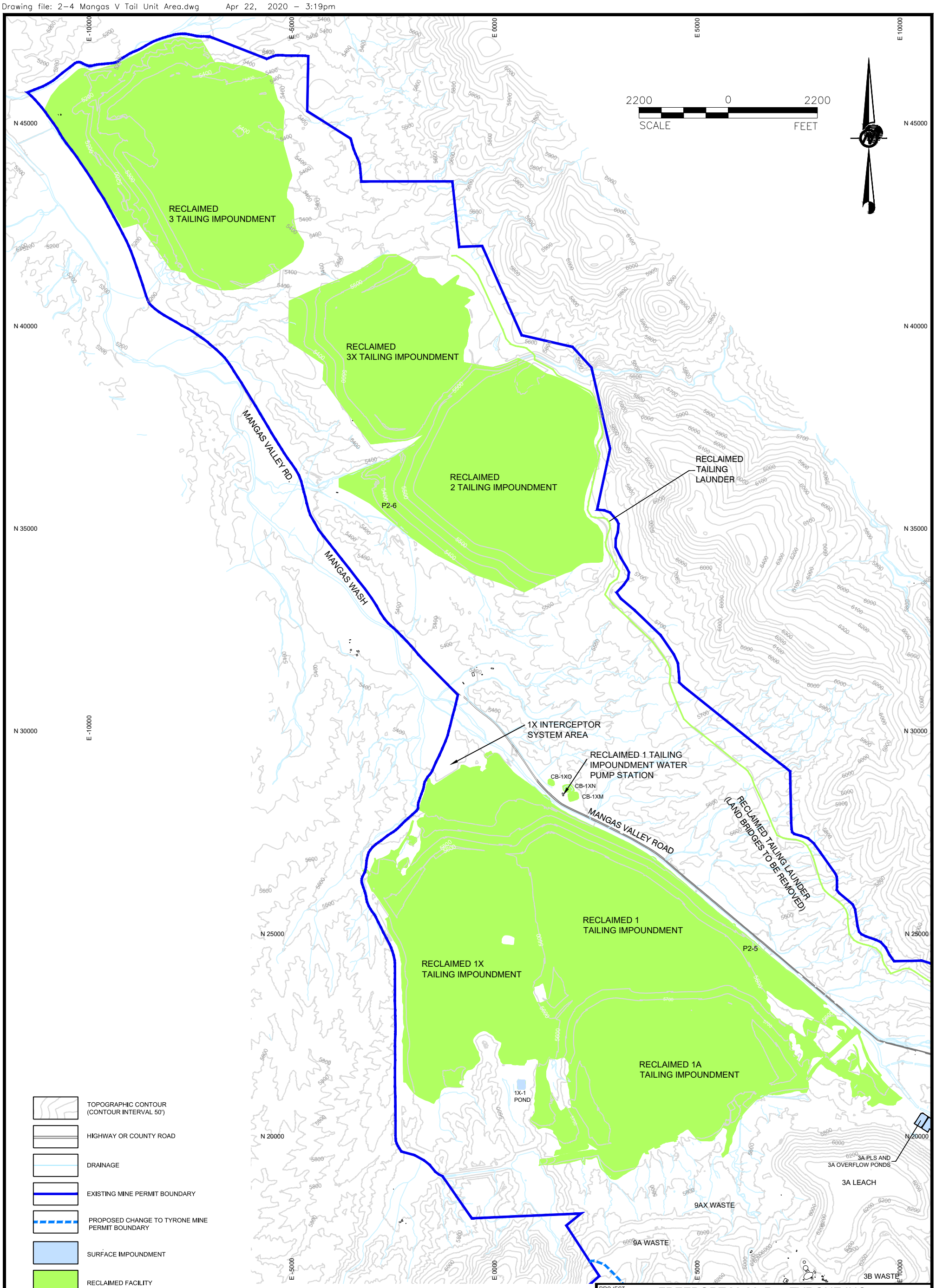
GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. East Mine_Stkpl Unit | |
| DESIGN | TS | 04/06/20 | SCALE AS SHOWN | REV. 1 |
| CADD | SIB | 04/06/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-3**

Drawing file: 2-3 East Mine_Stkpl Unit Area.dwg Apr 22, 2020 - 3:09pm

Drawing file: 2-4 Mangas V Tail Unit Area.dwg Apr 22, 2020 - 3:19pm




TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROAD

DRAINAGE

EXISTING MINE PERMIT BOUNDARY

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

SURFACE IMPOUNDMENT

RECLAIMED FACILITY

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED.

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# MANGAS VALLEY TAILING AREA

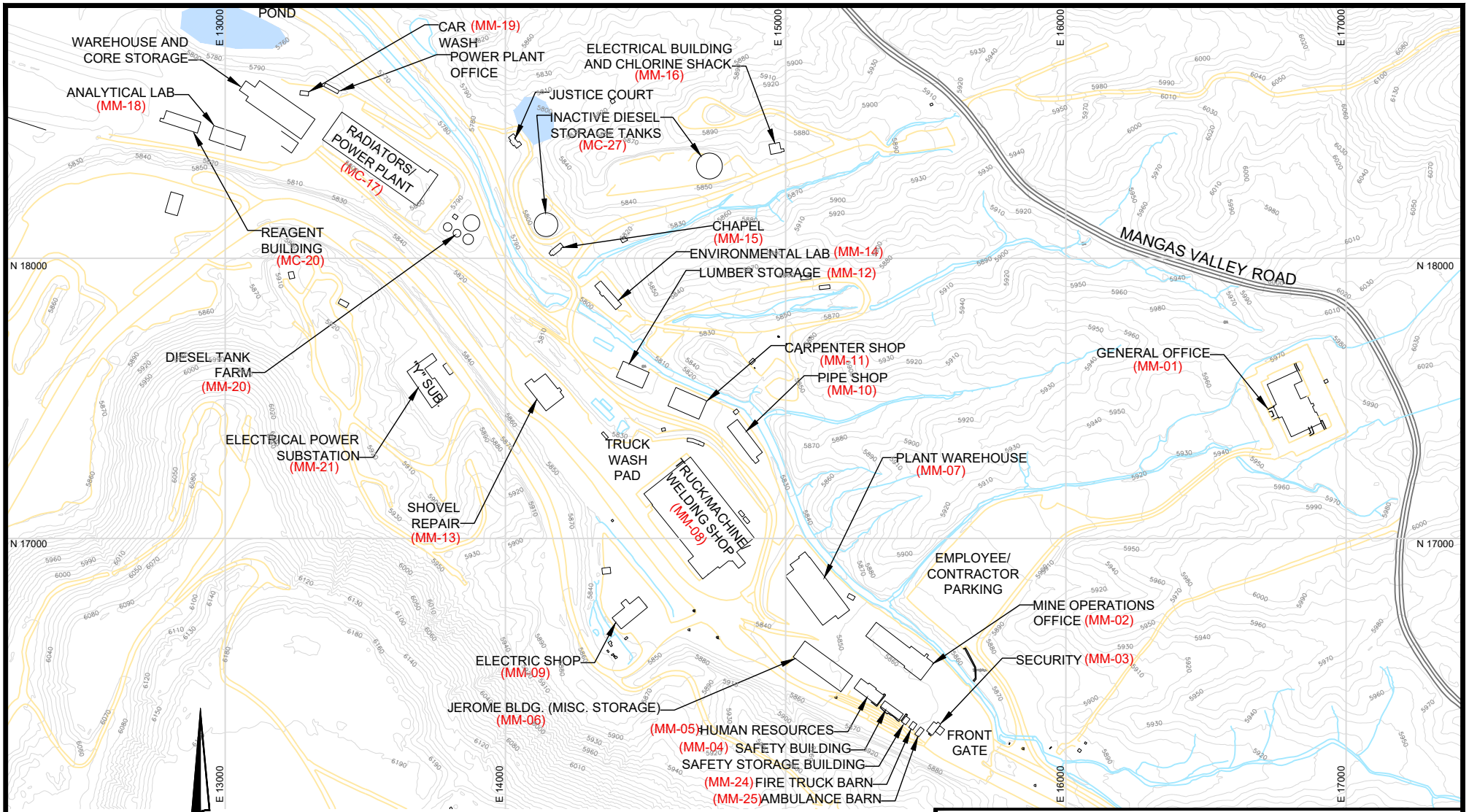
GOLDER

| | | |
|---|---|---|
| PROJECT No. | | 18106417 |
| DESIGN | TS | 04/06/20 |
| CADD | SIB | 04/06/20 |
| CHECK | | |
| REVIEW | | |

FILE No. Mangas V Tail Unit
SCALE AS SHOWN REV. 1

**FIGURE 2-4**

Drawing file: 2-5 Main Mine Facilities.dwg Apr 28, 2020 - 12:04pm




NOTE: ALL LOCATION LABELS ARE TO BE CONSIDERED APPROXIMATE.

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

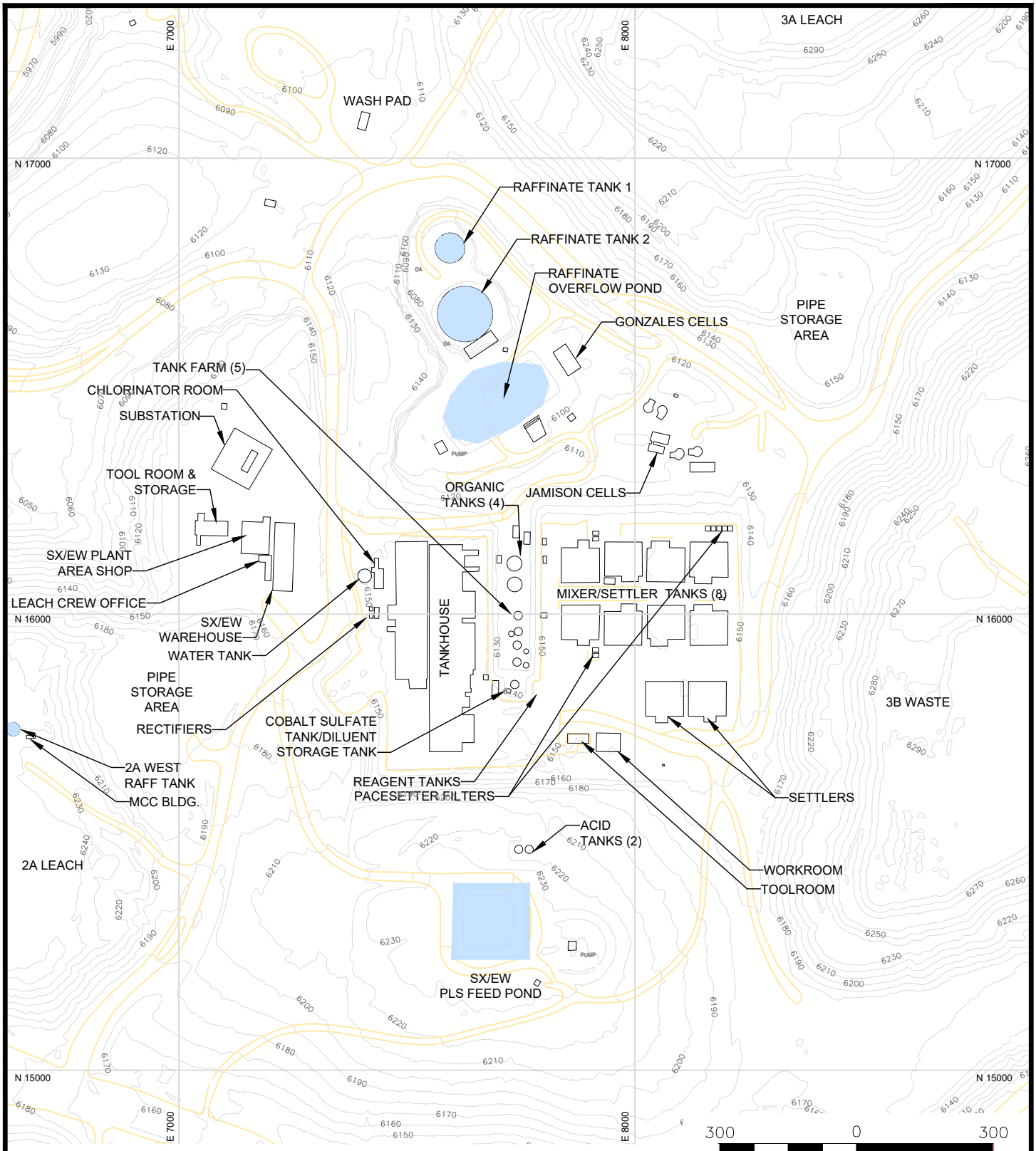
TITLE

# MAIN MINE FACILITIES AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE No. | 2-6 Mine Facilities |
| DESIGN | TS | 04/09/20 | SCALE | AS SHOWN REV. 0 |
| CADD | SIB | 04/09/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-5**




TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 10')

UNIMPROVED ROAD

SURFACE IMPOUNDMENT

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

NOTE: ALL LOCATION LABELS ARE TO BE CONSIDERED APPROXIMATE.

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

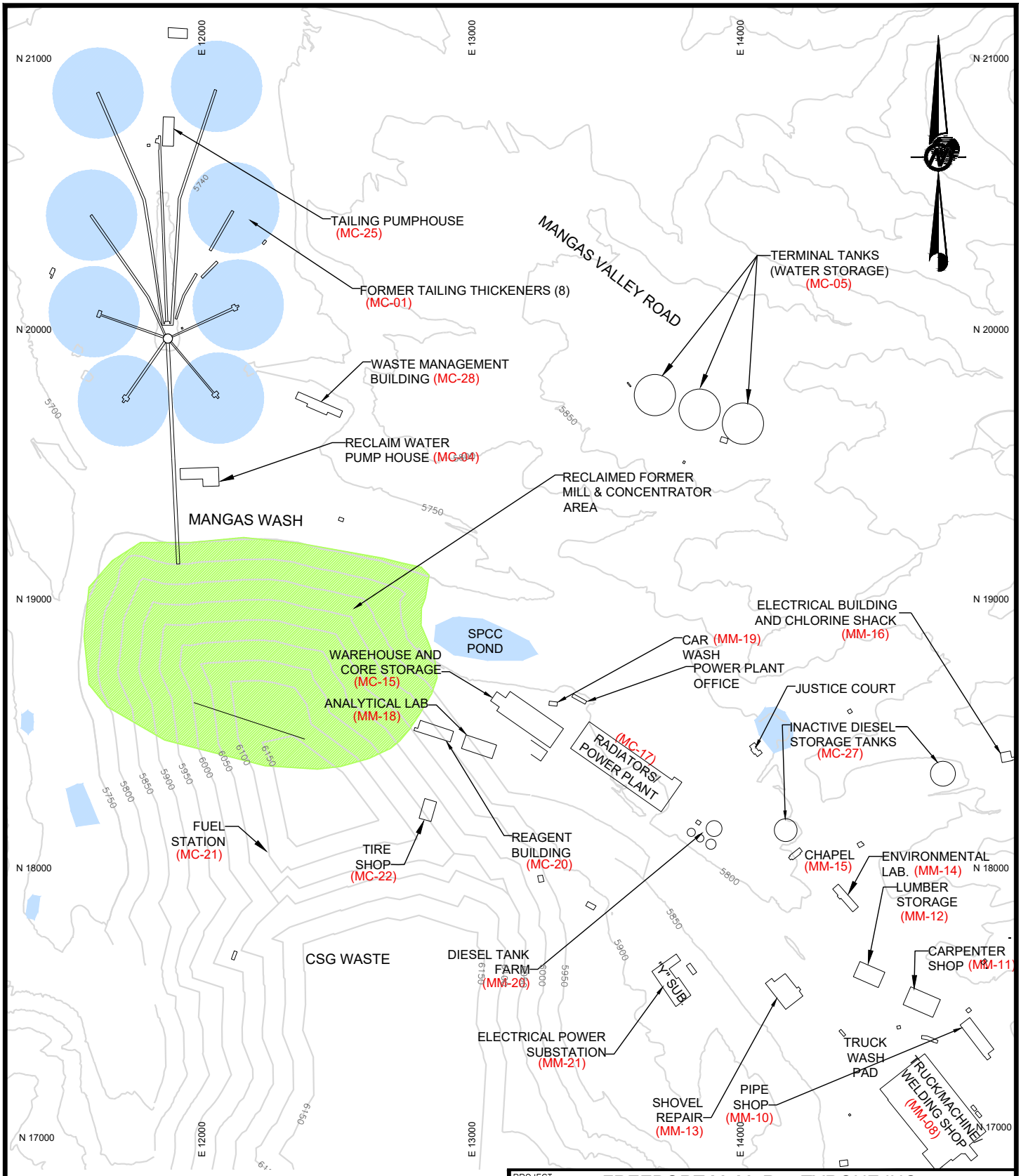
# SX/EW PLANT

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE No. | 2-6 |
| DESIGN | TS | 04/07/20 | SCALE AS SHOWN | REV. 0 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-6**

Drawing file: 2-6 SXEW PLANT.dwg Jul 08, 2019 - 4:30pm




REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

NOTES:
1. CONSTRUCTION OF THE CSG WASTE STOCKPILE BEGAN IN 2019, COVERS THE RECLAIMED MILL & CONCENTRATOR AREA AND IS SHOWN IN THIS FIGURE FOR REFERENCE. REPRESENTS FULL BUILD-OUT OF FACILITY.
2. ALL LOCATION LABELS ARE TO BE CONSIDERED APPROXIMATE.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

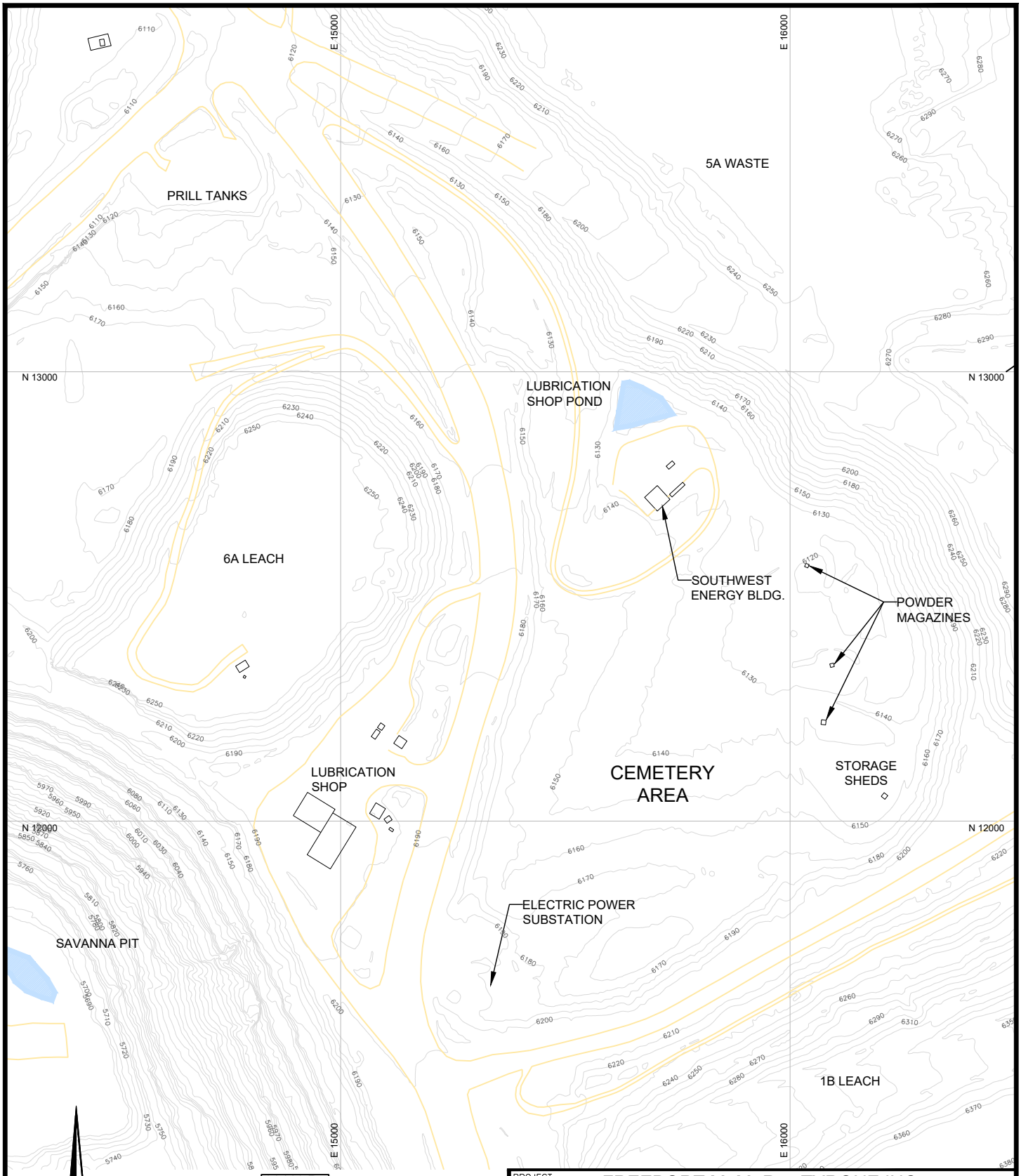
TITLE
# FORMER MILL AND CONCENTRATOR RECLAIMED AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE No. | 2-8 Mill Concentrator |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN |
| CADD | SIB | 04/07/20 | REV. | 0 |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-7**

Drawing file: 2-7 Mill-Concentrator.dwg Apr 07, 2020 - 8:50am




PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

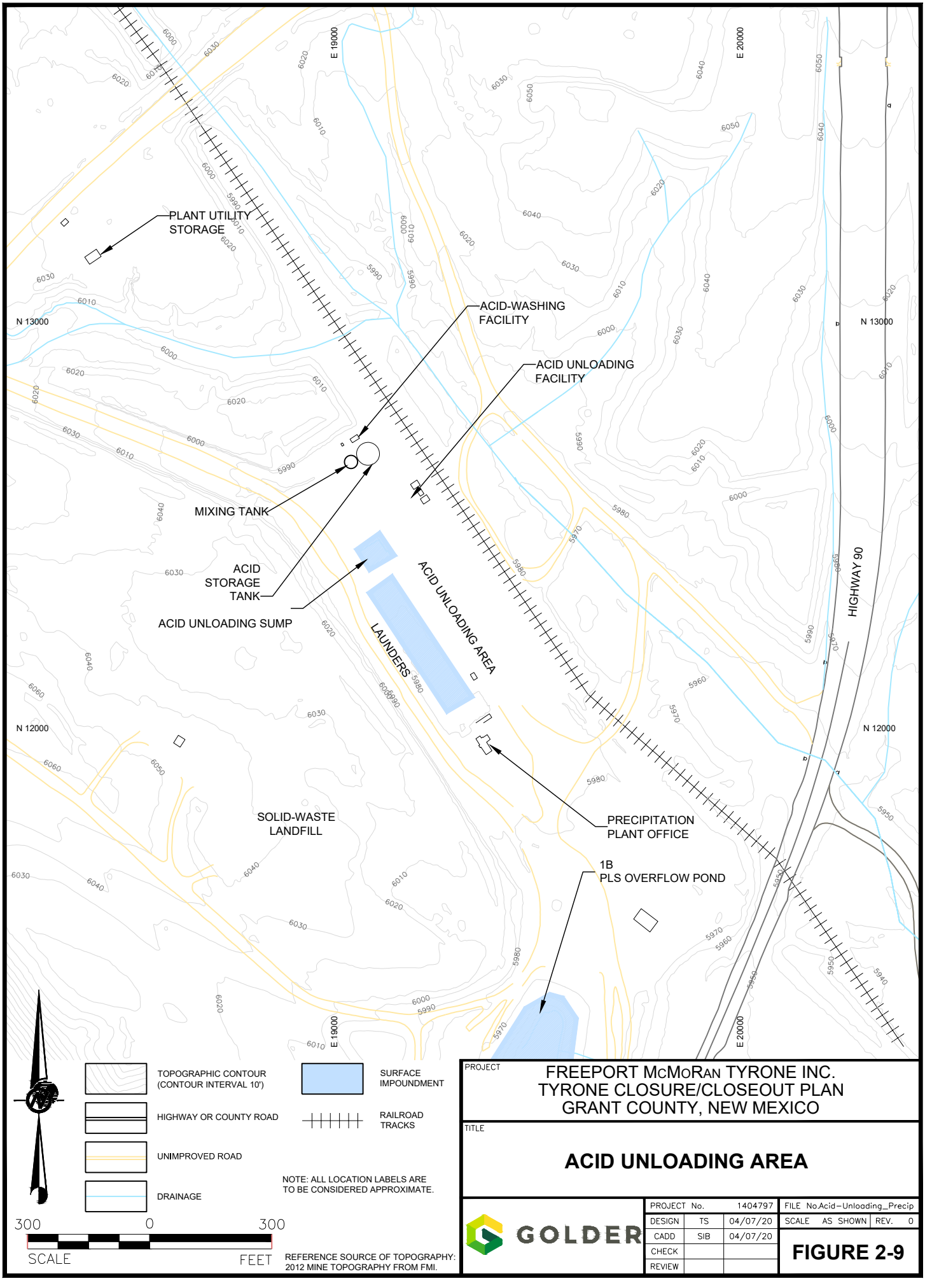
# LUBRICATION SHOP AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE No. | Lubrication Shop |
| DESIGN | TS | 04/07/20 | SCALE AS SHOWN | REV. 0 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-8**

Drawing file: 2-8 Lubrication Shop.dwg Apr 28, 2020 - 12:20pm




PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

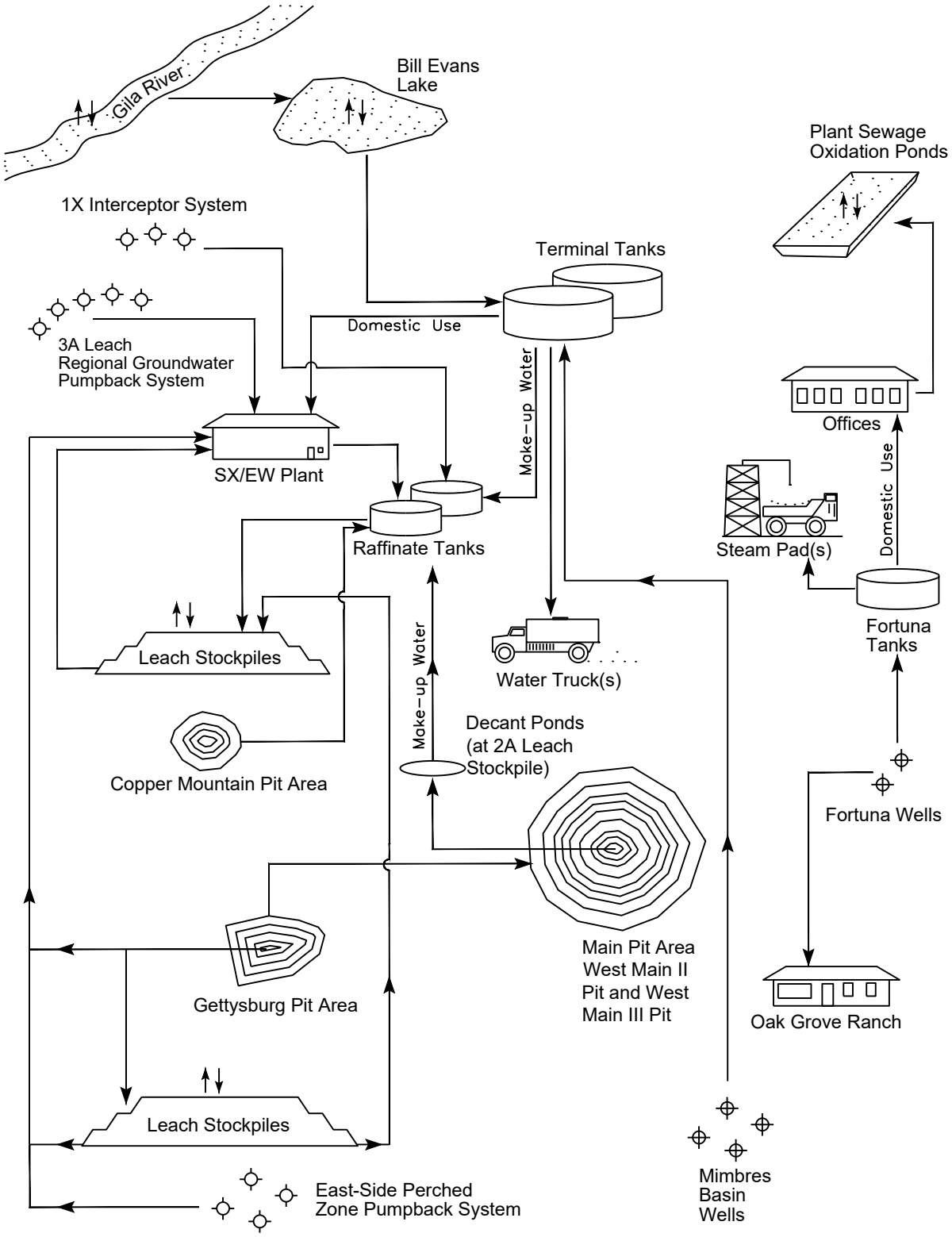
# ACID UNLOADING AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE No.Acid-Unloading_Precip | |
| DESIGN | TS | 04/07/20 | SCALE AS SHOWN | REV. 0 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-9**

Drawing file: 2-9 Acid-Unloading _Precipitation Plant.dwg Jul 08, 2019 - 4:36pm




PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

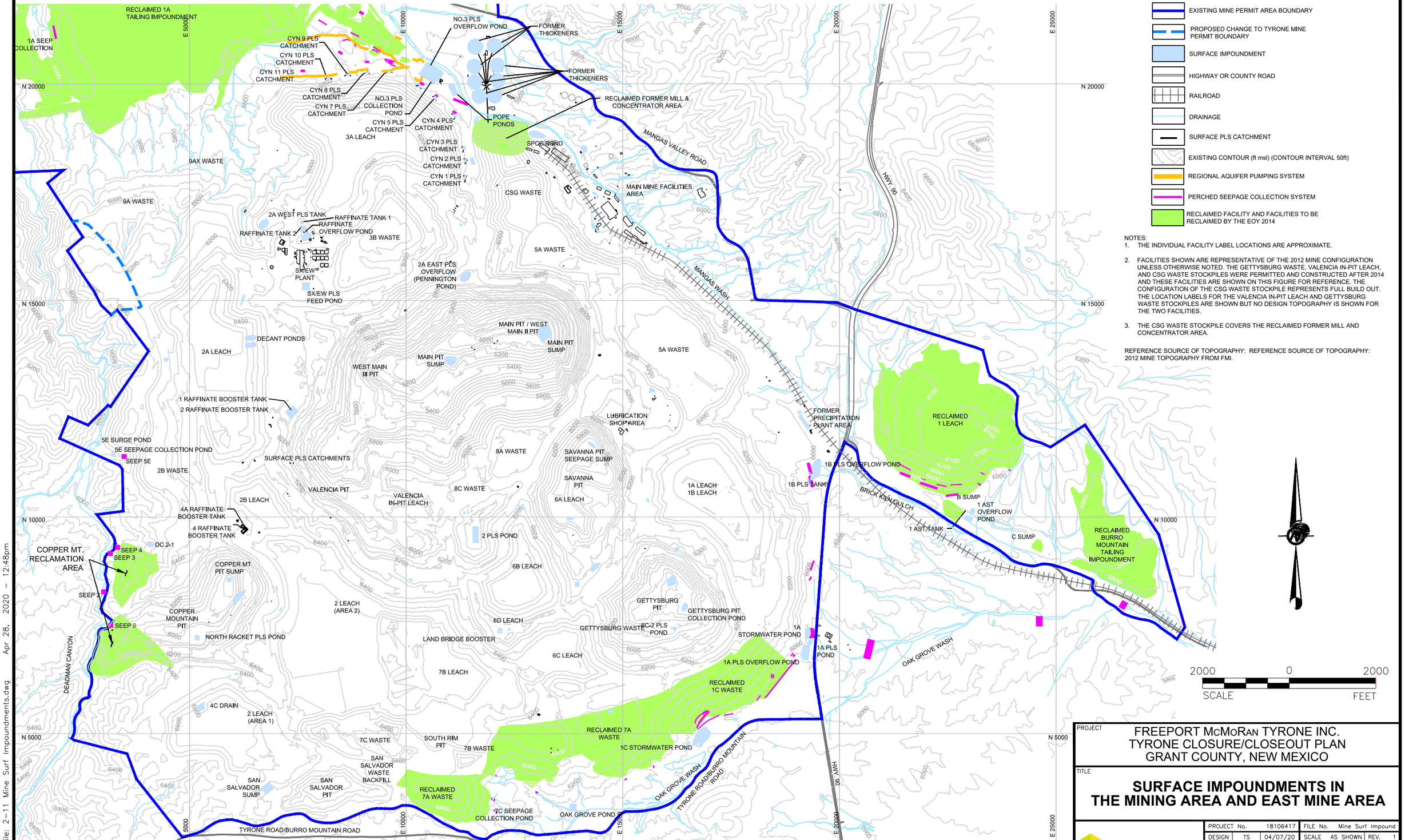
# CURRENT WATER MANAGEMENT SCHEMATIC

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE No. | Water Management |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN REV. 0 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-10**

Drawing file: 2-10 Water Management.dwg Apr 14, 2020 - 4:32pm




EXISTING MINE PERMIT AREA BOUNDARY

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

SURFACE IMPOUNDMENT

HIGHWAY OR COUNTY ROAD

RAILROAD

DRAINAGE

SURFACE PLS CATCHMENT

EXISTING CONTOUR (ft msl) (CONTOUR INTERVAL 50ft)

REGIONAL AQUIFER PUMPING SYSTEM

PERCHED SEEPAGE COLLECTION SYSTEM

RECLAIMED FACILITY AND FACILITIES TO BE RECLAIMED BY THE EOY 2014

NOTES:

1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS FIGURE FOR REFERENCE. THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT. THE LOCATION LABELS FOR THE VALENCIA IN-PIT LEACH AND GETTYSBURG WASTE STOCKPILES ARE SHOWN BUT NO DESIGN TOPOGRAPHY IS SHOWN FOR THE TWO FACILITIES.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

REFERENCE SOURCE OF TOPOGRAPHY: REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

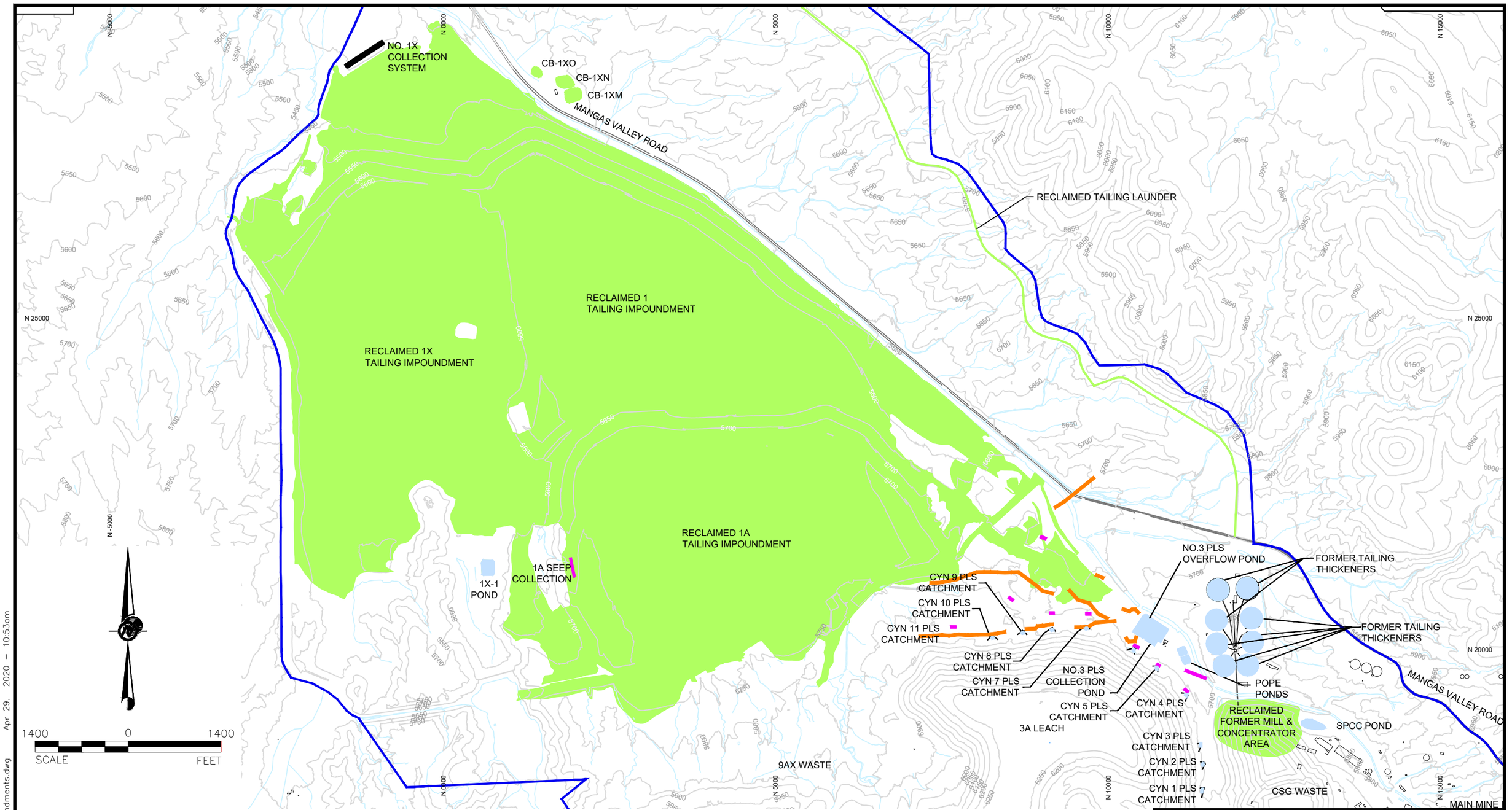
# SURFACE IMPOUNDMENTS IN THE MINING AREA AND EAST MINE AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | Mine Surf Impound |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN |
| CADD | SIB | 04/07/20 | REV. | 1 |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-11**

Drawing file: 2-11 Mine Surf Impoundments.dwg Apr 28, 2020 - 12:48pm




EXISTING MINE PERMIT AREA BOUNDARY
SURFACE IMPOUNDMENT
HIGHWAY OR COUNTY ROAD
RECLAIMED FACILITY AND FACILITIES TO BE RECLAIMED BY THE EOY 2014
SURFACE PLS CATCHMENT
DRAINAGE
EXISTING CONTOUR (ft msl) (CONTOUR INTERVAL 50ft)
REGIONAL AQUIFER PUMPING SYSTEM
PERCHED SEEPAGE COLLECTION SYSTEM

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE CSG WASTE STOCKPILE WAS PERMITTED AND CONSTRUCTED AFTER 2014 AND THIS FACILITY IS SHOWN ON THIS FIGURE FOR REFERENCE. THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

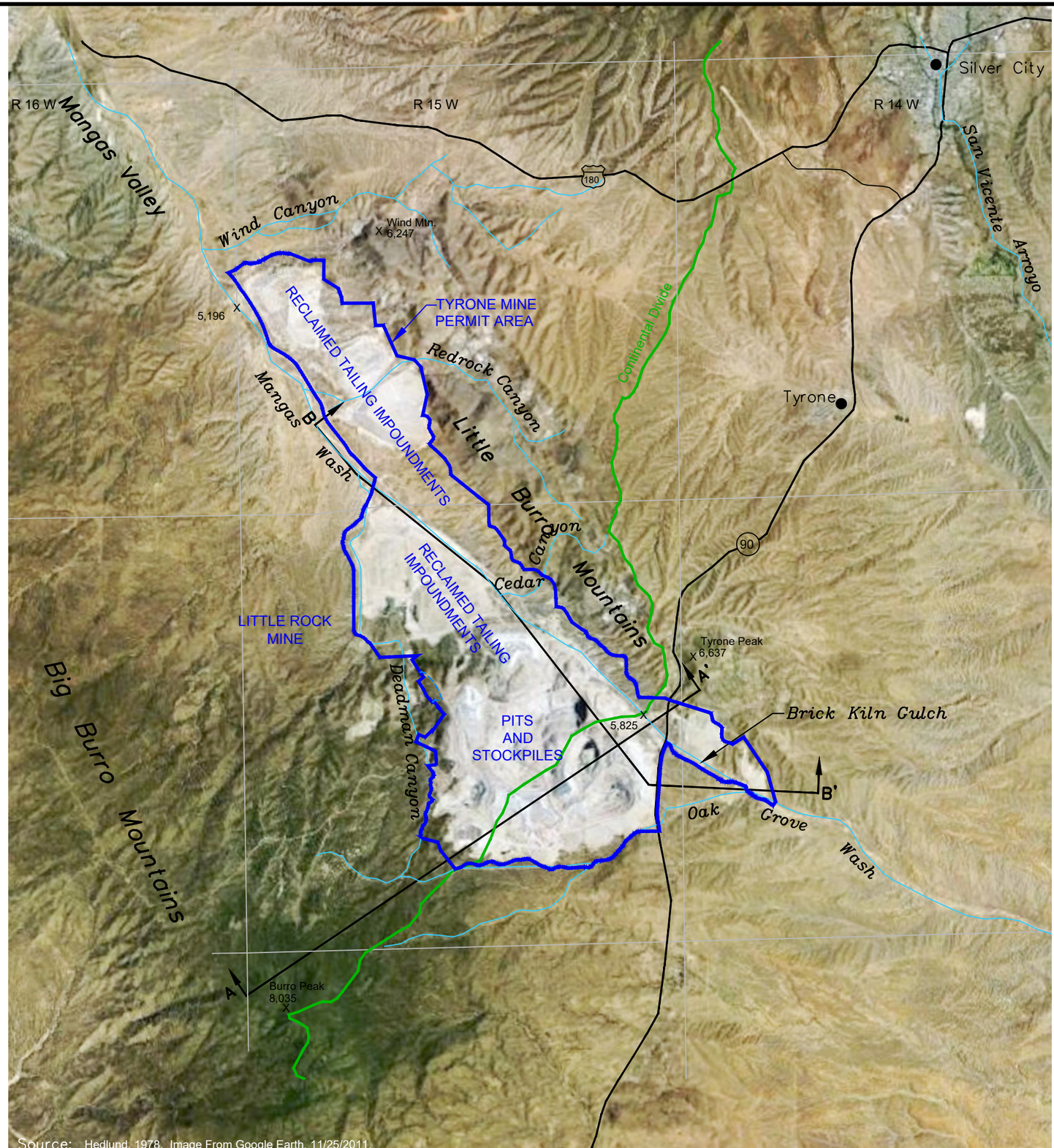
TITLE
# SURFACE IMPOUNDMENTS IN THE SOUTHERN PORTION OF MANGAS VALLEY

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | S-MV Surf Impound |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN REV. 1 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-12**

Drawing file: 2-12 S-MV Surf Impoundments.dwg Apr 29, 2020 - 10:53am




A—A' CROSS SECTION LOCATIONS

EXISTING MINE PERMIT AREA

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

NATURAL DRAINAGE

CONTINENTAL DIVIDE

X 5,825 ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTE: CROSS SECTION DETAILS SHOWN ON FIGURE 2-16.

N

8000 0 8000

SCALE FEET

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

**REGIONAL PHYSIOGRAPHIC FEATURES AND CROSS SECTION LOCATIONS**

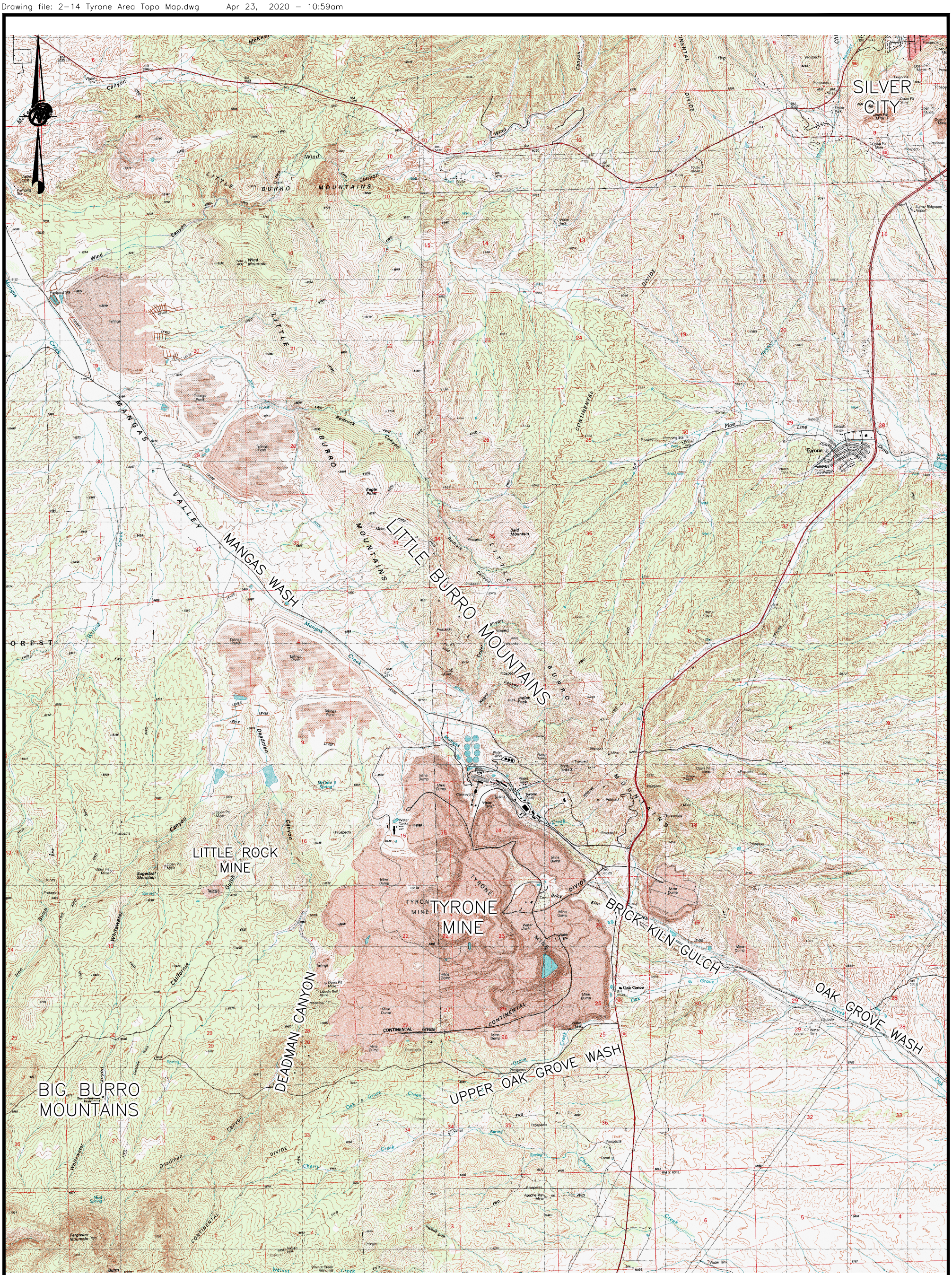
GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 1404797 | FILE | NoRegional Physiographic |
| DESIGN | TS | 04/09/20 | SCALE | AS SHOWN REV. 0 |
| CADD | SIB | 04/09/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-13**

Drawing file: 2-13 Regional Physiographic-CS Locs.dwg Apr 15, 2020 - 11:52am

Drawing file: 2-14 Tyrone Area Topo Map.dwg Apr 23, 2020 - 10:59am




NOTE: TOPOGRAPHIC MAP DETAILS WERE DEVELOPED BETWEEN 1992 AND 1999. SPECIFIC MINE FEATURES MAY VARY FROM THOSE SHOWN ON THIS MAP. FOR SPECIFIC MINE TOPOGRAPHY AND PHYSICAL FEATURES, REFER TO PLATES 1 THROUGH 3 OF THIS CCP.

1500 0 1500
SCALE METERS

SOURCE: ALL TOPO MAPS V7 PROFESSIONAL MAP REFERENCE SET, NEW MEXICO RELEASE 3. INCLUDES QUADS: CIRCLE MESA, SILVER CITY, TYRONE, WIND MOUNTAIN, WHITE SIGNAL AND BURRO PEAK.

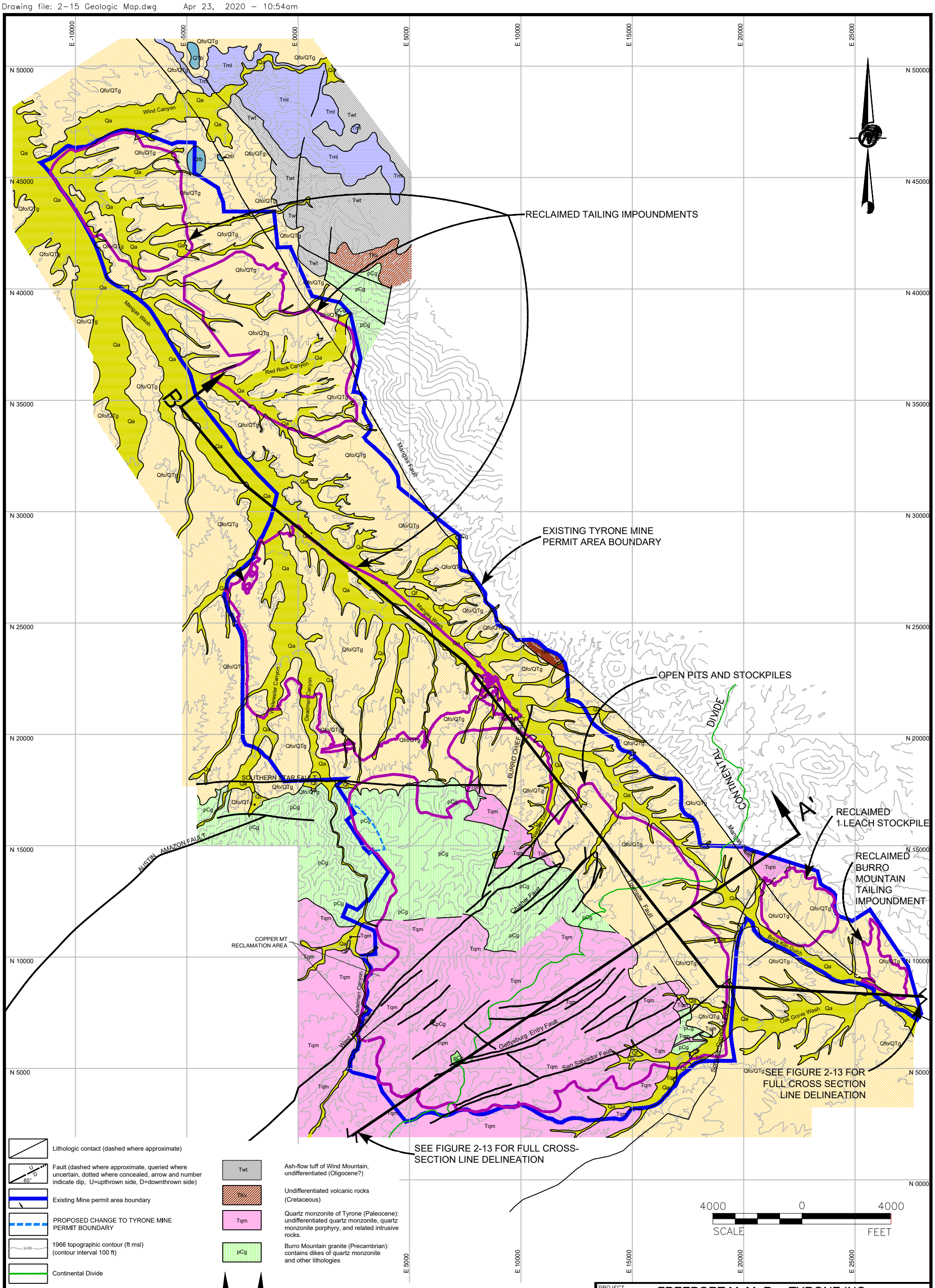
PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# GENERALIZED REGIONAL TOPOGRAPHIC MAP

GOLDER

| | | | |
|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No.Tyrone Area Topo Map |
| DESIGN | TS | 04/09/20 | SCALE AS SHOWN REV. 1 |
| CADD | SIB | 04/09/20 | FIGURE 2-14 |
| CHECK | | | |
| REVIEW | | | |

Drawing file: 2-15 Geologic Map.dwg Apr 23, 2020 - 10:54am




Lithologic contact (dashed where approximate)

Fault (dashed where approximate, queried where uncertain, dotted where concealed, arrow and number indicate dip, U=upthrown side, D=downthrown side)

Existing Mine permit area boundary

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

1966 topographic contour (ft msl) (contour interval 100 ft)

Continental Divide

**Qa** Alluvium (Holocene): unconsolidated poorly sorted gravel, sand, and silt

**Qf** Fan deposits (Holocene and/or Pleistocene): sheet flood fan deposits

**Qt** Talus (Holocene and/or Pleistocene)

**Qtb** Basalt (Pleistocene and/or Pliocene?)

**Qfo/QTg** Undifferentiated older fan deposits, un-differentiated sheet flood deposits (Pleistocene) and Gila Conglomerate (Pleistocene, Pliocene, and Miocene): upper eroded surface locally cemented by caliche

**Tml** Andesite and basaltic andesite (Oligocene?) flows and pyroclastic rocks exposed in Wind Canyon

**Twt** Ash-flow tuff of Wind Mountain, undifferentiated (Oligocene?)

**TKv** Undifferentiated volcanic rocks (Cretaceous)

**Tqm** Quartz monzonite of Tyrone (Paleocene): undifferentiated quartz monzonite, quartz monzonite porphyry, and related intrusive rocks.

**pCg** Burro Mountain granite (Precambrian): contains dikes of quartz monzonite and other lithologies

A A' Cross Section Location

NOTE: 1966 topography compiled by stereophoto- surveys by Fairchild Aerial Surveys, Hollywood, CA. grammetric methods from 1964 and 1966 aerial

SOURCES: Recent unplublished data from PD Kolessar, J., 1982, The Tyrone copper deposit. In Titley, Hedlund, 1978, Geologic Map of the Wind Mountain Quadrangle, Grant Co., NM, USGS Misc. Field Studies, MF-1031, 7.5' map. Hedlund, 1978, Geologic Map of the Tyrone Quadrangle, Grant Co., NM, USGS Misc. Field Studies, MF-1037, 7.5' map. Hedlund, 1978, Geologic Map of the Burro Peak Quad-rangle, Grant Co., NM, USGS Misc. Field Studies, MF-1040, 7.5' map. Hedlund, 1978, Geologic Map of the White Signal Quad-rangle, Grant Co., NM, USGS Misc. Field Studies, MF-1041, 7.5' map. Deposits southwestern North America. University of S. R., ed., Advances in geology of the porphyry copper Arizona Press, Tucson, AZ. geologists (Stegen, Gerwe, and Seibert, 1998; Calkins, and Seibert,1999); DBS&A, 2012.

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

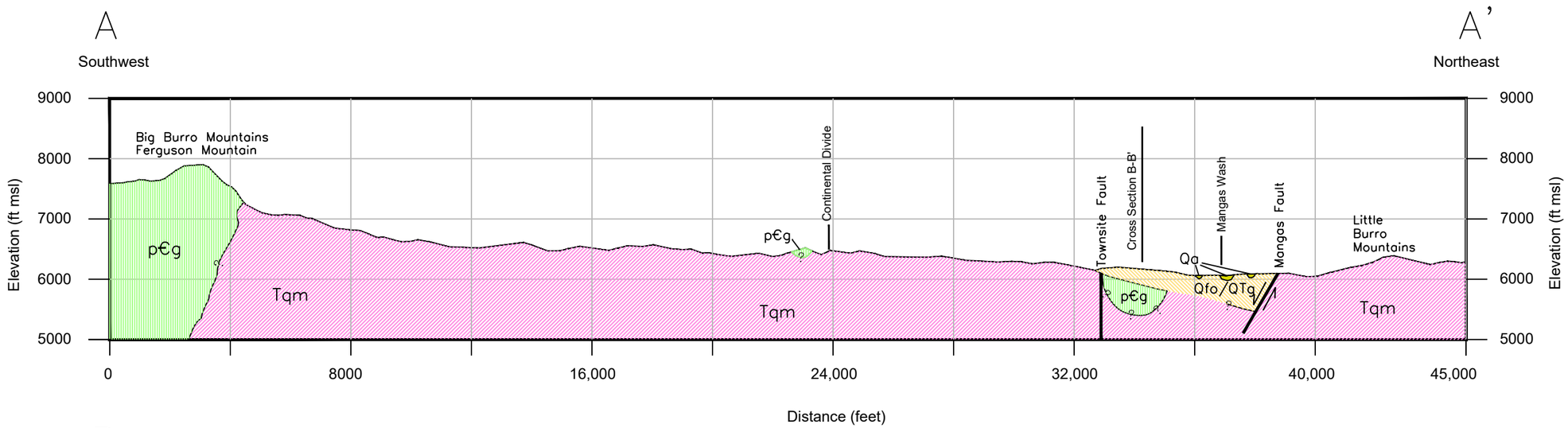
TITLE

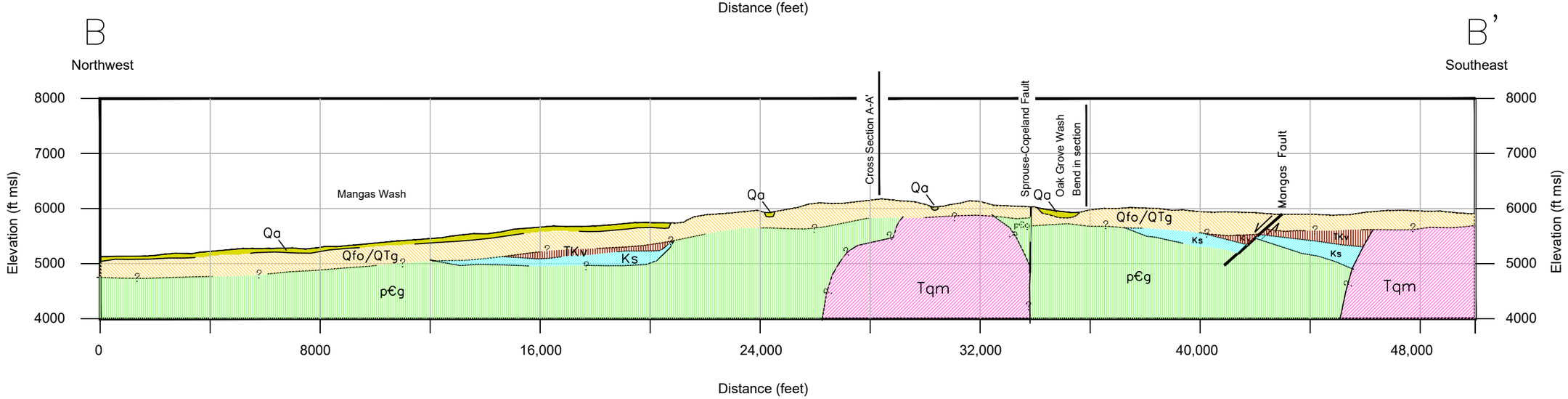
# GENERALIZED GEOLOGIC MAP OF THE TYRONE MINE AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | Geologic Map |
| DESIGN | TS | 04/09/20 | SCALE AS SHOWN | REV. 1 |
| CADD | SIB | 04/09/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-15**




| | |
|---|---|
| Qa | QUATERNARY ALLUVIUM |
| Qfo/QTg | QUATERNARY OLDER FAN DEPOSITS AND SHEET FLOOD DEPOSITS/TERTIARY/QUATERNARY GILA CONGLOMERATE; UNDIVIDED |
| Tqm | TERTIARY QUARTZ MONZONITE OF TYRONE (QUARTZ MONZONITE AND QUARTZ MONZONITE PORPHYRY); UNDIVIDED |
| TKv | CRETACEOUS/TERTIARY VOLCANIC ROCKS; UNDIVIDED |
| Ks | CRETACEOUS SEDIMENTARY ROCKS (INCLUDES BEARTOOTH QUARTZITE AND COLORADO FORMATION); UNDIVIDED |
| p€g | PRECAMBRIAN BURRO MOUNTAIN GRANITE |
| | FAULT (DASHED WHERE APPROXIMATE, QUERIED WHERE UNCERTAIN) (ARROWS INDICATE DIRECTION OF MOVEMENT) |
| | LITHOLOGIC CONTACT (DASHED WHERE APPROXIMATE, QUERIED WHERE UNCERTAIN) |

NOTE:
1. CROSS SECTION LINES SHOWN ON FIGURE 2-13.

Source: Hedlund, 1978

Horizontal scale 1"=4000'
Vertical scale 1"=2000'
(2x vertical exaggeration)

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
**IDEALIZED REGIONAL GEOLOGIC CROSS SECTIONS A-A' AND B-B'**

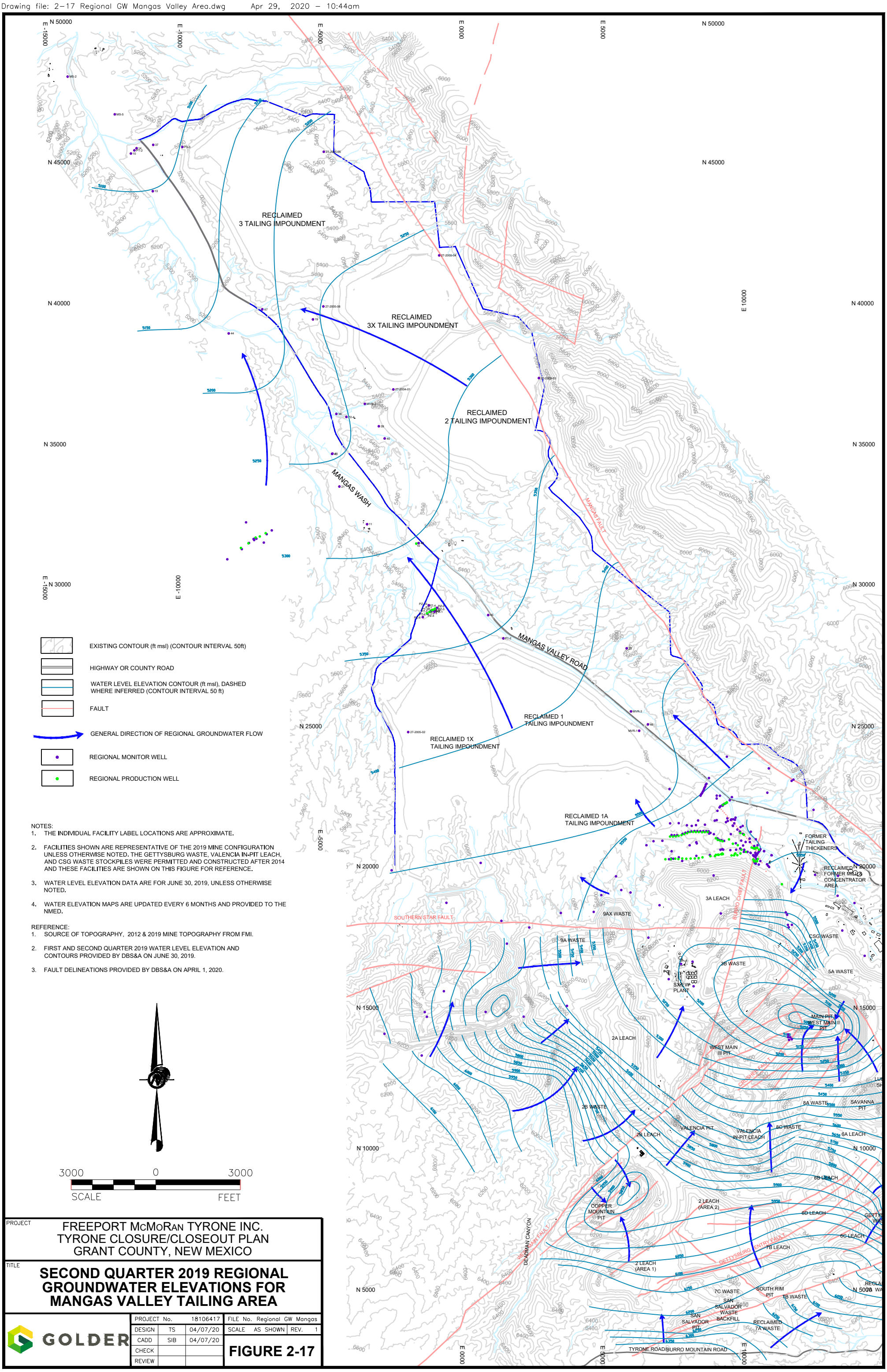
GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | Regional Geologic CS |
| DESIGN | TS | 04/09/20 | SCALE | AS SHOWN REV. 1 |
| CADD | SIB | 04/09/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-16**

Drawing file: 2-16 Regional Geologic CS.dwg Apr 23, 2020 - 10:53am

Drawing file: 2-17 Regional GW Mangas Valley Area.dwg Apr 29, 2020 - 10:44am




EXISTING CONTOUR (ft msl) (CONTOUR INTERVAL 50ft)

HIGHWAY OR COUNTY ROAD

WATER LEVEL ELEVATION CONTOUR (ft msl), DASHED WHERE INFERRED (CONTOUR INTERVAL 50 ft)

FAULT

GENERAL DIRECTION OF REGIONAL GROUNDWATER FLOW

REGIONAL MONITOR WELL

REGIONAL PRODUCTION WELL

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2019 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS FIGURE FOR REFERENCE.
3. WATER LEVEL ELEVATION DATA ARE FOR JUNE 30, 2019, UNLESS OTHERWISE NOTED.
4. WATER ELEVATION MAPS ARE UPDATED EVERY 6 MONTHS AND PROVIDED TO THE NMED.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 & 2019 MINE TOPOGRAPHY FROM FMI.
2. FIRST AND SECOND QUARTER 2019 WATER LEVEL ELEVATION AND CONTOURS PROVIDED BY DBS&A ON JUNE 30, 2019.
3. FAULT DELINEATIONS PROVIDED BY DBS&A ON APRIL 1, 2020.

3000 0 3000
SCALE FEET

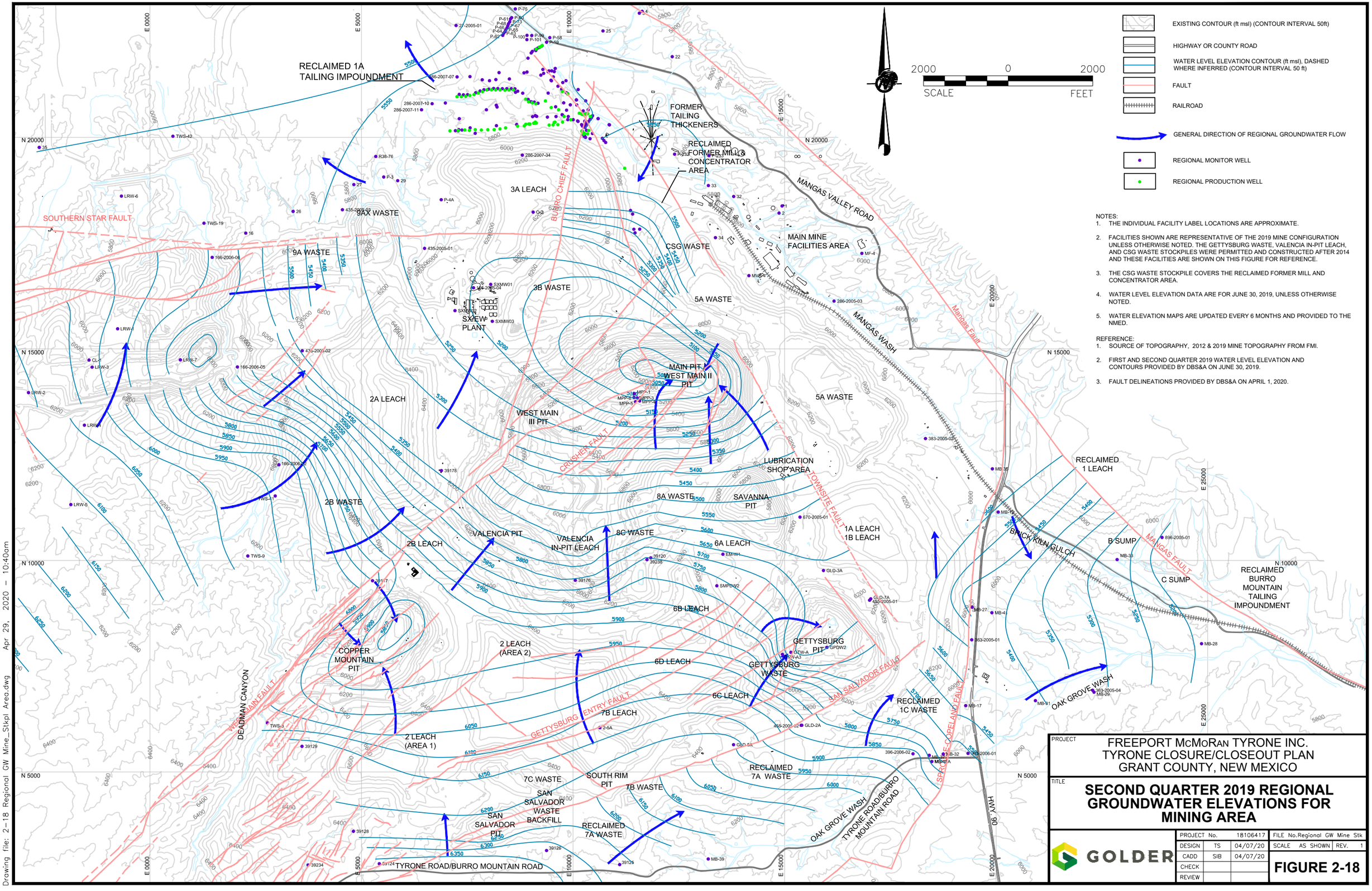
PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# SECOND QUARTER 2019 REGIONAL GROUNDWATER ELEVATIONS FOR MANGAS VALLEY TAILING AREA

GOLDER

| PROJECT No. | | 18106417 | FILE No. Regional GW Mangas | |
|---|---|---|---|---|
| DESIGN | TS | 04/07/20 | SCALE AS SHOWN | REV. 1 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-17**




NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2019 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS FIGURE FOR REFERENCE.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.
4. WATER LEVEL ELEVATION DATA ARE FOR JUNE 30, 2019, UNLESS OTHERWISE NOTED.
5. WATER ELEVATION MAPS ARE UPDATED EVERY 6 MONTHS AND PROVIDED TO THE NMED.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 & 2019 MINE TOPOGRAPHY FROM FMI.
2. FIRST AND SECOND QUARTER 2019 WATER LEVEL ELEVATION AND CONTOURS PROVIDED BY DBS&A ON JUNE 30, 2019.
3. FAULT DELINEATIONS PROVIDED BY DBS&A ON APRIL 1, 2020.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# SECOND QUARTER 2019 REGIONAL GROUNDWATER ELEVATIONS FOR MINING AREA

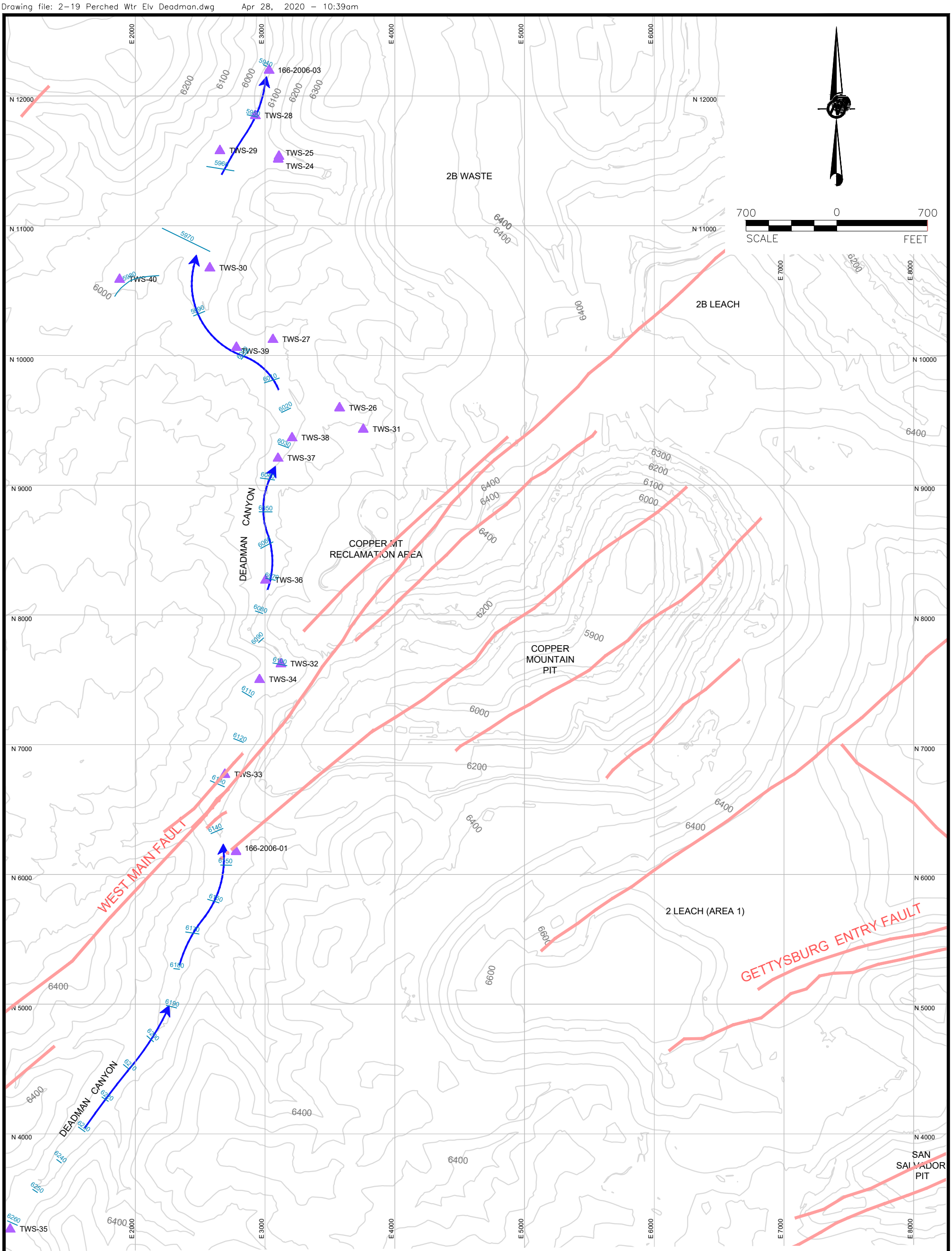
GOLDER

| | | | | | |
|---|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | Regional GW Mine Stk | |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN | REV. 1 |
| CADD | SIB | 04/07/20 | | | |
| CHECK | | | | | |
| REVIEW | | | | | |

FIGURE 2-18

Drawing file: 2-18 Regional GW Mine_Stkpl Area.dwg Apr 29, 2020 - 10:40am

Drawing file: 2-19 Perched Wtr Elv Deadman.dwg Apr 28, 2020 - 10:39am




EXISTING CONTOUR (ft msl) (CONTOUR INTERVAL 50ft)

WATER LEVEL ELEVATION CONTOUR (ft msl), DASHED WHERE INFERRED (CONTOUR INTERVAL 10 ft)

FAULT

GENERAL DIRECTION OF PERCHED GROUNDWATER FLOW

PERCHED ZONE MONITOR WELL

DRY PERCHED ZONE MONITOR WELL

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2019 MINE CONFIGURATION UNLESS OTHERWISE NOTED.
3. WATER LEVEL ELEVATION DATA ARE FOR JUNE 30, 2019, UNLESS OTHERWISE NOTED.
4. WATER ELEVATION MAPS ARE UPDATED EVERY 6 MONTHS AND PROVIDED TO THE NMED.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 & 2019 MINE TOPOGRAPHY FROM FMI.
2. FIRST AND SECOND QUARTER 2019 WATER LEVEL ELEVATION AND CONTOURS PROVIDED BY DBS&A ON JUNE 30, 2019.
3. FAULT DELINEATIONS PROVIDED BY DBS&A ON APRIL 1, 2020.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

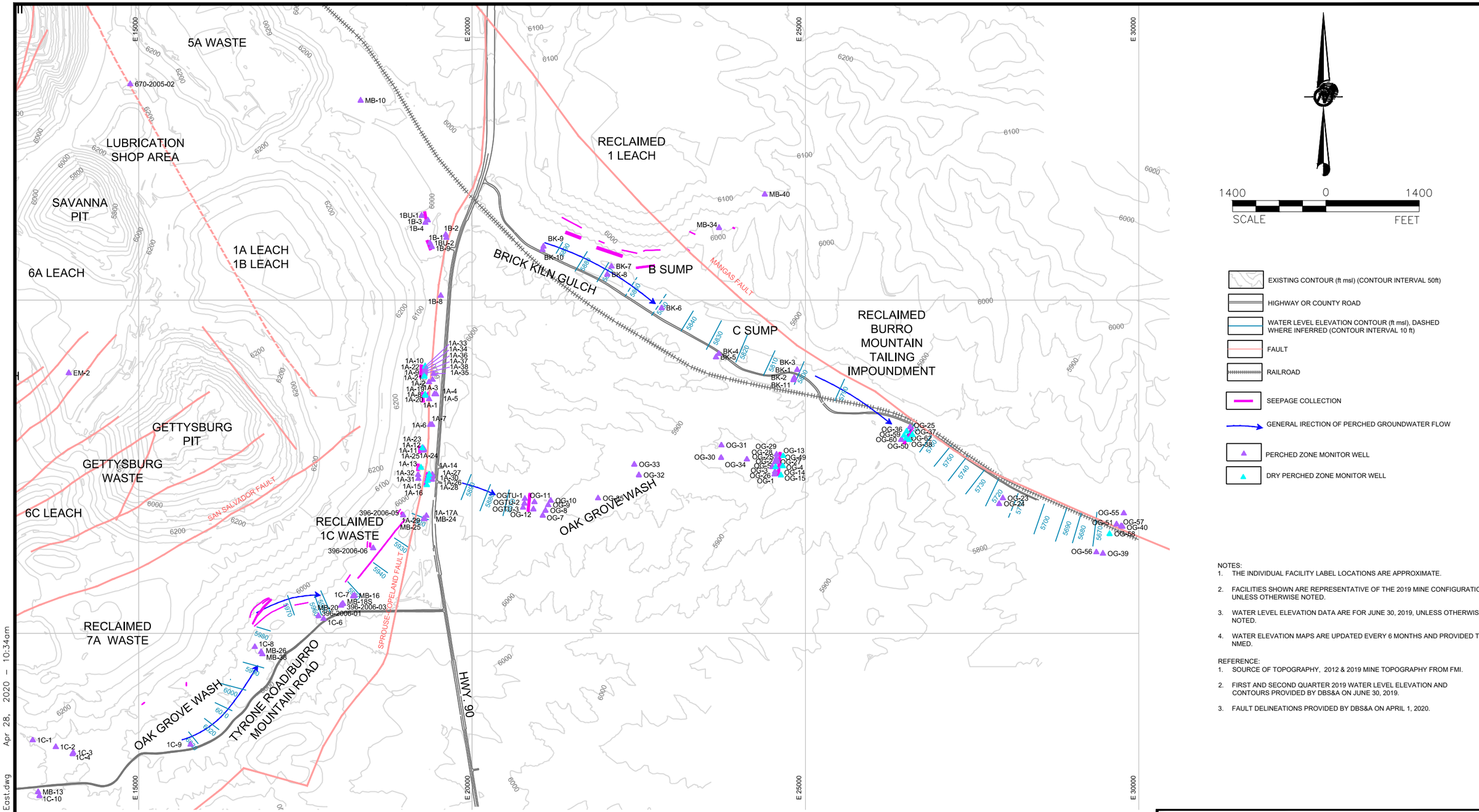
TITLE
# SECOND QUARTER 2019 PERCHED WATER ELEVATIONS IN DEADMAN CANYON

GOLDER

| | | |
|---|---|---|
| PROJECT No. | | 18106417 |
| DESIGN | TS | 04/07/20 |
| CADD | SIB | 04/07/20 |
| CHECK | | |
| REVIEW | | |

FILE Perched Wtr Elv Deadman
SCALE AS SHOWN REV. 1

**FIGURE 2-19**




NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2019 MINE CONFIGURATION UNLESS OTHERWISE NOTED.
3. WATER LEVEL ELEVATION DATA ARE FOR JUNE 30, 2019, UNLESS OTHERWISE NOTED.
4. WATER ELEVATION MAPS ARE UPDATED EVERY 6 MONTHS AND PROVIDED TO THE NMED.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 & 2019 MINE TOPOGRAPHY FROM FMI.
2. FIRST AND SECOND QUARTER 2019 WATER LEVEL ELEVATION AND CONTOURS PROVIDED BY DBS&A ON JUNE 30, 2019.
3. FAULT DELINEATIONS PROVIDED BY DBS&A ON APRIL 1, 2020.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

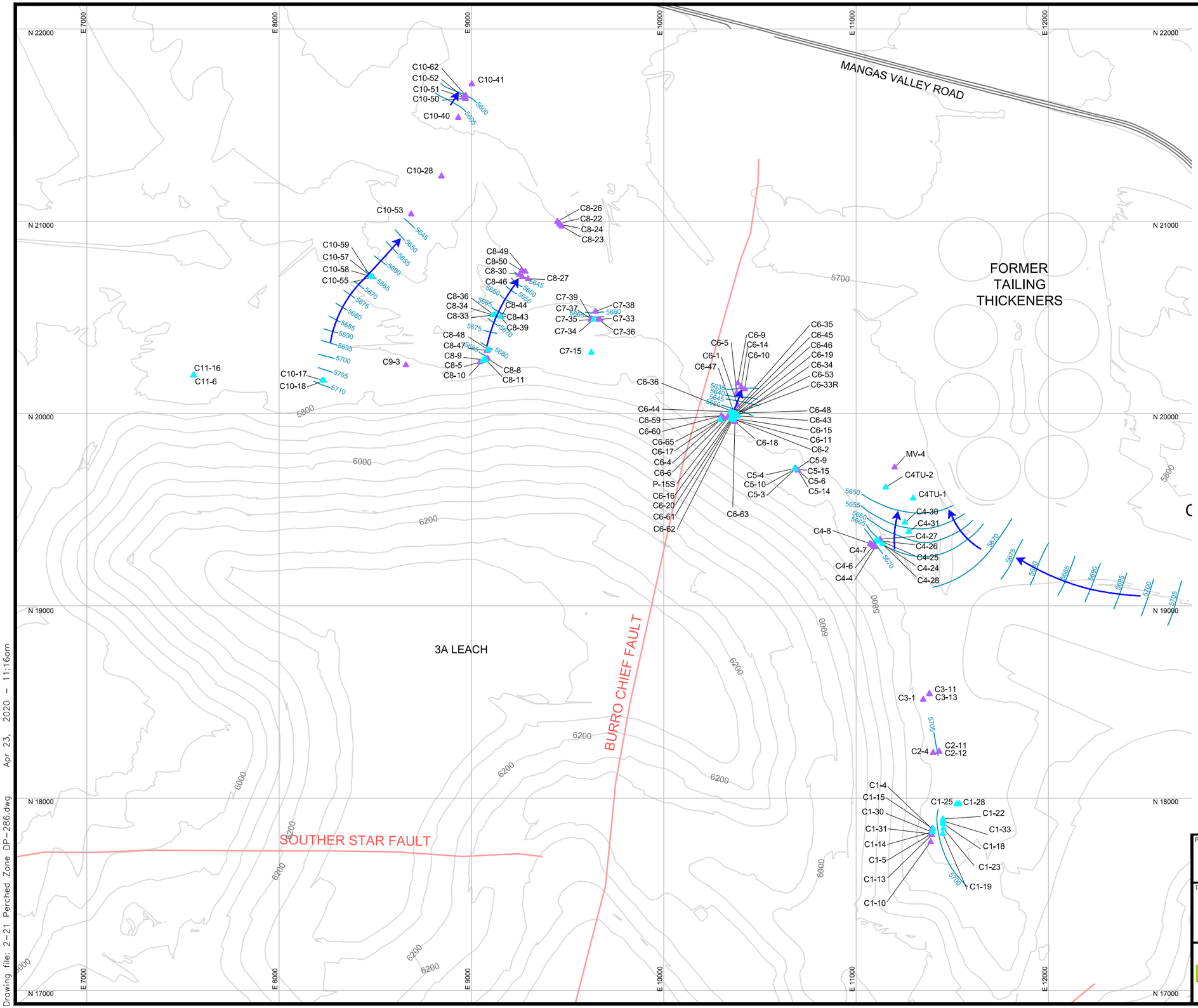
TITLE
# SECOND QUARTER 2019 PERCHED WATER ELEVATIONS FOR EAST SIDE AREA

GOLDER

| | | | | | |
|---|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE | NoPerched Wtr Elev East | |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN | REV. 1 |
| CADD | SIB | 04/07/20 | | | |
| CHECK | | | | | |
| REVIEW | | | | | |

**FIGURE 2-20**

Drawing file: 2-20 Perched Wtr Elev East.dwg Apr 28, 2020 - 10:34am




500 0 500
SCALE FEET

- PERCHED ZONE MONITOR WELL
- DRY PERCHED ZONE MONITOR WELL
- EXISTING CONTOUR (ft msl) (CONTOUR INTERVAL 50ft)
- HIGHWAY OR COUNTY ROAD
- WATER LEVEL ELEVATION CONTOUR (ft msl), DASHED WHERE INFERRED (CONTOUR INTERVAL 5 ft)
- FAULT
- GENERAL DIRECTION OF PERCHED GROUNDWATER FLOW

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. WATER LEVEL ELEVATION DATA ARE FOR JUNE 30, 2019, UNLESS OTHERWISE NOTED.
3. WATER ELEVATION MAPS ARE UPDATED EVERY 6 MONTHS AND PROVIDED TO THE NMED.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 & 2019 MINE TOPOGRAPHY FROM FMI.
2. FIRST AND SECOND QUARTER 2019 WATER LEVEL ELEVATION AND CONTOURS PROVIDED BY DBS&A ON JUNE 30, 2019.
3. FAULT DELINEATIONS PROVIDED BY DBS&A ON APRIL 1, 2020.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

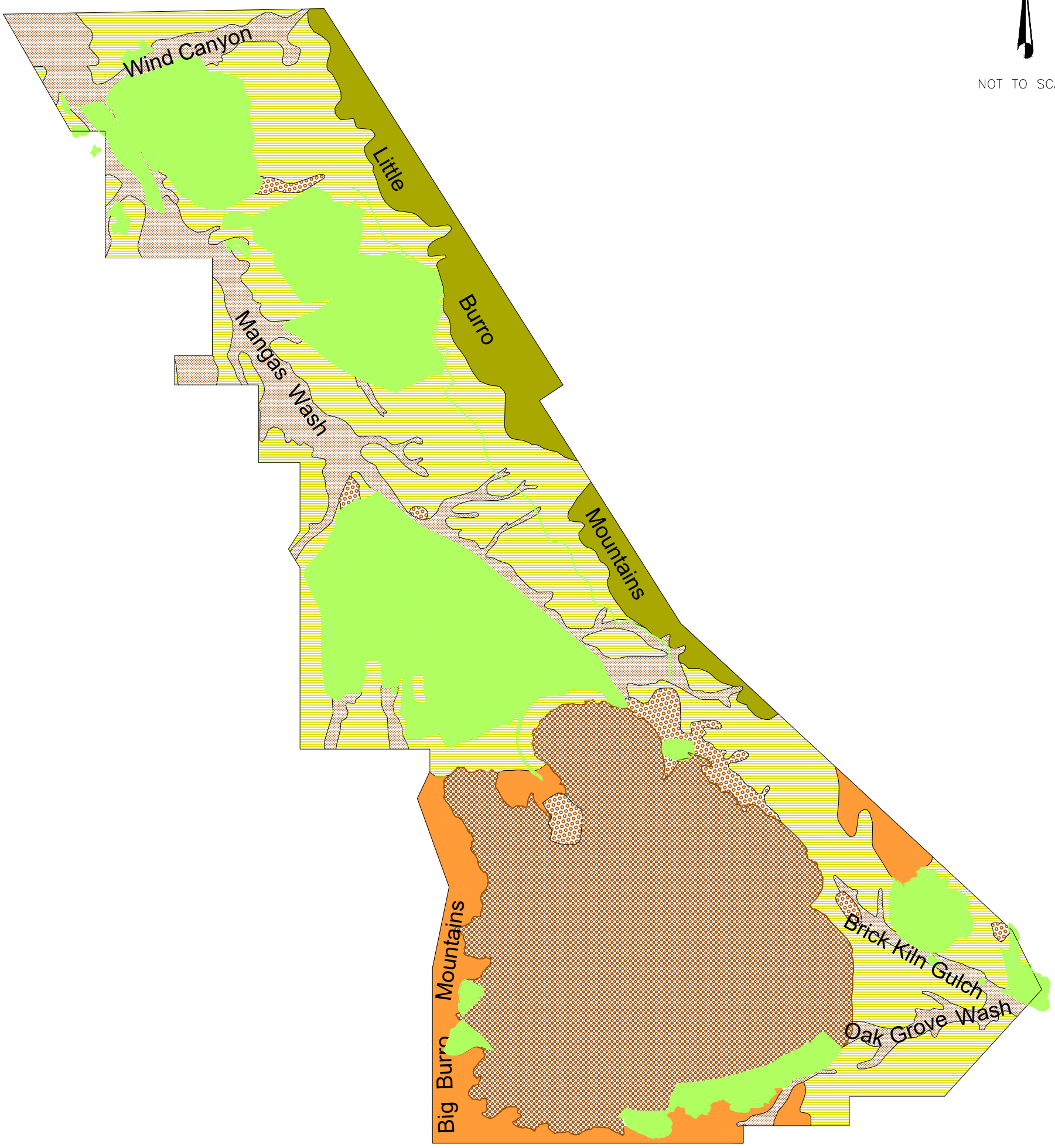
TITLE
# SECOND QUARTER 2019 WATER LEVEL ELEVATIONS FOR PERCHED ZONE, DP-286 AREA

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE | NoPerched Zone DP-286 |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN REV. 1 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

**FIGURE 2-21**

Drawing file: 2-21 Perched Zone DP-286.dwg Apr 23, 2020 - 11:16am




NOT TO SCALE

- ALLUVIAL GRASSLAND
- PIEDMONT SCRUB SAVANNA
- MOUNTAIN SLOPE SCRUB SAVANNA
- MOUNTAIN SLOPE MIXED EVERGREEN WOODLAND
- FACILITIES AND DISTURBED AREAS
- MINE PITS AND STOCKPILES
- RECLAIMED MINE FACILITY

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

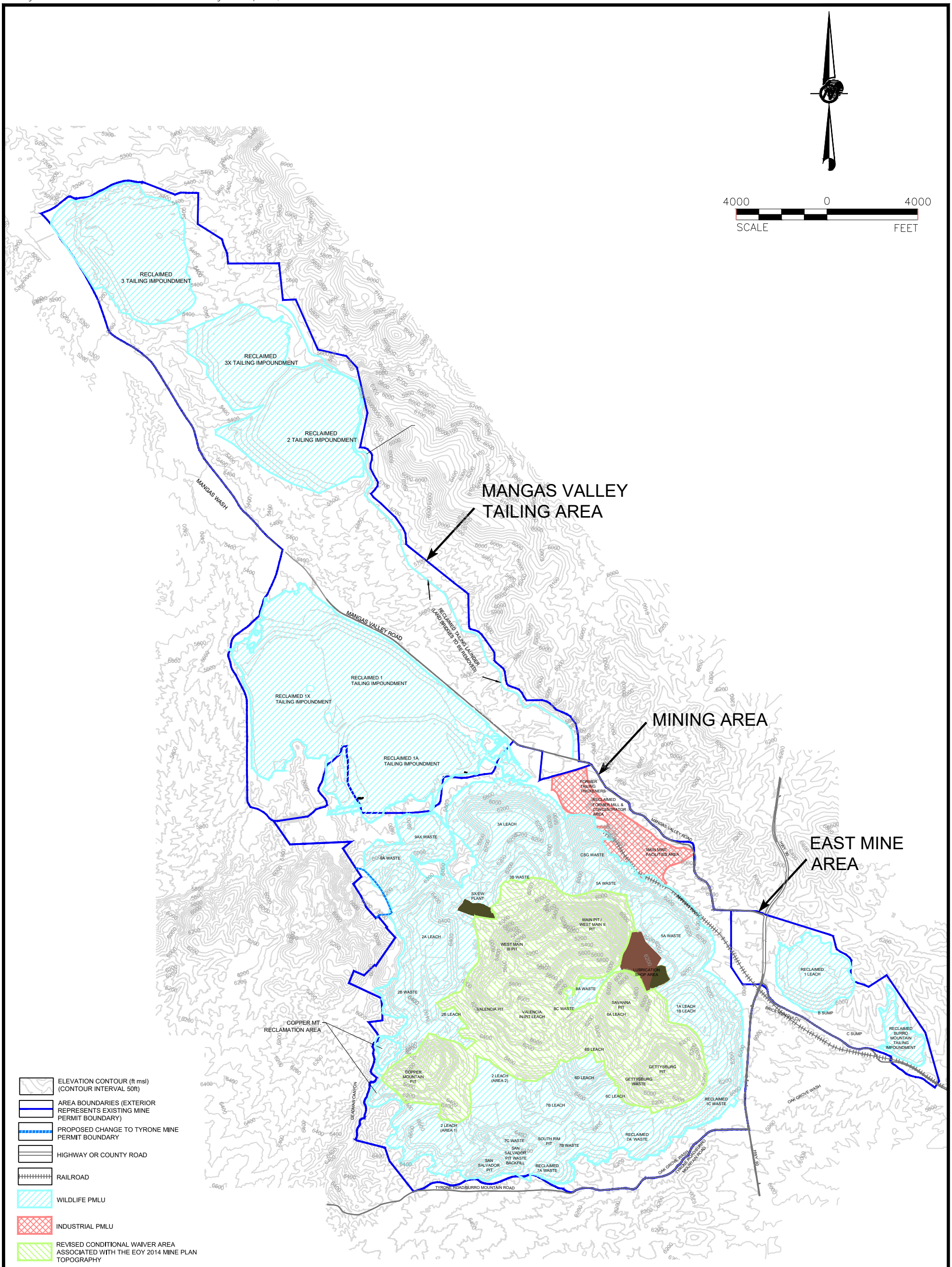
# SOIL-VEGETATION ASSOCIATIONS AND MISCELLANEOUS LAND AREAS

GOLDER

| | | | | | |
|---|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | | Soil-Vegetaion |
| DESIGN | TS | 04/09/20 | SCALE | AS SHOWN | REV. 1 |
| CADD | SIB | 04/09/20 | | | |
| CHECK | | | | | |
| REVIEW | | | | | |

**FIGURE 2-22**

Drawing file: 7-1 Post Land Use-Waiver Areas.dwg Apr 28, 2020 - 10:22am




NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED, THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS FIGURE FOR REFERENCE. THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT. THE LOCATION LABELS FOR THE VALENCIA IN-PIT LEACH AND GETTYSBURG WASTE STOCKPILES ARE SHOWN BUT NO DESIGN TOPOGRAPHY IS SHOWN FOR THE TWO FACILITIES.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# PROPOSED POST-MINING LAND USE AND WAIVER AREAS

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE NoPost Land Use-Waiver | |
| DESIGN | TS | 04/07/20 | SCALE AS SHOWN | REV. 1 |
| CADD | MS | 04/07/20 | FIGURE 7-1 | |
| CHECK | SIB | | | |
| REVIEW | | | | |

# Plates

Drawing file: PLATE 01_Permit Bndy Adjust.dwg Apr 28, 2020 – 8:19am

4000 0 4000

SCALE FEET

RECLAIMED 3 TAILING IMPOUNDMENT

RECLAIMED 3X TAILING IMPOUNDMENT

RECLAIMED 2 TAILING IMPOUNDMENT

RECLAIMED TAILING LAUNDER

MANGAS WASH

MANGAS VALLEY TAILING AREA

MANGAS VALLEY ROAD

RECLAIMED TAILING LAUNDER (LAND BRIDGES TO BE REMOVED)

RECLAIMED 1 TAILING IMPOUNDMENT

RECLAIMED 1X TAILING IMPOUNDMENT

RECLAIMED 1A TAILING IMPOUNDMENT

FORMER TAILING THICKENERS

RECLAIMED FORMER MILL & CONCENTRATOR AREA

MINING AREA

3A LEACH

9AX WASTE

9A WASTE

CSG WASTE

MAIN MINE FACILITIES AREA

HWY 90

EAST MINE AREA

3B WASTE

5A WASTE

SX/EW PLANT

MAIN PIT / WEST MAIN II PIT

WEST MAIN III PIT

2A LEACH

2B WASTE

VALENCIA PIT

VALENCIA IN-PIT LEACH

8A WASTE

8C WASTE

SAVANNA PIT

6A LEACH

LUBRICATION SHOP AREA

1A LEACH 1B LEACH

2B LEACH

COPPER MT. RECLAMATION AREA

COPPER MOUNTAIN PIT

2 LEACH (AREA 2)

6B LEACH

6D LEACH

GETTYSBURG WASTE

GETTYSBURG PIT

6C LEACH

7B LEACH

RECLAIMED 1C WASTE

RECLAIMED 1 LEACH

B SUMP

C SUMP

BRICK KILN GULCH

RECLAIMED BURRO MOUNTAIN TAILING IMPOUNDMENT

OAK GROVE WASH

DEADMAN CANYON

2 LEACH (AREA 1)

7C WASTE

SOUTH RIM PIT

7B WASTE

SAN SALVADOR WASTE BACKFILL

SAN SALVADOR PIT

RECLAIMED 7A WASTE

TYRONE ROAD/BURRO MOUNTAIN ROAD

TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROADS

RAILROAD

DRAINAGE

SURFACE IMPOUNDMENT

AREA BOUNDARIES (EXTERIOR REPRESENTS EXISTING MINE PERMIT BOUNDARY)

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

RECLAIMED FACILITY FACILITIES TO BE RECLAIMED BY THE EOY 2014

REVISED CONDITIONAL WAIVER AREA ASSOCIATED WITH THE EOY 2014 MINE PLAN TOPOGRAPHY

2013 APPROVED CONDITIONAL WAIVER AREA

REVISED OPEN PIT SURFACE DRAINAGE AREA (BASED ON 2014 MINE CONFIGURATION)

NOTES:

1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS PLATE FOR REFERENCE. THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT. THE LOCATION LABELS FOR THE VALENCIA IN-PIT LEACH AND GETTYSBURG WASTE STOCKPILES ARE SHOWN BUT NO DESIGN TOPOGRAPHY IS SHOWN FOR THE TWO FACILITIES.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

REFERENCE:

1. SOURCE OF TOPOGRAPHY, 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT

FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE

# TYRONE MINE AREAS AND FACILITIES

GOLDER

| | | |
|---|---|---|
| PROJECT No. | 18106417 | |
| DESIGN | TS | 04/07/20 |
| CADD | SIB | 04/07/20 |
| CHECK | | |
| REVIEW | | |

FILE No. PLATE 1

SCALE AS SHOWN REV. 1

**PLATE 1**

Drawing file: PLATE 02.dwg Apr 23, 2020 – 2:01pm

2200 0 2200
SCALE FEET

RECLAIMED
3 TAILING IMPOUNDMENT

DP-27

RECLAIMED
3X TAILING IMPOUNDMENT

RECLAIMED
2 TAILING IMPOUNDMENT

P2-6

RECLAIMED
TAILING
LAUNDER

MANGAS WASH

1X INTERCEPTOR
SYSTEM AREA

NO.1 TAILING DAM
RECLAIM WATER
PUMP STATION

CB-1XO
CB-1XN
CB-1XM

DP-27

MANGAS VALLEY ROAD

RECLAIMED TAILING LAUNDER
(LAND BRIDGES TO BE REMOVED)

RECLAIMED 1
TAILING IMPOUNDMENT

RECLAIMED 1X
TAILING IMPOUNDMENT

DP-27

P2-5

RECLAIMED 1A
TAILING IMPOUNDMENT

1X-1
POND

1A SEEP
COLLECTION

3A LEACH

9AX WASTE

9A WASTE

3B WASTE

TOPOGRAPHIC CONTOUR
(CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROAD

DRAINAGE

EXISTING MINE PERMIT BOUNDARY

APPROXIMATE OPERATIONAL DISCHARGE
PLAN AREA (SHOWING GENERAL DP AREA,
NOT AN OFFICIAL BOUNDARY DELINEATION)

DP-27 SA DP-27 SETTLEMENT AGREEMENT AREA

SURFACE IMPOUNDMENT

RECLAIMED FACILITY

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED.

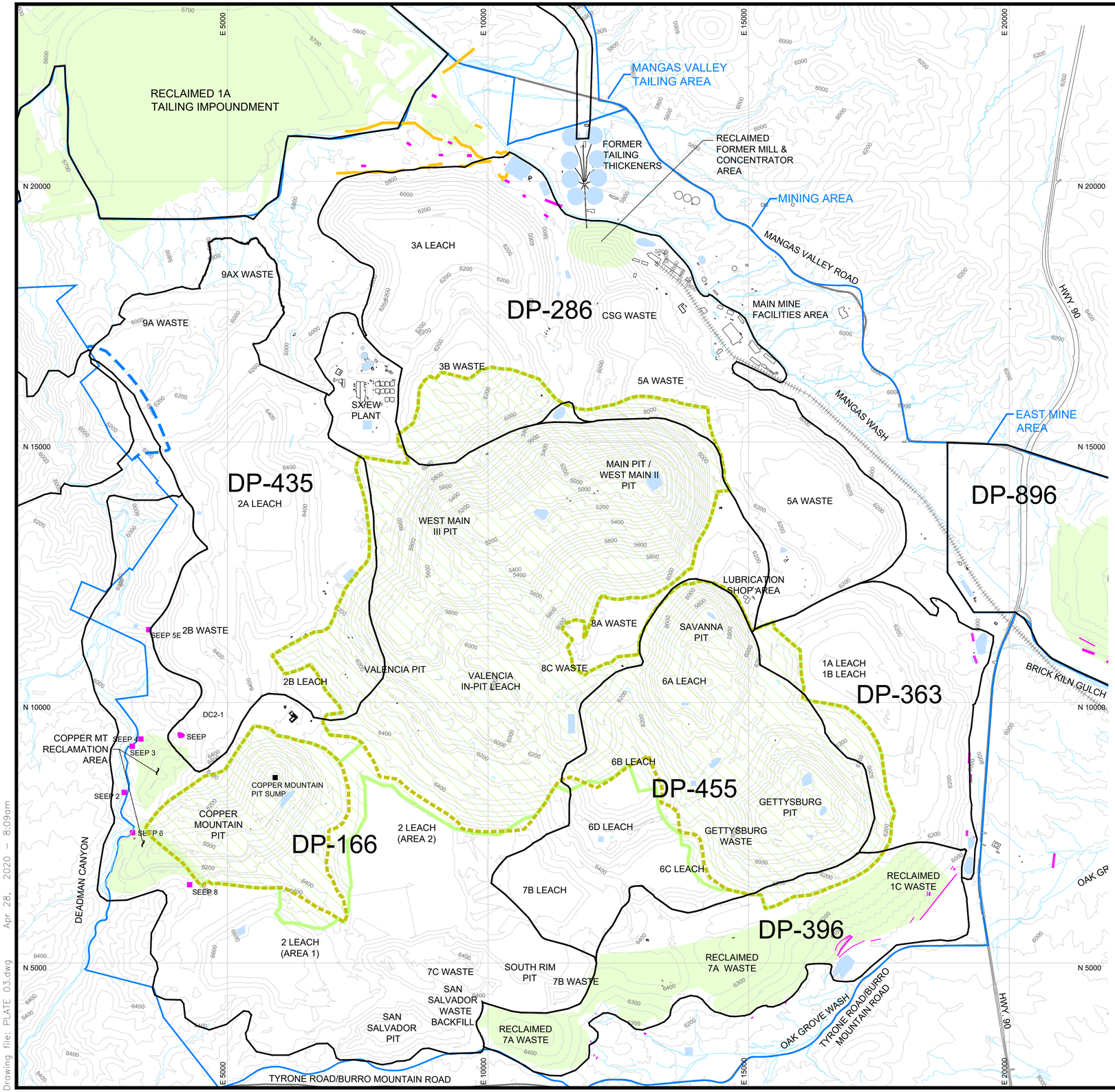
REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 MINE TOPOGRAPHY FROM FMI.

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# MANGAS VALLEY TAILING AREA CHARACTERISTICS AND FACILITIES

GOLDER

| | | | | | |
|---|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | | PLATE 2 |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN | REV. 1 |
| CADD | SIB | 04/07/20 | PLATE 2 | | |
| CHECK | | | | | |
| REVIEW | | | | | |




TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROAD

RAILROAD

DRAINAGE

EXISTING MINE PERMIT BOUNDARY

APPROXIMATE OPERATIONAL DISCHARGE PLAN BOUNDARY AREA (SHOWING GENERAL DP AREA, NOT AN OFFICIAL BOUNDARY DELINEATION)

DP-286 DISCHARGE PLAN I.D. NUMBER

SURFACE IMPOUNDMENT

PROPOSED CHANGE TO TYRONE MINE PERMIT BOUNDARY

RECLAIMED FACILITY/FACILITY UNDERGOING RECLAMATION

REGIONAL AQUIFER PUMPING SYSTEM

PERCHED SEEPAGE COLLECTION SYSTEM

REVISED CONDITIONAL WAIVER AREA ASSOCIATED WITH THE EOY 2014 MINE PLAN TOPOGRAPHY

2013 APPROVED CONDITIONAL WAIVER AREA

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE GETTYSBURG WASTE, VALENCIA IN-PIT LEACH, AND CSG WASTE STOCKPILES WERE PERMITTED AND CONSTRUCTED AFTER 2014 AND THESE FACILITIES ARE SHOWN ON THIS PLATE FOR REFERENCE.: THE CONFIGURATION OF THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD OUT. THE LOCATION LABELS FOR THE VALENCIA IN-PIT LEACH AND GETTYSBURG WASTE STOCKPILES ARE SHOWN BUT NO DESIGN TOPOGRAPHY IS SHOWN FOR THE TWO FACILITIES.
3. THE CSG WASTE STOCKPILE COVERS THE RECLAIMED FORMER MILL AND CONCENTRATOR AREA.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 MINE TOPOGRAPHY FROM FMI.

2000 0 2000
SCALE FEET

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

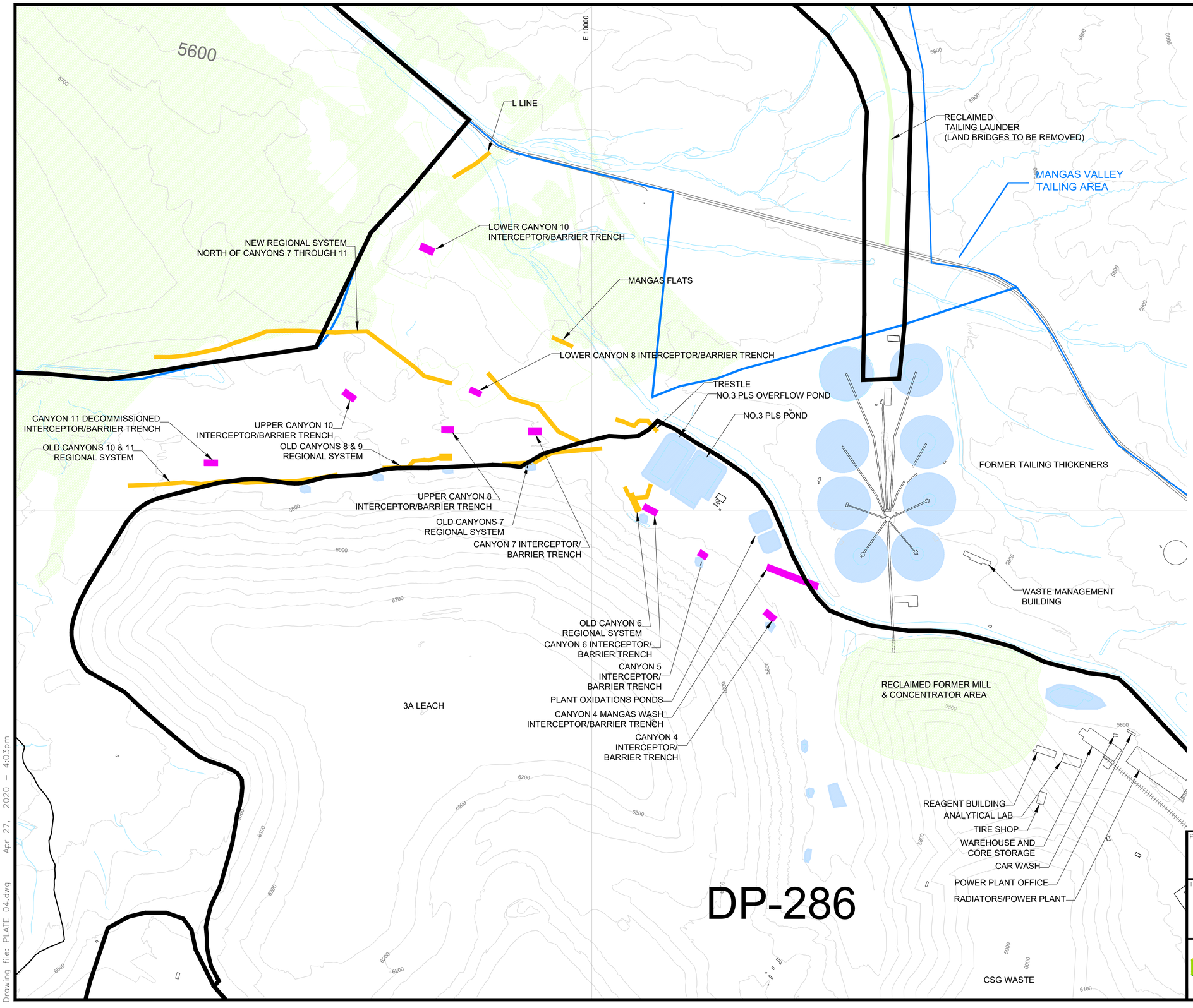
TITLE
# MINING AREA AND EAST MINE AREA CHARACTERISTICS AND FACILITIES

GOLDER

| | | | | |
|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | PLATE 3 |
| DESIGN | TS | 04/07/20 | SCALE AS SHOWN | REV. 1 |
| CADD | SIB | 04/07/20 | | |
| CHECK | | | | |
| REVIEW | | | | |

PLATE 3

Drawing file: PLATE 03.dwg Apr 28, 2020 - 8:09am




TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 50')

HIGHWAY OR COUNTY ROAD

RAILROAD

DRAINAGE

EXISTING MINE PERMIT BOUNDARY

APPROXIMATE OPERATIONAL DISCHARGE PLAN BOUNDARY AREA (SHOWING GENERAL DP AREA, NOT AN OFFICIAL BOUNDARY DELINEATION)

DP-286 DISCHARGE PLAN I.D. NUMBER

SURFACE IMPOUNDMENT

RECLAIMED FACILITY

REGIONAL AQUIFER PUMPING SYSTEM

PERCHED SEEPAGE COLLECTION SYSTEM

NOTES:
1. THE INDIVIDUAL FACILITY LABEL LOCATIONS ARE APPROXIMATE.
2. FACILITIES SHOWN ARE REPRESENTATIVE OF THE 2012 MINE CONFIGURATION UNLESS OTHERWISE NOTED. THE CSG WASTE STOCKPILE WAS PERMITTED AND CONSTRUCTED AFTER 2014 AND IS SHOWN ON THIS PLATE FOR REFERENCE.: THE CSG WASTE STOCKPILE REPRESENTS FULL BUILD-OUT OF THIS FACILITY.

REFERENCE:
1. SOURCE OF TOPOGRAPHY, 2012 MINE TOPOGRAPHY FROM FMI.

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SCALE FEET

PROJECT
FREEPORT McMoRan TYRONE INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
# NORTHERN PORTION OF MINING AREA CHARACTERISTICS AND FACILITIES

GOLDER

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|---|---|---|---|---|---|
| PROJECT No. | | 18106417 | FILE No. | | PLATE 4 |
| DESIGN | TS | 04/07/20 | SCALE | AS SHOWN | REV. 1 |
| CADD | SIB | 04/07/20 | | | |
| CHECK | | | | | |
| REVIEW | | | | | |

**PLATE 4**

Drawing file: PLATE 04.dwg Apr 27, 2020 - 4:03pm

**APPENDIX A**

# Reclamation Design Drawings

**APPENDIX B**

# Facility Characteristics Forms

**APPENDIX C**

# Earthwork Cost Estimate Summary Report

**APPENDIX D**

# Basis of Cost Estimate for Water Management and Treatment

**APPENDIX E**

# Characterization and Volumetrics of Gila Conglomerate and Precambrian Granite Reclamation Cover Materials

**APPENDIX F**

# Tyrone Stockpile Stability Analysis for the 2013 Closure Close-Out Plan Update


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