FREEPORT-McMoRAN

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February 15, 2018

Hand Delivered

Mr. Bruce Yurdin, Director
Water Protection Division
New Mexico Environmentl Department
P.O. Box 5469
Santa Fe, New Mexico 87502

Mr. Fernando Martinez
Director, Mining and Minerals Division
New Mexico Energy, Minerals and Natural Resources Department
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

Dear Messrs. Yurdin and Martinez:

Re: Freeport-McMoRan Chino Mines Company – Updated Closure/Closeout Plan

Freeport-McMoRan Chino Mines Company (Chino) is providing a Closure/Closeout Plan (CCP) update for the Chino Mine Facility to the Mining and Minerals Division (MMD) and to the New Mexico Environment Department (NMED). This information updates the application to renew Discharge Permit 1340 (DP-1340) submitted to the NMED on August 28, 2007 and to the MMD under Permit No. GR009RE on November 25, 2008.

The updated CCP revises the scope of work for closure/closeout of the Chino Mine under the New Mexico Water Quality Act, the Copper Mine Rule and the New Mexico Mining Act. The Chino CCP update reflects the results of numerous CCP communications and presentation meetings with the Agencies, various studies completed under the conditions of DP-1340 and the Permit No. GR009RE, common reclamation practice, and changes due to ongoing mining and reclamation activities. The plan incorporates specific design criteria set forth in the existing DP-1340, 20.6.7.33 NMAC, and Permit GR009RE. Chino will prepare a financial assurance cost estimate shortly after the agencies determine that the scope of work described in the updated CCP meets the applicable requirements.

Chino previously has applied for the renewal and modification of DP-1340 to incorporate an updated CCP, and the enclosed CCP update modifies and updates Chino's pending application. In accordance with 20.6.7.39.B NMAC, the pending application will be processed in accordance with 20.6.7 NMAC. Chino has submitted a sitewide Master Document, dated October 8, 2015, to satisfy the general application requirements of 20.6.7.10 and .11 NMAC. The CCP also updates the previous CCP submitted to MMD in 2008.

Chino intends to achieve the reclamation goals through a combined, technically proven approach involving source control and revegetation complemented by surface and ground water controls and water treatment. In addition to honoring environmental commitments, Chino provides for the economic viability of its mining operation. Thus, the reclamation plans must be rationalized from a cost-benefit perspective.

The updated CCP relies on the application of standard reclamation principles to the unique set of environmental and practical conditions that characterize the facilities at Chino. Consistent with industry practices at large open pit copper mines with long operating histories, Chino's CCP employs selectively located vegetated earthen covers and surface and subsurface water management systems to stabilize the mining wastes and protect water quality. These practices are combined to optimize the reclamation and provide efficient, long-term achievement of Chino's environmental goals. Chino is continually evaluating and implementing practices that will facilitate the efficiency of the reclamation being performed now and in the future.

Chino appreciates the time and effort spent by the NMED and MMD staffs in reviewing and commenting on the studies, presentations, and data submitted by Chino and in discussing the approaches incorporated in the CCP update. Chino is ready to meet with your staffs and to respond to any questions or comments on the CCP update. Please contact Lynn Lande at (575) 912-5235 regarding scheduling. Chino looks forward to further discussions with the objective of reaching agreement on the CCP update and upcoming FA cost estimate. Chino will forward the appropriate application payment fee to each agency by separate letters.

Sincerely,

Thomas L. Shelley

Thomas L. Shelley, Manager
Environmental/Sustainable Development

TLS:ll
20180215-024

CLOSURE/CLOSEOUT PLAN UPDATE

CHINO MINE CLOSURE / CLOSEOUT PLAN UPDATE

Freeport-McMoRan
Chino Mines Company
Bayard, New Mexico

Prepared for: New Mexico Environment Department
Mining Environmental Compliance Section
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and

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Submitted By: Freeport-McMoRan
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Distribution: 6 Copies – Mining and Minerals Division, w/CD
3 Copy – New Mexico Environment Department, w/CD
4 Copies – Freeport-McMoRan Chino Mines Company, w/CD
2 Copies – Golder Associates Inc., w/CD

February 14, 2018 **113-01153**

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List of Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
ABA	acid-base accounting
ac-ft/yr	acre-feet per year
amsl	above mean sea level
AOC	Administrative Order on Consent
AOPHC	Area of Open Pit Hydrologic Containment
APP	Abatement Plan Proposal
Bgs	below ground surface
BLM	Bureau of Land Management
CCP	Closure/Closeout Plan
CDQAP	Construction Design Quality Assurance Plan
CFR	Code of Federal Regulations
CGCS	Comprehensive Groundwater Characterization Study
Chino	Chino Mines Company
cm	centimeter
CQAP	Construction Quality Assurance Plan
CQAR	Construction Quality Assurance Report
DBS&A	Daniel B. Stephens and Associates, Inc.
DP	Discharge Permit
DSM	dynamic system model
EOY	end of year
EPA	U.S Environmental Protection Agency
ETS	Evaporative Treatment System
EnviroGroup	EnviroGroup Limited
FS	Feasibility Study
FSIR	Final Site Investigation Report
ft	Feet
Golder	Golder Associates Inc.
Guidelines	Closeout Plan Guidelines
HDPE	high density polyethylene
HDS	high-density sludge
IRA	Interim Remedial Act
IU	investigation unit
JSAI	John Shomaker and Associates, Inc.
M3	M3 Engineering & Technology Corp.
MMD	Mining and Minerals Division
MWWCA	Middle Whitewater Creek Area

List of Acronyms and Abbreviations (Continued)

NMA	North Mine Area
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
NSR	New Source Review
O&M	Operation and Maintenance
OPSDA	Open Pit Surface Drainage Area
PCA	Pipeline Corridor Area
PLS	pregnant leach solution (economic copper-bearing leach solution)
PMLU	post-mining land use
RCM	Reclamation Cover Material
RCRA	Resource Conservation and Recovery Act
Rules	New Mexico Mining Rules
SCS	Soil Conservation Service
SMA	South Mine Area
SSE	self-sustaining ecosystem
SWA	Site-Wide Abatement
SWQB	Surface Water Quality Bureau
SX/EW	solution extraction-electrowinning
TDS	total dissolved solids
UC	utility corridor
Van Riper	Van Riper Consulting
WCC	Woodward-Clyde Consultants
Y^3	cubic yards

1.0 INTRODUCTION

Freeport-McMoRan Chino Mines Company (Chino) operates an open-pit copper mine, concentrator and associated tailings impoundments, and a solution extraction-electrowinning (SX/EW) plant located approximately 10 miles east of Silver City in Grant County, New Mexico (**Figure 1-1**). This Closure/Closeout Plan (CCP) is submitted in support of Chino's pending application to renew and modify Supplemental Discharge Permit DP-1340 (DP-1340) for closure of Chino's operations in accordance with the New Mexico Water Quality Act and Water Quality Control Commission Rules and to update the closeout plan as required by Permit GR009RE issued under the New Mexico Mining Act Rules. On August 28, 2007, Chino submitted an application to renew and to modify Discharge Permit DP-1340 along with an update to the Chino CCP to the New Mexico Environment Department (NMED), Groundwater Quality Bureau, Mining Environmental Compliance Section, and the Mining and Minerals Division (MMD) of the Energy of the Minerals, and Natural Resources Department, on August 28, 2007 (Chino, 2007). NMED and MMD have provided some technical comments on the 2007 CCP Update, but neither agency has taken action to approve or deny the 2007 CCP Update. Since the 2007 CCP Update was submitted, Chino has completed additional studies in accordance with permit requirements and has obtained approved permit modifications and revisions for expansions and changes to portions of its operations, including approved closure and reclamation plans associated with those expansions and changes. Information gained to date from the additional studies and the closure and reclamation plans approved in prior permit modifications and revisions are incorporated into this CCP. In addition, in December 2013 the Water Quality Control Commission adopted the Copper Rule, 20.6.7 NMAC. This CCP reflects the applicable requirements of the Copper Rule.

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 DP-1340 once this scope of work is approved by the State and Federal Agencies. Applicable requirements for the Chino Mine area in general include the conditions of Chino's permits issued under the Mining Act and the Mining Act Rules, GR009RE, and Chino's Supplemental Discharge Permit for Closure, DP-1340. Portions of the mine area are subject to additional conditions related to revisions and modifications of GR009RE 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 incorporates the new requirements of the Copper Mine Rule, 20.6.7 NMAC. As this CCP supplements Chino's pending application for renewal of DP-1340, Chino contemplates that upon renewal, a new version of DP-1340 will be issued containing conditions consistent with 20.6.7 NMAC. In addition, for those portions of the Chino 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 of the 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, earthwork takeoffs 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 will be prepared following approval of the proposed Chino Mine area reclamation plan (scope of work) included in this CCP. The basis upon which these cost estimates will be developed are outlined in Section 9.0. A detailed scope of work for the proposed water management and water treatment systems is also provided in Appendix C and will serve as the basis for developing a financial assurance cost estimate associated with this component of the CCP.

1.2 Plan Organization

This CCP Update consists of the following sections:

- **Section 1.0** provides an overview of the updated CCP for Chino;
- **Section 2.0** summarizes the permits associated with the Chino Mine;
- **Section 3.0** describes the existing facilities and current environmental setting at the Chino Mine including geology, fauna, flora, mine history, and current disturbances associated with the mine;
- **Section 4.0** describes the ongoing and completed reclamation projects at Chino, including reclamation projects planned up through the end of year (EOY) 2018;
- **Section 5.0** describes the proposed reclamation design criteria and performance objectives for surface reclamation and water management and treatment;
- **Section 6.0** provides details on the reclamation plans for each of the operational discharge plan (DP) areas at Chino;
- **Section 7.0** describes the closure and post-closure monitoring plans for Chino along with contingency plans and reporting schedules;
- **Section 8.0** provides details of the proposed post-mining land uses (PMLUs) for the Chino and the associated requirements for individual areas;
- **Section 9.0** presents a summary of the material take-offs and factors that will be applied in the capital and operations and maintenance (O&M) cost estimates associated with the proposed reclamation and post-closure monitoring plans presented in Sections 6.0 and 7.0;
- **Section 10.0** presents the proposed reclamation schedule associated with this CCP Update;
- **Section 11.0** is the signature page for the CCP Update; and
- **Section 12.0** lists the references used in preparation of this CCP Update.

The following appendices are also included in the CCP Update:

- **Appendix A** includes the reclamation design drawings that illustrate the CCP Update;
- **Appendix B** provides the updated facility characteristic forms; and
- **Appendix C** includes the scope of work for the proposed water management and water treatment systems.

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 Chino's permits GR009RE and DP-1340. In 2013, NMED adopted new rules for the copper mining industry. Applicable conditions of these new rules (Copper Mine Rules Section 20.6.7 NMAC) have been addressed in this CCP.

1.4 History of Closure/Closeout Plan Submittal

In 1994, Chino submitted a mining operations site assessment and an existing mining operation permit application. The permit application was approved by the MMD on December 29, 1997. The following list provides a chronology of the more recent progress leading to this updated CCP:

- Chino submitted the End of Year 2001 Through Year 2006 CCP for Chino in March 2001 (M3, 2001) as its proposed closure plan under the NMWQCC Regulations and as its proposed closeout plan under the New Mexico Mining Act;
- Following public hearings resulting in changes to the CCP, DP-1340 was issued by the NMED on February 24, 2003 approving the CCP subject to various permit conditions (NMED, 2003);
- Revision 01-01 to Permit GR009RE was issued by the MMD on December 18, 2003 approving the CCP as Chino's closeout plan, subject to conditions in that permit revision. Revision 01-01 also approved a conditional waiver for the Santa Rita Pit and interior stockpile slopes within the area of open pit hydrologic containment (AOPHC) (MMD, 2003a,b);
- A CCP Update was submitted to MMD in February 2005 in fulfillment of the requirement in Section 8.T of the MMD Permit (Chino, 2005); and
- Chino submitted a CCP Update in August 2007 (Chino, 2007f). In support of Chino's application to renew DP-1340 and to modify Chino's closeout plan under Permit GR009RE. Neither NMED nor MMD acted on the 2007 CCP Update. This CCP Update supplements the 2007 CCP Update.

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 August 2007 (Chino, 2007f) with refined closure/closeout conceptual engineered designs that account for changes in site-specific conditions, ongoing and completed reclamation projects, date collected and information gained through the studies performed under the permit conditions and ongoing monitoring, and recent mine plans. Similar to the first CCP (M3, 2001) submitted to the agencies in 2001 and the 2007 CCP Update (Chino, 2007f), this updated plan is a "snapshot in time" that reflects the most expensive closure scenario within the five year period covered by this CCP based on the Chino 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 proposed reclamation and post-closure monitoring plans for the principal mine facilities and eight operational DP areas (see Section 2.0) are described in Sections 6.0 and 7.0. This updated CCP will support financial assurance cost estimates for closure/closeout based on the EOY 2018 mine plan. Use of the EOY 2018 mine plan is consistent with the snapshot in time philosophy that was adopted by Chino and the Agencies early in the closure planning process and represents the year with the greatest volume of regrading and cover placement required between 2014 and 2019. If mining activities were to cease between the years 2014 and 2019, the highest financial assurance requirements would be associated with the EOY 2018 conditions. Thus, the EOY 2018 plan is expected to represent the most onerous condition from a cost perspective. The NMED and MMD approved the use of the EOY 2018 configuration for the current CCP Update on September 3, 2014.

1.6 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 GR009RE and DP-1340. The CCP basis 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 Chino Mine. Following MMD and NMED approval of the CCP designs and plans (scope of work), the FA current and net present value calculations will be submitted for MMD and NMED approval consistent with 19.10.12.1201 NMMA. The basis upon which these cost estimates will be developed will be submitted with the cost estimate.

2.0 PERMITS AND DISCHARGE PLANS

Chino conducts its mining operations pursuant to numerous state and federal regulations. **Table 2-1** lists all federal and state permits, and permit numbers required for the CCP. **Table 2-2** summarizes the NMED Discharge Plans associated with the Chino Mine.

3.0 EXISTING FACILITIES AND CONDITIONS

The following sections describe the Chino mine facilities and operations, past and current land uses, environmental setting, and mine material characteristics.

3.1 Description of Mine Facilities

For the purposes of the updated CCP, the Chino Mine is separated into three geographical areas including; the North Mine Area (NMA), Pipeline Corridor Area (PCA), and South Mine Area (SMA) (**Figure 3-1, Figures 3-16 through 3-23, and Plate 1**). The three areas are described as follows:

- The NMA is associated with mining and copper extraction and includes: the Santa Rita Open Pit; stockpiles; maintenance facilities; SX/EW Plant; Ivanhoe Concentrator; and process and stormwater management systems (**Figure 3-2 and Plate 2**).
- The PCA also referred to as the Middle Whitewater Creek Area (MWWCA), extends from the Ivanhoe Concentrator (in the NMA) to the north end of Lake One and the Hurley Operation Area (in the SMA), includes: the areas associated with the tailings, concentrate, and water pipelines. (**Figure 3-3 and Plate 3**).
- The SMA extends from the north end of Lake One to the confluence of Whitewater Creek with San Vicente Arroyo, approximately 10.5 miles to the south, includes areas associated with the tailings deposition, concentrate management, and water pipelines as well as operational and reclaimed tailing ponds, such as Lake One, Axiflo Lake, tailings ponds B, C, 1, 2, 4, 6 and 7 (**Figure 3-4 and Plate 4**).

The general layout of the mine facilities at Chino is presented in **Figure 3-1** and **Plate 1**. The principal mine facilities and main mine components are discussed in Sections 3.1.1 through 3.1.10 and include:

- Santa Rita Open Pit;
- Waste Rock, Reclamation Cover Material (RCM), and Leach Ore Stockpiles;
- Mine Maintenance Facilities;
- SX/EW Plant;
- Ivanhoe Concentrator;
- Filter Plant, and Power Plant;
- Reclaimed Groundhog Mine;
- Active Tailings Pond 7;
- Reclaimed Older Tailings Ponds 1, 2, 4 East, 4 West, B, and C;
- Partially Reclaimed Older Tailings Ponds 6 East and 6 West;
- Axiflo Lake;
- Water Management System (including reservoirs); and
- Ancillary Infrastructure (roads/railway, pipeline corridors, fuel storage tanks, power lines, stormwater controls).

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

3.1.1 Santa Rita Open Pit

The Santa Rita Open Pit includes the Lee Hill, East and Estrella pit areas, and a number of pregnant leach solution (PLS) booster and pit dewatering collection sumps joined by a network of pipelines. The uppermost level of the open pit rim is on the south side at an elevation of approximately 6,600 feet above mean sea level (ft amsl), and the lowest level in the pit is near the East pit area at a current elevation of approximately 4800 ft amsl. The open pit was developed in stepped benches with 50-foot near-vertical highwalls.

The Santa Rita Open Pit is a passive hydrologic evaporative sink in which evaporation exceeds the water inflow and the surrounding and underlying ground water is hydrologically contained. During and after closure, water flows to the open pit where it is captured. Water captured in open pit bottoms will be treated and released. The water treatment system is addressed in Sections 5.0 and 9.0 of this CCP. Those sections of the mine where stormwater can be feasibly diverted by gravity outside the pit perimeter will be reclaimed (20.6.7.2.33 NMAC).

When Revision 01-01 to Permit GR009RE was issued, MMD granted a conditional waiver from reclamation to achieve a post-mining land use which applies to the open pit and some stockpile outslopes (MMD, 2003b). Under the Copper Rule, requirements for reclamation of leach and waste rock stockpiles are reduced inside an area known as the Open Pit Surface Drainage Area (20.6.7.7.B[42] and .33.C[3] NMAC). The area covered by the existing MMD waiver area is located inside the open pit surface drainage area (OPSDA), except for some portions of the waiver area on outslopes of the West and South Stockpiles. The projected EOY 2018 OPSDA is shown on **Figure 3-11**. The final revised conditional waiver area is depicted on Figure 2 in DP-1340 (NMED, 2003). This CCP Update is based upon the Copper Rule requirements that stockpile outslopes located within the OPSDA do not require grading and covering (20.6.7.33.C[3][b] NMAC). Chino contemplates that an update to the area covered by the MMD waiver will be addressed during or following agency review of this CCP Update.

3.1.2 Waste Rock, Leach and Reclamation Cover Material Stockpiles

The NMA contains a number of stockpiles in and near the Santa Rita Open Pit. The stockpiles generally fall into three categories: 1) leach stockpiles, which are used to extract copper ore from the host rock; 2) waste rock piles, which store excavated rock removed to access the ore body; and 3) overburden stockpiles, which contain materials suitable for future reclamation purposes. The acreages of the operational stockpile foot prints can be found in **Table 3-1**. In total, the stockpiles encompass approximately 2,565 acres (**Table 3-1**). The following paragraphs describe the main stockpile areas at the mine.

Lampbright Stockpiles

The Lampbright Stockpiles are located east of the Santa Rita Open Pit and consist of three generally adjacent stockpiles. They are constructed mostly within a tributary valley (Tributary 1) to Lampbright Draw (**Figure 3-2**). The Stockpiles from north to south are called Main Lampbright (leach stockpile), South Lampbright (leach stockpile); and Southwest Lampbright (waste rock pile). Additionally, Chino submitted a permit modification for DP-376 on January 18, 2016 for the proposed North Lampbright Waste Rock Stockpile (NLS). Construction of the NLS is scheduled to begin in 2018. The existing Lampbright Sumps #1 through #3 will be abandoned prior to the placement of waste rock over the area. As part of this NLS construction, a new high density polyethylene (HDPE)-lined collection system (East Headwall Impoundment) will be installed to collect stormwater from the NLS and incidental seepage from the Main Lampbright Stockpile. Stockpiling of low grade copper ore began in 1973. The stockpiles outslopes have been constructed at angle of repose with relatively flat top surfaces.

The Main Lampbright Leach Stockpile is located primarily within the drainage area of Tributary 1 and is bounded on the north by the North Diversion Channel and on the east by Tributary 2. The South Lampbright Leach Stockpile is a southward extension of the Main Lampbright Leach Stockpile. The Southwest Lampbright Waste Rock Pile is on the northeast-facing slope of the Kneeling Nun Ridge. As previously mentioned, three sumps (Lampbright Sumps 1, 2, and 3) are located along the north side of the Main Lampbright Leach Stockpile. Sumps 1 and 2 collect seepage and stormwater runoff, which are pumped to Reservoir 7 and used as makeup water at the SX/EW Plant. Sump 3, located along the northeast edge of the stockpile, is a buried french-drain and vertical sump system designed to intercept groundwater. Solutions collected in this sump are pumped to Reservoir 8. These three sumps will be abandoned prior to placement of waste rock over the area as part of the NLS construction. The new HDPE-lined East Headwall Impoundment will be installed east of the existing sumps. Storm water and seepage collected in the East Headwall Impoundment will be pumped to Reservoir 7 and used as makeup water at the SX/EW Plant. The East Lampbright Sump, located on the central eastside of the Main Lampbright Leach Stockpile, will remain in place and continue to operate. Both the East Headwall Impoundment and East Lampbright Sump will be used in the water management and treatment systems detailed in Sections 5.0 and 9.0 of this CCP.

South, STS2, Upper South, West, and 3A Stockpiles

The South, STS2, Upper South, and West stockpiles are located south and west of the Santa Rita Open Pit (**Figure 3-2**). The South and West stockpiles are leach stockpiles. Stockpiling of low-grade copper ore on the West Stockpile began in 1969. Mined rock was placed on the South Stockpile as early as 1940. PLS from the West and South Stockpiles is collected in a combination of launders, tanks, ponds, and reservoirs (the unlined PLS launder, South Side PLS Tank, PLS collection pond, and/or Reservoirs 2 and 4A). The PLS collected from the stockpiles is then pumped to the PLS Feed Pond located at the SX/EW Plant for

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copper recovery. Runoff and seepage containment dams and sumps have been installed along the base of the west side of the West Stockpile to prevent flows to Hanover Creek.

The 3A Reservoir was used to manage process and storm water at the mine. Reclamation of the 3A Reservoir began in 2015. The 3A Stockpile construction began at the end of 2016 and is located in the approximate location of the closed 3A Reservoir. The stockpile contains waste rock and is located entirely within the AOPHC.

The STS2 and Upper South Stockpiles contain waste rock and rock suitable for RCM. Chino has dedicated the upper lifts of the STS2 and Upper South stockpiles for storage of RCM for future reclamation. The RCM was generated from rock mined along the south and east side of the mine. The RCM was approved by NMED on November 10, 2016 and by MMD on September 1, 2017.

Santa Rita Open Pit Stockpiles

Five stockpiles currently exist within and along the perimeter of the Santa Rita Open Pit and are known as the North In-Pit, North, Northwest, Northeast, and Lee Hill stockpiles (**Figure 3-2**). Chino began stockpiling of waste rock for the Northeast Stockpile in 1969, and stockpiling of leach ore for the North In-Pit Stockpile began in 1986. Stockpiling of waste rock for the Lee Hill Waste Rock Pile began in 1998. The North In-Pit Leach Stockpile will be mined out completely by the EOY 2018. Additionally, the planned Santa Rita waste rock pile will be constructed on the southeast side of the Santa Rita Open Pit by the EOY 2018. The North, Northwest, and Northeast waste rock piles contain both overburden and waste rock. The North In-Pit and Lee Hill leach stockpiles contain low grade ore. PLS from the North In-Pit and Lee Hill stockpiles is collected in a combination of sumps and tanks (5900 Sump and 6250 Tank) and pumped to the PLS Feed Pond located at the SX/EW Plant. These stockpiles are located entirely within the AOPHC.

3.1.3 Main Mine Facilities

The Maintenance Facilities Area for mine operations is located west of the Santa Rita Open Pit between the West and South stockpiles (**Figure 3-2**). A number of offices and storage facilities are located in this area, including: mine operations; environmental building; security; geology, safety, mine engineering and planning departments; vehicle and electrical maintenance shops; primary crusher; and conveyor. Three small retention basins along the southeast side of this area collect surface water. The surface water flows southwest and is incorporated into the West and South stockpile leach collection systems.

3.1.4 SX/EW Plant

The SX/EW plant is located northeast of the Santa Rita Open Pit, between the Northeast Waste Rock Pile and the Main Lampbright Leach Stockpile (**Figure 3-2**). Chino's SX/EW plant was constructed in 1987 and became operational in 1988. PLS is conveyed to the SX/EW feed pond via pumps and pipes, where it is processed to extract copper. An organic reagent in the PLS is reacted with an acidic solution to release the copper from the reagent. The copper in solution is then electroplated into a copper cathode. The barren copper leach solution (known as raffinate) is recycled to the top of leach stockpiles. The process water is continually recycled through the use of pumps, pipes, and reservoirs.

The SX/EW Plant feed pond has a capacity of 1.4 million gallons and is lined with 80-mil HDPE. Recirculated raffinate that leaves the SX/EW Plant is stored in a 900,000 gallon above-ground stainless steel holding tank. Prior to 1997, the raffinate was stored in a 2.3 million-gallon holding pond lined with 80-mil HDPE located immediately south of the tank. This lined pond now serves as a standby containment facility in the event that upset conditions arise at the raffinate storage tank. Any overflow from the raffinate tank would flow via gravity into this lined pond.

3.1.5 Ivanhoe Concentrator

The Ivanhoe Concentrator is located south of the South Stockpile and produces copper and molybdenum concentrate from milled sulfide ore (**Figure 3-2**). The Ivanhoe Concentrator plant was constructed in 1982 and became operational in 1983. The copper and molybdenum concentrates are shipped off-site for processing and refining. Tailings produced from this process is pumped as slurry to Tailings Pond 7 located at the SMA. Facilities in the area of the Ivanhoe Concentrator include the coarse ore storage area, crushers, laboratory, concentrate and tailing thickeners, maintenance shop, guard house, process water tanks, and storage yard.

3.1.6 Reclaimed Groundhog Mine Area

The Groundhog Mine Area is a historical mining area approximately one mile northeast of Bayard and east of San Jose Mountain (**Figure 3-1**). Site reclamation is addressed under the Hanover/Whitewater Creeks Investigation Units of the Administrative Order on Consent (AOC). The former facilities and workings associated with the mine occupied the saddle between Bayard Canyon and an unnamed tributary of Whitewater Creek to the northwest and extended southwest down Bayard Canyon and southeast into Lucky Bill Canyon. The Groundhog Mine Area is currently comprised of the reclaimed Groundhog Stockpile Area and the reclaimed Groundhog No. 5 site. The Groundhog Stockpile Area was part of the Groundhog Mine complex, which consisted of four additional shafts and other mine openings and waste rock piles. The Groundhog No. 5 site is an abandoned mine shaft and waste rock pile that covers less than two acres. Reclamation at these sites included the removal of potentially-reactive stockpile materials and affected soils, closure of mine openings, site regrading, cover placement, and revegetation. This work was performed as part of the mitigation requirements under Interim Remedial Actions (IRAs) pursuant to the AOC. Completed and ongoing reclamation activities at the Groundhog Mine Area are discussed in Section 4.1.

3.1.7 Hurley Operation Area

The primary facilities within the Hurley Operational Area include the Filter Plant and Maintenance Shop and the Power Plant. At the Filter Plant, the concentrate slurry from the Ivanhoe Concentrator is filtered which produces a dry concentrate and wastewater. The wastewater is sent to the No. 2 Metal Recovery Unit, which discharges to the Tailings Pond 7. The dry concentrate is loaded in rail cars or trucks and shipped offsite. The Hurley Power Plant is on the south side of the Hurley Operation Area (**Figure 3-4**). The plant was constructed in 1911 to provide a reliable source of power to the Hurley Concentrator. The power plant burned coal until 1946, when it was converted to natural gas. The public utility provider supplies the daily electric power source for the mine. The Hurley Power Plant is the main back-up power source when the utility provider is not operating.

3.1.8 Tailings Impoundments, Lake One, and Axiflo Lake

The reclaimed Older Tailings Impoundments, reclaimed Lake One, Axiflo Lake, partially reclaimed Tailings Ponds 6E and 6W, and active Tailings Pond 7 are located in the SMA (**Figure 3-4 and Table 3-2**). Tailings are the crushed rock residue remaining after the processing of milled ore. Tailings slurry generated during the ore concentration process is currently gravity fed by pipeline and deposited by crane-mounted cyclones on Tailings Pond 7. The footprint areas for the Older Tailings Impoundments, reclaimed Lake One, Axiflo Lake, partially reclaimed Tailings Ponds 6E and 6W, and active Tailings Pond 7 can be found in **Table 3-2** and each are described below.

Older Tailings Impoundment Area

The Older Tailings Impoundment Area includes: reclaimed Tailings Ponds 1, 2, 4 East, 4 West, B, and C; Tailings Ponds 6 East and 6 West (all but southern portions of the ponds are reclaimed); reclaimed Lake One (and slag stockpile), Axiflo Lake; and other ancillary facilities. Beginning in 1910, tailings generated by the now decommissioned Hurley Concentrator, was deposited in a series of older impoundments (Tailings Ponds 1, 2, B, C, 4, and 6). Starting in 1982 tailings from the Ivanhoe Concentrator was stored in Tailings Pond 6 (East and West). The southern portions of the Pond 6E and 6W area are currently available for upset conditions of tailings storage and stormwater. Ancillary facilities associated with the older tailings impoundments include:

- A Class D solid waste landfill, Tailings Pond 1 landfarm (closed in 2005). The Class D landfill was operated under the authority of New Mexico solid waste management regulations. The landfarm was closed according to a closure plan approved by NMED on November 21, 2005. The closure report was approved by NMED on April 28, 2006. The closed landfarm occupies less than an acre on the southern edge of reclaimed Tailings Pond 1.
- Tailings and reclaim water pipelines.

Lake One Area

The Lake One project area is located east of the former Hurley Mill and Smelter on the east side of the town of Hurley. The smelter was built adjacent to Lake One in 1939, and slag was deposited on the northwestern side of the lake. The Chino Smelter was demolished in June 2007 and the area was subsequently covered and revegetated.

Lake One was constructed in 1910 to collect and store water for use in the Hurley Mill. The lake was created by constructing an earth-fill dam southeast of the Hurley Operation Area. Over time, Lake One gradually filled with sediment from Whitewater Creek and tailings from the milling operations. In 1982 the mill was shut down. In 1984, the Whitewater Creek diversion was constructed to divert stormwater around the eastern side of Lake One. In 2003 to improve stormwater management, Whitewater Creek was again diverted farther to the east into James Canyon Reservoir. Chino mined tailings from Lake One for copper recovery between 2003 and 2009. Lake One was reclaimed in early 2014 and reclamation of the slag pile was completed in late 2014.

Axiflo Lake

Axiflo Lake, located south of reclaimed Tailings Pond 2, was constructed in 1919 as a process water reservoir. It was historically used for the storage of tailings decant water, and most recently has been used to store decant water from Tailings Pond 7, makeup water from the Bolton production wells, and for upset conditions associated with tailings delivery to Tailings Pond 7. Water stored in Axiflo Lake can be pumped to Pond 7 or back to the mill for copper production.

Tailings Pond 7

Constructed in mid-1988, Tailings Pond 7 is the only tailings impoundment currently operating. Tailings generated by the Ivanhoe Concentrator is conveyed through a set of 9-mile long pipelines and deposited in Tailings Pond 7. Tailings Pond 7 is permitted to receive discharges from the termination tank, which includes: tailings slurry from the Ivanhoe Concentrator; treated water from the Metals Recovery Unit; stormwater; treated effluent from the Tri-City sewage collection system, untreated domestic wastewater; mine water from Ivanhoe Concentrator; and stormwater from the Lower Lined Pond. It also receives stormwater runoff from the southern portions of Tailings Ponds 6E and 6W, and groundwater from the Interceptor Well System south of Tailings Pond 7. The Interceptor Well System is an attendant facility to Tailings Pond 7 and lies along its southern edge. The system consists of 18 wells that intercept groundwater at the south end of Tailings Pond 7.

3.1.9 Water Management System and Ponds

Figure 3-5 presents a generalized schematic of the water supply and use cycle at the Chino Mine. Chino's water management system is designed to contain process solutions as well as divert stormwater not required for operations from mine facilities. As part of, and for operational activities, Chino recycles process and stormwater throughout the mine. The system consists of the following facilities:

- Production wells that supply process water;
- Interceptor wells and systems;
- Reservoirs and impoundments for storage of process water and stormwater runoff (i.e., James Canyon seasonal water diversion and reservoir);
- Pipeline from Cobre to Chino;
- Various tanks and sumps that collect and store process solutions;
- Diversion structures for rerouting natural drainage channels around operational facilities; and
- Pipelines and pumping stations for transferring water from one location to another.

Several well fields supply much of the water used to operate the mine. These well fields include production and interceptor well systems in the Santa Rita Open Pit area, interceptor wells south of Tailings Pond 7, and production wells south and east of the tailings impoundments. Groundwater has also been pumped from underground workings in the Santa Rita Open Pit area and the Cobre Mine. A summary of the existing well fields and monitoring wells at the mine are presented within the individual DPs and in the Master Document (Chino, 2015).

In the NMA, several reservoirs serve to control process water and stormwater runoff throughout the mine site (**Figure 3-2**). **Table 3-3** lists the reservoirs, impoundments, sumps, and storage tanks that will be in operation at the mine at the EOY 2018. Chino practices water conservation through the recirculation of process water and from the capture and reuse of stormwater runoff, which reduces the amount of groundwater that is utilized in the process circuit.

Major diversion channels associated with mining and reclamation that are part of the Chino stormwater management system include:

- The North Diversion Channel that routes runoff around the Lampbright Stockpiles to Lampbright Draw; and
- Several operational stormwater diversion were constructed in the SMA. A series of diversions were constructed along the east side of the tailings ponds. In 1911 a diversion was constructed around the Older Tailings Impoundment Area, the 1984 diversion around Lake One, the 1988 and 1998 diversions around Tailings Pond 7. In 2003, the James Canyon Diversion was constructed to capture Whitewater Creek surface water north of Lake One, and route it through Bolton Draw. Today, the Whitewater Creek diversions from Lake One to most of Tailings Pond 6 have been reclaimed and are used to convey stormwater that is not affected by mine activities. The Whitewater Creek Diversion along Pond 7 remains in operation.

Various surface impoundments are used during current operations for temporary storage of process water and stormwater. Surface impoundments at Chino were identified as part of the Reservoir and Impoundment Study (M3, 2004a) and in the 2007 CCP Update (Chino, 2007). The locations of the existing surface impoundments and reservoirs at Chino have been further updated based on information compiled as part of the Stage 1 Abatement revised FSIR (Golder, 2016b), and more recently within the Master Document (Chino, 2015). The locations of the surface impoundments and reservoirs at the mine are shown on **Figures 3-2 through 3-4**. **Table 3-3** summarizes the type and operational status of the reservoirs and surface impoundments at the mine at the EOY 2018.

3.1.10 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 Chino. Some of the more important ancillary facilities that require consideration at closure are listed below:

- Administrative/office facilities;
- Outdoor lighting systems;
- Haul and access roads;
- Electrical power transmission lines and substations that will not be used after mining ceases;
- Explosive, fuel, and reagent storage areas;
- Storm water structures for drainage, diversion, and sediment control;
- Fencing and security systems; and
- Miscellaneous pipelines and pipeline corridors.

3.2 Past and Current Land Uses

Mining has been the principal land use and economic support for the area since mining of the Santa Rita copper deposits began in early 1800's. Current surrounding land uses include private residences, livestock grazing, mining, recreation, and wildlife habitat. Recreation in the area includes camping, picnicking, hunting, off-road vehicle use, hiking, horseback riding, and bicycling.

3.3 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.

3.3.1 Topography

The general topography of the Chino area is depicted on **Figure 3-6**. Chino operations are located near the base of the Cobre Mountains within the Piños Altos Range. The topography at Chino ranges from hilly to mountainous in the NMA to relatively flat in the SMA. Elevations across the site range from less than

5,200 ft amsl along Whitewater Creek to 7,704 ft amsl approximately 1 mile south of the Kneeling Nun monolith.

The San Vicente Basin is a broad lowland that extends southward from the Mimbres Valley. The basin begins on the flanks of the Big Burro and Little Burro Mountains on the west, Piños Altos Ranges on the north, and Cobre Mountains on the east. The terrain slopes from these mountains toward San Vicente Arroyo, which runs parallel to the long axis of the basin. The San Vicente Basin is characterized by numerous arroyos that are tributary to San Vicente Arroyo. The Mimbres River drains the eastern slopes of the Piños Altos and Cobre Mountains. San Vicente Arroyo and Whitewater Creek drain the San Vicente Basin and adjacent slopes between the Big Burro and Cobre Mountains. The topographic setting within the NMA, PCA and SMA are described in the following sections.

North Mine Area

The NMA includes the open pit and surrounding terrain along with Whitewater Creek to the north end of the reclaimed Lake One area. Major topographic features of the NMA include the Cobre Mountains and the San Vicente Basin. Erosion of the plateau surface in the Cobre Mountains southeast of Bayard has left a series of even-crested, southward-sloping ridges that gradually become low hills. The natural ground surface elevation ranges from 6,600 to 7,700 ft amsl (**Plate 2**).

The topography of the NMA consists of ridges and southeast to southwest-trending drainages. Slopes range from 0 to 5 percent on the ridge tops to more than 65 percent on hillsides. The steeper slopes are characterized by rock outcrops and cliffs associated with the Kneeling Nun Tuff. The original landscape at the site has been altered as a result of mining activities. The Santa Rita Open Pit truncates the historical headwaters of Whitewater and Santa Rita Creeks. Stockpiles of mined material discontinuously cover the pre-mining topography around the perimeter of the open pit.

Pipeline Corridor Area

The PCA, which has also been referred to as the Middle Whitewater Creek Area (Golder, 2007a), generally encompasses the Whitewater Creek drainage area between the confluence of Gold Gulch and Whitewater Creek in the north and the town of Hurley in the south. The topography of the PCA is transitional between the NMA and the SMA (**Plate 3**).

South Mine Area

The SMA operations lie along the eastern border of San Vicente Basin, approximately 7 miles southwest of the Santa Rita Open Pit. Elevations in the immediate vicinity of the SMA operations range from about 5,600 ft amsl near Hurley to about 5,250 ft amsl immediately south of Tailings Pond 7 (**Plate 4**). The original surface topography was relatively featureless in this area, with the exception of a number of small incised washes and the channel of Whitewater Creek. The placement of tailings, which began in 1910, has changed the original topography.

3.3.2 Geology

The Santa Rita ore deposit that has been mined at Chino lies in the southeastern corner of the Central Mining District (Rose and Baltosser, 1966). Chino lies in the transition zone between the Colorado Plateau and the Basin and Range physiographic provinces. The following sections describe the geology of the ore deposits in and around the Santa Rita Open Pit in the NMA and unmineralized rocks and sediments in the PCA and SMA.

North Mine Area

Figure 3-7 shows a geological map of the NMA. The Chino or Santa Rita Deposit is a porphyry copper body that includes intrusive and skarn hosted copper mineralization (Rose and Baltosser, 1966). Mineralization is associated with a generally porphyritic composite intrusion varying in composition from granodiorite to quartz monzonite that has domed, surrounding Paleozoic and Cretaceous sedimentary rocks during the early Tertiary. The sedimentary section was intruded by late Cretaceous quartz diorite sills that predate the main stock intrusion, but are not believed to be associated with mineralization. Post-mineralization, mid-Tertiary volcanic rocks were extruded over the deposit and included rhyolitic tuffs and basaltic andesite flows.

Sedimentary rocks in the area include Paleozoic sandstone, limestone, dolomite, and shale. The lower portion of the Cretaceous and all of the Triassic and Jurassic sections are not represented in the area, presumably because the region was a topographic high during these periods, thus accounting for the disconformity between the Permian and upper Cretaceous rocks. The upper Cretaceous rocks include sandstone, siltstone, shale, and minor shaley limestone of the Colorado and Beartooth Formations.

Hydrothermal alteration and mineralization is associated with the intrusion of the Santa Rita composite stock, which has been dated at between approximately 58 and 59 million years old. The stock intruded at the junction of three sets of faults, including pronounced northwest and northeast sets and a less prominent easterly set. The stock is elongated in a northwest-southeast direction. Abundant mineralized fractures show that the stock was intensively fractured and hydrothermally altered following solidification. Three ages and compositions of dikes cut the intrusion. Granodiorite is the oldest and occurs as early apophyses of the stock into the surrounding rocks and as late dikes cutting the stock. Later intrusive rocks include dikes of quartz monzonite and latite, both of which have been dated at about 56 million years old. Cross-cutting relationships show the latite to be the youngest dike phase. The latite is not mineralized and the quartz monzonite is rarely mineralized, but is usually not ore grade.

Pennsylvanian and Mississippian sedimentary rocks, primarily limestone, that were intruded by the magma were completely altered and replaced by calc-silicates and associated contact metasomatic minerals. Common skarn minerals associated with these rocks include magnetite, pyrite, quartz, garnet, epidote, actinolite, and chalcopyrite. Chalcopyrite is the primary hypogene copper mineral in both skarn and unenriched intrusive rocks. Cretaceous clastic sedimentary rocks and the quartz diorite porphyry sills within surrounding sedimentary rocks are also secondarily enriched, frequently to ore grade. Oxidation of chalcocite has commonly resulted in the formation of native copper, cuprite, and chrysocolla and more rarely azurite, malachite, turquoise, and libethenite (copper phosphate).

Post-mineralization (mid-Tertiary) volcanic rocks overlie the southern and southeastern portions of the deposit and probably originally overlaid the entire deposit. These rocks include the Sugarlump and Kneeling Nun Tuffs. The tuffs are overlain, in places, by basaltic andesite lava flows. These volcanic rocks are exposed over a large portion of the area south and east of the Santa Rita Open Pit. The Sugarlump Tuff is 50 to 100 feet thick and in the mine area is a poorly consolidated, non-welded tuff that typically forms slopes. The 400- to 600-foot-thick Kneeling Nun Tuff is a massive, welded tuff, easily identified because it is a cliff former in the area south of the mine. Basaltic andesite flows overlying the tuffs reach a thickness of up to 500 feet, but are typically 200 to 400 feet thick in the mine area. These mid-Tertiary units are not mineralized and are only removed during mining to facilitate access to mineralized material.

The structural features of the NMA are related to the Late Cretaceous and Miocene intrusive activity. The primary structural trend of faults and dikes in the area is approximately north northeast. Secondary trends for faults and dikes are northwest and east. The north northeast trending faults are generally high angle normal faults, dipping steeply eastward to nearly vertical.

Pipeline Corridor Area

The geology of the PCA between the confluence of Hanover Creek and Whitewater Creek in the north and the town of Hurley in the south is transitional between the NMA and the SMA (**Figure 3-8**). The bedrock northeast of Bayard consists primarily of an igneous sill (Hornblende Quartz Diorite). The bedrock from Bayard south consists primarily of volcanic bedrock that includes the Sugarlump, Kneeling Nun rhyolite tuffs, and Rubio Peak Formation.

The bedrock is overlain by a thin veneer of alluvium confined to the Whitewater Creek channel that forms the most significant hydrostratigraphic unit of the area. Northeast of Bayard, the alluvium is confined to a relatively narrow channel from 20 to 50 feet wide and generally less than 20 feet thick. In the Bayard area, the alluvium is over 100 feet thick, presumably due to local faulting. From Bayard south to former Lake One, the alluvium is generally between 5 and 20 feet thick and the width varies from approximately 500 feet to nearly 3,000 feet, averaging less than 1,000 feet.

South Mine Area

Figure 3-9 is a geologic map of the SMA. In the SMA, geologic units consist chiefly of the Gila Conglomerate with volcanic bedrock of the Sugarlump and Kneeling Nun formations exposed along the east side of the tailings ponds. Surface exposures of Paleozoic limestone of the Lake Valley Limestone and the Oswaldo Formation occur along the west and northwestern sides of the SMA. A relatively thin veneer of recent alluvium occurs at the surface along the major drainages. Alluvium along the original channel of Whitewater Creek is up to 50 feet thick (DBS&A, 1996). The thickest alluvium along Whitewater Creek, occurs immediately south of Tailings Pond 7 where it was noted to be less than 75 feet thick (Woodward-Clyde Consultants [WCC], 1990).

The Gila Conglomerate consists of poorly to well consolidated gravel, sand, silt, and clay deposited in alluvial fan, stream channel and lacustrine environments (Trauger, 1972). The Gila Conglomerate generally becomes more consolidated and cemented with depth. The lower portion of the Gila Conglomerate is typically more fine grained and consolidated, and consequently of lower hydraulic conductivity than the upper Gila Conglomerate (WCC, 1990). In the SMA, the Gila Conglomerate is confined to a north to south oriented buried bedrock channel believed to have originally been cut by the ancestral Whitewater Creek and other drainages of the Cobre Mountains to the east (Dames & Moore, 1983). The bedrock channel is deepest beneath the tailings ponds. The Gila Conglomerate thins and pinches out to the east by the surface exposure of volcanic bedrock. The Gila Conglomerate also thins and pinches out in places to the west where Paleozoic bedrock is exposed. The Gila Conglomerate south of Tailings Pond 7 is estimated to be at least 500 feet thick. Farther south the Gila Conglomerate thickens to an estimated 1,000 feet. The Gila Conglomerate thins to the north, and pinches out in the northern part of former Lake One.

Bedrock underlying the Gila Conglomerate within the SMA includes from youngest to oldest, the Kneeling Nun Formation, the Sugarlump Formation, the Rubio Peak formations, and the Paleozoic sediments (Lake Valley Limestone and Oswaldo Formation). These units dip to the east, due to their occurrence along the western limb of the Piños Altos Central Syncline. The axis of this syncline is located to the east of the SMA and is oriented northwest to southeast. Due to the eastern dip of the bedrock underlying the Gila Conglomerate, the younger bedrock formations are exposed at the surface and in contact with the Gila Conglomerate on the east. To the west, progressively older formations underlie and are in contact with the Gila Conglomerate.

3.3.3 Climate

The Chino Mine is located in a semiarid region in southwestern New Mexico, with elevations ranging from about 5,200 to 7,700 ft amsl. The climate at Chino is warm and dry, with mean annual precipitation of approximately 16 inches (400 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. 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. Near Hurley, annual precipitation averages approximately 14 inches where the elevation is approximately 5,700 ft amsl. Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation. Annual potential evaporation is estimated to range from 53 to 70 inches per year (DBS&A, 1996; Golder, 2007a).

3.3.4 Surface Water Hydrology

An overview of the surface-water hydrologic setting at the Chino Mine is presented below.

Regional Surface-Water Hydrology

The Chino Mine area lies within the watershed of the San Vicente Basin (part of the Mimbres Watershed, a closed basin). Major drainages within the San Vicente Basin that drain the southwestern flank of the Piños Altos Range and Cobre Mountains include, from west to east: San Vicente Arroyo, Whitewater Creek, and Lampbright Draw. Whitewater Creek merges with San Vicente Arroyo approximately 10.5 miles south of Tailings Pond 7 in the SMA. The drainages within the San Vicente Basin are all ephemeral in their lower reaches (Trauger, 1972), but they may have intermittent flows in their upper reaches. These drainages typically lose a substantial amount of their flows to groundwater recharge in the alluvial basins along the mountain fronts. The drainages typically flow only in response to significant precipitation events.

The major drainages at Chino include Whitewater and Hanover Creeks and Lampbright Draw (Tributaries 1 and 2) (**Figure 3-10**). The key surface drainage characteristics within the Chino Mine area are further described below.

Whitewater Creek Surface Water Hydrology

Whitewater Creek drains a watershed of approximately 57 square miles and ranges in elevation from 5,300 to 7,600 ft amsl (DBS&A, 1995). The watershed extends from the crest of the Piños Altos Range north of the Santa Rita Open Pit, south to its confluence with San Vicente Arroyo (**Figure 3-10**). Whitewater Creek is an ephemeral drainage and represents the primary channel draining the NMA and SMA. Hanover Creek is a main tributary to Whitewater Creek, which eventually joins San Vicente Arroyo south of the mine.

The lower reaches of Whitewater Creek have been modified in association with the development of the tailings impoundments. The historical channel of Whitewater Creek flowed in the area now occupied by portions of reclaimed Lake One and Tailings Ponds 1, 2, 4, 6, and 7. In 1910, Whitewater Creek was dammed to form Lake One and in 1911 diverted to flow east of Pond 1. Additional changes in channel location were made in 1984, when the creek bed was moved to the east around Lake One, and in 1988, when the channel was diverted to the east of the planned site for Pond 7. In 2003, Whitewater Creek was diverted out of the Lake One drainage by the construction of an engineered channel cut into the bedrock from Whitewater Creek north of Razorback Ridge, through James Canyon, and a bedrock ridge east to Bolton Draw.

The headwaters of the Santa Rita Creek drainage are located northeast of the Santa Rita Open Pit. Santa Rita Creek historically drained to the southwest, merging with Whitewater Creek and Hanover Creek. The Santa Rita Open Pit and associated mine facilities now occupy much of the former drainage. Most of the drainage upstream of Santa Rita Open Pit is collected in Reservoir 5. Presently, all surface water flow southwest of the Santa Rita Open Pit in the Santa Rita drainage is contained by reservoirs in the former Precipitation Plant Area. Santa Rita Creek is an ephemeral stream.

Hanover Creek is an ephemeral stream that originates in the Piños Altos Range north of Chino. In the vicinity of the NMA, it flows on the west side of the mine in a south-southwesterly direction between Highway 356 and the West Stockpile, merging with Whitewater Creek southwest of the Ivanhoe Concentrator. The Hanover Creek watershed includes the area north of the Santa Rita Open Pit and the historical Hanover Mining District.

Lampbright Draw Surface Water Hydrology

Lampbright Draw is an ephemeral stream draining the eastern portions of the NMA. Lampbright Draw commences approximately 6 miles east of Santa Rita Open Pit and east of the present Lampbright stockpiles (**Figure 3-10**). Drainages referred to as Tributaries 1 and 2 occur in the immediate area of the Lampbright stockpiles. The Lampbright stockpiles cover the upper portions of the Tributary 1 watershed and drainage channel. The Tributary 2 drainage occurs east of the stockpiles and joins Tributary 1 approximately 1 mile to the south. The drainage continues to the southeast approximately 2 miles where it joins the main fork of Lampbright Draw. From this point, Lampbright Draw continues south and southwestward joining Whitewater Creek near Faywood Station.

3.3.5 Groundwater Hydrology

The differing physiographic and geologic settings within the NMA, PCA, and SMA lead to hydrogeologic conditions within these sub-regions that are also distinct. Over the past 11 years, numerous field investigations were undertaken to collect data needed for site-wide abatement (SWA), AOC, and operational DP purposes. In all, 53 monitoring wells were installed specifically for SWA purposes, 42 as part of an initial field investigation, and 11 additional monitoring wells to complete the delineation of the extent of impacted groundwater. Eight other newly installed wells have also been installed to help define the hydrogeologic conditions at the site. The following sections present a brief overview of the overall hydrogeologic conditions at the site for each of the three sub-regions. The geology in the mine site area has been divided into five hydrostratigraphic units based on the rock types and their hydraulic properties (Golder, 2016b). These units are: Alluvium, Gila Conglomerate, Intrusive Plutonic Bedrock, Volcanic Bedrock, and Sedimentary Bedrock.

North Mine Area

The NMA is dominated by igneous and sedimentary bedrock, with thin unconsolidated alluvial deposits along the major drainages. The matrix and overall porosity of the bedrock near the Santa Rita Open Pit is typically very low and occurs primarily in the form of fractures, joints and faults (Golder, 2016b). Fractures are the primary conduits for groundwater flow in the immediate area of the open pit. Farther away from the open pit, the original matrix porosity of sedimentary units remains intact, allowing groundwater to move through sedimentary pore spaces in addition to fractures and faults and along bedding plans.

As is typical in mountainous terrain with low hydraulic conductivity rocks, groundwater levels within bedrock generally reflect ground surface elevations: groundwater levels are generally higher in the elevated terrain and generally lower in the drainages and lower elevations. Overall, the depths to groundwater range from over 500 ft below ground surface (bgs) below the ridges and elevated terrain to ground surface or near ground surface in the drainage bottoms. Groundwater flows from the ridges down gradient to discharge areas in the valley bottoms. The presence of the Santa Rita Open Pit in the NMA has greatly affected the groundwater flow regime. Groundwater elevations near the bottom of the Santa Rita Open Pit are approximately 1,000 feet lower than the surrounding groundwater levels. Consequently, the open pit acts as a large regional hydraulic sink, drawing groundwater into the open pit from around the circumference of the pit. Located within the regional hydraulic sink is the Area of Open Pit Hydrologic Containment (AOPHC), as defined in 20.6.7.7.B(5) NMAC, which is further bounded by the area of mine disturbance and a monitoring well network installed around the perimeter of the open pit. Chino contemplates that the current configuration of the AOPHC will be determined during agency review of this CCP Update. Although the current configuration of the AOPHC has not been agreed-upon, it is referenced in this document with regard to the function of the hydraulic sink. The nature of the groundwater flow system described above is a critical factor controlling the nature and extent of impacted groundwater in the NMA. As a consequence of the characteristics of the NMA groundwater flow system, impacted groundwater in the NMA is already largely controlled and contained. Within the AOPHC and during active mining operations, groundwater flows towards and into the Santa Rita Open Pit where it is collected and used for mine water supply purposes. Impacted groundwater associated with mine facilities outside of the AOPHC flows towards the local, predominantly buried drainages beneath the stockpiles and to areas where it is collected by existing collection systems, such as the corridor area between the West and South stockpiles.

Figure 3-11 shows the groundwater elevations and the groundwater flow directions in the NMA observed in 2016. As shown on the figure, groundwater elevations are highest in the elevated terrain to the north and south of the pit, and lowest within the Santa Rita Open Pit. The AOPHC extends a relatively short distance around the western, southern and eastern perimeter of the Santa Rita Open Pit in comparison to the size of the pit. However, the regional hydraulic sink extends much farther to the north (beyond the mapped portion of the hydraulic sink shown on **Figure 3-11** in the regionally upgradient direction.

The North Mine Area numerical groundwater flow model originally developed in 2004 (Golder, 2005a) was recently updated with more current information on existing mine operations, underground workings, and groundwater conditions in the NMA (Golder, 2015b). The results of the updated groundwater flow model are generally consistent with the 2004 model, showing that the size of the hydraulic sink, and consequently the AOPHC, will expand over time, extending over a greater footprint area of the mine facilities during and following closure in response to reduced groundwater recharge associated with the reclaimed stockpiles in the NMA.

Pipeline Corridor Area

The PCA (aka MWWCA) hydrogeology is comprised of a thin veneer of variably saturated alluvium confined to the immediate Whitewater Creek channel and tributary canyons. The alluvium overlies bedrock of various lithologies. In contrast to the bedrock in the NMA and the bedrock at depth, the Whitewater Creek alluvium is more unconsolidated and permeable, and as such, groundwater preferentially flows within the alluvium. Consequently, far more groundwater flows (per unit area) through the alluvium along Whitewater Creek in the PCA in comparison to flows within the underlying and adjacent bedrock. Groundwater within the alluvium is generally within 10 feet of the surface. The hydraulic gradient in the alluvium closely coincides with the low gradient of the channels and the groundwater flows southward along the course of Whitewater Creek toward the SMA.

Figure 3-12 shows the groundwater elevations and groundwater flow direction in the PCA observed in 2016. Consistent with the characteristics of the NMA groundwater system, groundwater is recharged along the ridges flanking Whitewater Creek, and it converges towards and discharges into the alluvium of Whitewater Creek. Also consistent with the NMA, despite groundwater flowing towards and discharging to the lower elevations, in this case Whitewater Creek, there is little to no surface water flow. In the NMA, most of the groundwater reporting to the drainages is removed via evaporation (except possibly Hanover Creek).

The amount of groundwater in the PCA, reporting to the alluvium is greater than the amount that can be removed by evaporative transportation. The bedrock groundwater that discharges into the alluvium, infiltration of surface flows and direct precipitation, and some periodic inflows from the alluvium of Hanover Creek contribute groundwater to the alluvium of Whitewater Creek. The hydraulic gradient in the bedrock is directed upward into the alluvium throughout most of the PCA. In the Bayard area, however, the vertical hydraulic gradient between the alluvium and bedrock is reversed. Regardless, little alluvial groundwater infiltrates into the bedrock in this area due to the much lower permeability of the bedrock in comparison to the alluvium. Whitewater Creek surface water is diverted to James Canyon Reservoir to the east of the Tailings Ponds.

South Mine Area

The SMA hydrogeologic system is located within a deep channel of semi-consolidated alluvium that is over 500 feet thick at its southern end (Golder, 2007a). The primary hydrostratigraphic unit of the SMA is the Gila Conglomerate, which consists of variably cemented clay, silt, sand and gravel. Quaternary alluvial sediments, which are as much as 50 feet thick, overlie the Gila Conglomerate along the axis of Whitewater Creek. Stratigraphically beneath the Gila Conglomerate is a series of east-dipping volcanic bedrock units including the Kneeling Nun Tuff, Sugarlump Tuff and Rubio Peak Formation and Paleozoic sedimentary formations.

Figure 3-13 shows the groundwater elevations and groundwater flow directions in the SMA observed in 2016. The direction of groundwater flow in the historically active mine portion of the SMA is generally to the south towards the Tailings Pond 7 interceptor well system. Immediately south of Hurley, groundwater flows to the southeast beneath the reclaimed older tailings ponds. The Tailings Pond 7 interceptor wells contain groundwater flowing from beneath the reclaimed tailings ponds, Tailings Pond 7, and groundwater upgradient to the north, principally the groundwater flowing from the alluvium in the MWWCA. South of the Tailings Pond 7 interceptor system, groundwater flows in south-southeastern direction.

Groundwater in the SMA flows principally through Gila Conglomerate. The hydraulic conductivity of the Gila Conglomerate is considered moderate, with a geometric mean of approximately 6.0 feet per day. Recent alluvium, principally along the original channel of Whitewater Creek, has a much higher hydraulic conductivity than the Gila Conglomerate. However, the recent alluvium generally lies above the water table, which varies from approximately 60 feet bgs southeast of Hurley, to over 150 feet bgs south of Tailings Pond 7.

Recharge to the SMA hydrogeologic system occurs by infiltration along alluvial drainages during times of surface runoff, groundwater inflows from the underlying and surrounding bedrock, inflows from the alluvium of Whitewater Creek upstream of the Lake One area, and infiltration of precipitation. Following reclamation of the older tailings facilities and Lake One, seepage through these facilities has been minimized. Recharge currently occurs from seepage from Tailings Pond 7. Groundwater in this area exceeds standards for sulfate and TDS and is captured by the Tailings Pond 7 interceptor well system.

3.3.6 Soils and Vegetation

The soils in the Chino area were mapped by the U.S. Soil Conservation Service (SCS) (Parnham et al. 1983). The SCS map units were composed primarily of complexes of soil series and miscellaneous land areas. The dominant soils in the northern portion of the survey area (Luzena and Muzzler series) are shallow (<50 cm [centimeters]) and fine-textured with moderate to high rock fragment contents. The soils in the uplands are mostly shallow, although moderately deep (50 to 100 cm) and deep (>100 cm) soils occur to a minor extent. The soils in the valley bottoms are generally deep, vary considerably in texture, but tend to be somewhat coarser textured than the upland soils. The soils in the SMA range from shallow to deep, are generally medium to coarse-textured, calcareous, and overlie thick alluvial deposits (DBS&A, 1998).

The distribution of native vegetation around Chino is locally complex and reflects the combined influences of environmental gradients (soils and climate), disturbance histories (drought, floods, fire, and predation) and management practices. The major structural characteristics of vegetation are controlled primarily by the prevailing environment gradients. The vegetation at Chino was classified using the nomenclature and hierarchical classification of the U. S. National Vegetation Classification system (Grossman et al., 1998) and mapped at the Alliance level, which represents the sixth tier in a seven-tiered hierarchy. The vegetation alliances in the area surrounding Chino (DBS&A, 2000) are listed below. **Figures 3-14 and 3-15** show the distribution of the vegetation in the NMA and SMA, respectively.

Vegetation Map Units in the Chino Survey Area

Name	Acreage	Elevation Range (ft amsl)
Mixed-Grama Herbaceous Alliance	6,717	5,200-5,750
Mesquite/Mixed Grama Shrubland Alliance	8,858	5,200-5,800
Fluvial Forest and Shrubland Alliance	1,585	5,200-5,600
Alligator juniper-Oak/Grama Woodland Alliance	10,257	5,800-7,700
Alligator juniper-Oak Woodland Alliance	4,456	5,800-7,400
Mountain mahogany Shrubland Alliance	10,038	5,600-7,600
Ponderosa pine-Oak Forest Alliance	1,552	6,000-7,600
Mine Facilities/Urban	10,122	NA

Notes: NA = Not applicable

3.3.7 Wildlife

The undisturbed lands that encompass and surround Chino harbor diverse vegetation and wildlife communities. General habitat types include riparian corridors, rock outcrops and cliffs, foothills, canyons, mixed woodlands, and grasslands.

Previous wildlife studies at Chino have recorded at least 18 mammal, 71 bird, and 5 reptile species. Surveys to identify federal and state threatened, endangered, and special status wildlife species was also conducted at Chino in 1998 (Golder, 1998b). Additional more recent focused wildlife surveys have been conducted at Chino in association with various expansion projects at the mine (Golder, 2013; 2015c; 2017b). No special-status (threatened or endangered) species of wildlife were observed in these areas during the surveys. The peregrine falcon was the only federally listed endangered species to be recorded during the 1996 field investigations. Subsequently, this species has been removed from the federal endangered species list, but is still listed as threatened by the State of New Mexico. Two other state listed species, the common ground dove (endangered) and the gray vireo (threatened), were also observed. In addition, two species of bats (western small-footed myotis and fringed myotis) were observed that were listed by the Bureau of Land Management (BLM) as species of concern and as sensitive species by the State of New Mexico. The Chiricahua leopard frog, a federally listed endangered species, occurs south and east of the NMA in association with Lampbright Draw and its tributaries.

3.3.8 Material Characteristics

Stockpile, tailing, and potential RCM found at the Chino Mine have been characterized with respect to their chemical composition and physical properties. The physical and chemical characteristics of these materials are described below.

Stockpile Materials

Chino stockpile materials characterization data have been reported in five principal reports as part of the End of Year 2001 through 2006 CCP (M3, 2001), three reports for DP-1340 (Greystone, 2004; EnviroGroup, 2006; DBS&A, 2007), and the Master Document (Chino, 2015). Information from these studies show that the Chino stockpiles are composed predominantly of granodiorite, Cretaceous metasediments, and skarn. The mineralogy of these rocks is dominated by quartz, illite, and K-feldspar with lesser amounts of kaolinite, plagioclase, chlorite, epidote, magnetite, garnet, alunite, pyrite, jarosite, and amorphous silica.

Comparisons of data from newly mined materials with those of older stockpiled materials conducted as part of the *Supplemental Leached Ore Stockpiles and Waste Rock Stockpiles Mass Loading Study* (DBS&A, 2007) showed that the materials properties are highly variable and that the variability of stockpile material properties is similar to that of the freshly mine materials. The sulfate content in the stockpile materials is significantly higher than that of fresh mine materials owing to the effects of pyrite oxidation. The composition of the leach ore materials are not significantly different from the waste rock materials and the range in properties overlap. The leach ore stockpile materials do not appear to be more reactive than waste rock stockpile materials.

The stockpile materials at Chino 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 3 and above. These conditions do not result in pervasive weathering and leaching of the primary rock forming minerals at Chino. 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.

Tailings Material Characteristics

The older tailings impoundments were constructed by the upstream method from perimeter starter dikes. The tailings impoundments show an internal stratigraphy that grows progressively finer from the outer embankment dikes to the inner decant pond. The impoundment sediments are layered, and there is a general coarsening-upward stratigraphy near the impoundment embankments.

The principal sulfide mineral in the tailings is pyrite, although chalcopyrite and trace copper sulfides such as digenite, covellite, and bornite may also occur. Non-sulfide copper minerals include copper sulfate minerals and possibly copper carbonates. Gangue minerals (quartz, magnetite, muscovite or sericite, chlorite/clays, and potassium feldspar) make up the largest fraction of the tailings solids. The tailings were originally deposited in the ponds as an alkaline slurry. The degree to which the pyrite oxidizes appears to be a function of the moisture contents as it affects oxygen ingress in the near-surface tailings and the relative age of the pond. The higher moisture contents of the slimes and silts relative to the sands, and the interlayered nature of the tailing, appear to limit the movement of oxygen into the deeper parts of the ponds. Groundwater samples collected just south of the tailing ponds exceed ground water standards for sulfate and TDS, but not metals, and is captured by the Tailings Pond 7 interceptor well system.

Borrow Materials

Agency approved borrow material will be used as RCM and will meet all regulatory requirements listed in permit GR009RE and the Copper Mine Rules. Potential RCM identified at Chino include native soils, alluvium, in-situ Gila Conglomerate, and a suite of rock types found in the NMA. RCMs are tested in accordance with the agency approved borrow material handling plans. Chino plans on updating the material handling plan to include additional RCM in the near future. The suitability of the RCM have been demonstrated as part of the Chino test plot program. The fine-earth fraction of the RCM is mostly medium- and moderately coarse-textured with clay ranging from about 10 to 20%. The rock fragment content of the RCM ranges from about 35 to 65% by volume. The results from the 2015 vegetation surveys of the stockpile test plots and Rustler Canyon reference area indicate that the unamended, mixed lithology cover material used at the test plots is capable of supporting a diverse self-sustaining ecosystem (Golder, 2015d and 2017a). A 3-foot thick cover constructed from the RCM meets the water holding capacity requirements specified by the Copper Mine Rules Section 20.6.7.F (Golder, 2016c). Approximately 20.6 million yd^3 of RCM have been identified in the NMA.

The RCM mined from the east side of the mine and stored in the STS2, Upper South and Whitehouse stockpiles was approved for reclamation activities by NMED on November 10, 2016 and MMD on September 1, 2017. That material is composed mostly of rhyolitic tuff and Cretaceous stock. The remaining cover material required for the NMA will be sourced from the unmineralized volcanic conglomerate deposit that occurs east of the Main Lampbright Leach Stockpile. This deposit was identified as the Rubio Peak

Formation, which is lithologically correlative with the Kneeling Nun and Sugarlump tuffs according to the U. S. Geological Survey. The Rubio Peak Formation in this area contains poorly sorted coarse gravels from sedimentary and igneous rock in the volcanic ash matrix.

Significant borrow resources exist in the SMA associated with the thick alluvial and Gila Conglomerate deposits around the tailings ponds. The upper soil horizons are generally medium-to fine-textured and have low to moderate rock fragment contents. In contrast, the substratum materials (alluvium and Gila conglomerate) are typically moderately coarse-textured and contain moderate to moderately-high amounts of rock fragments. In general, the amount and size of rock fragments are greater in the deposits east of the tailings ponds than those to the west. Furthermore, the deposits tend to become finer-textured in the down-fan direction (i.e., south) and with distance away from the Whitewater Creek channel (DBS&A, 1998). Near the tailings impoundments, the subsoils below roughly 3 feet in depth typically contain about 40 to 65 % rock fragments (> 2 mm diameter) by volume.

The Gila Conglomerate and associated soils in the SMA have few inherent chemical limitations (DBS&A, 1998; Golder and URS, 2007b) and have proven to be suitable RCM for the reclaimed facilities in the SMA. More than 20 million yd^3 of Gila Conglomerate cover materials have been conservatively identified in the SMA (Golder, 2006d). A significant portion of the available borrow material in the SMA was utilized as part of the reclamation of Older Tailings Ponds 1, 2, 4 East, 4 West, B, and C; and partial reclamation of older Tailings Ponds 6 East and 6 West. Remaining borrow areas E, F, and H will be utilized as the reclamation cover source for the remaining facilities within the SMA. These three borrow areas are estimated to contain over 4 million yd^3 of suitable RCM.

4.0 DESCRIPTION OF COMPLETED AND PLANNED RECLAMATION PROJECTS

As previously noted, a substantial amount of reclamation has been conducted at the Chino Mine since the issuance of DP-1340 and MMD Permit GR009RE. Facilities where reclamation is complete include: the Groundhog Mine; older Tailings Ponds 1, 2, 4 East, 4 West, B, and C; portions of older Tailings Ponds 6 East and 6 West; former Hurley Smelter Area; and the Lake One and Slag Pile area (**Figure 4-1 and Table 4-1**). Additionally, Chino terminated operation of Reservoir 3A in 2015, and surface preparations for the proposed 3A Waste Rock Pile began in early 2016 within the former footprint of the reservoir.

The following sections describe the ongoing and completed reclamation activities that have occurred since the issuance of DP-1340 and MMD Permit No. GR009RE, and planned reclamation projects scheduled to be initiated prior to the EOY 2018.

4.1 Groundhog Mine Reclamation

Reclamation and remediation of the Groundhog Mine Stockpile Area was completed in accordance with the IRA plan that was submitted to the NMED on April 28, 2003 and approved by NMED on November 18, 2003 with concurrence from MMD. The Groundhog Mine Stockpile Area is located within the Hanover and Whitewater Creeks Investigation Unit under the AOC for Chino (Chino, 2003). The IRA included all stockpiles associated with the Groundhog Mine, except for Groundhog No. 5 Stockpile. Chino completed reclamation of several small waste rock stockpiles in the headwaters of Whitewater Creek in 2004, and the Groundhog Mine site in 2008. Chino removed approximately 270,000 cubic yards of stockpile material to bedrock and hauled it to the West Stockpile in accordance with an approved temporary permit modification to DP-526 (Golder, 2009b). The IRA also included the placement of RCM and revegetation on areas excavated to bedrock, removal of building foundation materials adjacent to the stockpiles, closure of mine shafts, diversion of stormwater run-on, and containment of impacted stormwater. In 2009, Golder prepared a Completion Report detailing the removal of stockpile material, shaft closure, cover construction, and surface reclamation activities completed under the IRA (Golder, 2009b).

Potentially acidic stockpile material delineated during the Groundhog Mine site investigation (Golder, 2001) was removed from the pipeline corridor from December 2010 to February 2011. Chino excavated the stockpile materials to bedrock and scraped the bedrock surface to remove weathered surfaces to the extent possible. RCM was then placed on areas excavated to bedrock and revegetated. Approximately 42,500 yd^3 of excavated material was hauled to the northwest side of the West Stockpile as part of the pipeline corridor reclamation project (Golder, 2011).

4.2 Groundhog No. 5 Stockpile Reclamation

The Groundhog No. 5 Stockpile is a small waste rock stockpile (footprint of less than 2 acres) associated with the Groundhog No. 5 Shaft located on the north wall of Lucky Bill Canyon near its confluence with Bayard Canyon. The Groundhog No. 5 site has been thoroughly investigated (Golder, 2005b and 2007e) under the Hanover/Whitewater Creek Investigation Unit and is being reclaimed in accordance with the standards prescribed in the AOC agreement and the NMMA Rules. An IRA Closure Plan (Engineers Inc., 2005) was prepared pursuant to the requirements under Permit GR009RE and the AOC to meet the standards for existing mines under the NMMA Rules. The IRA was initiated in 2006 and consisted of regrading the stockpile, removing structures, covering the mine shaft opening and constructing drainage controls. In February 2006, Chino submitted a Construction Quality Assurance and Reclamation Completion Plan (Telesto, 2006) to the MMD and NMED to fulfill the requirement listed in Permit Condition E.2.a. Reclamation of the stockpile is pending a Record of Decision for the Hanover/Whitewater Creek Investigation Unit, which is delineated as part of the AOC.

Stormwater run-on drainages were further modified in early 2014 to divert runoff away from the stockpile and to improve erosion control of the downgradient segments of the drainages. Later in March 2014, additional surface water drainage channel improvements were constructed at the top of the stockpile where the surface gradient was shallow to shed incident precipitation more quickly during rainfall events. A seepage collection trench was constructed in May 2014 along the toe of the stockpile to increase the collection of seepage water (if present) along the entire length of the stockpile toe.

4.3 Former Hurley Smelter Area

The Hurley Mill was shut down in 1982, and the Hurley Smelter stopped operating in January of 2001 and was demolished in the summer of 2007. The 25-acre site is located east of Hurley, New Mexico and previously included smelting and related ore-handling equipment. Reclamation of the area was completed in accordance with DP-1340 and Operational DP-214. A minimum three foot RCM derived from designated borrow sources was placed on the top surfaces and sloped areas between October 2007 and February 2008. Long-term storm water management structures were also completed including riprap lined channels, a detention pond, and drainage pipelines and culverts designed for peak flows from the 100-year 24-hour storm. Details of the reclamation of the Hurley smelter area are provided in the *As-Built Report for Cover Placement and Storm Water Runoff Control for the Chino Smelter Site* submitted to the MMD and NMED in September 2008 (Telesto, 2008).

4.4 Older Tailings Ponds 1, 2, 4, 6, B, and C Reclamation

Except for small areas that continue to be necessary for operational activities, reclamation work has been completed on the majority of the older tailings ponds located within the SMA. Chino submitted a Construction Design Quality Assurance Plan (CDQAP) and Construction Quality Assurance Plan (CQAP) to the NMED and MMD in support of the reclamation of Ponds 1, 2, B, C, 6 East, and 6 West on May 1, 2007 (Golder-URS, 2007a). The CDQAP was prepared in part to fulfill the requirements of DP-1340 and Permit Revision 01-1 to the MMD Permit GR009RE. A number of revision inserts were issued between May and September 2008, with the detailed design drawings submitted in May, 2008. The CDQAP was approved by

NMED and MMD on October 6, 2008. Tailings Pond 4 was not included in the original CDQAP reclamation designs because the portion of Tailings Pond 4 located west of the utility corridor, referred to as Pond 4W, was designated for contingency tailings deposition. The Pond 4W Closure Design Report, Revision 1, dated March 11, 2010 was formally submitted to the NMED, MMD, and the New Mexico Office of the State Engineer (NMOSE) as Addendum 1 of the Chino Tailing Reclamation CDQAP (Golder-URS, 2010). The Pond 4E Closure Design Report for the closure and reclamation design of Pond 4E was submitted as Addendum 2 of the Chino Tailing Reclamation CDQAP, Revision 1, dated May 19, 2011 (Golder-URS, 2011).

Reclamation of the older tailings ponds consisted of grading to achieve positive drainage, construction of surface water diversions and drainage channels, and placement of RCM. Details of reclamation of the older tailings ponds are provided in the individual Construction Quality Assurance Reports (CQARs) associated with these facilities that were submitted to the MMD and NMED (Golder-URS, 2011; 2013a; 2013b; 2013c; 2013d). **Table 4-1** provides summary details of the reclamation and reporting associated with each of these facilities.

4.5 Lake One and Slag Pile Reclamation

The Lake One Reclamation CDQAP which covers both Lake One and the Slag Pile was submitted to the MMD and NMED in September 2012 (EMC^2, 2012) and subsequently approved by the agencies on December 12, 2012. The Lake One reclamation work was performed from April 2013 through August 2014 in accordance with the design requirements included in the CDQAP.

Earthwork activities began in April 2013 with Lake One area subgrade regrading. Slag Pile top and slope subgrade surface regrading began in May 2013. Final regrading of the Lake One and Slag Pile subgrade was completed in June 2014. Placement of Lake One and Slag Pile RCM from designated borrow sources began in August 2013 and was fully completed in July 2014. Surface water channel construction, riprap, ACB mats placement and Channel P1 HDPE liner began in August 2013 and was completed in August 2014. Seeding and mulching for Lake One occurred between March 2014 and June 2014. Details of the reclamation of the Lake One and Slag Pile area were provided in the Draft CQAR submitted to the MMD and NMED in September 2014 (EMC^2, 2014).

4.6 Reservoir 3A Reclamation

Chino terminated operation of Reservoir 3A in 2015 to initiate closure of the reservoir in anticipation of converting the area from a stormwater management facility to a waste rock stockpile. The 3A Reservoir is located within the OPSDA. A CDQAP was prepared for the Reservoir 3A area in April 2014 in part to fulfill the requirements of DP-1340 and MMD Permit GR009RE (Golder, 2014). The CDQAP was approved by the NMED and MMD in May 2014. Chino subsequently submitted a request to amend the CCP (DP-1340) and modify Permit GR009RE to construct the proposed 3A Waste Rock Pile in the area of Reservoir 3A in July 2014 (Chino, 2014b).

In accordance with the CDQAP, Reservoir 3A reclamation activities began in late 2015 following drainage of the reservoir by April 1, 2015. In anticipation of agency approval of the proposed 3A Waste Rock Stockpile that would be constructed over the closed reservoir, a final reclamation cover system was not installed. However, upon closure of the stockpile, a reclamation cover system will be constructed.

5.0 FACILITY CHARACTERISTICS AND RECLAMATION PERFORMANCE OBJECTIVES

This section presents the characteristics of the major facilities to be reclaimed and performance objectives for closure/closeout of the Chino Mine facilities. The performance objectives presented herein for closure closeout of the facilities were developed based upon the current requirements of Permit GR009RE, DP-1340, 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. Generally, BLM has accepted the existing CCP as meeting the requirements of 40 CFR Part 3809, except for the specific financial assurance requirements. The primary performance objectives for closure closeout of the Chino 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 are included in Section 5.1, and the performance objectives and reclamation design criteria for closure/closeout of the facilities are included in Section 5.2. Performance objectives for the proposed water management and treatment system are described in Section 5.3. The reclamation plan for closure/closeout of the Chino Mine is presented in association with the NMA and SMA in Section 6.0 and the associated engineering\reclamation design drawings are presented in **Appendix A**.

5.1 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. Thus, the stockpiles, tailings ponds, open pit, surface impoundments, disturbed areas, facilities to be demolished, and industrial facilities are identified as the primary reclamation facility groups. Sections 5.1.1 through 5.1.7 provide general descriptions of these facility groups.

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

5.1.1 Stockpiles

A total of approximately 2,340 acres of stockpile surfaces are targeted for reclamation at the EOY 2018 under this plan. 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 OPSDA and areas that are covered by the conditional waiver from achieving a post mining land use or self-sustaining ecosystem. This Updated CCP does not provide for regrading or covering of the stockpile outslopes located both within the OPSDA and the conditional waiver area. Water treatment for groundwater and surface water captured within the mine area is described in the water treatment sections of this plan. The stockpile slope areas that will not be regraded and covered (at the EOY 2018) include approximately 28 acres of Lee Hill outslope area; approximately 20 acres of the interior (eastern) slope of the West Stockpile; approximately 91 acres of the interior (northeastern) slope of the South Stockpile; and approximately 79 acres of the Northeast Waste Rock Pile outslope (**Figure 5-1**).

5.1.2 Tailings Ponds

As described in Section 4.4, reclamation work has been completed on the majority of the older tailings ponds. A total of approximately 1,640 acres of tailings pond surfaces are targeted for reclamation at the EOY 2018 under this plan. The tailings ponds are located outside of the OPSDA and waiver area. Tailings pond surfaces targeted for reclamation under this plan include Tailings Pond 7, Axiflo Lake, and the southern end of Tailings Ponds 6E and 6W (**Figure 5-2**).

5.1.3 Open Pits

The Santa Rita Open Pit is about 1,550 feet deep, 1.8 miles in diameter, and covers an area of approximately 1,630 acres. The Santa Rita Open Pit includes a number of PLS booster and pit dewatering collection sumps joined by a network of pipelines. The uppermost level of the pit rim is on the south side at an elevation of approximately 6,500 ft amsl, and the lowest level in the pit is near the south-center of the pit at an elevation of approximately 4,900 ft amsl. The open pit was developed in benches with 50-foot vertical highwalls.

The Santa Rita Open Pit is a passive hydrologic evaporative sink in which evaporation exceeds the water inflow and the underlying ground water is hydrologically contained. During and after closure water flows to the open pit where it is captured. Captured open pit lake water will be treated and released. The water treatment system is addressed in Sections 5.0 and 9.0 of this CCP. 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.

On December 18, 2003, MMD granted a conditional waiver from the requirements to achieve a post-mining land use for the Santa Rita Open Pit (MMD, 2003b). MMD's evaluation has focused on the economic infeasibility of reclaiming the open pit and some stockpile outslopes. The Chino proposal was verified by a MMD registered professional engineer. It was also determined that the environmental benefits of reclaiming the open pit and some stockpile outslopes located at the rim of the open pit are not significant in relation to the cost. All of the open pit lies within the OPSDA. Due to mining since 2003, portions of the open pit lie outside the geographic area defined when the conditional waiver was granted in 2003. Chino contemplates that all of the open pit will continue to qualify for a waiver, as the economic and environmental analysis that supported the 2003 waiver decision are still valid. Consequently, this Updated CCP does not provide for regrading, covering, or backfilling of the open pit highwalls. The open pit bottoms will be used as part of the collection and treatment system for mine water following closure. The projected EOY 2018 OPSDA is shown on **Figure 5-1**.

5.1.4 Surface Impoundments

Table 3-3 in this plan presents an updated summary of the existing and planned surface impoundments that will be in place by the EOY 2018. For the purposes of this plan, surface impoundments include: storage tanks for process waters, seepage collection waters, and extracted ground water/pit water; stormwater catchments; dams; reservoirs; and surface impoundments. According to this summary, there will be 52 surface impoundments present at Chino at the EOY 2018. A summary of the surface impoundments to be utilized throughout the post-closure period are presented in **Table 5-1**. The surface impoundments to remain during post-closure will be used to intercept surface water, seeps, or perched water and direct flows to permanent impoundments or treatment facilities. All of the other existing surface impoundments will be closed and reclaimed. The surface impoundments listed in **Table 5-1** will be closed at the end of the post-closure period.

5.1.5 Disturbed Areas

A miscellaneous group of disturbed areas are present at the Chino Mine such as haul roads and operational roads, existing borrow areas, pipeline and utility corridors, and disturbed areas within various facilities such as the SX/EW, concentrator, acid storage areas, equipment storage areas, and SMA disturbances. The total estimated disturbance area of 128 acres has been included in the reclamation plan for allowance for this miscellaneous group of disturbed areas within the Mine Permit area. Also included within this 128 acres is the surface impoundments that will not be utilized in the evaporative treatment system during the closure period. In addition to these existing disturbed areas, Chino proposes to include financial assurance for an additional 100 acres of disturbance 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.

5.1.6 Facilities to be Demolished

Those facilities not designated for industrial PMLU will be demolished, removed, and/or buried or otherwise closed in accordance with an approved CDQAP. A total of approximately 15 buildings/tanks/structures covering approximately 109,000 square feet will be demolished and removed under this plan. The list of facilities that are scheduled to be removed is provided in **Table 5-2**.

5.1.7 Industrial Facilities

The infrastructure (shops, buildings, roads and utilities) associated with the Industrial PMLU areas will be adapted for non-mining industrial applications. Under DP-1340, NMED requires abatement of contaminated soils that are potential source areas for ground water 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 any impacted groundwater and/or surface water collected as part of abatement is also required. Chino will maintain erosion controls, structures, equipment, and utilities within the Industrial PMLU areas until they are occupied by tenants. Chino proposes to reclaim areas located within the Industrial PMLU with the potential to impact ground water with 36-inches of RCM and revegetate the areas in accordance with Appendix C of MMD Permit GR009RE and applicable modifications.

5.2 Reclamation Performance Objectives

The following sections present the reclamation performance objectives for the major facilities at the mine.

5.2.1 Stockpiles, Tailings Impoundments, and Disturbed Areas

The reclamation performance objectives for the stockpiles, tailings impoundments, and associated mining disturbed areas includes: re-establishment of a self-sustaining ecosystem and/or post-mining land use; stabilize the reclaimed areas, and control discharges of process waters. For stockpile outslopes located within the OPSDA and the waiver area, the reclamation performance objectives include: reclamation of the stockpile top surfaces, limit future access to the slope areas to authorized personnel only, prevent stormwater from running onto reclaimed areas from the uncovered slope areas, and construct water collection ponds as needed for water containment and treatment.

5.2.2 Open Pits

The Santa Rita Open Pit is considered a hydrologic evaporative sink and in accordance with Section 20.6.7.33. D NMAC the groundwater quality standards in Section 20.6.2.3103 NMAC do not apply within the AOPHC. Chino received a conditional waiver from the requirements of achieving a PMLU or self-sustaining ecosystem for the Santa Rita Open Pit pursuant to Section 3.H of MMD Permit GR009RE (MMD, 2003b). The performance objectives for the Santa Rita Open Pit are to provide a hydraulic sink for capture and removal of process waters, control run-on and public access, maintain operational access for water treatment work, and minimize adverse impacts to waterfowl and other wildlife resulting from ponding or water impounded in the pit areas.

5.2.3 Surface Impoundments

The performance objectives for surface impoundment facilities during closure and reclamation 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 ground water/pit water; stormwater catchments; and surface impoundments. The surface impoundment facilities identified for closure are planned to be the last features to be closed following the establishment of vegetation and site stabilization on the reclaimed facilities. Impoundments that serve PMLU functions or are associated with the stockpile toe perimeter and ground water control systems are planned to be permanent parts of the reclamation system and will be maintained throughout the post-closure period.

5.3 Water Management and Treatment Performance Objectives

The primary performance objective of the water management and treatment system is to control discharges of water contaminants specific to copper mine facilities. During and after reclamation, groundwater and surface water will be monitored using an approved monitoring well network system. Post-closure water quality and water level monitoring will be conducted in accordance with applicable DP's and Section 20.6.7.35.B NMAC. Process water is managed and contained using several methods such as large scale reclamation cover systems, impoundments, interceptor well systems and the natural hydrologic evaporative open pit sink. Process water will be collected and treated to meet the applicable standards for discharge. To meet the performance objectives the following water reduction and treatment strategy will be utilized:

- A short-term evaporative treatment system (ETS) will be utilized to evaporate all process waters beginning in year one and continuing through year six following closure. The short-term ETS system will be shut down at the end of the sixth year following closure;
- A long-term ETS will be utilized to evaporate all high TDS and sulfate process waters beginning in year seven and continuing through year 100 following closure;
- A combined lime-high density sludge (HDS) and membrane (hyper filtration) system will be utilized beginning in year six and continuing through year 100 following closure to treat all the lower TDS and sulfate process waters in the SMA and NMA;
- Stormwater runoff will be managed through surface reclamation to preclude potential for contact with uncovered stockpiles and tailings, thus minimizing the amount of impacted surface runoff requiring treatment. Impacted storm water runoff from within the OPSDA 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 and the water treatment plant.

6.0 RECLAMATION PLAN AND DESIGN CRITERIA

The objective of the Chino 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 Chino Mine including long-term management and/or treatment of process water, based the anticipated configuration of the mine at EOY 2018. 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-1340 and 20.6.7 NMAC, and closeout requirements described in MMD Permit GR009RE. 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 Chino Mine at the EOY 2018. 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 ground water 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 will be used to develop capital, operational and maintenance costs for an engineering-level cost estimate. The general reclamation plan for the Chino Mine area is shown on **Figures 5-1** (North Mine Area) and **5-2** (Pipeline Corridor Area and South Mine Area), and the closure or reclamation designs are depicted 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 GR009RE. A final CQA/CQC plan for reclamation and closure will be prepared by Chino 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. Monitoring and maintenance activities will follow primary reclamation and will continue throughout the post-closure period as described in Section 7.0.

As previously described in Section 4.0, several facilities have already been reclaimed. Erosion and vegetation establishment monitoring will continue at these facilities in accordance with Permit GR009RE and NMED requirements. Additionally, the disposition of several facilities will change before the EOY 2018 that are accounted for in this CCP. These include: 1) the North In-Pit Stockpile and associated facilities are currently scheduled to be completely mined out by the EOY 2018; 2) a new stockpile (the Santa Rita Stockpile) is projected to be constructed within the Santa Rita Open Pit by the EOY 2018; and 3) the 3A Waste Rock Pile is projected to be partially built out by the EOY 2018. Chino also intends to expand the existing Main Lampbright Stockpile approximately 105 acres to the north (NLS) as part of the current mine plan. A CCP for the NLS was submitted in January 2016 (Golder, 2016a) in preparation of the stockpile expansion and approved by the NMED on August 14, 2017 and the MMD on October 13, 2017. Additionally, Chino submitted a permit modification for DP-376 on January 18, 2016 for the proposed NLS. Construction of the NLS is scheduled to begin in 2018. The existing Lampbright Sumps #1 through #3 will be abandoned prior to the placement of waste rock over the area. As part of this NLS construction, a new HDPE-lined collection system (East Headwall Impoundment) will be installed to collect stormwater from the NLS and incidental seepage from the Main Lampbright Stockpile.

The following sections describe the specific facilities that will still have components to be closed at the EOY 2018, 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 NMA, PCA, and SMA is discussed in Sections 6.1 (NMA) and 6.2 (PCA and SMA). 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 6.3. A summary of the key design criteria for the facilities to be closed is presented in **Table 6-1**.

6.1 North Mine Area Reclamation Plan

The primary facilities to be reclaimed in the NMA include: 1) stockpiles; 2) the Santa Rita Open Pit; 3) surface impoundments; 4) buildings and structures (SX/EW Plant, mine maintenance facilities, Ivanhoe Concentrator area, and associated facilities); 5) various ancillary facilities (pipelines, haul roads and access roads, electrical power transmission lines and a substations; disturbed areas outside the OPSDA, stormwater structures for drainage, diversion, and sediment control; equipment storage areas; and fencing and security systems); and 6) borrow areas.

The general setting of the NMA is shown on **Plate 2** and the reclamation areas are presented in **Figure 5-1** and 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 2018 and the components that will be retained for further use during the closure/post-closure period.

6.1.1 Stockpiles

The stockpiles that will be present at the EOY 2018 are listed in **Table 3-1**, and reclamation designs for the portions of the stockpiles to be regraded and covered are included in **Appendix A**. The reclamation designs were developed in accordance with Section 20.6.7.33 NMAC and are based on an inter-bench slope of 3H:1V, 15-foot wide terrace benches, and 200-foot inter-bench slope lengths. In order to avoid encroaching onto Hanover Creek, the western slope of the West Stockpile will be graded to an inter-bench slope of 2.5H:1V, 15-foot wide terrace benches, and 175-foot inter-bench slope lengths. The stockpile top surfaces will be graded to slopes between one and five percent. Final designs for the stockpiles will be prepared and submitted to the agencies within 60 days of the start of reclamation activities in accordance with Section 20.6.7.34 NMAC and GR009RE and may alter the overall slope design as presented in this Updated CCP.

The stockpiles that will be present at the EOY 2018 at the Chino Mine are typically constructed in 30- to 50-foot high lifts through end-dumping at angle of repose. 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 20.6.7.33.B NMAC and Permit GR009RE are met. The results of stockpile stability analyses previously conducted by Golder (2007b; 2008) indicate that the stockpiles are stable both in their existing configuration and for long term conditions reflecting the post-closure stockpile configurations and strength conditions (**Table 6-2**). The evaluation of the stability of the Chino stockpiles confirms that the stockpiles exhibit suitable factors of safety (i.e., > 1.3 for static conditions and > 1.1 for pseudostatic conditions) both for the “as originally placed” strength condition and for the weathered leach ore strength condition. One analyzed stability cross section at the Upper South Stockpile yielded a factor of safety below the target value due to the over steepened slope where mine benches have been excavated into the stockpile toe. However, the Upper South Stockpile is currently planned to be mined for use as RCM allowing these slopes to be regraded to a more stable configuration.

Temporary erosion control measures may be provided during the construction and early vegetation establishment periods for the stockpiles. These measures may include, but are not limited to, berms, mulch, straw bales, silt fences, and minor corrective regrading. Following grading, the top surfaces and outslopes of the stockpiles will be revegetated by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with MMD Permit GR009RE and applicable modifications. The following sections describe the specific stockpile facilities that will still have components that will be retained for further use during the closure/post-closure period and components to be closed at the EOY 2018.

6.1.1.1 Existing Components That Will Be Used for Post-Closure Purposes

The existing closure components and related engineering controls that will be used for reclamation activities and post-closure purposes include:

- Maintenance of existing berms at the toes of the stockpiles;
- Operation and maintenance of existing stormwater diversion north of the Main Lampbright Leach Stockpile along the North Diversion Channel into Tributary 2;
- Operation and maintenance of existing stormwater diversion south of the South Lampbright Leach Stockpile into a number of catchments in Tributary 1 to reduce peak flows into Reservoir 8;
- Operation and maintenance of existing groundwater pumpback well/interceptor system within the Lampbright stockpile area (see Table 10 of the Master Document; Chino, 2015);
- Operation and maintenance of existing groundwater pumpback well/interceptor system within the West Stockpile area (see Table 10 of the Master Document; Chino, 2015);

- Operation, and maintenance of the existing toe control and conveyance systems at the West Stockpile, including the collection systems along the western portion of West Stockpile (see Table 10 of the Master Document; Chino, 2015);
- Operation and maintenance of existing surface impoundments, berms, sumps, collector pipes, seepage and PLS collection systems, and ground water interceptor systems. These systems will be integrated into a new overall system to control releases to surface water, perched water, and ground water. Process waters will be directed to the proposed site-wide water treatment plant described in Section 6.3;
- Operation and maintenance of existing PLS collection systems and associated pumps, pipelines and impoundments associated with the leach stockpiles;
- Maintenance of existing monitoring wells that will be used for post-closure groundwater monitoring; and
- Construction and maintenance of stormwater controls in the NMA.

6.1.1.2 Planned Closure/Closeout Activities

The design criteria for the reclaimed stockpiles are summarized in **Table 6-1** 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 include:

- Process water 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 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 or wildlife PMLU or not necessary for site operations and maintenance, including water 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, with the exception of the western slope of the West stockpile which will be graded to interbench slopes of 2.5H:1V;
- Construction of 15-foot wide terrace benches on the outslopes at maximum slope lengths of 200 feet for all stockpiles except the western portion of the West Stockpile;
- Construction of 15-foot wide terrace benches on the outslopes at maximum slope lengths of 175 feet for the western portion of the West Stockpile (due to constraint with Hanover Creek);
- Covering of the top surfaces and outslopes of the stockpiles with a minimum of 36 inches of RCM;
- Construction of surface water conveyance channels on the top surfaces and terrace benches to direct surface water off the covered stockpile surfaces. The water conveyances and channels will be designed to convey the peak flow generated by the 100 year, 24 hour storm event;
- 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;

- Replacement of abandoned monitor wells that are required to be monitored as part of closure and post-closure monitoring program;
- 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 process waters to a site-wide water treatment facility; channels to have energy dissipaters as required; and
- Providing facilities to discharge non-impacted stockpile runoff from the covered facilities.

6.1.2 Waiver Areas within the OPSDA.

As part of MMD Permit GR009RE a conditional waiver was granted for portions of the interior slopes of the West, South, and North In-Pit leach stockpiles, and the slopes of the Lee Hill and Northeast waste rock piles. Some of these areas are located within the OPSDA. The following sections describe the components within the waiver area and the OPSDA to be closed at the EOY 2018, and the components that will be retained for further use during the closure/post-closure period.

6.1.2.1 Existing Components That Will Be Used for Post-Closure Purposes

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

- Maintenance of existing berms at the toes of the stockpiles; and
- Maintenance of existing storm water controls in the area.

6.1.2.2 Planned Closure/Closeout Activities

The design criteria for the stockpile outlopes within the waiver area and the OPSDA are summarized in **Table 6-1** and the planned approaches for closure of these areas are summarized below:

- Process water pipelines located within the footprint of the conditionally waived areas that will not be part of the post-closure water management and water treatment system will be removed and disposed of in an approved manner;
- 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 site operations and maintenance, including water 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 a minimum of 36 inches RCM;
- Construction of surface water conveyance channels on the top surfaces and outslopes (where applicable) to direct surface water off the stockpile surfaces and to the nearest open pit sump. The water conveyances and channels will be designed to convey the peak flow generated by the 100 year, 24 hour storm event;
- 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 to have energy dissipaters as required.

6.1.3 Santa Rita Open Pit

The Santa Rita Open Pit and is located within the OPSDA and has been granted a conditional MMD waiver from the requirement of achieving a self-sustaining ecosystem, so closure closeout activities will focus on safety measures, wildlife and public access restrictions, and water management. The open pit forms an area of hydrologic containment, capturing ground water flowing from all directions. The water that accumulates in the Santa Rita Open Pit will be managed through combined processes of evaporation and pumping. Surface water conveyed from the stockpiles located within the OPSDA will be directed to the individual pit sumps and/or PLS sump collections for incorporation into the water treatment system circuit during closure and post-closure. Site vehicle and pedestrian access will be controlled by 6-foot high chain link fences and/or a water diversion and exclusion berms constructed around the circumference of the Santa Rita Open Pit. The berm, constructed from local rock and soils, will be a minimum of 10 feet wide and 5 to 10 feet high with sideslopes angled at 1.5H:1V. Site access will be controlled at the mine property line by fences that will be maintained throughout the post-closure period. Signs will be posted on the fencing at 500-foot intervals and at all access points, warning of the potential hazards present. The Santa Rita Open Pit area is shown on **Plate 2**, and the existing closure components and the planned closure activities for the area are described below.

6.1.3.1 Existing Components That Will Be Used for Post-Closure Purposes

The existing closure components and related engineering controls associated with the Santa Rita Open Pit area that will be used for post-closure purposes include:

- Maintenance of existing open pit perimeter berms;
- Operation and maintenance of existing Estrella Pit dewatering system;
- Operation and maintenance of existing Lee Hill Pit dewatering system;
- Operation and maintenance of existing East Pit dewatering system; and
- Operation and maintenance of existing 5900 PLS Sump, 6300 PLS Booster Station, West In-Pit Sump and associated electrical distribution and piping systems to pump water from the North In-Pit leach collection system to the SX/EW plant.

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 process waters to the site-wide water treatment facility.

6.1.3.2 Planned Closure/Closeout Activities

The design criteria for the conditionally waived Santa Rita Open Pit are summarized in **Table 6-1** and the planned approaches for closure of this facility include:

- Construction of a 6-foot high continuous chain-link security fence around the perimeter of the Santa Rita Open Pit to control access and/or a water diversion and vehicle exclusion berm constructed around the circumference of the pit. The berm, constructed from local rock and soils, will be a minimum of 10 feet wide and 5 to 10 feet high with side slopes angled at 1.5H:1V. Vehicle gates will be installed at approximately 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 operations and maintenance, including water treatment.

6.1.4 Surface Impoundments

Table 3-3 in this plan presents an updated summary of the existing and planned surface impoundments that will be in place by the EOY 2018. As previously mentioned, for the purposes of this plan, surface impoundments include: storage tanks for process waters, seepage collection waters, and extracted ground water/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 ground water 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 GR009RE. For impoundments located outside the OPSDA or the 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 GR009RE and applicable modifications. For impoundments located within the OPSDA or the waiver area, the impoundment areas will be graded to drain. The existing closure components and the planned closure activities for the surface impoundments and tanks are described below.

6.1.4.1 Existing Components That Will 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 6 year short-term evaporative treatment system (ETS) period:

- Operation, and maintenance of the existing raffinate distribution system at the Lambright, Lee Hill, South, and West stockpiles. Includes the 6525 and Northeast Lampbright booster stations and tanks, raffinate application drip line 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 **Attachment A to Appendix C**) and associated pumps, electrical distribution and pipeline systems; and
- Operation, and maintenance of the PLS Feed Pond, raffinate tank, and lined overflow pond located at the SX/EW Plant; and associated pumps and pipelines.

Systems required to convey process solutions into designated surface impoundments throughout the long-term ETS period (closure years 7 through 100):

- Operation, and maintenance of existing surface impoundments designated for the long-term ETS (see Table 3 in **Attachment A to Appendix C**) 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 6 through 100):

- Operation, and maintenance of the existing toe control and conveyance systems at the Main and South Lampbright leach stockpiles, including the process water interceptor system along the north and east sides of the Main Lampbright Leach Stockpile (East Headwall Impoundment, and East Lampbright Sump), Reservoir 8, stainless steel PLS tank, and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing toe control and conveyance systems at the West Stockpile, including the process water interceptor system along the western portion of West Stockpile (Dams 10, 11, 12, 13, 14, 14- 1, 14-2, 14-3, 16, 18, and 19), stainless steel-lined concrete PLS tank and launder at the Ivanhoe Concentrator, and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing toe control and conveyance systems at the in-pit stockpiles (Lee Hill and Santa Rita), including the 5900 Sump, 6300 Booster Station, Lee Hill #1 Booster Station, Lee Hill #2 Booster Station, and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing toe control and conveyance systems at the South Stockpile, including the PLS launder, and associated pumps, electrical distribution and pipeline systems;
- Operation, and maintenance of the existing Reservoirs 6 and 7 and associated pumps, electrical distribution and pipeline systems; and

- Operation, and maintenance of existing two tailing thickeners at the Ivanhoe Concentrator and associated pumps, electrical distribution and pipeline systems.

Systems required for post-closure stormwater management:

- Operation, and maintenance of Reservoirs 2, 5, 7, 9, and 17; Dams 15, 20, and 21; James Canyon Reservoir; Reservoir 8; Fleming Pond; Frog Pond; Last Chance Dam; Upper and Lower HDPE-lined stormwater ponds near the reclaimed slag pile, 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).

6.1.4.2 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 GR009RE. Several of these impoundments will be utilized during portions of the ETS period but will ultimately be covered over by stockpile regrading, including: Reservoir 4A; PLS tank and PLS Pond at the Ivanhoe Concentrator; 6525 Booster Station; NE Lampbright Booster Station; and East Lampbright Sump. 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 OPSDA;
- 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 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).

6.1.5 Buildings and Structures

Those facilities not designated for industrial PMLU will be demolished, removed, and/or buried. A total of approximately 15 buildings/tanks/structures covering approximately 109,000 square feet will be demolished and/or removed under this plan. The list of facilities that are scheduled to be removed is provided in **Table 5-2**. The existing closure components and the planned closure activities for the buildings and structures are described below.

6.1.5.1 Existing Components That Will 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 stormwater runoff from paved areas and along access roads at the Mine Maintenance Facilities area, Ivanhoe Concentrator/Precipitation Plant area, SX/EW plant area, and SMA through ditches and culverts to existing sediment/storm water control ponds.

6.1.5.2 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 5-2**;
- 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, to confirm remaining soil is not a potential source to impact groundwater or surface water;
- 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 site operations and maintenance, including water treatment;
- Maintaining and improving existing culverts and surface water conveyance structures (if required); and
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications.

6.1.6 Ancillary Facilities

Included in the CCP is a description of the ancillary facilities that were associated with mine activity and no longer required for the approved PMLU and will be reclaimed. This 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 regraded footprint of stockpiles and outside the OPSDA will be inspected and characterized for evidence of past spills that could potentially cause exceedances of water quality standards of Section 20.6.4 NMAC and Section 20.6.2.3103 NMAC. If soils have been impacted, the material will be removed or covered with 36 inches of RCM. Where process water pipelines are removed or buried, the pipeline corridor will be revegetated in accordance with Appendix C of MMD Permit GR009RE and applicable modifications.

Haul roads and access roads not needed for closure and post closure access will be reclaimed to achieve the approved PMLU. Haul roads located on potentially acid-generating material will be ripped, covered with 36 inches of the suitable cover material and revegetated. Roads located on native soils and bedrock will be loosened by ripping to a depth of 18-24 inches and revegetated. Where practical, 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 OPSDA 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 OPSDA 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 20.6.2.3103 NMAC, the structures and impacted soils will be removed or covered in place with 36 inches of suitable cover material.

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 MMD Permit GR009RE and applicable modifications.

6.1.7 Borrow Areas

Freeport has successfully completed reclamation in New Mexico using a wide range of RCM. Before commencement of reclamation activities, a borrow material handling plan will be submitted for state review and approval. Chino has several borrow material stockpiles on site as well as RCM sources located in-situ east of the Lampbright Stockpile, north of the mine by Reservoir 5, and along the SMA tailings ponds. The exact location and configuration of the borrow areas will ultimately be determined during the final design and construction phases of the reclamation.

Borrow pits/sites (69-36-3.G to 69-36-3.HH NMSA) are not subject to the rules and regulations listed in the New Mexico Mining Act, including the post-mining land use criteria. However, Chino has voluntarily proposed a reclamation plan for all mine borrow sites. It should be understood that borrow sites are likely to be actively excavated from time-to-time until all mining disturbances near them are reclaimed and released from Mining Act requirements. Borrow material sites that are no longer required for long-term maintenance activities will be reclaimed. Sufficient RCM will remain on the RCM borrow stockpile to complete reclamation. RCM stockpile reclamation plans are consistent with those described in Section 6.1.1 to achieve an approved PMLU, because at this time all Chino RCM stockpiles cap mine waste rock. Where practical, the in-situ borrow pit areas will have 3H:1V maximum side slopes with the goal of minimizing erosion and achieving long term stabilization. Borrow pit side slopes, formed from loose material, will be ripped and revegetated with the approved seed mix.

6.2 Pipeline Corridor Area and South Mine Area Reclamation Plan

The primary facilities to be closed and/or maintained in the PCA and SMA include: 1) Axiflo Lake and southern portions of older Tailings Ponds 6 East and 6 West; 2) Tailing Pond 7; 3) the Filter Plant; 4) various surface impoundments; 5) Tailings Pond 7 interceptor system; 6) various process water, fresh water, and tailing concentrate pipelines; and 7) various haul roads and mine access roads.

As previously described in Section 4.0, reclamation has been completed for: the older Tailings Ponds 1, 2, 4 East, 4 West, B, and C; portions of older Tailings Ponds 6 East and 6 West; the smelter area; and Lake One and Slag Pile area (**Figure 4-1**). The general reclamation plan for the PCA and SMA is shown on **Figure 5-2** 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 2018, and the components that will be retained for further use during the closure/post-closure period.

6.2.1 Axiflo Lake, Southern Portion of Tailings Ponds 6E and 6W, and Tailing Pond 7

Conceptual CCP designs for reclamation of Axiflo Lake, Tailings Pond 7 and the southern portions of Tailing Ponds 6E and 6W are located in **Appendix A**. The design criteria for reclamation of these facilities are summarized in **Table 6-1**. The inter-bench slopes of Axiflo Lake and Tailings Ponds 6E and 6W are 3H:1V or flatter and Pond 7 are 4H:1V or flatter. The terrace benches are 15-foot wide, and the inter-bench slope lengths are 200-foot for Axiflo Lake and Tailings Ponds 6E and 6W, and 300-foot for Tailings Pond 7. The top surface of Axiflo Lake will be graded to a minimum 0.5 percent toward a constructed outlet channel on the east side of the area to be reclaimed, and the top surfaces of Tailings Ponds 6E and 6W will be graded to a minimum 0.5 percent toward the existing surface water conveyance channels located on the north side of the area to be reclaimed. The top surface of Tailings Pond 7 will be graded to a minimum 0.5 percent toward an HDPE-lined attenuation basin that will be constructed on the northern portion of the pond. Surface water that accumulates within the attenuation basin will be directed to a constructed outlet channel.

The gross stability of the tailings ponds with respect to mass failure has been determined to be adequate, with long-term static factors of safety ranging between 1.6 and 3.06, and between 1.22 and 2.6 for undrained and post-earthquake loading conditions (**Table 6-3**). The stability of the tailings ponds is expected to increase under post-closure conditions, as they undergo long-term draindown and consolidation. Ultimately, the NMOSE is required to review the reclamation plans to determine that the designs will not negatively affect the safety of the ponds in the post-closure period.

The tailings ponds are constructed above the surrounding terrain; therefore, run-on controls are not required for these facilities. Temporary erosion control measures may be provided during the construction and early vegetation establishment periods for the tailing ponds. These measures may include, but are not limited to, berms, mulch, straw bales, silt fences, and minor corrective regrading. Following grading, the top surfaces and outslopes of Axiflo Lake, Tailings Ponds 6E, 6W, and 7 will be revegetated by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with MMD Permit GR009RE and applicable modifications. The following sections describe the specific facilities that will still have components to be closed at the EOY 2018, and the components that will be retained for further use during the closure/post-closure period.

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

The existing closure components and related engineering controls associated with Axiflo Lake, the southern portions of older Tailings Ponds 6E and 6W, and Tailings Pond 7 that will be used for post-closure purposes include:

- Maintenance of existing berms at the toes of the Axiflo Lake and the tailings ponds;
- Operation and maintenance of existing stormwater diversions around the perimeter of Axiflo Lake and the tailings ponds, including the Whitewater Creek diversion;
- Operation and maintenance of existing Utility Corridor 2 (UC-2) located east of Tailings Ponds 4 and 6;
- Operation and maintenance of existing Tailings Pond 7 interceptor well system; and
- Operation and maintenance of existing Tailings Pond 7 seepage collection sump.

6.2.1.2 *Planned Closure/Closeout Activities*

The design criteria for Axiflo Lake, the southern portions of older Tailings Ponds 6E and 6W, and Tailings Pond 7 are summarized in **Table 6-1** 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 these facilities include:

- Pipelines located within the regraded footprint of the tailings ponds that will not be part of the post-closure water management and water treatment system will closed in accordance with 20.6.7.33.J NMAC;
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not necessary for site operations and maintenance (including water treatment), or wildlife PMLU;
- Grading of the top surfaces to a minimum final grade of 0.5% to direct stormwater to the surface water conveyance channels at the Axiflo Lake and Tailings Pond 6E and 6W reclaimed areas. At Tailings Pond 7 stormwater will be directed to a new HDPE-lined attenuation basin that will be constructed on the northern portion of the pond;
- Grading of the outslopes down to maximum interbench slopes of between 3H:1V (or flatter for Axiflo Lake and Tailings Ponds 6E and 6W) and 4H:1V (or flatter for Tailings Pond 7);
- Construction of 15-foot wide terrace benches on the outslopes at maximum 200-foot (Axiflo Lake and Tailings Ponds 6E and 6W) and 300-foot (Tailings Pond 7) inter-bench slope lengths;
- Covering of the top surfaces and outslopes outside the limits of the surface water channels with 36 inches of Gila Conglomerate (or other suitable material);
- Construction of surface water conveyance channels on the top surfaces (where required) and terrace benches to direct surface water off the covered surfaces. The water conveyances and channels will be designed to convey the peak flow generated by the 100 year, 24 hour storm event;
- Construction of an HDPE lined attenuation basin on the northern portion of Tailings Pond 7. Surface water that accumulates within the attenuation basin will be directed to a constructed outlet channel;
- Placement of a minimum 18- 24 inches of soil similar in composition to the RCM beneath all surface water conveyance channels;
- Where equipment can operate safely and ground conditions are appropriate, the seedbed will be ripped to a minimum depth of 8 to 12 inches along the contour;
- 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 and/or interceptor wells;
- Replacement of monitor wells that are abandoned that are required to be monitored as part of operational DPs 214 and 484; and
- Providing additional channels, sumps, wells, pumps, and pipelines to direct process waters to a site-wide water treatment facility; channels to have energy dissipaters as required.

6.2.2 Surface Impoundments and Tanks

Table 3-3 presents an updated summary of the surface impoundment list and shows the surface impoundments grouped by the operational DP areas that will be present at the EOY 2018. According to this summary, there will be seven surface impoundments present in the PCA and SMA at Chino at the EOY 2018. One impoundment and one tank that are currently present in the SMA (Axiflo Lake addressed in Section 6.2.1, and the Termination Tank) will be reclaimed following mine closure.

The surface impoundment facilities that contain process water 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 tailings pond toe perimeter and ground water 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** and 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.

6.2.2.1 *Existing Components That Will 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:

- Operation, and maintenance of the tailings interceptor system that will circulate extracted groundwater to the top of Tailings Pond 7 and the southern ends of Ponds 6E and 6W during the first five years of the ETS operational period, and to the site-wide water treatment plant during years 6 through 100), and associated pumps, electrical distribution and pipeline systems; and
- Operation, and maintenance of Dam 21, James Canyon Reservoir, Upper and Lower-lined stormwater ponds near the reclaimed slag pile, 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 in the PCA and SMA. The few auxiliary structures not needed to operate these systems (unused power lines and pipelines) will be removed and salvaged or buried upon closure. The remaining surface impoundments that will not be used for PMLU purposes will be closed at the end of the post-closure period.

6.2.2.2 *Planned Closure/Closeout Activities*

All surface impoundments that will not be used for post-closure purposes will be closed during the post-closure period. The closure/closeout activities planned for the PCA and SMA surface impoundments are the same as those described for the NMA in Section 6.1.4.

6.2.3 Ancillary Facilities

Various ancillary facilities that were associated with mine activity and no longer required for the approved PMLU will be reclaimed. For the PCA and SMA, the primary ancillary faculties include utility and structure foundations, pipeline and pipeline corridors, power lines, buildings (including the Filter Plant), and disturbed areas. The closure/closeout activities planned for the ancillary facilities within the PCA and SMA are the same as those described for the NMA in Sections 6.1.5 and 6.1.6.

6.2.4 Borrow Areas

The RCM in the PCA and SMA consist of Gila Conglomerate and associated soil deposits in the general vicinity of the tailings ponds. A total of four borrow areas (Borrow Areas A through D) were utilized for reclamation of the older tailings ponds, and additional Borrow Areas E, F, and H have been identified in the vicinity of Tailings Ponds 6E, 6W, and 7 that will be utilized for cover source material as part of their reclamation. The performance objectives for the reclaimed borrow pits are to reduce erosion and slope stabilization. The closure/closeout activities planned for the PCA and SMA borrow areas (Borrow Areas E, F, and H) are the same as those described for the NMA in Section 6.1.7.

6.3 Water Management and Treatment Plan

The proposed water management and treatment plan included in **Appendix C** 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 Chino 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 will be prepared for financial assurance.

The plan identifies nine sources of process water that are likely to be sent to the proposed water 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 treatment over time. The process water streams that are likely to be sent to the proposed water treatment systems include the following:

Process Waters (High TDS and Sulfate):

- Residual process solutions from the leach operation (PLS and raffinate);
- Meteoric water that infiltrates through the leach stockpiles to seepage collection;
- Stormwater runoff that comes into contact with un-reclaimed leach stockpiles;

Process Waters (Low TDS and Sulfate):

- Process waters from the Cobre Mine;
- Meteoric water that infiltrates through the waste rock stockpiles to seepage collection;
- Stormwater runoff that comes into contact with un-reclaimed waste rock stockpiles;
- Stormwater runoff that comes into contact with un-reclaimed pit walls;
- Dewatering water from the existing open pit sumps; and

- Impacted groundwater captured in seepage collection and interceptor well systems.

These sources will be managed and or treated throughout site reclamation activities and until applicable water quality standards are met. The water management plans included in this Updated CCP contemplate operation for a duration of 100 years following cessation of mining operations consistent with the existing requirements of DP-1340. The following sections describe details of the methods proposed for management and treatment of process waters following closure.

6.3.1 Water Management and Water Treatment Considerations

To meet the performance objectives, elements have been designed to segregate waters that meet applicable standards from those that do not. Waters that meet applicable standards are to be released at approved points of discharge, and waters that exceed applicable standards are treated to meet applicable standards. The basis of the design of water management and treatment operations considers the following:

- Quantity and quality of water to be managed through segregation of waters that meet applicable standards from those that don’t, 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; and
- Sludge management.

6.3.2 Management and Treatment Processes

In the development of the CCP, the water treatment plan is evaluated over a 100 year period. The individual sources of water requiring management and or treatment through the post-closure period will be handled as follows:

- Stormwater runoff will be managed through surface reclamation to preclude potential for contact with stockpiles and tailing. All tailings surfaces, stockpile top surfaces and outslopes located outside the OPSDA, and the stockpile top surfaces within the OPSDA will be coved with a minimum of 36 inches of RCM. Impacted storm water runoff will be collected and treated and impacted storm water runoff and seepage from the leach stockpiles will be managed in the ETS system;
- Diversion of meteoric water and stormwater surface runoff away from potentially impacted sources, which will allow for discharge to an approved surface discharge area in accordance with state regulations. These water sources will not require treatment prior to discharge;
- A short-term ETS will be utilized to evaporate all process waters beginning in year one and continuing through year 6 following closure. The short-term ETS system will be shut down at the end of the sixth year following closure;

- A long-term ETS will be utilized to evaporate all high TDS and sulfate process waters beginning in year seven and continuing through year 100 following closure; and
- A combined HDS and membrane system will be utilized beginning in year 6 and continuing through year 100 following closure to treat all the lower TDS and sulfate process waters in the SMA and NMA. This system is referred to as the South Treatment System (STS).

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 6 years following closure) and a long-term program (years 7 through 100) for treating process waters at Chino. A detailed description of the ETS programs is included in **Appendix C** and is summarized below.

The short-term ETS program will treat all process waters when mining operations cease. These waters will be collected and treated by evaporation by the short-term ETS to allow time for construction of the STS and to reduce the volume of impacted waters requiring treatment with the STS during the initial years of closure. Using the ETS for residual process solutions allows for minimization of secondary waste generation and associated optimization of operational costs. ETS cost estimates were originally developed as part of the 2004 PSE study conducted by M3 Engineering and Technology Corporation (M3, 2004b). The results of this study has been updated herein with more current estimates of the volume and sources of residual process waters that would be required to be managed upon cessation of mining operations. In addition, updated information on new spray evaporative technology have been obtained, estimates of the volume of process water that will be required to be treated, and the impoundments available for use in the ETS have been updated as part of this CCP Update.

The short-term ETS consists of forced evaporation and wetted surface evaporation. Forced evaporation maximizes the evaporation rate through a network of mechanical spray systems. Wetted surface evaporation will occur from the impoundment surfaces and at the wetted rock surfaces through the existing drip irrigation network. For the first year, all process solutions will be distributed through the existing drip irrigation network and into the existing surface impoundments, where the solutions will be exposed to surface evaporation. In addition, during this initial year, a series of mechanical spray evaporator systems will be installed on top of the Main Lampbright and South leach stockpiles. For years 2 through 6, solution evaporation will be accomplished through a combination of drip irrigation on the stockpile surfaces, spray systems on the stockpiles, and within the existing surface impoundments. The operational duration for the short-term ETS is projected over the first six years following closure; however, the time of operation may be slightly shorter or longer based on actual results.

The long-term ETS program is a proven technology and will be employed to treat all high TDS and sulfate process waters. The long-term ETS system consists of forced evaporation and wetted surface evaporation. Forced evaporation will be conducted through a network of mechanical spray systems installed at the impoundments located at the toes of the leach stockpiles. Wetted surface evaporation will occur from the impoundment surfaces. The collected waters will be treated over the 100-year closure period, thus reducing the quantity of residuals generated by alternative treatment methods such as chemical precipitation. These high sulfate concentration process waters would result in a high lime demand and sludge production if it were to be treated with the STS. Using the evaporation systems for treating the high TDS and sulfate process waters allows for minimization of secondary waste generation (evaporate salts) and associated optimization of operational costs over the 100 year period.

Long-Term Water Treatment System

The Chino long-term water treatment system will include a membrane filtration and HDS lime precipitation system located at the STS, which is detailed in **Appendix C**. 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. The original design basis for the proposed long-term water treatment system was derived from a dynamic system model (DSM) using the GoldSim simulation software platform (Golder 2007c, 2007d), and an evaluation of potential water treatment technologies and subsequent testing programs carried out to evaluate the viability and effectiveness of the proposed treatment process trains by Van Riper Consulting (2008). The estimates that are used as “inputs” for water treatment design include the predicted flow rates and sulfate concentrations of waters collected for treatment.

All process waters in the NMA (with the exception of the high TDS and sulfate process waters from the leach stockpile seepage and runoff flow streams) will be sent to the HDS system to increase the pH and precipitate any metals that could cause scaling in the membrane system. Effluent from the HDS system and a portion of the SMA waters will be sent to the membrane system consisting of microfiltration (MF) and reverse osmosis (RO) for treatment. A portion of the SMA waters will bypass the membrane treatment system and be recombined prior to effluent equalization. The MF unit provides suspended solids removal to prevent fouling of the RO membranes. 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 primarily dissolved monovalent and divalent (and higher valence) constituents including some metals and sulfate.

The MF and RO reject streams will be sent back to the HDS system to be treated by chemical precipitation using calcium hydroxide (lime) addition with sludge recycle to form HDS. Chemical precipitation is a conventional and widely used treatment for the removal of metals. A portion of the sulfate concentration will also be removed as part of this process. With the addition of lime, the pH is adjusted to 10 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 SMA bypass and the RO permeate prior to effluent equalization to ensure compliance with Section 20.6.2.3103 NMAC groundwater standards for discharge. Sulfuric acid will be added to the clarified process stream to achieve neutral pH prior to discharge. This bypass also allows ions that are not precipitated by the HDS systems such as sodium, potassium and chloride to pass to the effluent.

The projected rate and quality of the influent from the NMA to the STS over a 100-year simulation period was based on updated estimates of the quantity and quality of individual process water streams, including: projected groundwater in-flows into the open pit from the updated NMA groundwater flow model (Golder, 2015b); projected flows from the existing seepage collection systems and groundwater interceptor systems; and the CCP reclamation drawings and associated areas presented in **Appendix A**. The projected rate and quality of the influent to the SMA water treatment plant over a 100-year simulation period was based on measure flows from the Tailings Pond 7 interceptor system, projected groundwater flows from the updated SMA groundwater flow model (Golder, 2015a), and the CCP reclamation drawings and associated areas presented in **Appendix A**.

Sludge Management

Precipitated solids removed during clarification will be further dewatered by pressure filtration as detailed in **Appendix C**. 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, 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 sludge disposal facility (SDF).

Dewatered sludge will be hauled to and stored at the SDF expected to be located on or near Tailings Pond 7. The sludge volumes were calculated based on the results of HDS treatability studies conducted by Hazen Research under the direction of Van Riper Consulting (VRC, 2008). The quantities were scaled based on revised projections of flow and sulfate concentration. 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 95 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 1,031,834 tons of sludge will require storage at the SDF during the 100-year management plan.

Salts generated from the evaporation of the high TDS and sulfate process waters as part of the ETS will be hauled to and stored at an HDPE-lined disposal facility. The total estimated amount of salts produced annually is summarized in **Appendix C**, and is based on the estimated water quality and flows associated with the high TDS and sulfate process water streams over the 100 year post-closure period. The amount of salt generation begins to drop off in year 12 when the stockpiles are planned to be reclaimed, and reaches a steady generation rate of approximately 4,100 tons/year beginning in year 32. It's anticipated that the HDPE-lined disposal facility will be located within the Ivanhoe Concentrator area or on top of the Santa Rita Stockpile. The capacity of the disposal facility will be adequate to handle the salts generated over the 100 years of ETS operation.

The closure/closeout activities planned for the SDF and HDPE-lined disposal facility are the same as those described for the stockpiles in Section 6.1.1. 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.

7.0 CLOSURE & POST-CLOSURE MONITORING, REPORTING, AND CONTINGENCY PLANS

Closure and post-closure monitoring will be conducted at the Chino 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, Chino's current operational DP's, DP-1340 and the MMD Permit. GR009RE. The costs associated with the closure and post-closure monitoring will be included in the CCP financial assurance cost estimate using an assumed third party to complete all the monitoring listed in Sections 7.0 through 7.8.

All the closure and post-closure ground water, surface water, seep, spring, interceptor system, tailings draindown, and piezometer monitoring data will be reported in accordance with 20.6.7.35 NMAC, applicable Chino Operational DPs, and DP-1340 (NMED, 2003). Additionally, as specified in DP-1340, Chino will submit to NMED quarterly reports summarizing reclamation and post-closure activities on or before January 15, April 15, July 15, and October 15 of each year. Chino will also prepare potentiometric maps that include data from all monitoring wells, extraction wells, piezometers, seeps, and springs in both the NMA and SMA in accordance with DP-1340.

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, conditionally waived areas, and construction quality assurance plans are specified in the Copper Mine Rule and the MMD Permit (MMD, 2003a). The following sections summarize the general approach that will used to meet these requirements.

7.1 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 8.N.1 of the MMD Permit. Chino will conduct inspections and submit reports of the reclaimed facilities monthly for the first year following completion of reclamation construction activities, and quarterly thereafter. Additional erosion inspections will also be conducted after a one inch or more rain event. Chino will report evidence of excessive erosion and/or structural failures to the appropriate agencies (MMD, NMED, or 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 NMAC.

As specified in 20.6.7.35 NMAC, Chino 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.

7.2 Ground Water and Surface Water Control Facilities

In accordance with DP-1340 (NMED, 2003) and 20.6.7.35 NMAC, Chino will perform quarterly inspections and annual evaluations of all seepage interceptor systems, including the Tailings Pond 7 Interceptor System and groundwater remediation systems, and perform maintenance as necessary to ensure that all water contaminants are managed in a manner that is protective of ground water quality. Monitoring of site water quality will be accomplished through sampling and analysis of potentially impacted water at site locations in accordance with DP-1340 and 20.6.7.35.B NMAC. Ground water quality will be monitored throughout the post-closure period. 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-1340 and 20.6.7.28 NMAC.

A contingency plan for closure components and emergency response plan for surface impoundments were prepared and submitted as required by DP-1340 (Chino, 2003 and 2004a). The plans present details for addressing potential failures of individual components of the Chino Mine closure plan, including an increase in the extent or magnitude of ground water 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 plan, which was recently updated (Chino, 2014a and 2015), outlines operational parameters and contingencies to address operation failures at Chino associated with pumping water from the open pits, sumps, and other impoundments that may contain affected water. Any leaks or spills of PLS or leach solutions outside the leach stockpile or containment system shall be recorded and reported pursuant to 20.6.2.1203 and 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 Chino Mine Storm Water Pollution Prevention Plan (Chino, 2008) and 20.6.7.35.B NMAC. These data will be reported according to the Chino NPDES permit (EPA Multi-Sector Stormwater Discharge Permit), DP-1340, and 20.6.7.35.B NMAC. Chino 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 in Whitewater Creek and Lampbright Draw, and one outfall point in Hanover Creek.

Samples will be collected in accordance with 20.6.7.28 and 20.6.7.29 NMAC and applicable DP 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 in the

Operational DPs, 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.

7.3 Revegetation Success Monitoring

The reclaimed areas will be monitored in accordance with 20.6.7.35.C NMAC and Section 8.N.2 of the MMD Permit after the final grading and the initial establishment of vegetation on the reclaimed lands. Chino 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 8.N.2 of the MMD Permit (MMD, 2003a).

7.4 Wildlife Monitoring

Pursuant to Section 8.N.3 of the MMD Permit, Chino submitted a wildlife monitoring plan for post closure in December 2004 (Golder, 2004c). This plan was conditionally approved by the MMD and New Mexico Department of Game and Fish on 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 Chino Mine, and the proposed methods for deer pellet group counts and bird diversity surveys.

Chino 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.

7.5 Public Health and Safety

Pursuant to Section 8.F.2 of the MMD Permit (MMD, 2003a), Chino will submit written details and maps showing the locations of berms and fences that will be placed at the interface of the conditionally waived stockpile areas and the non-waived stockpile areas; and around the Santa Rita Open Pit 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 conditionally waived 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, Chino 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.

7.6 Adjustment of OPSDA and Conditional Waiver Area

In accordance with DP-1340 and 20.6.7.35.B NMAC, Chino will prepare two potentiometric maps annually. One potentiometric map will cover the NMA and the second map will cover the SMA. Chino proposes to include an updated delineation of the OPSDA (NMED) and associated conditionally MMD waived area (as approved in MMD Permit GR009RE) and any updates to the AOPHC with the annual submittal of the potentiometric maps.

7.7 Construction Quality Assurance Plan

Pursuant to Sections 8.D.2.a and 8.E.2.a of the MMD Permit and 20.6.7.34.F and 20.6.7.34.G NMAC, Chino will submit a CQAP to the NMED and MMD for approval no less than 180 days prior to regrading of a facility and placement of any cover material for final closure. The CQAP will be supplemented with a CQAR to be submitted to the MMD within 180 days after completion of construction.

7.8 Alternative Abatement Standards

In accordance with DP-1340 and 20.6.2.4103 NMAC, Chino may submit a petition for alternative abatement standards. The petition will be prepared in accordance with Section 20.6.2.4103.F NMAC. Chino'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.

8.0 POST-MINING LAND USE DESIGNATION

This section provides the PMLU for the permit area as a whole and for specific facilities at Chino 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 Chino are wildlife habitat and industrial (MMD, 2003). 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 SX/EW Plant Area, the Mine Maintenance Facilities Area, and the Ivanhoe Concentrator Area. The proposed PMLU areas are shown on **Figures 8-1 and 8-2**.

8.1 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 Chino 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 Chino Mine are presented in **Table 8-1** 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 Chino have been successfully used in mine reclamation and range improvement projects in many parts of New Mexico, including the Chino Mine. The primary reclamation seed mix proposed for the wildlife habitat PMLU areas at Chino 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 8-2 lists some of the major attributes of the vegetation selected for use at the Chino 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.

8.2 Industrial Post-Mining Land Use

The industrial PMLU designation of buildings and structures are summarized in **Table 8-3**. 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 ground water 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 ground water and/or surface water. Those facilities not designated for industrial PMLU will be removed or demolished as described in Section 6.1.5.

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 is accessible by roads and the Ivanhoe Concentrator Area has railroad access. Electrical power is available in each area, including possible backup power from the existing power plant. Stormwater runoff from the areas is contained within the on-site reservoir system. Finally, ample water resources are available due to the water rights that Chino controls.

Chino 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.

8.3 Site-Specific Revegetation Success Guidelines

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). New disturbances located outside the current design limit associated with the proposed NLS will meet the reclamation standards set forth in 19.10.5.507 NMAC and will also comply with the new unit standards set forth in 19.10.5.508.E NMAC.

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 guidelines required by the MMD vary depending on the PMLU. Canopy cover, shrub density, and vegetation diversity are the revegetation success guidelines that are typically used to judge revegetation success on lands designated as wildlife habitat. The vegetation success guidelines include numerical standards to address the canopy cover and shrub density requirements of the NMMA. The plant diversity guidelines 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. Site-specific revegetation success guidelines for each of the PMLU areas (**Figures 8-1 and 8-2**) are based on the vegetation cover and shrub density requirements listed in the Permit. Based on the results of the test plots and vegetation monitoring studies at Chino and Tyrone, the requirement for cool-season grasses was eliminated. The elimination of the cool-season grasses is consistent with the surrounding ecosystem and will not negatively affect the post-mining land use. The numerical diversity guidelines for the Chino mine are listed in **Table 8-4**.

9.0 BASIS FOR CAPITAL AND OPERATION AND MAINTENANCE COST ESTIMATES

This section provides a brief description of the material take-offs and factors that will be applied in the capital and O&M cost estimates associated with the Chino reclamation plan. A financial assurance cost estimate for the purpose of determining the value of the financial assurance will be prepared following approval of the proposed reclamation plan, or scope of work, described in this CCP.

Chino employs thorough cost estimating methods and best practices accepted in the engineering and construction industries. Chino's approach to cost estimating is completely consistent with industry standards outlined in references such as the RS Means Estimating Handbook. This approach meets the objectives of the regulations cited in Section 1.1 of this CCP. The cost estimate is developed in the format preferred by the MMD and NMED which was mandated by these agencies about 15 years ago. This provides a transparent format that can be reviewed by any interested party. The scope of work for closure/closeout activities may be divided into two basic categories: Earthwork and Water Treatment. A basic input for the cost estimate are the quantities or "material takeoffs" taken from the drawings and plans presented in this CCP. The material takeoffs are provided in this CCP. The cost for both the earthwork and water treatment categories will include capital construction costs and operation and maintenance costs. Once the scope of work is approved and will not change further, Chino will develop the financial assurance cost estimate by employing the following steps:

- Break the scope of work down into basic tasks (work breakdown structure) to which equipment fleets, manpower and materials can be uniformly applied to complete work;
- Evaluate and apply the most efficient equipment spread and manpower labor crews to construct/complete the work entailed by each task;
- Develop the unit cost for individual tasks and subtasks from the most up-to-date source of construction data (e.g., Equipment Watch and RS Means Construction data and in some cases from a third party contractor quote);
- Multiply the unit costs by the quantities or hours for equipment and labor to yield the direct costs; and
- Multiply the direct costs by the appropriate indirect cost multiplier to account for administrative and support to yield the total cost of the project work. Indirect multipliers may include mobilization/demobilization, contingencies, engineering redesign fees, contractor profit and overhead (per RS Means process definition) and project management costs if they have not already been incorporated into the direct costs.

The following sections provide the basis upon which these cost estimates will be developed.

9.1 Basis for Capital Cost Estimates

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

Earthwork Material Take-Off Summary		
Item	**Quantity**	**Units**
Earthwork		
Stockpile Grading	77,477,590	cubic yards
Stockpile Bench Grading	384,857	feet
Stockpile Cover Material	12,464,534	cubic yards
Stockpile Cover and Revegetate	2,718	acres
Stockpile Surface Water Conveyance Channels	41,657	cubic yards
Stockpile Riprap for Conveyance Channels	27,818	cubic yards
Tailing Grading	2,318,977	cubic yards
Tailing Bench Grading	48,721	feet
Tailing Cover Material	9,773,123	cubic yards
Tailing Cover and Revegetate	2,019	acres
Tailing Surface Water Conveyance Channels	5,007	cubic yards
Tailing Riprap for Conveyance Channels	3,784	cubic yards
Santa Rita Open Pit	0	cubic yards
Disturbed Areas[1]	228	acres
Building Demolition and Soil Removal	109,000	square feet

1- Includes 128 acres of miscellaneous disturbed areas present at the Chino Mine, and an additional 100 acres 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.

9.1.1 Basis for Earthworks Capital Cost Estimates

The earthwork reclamation cost estimate will be based on a template originally created by the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD, 1996). The estimate will include reclamation earthwork and site operations and maintenance costs and will be based on the reclamation designs for the Chino Mine included in **Appendix A.**

9.1.2 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 C**. Specific details of the influent design basis, proposed water management and treatment system designs, quantity takeoffs, calculations, and supporting documentation are included in **Appendix C**.

9.2 Basis for Operation and Maintenance Cost Estimates

A summary of the basis for operations and maintenance (O&M) cost estimates along with supporting documentation are provided below.

9.2.1 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.

Additional details and supporting documentation for the basis of the earthworks O&M cost estimate will be provided with the cost estimate.

9.2.2 Basis for Water Treatment Operation and Maintenance Cost Estimates

O&M costs for water treatment will be estimated annually for the 100 year post-closure period. The O&M costs for water treatment include labor, capital for equipment replacement, routine maintenance parts costs, utilities (power costs), chemical reagents, sludge 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 C**.

10.0 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 2018. The EOY 2018 was chosen for the development of the CCP in that it represents the most conservative earthwork takeoff volumes and thus the highest financial assurance cost estimate amount for the five year period under evaluation. The anticipated durations for reclamation presented in **Table 10-1** include earthwork and reseeding, but do not include vegetation success/O&M/monitoring.

Table 10-1 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 Chino's understanding of the existing near-term mine operation and reclamation commitments and longer-term mine plan 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 stockpiles 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 will be explicitly linked. Chino expects that the planned closure of the facilities represented by the proposed schedule will be conducted in a more cost efficient manner than that that will be reflected in the financial assurance cost estimate, which is predicated on the unlikely condition of forfeiture.

11.0 USE OF THIS REPORT

Golder has compiled this CCP Update to present Chino 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 Telesto Solutions, Inc., who prepared the earthwork material takeoffs from the reclamation plans presented in **Appendix A**. The Chino Mine CCP has been updated to fulfill the requirements of the following permits:

- **Supplemental Discharge Permit for Closure, DP-1340, Chino Mines Company**, issued by the NMED on February 24, 2003 (NMED, 2003);
- 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
- **Revision 01-1 to Permit GR009RE**, issued by the Director of the MMD of the New Mexico Energy, Minerals and Natural Resources Department on December 18, 2003 (MMD, 2003a), respectively.

Chino has completed numerous other studies required by DP-1340 and Mining Act Permit GR009RE. Information from these various studies has also been considered in preparing this CCP Update.

The reclamation designs included herein were developed at a level consistent with preliminary designs for agency review. Development of this CCP and associated preliminary reclamation designs was conducted under the oversight of the following Golder staff:

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14 Feb, 2018

Brent Bronson, PE, Principal, Senior Practice Leader — Date
(Senior Level Review of Preliminary Reclamation Drawings and Associated Engineering Calculations)

2/14/2018
Terry Fairbanks, Senior Engineer — Date
(Preparation of Preliminary Reclamation Drawings and Associated Engineering Calculations)

2/14/2018
Todd Stein, PG — Date
(Preparation of CCP Document)

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TABLES

TABLE 2-1
SUMMARY OF CHINO CLOSURE/CLOSEOUT-RELATED PERMITS

Permit or Requirement	Agency	ID Number	Area Covered
Mining Act Permit	New Mexico Mining Minerals Division	GR009RE	Chino Mine
Groundwater Discharge Plans	NMED Ground Water Quality Bureau	DP-213, DP-214, DP-376, DP-459, DP-484, DP-493, DP-526, DP-591, DP-1568 DP-1340	Operational DP's North and South Mine areas. Supplemental DP for Closure
National Pollutant Discharge Elimination System (NPDES)	U.S. EPA (Region 6)	NM0020435 NMR053259	Two outfalls, one in Whitewater Creek and one in Lampbright Draw Multi-Sector General Storm Water Permit
NPDES Stormwater General Permit	U.S. EPA (Region 6)	NMR00A101 NMR00A106 NMR00A107	Limestone quarry Concentrator Hurley Smelter
Water Rights	New Mexico Office of State Engineer	M-129, M-1591, M-3527, M-4425, M-5010 through 5019, M-6724	North and South Mine areas
Air Quality	NMED Air Quality Bureau U.S. EPA (Region 6)	0298-M8 0376-M4 P066-R2	Chino and Cobre Mines Hurley Smelter Title V Mine-Wide
SARA Title III			
Hazardous Waste Generator/ Hazardous Materials Inventory	U.S. EPA/New Mexico Department of Public Safety State and County Emergency Response Commission	NMD007396930	Chino Mine
Plan of Operation	Bureau of Land Management	Submitted in 1981 and 1997	All federal land

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

TABLE 2-2
SUMMARY OF NMED DISCHARGE PLANS

Discharge Plan	Area Description	Primary Facilities/Discharges Permitted
213	Ivanhoe Concentrator and Associated Pipelines	Ivanhoe Concentrator and associated infrastructure Three Tailings Pipelines (conveying slurry) Process Water Pipeline Copper Concentrate Pipeline Discharges (tailing slurry, mine process water, domestic waste, copper concentrate)
214	Hurley Operation Area, Lake One, Older Tailing Impoundments, Axiflo Lake, Lower Whitewater Creek	Older Tailing Impoundments (reclaimed Tailing Ponds 1, 2, 4 East, 4 West, B, and C; and partially reclaimed Tailing Ponds 6 East and 6 West) Reclaimed Lake One Axiflo Lake Upper Whitewater Creek Diversion project Discharges (emergency flow of tailing slurry to Ponds 6E and 6W, tailing decant return water, stormwater, mine process water, domestic waste)
376	Lampbright Leach System	Main and South Lampbright Leach Stockpiles Southwest Lampbright Waste Rock Stockpile Lampbright Leach System Discharges (raffinate, PLS, seepage, groundwater from interceptor systems, stormwater) Proposed North Lampbright Waste Rock Stockpile Extension
459	Main Pit, North In-Pit Leach System, and 3A, North, Northwest Northeast, and Lee Hill Waste Rock Stockpiles, and Reservoir 5	Main Pit (Santa Rita Open Pit) North Pit Leach Stockpile 3A, Northwest, Northeast, and North Waste Rock Stockpiles Reservoir 5 Discharges (raffinate, PLS, seepage, pit water, stormwater)
484	Tailing Pond 7	Tailing Pond 7 Interceptor well system south of Tailing Pond 7 Segment of the 1988 Whitewater Creek diversion channe Tailing termination tank pipeline system Discharges (tailing slurry, domestic wastewater, treated mine water, stormwater, groundwater from interceptor system)

TABLE 2-2
SUMMARY OF NMED DISCHARGE PLANS

Discharge Plan	Area Description	Primary Facilities/Discharges Permitted
493	Reservoir 3A	Reservoir 9 and Highway to Heaven Discharges (mine process water and stormwater)
526	Whitewater Leach System	Whitewater leach system (South, Upper South, and West stockpiles) Various reservoirs, catchments, and seepage collection systems Whitewater Creek from the Ivanhoe Concentrator to Lake One Mine Maintenance, Truck Wash and General Offices Area Discharges (raffinate, PLS, seepage, groundwater from extraction systems, stormwater, mine water)
591	SX-EW Plant and Reservoirs 6 and 7	SX/EW Plant and associated facilities Reservoir 6 and Reservoir 7 Discharges (raffinate, PLS, groundwater from pumping well SXIW-2, stormwater, domestic wastewater, Cobre waters, mine water)
1568	Lee Hill Leach Stockpile	Lee Hill Leach Stockpile and associated water management facilities and infrastructure Lee Hill Pit Sump Discharges (raffinate, PLS, pit water, stormwater)
1340	Mine-Wide	Supplemental discharge plan for closure.

Notes:
Sources: NMED
SX/EW = solution extraction/electrowinning
PLS = pregnant leach solution

Golder Associates

TABLE 3-1
SUMMARY OF STOCKPILE AREAS (EOY 2018)

Stockpile Facility	Stockpile Type	Total Area[1] (acres)
Upper South	Waste Rock and Overburden	146
STS 2	Waste Rock and Overburden	76
Northeast (Perimeter of Santa Rita Pit)	Waste Rock	91
Northwest (Perimeter of Santa Rita Pit)	Waste Rock	16
North (Perimeter of Santa Rita Pit)	Waste Rock	7
Southwest Lampbright	Waste Rock	81
3A	Waste Rock	210
North In-Pit (Inside Santa Rita Pit)[2]	Leach	0
Santa Rita (Inside Santa Rita Pit)	Leach	61
Lee Hill (Inside Santa Rita Pit)	Leach	53
Main Lampbright	Leach	447
South Lampbright	Leach	227
South	Leach	592
West	Leach	549
Total		**2,565**

Notes:
EOY 2018 – End of year 2018
(1) EOY 2018 plan areas based on the EOY 2018 Mine Plan.
(2) The North In-Pit Leach Stockpile will be mined out by the EOY 2018. The current footprint area of this stockpile is approximately 90 acres.

TABLE 3-2
SUMMARY OF TAILINGS IMPOUNDMENT AREAS (EOY 2018)

Facility	Total Area[1] (acres)
Lake One Reservoir[2]	249
Pond 1[2]	159
Pond 2[2]	150
Axiflo Lake Reservoir	95
Pond B[2]	395
Pond C[2]	
Pond 4[2]	420
Pond 6 West[3]	449
Pond 6 East[3]	470
Pond 7	1,643
Tailing Borrow Areas[3]	626
Total	**4,656**

Notes:
EOY 2018 – End of Year 2018
[1] EOY 2018 Plan Areas.
[2] Facility has been reclaimed, plan areas presented are from the associated facility As-Built report and drawings associated with this facility.
[3] Facility has been partially reclaimed, plan areas include both the reclaimed and un-reclaimed portions of the facility. Reclaimed plan areas are from the associated facility As-Built report and drawings, and un-reclaimed portions are from the EOY 2018 plan areas.

TABLE 3-3
CHINO MINE SURFACE IMPOUNDMENTS (EOY 2018)

Reservoir	Reservoir Size	Dam Type	Location[a]	Water Source	Discharge Location
Discharge Permit 213					
Tailing Thickener 1	2.6 acres	Aboveground concrete tank	West of Ivanhoe Concentrator	Flows from Freshwater tank, Ivanhoe Concentrator	Flows to Tailings Pond 7, under upset conditions flow can go to Reservoir 17
Tailing Thickener 2	2.6 acres	Aboveground concrete tank	West of Ivanhoe Concentrator	Flows from Freshwater tank, Ivanhoe Concentrator	Flows to Tailings Pond 7,under upset conditions flow can go to Reservoir 17
Discharge Permit 214					
Axiflo Lake	55 AF	Earthen	South of Tailings Impoundment 2	Use discontinued	TP 7 or Ivanhoe Concentrator
James Canyon Reservoir	12 acres	Earthen	East of Lake One	Stormwater flow from Upper Whitewater Creek watershed	To Whitewater Diversion Channel
Process Water Tank	750,000 gal	Stainless steel tank	Hurley Operations Area	Axiflo Reservoir and Clearwater Reservoir	Flows to Ivanhoe Concentrator process water tank
Lower Lined Pond	2.2 acres	HDPE lined	Southeast Corner of Reclaimed Slag Pile	Stormwater runoff	N/A
Upper Lined Pond	0.4 acres	HDPE lined	South Corner of Reclaimed Slag Pile	Stormwater runoff	N/A
Elmo's Pond	1.2 acres	HDPE Lined	Southwest Corner of Reclaimed Lake One	Stormwater runoff	Tailings Pond 7
Discharge Permit 376					
Reservoir 8	39 AF	HDPE lined, earthen	MLSA: South of Main Lampbright Stockpile	PLS collection, overflow from PLS tank, stormwater from setting ponds	Pumped to Reservoir 7 or PLS Tank.
East Lampbright Sump	2,000,000 gal	Concrete headwall, HDPE lined	East of Lampbright leach stockpile	PLS from Lampright leach stockpile captured	Pumped to Reservoir 8 or Reservoir 7.

TABLE 3-3
CHINO MINE SURFACE IMPOUNDMENTS (EOY 2018)

Reservoir	Reservoir Size	Dam Type	Location[a]	Water Source	Discharge Location
Discharge Permit 376					
East Headwall Impoundment	1.4 AF	Concrete headwall, HDPE lined	Northeast of Main Lampbright leach stockpile	Stormwater and seepage captured	Pumped to SX PLS Feed Pond or to Reservoir 7.
PLS Tank	371,846 gal	Stainless steel tank	Northwest of Reservoir 8	PLS from Reservoir 8	SX/EW plant, Reservoirs 6 and 7, or South Stockpile. Flow to Reservoir 8 during upset conditions.
Northeast Lampbright Booster Station	400,000 gal	Stainless steel tank	Northeast corner of Main Lampbright Stockpile	From SX/EW plant	Discharged to Main or South Lampbright leach stockpiles
Discharge Permit 459					
Reservoir 5	233 AF	Concrete faced earthern dam with concrete spillway and outlet channel	North of Northeast Stockpile	Storm runoff from Upper Santa Rita Creek and process water storage. Stormwater and process water separated by a small internal berm in all but wet years when berm would become submerged.	Gravity discharge to Reservoirs 6 and 7.
5900 PLS Sump	1.53 AF	HDPE lined	Santa Rita Pit south of In-Pit leach stockpile	PLS from In-Pit leach stockpile	Pumped to 6250 PLS Booster Station.
6250 PLS Booster Station	0.003 acre	Stainless steel tank	Santa Rita Pit	PLS from 5900 PLS Sump	Pumped to SX PLS Feed Pond.
East Pit Sump	1.4 acres	Open pit sump	Santa Rita Pit	Groundwater inflow, stormwater runoff, process water	Pumped to the Estrella Pit Sump
Estrella Pit Sump	28 acres	Open pit sump	Santa Rita Pit	Groundwater inflow, stormwater runoff, process water	Pumped to the Reservoirs 6 and 7, and South Stockpile
Lee Hill Pit Sump	3.8 acres	Open pit sump	Santa Rita Pit	Groundwater inflow, stormwater runoff, process water	Pumped to the Estrella Pit Sump
Estrella Booster	60,000 gal		Santa Rita Pit	Water for the Estrella Pit Sump	Pumped to the PLS Feed Pond

TABLE 3-3
CHINO MINE SURFACE IMPOUNDMENTS (EOY 2018)

Reservoir	Reservoir Size	Dam Type	Location[a]	Water Source	Discharge Location
Discharge Permit 459					
Lee Hill #1 Booster	100,000 gal	HDPE lined	Santa Rita Pit	Booster station to help dewater Lee Hill Pit. Currently not in use.	Pumped to the Estrella Booster and then to the PLS Feed Pond
Lee Hill #2 Booster	60,000 gal	HDPE lined	Santa Rita Pit	Booster station to help dewater Lee Hill Pit. Currently not in use.	Pumped to the Estrella Booster and then to the PLS Feed Pond
Discharge Permit 484					
Termination Tank	0.004 acres	Stainless Steel Tank	Adjacent to Axiflo Lake (West)	Tailing slurry from Concentrator	Tailing Pond 7
Discharge Permit 493					
Rustler Canyon Containment	4 AF	HDPE lined	North end of Rustler Canyon, south of Highway to Heaven	Stormwater and seepage from Highway to Heaven	Pumped to Reservoir 9
Reservoir 9	47 AF	Concrete/ earthen	East of former Reservoir 3A	Storm runoff from Upper South Stockpile and haul road, dewatering of Reservoir 3A.	Make-up water source, as necessary, drains to Estrella Pit.
Discharge Permit 526					
Reservoir 2	3.5 AF	Concrete	SSA: South of Ivanhoe Concentrator; Between Res. 4A and Res. 17.	Seepage and overflow from Res. 4A, storm runoff from P-Plant and Concentrator; upset conditions from the PLS tank. Receives discharge from Last Chance, Dam 16, and Res. 17.	Water can be pumped to Reservoir 4A. Emergency overflows into Last Chance.
Reservoir 4A	15,000,000 gal.	Concrete/ earthen	SSA: Adjacent to South Stockpile and upgradient of Reservoir 2	PLS seepage from stockpiles and PLS collection pond, storm runoff from concentrator and mine shop area, overflow from PLS Pond, and PLS Tanks. Receives discharges from Last Chance, Res. 2 and 17, and Groundhog.	Water can be pumped to Reservoirs 6 and/or 7 via two 16-inch pipes and to the PLS Tank.
Dam 10	2.58 AF	Concrete, synthetic lined	WSA: West side of West Stockpile, northernmost large dam	Stockpile runoff and seepage.	Water is pumped via 12-inch pipe to Reservoir 4A.

TABLE 3-3
CHINO MINE SURFACE IMPOUNDMENTS (EOY 2018)

Reservoir	Reservoir Size	Dam Type	Location[a]	Water Source	Discharge Location
Discharge Permit 526					
Dam 11	2.8 AF	Concrete, synthetic lined	WSA: West side of West Stockpile, southernmost large dam	Stockpile runoff and seepage.	Water is pumped via 12-inch pipe to Reservoir 4A.
Dam 12	~10,000 gal.	Concrete, synthetic lined	WSA: West side of West Stockpile, northernmost structure	Stockpile runoff and seepage.	Gravity discharges via a 22-inch pipe to Dam 10.
Dam 13	1.0 AF	Concrete, synthetic lined	WSA: 300 feet north of Dam 14, near middle of West Stockpile	Stockpile runoff and seepage.	Pumped to Reservoir 4A and connects via pipe to Dam 14.
Dam 14	4.7 AF	Concrete, synthetic lined	WSA: West side of West Stockpile, 1,000 feet north of Dam 11	Stockpile runoff and seepage.	Pumped to Reservoir 4A and connects via pipe to Dam13.
Dam 14-1	~10,000 gal.	Concrete	WSA: West side of West Stockpile, 700 feet north of Dam 13	Stockpile runoff and seepage.	Gravity discharges via pipe to Dam 14.
Dam 14-2	~10,000 gal.	Concrete	WSA: West side of West Stockpile, 500 feet north of Dam 13	Stockpile runoff and seepage.	Gravity discharges via pipe to Dam 14.
Dam 14-3	~5,000 gal.	Earthen, French drain	WSA: West side of West Stockpile, 400 feet north of Dam 13	Stockpile runoff and seepage.	Gravity discharges via pipe to Dam 14-2.
Dam 15	~10,000 gal.	Concrete, earthen	WSA: South of mine entrance road, 500 feet west of lay down yard by Concentrator	Stockpile runoff and seepage.	Pumped to Concentrator thickeners overflow tank.
Dam 16	NA	Underground coffer dam	SSA: 2,200 feet down Whitewater Creek from Last Chance Dam	Alluvial flow from Whitewater Creek.	Reservoir 4A.
Reservoir 17	46.8 AF	Concrete, synthetic lined	SSA: Directly downgradient of Reservoir 2	Seepage in Whitewater Creek, runoff from Concentrator area, overflow from Reservoir 2A.	Pumped to Reservoirs 4A, PLS tank, or south thickener.

TABLE 3-3
CHINO MINE SURFACE IMPOUNDMENTS (EOY 2018)

Reservoir	Reservoir Size	Dam Type	Location[a]	Water Source	Discharge Location
Discharge Permit 526					
Dam 18	~0.5 AF	Concrete, earthen	WSA: West side of West Stockpile, 300 feet west of Dam 11	Seepage from Dam 11.	Pumped to Dam 11.
Dam 19	~0.5 AF	Concrete, earthen	WSA: West side of West Stockpile, 200 feet west of Dam 13	Seepage from Dam 13.	Pumped to Dam 13.
Dam 20	~10,000 gal.	Earthen	WSA: Adjacent to north side of mine entrance road by abandoned guard shack near Concentrator	Storm runoff.	Pumped to Reservoir 4A.
6525 Raffinate Tank	100,000 gal.	Stainless steel	SSA: Northwest end of South Stockpile	Water from SX/EW raffinate tanks or SX/EW PLS tank, pit bottom.	Dispersed on top of South Stockpile.
PLS pond and launder	NA	Concrete, earthen	SSA: Adjacent to South Stockpile and upgradient of Reservoir 4A	PLS collection from South and West Stockpiles and storm runoff from stockpiles and mine shop area.	Gravity drains to PLS tank, or Reservoir 4A.
PLS Tank	500,000 gal.	Concrete and stainless steel	SSA: Between Reservoir 4A and Reservoir 2	PLS from South and West stockpiles and emergency overflow from Reservoir 4A.	PLS is pumped to SX/EW or 6225 Raffinate Tank, overflows to Reservoir 4A or OHP
Frog Pond	1,500,000 gal.	HDPE lined	WSA: East side of West Stockpile,		Dust suppression or make-up water.
Last Chance Dam	NA	Coffer dam	Between Reservoir 4A and Reservoir 2	PLS from PLS Pond, emergency overflow from PLS Tank and water pumped from Reservoir 2 and Reservoir 4A.	Pumped to Southside booster, emergency overflows to PLS Tank, Reservoir 2 and Reservoir 4A.

TABLE 3-3
CHINO MINE SURFACE IMPOUNDMENTS (EOY 2018)

Reservoir	Reservoir Size	Dam Type	Location[a]	Water Source	Discharge Location
Discharge Permit 591					
Reservoir 6	285 AF	Earthen	SSA: Northwest of SX/EW Plant	Process water overflow and storm runoff flows from Reservoir 7, Lee Hill Booster Station #2, Princess Shaft and Reservoir 4A.	Pumped to SX/EW or Reservoir 7.
Reservoir 7	252 AF	Earthen	SSA: Southwest of SX/EW Plant	Stormwater, process water, and contaminated groundwater from the SX/EW Plant, Reservoir 4A, the South leach ore stockpile PLS tank, Reservoir 6, Reservoir 8, Princess Shaft and Well SX-IW-2.	Pumped to Reservoir 6, and the SX/EW Plant.
PLS Feed Pond	1,400,000 gal	HDPE lined	SX/EW Plant	PLS from Lampbright and North In-Pit leach systems	SX/EW Plant
Raffinate Tank	900,000 gal	Stainless steel	SX/EW Plant	Raffinate from SX/EW Plant	Dispersed onto the Lampbright, In-Pit leach stockpiles, South, and West stockpiles.
Raffinate Pond	7 AF	HDPE lined	SX/EW Plant	Stormwater flows from SX/EW plant area, upset flows from raffinate tank	Pumped to raffinate tank.
Fleming Pond	0.22 acres	Earthen	Northwest of Main Lampbright Stockpile		Lampbright water spout.

Notes:
[a]SSA = South Stockpile Area
[b]Collection basin
EOY 2018 = end of year 2018
AF = acre-feet
MLSA = Main Lampbright Stockpile Area
NA = Information not available
OHP = old high head pumps
PLS = pregnant leach solution
SX/EW = solution extraction/electrowinning
TDRW = tailing decant return water
WSA = West Stockpile Area

TABLE 4-1
STATUS OF RECLAMATION AND FINANCIAL ASSURANCE REDUCTION AT THE CHINO MINE

Facility	Start of Reclamation	Completion of Reclamation	Financial Assurance Release Approval Date
South Mine Area			
Hurley Smelter Area	October 2007	April 2008	---
Lake One and Slag Pile	April 2013	August 2014	
Tailings Pond B	June 2008	December 2012	
Tailings Pond C	June 2008	December 2012	
Tailings Pond 1	January 2012	June 2013	March 2014
Tailings Pond 2	January 2012	June 2013	March 2014
Tailings Pond 4	May 2010	February 2013	March 2014
Tailings Pond 6E	June 2008	December 2012[(1)]	
Tailings Pond 6W	June 2008	December 2012[(1)]	
North Mine Area			
Reservoir 3A	April, 2015	Not Completed	---
Groundhog Mine Stockpile Area	December 2003	August 2008/March 2011[(2)]	---
Groundhog No. 5 Stockpile	2006	May 2014[(3)]	---

Notes:
(1) – Substantial completion of facility reclamation (69% for Pond 6E, 71% for Pond 6W)
(2) – Primary reclamation activities completed in August 2008, additional reclamation completed along pipeline corridor in May 2014
(3) – Primary reclamation activities completed in 2006, additional drainage modifications and seepage collection system installed in May 2014
--- - Not applicable

TABLE 5-1
POST-CLOSURE SURFACE IMPOUNDMENTS

Impoundment Designation[1]	Surface Area[(a)] (acres)	Post-Closure Use	Liner[(b)]	Status
DP-213				
Tailing Thickener 1	2.60	Water Treatment/Conveyance[(d)]	Concrete	Existing
Tailing Thickener 2	2.60	Water Treatment/Conveyance[(d)]	Concrete	Existing
DP-214				
James Canyon Reservoir	11.74	Stormwater Control	Earthen	Existing
Dam 21	1.72[(b)]	Stormwater Control	Earthen	Existing
Process Water Tank	0.11	Water Treatment	Stainless Steel	Existing
Elmo's Pond	1.24	Stormwater Control	Synthetic	Existing
Lower Lined Pond	2.23	Stormwater Control	Synthetic	Existing
Upper Lined Pond	0.41	Stormwater Control	Synthetic	Existing
DP-376				
Reservoir 8	0.51	Seepage Collection/Conveyance[(d)]	Synthetic, Earthen	Existing
East Lampbright Sump	0.51	Stormwater Runoff and Seepage Collection[(c,d)]	Synthetic	Existing
East Headwall Impoundment	0.46	Stormwater Runoff and Seepage Collection[(c,d)]	Synthetic	Existing
PLS Tank	0.08	Seepage Collection/Conveyance[(d)]	Stainless Steel	Existing
Northeast Lampbright Booster Station	0.07	Seepage Collection/Conveyance[(d)]	Stainless Steel	Existing
DP-459				
Reservoir 5	6.4	Upgradient Runoff Control	Concrete Faced Earthen Dam	Existing
5900 PLS Sump	0.57	Stormwater Runoff and Seepage Collection[(d)]	Synthetic	Existing
6300 PLS Booster Station	0.03	Stormwater Runoff and Seepage Collection[(d)]	Synthetic	Existing
East Pit Sump	NA	Pit Dewatering/ Water Treatment	Earthen	Existing
Estrella Pit Sump	NA	Pit Dewatering/ Water Treatment	Earthen	Existing
Lee Hill Pit Sump	NA	Pit Dewatering/ Water Treatment	Earthen	Existing
Lee Hill #1 Booster	0.14	Pit Dewatering Collection/Conveyance[(d)]	Synthetic	Existing
Lee Hill #2 Booster	0.14	Pit Dewatering Collection/Conveyance[(d)]	Synthetic	Existing
DP-484				
None				
DP-493				
Rustler Canyon Containment	0.64	Stormwater Control[(d)]	Synthetic with Seep Collection	Existing
Reservoir 9	2.66	Stormwater Control[(d)]	Concrete Faced Earthen Dam	Existing

TABLE 5-1
POST-CLOSURE SURFACE IMPOUNDMENTS

Impoundment Designation[1]	Surface Area[(a)] (acres)	Post-Closure Use	Liner[(b)]	Status
DP-591				
Reservoir 2	0.22[(b)]	Stormwater Control, Runoff and Seepage Collection[(d)]	Concrete	Existing
Reservoir 4A	1.50	Stormwater Control, Runoff and Seepage Collection[(d)]	Concrete Faced Earthen Dam	Existing
Dam 10	0.23	Stormwater Runoff and Seepage Collection[(c)]	Concrete	Existing
Dam 11	0.5	Stormwater Runoff and Seepage Collection[(c)]	Concrete	Existing
Dam 12	0.43	Stormwater Runoff and Seepage Collection[(c)]	Concrete Faced Earthen Dam	Existing
Dam 13	0.04	Stormwater Runoff and Seepage Collection[(c)]	Earthen	Existing
Dam 14	1.07	Stormwater Runoff and Seepage Collection[(c)]	Synthetic	Existing
Dam 14-1	0.02	Stormwater Runoff and Seepage Collection[(c)]	Earthen	Existing
Dam 14-2	0.01	Stormwater Runoff and Seepage Collection[(c)]	Earthen	Existing
Dam 14-3	0.01[(b)]	Stormwater Runoff and Seepage Collection[(c)]	Earthen	Existing
Dam 15	0.01	Stormwater Control	Concrete Faced Earthen Dam	Existing
Dam 16	NA	Alluvial Flow Collection	Coffer Dam	Existing
Reservoir 17	3.36	Stormwater Control, Runoff and Seepage Collection[(d)]	Synthetic	Existing
Dam 18	0.05	Seepage Collection/Conveyance	Concrete Faced Earthen Dam	Existing
Dam 19	0.01	Seepage Collection/Conveyance	Concrete Faced Earthen Dam	Existing
Dam 20	0.3	Stormwater Control	Earthen	Existing
6525 Raffinate Tank	0.05	Water Treatment/Conveyance[(d)]	Stainless Steel	Existing
PLS pond and launder	0.26	Water Treatment/Stormwater[(d)]	Concrete Faced Earthen Pond	Existing
PLS Tank	0.05	Water Treatment/Conveyance[(d)]	Stainless Steel	Existing
Frog Pond	0.63	Water Management	Earthen	Existing
Last Chance Dam	NA	Pond Seepage Collection/Overflow	Coffer Dam	Existing

TABLE 5-1
POST-CLOSURE SURFACE IMPOUNDMENTS

Impoundment Designation[1]	Surface Area[(a)] (acres)	Post-Closure Use	Liner[(b)]	Status
DP-591				
Reservoir 6	11.50	Stormwater Collection & Conveyance[(d)]	Earthen	Existing
Reservoir 7	7.41	Stormwater Collection & Conveyance[(d)]	Earthen	Existing
Fleming Pond	0.78	Water Supply for Reclamation	Earthen	Existing
PLS Feed Pond	0.49	Industrial PMLU[(d)]	Synthetic	Existing
Raffinate Tank	0.11	Industrial PMLU[(d)]	Stainless Steel	Existing
Overflow Stormwater Pond	0.44	Industrial PMLU[(d)]	Synthetic	Existing

Notes:
AST = Above-ground storage tank
PLS = pregnant leach solution
NA = not analyzed
Status = Status at the EOY 2018
(a). from Google Earth Pro 2009 to 2013 Images unless otherwise noted
(b) - M3. *Reservoir and Impoundment Study For Chino Mines CompanyDP-1340 Condition 91*. March 25, 2004.
(c) – Stockpile seepage will be collected from these facilities throughout the post-closure period. Surface water runoff will also be collected from these facilities up to the point that the West and Lampbright stockpiles are covered and reclaimed. Once the stockpiles are reclaimed, surface water runoff will be diverted around these facilities.
(d) - These facilities will also be utilized to promote evaporation of process solutions during the first five years of closure as part of the Evaporative Treatment System

TABLE 5-2
SUMMARY OF BUILDINGS/STRUCTURES TO BE REMOVED/RECLAIMED

Chino Tag No.	Description	Dimensions or Volumes[a]	General Description and Additional Information
Mine Maintenance Facilities Area			
MF-02	Wash Shop	40'x25'	Wash rack; Hoses; Concrete pad
MF-05	Maintenance Shop	150'x57'	Saws; Drills; Warehouse w/ hand tools
MF-07	Storage	74'x19'	Lean-to storage for Electric Shop
MF-15	Storage Shed	20'x118'	Core Samples
MF-16	Primary Crusher	31'x22'x8'	
MF-17	Wash Shop Wastewater	80'x150'	Sump for wash rack; settling pond with skimmer
MF-19	Shop Fast Fuel	8' D	Hoses & pumps
SX / EW Plant Area			
SX-11	Plant Feed Pond	108'x238'	Will be used during the first 6 years following closure as part of the Evaporative Treatment System
SX-12	Raffinate Pond	110'x330'	Will be used during the first 6 years following closure as part of the Evaporative Treatment System
SX-13	Wash Rack	21'x15'	
SX-17	Temporary Storage	76'x43'	
Ivanhoe Concentrator/Precipitation Plant Area			
CP-32	Wet Recycle Crush Plant	153'x74'	Crushers; Screens; Pumps; Conveyor system
CP-35	Portable Storage Shed	40'x19'	Miscellaneous supplies
CP-39	Hoist House & Headframe	90'x42' 44'x25'	
CP-42	Waste Oil Pad	30'x12'	

Note:
[a] Building or facilities dimensions (Length x Width and Height, if known); Tank Dimension (D – Diameter and H- Height, if known) and other capacities may be listed

TABLE 6-1
SUMMARY OF KEY DESIGN CRITERIA FOR FACILITIES TO BE CLOSED

Tailings Pond Regrading – applicable to Tailings Pond 7, southern (un-reclaimed) portions Tailings Ponds 6E and 6W (the Older Tailings Impoundments have been reclaimed), and Axiflo Lake:

- Pipelines located within the regraded footprint of the tailings ponds that will not be part of the post-closure water management and water treatment system will be crushed and covered as part of the tailing regrading and cover placement of these facilities
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not necessary for site operations and maintenance (including water treatment), or wildlife PMLU (power poles)
- Outslopes to be graded to maximum interbench slopes of between 3H:1V (Tailings Ponds 6E and 6W, and Axiflo Lake) and 4H:1V (or flatter for Tailings Pond 7)
- Construction of 15-foot wide terrace benches on the outslopes at maximum 200-foot (Tailings Ponds 6E and 6W, and Axiflo Lake) and 300-foot (Tailings Pond 7) inter-bench slope lengths
- Bench longitudinal slopes at maximum of 5 percent
- Bench cross slopes and channels between 1 and 5 percent
- Grading of the top surfaces to a minimum final grade of 0.5% to direct storm water to the surface water conveyance channels at the Axiflo Lake and Tailings Pond 6E and 6W reclaimed areas. At Tailings Pond 7 storm water will be directed to a new HDPE lined attenuation basin that will be constructed on the northern portion of the pond
- Surface water that accumulates within the Tailings Pond 7 attenuation basin will be directed to a constructed outlet channel
- Slope channels will be located where possible in natural junctions or drainage chutes, but all channels will contain riprap or other appropriate channel armoring and energy dissipation structures as appropriate
- Placement of a minimum 18- 24 inches of soil similar in composition to the RCM beneath all surface water conveyance channels
- Top surfaces and outslopes to be covered with 36 inches of RCM
- Top surfaces and outslopes to be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications

Stockpile Regrading:

- Outslopes to be graded to a maximum inter-bench slope of 3.0H:1V (excluding western slope of the West Stockpile)
- Western slope of the West Stockpile will be graded to a maximum inter-bench slope of 2.5H:1V
- Maximum uninterrupted slope length of 200 feet for outslopes (175 feet for the western slope of the West Stockpile)
- Terrace benches will be constructed at a width of 15-feet on the outslopes
- Bench longitudinal slopes at maximum of 5 percent
- Bench cross slopes and channels between 1 and 5 percent
- Top surfaces graded to between 1 and 5 percent
- Regrading to be done in such a manner that orients surface water conveyances to the exterior perimeter of the stockpiles
- Slope channels will be located where possible in natural junctions or drainage chutes, but all channels will contain riprap and energy dissipation structures as appropriate
- Top surfaces and outslopes to be covered with 36 inches of RCM
- Top surfaces and outslopes to be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications

TABLE 6-1
SUMMARY OF KEY DESIGN CRITERIA FOR FACILITIES TO BE CLOSED

Post-Mining Land Use or Self-Sustaining Ecosystem Waived Areas:

- Outslopes to remain at angle of repose
- No terrace benches to be constructed
- Process water pipelines located within the footprint of the waived areas that will not be part of the post-closure water management and water treatment system will be removed and disposed of in an approved manner
- 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 site operations and maintenance, including water 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 a minimum of 36 inches of RCM
- Construction of surface water conveyance channels on the top surfaces and outslopes (where applicable) to direct surface water off the stockpile surfaces and to the nearest open pit sump
- Seeding of covered top surfaces to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications;
- Plugging and abandonment of any unneeded monitor wells
- Providing additional channels, sumps, wells, pumps, and pipelines to direct impacted water to a site-wide water treatment facility
- Maintenance of existing berms and stormwater controls at the toes of the stockpiles

Santa Rita Open Pit:

- Surface water to be eliminated to the maximum extent practicable with the existing pit extraction systems
- 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)
- Signs will be posted on fencing at 500-ft intervals and all access points, warning of potential hazards present
- Removal of all aboveground electrical systems and infrastructure, including outdoor lighting and transmission lines, not necessary for site operations and maintenance, including water treatment

Pipelines (applies to process water pipelines that will not be used in closure/post closure water management & water treatment, pipelines located outside the OPSDA, and pipelines located outside the regrade footprint of stockpiles):

- Residual sediments and fluids will be removed and disposed of in an approved manner
- 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 covered as part of the stockpile regrading and cover placement of these facilities
- 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
- Impacted soils along corridor will be removed unless they are on a stockpile, within the OPSDA, or within the regrade footprint of these facilities
- 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
- Where pipelines are removed, corridor will be ripped and revegetated in accordance with Appendix C of the MMD Permit and applicable modifications

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TABLE 6-1
SUMMARY OF KEY DESIGN CRITERIA FOR FACILITIES TO BE CLOSED

Haul Roads (all haul roads except those located within OPSDA or PMLU access roads):

- Culverts to be removed where practicable, unless they serve a post closure purpose
- Where located on acid-generating material, surface to be covered with 36 inches of RCM and revegetated in accordance with Appendix C of the MMD Permit and applicable modifications
- Cover surfaces to be revegetated in accordance with Appendix C of the MMD Permit and applicable modifications
- Where located on non-acid-generating material, surface to be ripped to a depth of 18-24 inches and revegetated in accordance with Appendix C of the MMD Permit and applicable modifications

Surface Impoundments (all surface impoundments located outside the regrade footprint of stockpiles, those impoundments that will serve a post-closure function will be closed at the completion of water treatment):

- Pumping of remaining water in the impoundments and tanks to an approved discharge point, water treatment plant, or allowed to evaporate
- Flushing of pipelines 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
- Grading to achieve positive drainage away from the impoundment
- 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 OPSDA
- Synthetic liners (if present) left in place and ripped, or removed
- 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 treatment
- Areas revegetated in accordance with Appendix C of the MMD Permit and applicable modifications

Buildings and Structures:

- Salvaging and demolition of the buildings, tanks and structures not designated for industrial PMLU
- 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 cover material
- 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
- 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
- Capping all non-functional buried process water pipelines
- 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 treatment
- Seeding of covered and disturbed areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications
- Maintaining and improving existing culverts and surface water conveyance structures (if required)

TABLE 6-1
SUMMARY OF KEY DESIGN CRITERIA FOR FACILITIES TO BE CLOSED

Other Ancillary Facilities and Structures (including electrical power transmission lines and a substations; operational and exploration roads; disturbed areas outside the OPSDA, freshwater supply system; storm water structures for drainage, diversion, and sediment control; equipment storage areas; and fencing and security systems):

- Power transmission lines, booster pump stations, and substation will be removed once they are not needed for post-closure purposes. Power poles will be removed or left in place to serve as raptor perches after reclamation
- Removal of any temporary, portable operations and maintenance facilities used to support mining and not needed for post-closure purposes
- Covering impacted disturbed areas with 36 inches of suitable cover material
- Ripping of non-impacted disturbed areas to a depth of 18 to 24 inches
- Seeding of ripped and covered areas to reestablish vegetation in accordance with Appendix C of the MMD Permit and applicable modifications

Notes:
MMD = Mining and Minerals Department
PMLU = Post Mining Land Use; OPSDA = Open Pit Surface Drainage Area
RCM = Reclamation Cover Material

TABLE 6-2
STOCKPILE LONG-TERM SLOPE STABILITY

Stockpile	Minimum Static FOS Existing Stockpile Conditions	Minimum Static FOS Final Regraded Stockpile Condition	Minimum Pseudo-Static FOS Existing Stockpile Conditions	Minimum Pseudo-Static FOS Final Regraded Stockpile Conditions
Main Lampbright	1.73	1.74	1.51	1.52
Southwest Lampbright	1.45	2.20	1.28	1.85
Upper South	1.18	NA	1.06	NA
West	1.49	2.12	1.33	1.83
South	1.55	1.86	1.38	1.60
Northeast	1.49	NA	1.31	NA
North In-Pit	1.56	NA	1.38	NA
Northwest	1.50	NA	1.33	NA
Lee Hill	1.58	NA	1.39	NA

Notes:

Reference: (*Golder, 2008)*

FOS = factor of safety

NA = not analyzed

Due to the relatively low seismicity of the region, where the factor of safety meets the criteria of a factor of safety of 1.3 for static conditions the criteria for meeting a factor of safety 1.1 for pseudo-static is always exceeded. The Upper South Stockpile has a factor of safety below target values due to the over steepened slope where mine benches have been excavated into the stockpile toe. However, the upper South Stockpile is currently planned to be mined for use as reclamation cover allowing these slopes to be regraded to a more stable configuration (Golder, 2008).

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TABLE 6-3
TAILINGS IMPOUNDMENT LONG-TERM SLOPE STABILITY

Impoundment	Slope Stability Factor of Safety (FOS)		
	Minimum Static FOS Drained Loaded Conditions[1]	Minimum Static FOS Short-Term Undrained Loaded Conditions[1]	Minimum Pseudo-Static FOS[2]
1	2.3	2.6	1.22
2	1.8	1.8	1.22
4	1.6	1.22	1.22
B	1.9	1.7	1.22
C	1.6	1.6	1.22
6E	2.4	2.2	1.22
6W	2.1	1.6	1.22
7	3.06	2.00	2.00

Notes:

[1] – With the exception of Ponds 4 and 7 (M3, 2001), the above computed factors of safety were determined as part of the analyses conducted to support the Chino Tailing Reclamation CDQA Plan (Golder-URS, 2007). Liquefaction potential was also evaluated and the factor of safety was found to exceed 1.2 for the most critical section.

[2] – From the *End of Year 2001 through Year 2006 Closure/Closeout Plan* (M3, 2001)

In accordance with Copper Mine Rule Section 20.6.7.33.C NMAC, closure of all critical structures shall be designed for a long-term static factor of safety of 1.5 or greater and non-critical structures shall be designed for a long-term static factor of safety of 1.3 or greater. The facilities being closed shall also be designed for a factor of safety of 1.1 or greater under pseudo-static analysis.

TABLE 8-1
PROPOSED INTERIM SEED MIX AND RATES FOR THE CHINO MINE RECLAMATION SITES

Species[a]	Life-Form	Duration[b]	Seasonality	Rate[a,c]
Primary				
Blue grama (*Bouteloua gracilis*)	Grass	Per	Warm	0.50
Side-oats grama (*Bouteloua curtipendula*)	Grass	Per	Warm	1.50
Black grama (*Bouteloua eriopoda*)	Grass	Per	Warm	0.10
Green sprangletop (*Leptochloa dubia*)	Grass	Per	Warm	0.25
Plains lovegrass (*Eragrostis intermedia*)	Grass	Per	Intermediate	0.05
Apache plume (*Fallugia pardoxa*)	Shrub	Per	NA	0.10
Mountain mahogany (*Cercocarpus montanus*)	Shrub	Per	NA	1.50
Winterfat (*Eurotia lanata*)	Shrub	Per	NA	1.00
White prairie clover (*Dalea candida*)	Shrub	Per	NA	0.25
Globe mallow (*Sphaeralcea sp.*)	Forb	Per	NA	0.10
Blue flax (*Linum lewisii*)	Forb	Per	NA	0.25
Total PLS (lb/ac)				**5.60**
Alternate				
Sand dropseed (*Sporobolus cryptandrus*)	Grass	Per	Intermediate	ND
Tobosa (*Hilaria mutica*)	Grass	Per	Warm	ND
Bush muhly (*Mohlenbergia porteri*)	Grass	Per	Warm	ND
Squawberry (*Rhus trilobata*)	Shrub	Per	NA	ND
Fourwing saltbush (*Atriplex canescens*)	Shrub	Per	NA	ND
Prairie coneflower (*Ratibida columnaris*)	Forb	Per	NA	ND
White sweet clover (*Melilotus alba*)	Forb	Ann	NA	ND

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] Seed mix and rates are subject to change based on future investigations
[b] Per – Perennial; Ann = Annual
[c] Rate is in pounds of pure live seed per acre; substitutions may change seeding rates
lb/ac = pounds per acre
NA = Not applicable
ND = Not determined
PLS = Pure live seed

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TABLE 8-2
FUNCTIONS AND ATTRIBUTES OF THE PRIMARY PLANT SPECIES PROPOSED FOR THE CHINO 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,C,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 (*Eurotia lanata*)	N,P,HS	Low shrub providing winter browse
White prairie clover (*Dalea candida*)	N,P,S	Early season legume providing ground cover and forage
Globe mallow (*Sphaeralcea sp.*)	N,P,F	Persistent mid-height forb providing browse
Rubber rabbitbush (*Chrysothamnus nauseosus*)	N,P,S	Mid-height shrub providing cover and erosion control
Blue flax (*Linum lewisii*)	N,P,F	Persistent forb with a pretty blue flower

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
I = Introduced
P = Perennial
A/B = Annual or biannual
W = Warm season
C = Cool season
G = Grass
S = Shrub HS = Half shrub
F = Forb

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TABLE 8-3
BUILDINGS AND STRUCTURES DESIGNATED FOR INDUSTRIAL POST MINING LAND USE (PMLU)

Chino Tag No.	Description	Dimensions or Volumes[a]	General Description and Additional Information
Mine Maintenance Facilities Area			
MF-01	Vehicle Maintenance	330'x185'x100'	Lubricant tanks in SW corner (7x); Floor jacks; Welding machines; 15/50-ton combo overhead cranes (4x); 20-ton O/H overhead.
MF-03	Vehicle Maintenance; Lube/Tire Shop	160'x40'x80'	Tire repair equipment; 3 bays for lubing large equipment
MF-04	Maintenance Shop; Combo Machine, boiler & shovel/drill repair	230'x150'x50'	40-ton bridge cranes (3x); Lathes; Saws; Drill presses; Metal benders & presses; Welding equipment
MF-06	Electrical Maintenance	180'x60'x25'	25-ton overhead crane; cable repair equipment; welding equipment
MF-08	Warehouse	160'x60'x35'	Warehouse
MF-09	Mine Operations Office	130'x130'x15'	Lockers; Boiler for showers; computers
MF-10	Assay Lab	140'x60'x15'	Testing equipment
MF-11	Water Lab	40'x30'x12'	Computers; testing equipment
MF-12	Safety	100'x35'x12'	Computers
MF-13	Geology	60'x65'x12'	Mine offices
MF-14	Mine Planning/Engineering	200'x40'x15'	Mine offices
MF-18	Diesel Storage Tanks	2 @ 300,000 gal, 1 @ 125,000 gal, 2 @ 175,000	Diesel storage
MF-20	Surface Water	--	
MF-21	Storage Building	33'x28'	Storage
MF-22	Storage Shed	61'x40'	Storage
MF-23	Fuel Tank	35'x13'	Fuel storage
MF-24	Storage Shed	31'x22'x8'	Storage
MF-25	Storage Building	60'x41'	Flammables storage
MF-26	Mine Carpenter Shop	93'	Shop area

TABLE 8-3
BUILDINGS AND STRUCTURES DESIGNATED FOR INDUSTRIAL POST MINING LAND USE (PMLU)

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Chino Tag No.	Description	Dimensions or Volumes[a]	General Description and Additional Information
SX / EW Plant Area			
SX-01	SX Maintenance	60'x70'x16'	Lathe; Drill press; Welding machines; Bench grinder; 1/4-ton jib hoist; 1/4-ton portable jib crane
SX-02	SX Warehouse	135'x65'x16'	SX stock items
SX-03	Electrowinning Tankhouse	70' 6" x 600' 7" x 30' 4" w/ 38' 11" x 102' 7" x 19'9" Sheet prep annex & 28' x 62' 7" x 25' Office	5-ton P&H overhead cranes (2x); Wennberg equipment (2x); Bandsaw; 2-ton floor scale (2x); 1/2-ton beam-mounted jib crane; 210 EW cells (22'Lx4'Wx4'D)
SX-04	Sulfuric Acid Storage Tank	2 @ 18' D	Acid storage
SX-05	Mixer Settlers	6 each 75' x 80'	
SX-06	Raffinate Tank	40' D	Raffinate storage
SX-07	Tank Farm	290'x108'	Pumps; Stainless steel tanks
SX-08	Water Treatment Building	20'x42'3"	Pumps; Water softener
SX-09	Pump House	20'x42'3"	Pumps
SX-10	Water Tank	33'D x29'H	Water storage
SX-15	Electric Shop	19'x14'	Supplies; computers
SX-16	Propane Tank	8'Dx29'	Propane storage
SX-18	MCC Transformers	38'x36'	Power transformers
SX-19	Fire Station	100'x47'	Fire station
SX-20	Compressor Building	25'x17'	Plant instrument compressors (2x)
SX-21	Reagent Building	26'x17'	Reagent tanks; Pumps

TABLE 8-3
BUILDINGS AND STRUCTURES DESIGNATED FOR INDUSTRIAL POST MINING LAND USE (PMLU)

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Chino Tag No.	Description	Dimensions or Volumes[a]	General Description and Additional Information
Ivanhoe Concentrator/Precipitation Plant Area			
CP-01	Guard House, Changehouse 910	100'x400'x15', 20'x17'x15'	Boiler for showers; Lockers; Swtichroom for electrical in all rooms
CP-02	Ivanhoe Concentrator 300	384'x82'x90', 264'x192'x75', 192'x28'x75'	Sag Mills (2x); Ball Mills (4x); Verti Mills (4x); Regrind mills (4x); Wemco 1000' float cells (56x); Cleaner cells (32x); Boliden-Allis screens (2x); Conveyor belt systems (4x); Pumps; Column cells (4x); Xray system; Overhead cranes: 50/20-ton combo, 20-ton, 30-/5-ton combo, 4-ton (2x): MOLY Plant=Float cells; Roaster; Column cells (3x); Xray system; 3-ton overhead crane
CP-03	Shop & Warehouse 930	140'x250'x25'	Welding machines; Metal presses; 2-ton jib cranes (2x); Drill press; Bandsaws (2x); 5-ton overhead crane; 10-ton overhead crane
CP-04	Generator & Sample Storage House	115'x60'x25'	Generator
CP-05	Electrical Room	30'x40'x15'	Switchgear; Non-PCB transformers
CP-06	Tailing Pump House 730	50'x80'	Various supplies
CP-07	Electrical Room	40'x15'	Electrical
CP-08	Old ASARCO Storage Bldgs	90'Dx60'H	Storage
CP-09	Process Water Tank 2.5MMGal	40'D	Process water storage
CP-10	Fresh Water Storage Tank	2 @ 380'Dx10'H	Water storage
CP-11	Tailing Thickeners (2)	190’D	Tailing processing
CP-12	Laboratory 920	200'x50'x8'	Lab equipment; Offices; Computers
CP-13	Cu/Moly Thickener	100'D	Tailings processing
CP-14	Cu Thickener	100'D	Tailings processing
CP-15	Process Water Head Tank 85-TK-02	28'D	Process water storage
CP-16	Potable Water Tank 73-TK-02	15'D	Potable water storage
CP-17	Fire Water Tank 73-TK-05	35'D	Water storage

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TABLE 8-3
BUILDINGS AND STRUCTURES DESIGNATED FOR INDUSTRIAL POST MINING LAND USE (PMLU)

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Chino Tag No.	Description	Dimensions or Volumes[a]	General Description and Additional Information
Ivanhoe Concentrator/Precipitation Plant Area			
CP-18	Process Water Tank 1.5MMGal		Process water storage
CP-19	Contractor Storage (Temp)		Various supplies
CP-21	Reagent Mix & Storage Building 820	45x'60'x30'	Mixing tanks; Pumps; Overhead crane
CP-22	Lime Unloading		Hopper; Conveyor belt systems (2x); Bucket Elevator
CP-24	Concentrate Storage Tanks		Concentrate storage
CP-25	Concentrate Pump House		Pumps; Compressor; Overhead crane
CP-26	Lime Tanks	2 @ 20'D	Lime storage
CP-27	Collector Tanks		Fluid storage
CP-28	Shop Storage		Various supplies
CP-31	750 kV Substation	163'x29'	Power substation
CP-33	Dry Recycle Crush Plant	62'x48'	Crushers; Storage bins; Conveyor system
CP-34	Pipe Storage Shed	30'x30'	Pipe storage
CP-36	Sewage Plant	42'x11'	Sewage treatment
CP-37	Wash Rack/Pad		Wash rack
CP-38	Process Water Pump House	12x75x30'	Process water pumps
CP-40	Frother Tanks & Pumps Area	40'x80'	Reagent pumps
CP-41	NaHS Storage Tank Area	50'x30'	Reagent pumps
CP-44	Electrical Building @ Coarse Ore Conveyor Drive	25'x20'	Switchgear; Non-PCB transformers

Note:
[a] Building or facilities dimensions (Length x Width and Height, if known); Tank Dimension (D – Diameter and H- Height, if known) and other capacities may be listed

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TABLE 8-4
PROPOSED DIVERSITY GUIDELINES FOR CHINO MINE

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

NA = Not applicable

TABLE 10-1
RECLAMATION SCHEDULE

Unit	Anticipated Start Date for Reclamation to Begin[a]	Anticipated Duration (Years)[b]
Axiflo Lake	4 years following cessation of milling operations to allow for water management	1.5
Southern ends of Ponds 6E and 6W	180 days following reclamation of Pond 7 to allow for water management	2
Tailing Pond 7[e]	4 years following cessation of short-term ETS period	7.5
Tailing Pipeline Corridor	4 years following cessation of milling operations and water management	2.5
Tailing Borrow Areas	1 year following reclamation of Tailing Ponds	2
3A Stockpile [c]	180 days following cessation of mining operations	1.5
North Stockpile [c]	180 days following cessation of mining operations	1.5
Northeast Stockpile [c]	180 days following cessation of mining operations	1.5
Northwest Stockpile [c]	180 days following cessation of mining operations	1
North Lampbright Stockpile [d]	180 days following cessation of mining operations	3.5
Southwest Lampbright Stockpile [d]	180 days following cessation of mining operations	3.5
West Stockpile [c, d, e]	2 years following cessation of short-term ETS period	4.5
Lee Hill Leach Stockpile [c, e]	2 years following cessation of short-term ETS period	1.5
Santa Rita Stockpile [c]	2 years following cessation of mining operations	1.5
Main Lampbright Stockpile [d, e]	5 years following cessation of short-term ETS period	4.5
South Lampbright Stockpile [d, e]	5 years following cessation of short-term ETS period	4.5
South Stockpile [c,d, e]	3 years following cessation of short-term ETS period	5

TABLE 10-1
RECLAMATION SCHEDULE

Unit	Anticipated Start Date for Reclamation to Begin[a]	Anticipated Duration (Years)[b]
Upper South Stockpile [c]	1 year following completion of reclamation of South Stockpile	2
STS 2 Stockpile [d]	1 year following completion of reclamation of South Stockpile	1.5
East Pit Access Area	1 year following reclamation of Lampbright Stockpile	1
Reservoirs (not part of WTP)	5 years following cessation of leaching operations	3
Industrial PMLU areas	10 years following cessation of leaching operations	3.5

Notes:

WTP = water treatment plant

PMLU = post-mining land use

Cessation of Milling Operations = Cessation of operation at the Ivanhoe Concentrator when there is no intent to resume operations.

Cessation of Mining Operations = Cessation of ore and waste haulage operations at the Chino Mine when there is no intent to resume operations.

Cessation of Leaching Operations = Cessation of copper recovery operations at the SX/EW Plant when there is no intent to resume operations.

Start Date is defined as the date that work plans or engineering designs, describing how the unit is to be closed or reclaimed have been submitted.

[a] Anticipated start dates are subject to modification; 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; some borrow areas may be left open to be used in maintenance activities on the primary reclaimed facilities.

[c] Stockpiles located inside the OPSDA include the future Santa Rita leach stockpile; Lee Hill leach stockpile; North, Northeast and 3A waste rock stockpiles; Upper South stockpile; interior slope of the Northwest waste rock stockpile; portions of the eastern slope of the West stockpile; northwest corner of the Main Lampbright leach stockpile; and portions the northeastern slope of the South leach stockpile.

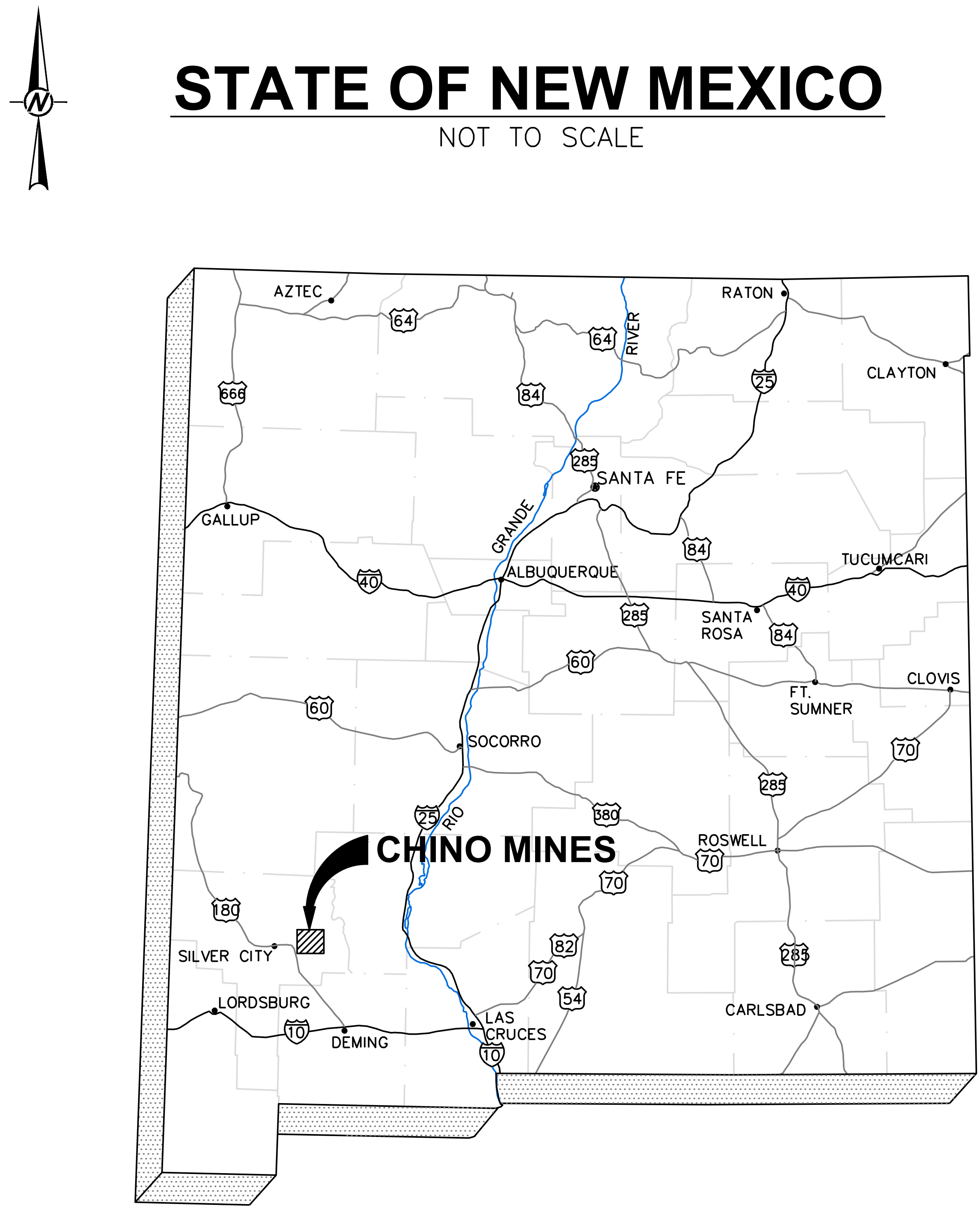
[d] Stockpiles located outside the OPSDA include the Main and South Lampbright leach stockpiles; Southwest Lampbright waste rock stockpile; STS 2 overburden and waste rock stockpile; all but the eastern slope of the West leach stockpile; and all but the northeastern slope of the South leach stockpile.

[e] The top surface area of this facility (or portions thereof) will be utilized for all 6 years of operation of the short-term evaporative treatment system (ETS). Cessation of Operation of this facility is considered the end of the 6 year short-term ETS period.

FIGURES

STATE OF NEW MEXICO

NOT TO SCALE



CLIENT
FREEPORT-McMoRAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

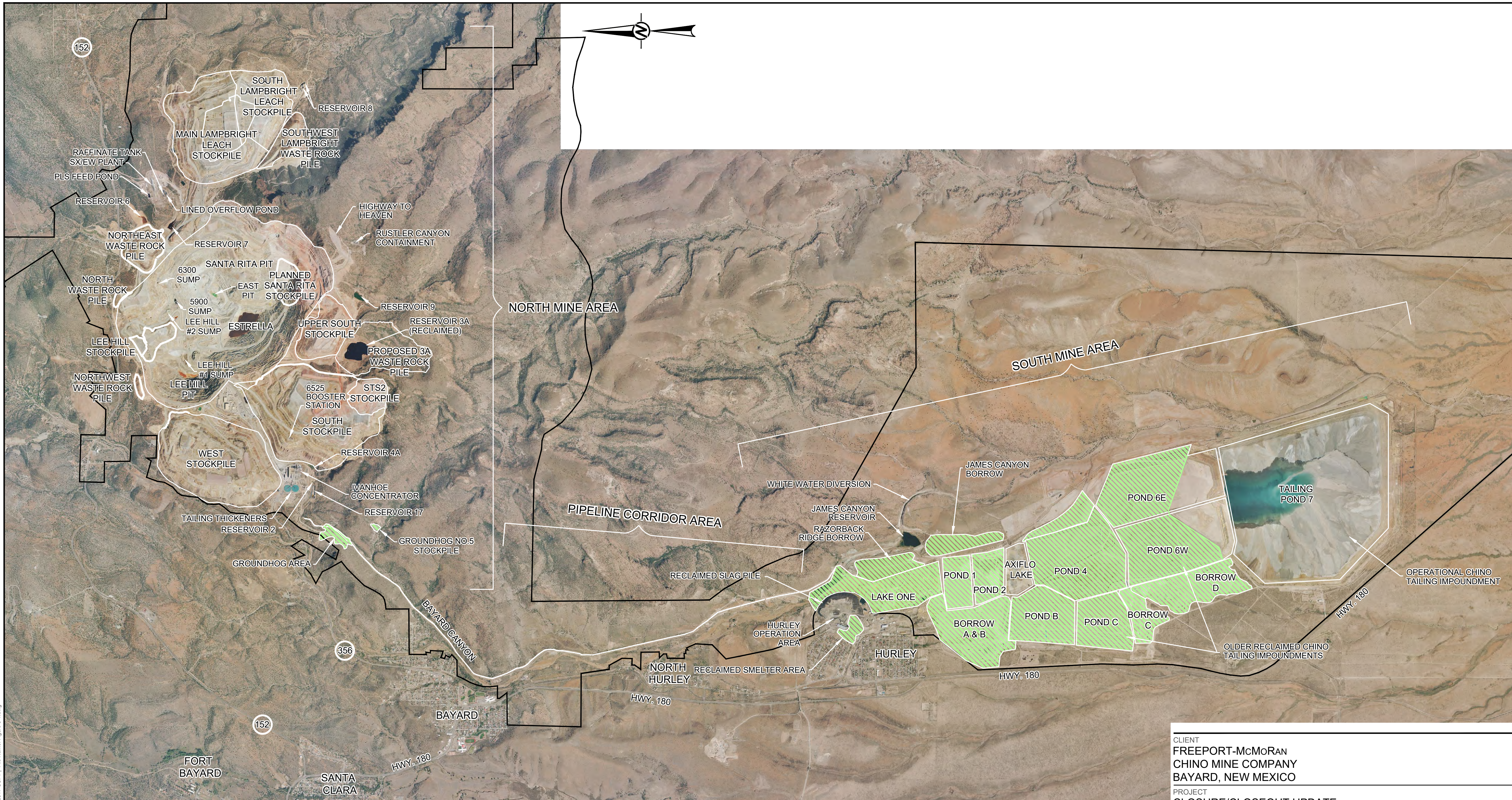
CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

TITLE
MINE LOCATION MAP

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	1-1



LEGEND

RECLAIMED AREAS

APPROXIMATE FACILITY BOUNDARY

356 STATE HIGHWAY 356

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COMPANY COORDINATE SYSTEM.

0 2500 5000 7500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
CHINO MINE FACILITIES MAP

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-1

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

LEGEND

RECLAIMED AREAS

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COORDINATE SYSTEM.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

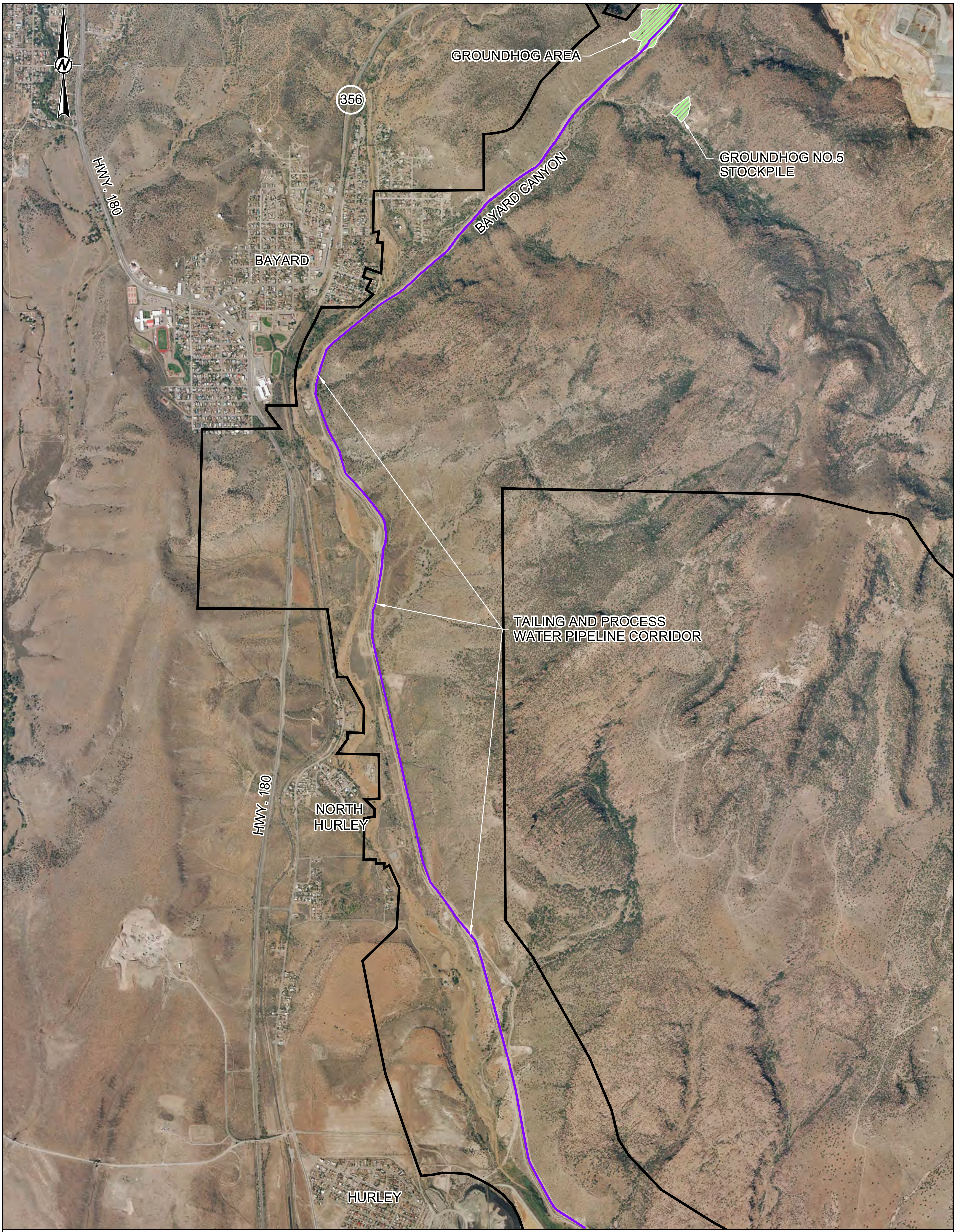
TITLE
NORTH MINE AREA LOCATION MAP

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-02-12
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-2



LEGEND

RECLAIMED AREAS

APPROXIMATE FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATE BASED ON CHINO MINE COMPANY COORDINATE SYSTEM

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
PIPELINE CORRIDOR AREA LOCATION MAP

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-3

LEGEND

RECLAIMED AREAS

APPROXIMATE FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES BASED ON CHINO MINE COMPANY COORDINATE SYSTEM

2500 0 2500
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

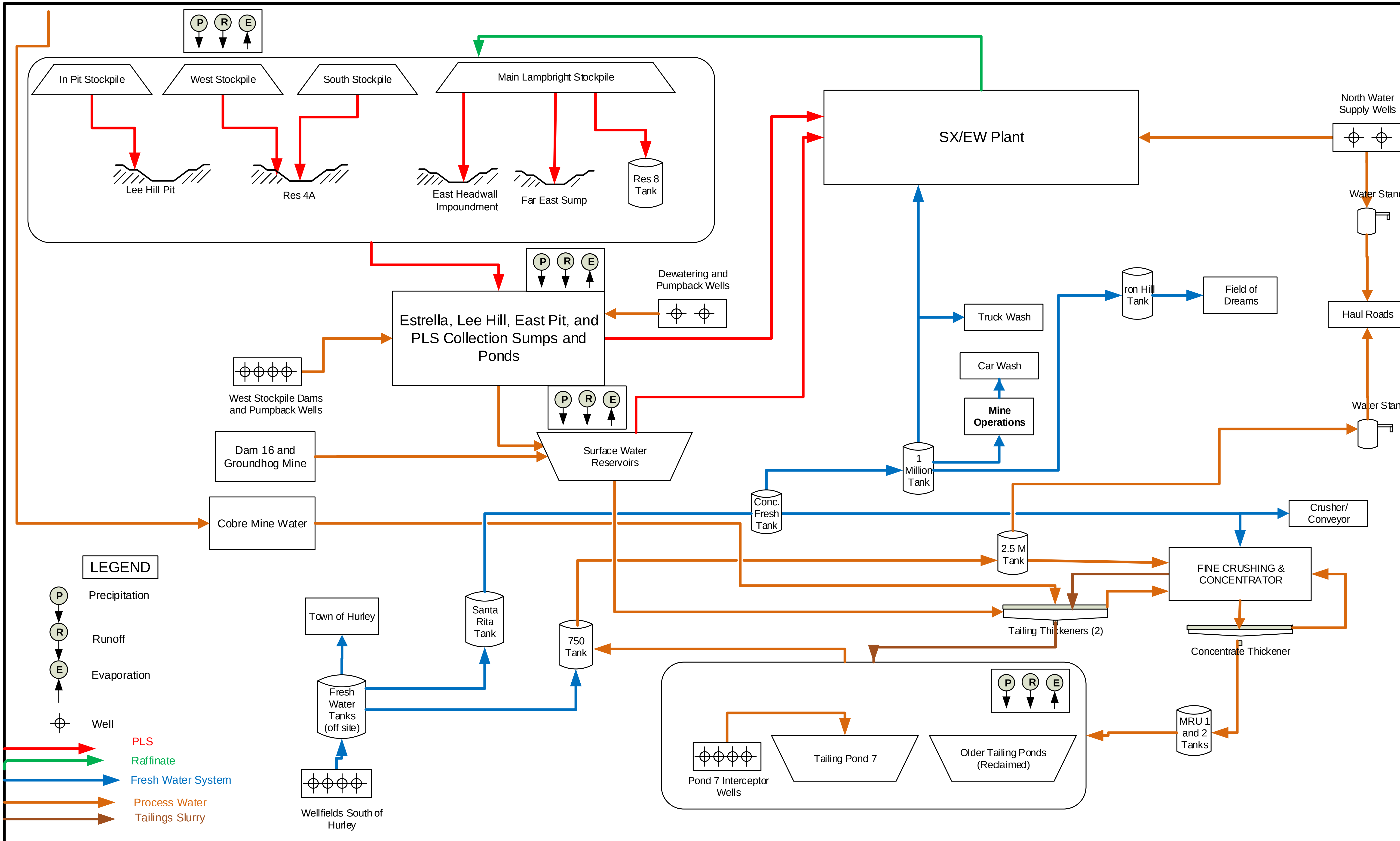
TITLE
SOUTH MINE AREA LOCATION MAP

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-4



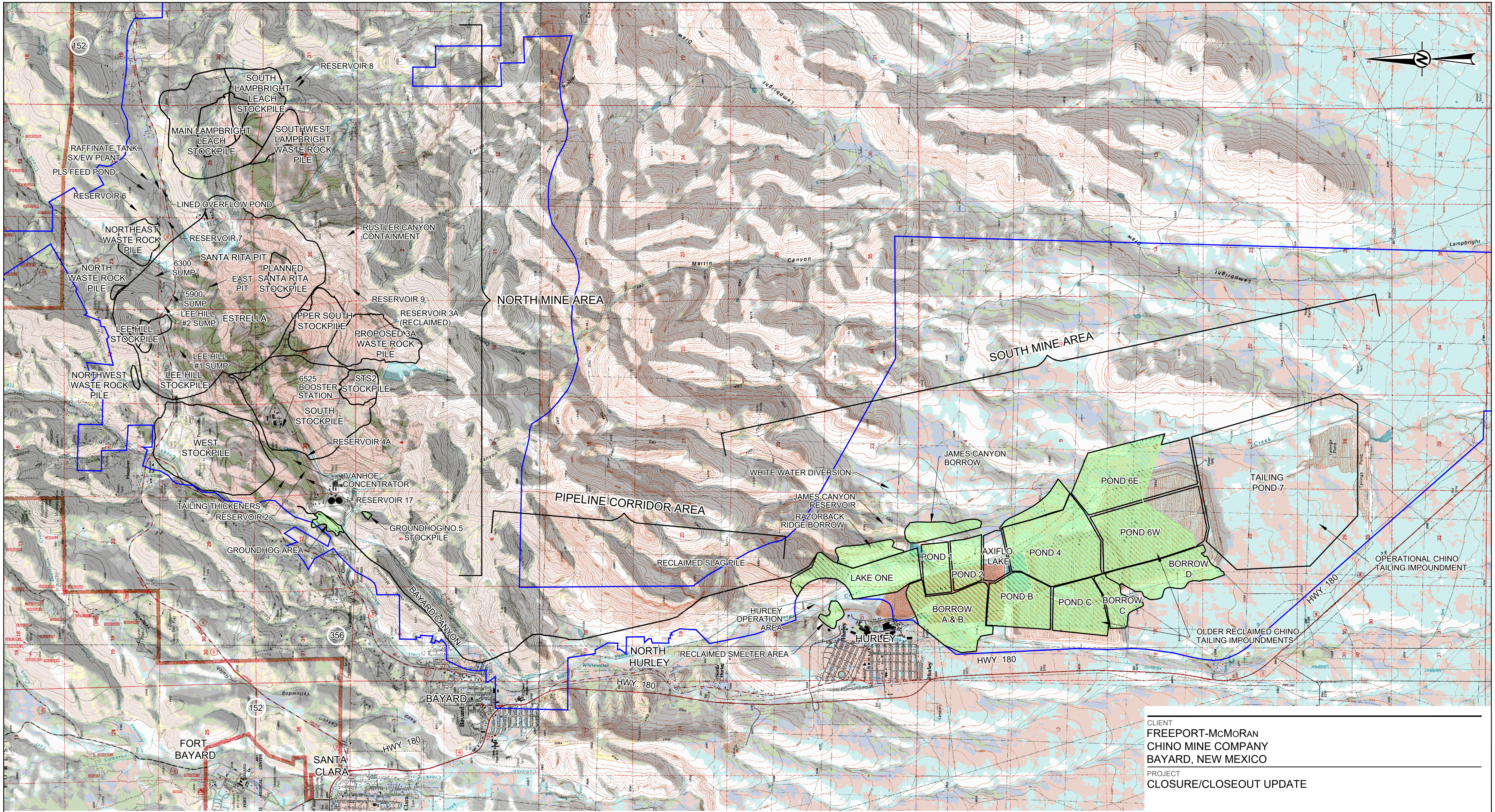
Golder Associates
ALBUQUERQUE, NM

PROJECT/REPORT
FREEPORT-McMoRan CHINO MINE COMPANY
BAYARD, NEW MEXICO
CLOSURE/CLOSEOUT UPDATE

PROJECT NO
113-01153

TITLE
CURRENT WATER MANAGEMENT SCHEMATIC DIAGRAM

FIGURE
3-5



LEGEND

RECLAIMED AREAS

APPROXIMATE FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

REFERENCE

ALL TOPO MAPS V7 PROFESSIONAL MAP REFERENCE SET, NEW MEXICO RELEASE 3. INCLUDES NEW MEXICO QUADS: FORT BAYARD, SANTA RITA MINE, SAN LORENZO, HURLEY EAST, WHITEHORSE MOUNTAIN, HURLEY WEST, FAYWOOD STATION, TAYLOR MOUNTAIN AND WHITEWATER.

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY. 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 4 OF THIS CCP.

0 2500 5000 7500
SCALE FEET

CLIENT
FREEPORT-McMoRAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

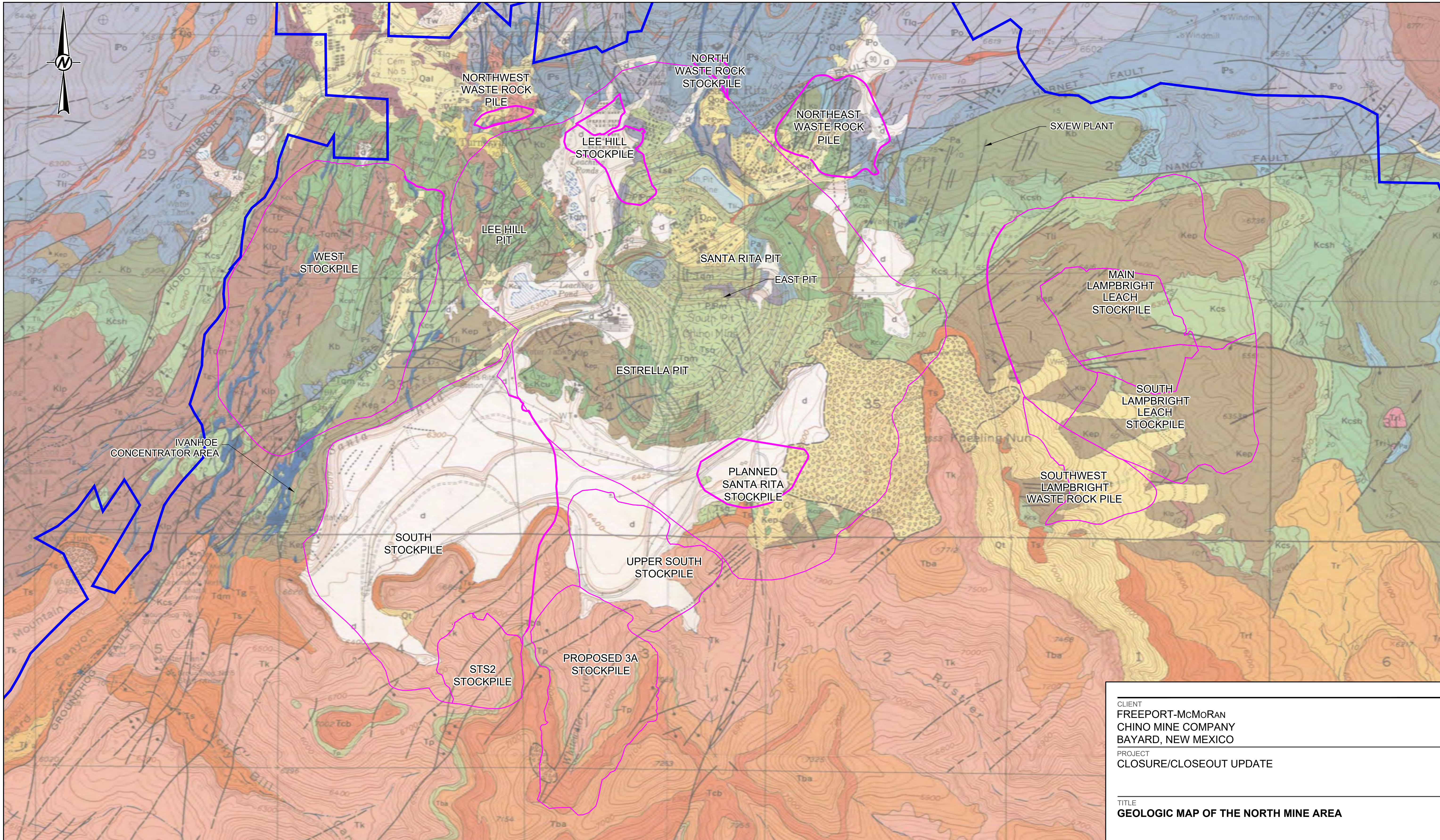
TITLE
GENERALIZED REGIONAL TOPOGRAPHIC MAP

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-6



LEGEND

APPROXIMATE FACILITY BOUNDARY

NOTES

SEE FIGURE 3-7A FOR GEOLOGIC FORMATION KEY

REFERENCES

SOURCE: INFORMATION SHOWN ON THIS MAP IS FROM THE USGS GEOLOGY OF THE SANTA RITA QUADRANGLE NEW MEXICO GRANT COUNTY

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

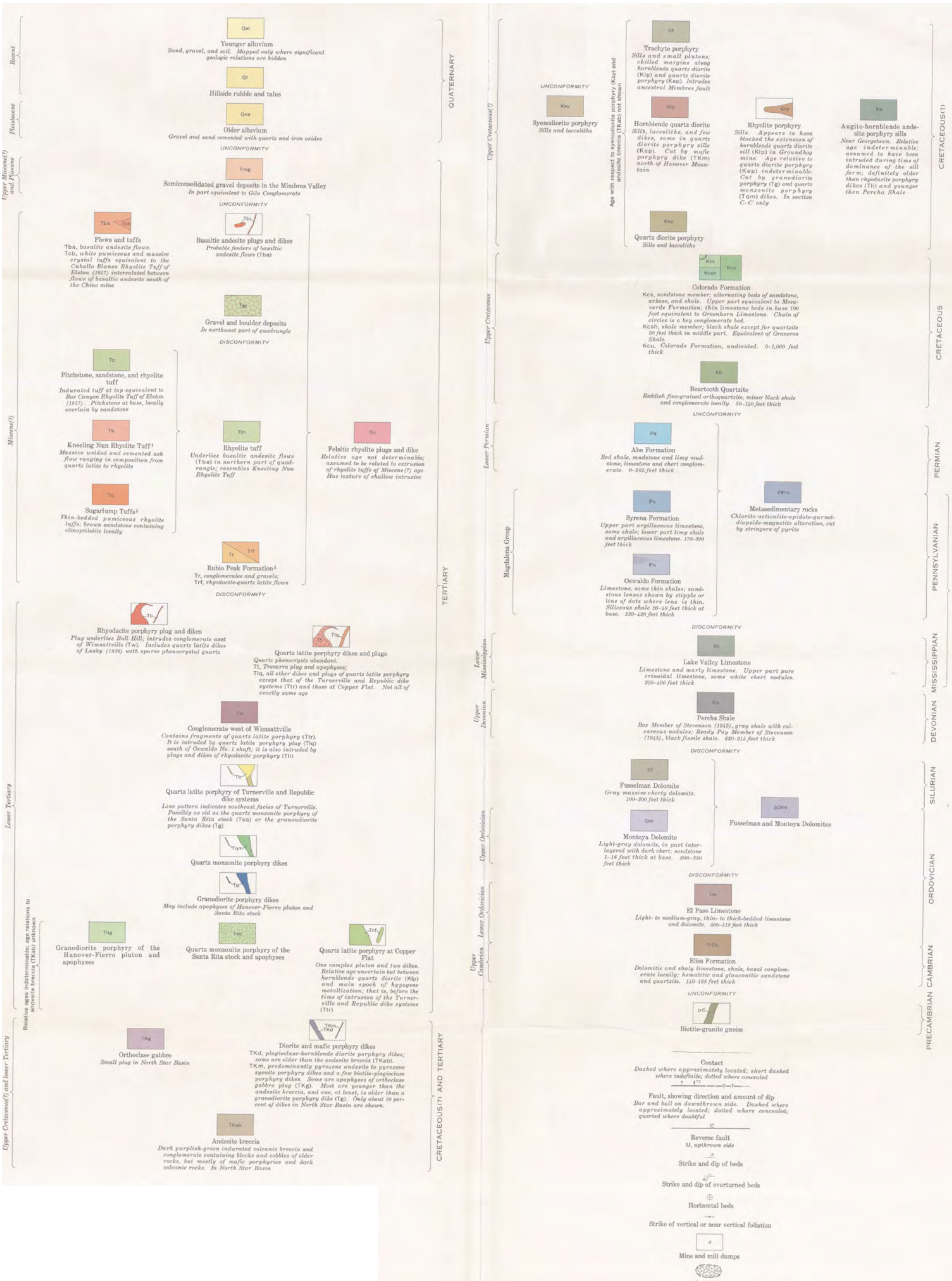
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
GEOLOGIC MAP OF THE NORTH MINE AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

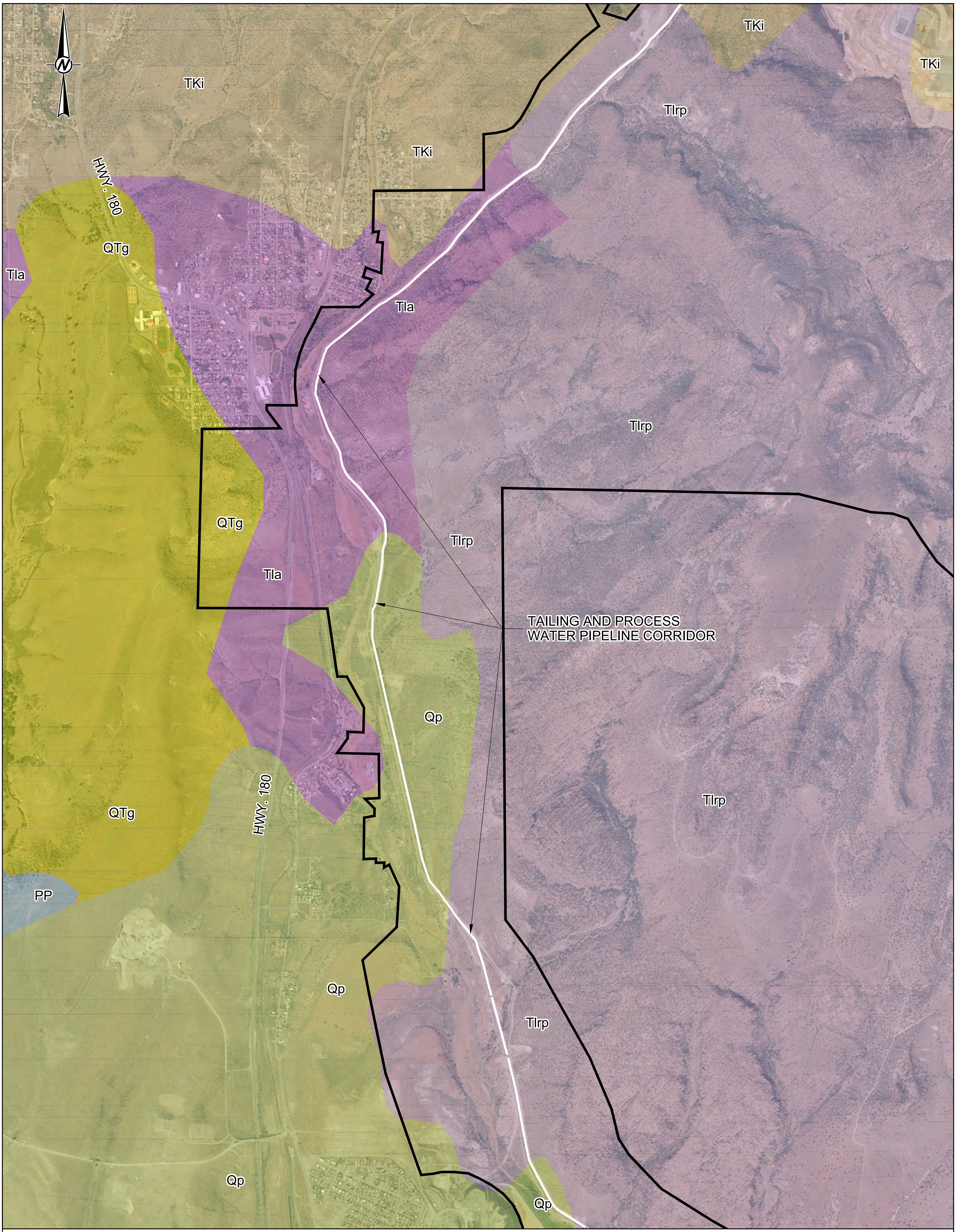
PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-7



CLIENT FREEPORT-McMoRan CHINO MINE COMPANY BAYARD, NEW MEXICO			PROJECT CLOSURE/CLOSEOUT UPDATE
CONSULTANT	YYYY-MM-DD	2017-07-24	TITLE **KEY TO GEOLOGIC FORMATIONS**
Golder Associates	DESIGNED	TS	
	PREPARED	CM	
	REVIEWED	TS	PROJECT NO. 11301153 / PHASE 6 / REV. 0 / FIGURE 3-7A
	APPROVED	TS	

1 in

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



LEGEND GEOLOGY

Qtg	GILA GROUP, FORMATION, OR CONGLOMERATE (MIDDLE PLEISTOCENE TO UPPERMOST OLIGOCENE?)- INCLUDES MIMBRES FORMATION AND SEVERAL INFORMAL UNITS IN SOUTHWESTERN BASINS
Qp	PEIDMONT ALLUVIAL DEPOSITS (HOLOCENE TO LOWER PLEISTOCENE)-INCLUDES DEPOSITS OF HIGHER GRADIENT TRIBUTARIES BORDERING MAJOR STREAM VALLEYS, ALLUVIAL VENEERS OF THE PIEDMONT SLOPE, AND ALLUVIAL FANS. MAY LOCALLY INCLUDE UPPERMOST PLIOCENE DEPOSITS
Tlrp	LOWER MIDDLE TERTIARY RHYOLITIC TO DACITIC PYROCLASTIC ROCKS OF THE DATIL GROUP, ASH-FLOW TUFFS (LOWER OLIGOCENE TO UPPER EOCENE, 31-36 MA0- REGIONAL ASH-FLOW TUFFS, INCLIDES SOME LOCALLY ERUPTED LAVAS AND TUFFS WITHIN THICK INTRA CALDERA UNITS; INCLUDES MINOR VOLCANIC LASTIC SEDIMENTARY UNITS AND LAVAS BETWEEN THIN OUTFLOW SHEETS
Tla	LOWER MIDDLE TERTIARY ANDESITIC TO DACITIC LAVAS AND PYROCLASTIC FLOW BRECCIAS (UPPER TO MIDDLE EOCENE, 33-43 MA)- INCLUDES RUBIO PEAK FORMATION, OREJON ANDESITE, ANDESITE OF DRY LEGGETT CANYON, ANDESITE OF TELEPHONE CANYON, AND OTHER UNITS IN SOUTH WESTERN, CENTRAL, AND NORTHERN NEW MEXICO, LOCALLY INCLUDES MINOR MACIC LAVAS. ANCIENT LANDSLIDE BLOCKS OF MADERA LIMESTONE, AS MUCH AS ONE MILE LONG, OCCUR WITHIN RUBIO PEAK LAVAS IN THE CENTRAL BLACK RANGE, WEST OF WINSTON
Tki	TERTIARY-CRETACEOUSINTRUSIVEROCKS (PALEOCENE AND UPPER CRETACEOUS)- INCLUDES GRANODIORITE TO QUARTZ MONZONITE STOCKS AND PLUTONS AT HANOVER, FIERRO, TYRONE, LORDSBURG, AND THE 73-MA QUARTZ MONZONITE PORPHYRY STOCK AT COPPER FLATS IN SIERRA COUNTY, ALSO INCLUDES MANY NORTHEAST-TRENDING MONZONITE PORPHYRY DIKES IN THE SILVER CITY REGION
PP	PERMIAN AND PENNSYLVANIAN ROCKS, UNDIVIDED - INCLUDES CONCHA, SCHERRER, COLINA, EPITAPH, AND EARP FORMATIONS (PEMIAN) AND HORQUILLA LIMESTONE (PERMIAN TO PENNSYLVANIAN
	CHINO MINE PERMIT BOUNDARY

REFERENCES

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY. GEOLOGIC MAP OF NEW MEXICO, NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES (2003) SCALE: 1:500,000. COORDINATE SYSTEM: CHINO MINES COMPANY COORDINATE SYSTEM

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

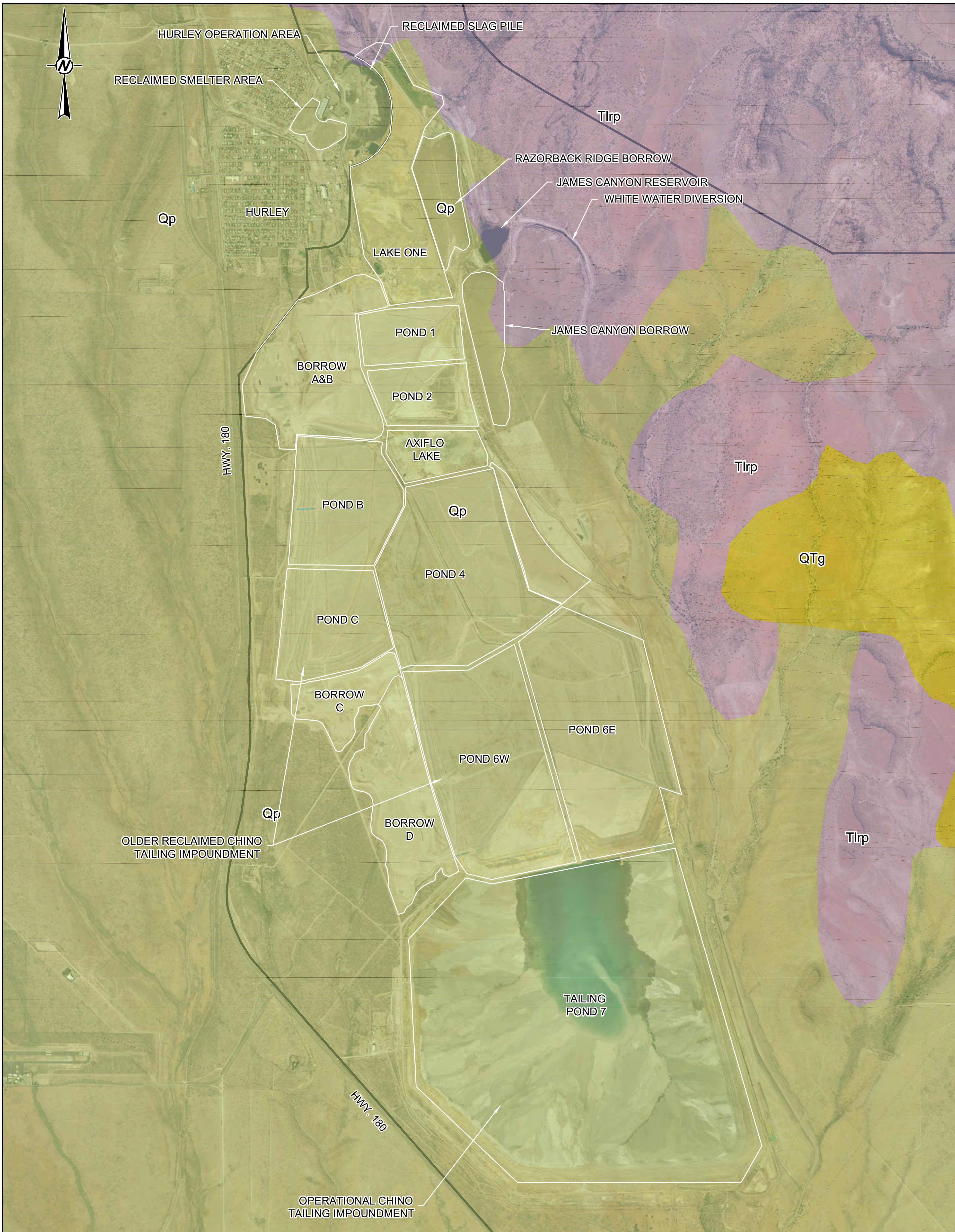
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
GEOLOGIC MAP OF THE PIPELINE CORRIDOR AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-8



LEGEND GEOLOGY

Qtg	GILA GROUP, FORMATION, OR CONGLOMERATE (MIDDLE PLEISTOCENE TO UPPERMOST OLIGOCENE?)- INCLUDES MIMBRES FORMATION AND SEVERAL INFORMAL UNITS IN SOUTHWESTERN BASINS
Qp	PEIDMONT ALLUVIAL DEPOSITS (HOLOCENE TO LOWER PLEISTOCENE)-INCLUDES DEPOSITS OF HIGHER GRADIENT TRIBUTARIES BORDERING MAJOR STREAM VALLEYS, ALLUVIAL VENEERS OF THE PIEDMONT SLOPE, AND ALLUVIAL FANS. MAY LOCALLY INCLUDE UPPERMOST PLIOCENE DEPOSITS
Tlrp	LOWER MIDDLE TERTIARY RHYOLITIC TO DACITIC PYROCLASTIC ROCKS OF THE DATIL GROUP, ASH-FLOW TUFFS (LOWER OLIGOCENE TO UPPER EOCENE, 31-36 MA0- REGIONAL ASH-FLOW TUFFS, INCLIDES SOME LOCALLY ERUPTED LAVAS AND TUFFS WITHIN THICK INTRA CALDERA UNITS; INCLUDES MINOR VOLCANIC LASTIC SEDIMENTARY UNITS AND LAVAS BETWEEN THIN OUTFLOW SHEETS
	APPROXIMATE FACILITY BOUNDARY
	CHINO MINE PERMIT BOUNDARY

REFERENCES

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY. GEOLOGIC MAP OF NEW MEXICO, NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES (2003) SCALE: 1:500,000. COORDINATE SYSTEM: CHINO MINE COMPANY COORDINATE SYSTEM

2500 0 2500

SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

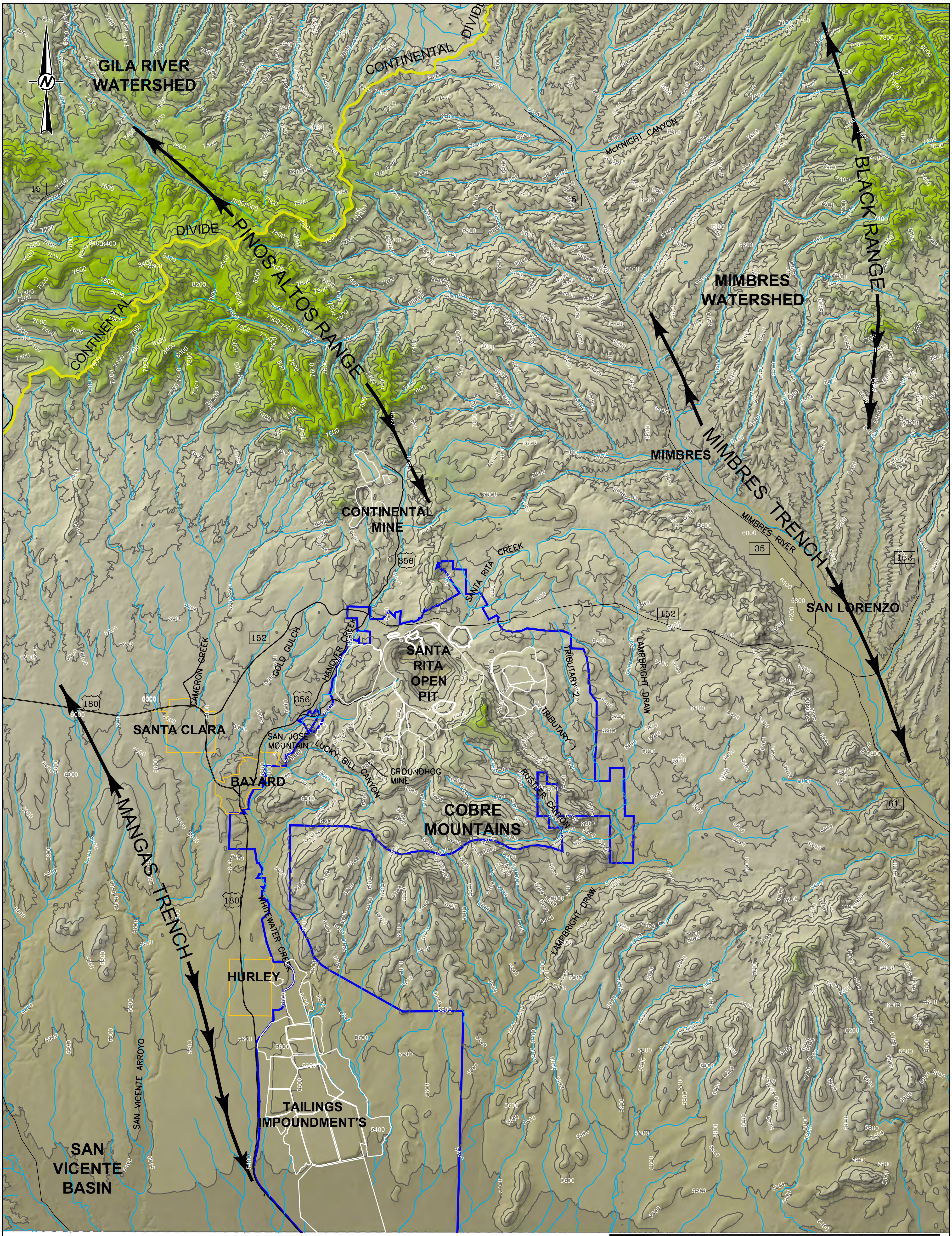
TITLE
GEOLOGIC MAP OF THE SOUTH MINE AREA

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-9



LEGEND

CONTINENTAL DIVIDE

DRAINAGES (USGS 2013)

GROUND SURFACE CONTOURS (200 FT. CONTOUR INTERVAL)

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

REFERENCES

COORDINATE SYSTEM: CHINO MINE COMPANY COORDINATE SYSTEM

SCALE 5000 0 5000 10000 FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

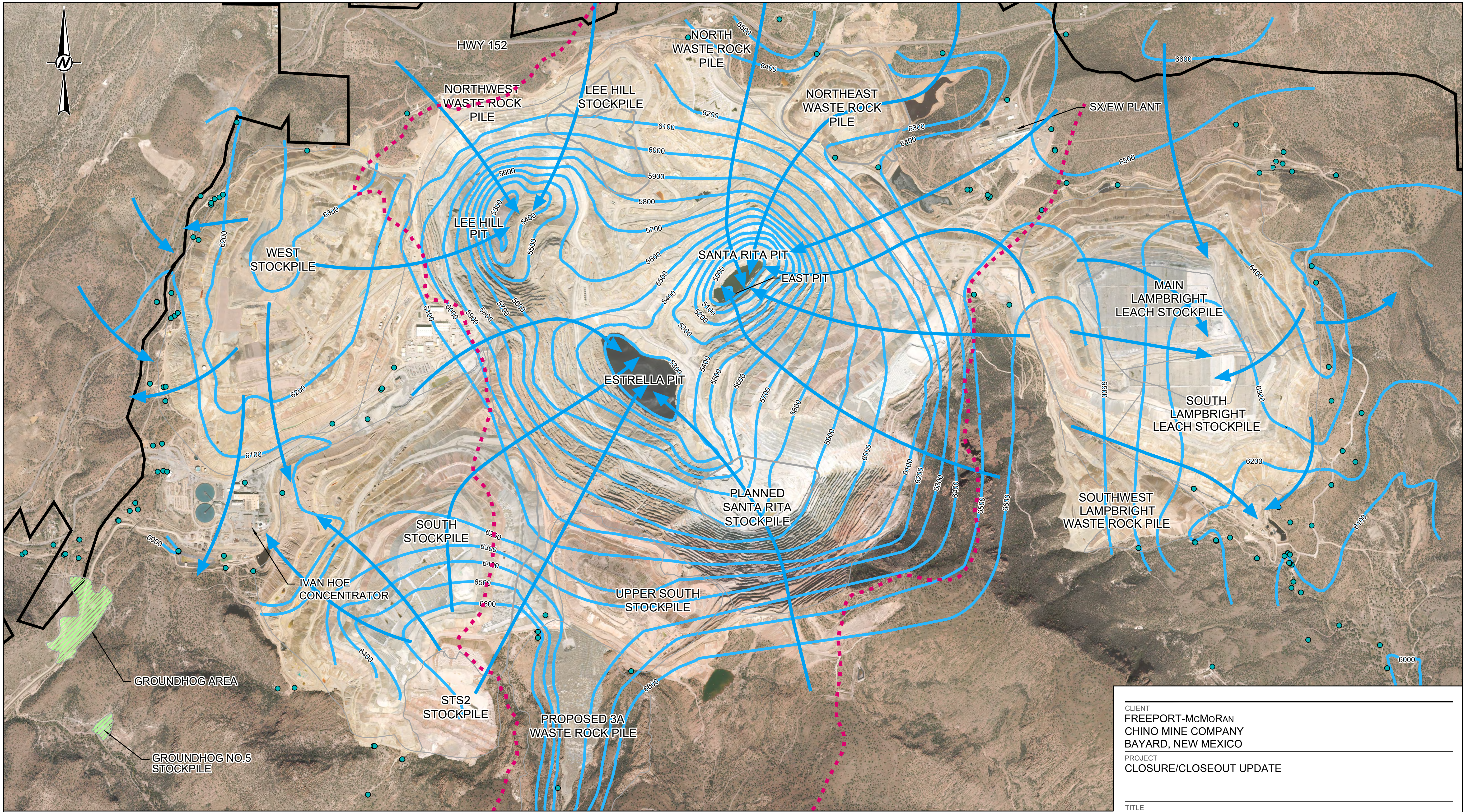
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
REGIONAL PHYSIOGRAPHIC FEATURES AND DRAINAGE MAP

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-10



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- CHINO MINE PERMIT BOUNDARY
- RECLAIMED FACILITY
- MONITOR WELL
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- 100 FT GROUNDWATER ELEVATION CONTOUR (FT MSL), DASHED WHERE INFERRED
- END OF 2018 CLOSURE OPEN PIT SURFACE DRAINAGE AREA PROVIDED BY CHINO MINE COMPANY ON 6/7/2017.

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. GROUNDWATER CONTOURS AND FLOW DIRECTIONS FROM CHINO MINE COMPANY, AUGUST 2016.
3. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

1800 0 1800

SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

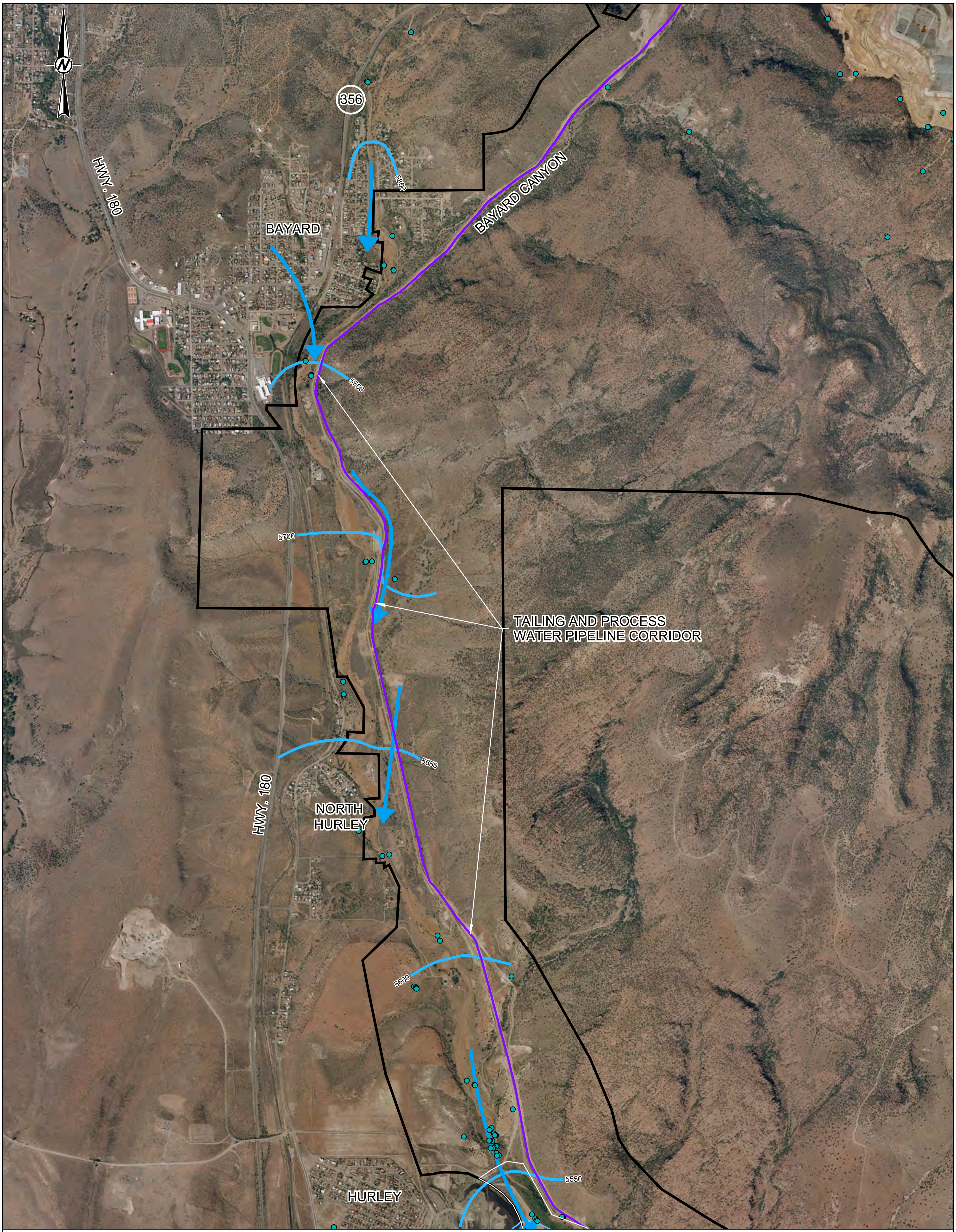
TITLE
GROUNDWATER ELEVATIONS AND FLOW DIRECTION MAP NORTH MINE AREA

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-11



LEGEND

- CHINO MINE PERMIT BOUNDARY
- MONITOR WELL
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- 50 FT GROUNDWATER ELEVATION CONTOUR (FT MSL), DASHED WHERE INFERRED
- 10 FT GROUNDWATER ELEVATION CONTOUR (FT MSL), DASHED WHERE INFERRED

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. GROUNDWATER CONTOURS AND FLOW DIRECTIONS FROM CHINO MINE COMPANY, DECEMBER 2016.
3. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
4. GROUNDWATER ELEVATIONS FROM DECEMBER 2016 WATER LEVEL MEASUREMENT.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

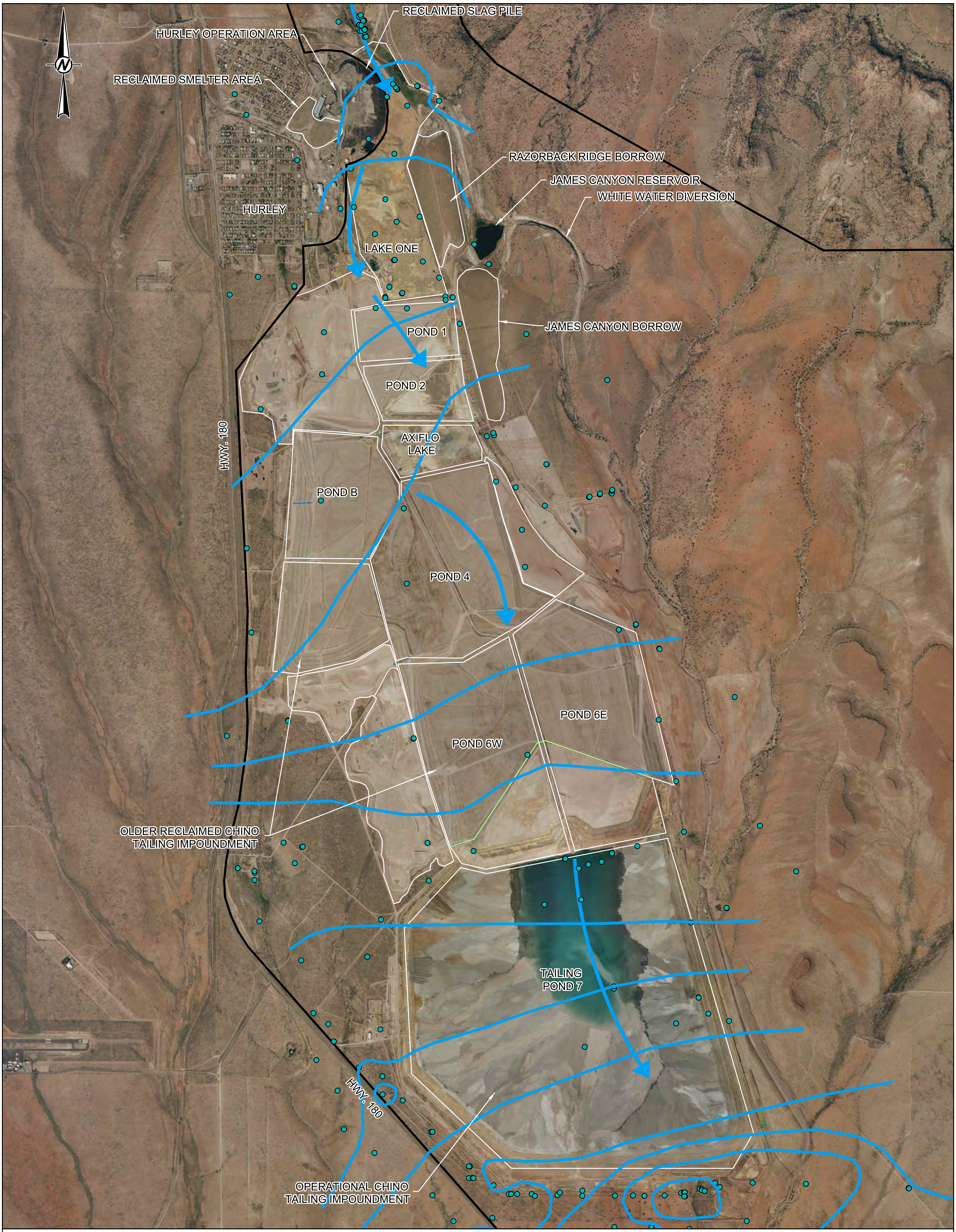
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
GROUNDWATER ELEVATION AND FLOW DIRECTIONS MAP PIPELINE CORRIDOR AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-12



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- CHINO MINE PERMIT BOUNDARY
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- 50 FT GROUNDWATER ELEVATION CONTOUR (FT MSL), DASHED WHERE INFERRED
- 10 FT GROUNDWATER ELEVATION CONTOUR (FT MSL), DASHED WHERE INFERRED
- MONITOR WELL

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. GROUNDWATER CONTOURS AND FLOW DIRECTIONS FROM CHINO MINE COMPANY, DECEMBER 2016.
3. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
4. GROUNDWATER ELEVATIONS FROM DECEMBER 2016 WATER LEVEL MEASUREMENT.

2500 0 2500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
GROUNDWATER ELEVATIONS AND FLOW DIRECTION MAP SOUTH MINE AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-13

Vegetation

- Fluvial Forest and Shrubland Alliance
- Mesquite/Mixed Grama Shrubland Alliance
- Mine Facilities/Urban
- Ponderosa Pine-Oak Forest Alliance
- Alligator Juniper-Oak Woodland Alliance
- Mountain Mahogany Shrubland Alliance
- Mixed-Grama Herbacious Alliance
- Alligator Juniper-Oak/Grama Woodland Alliance

Adapted from DBS&A (2000)

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

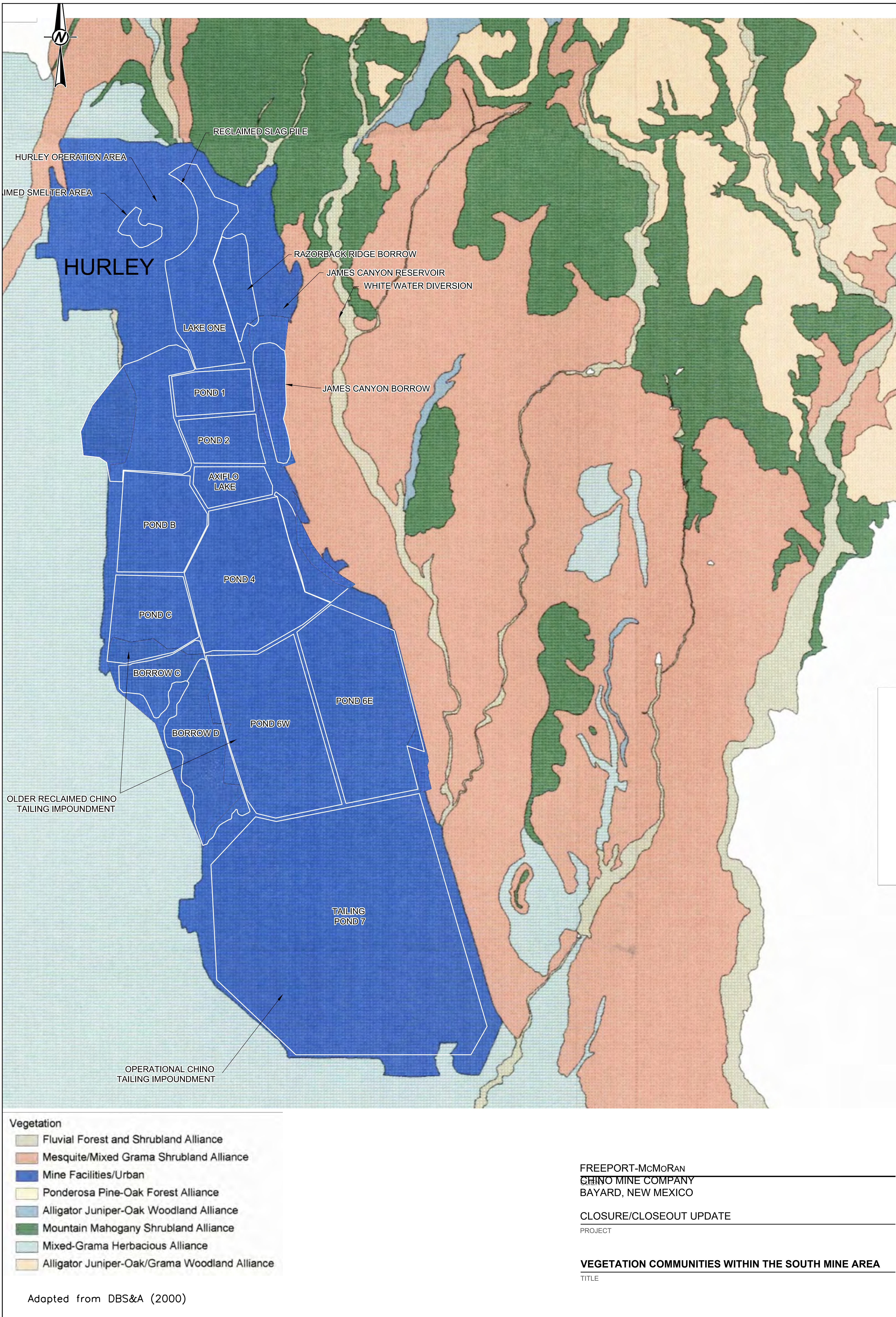
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
VEGETATION COMMUNITIES WITHIN THE NORTH MINE AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-14



FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

CLOSURE/CLOSEOUT UPDATE

PROJECT

VEGETATION COMMUNITIES WITHIN THE SOUTH MINE AREA

TITLE

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-15

LEGEND

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-376 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-376 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 600 1200 1800
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
DP-376: LAMPBRIGHT LEACH SYSTEM AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-16

LEGEND

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-591 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-591 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 200 400 600
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
DP-591: SX-EW PLANT AREA

CONSULTANT

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-17

LEGEND

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-459 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-459 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
DP-459: MAIN PIT, NORTH IN-PIT LEACH SYSTEM, AND NORTHEAST, NORTH, NORTHWEST AND LEE HILL WASTE ROCK PILES

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-18

LEGEND

APPROXIMATE FACILITY BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-493/526 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-493/526 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
DP-493/526: RESERVOIR 3A, RESERVOIR 9, HIGHWAY TO HEAVEN, WHITEWATER LEACH SYSTEM

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-19

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-213 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-213 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 150 300 450
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
DP-213: IVANHOE CONCENTRATOR AND ASSOCIATED PIPELINES

PROJECT No.		Rev.	
11301153	6	0	3-20

LEGEND

- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- RECLAIMED FACILITY
- CHINO MINE PERMIT BOUNDARY
- 5 FOOT CONTOURS

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-214 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-214 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 300 600 900
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
NORTHERN AREA OF DP-214: HURLEY SMELTER, LAKE ONE, OLDER TAILINGS, AXIFLO LAKE, LOWER WHITEWATER CREEK

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-21

LEGEND

- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- 5 FOOT CONTOURS
- AREAS
- CHINO MINE PERMIT BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY (TOPOGRAPHY ONLY SHOWN FOR SURVEY COVERAGE).
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-214 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-214 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 800 1600 2400
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

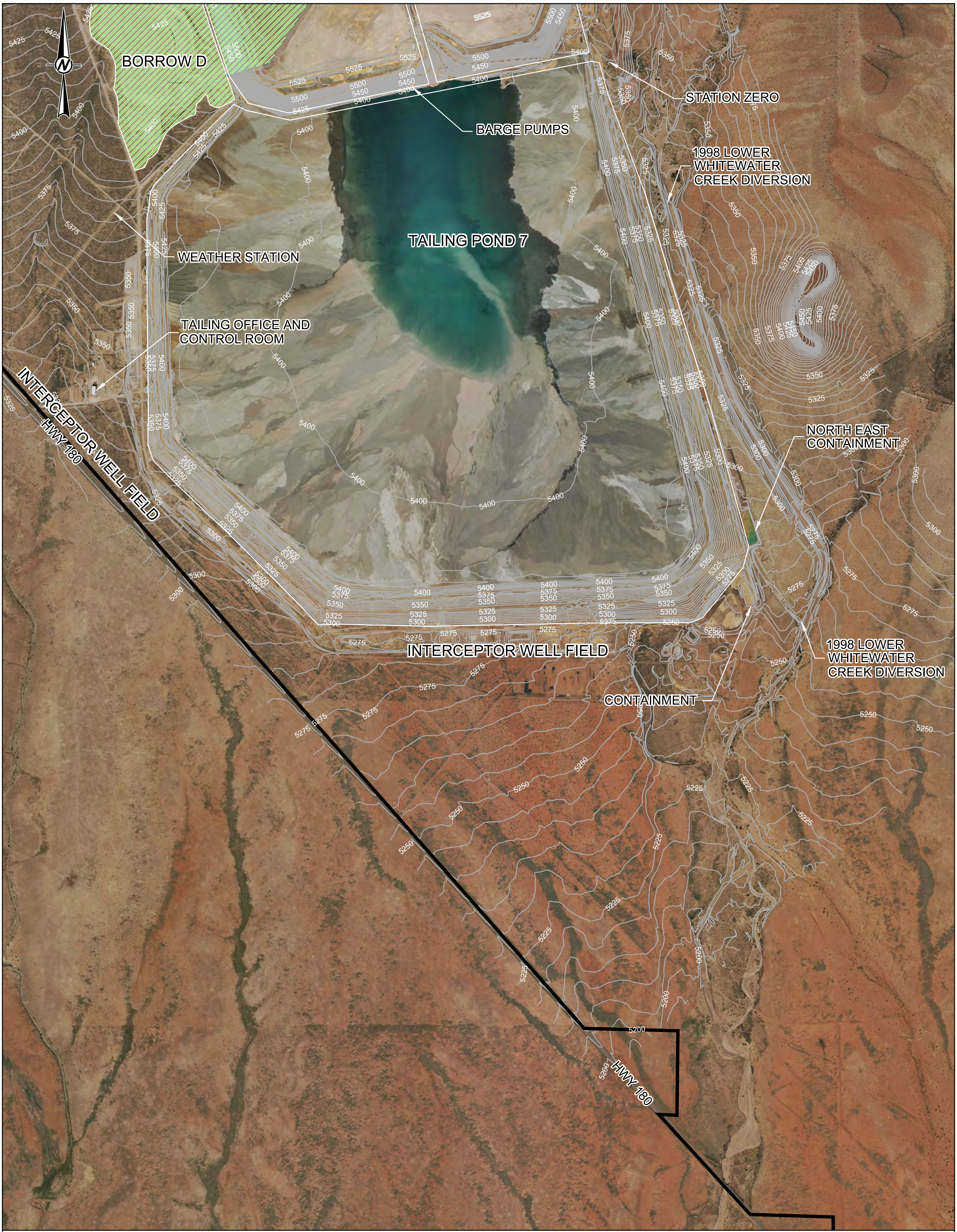
TITLE
SOUTHERN AREA OF DP-214: HURLEY SMELTER, LAKE ONE, OLDER TAILINGS, AXI FLO LAKE, LOWER WHITEWATER CREEK

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-22



LEGEND

- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- 5 FOOT CONTOURS
- RECLAIMED AREAS
- CHINO MINE PERMIT BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY (TOPOGRAPHY ONLY SHOWN FOR SURVEY COVERAGE.
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-484 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-484 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 750 1500 2250
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

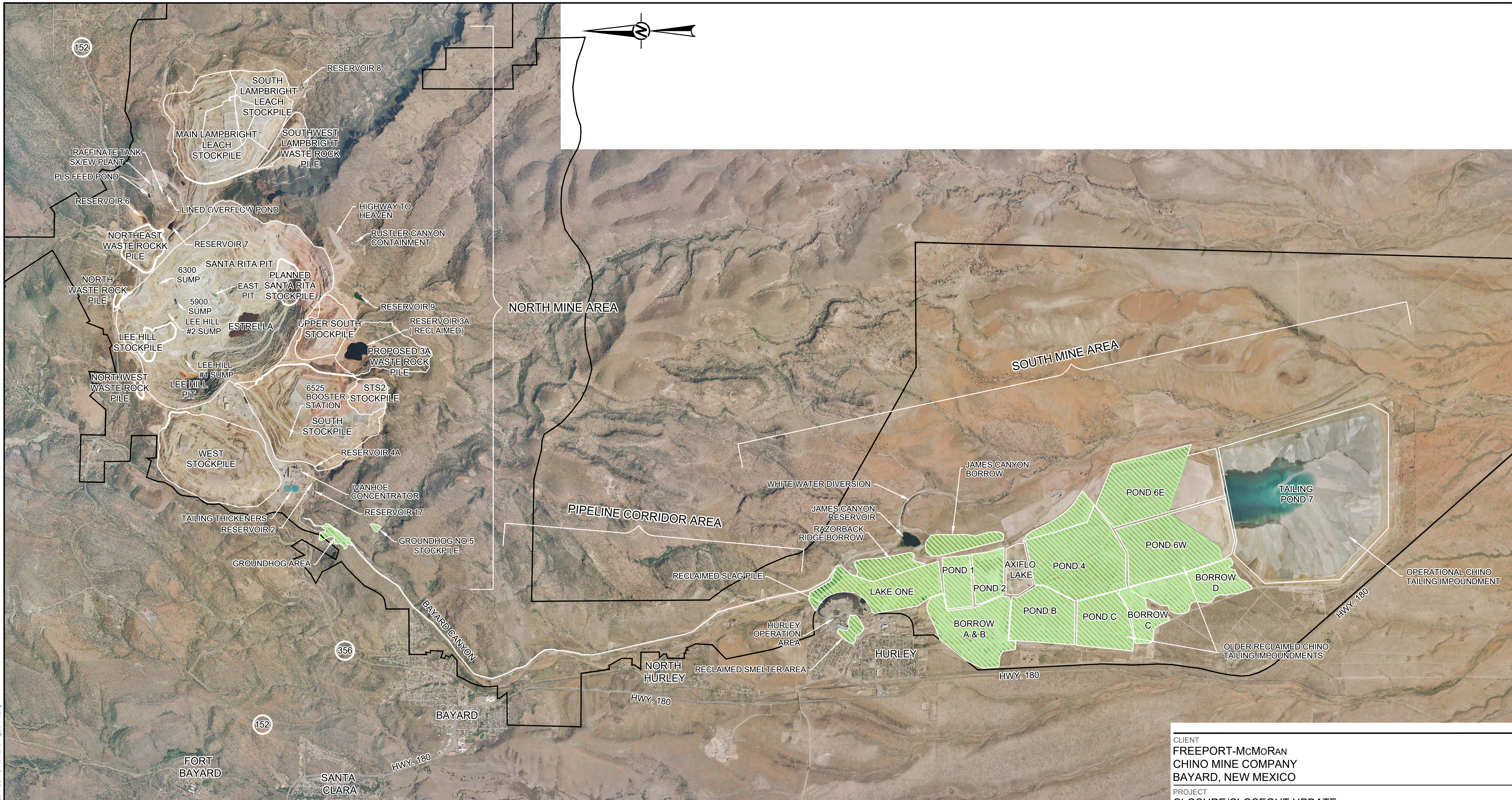
TITLE
DP-484: TAILING POND 7

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3-23



LEGEND

RECLAIMED AREAS

APPROXIMATE FACILITY BOUNDARY

356 STATE HIGHWAY 356

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COMPANY COORDINATE SYSTEM.

0 2500 5000 7500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
RECLAIMED AREAS BY THE END OF YEAR 2018

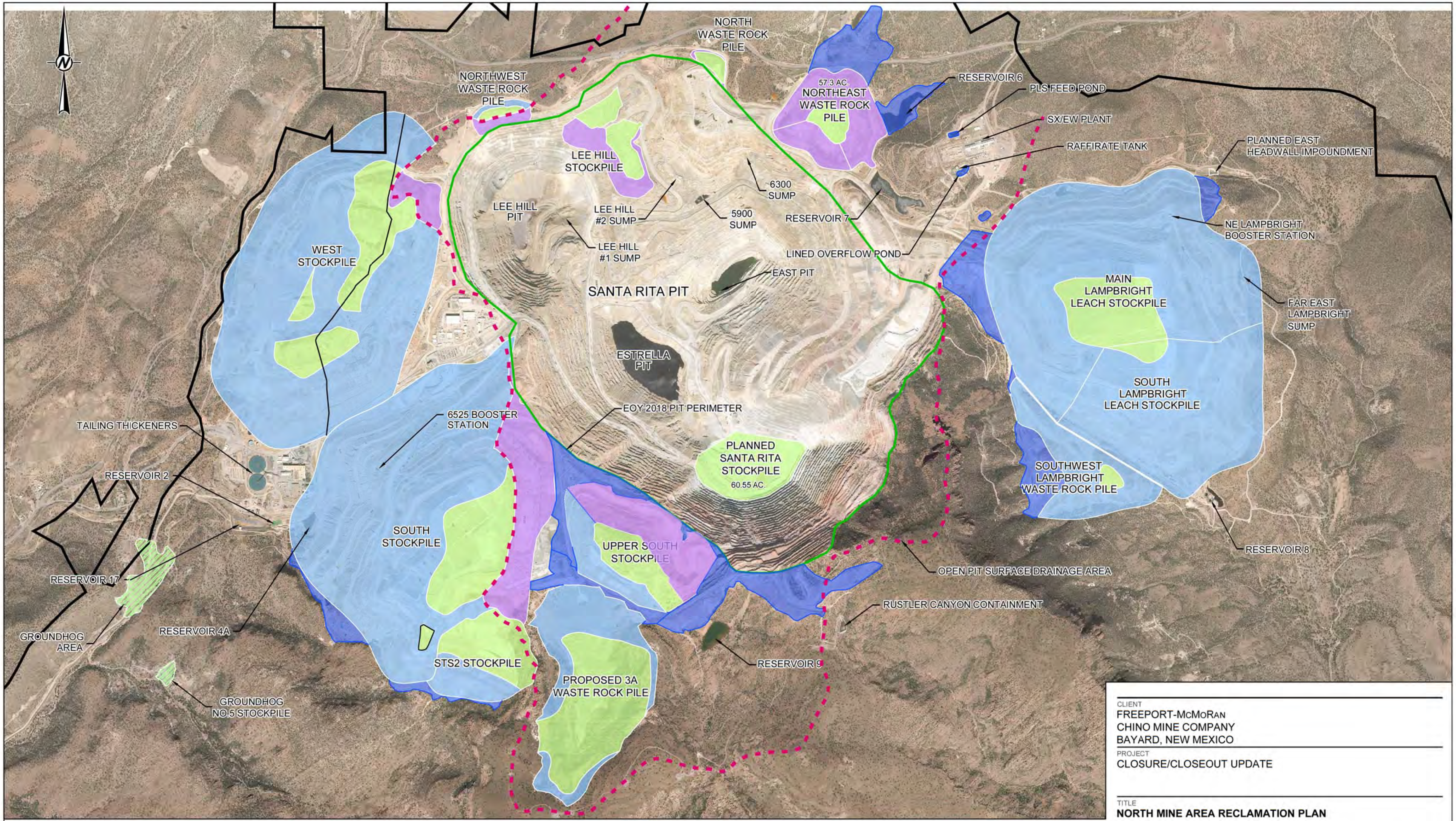
CONSULTANT

Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	####
APPROVED	####

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	4-1

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



LEGEND

- STOCKPILE OUTSLOPE AREA TO BE RECLAIMED
- STOCKPILE TOP SURFACE AREA TO BE RECLAIMED
- CONDITIONALLY WAIVED STOCKPILE AREA (NO REGRADING OR COVER PLACEMENT)
- DISTURBED AREA TO BE RECLAIMED
- RECLAIMED FACILITY
- APPROXIMATE FACILITY BOUNDARY AT END OF YEAR 2018
- END OF YEAR 2018 CLOSURE OPEN PIT SURFACE DRAINAGE AREA (OPSDA) PROVIDED BY CHINO MINE COMPANY ON 6/07/2017.
- PIT PERIMETER (FROM FMI "END OF YEAR 2018 TOPOGRAPHY CHINO MINE)
- CHINO MINE PERMIT BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

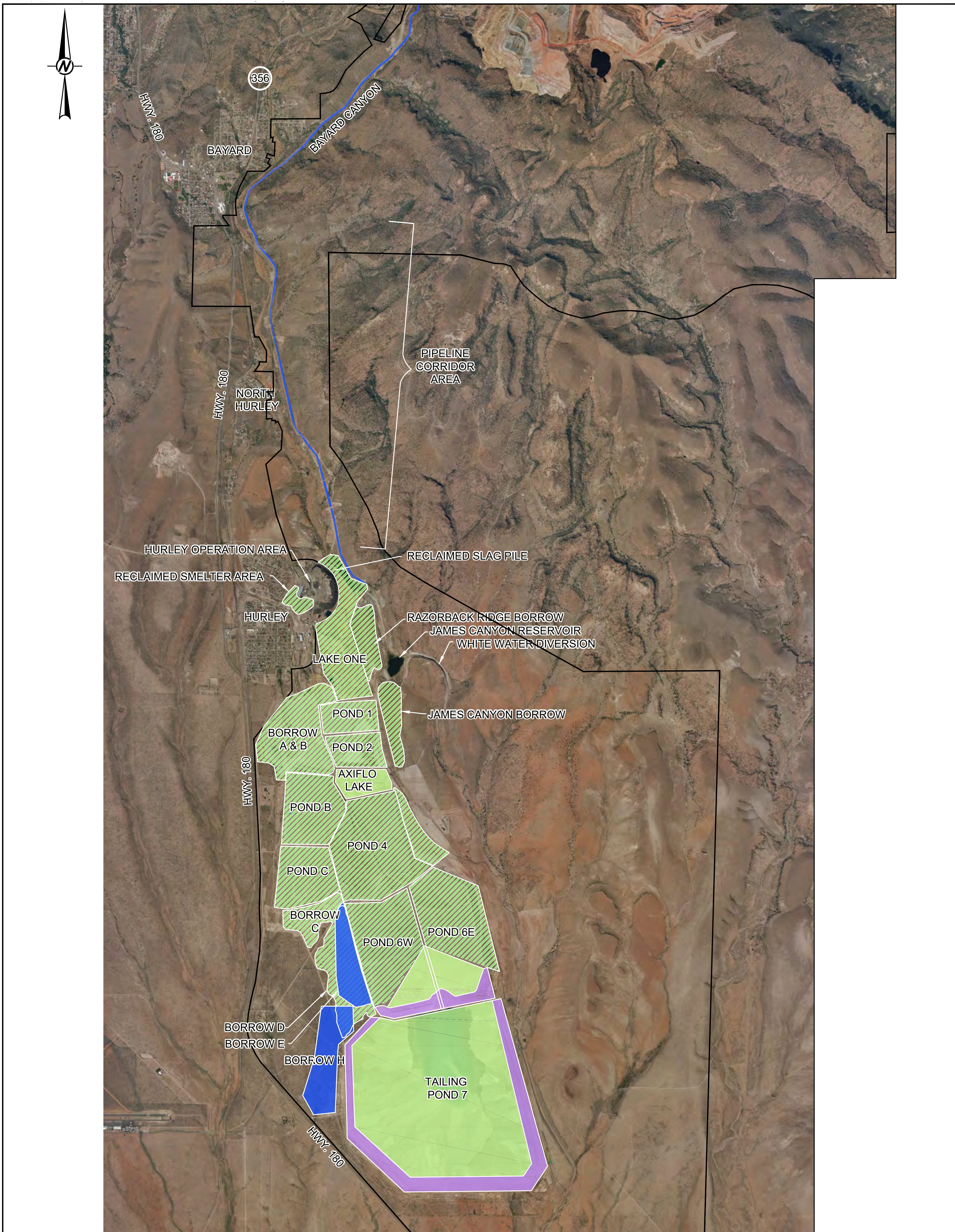
TITLE
NORTH MINE AREA RECLAMATION PLAN

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	5-1



LEGEND

- TOPSURFACE AREA TO BE RECLAIMED
- OUTSLOPE AREA TO BE RECLAIMED
- RECLAIMED FACILITY
- CHINO MINE PERMIT BOUNDARY
- DISTURBED AREA TO BE RECLAIMED

REFERENCE

COORDINATE SYSTEM: CHINO MINE COMPANY COORDINATE SYSTEM.
SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

4500 0 4500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
PIPELINE CORRIDOR AREA AND SOUTH MINE AREA RECLAMATION PLAN

CONSULTANT

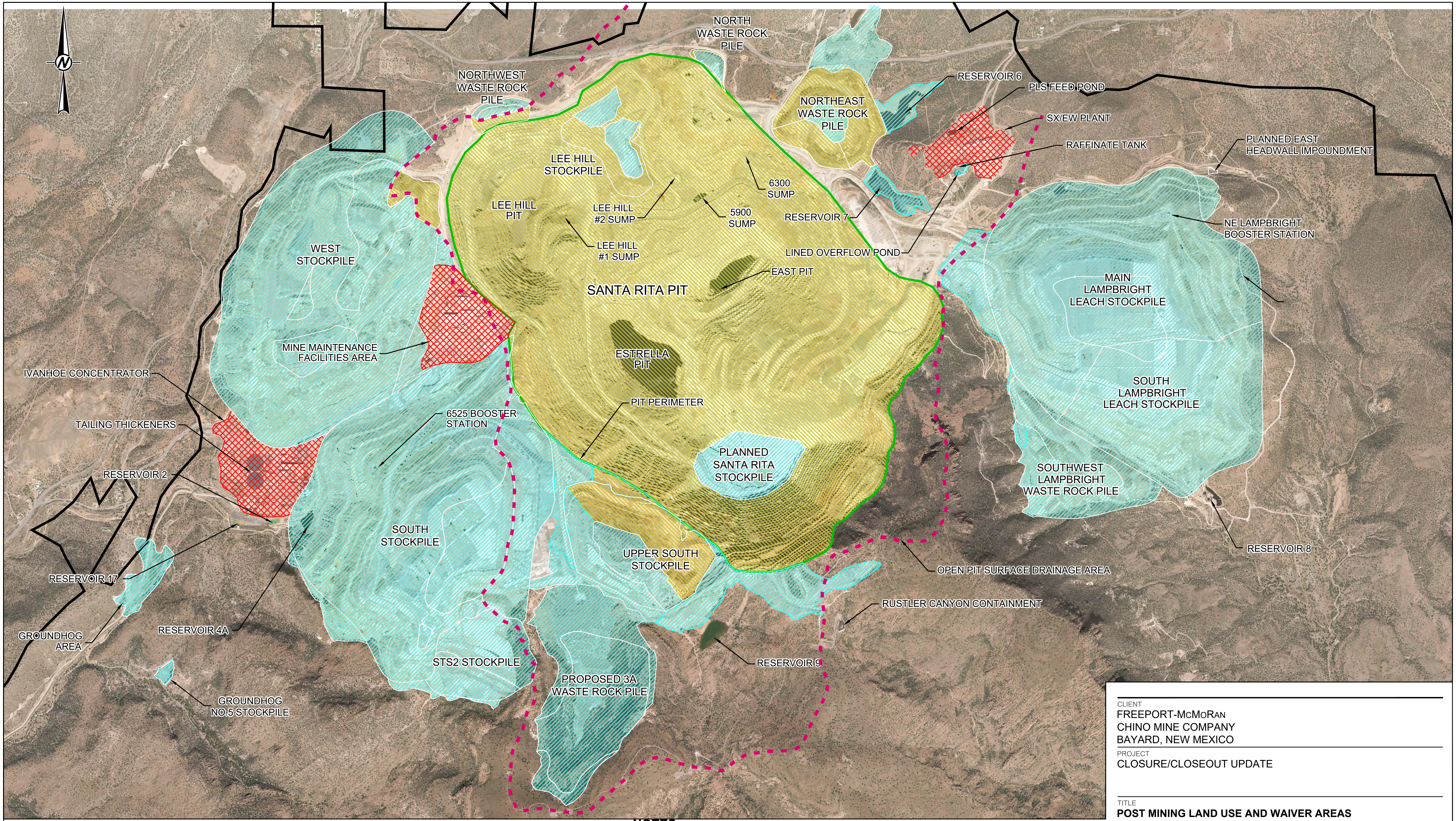
Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	5-2

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

1 in



LEGEND

- END OF YEAR 2018 CONDITIONAL WAIVER AREAS
- INDUSTRIAL PMLU
- WILDLIFE PMLU
- APPROXIMATE RECLAIMED FACILITY BOUNDARY (FOLLOWING REGRADING)
- END OF YEAR 2018 CLOSURE OPEN PIT SURFACE DRAINAGE AREA (OPSDA) PROVIDED BY CHINO MINE COMPANY ON 6/07/2017.
- PIT PERIMETER (FROM FMI "END OF YEAR 2018 TOPOGRAPHY CHINO MINE)
- CHINO MINE PERMIT BOUNDARY

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

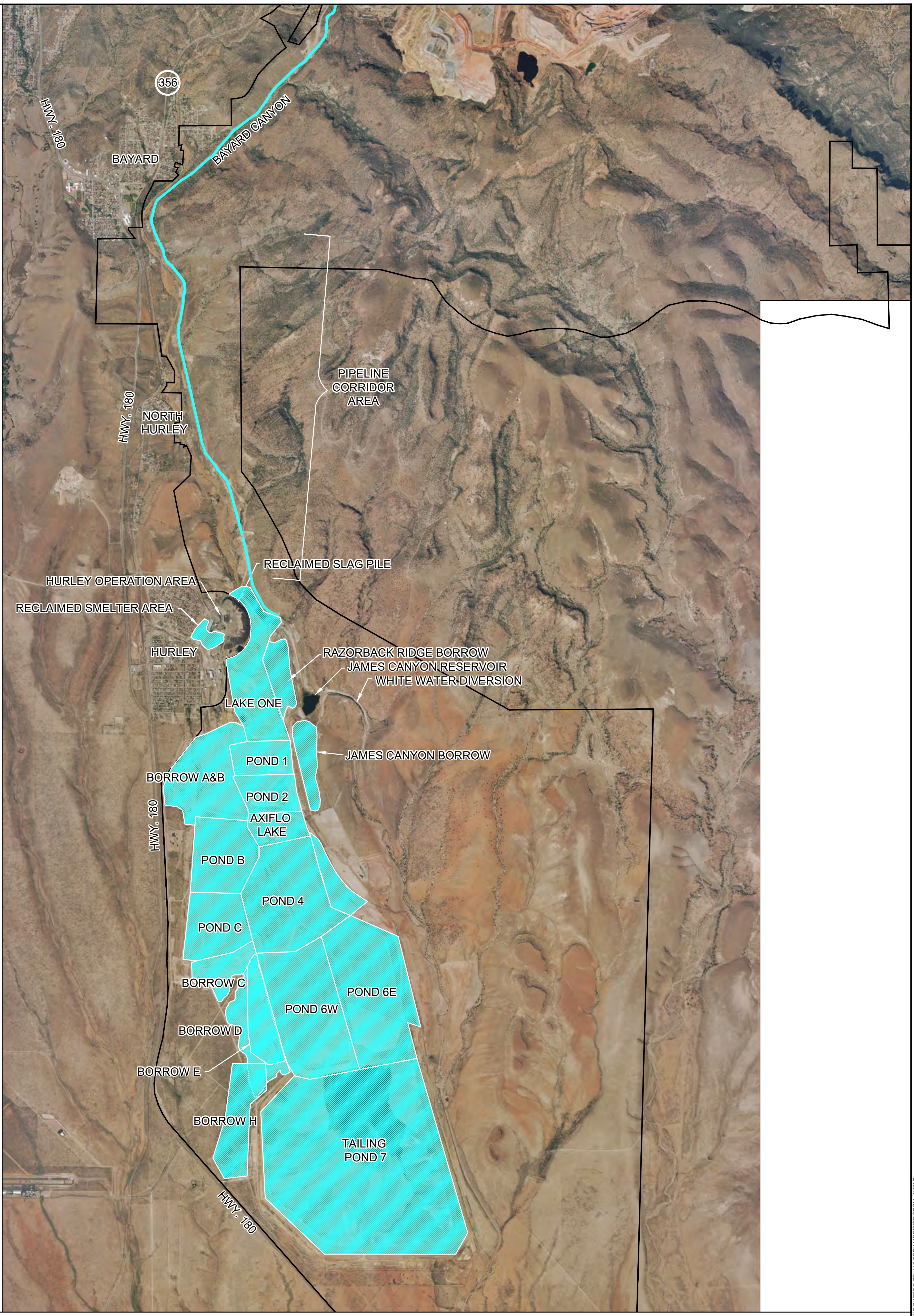
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
POST MINING LAND USE AND WAIVER AREAS IN THE NORTH MINE AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	8-1



LEGEND

WILDLIFE POST MINING LAND USE

CHINO MINE PERMIT BOUNDARY

REFERENCE

COORDINATE SYSTEM: CHINO MINE COMPANY COORDINATE SYSTEM.
SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

4500 0 4500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
POST-MINING LAND USE AND WAIVER AREAS IN THE PIPELINE CORRIDOR AREA AND SOUTH MINE AREA

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-06-01
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	8-2

PLATES

LEGEND

RECLAIMED AREAS

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

STATE HIGHWAY 356

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COMPANY COORDINATE SYSTEM.

0 2500 5000 7500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
CHINO MINE FACILITIES MAP

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	PLATE 1

LEGEND

RECLAIMED AREAS

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COORDINATE SYSTEM.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

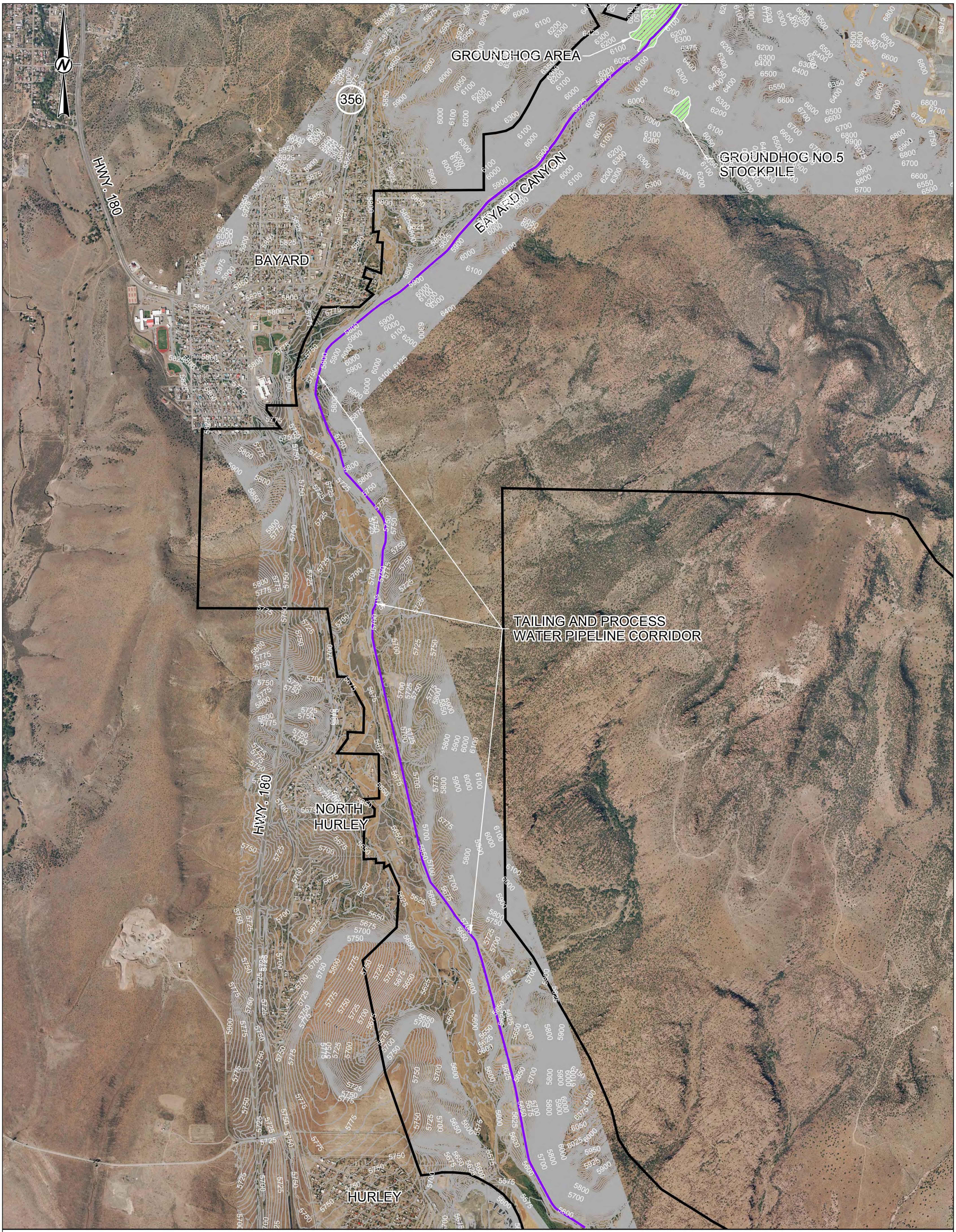
TITLE
NORTH MINE AREA LOCATION MAP

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	PLATE 2



LEGEND

- RECLAIMED AREAS
- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATE BASED ON CHINO MINE COMPANY COORDINATE SYSTEM

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

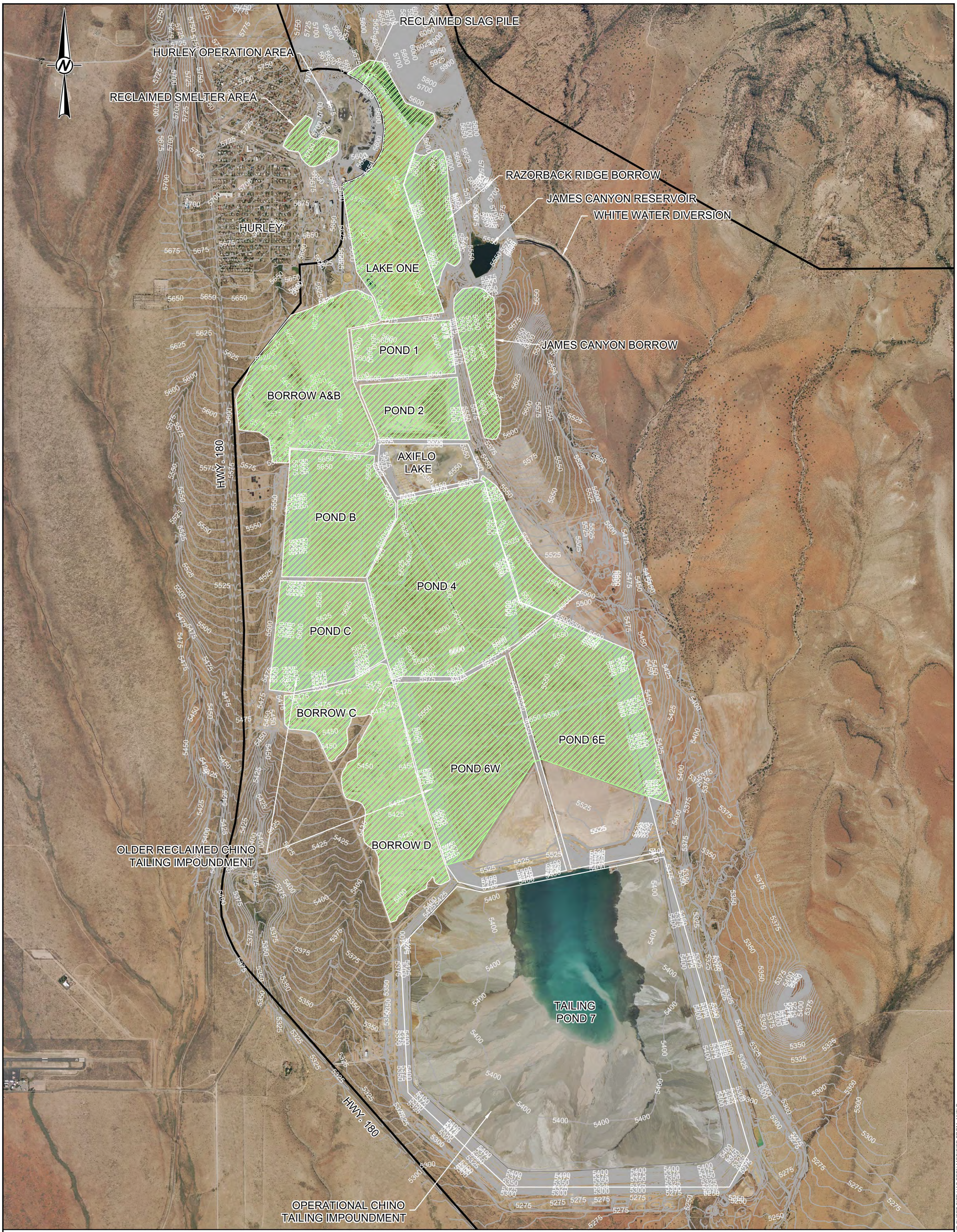
PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
PIPELINE CORRIDOR AREA LOCATION MAP

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	PLATE 3



LEGEND

RECLAIMED AREAS

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES BASED ON CHINO MINE COMPANY COORDINATE SYSTEM

2500 0 2500
SCALE FEET

CLIENT
FREEPORT-McMoRAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
SOUTH MINE AREA LOCATION MAP

CONSULTANT

Golder Associates

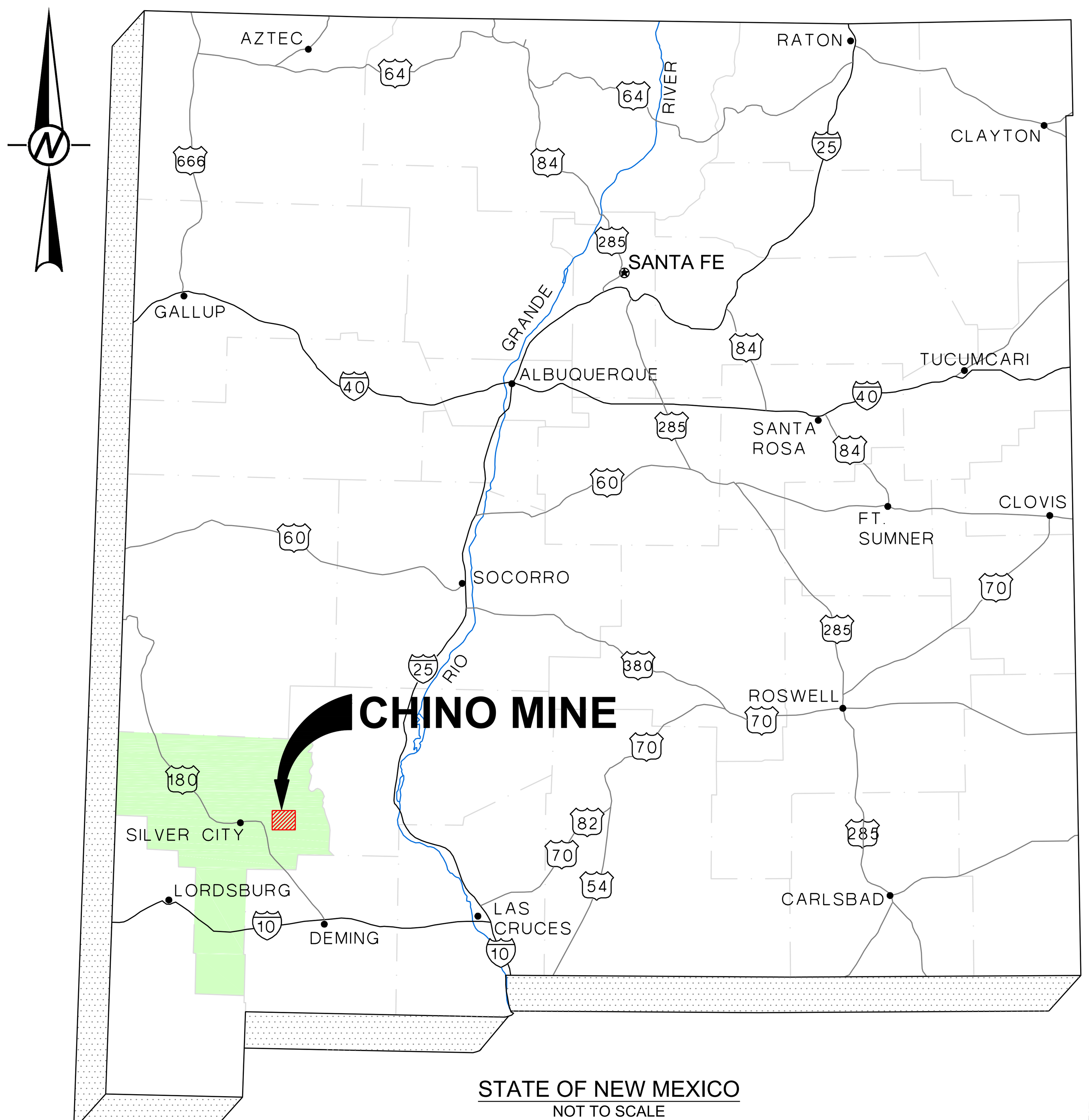
YYYY-MM-DD	2017-05-25
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	PLATE 4

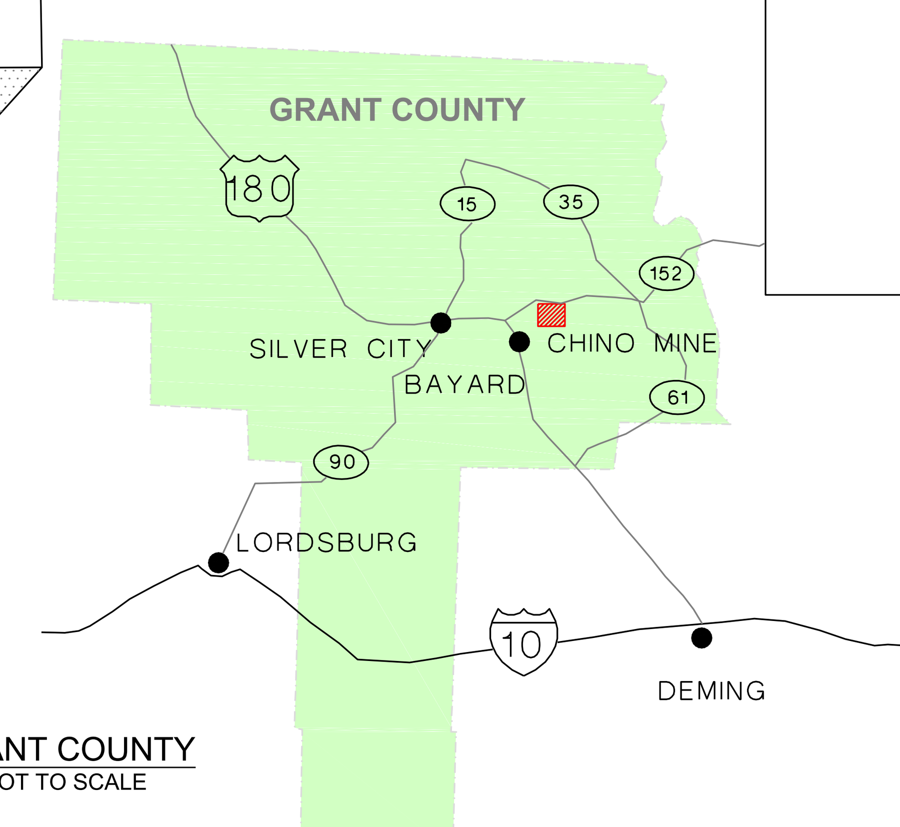
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX A
RECLAMATION DESIGN DRAWINGS

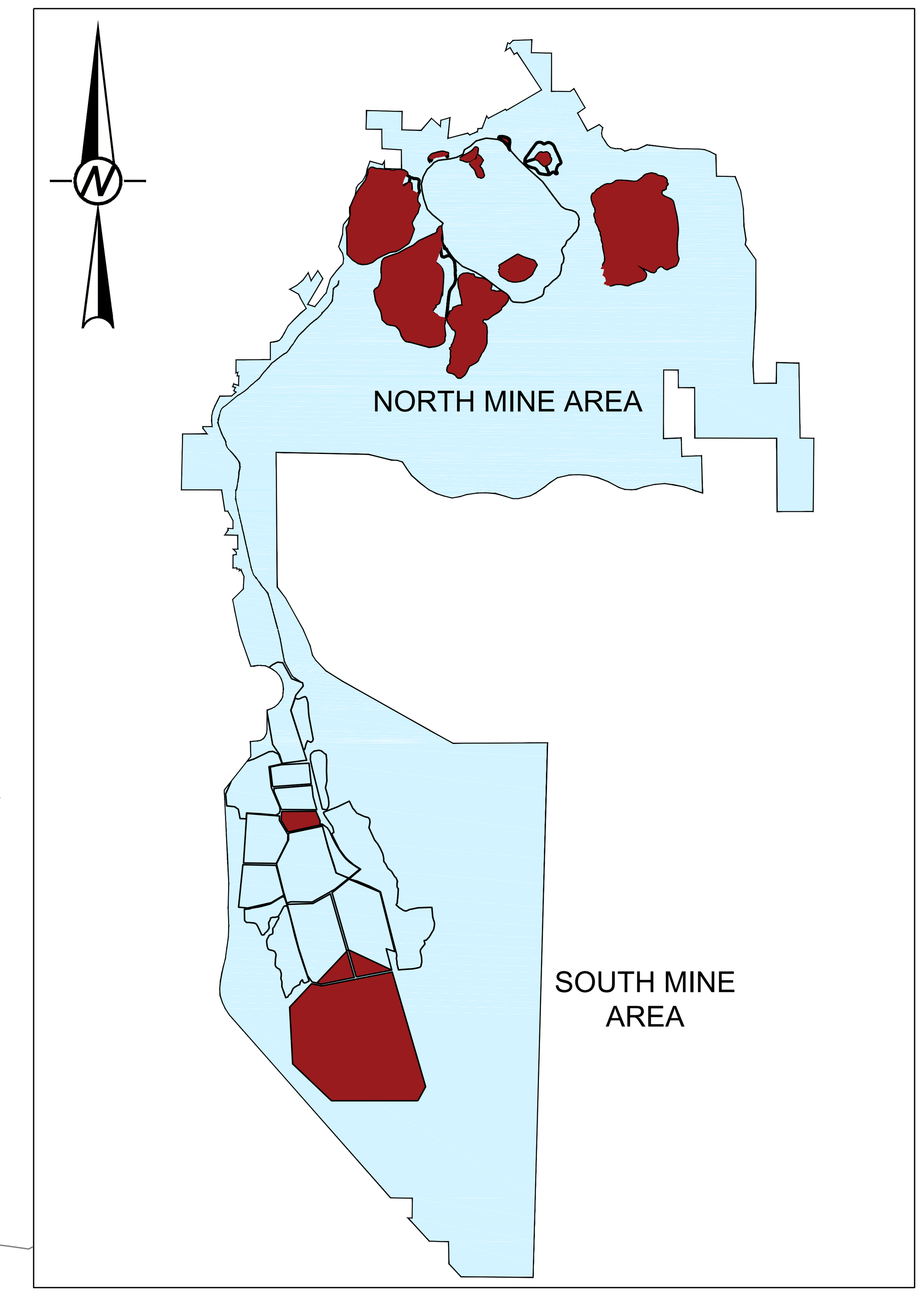
CHINO MINES COMPANY
CHINO MINE AREA RECLAMATION
HURLEY, NEW MEXICO
APRIL 2016



STATE OF NEW MEXICO
NOT TO SCALE



GRANT COUNTY
NOT TO SCALE



CHINO MINE AREA
NOT TO SCALE

SHEET INDEX		
SHEET NUMBER	DRAWING TITLE	REVISION
001	SHEET INDEX AND LOCATION PLAN	C
002	NORTH MINE AREA END OF YEAR 2018 PRE-RECLAMATION TOPOGRAPHY	C
003	NORTH MINE AREA POST-RECLAMATION TOPOGRAPHY	A
004	SOUTH STOCKPILE AND STS2 STOCKPILE GRADING AND DRAINAGE PLAN	C
005	SOUTH STOCKPILE AND STS2 STOCKPILE DESIGN SECTIONS (1 OF 2)	C
006	SOUTH STOCKPILE AND STS2 STOCKPILE DESIGN SECTIONS (2 OF 2)	C
007	LAMPBRIGHT STOCKPILE GRADING AND DRAINAGE PLAN	C
008	LAMPBRIGHT STOCKPILE DESIGN SECTIONS (1 OF 2)	C
009	LAMPBRIGHT STOCKPILE DESIGN SECTIONS (2 OF 2)	C
010	WEST STOCKPILE GRADING AND DRAINAGE PLAN	C
011	WEST STOCKPILE DESIGN SECTIONS (1 OF 3)	C
012	WEST STOCKPILE DESIGN SECTIONS (2 OF 3)	C
013	WEST STOCKPILE DESIGN SECTIONS (3 OF 3)	C
014	NORTH PIT AREA STOCKPILES GRADING AND DRAINAGE PLAN	C
015	NORTH PIT AREA STOCKPILES DESIGN SECTIONS (1 OF 2)	C
016	NORTH PIT AREA STOCKPILES DESIGN SECTIONS (2 OF 2)	C
017	PROPOSED 3A STOCKPILE GRADING AND DRAINAGE PLAN	C
018	PROPOSED 3A STOCKPILE DESIGN SECTIONS	C
019	PLANNED SANTA RITA STOCKPILE GRADING AND DRAINAGE PLAN	C
020	UPPER SOUTH STOCKPILE GRADING AND DRAINAGE PLAN	C
021	NORTH MINE AREA BORROW LOCATIONS AND HAUL ROUTES	C
022	TYPICAL RECLAMATION GRADING DETAILS	C
023	SOUTH MINE AREA END OF YEAR 2018 PRE-RECLAMATION TOPOGRAPHY	C
024	SOUTH MINE AREA POST-RECLAMATION TOPOGRAPHY	A
025	AXI-FLO LAKE GRADING AND DRAINAGE PLAN	C
026	AXI-FLO LAKE DESIGN SECTIONS	C
027	TAILING POND 6 EAST, 6 WEST AND 7 GRADING AND DRAINAGE PLAN	C
028	TAILING POND 6 EAST, 6 WEST AND 7 DESIGN SECTIONS (1 OF 2)	C
029	TAILING POND 6 EAST, 6 WEST AND 7 DESIGN SECTIONS (2 OF 2)	C
030	SOUTH MINE AREA BORROW AREAS & HAUL ROUTES	C

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

SEAL

CLIENT
CHINO MINES COMPANY

CONSULTANT

Golder Associates

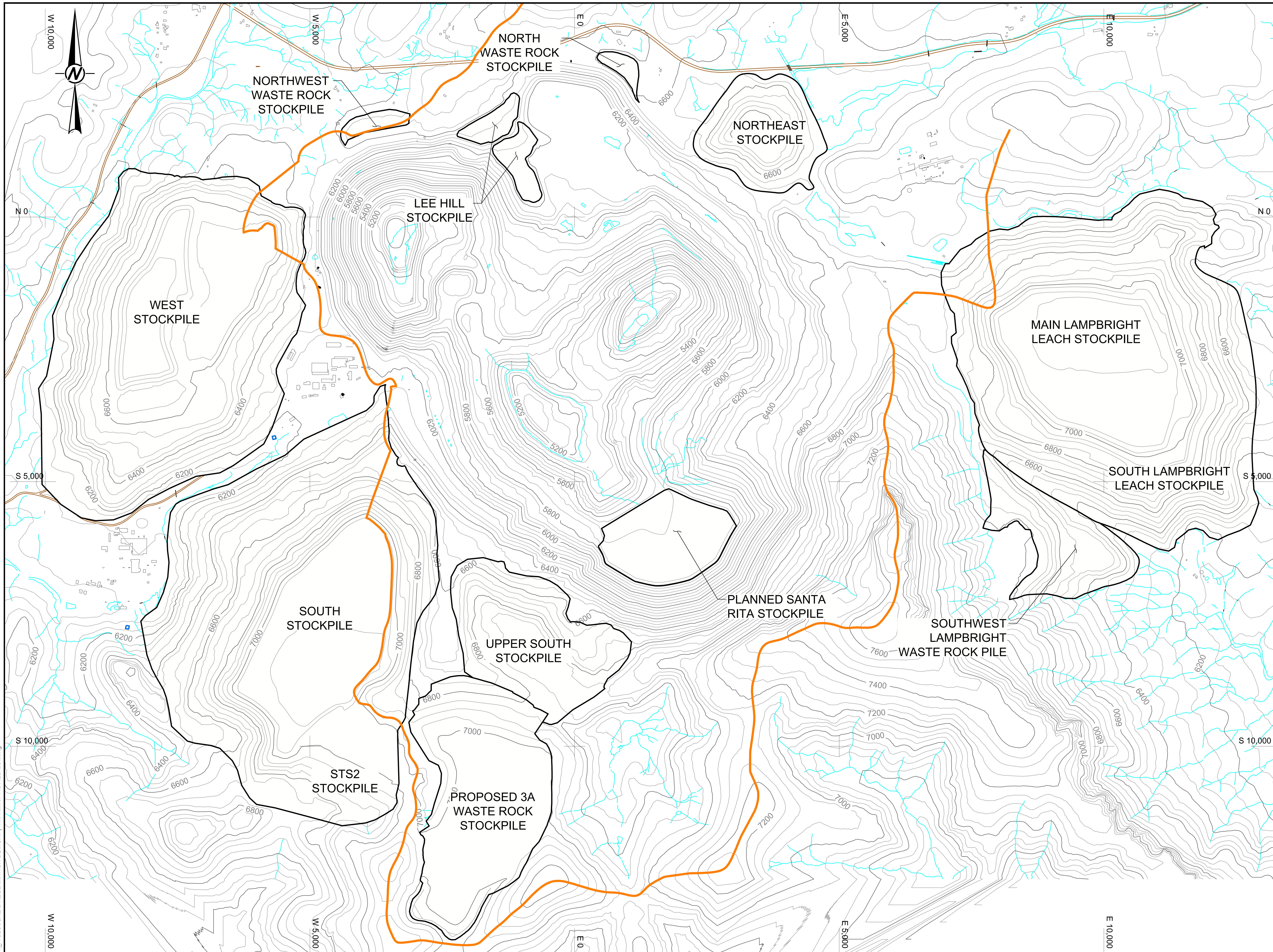
DENVER OFFICE
44 Union Boulevard, Suite 300
Lakewood, Colorado
USA 80228
[+1] (303) 980 0540
www.golder.com

PROJECT
CHINO MINE AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
SHEET INDEX AND LOCATION PLAN

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	1 of 30	001

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



LEGEND

5600	EOY 2018 TOPO
	BUILDINGS
	PAVED ROAD
	EXISTING DRAINAGE
	FACILITY TOE LIMITS

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 500 1000
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	CM	CM	TMF	BRB

SEAL

CLIENT
CHINO MINES COMPANY

CONSULTANT
Golder Associates

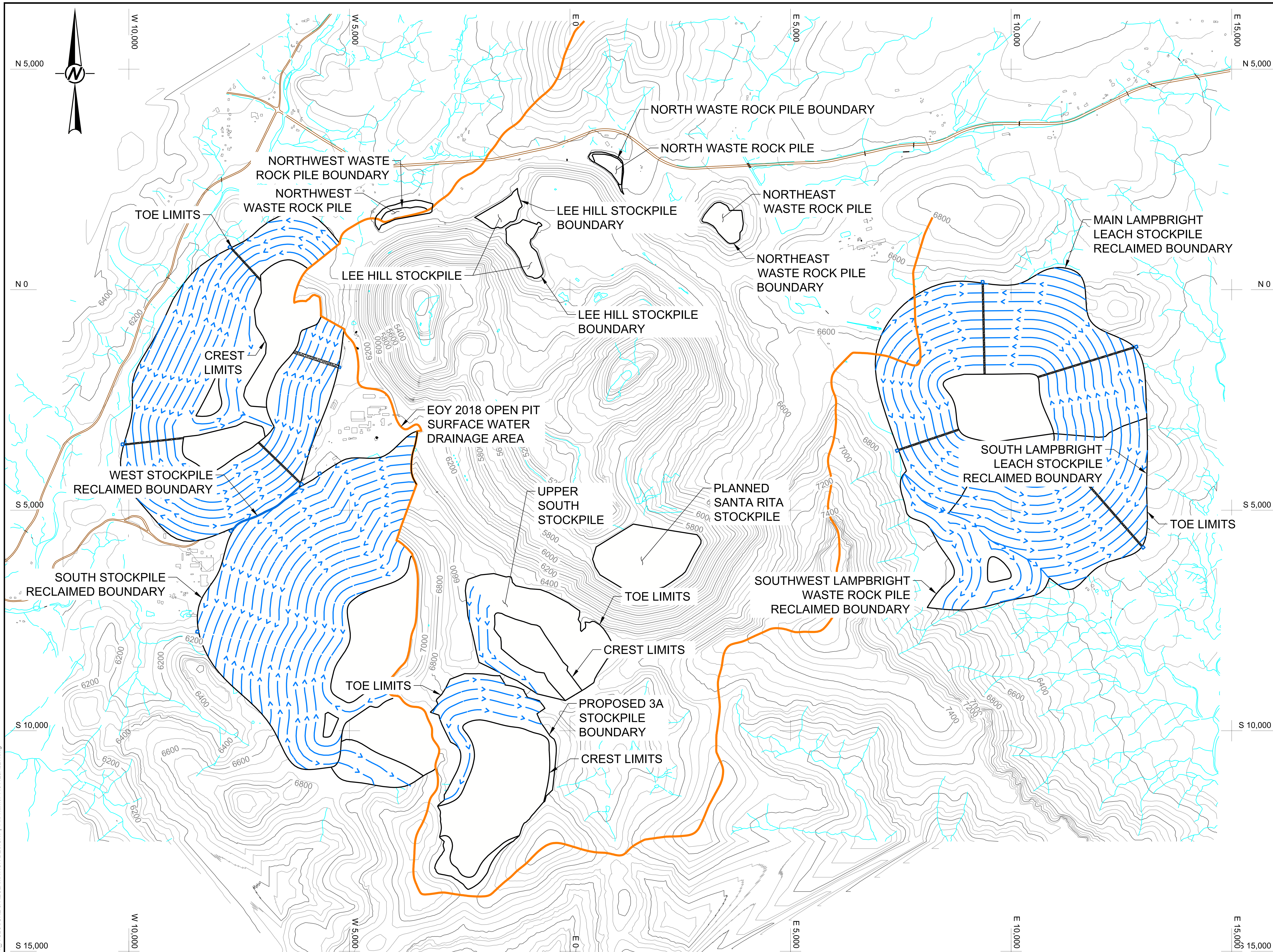
DENVER OFFICE
44 Union Boulevard, Suite 300
Lakewood, Colorado
USA 80228
[+1] (303) 980 0540
www.golder.com

PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
NORTH MINE AREA END OF YEAR 2018 PRE-RECLAMATION TOPOGRAPHY

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	2 of 30	002

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



LEGEND

- 5600 — EOY 2018 TOPO
- BUILDINGS
- PAVED ROAD
- EXISTING DRAINAGE
- FACILITY TOE LIMITS
- SURFACE WATER DRAINAGE CHANNEL

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 1200 2400
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
A	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	LRS	DET	TMF	BRB

SEAL

CLIENT
CHINO MINES COMPANY

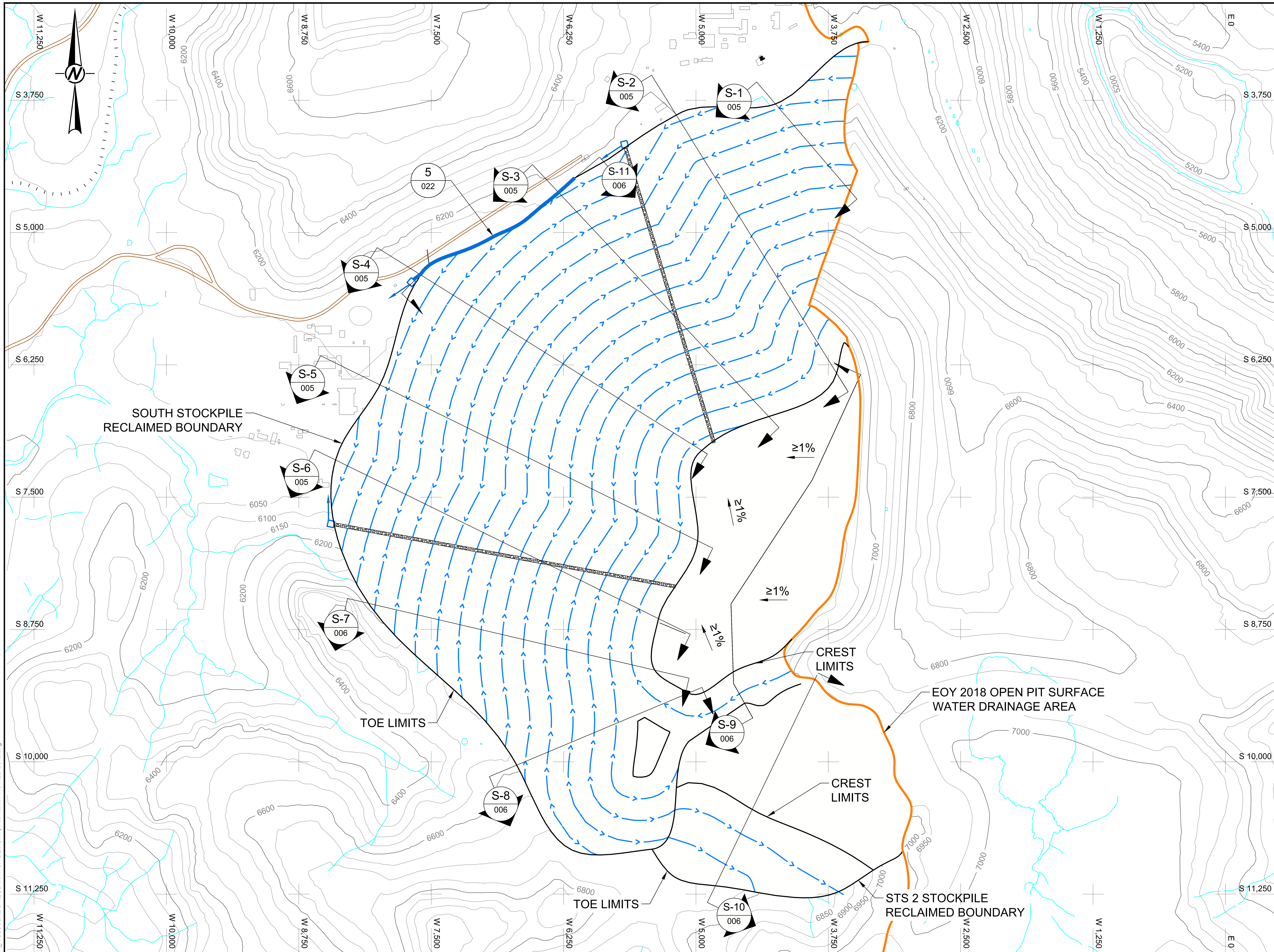
CONSULTANT
Golder Associates

DENVER OFFICE
44 Union Boulevard, Suite 300
Lakewood, Colorado
USA 80228
[+1] (303) 980 0540
www.golder.com

PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
NORTH MINE AREA POST-RECLAMATION TOPOGRAPHY

PROJECT No. 1401129 | CONTROL | Rev. A | 3 of 30 | FIGURE 003



LEGEND

- 5600 EOY 2018 TOPO
- BUILDINGS
- PAVED ROAD
- DOWNDRAIN OUTFLOW
- EXISTING DRAINAGE
- BENCH CHANNEL
- DOWNDRAIN
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- SURFACE WATER DRAINAGE CHANNEL
- ENERGY DISSIPATOR
- S-7 / 006: CROSS SECTION LETTER; SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 500 1000
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	CM	DET	TMF	BRB

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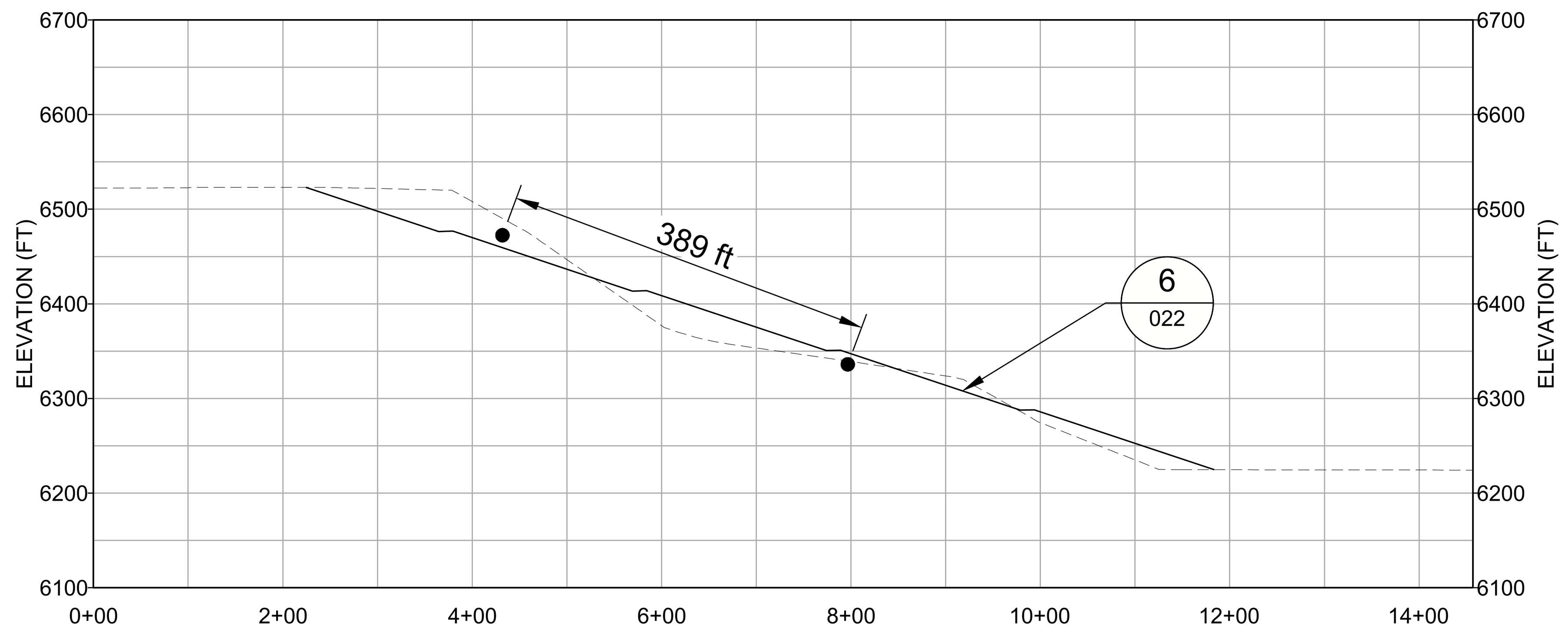
PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

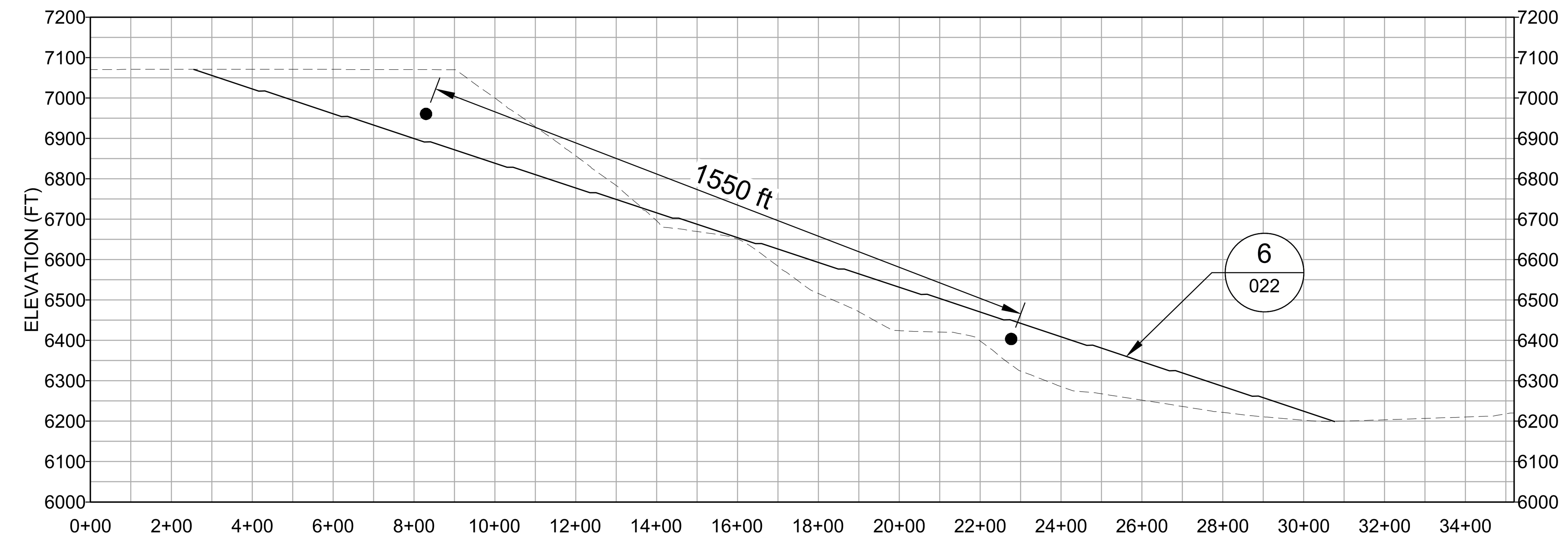
TITLE
SOUTH STOCKPILE AND STS2 STOCKPILE GRADING AND DRAINAGE PLAN

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	3 of 30	004

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



SCALE A S-1 SECTION S-1
004



SCALE B S-2 SECTION S-2
004

LEGEND

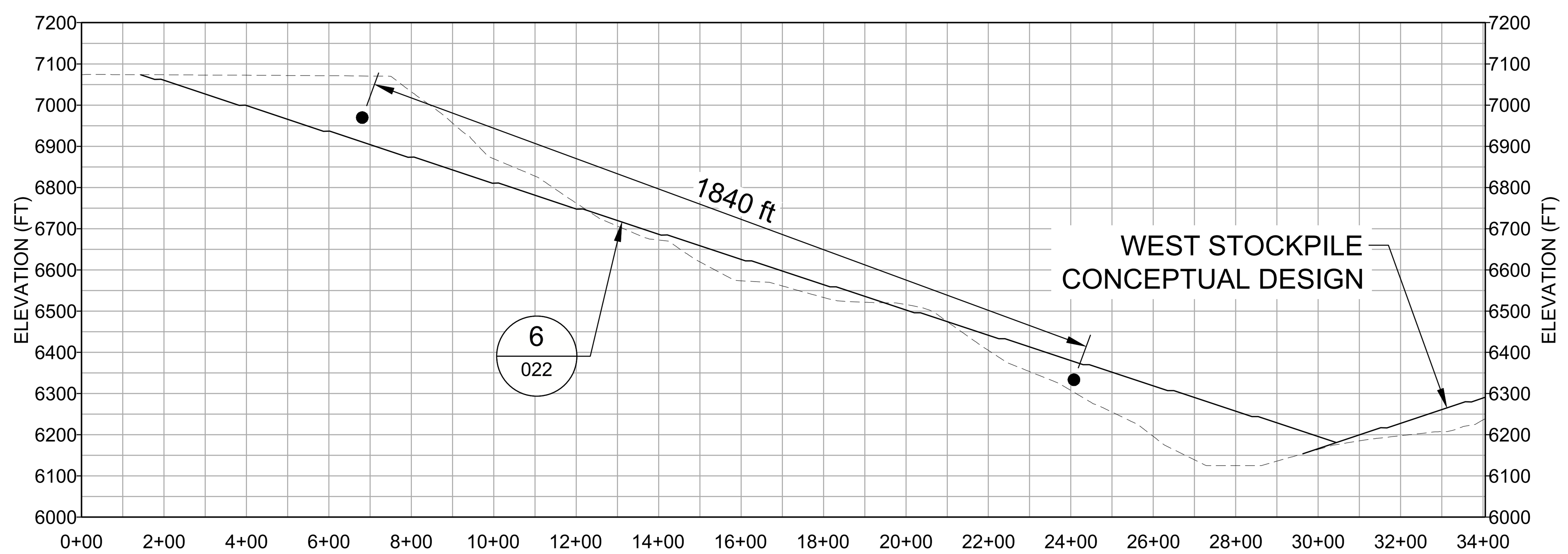
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

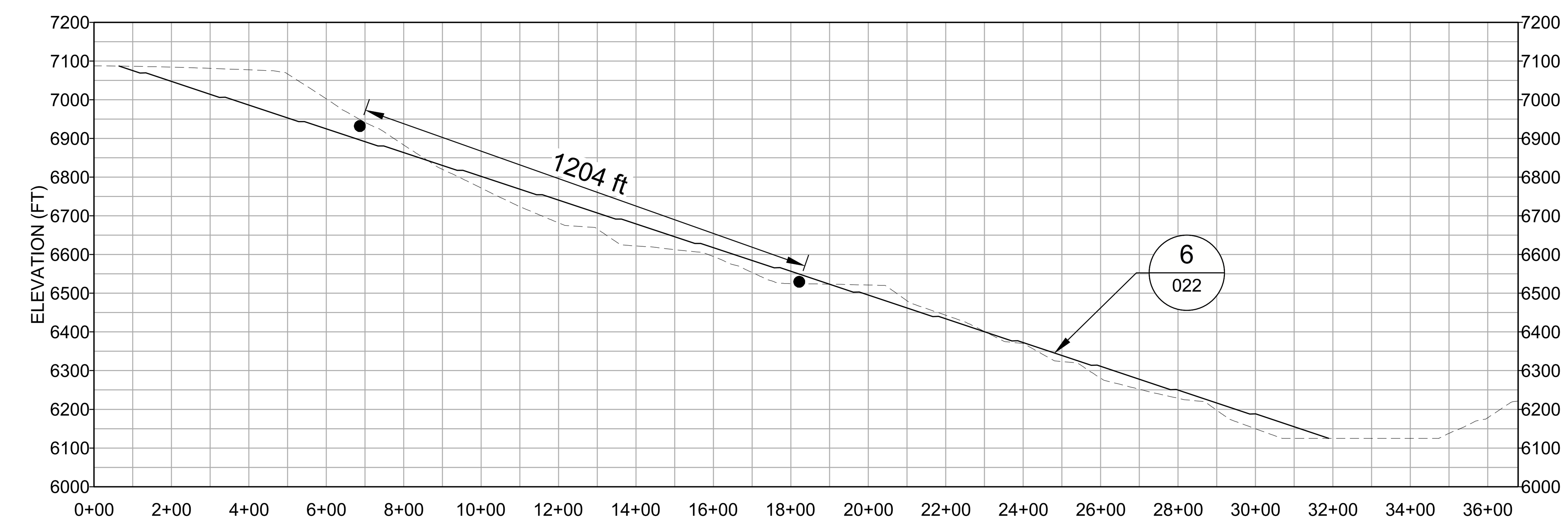
CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



SCALE B S-3 SECTION S-3
004



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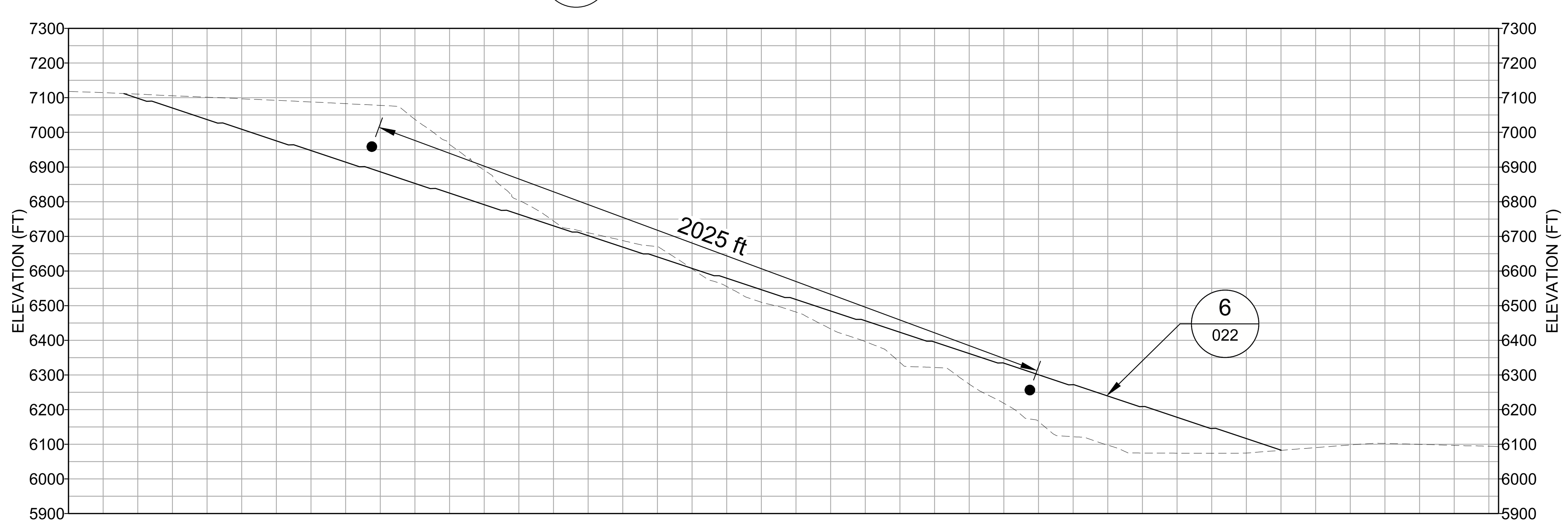
004



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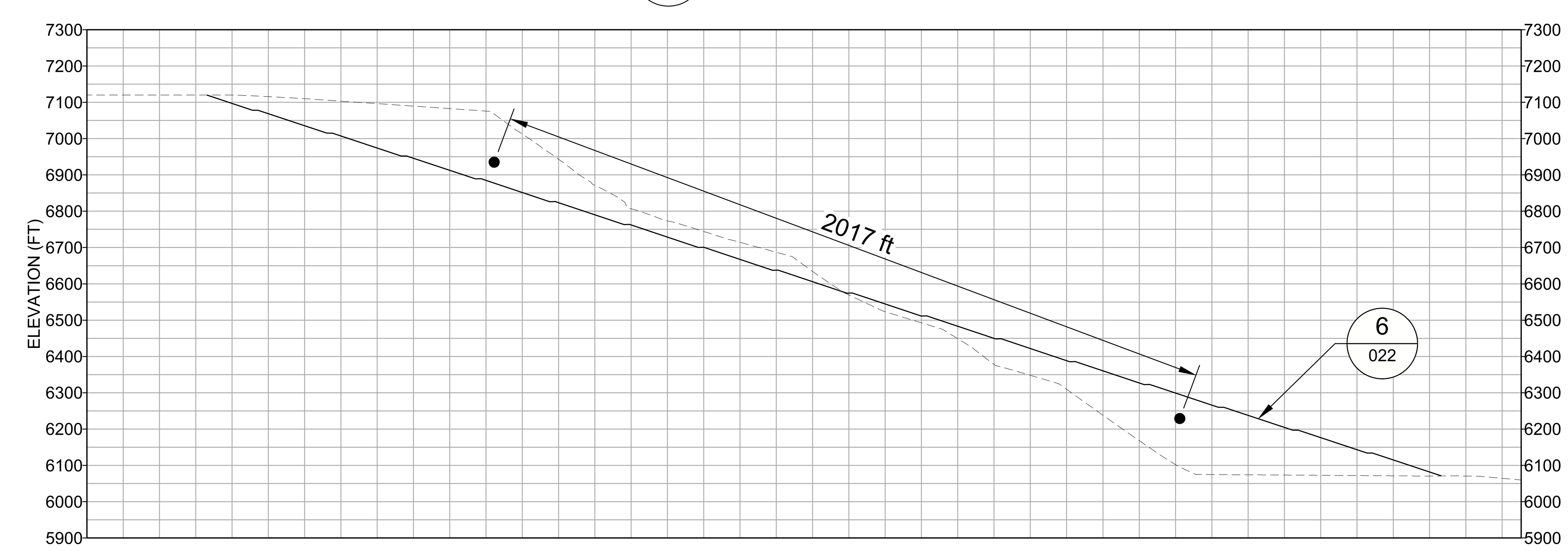
004



SCALE B S-6 SECTION S-6
004

0 150 300
SCALE A FEET

0 300 600
SCALE B FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT

CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE

SOUTH STOCKPILE AND STS2 STOCKPILE DESIGN SECTIONS (1 OF 2)

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	4 of 30	005

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

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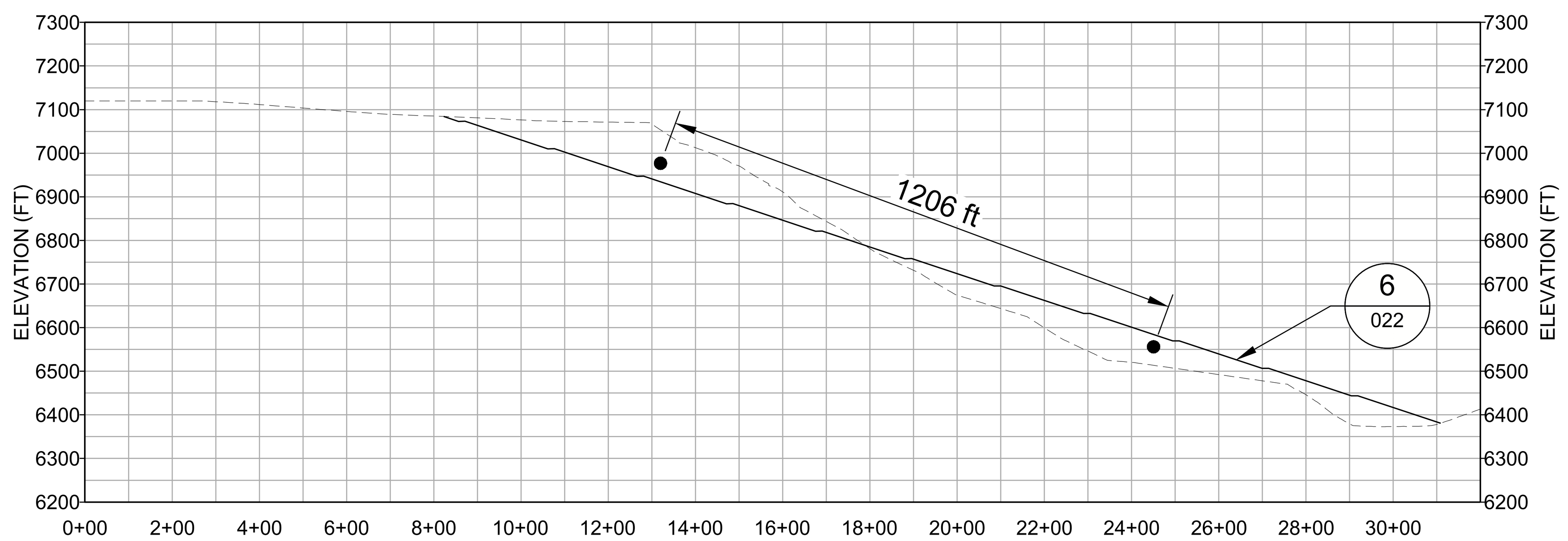
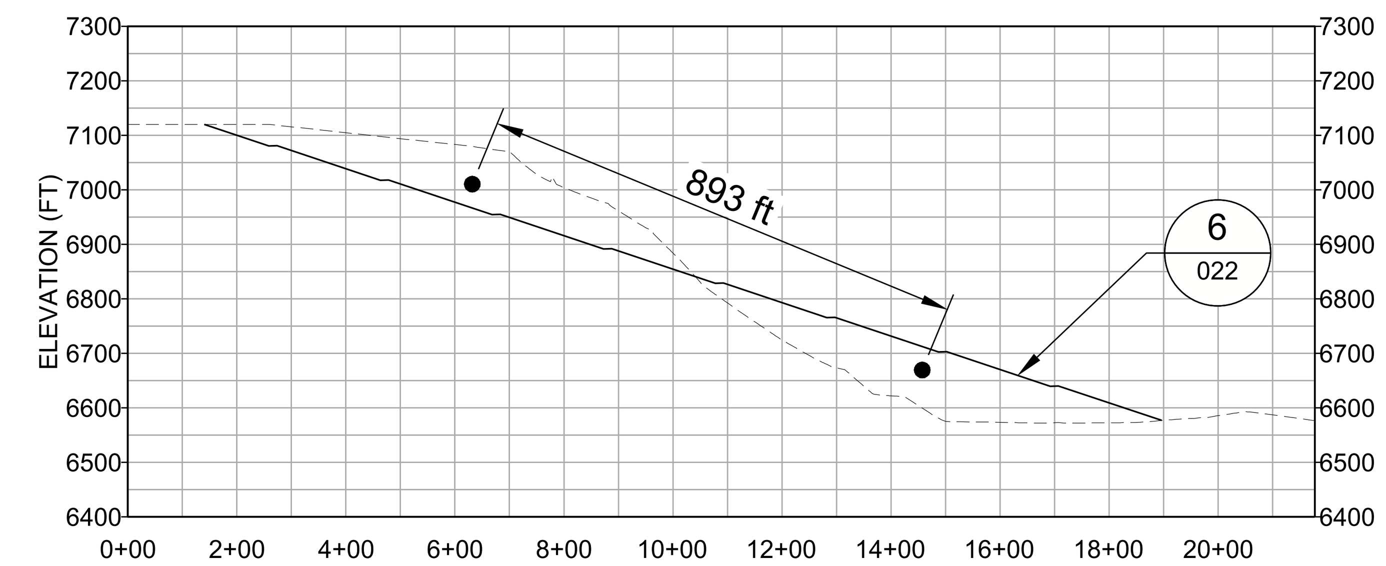


SCALE B S-7 SECTION S-7
004



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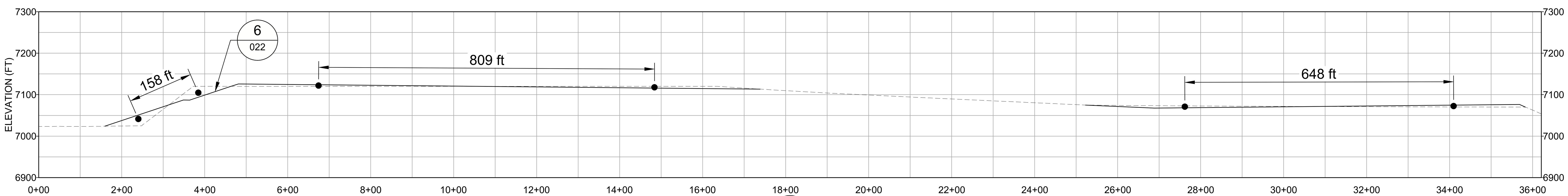
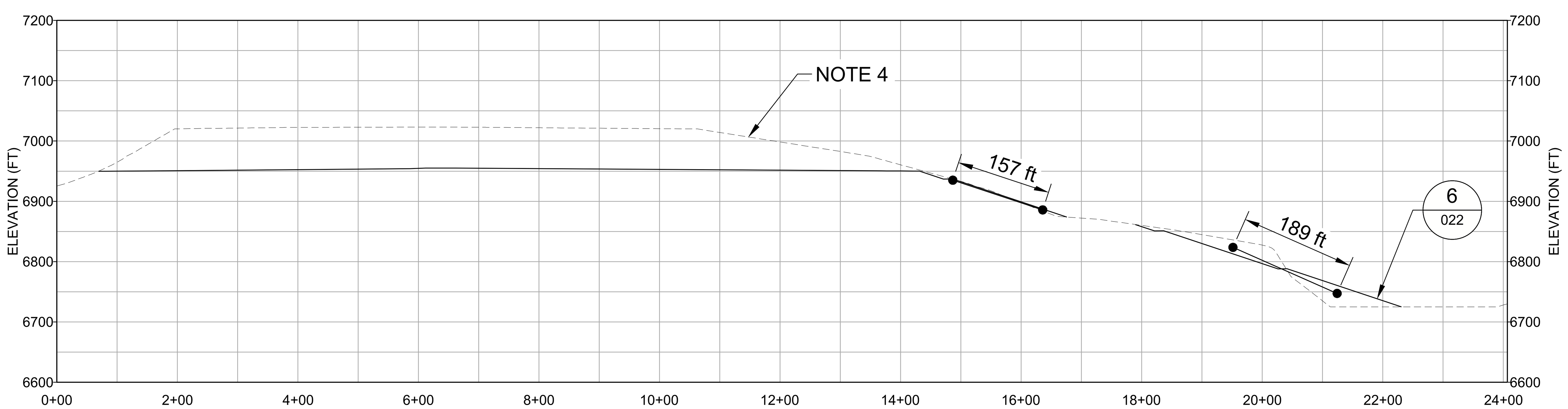
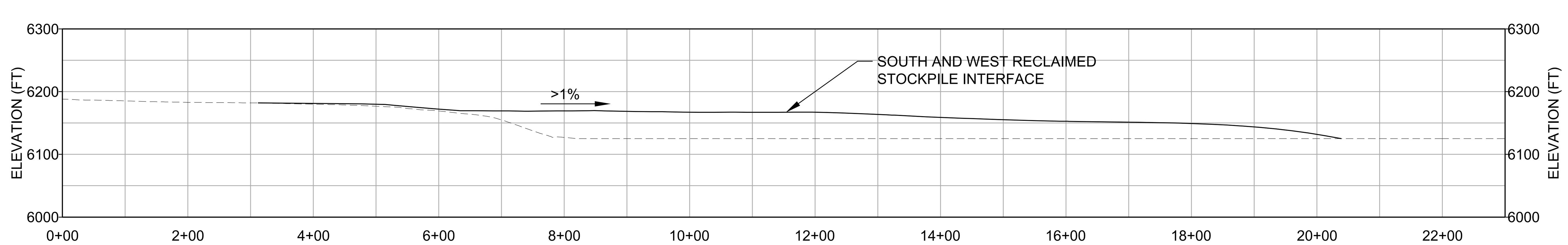
004



SCALE A S-9 SECTION S-9
004



SCALE A S-10 SECTION S-10
004



SCALE A S-11 SECTION S-11
004

LEGEND

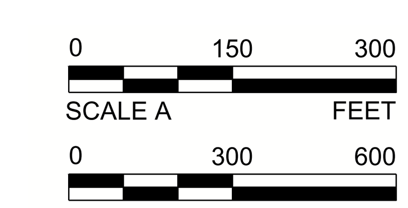
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT

CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE

SOUTH STOCKPILE AND STS2 STOCKPILE DESIGN SECTIONS (2 OF 2)

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	5 of 30	006

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

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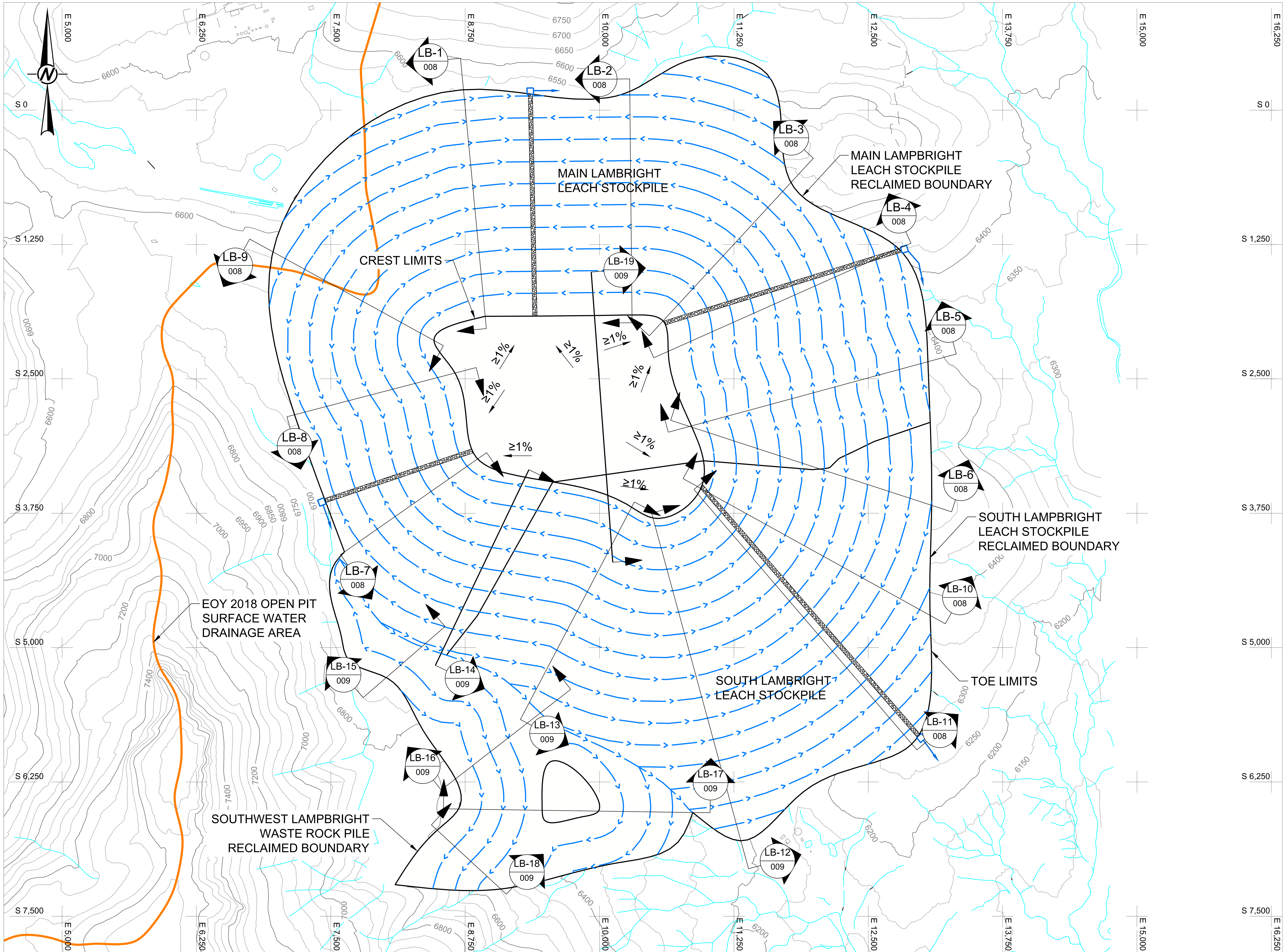

LEGEND

- 5600 — EOY 2018 TOPO
- BUILDINGS
- PAVED ROAD
- DOWNDRAIN OUTFLOW
- EXISTING DRAINAGE
- BENCH CHANNEL
- DOWNDRAIN
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- ENERGY DISSIPATOR
- LB-1 008 — CROSS SECTION LETTER; SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 500 1000
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
LAMPBRIGHT STOCKPILE GRADING AND DRAINAGE PLAN

PROJECT No. 1401129 | Rev. C | 6 of 30 | FIGURE 007

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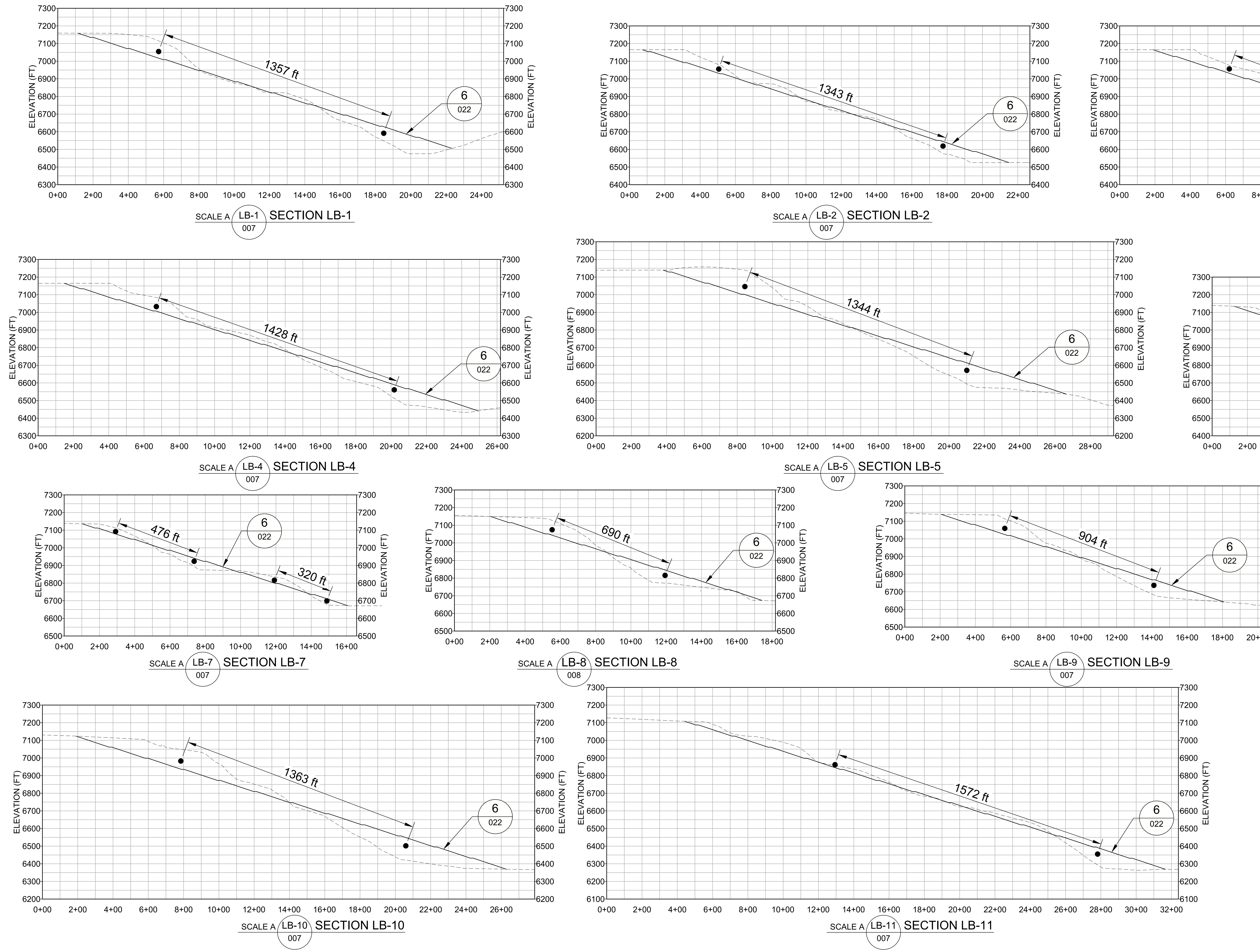

LEGEND

EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 300 600
SCALE A FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
LAMPBRIGHT STOCKPILE DESIGN SECTIONS (1 OF 2)

PROJECT No. 1401129 | Rev. C | 7 of 30 | FIGURE 008

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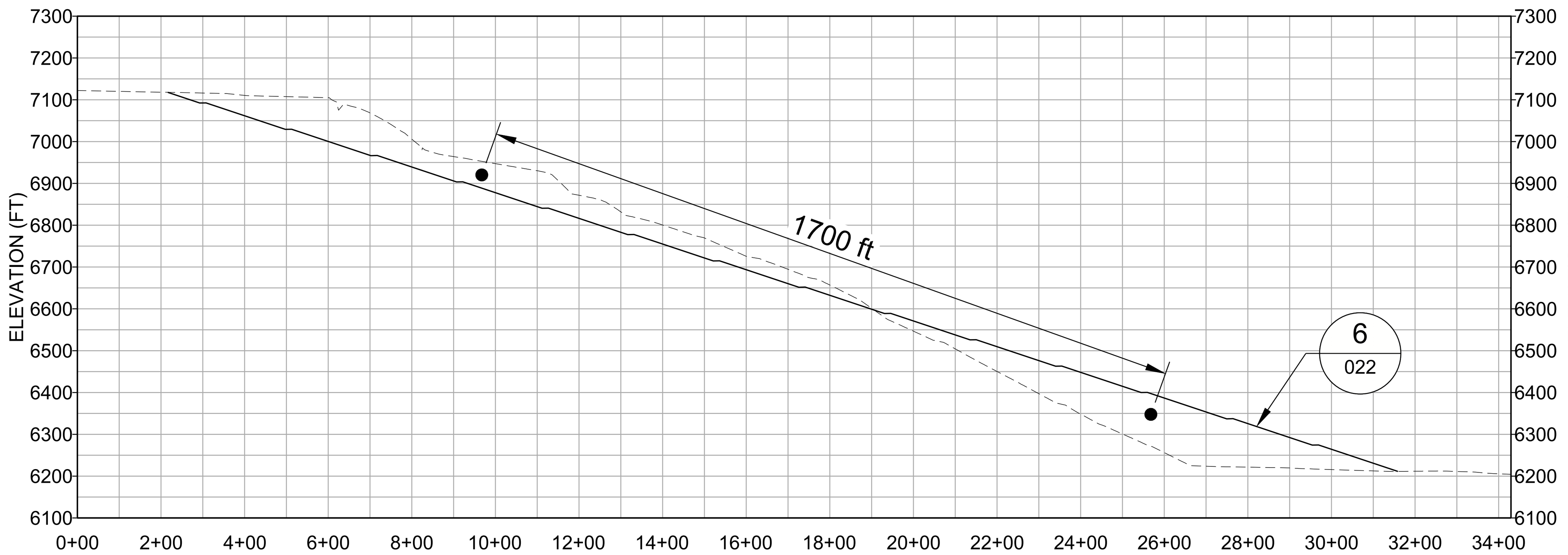

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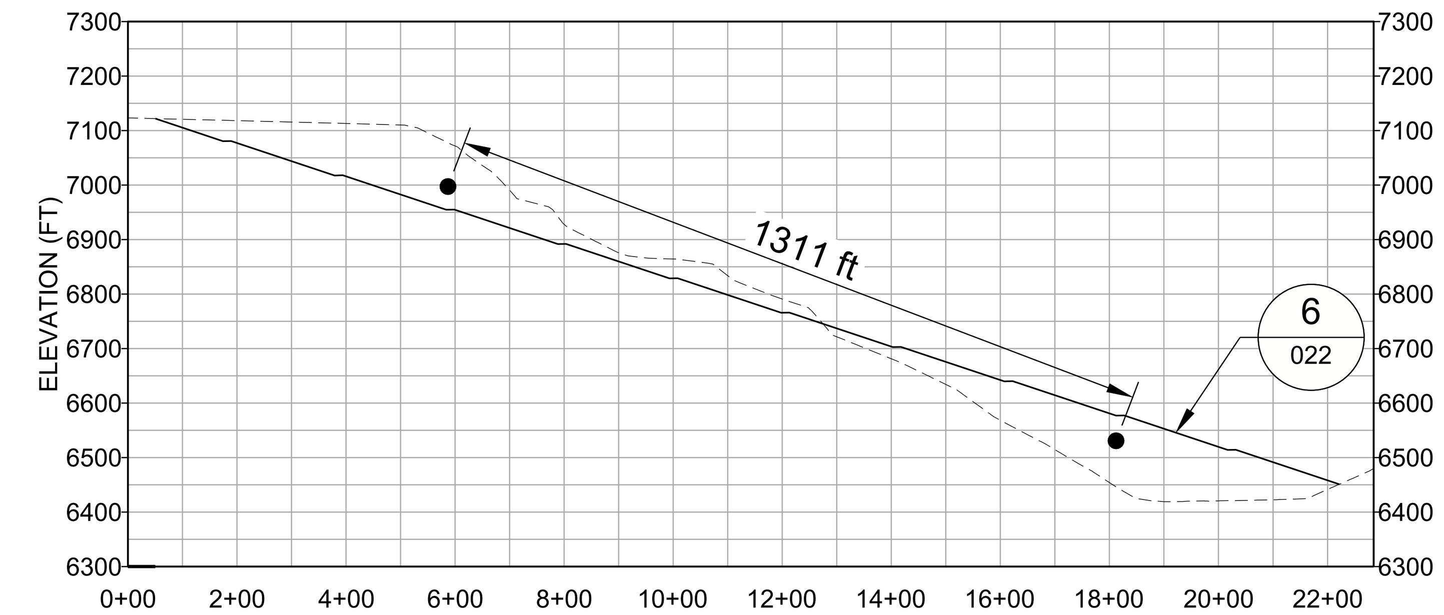
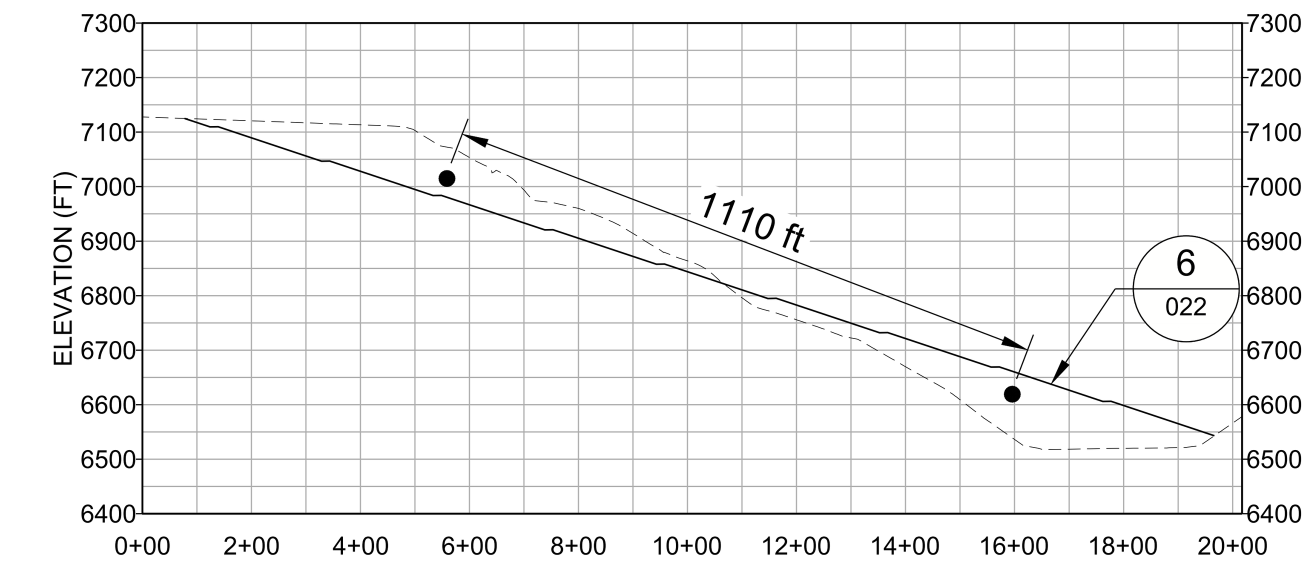


SCALE A LB-13 007 SECTION LB-13



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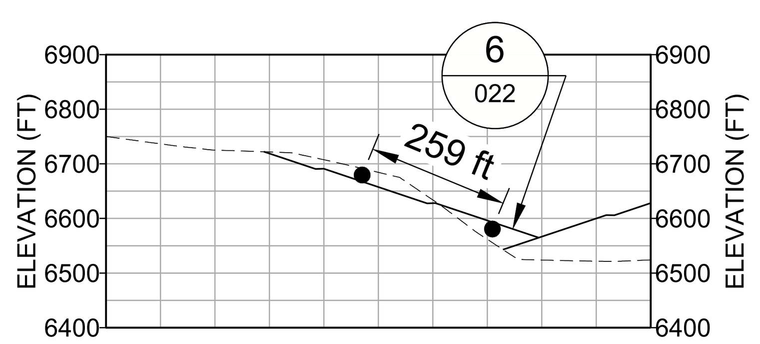

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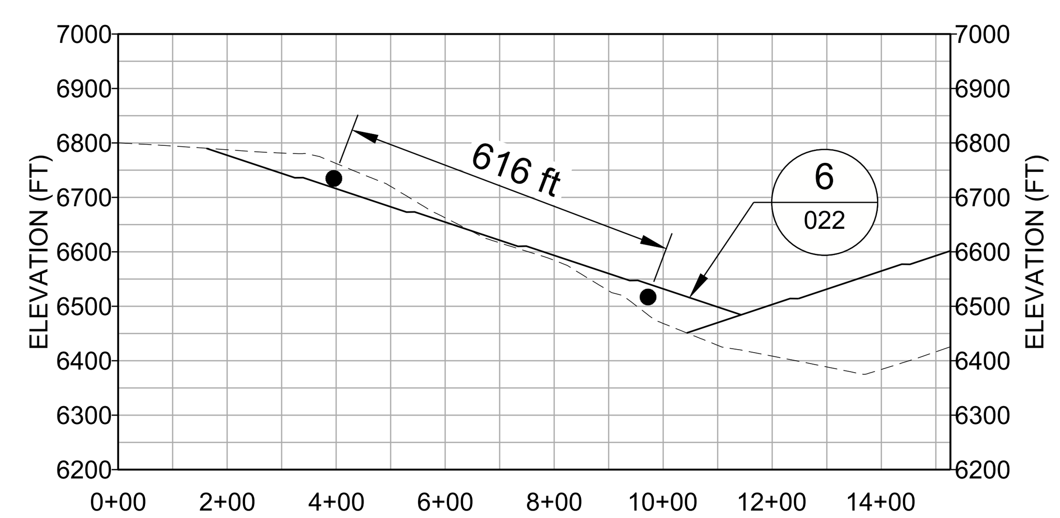

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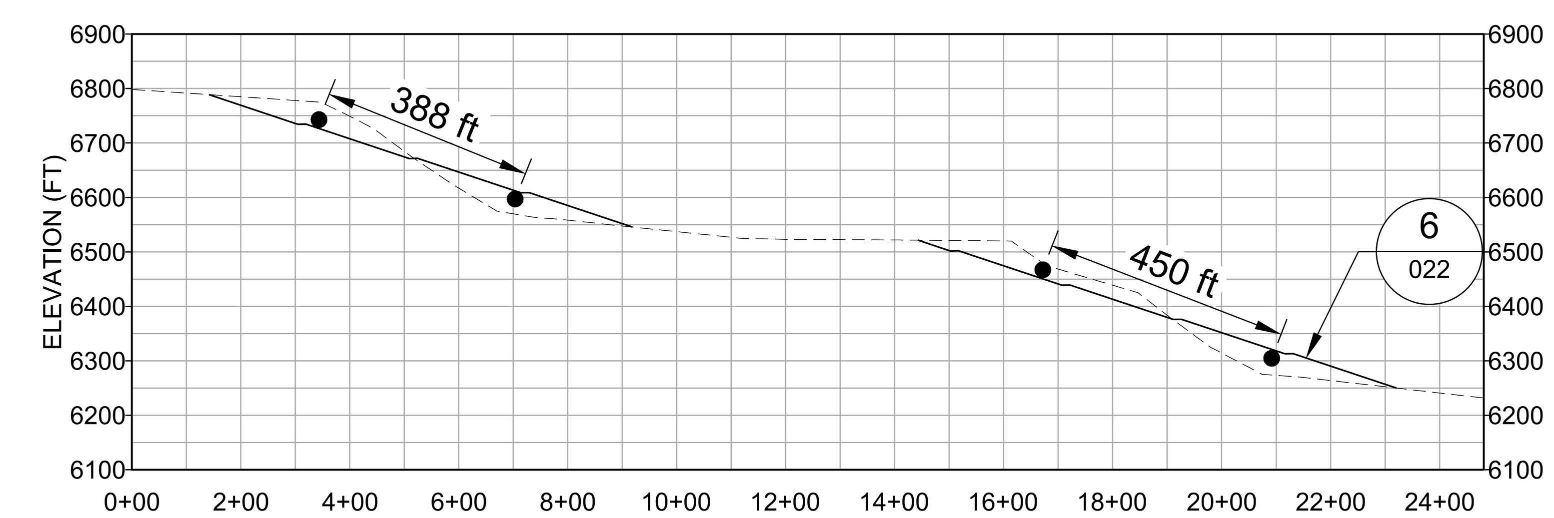
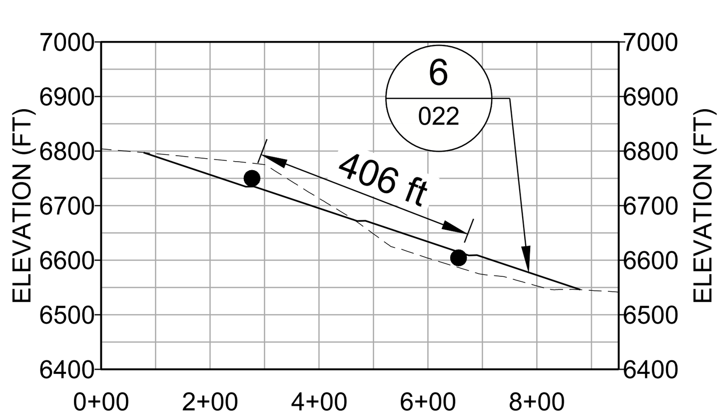


SCALE A LB-17 007 SECTION LB-17



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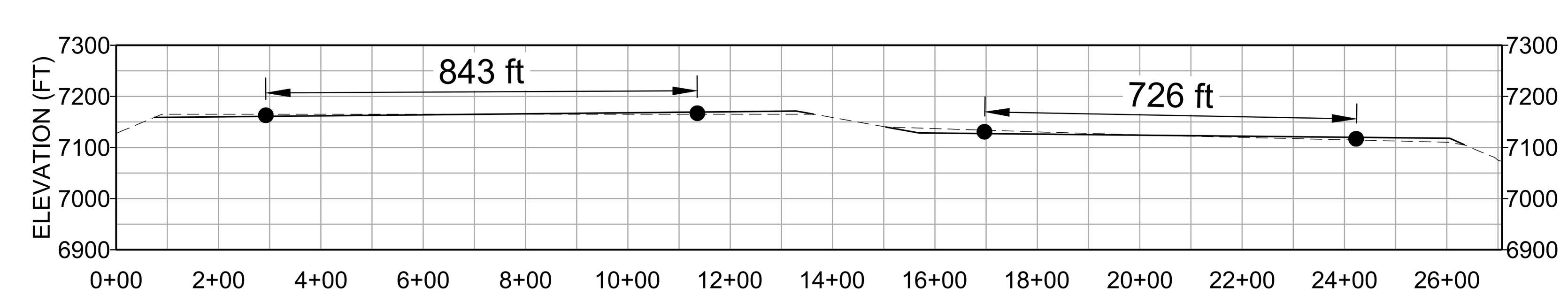

SCALE A LB-19 007 SECTION LB-19

LEGEND

- EOY 2018 TOPOGRAPHY
- CCP GRADING DESIGN
- CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 300 600
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
LAMPBRIGHT STOCKPILE DESIGN SECTIONS (2 OF 2)

PROJECT No. 1401129 | Rev. C | 9 of 30 | FIGURE 009

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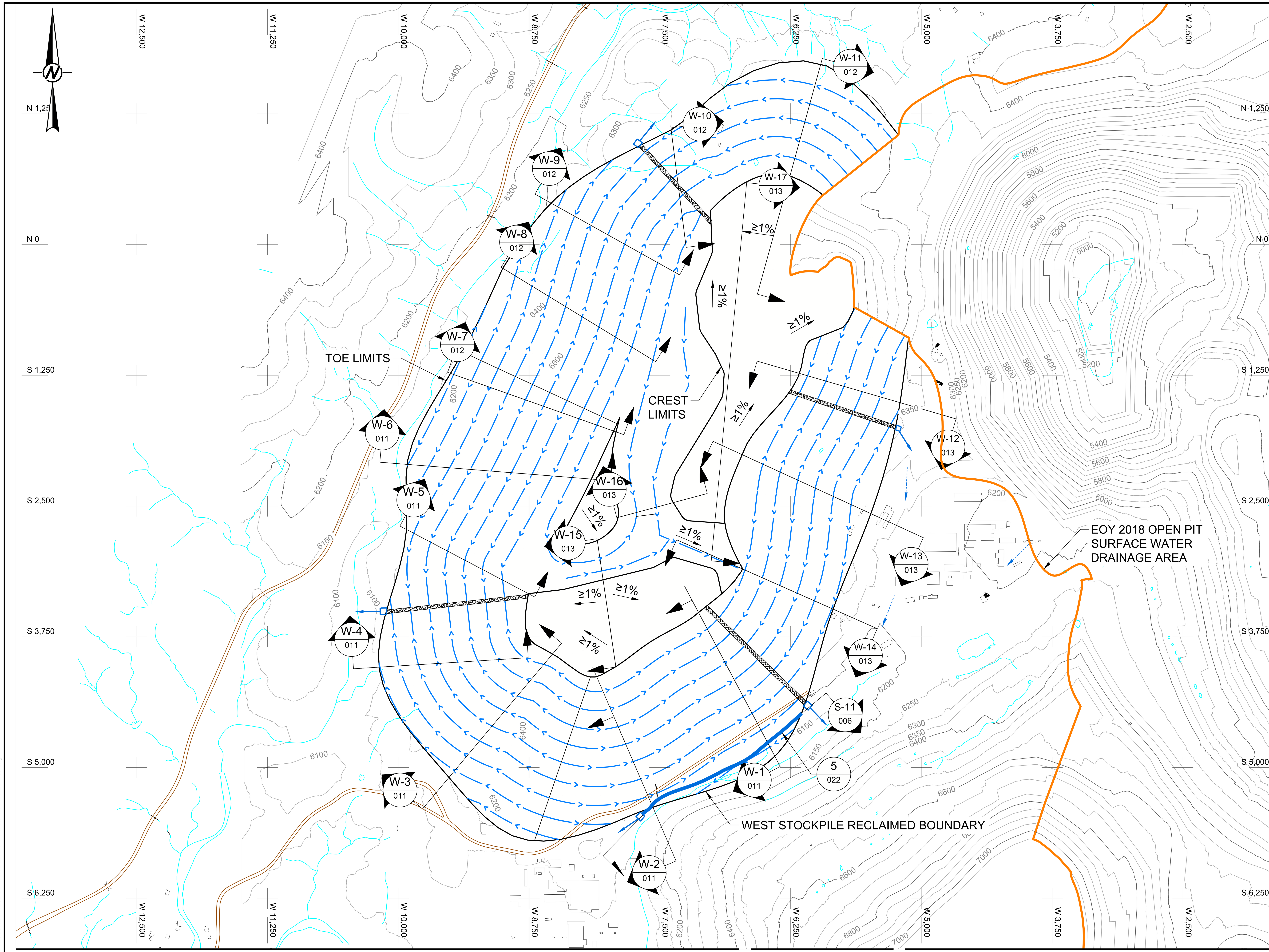

LEGEND

- 5600 — EOY 2018 TOPO
- BUILDINGS
- PAVED ROAD
- DOWNDRAIN OUTFLOW
- SURFACE WATER FLOW
- EXISTING DRAINAGE
- BENCH CHANNEL
- DOWNDRAIN
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- SURFACE WATER DRAINAGE CHANNEL
- ENERGY DISSIPATOR
- W-1 — CROSS SECTION LETTER
- 011 — SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 500 1000
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
WEST STOCKPILE GRADING AND DRAINAGE PLAN

PROJECT No. 1401129 | Rev. C | 10 of 30 | FIGURE 010

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

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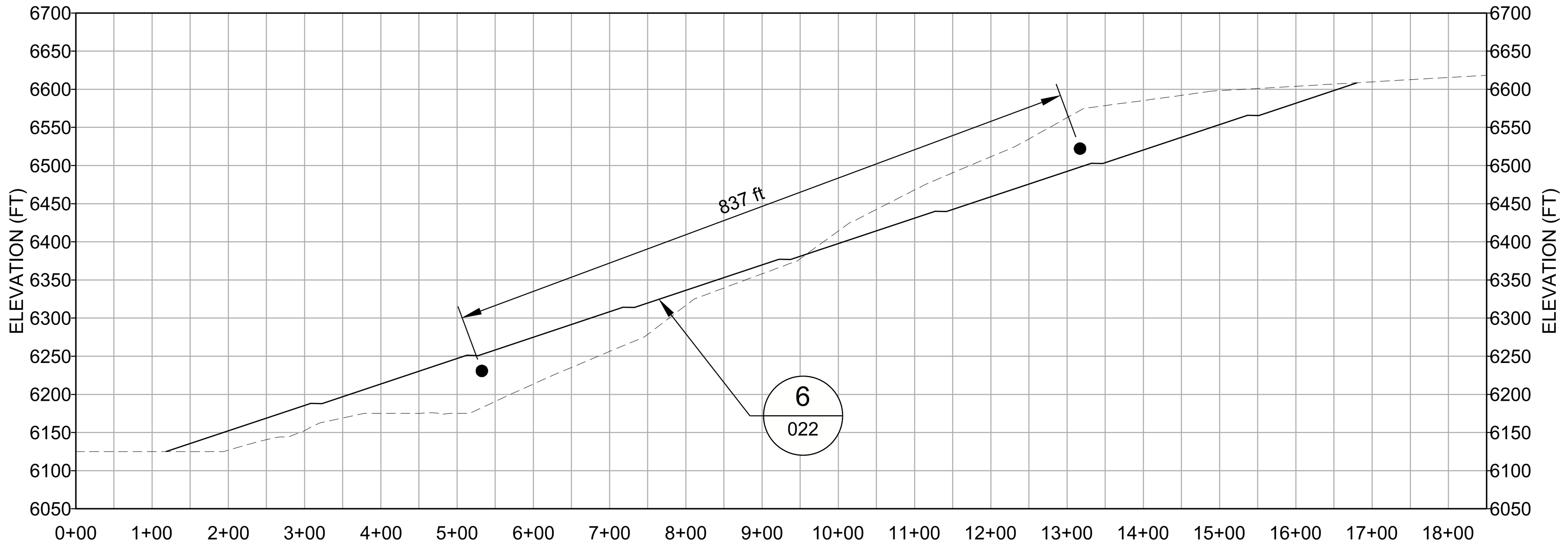
LEGEND

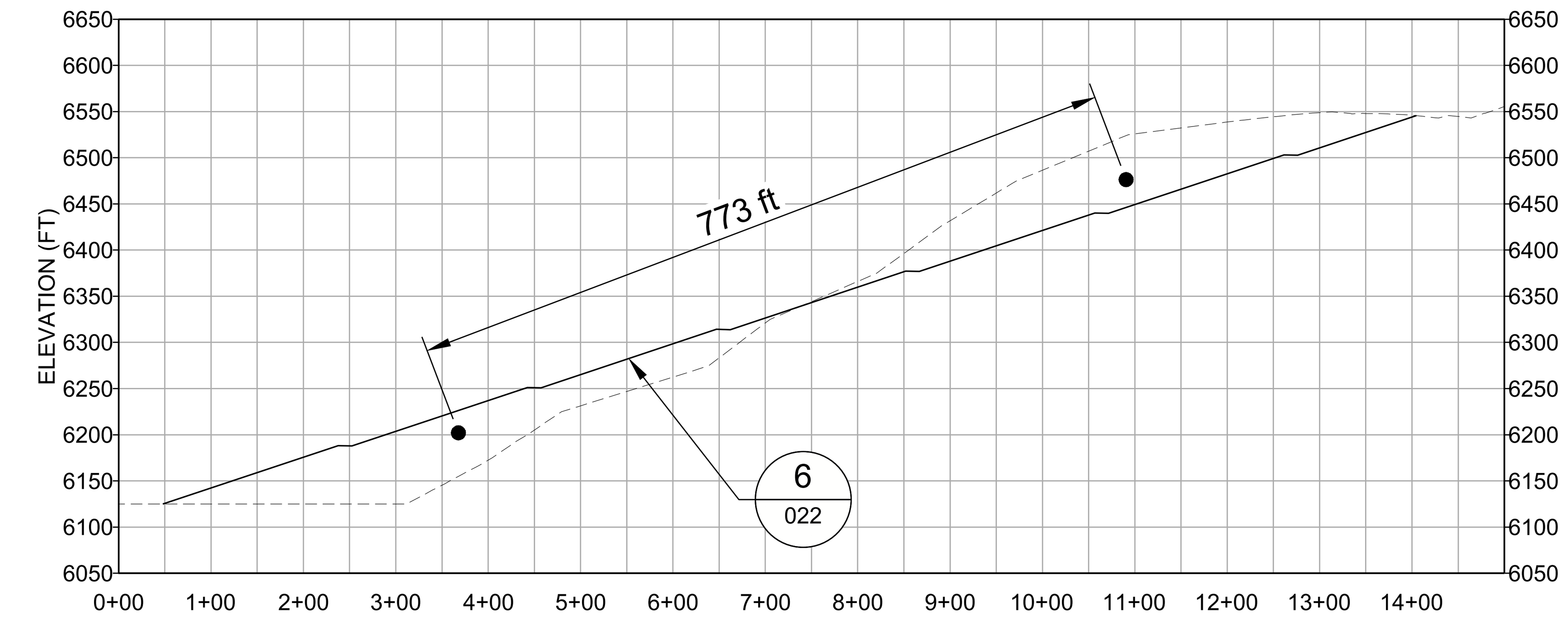
- - - - EOY 2018 TOPOGRAPHY
—— CCP GRADING DESIGN
● CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



SCALE A W-1 010 SECTION W-1



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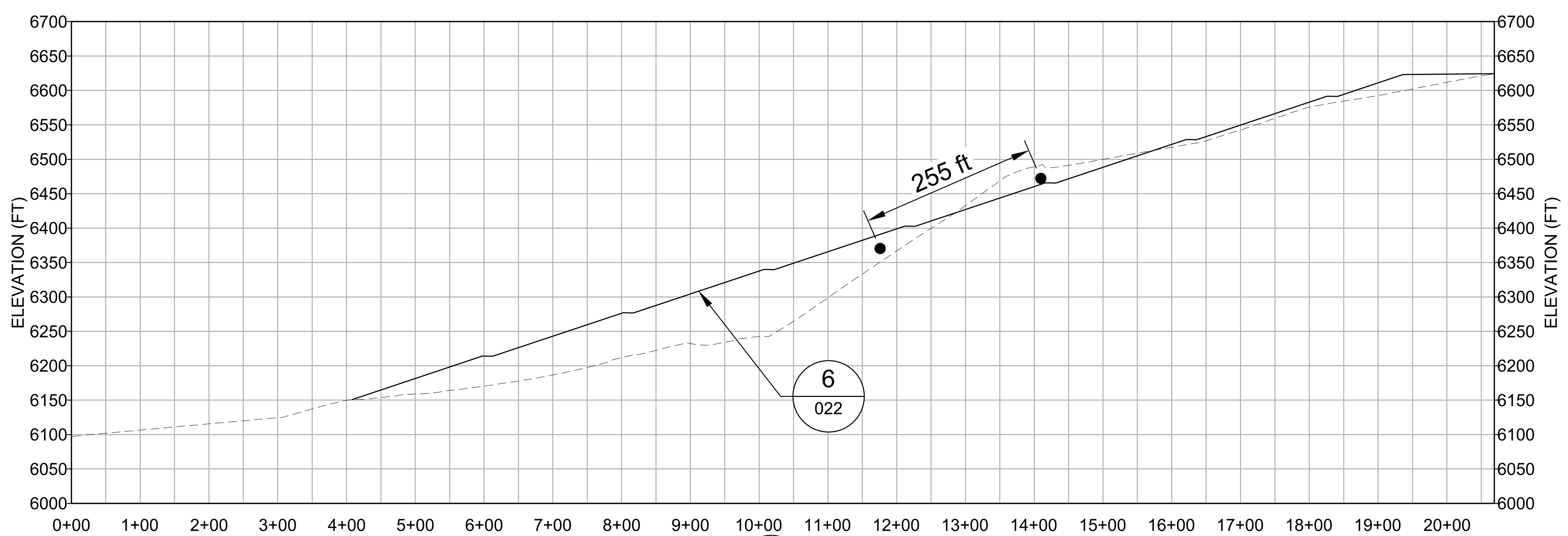

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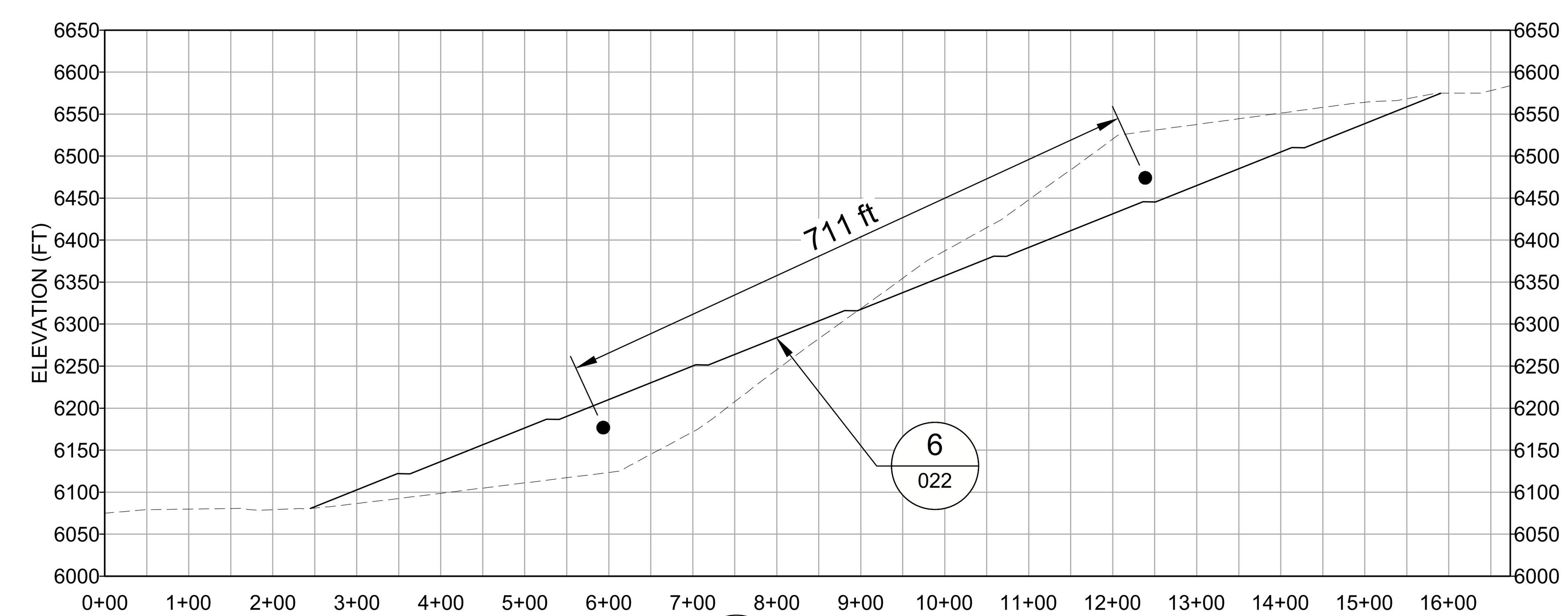

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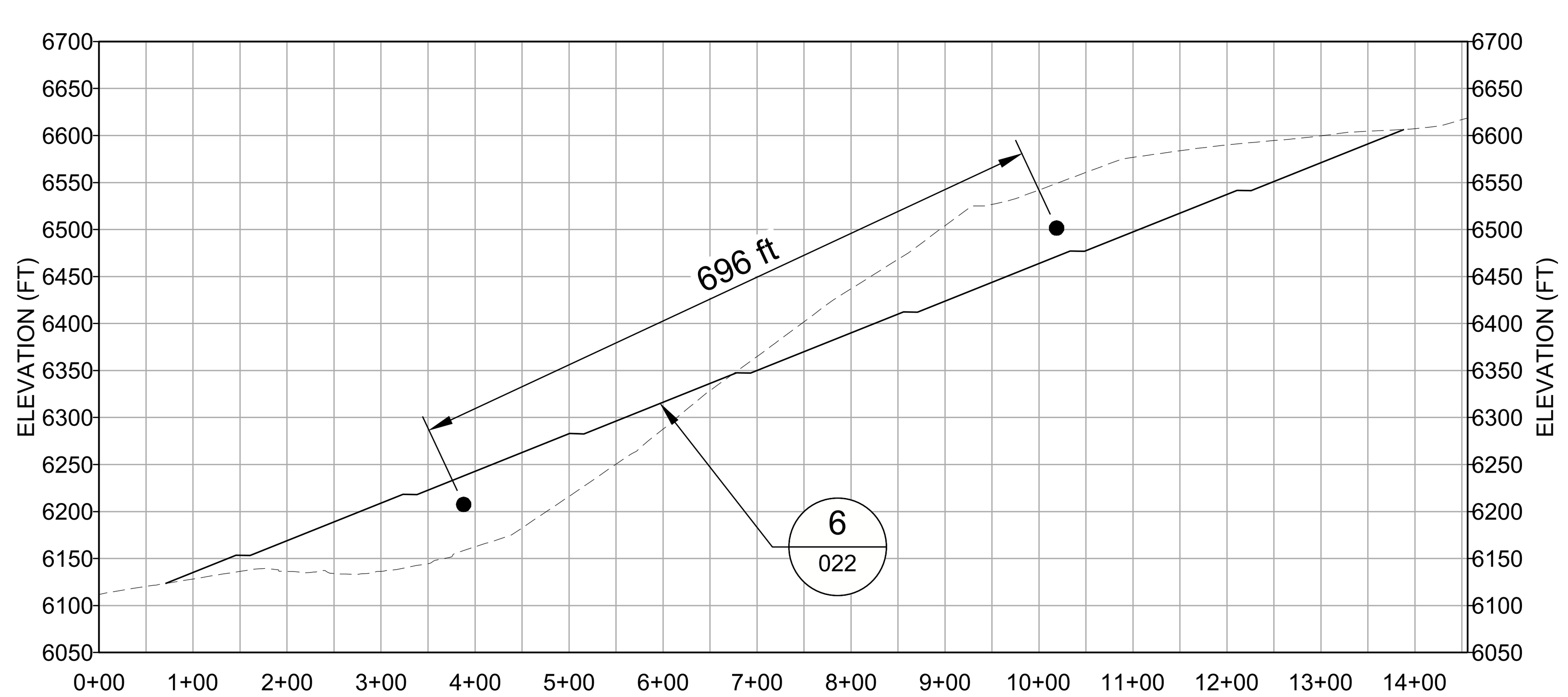
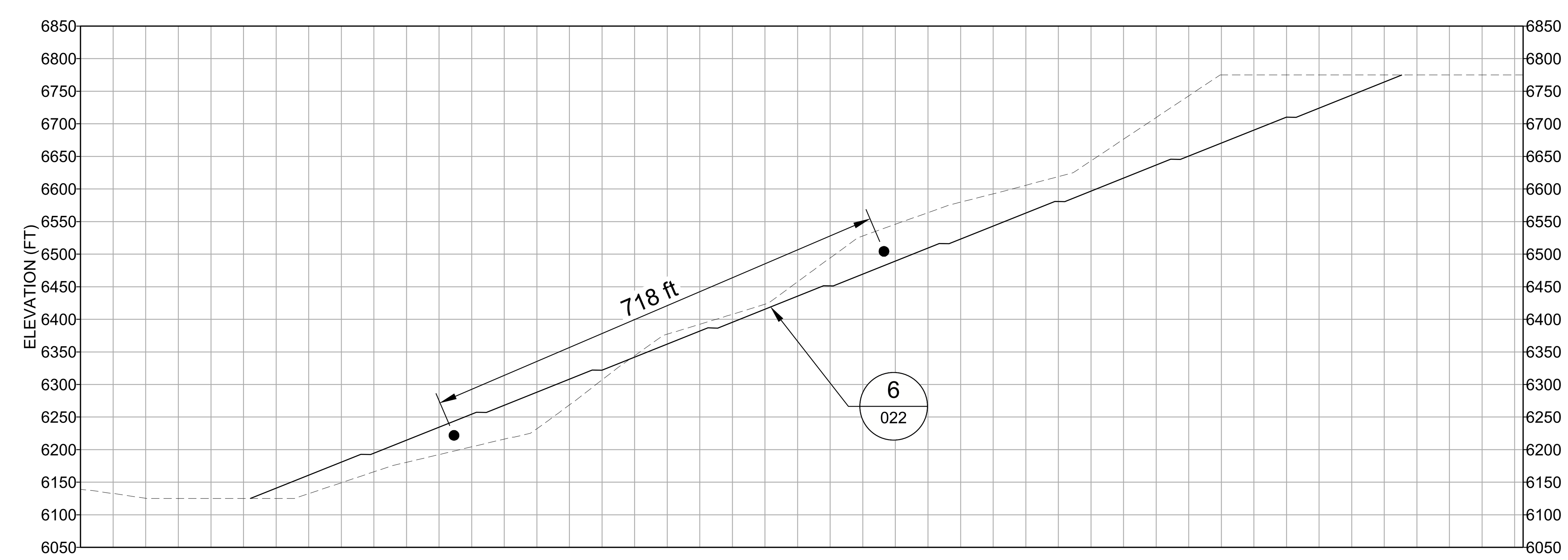


SCALE A W-5 010 SECTION W-5



SCALE A W-6 010 SECTION W-6

0 160 320
SCALE A FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
WEST STOCKPILE DESIGN SECTIONS (1 OF 3)

PROJECT No. 1401129 | Rev. C | 11 of 30 | FIGURE 011

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LEGEND

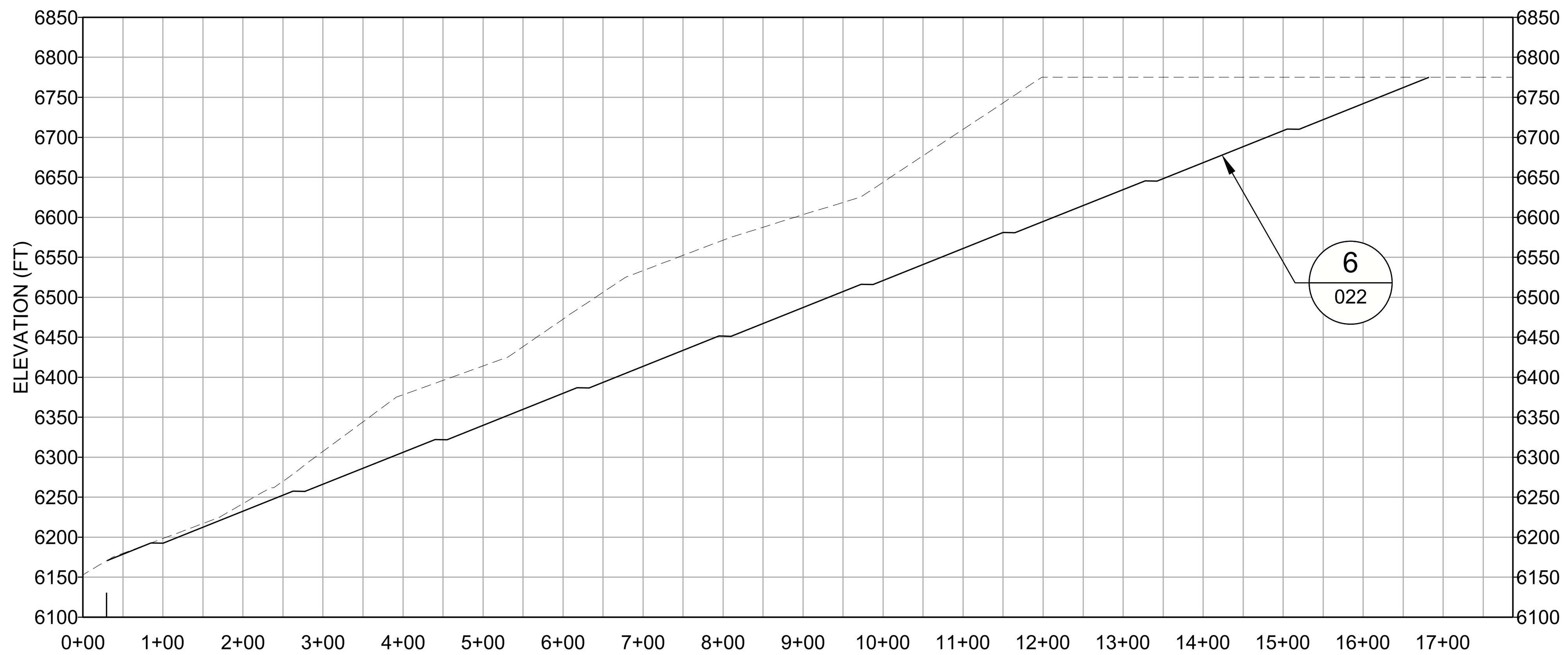
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

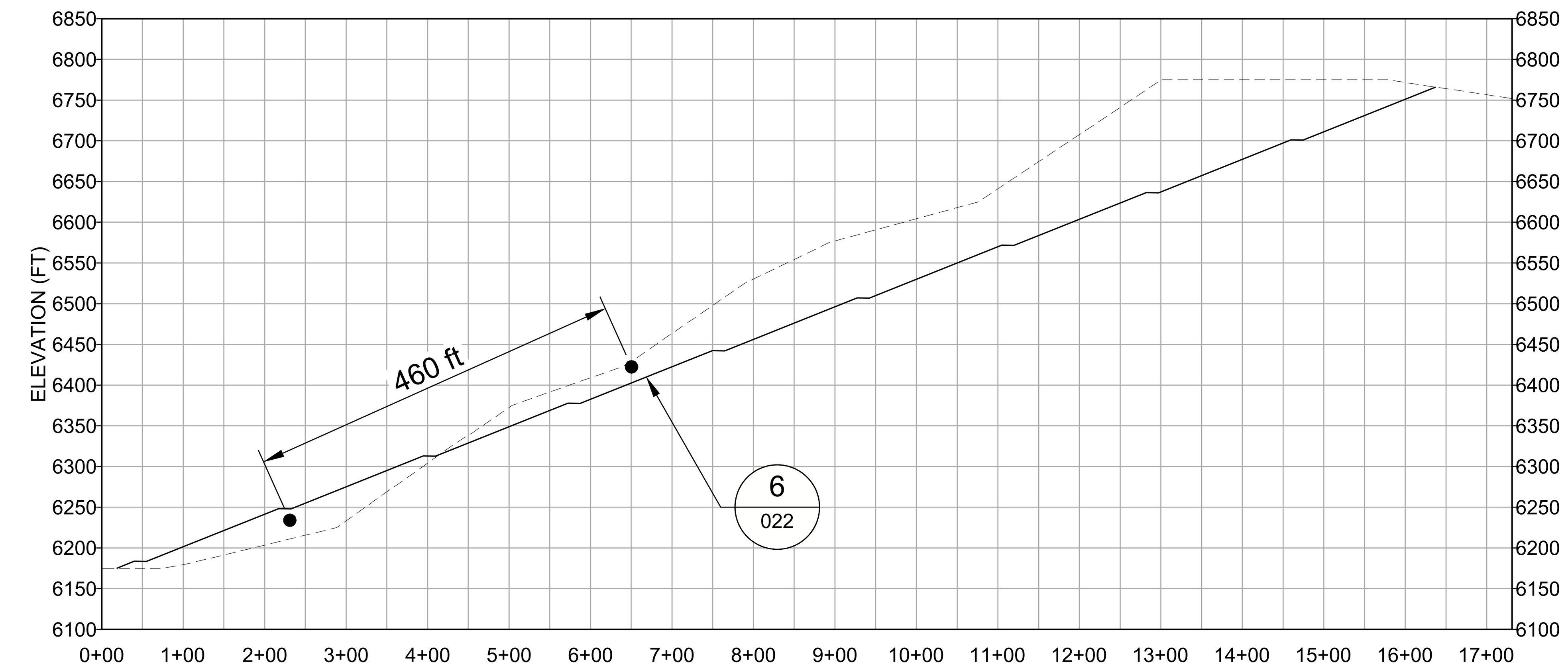
CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



SCALE A W-7 010 SECTION W-7



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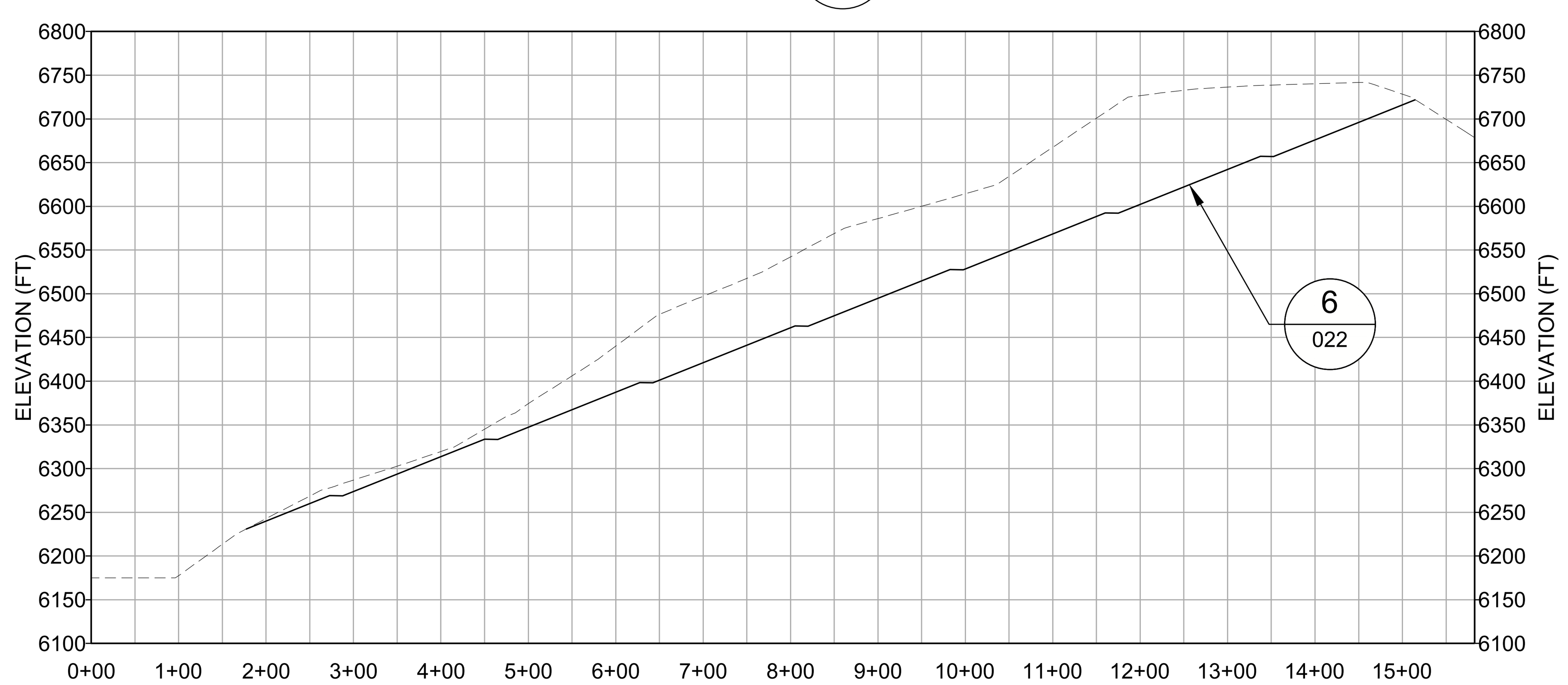
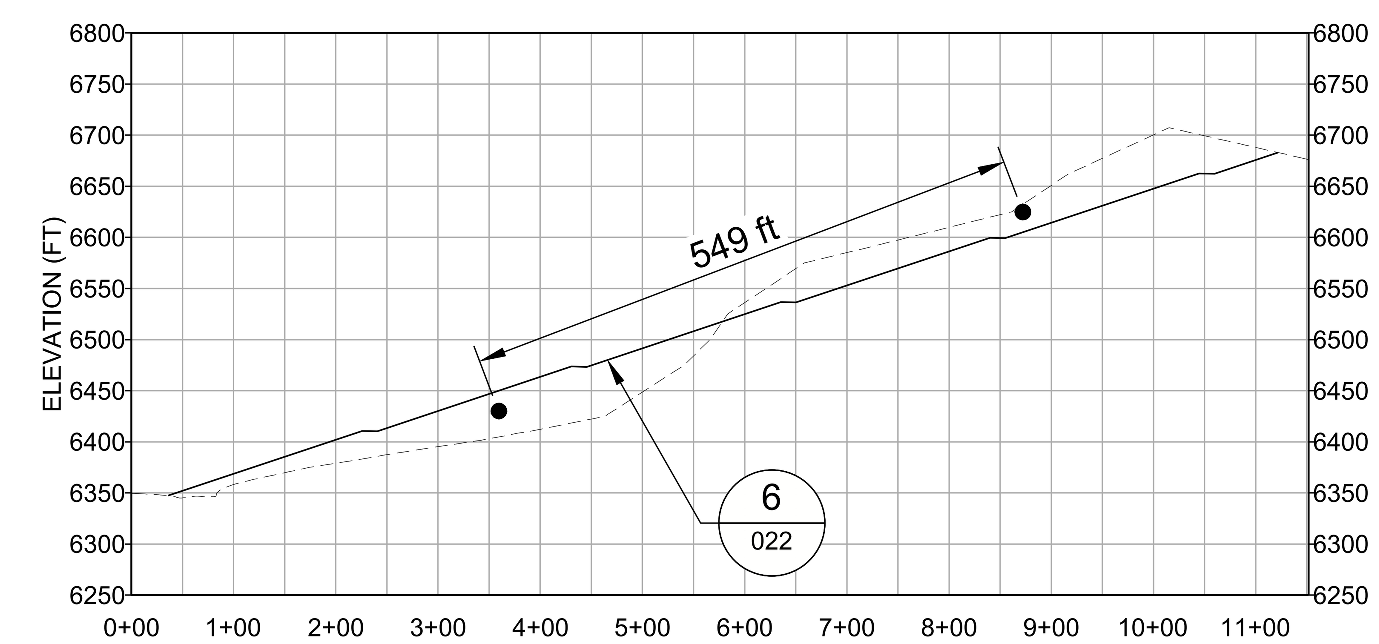


SCALE A W-9 010 SECTION W-9



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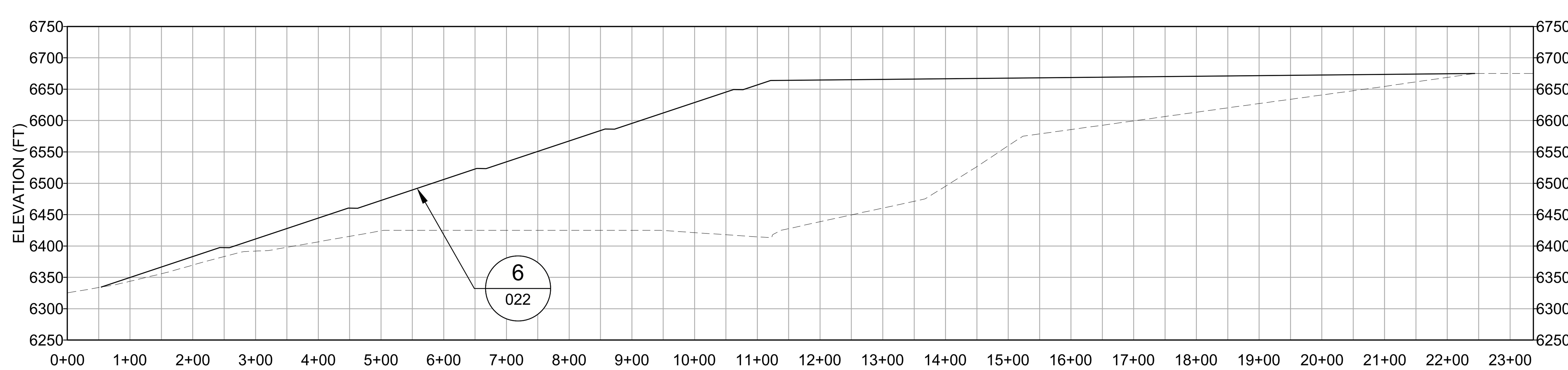

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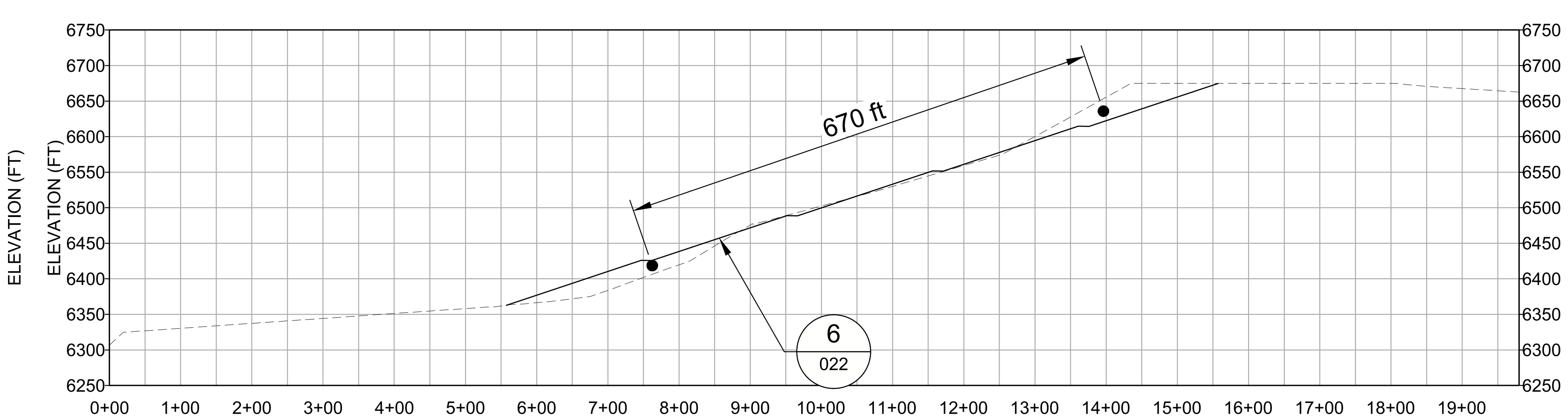

SCALE A W-12 010 SECTION W-12

0 160 320
SCALE A FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
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GRANT COUNTY, NEW MEXICO

TITLE
WEST STOCKPILE DESIGN SECTIONS (2 OF 3)

PROJECT No. 1401129 | Rev. C | 12 of 30 | FIGURE 012

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LEGEND

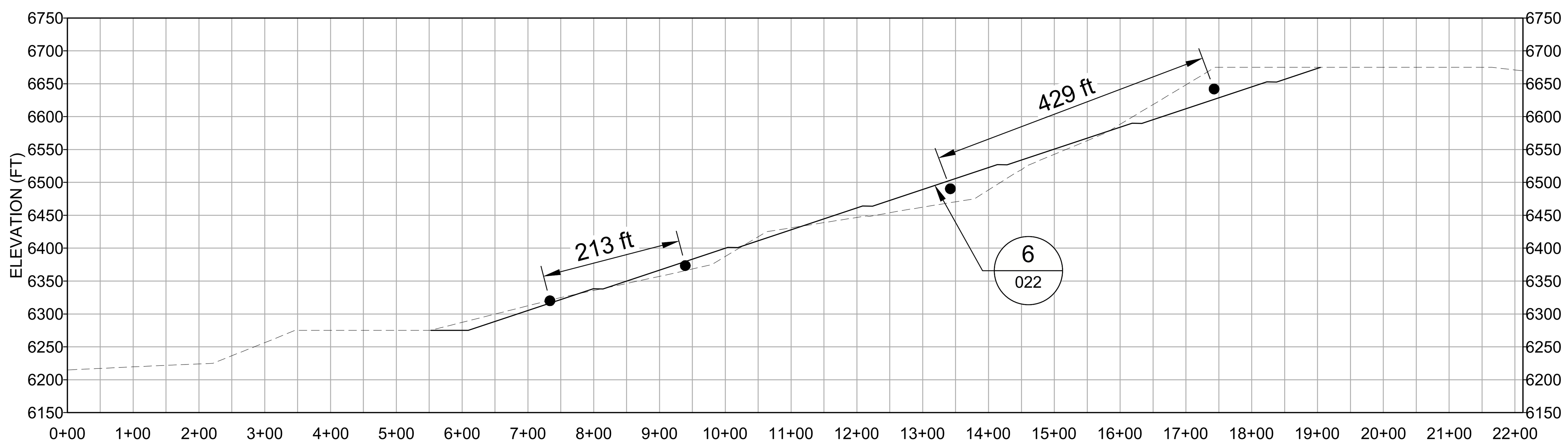
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



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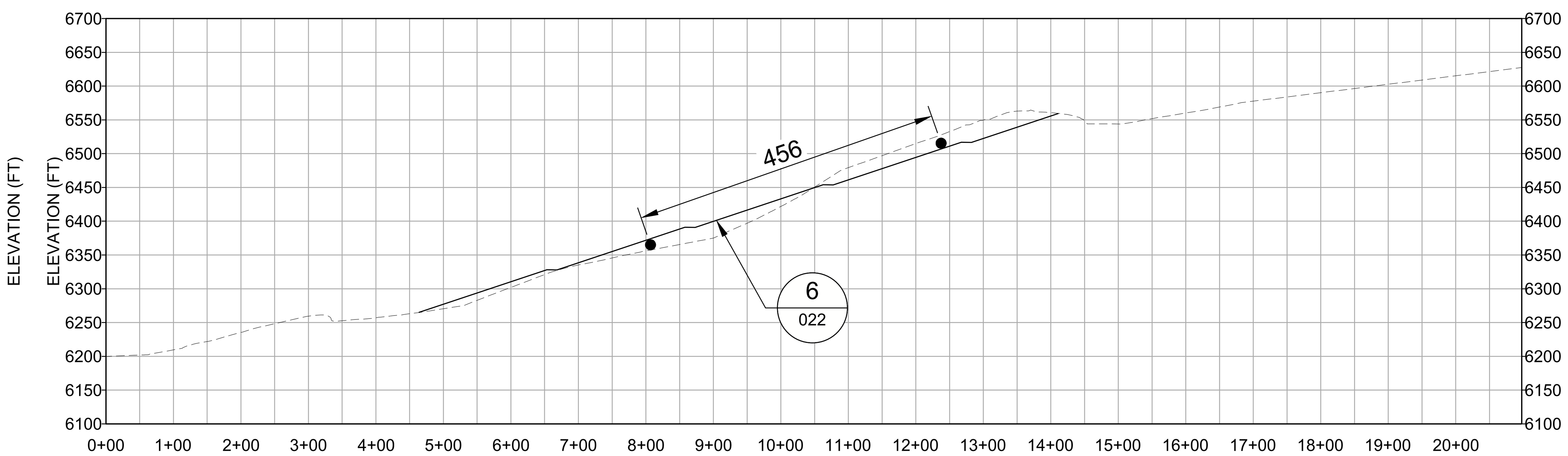

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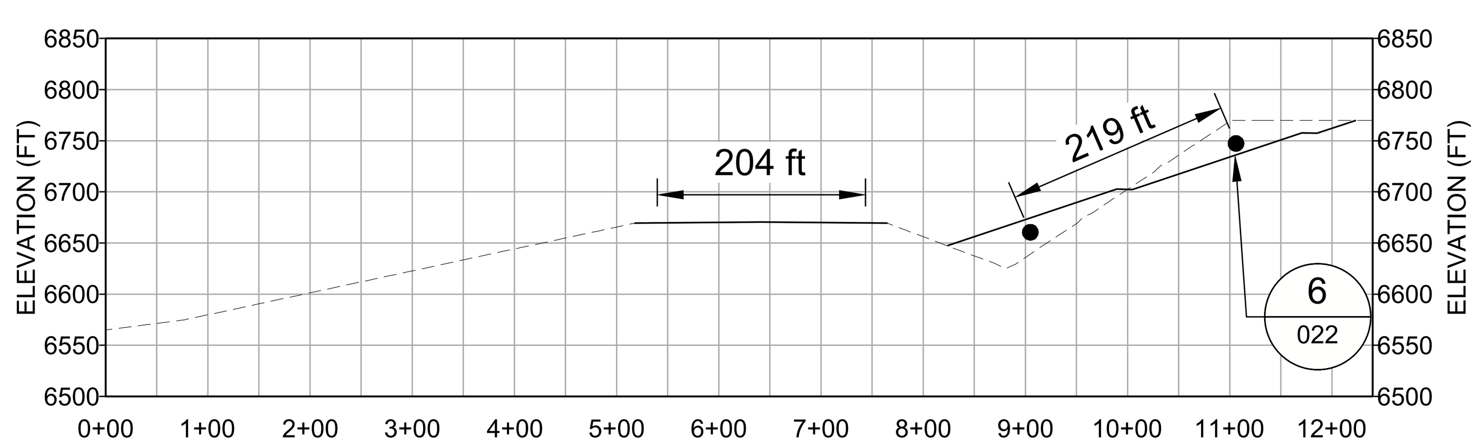
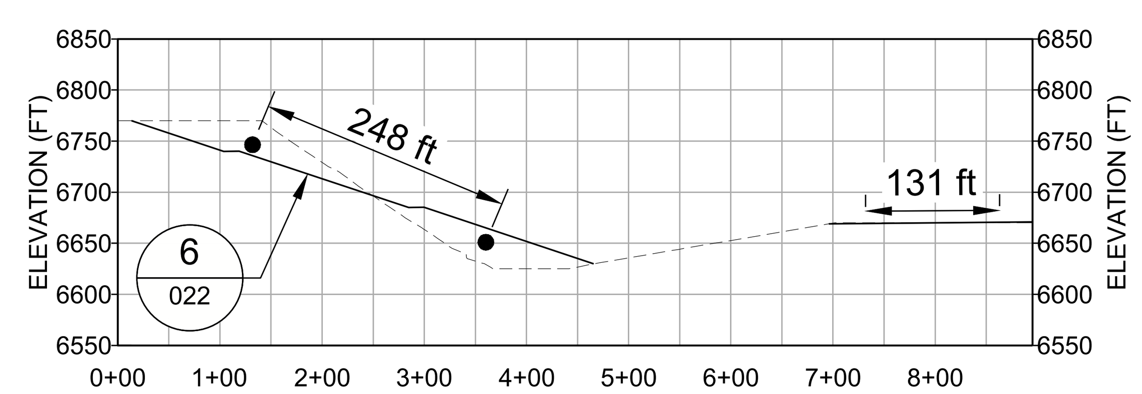
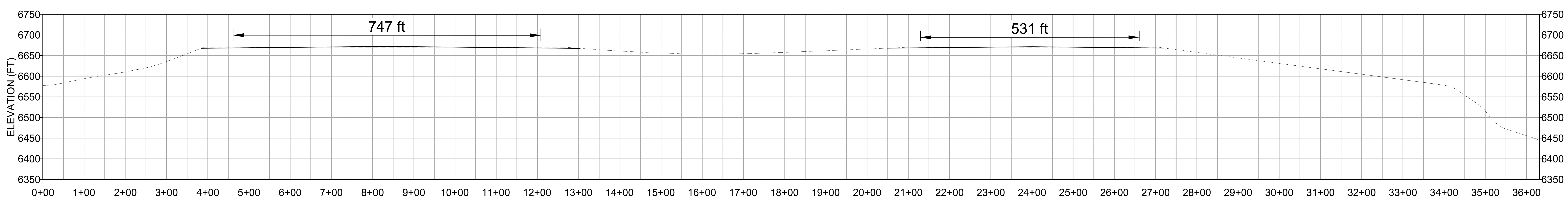


SCALE A W-15 010 SECTION W-15



SCALE A W-16 010 SECTION W-16



SCALE A W-17 010 SECTION W-17

0 160 320
SCALE A FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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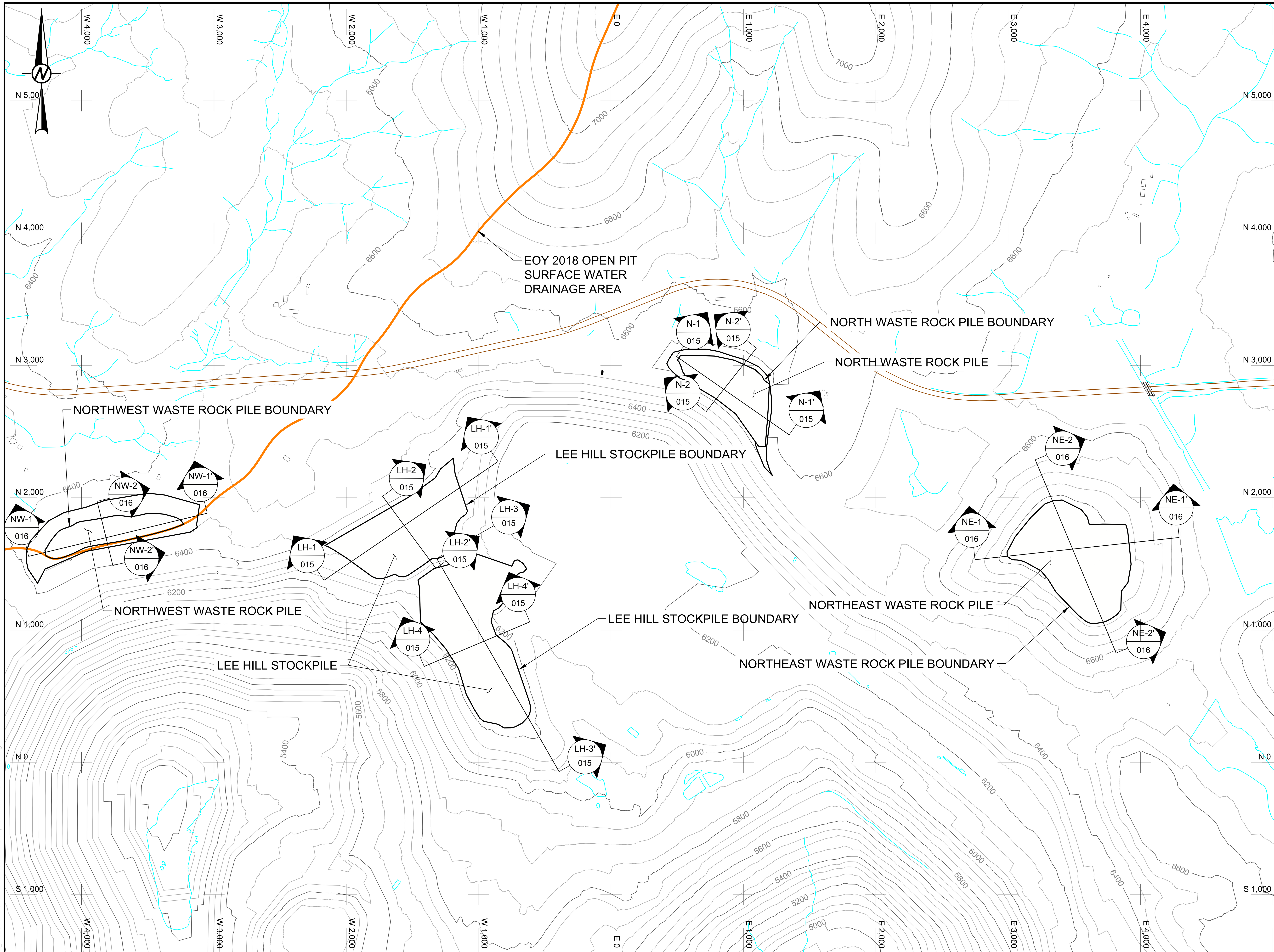
PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
WEST STOCKPILE DESIGN SECTIONS (3 OF 3)

PROJECT No. 1401129 Rev. C 13 of 30 FIGURE 013



LEGEND

- 5600 — EOY 2018 TOPO
- BUILDINGS
- EXISTING DRAINAGE
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- NE-1 — CROSS SECTION LETTER
- 015 — SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 400 800
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
NORTH PIT AREA STOCKPILES GRADING AND DRAINAGE PLAN

PROJECT No. 1401129 | Rev. C | 14 of 30 | FIGURE 014

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

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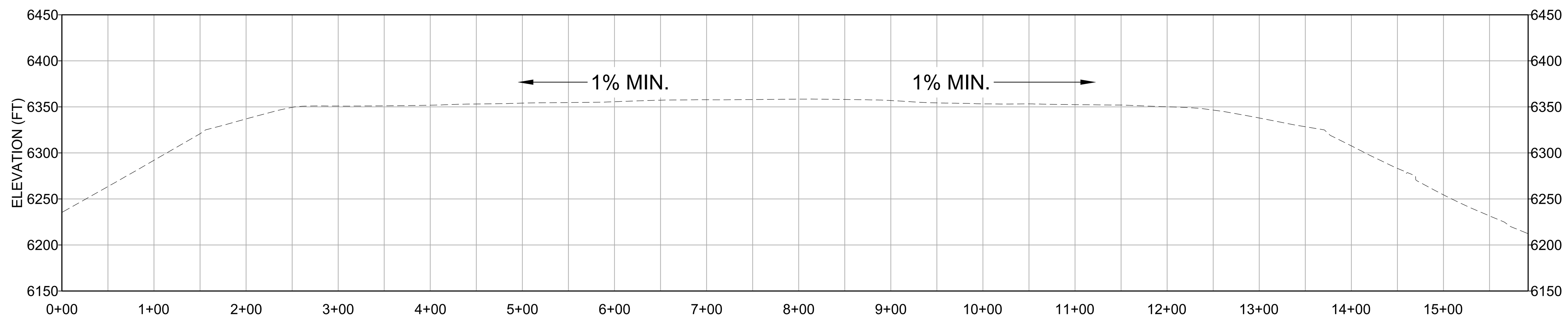


SCALE A LH-1 014 SECTION LH-1

LEGEND

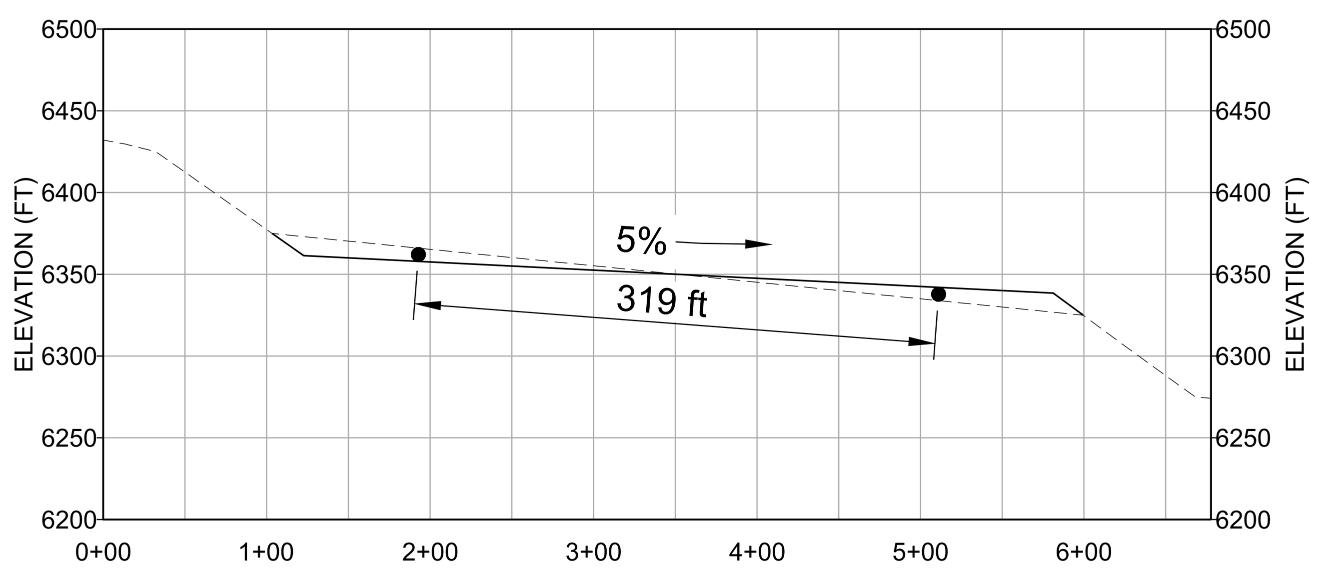
EOY 2018 TOPOGRAPHY

CCP DESIGN

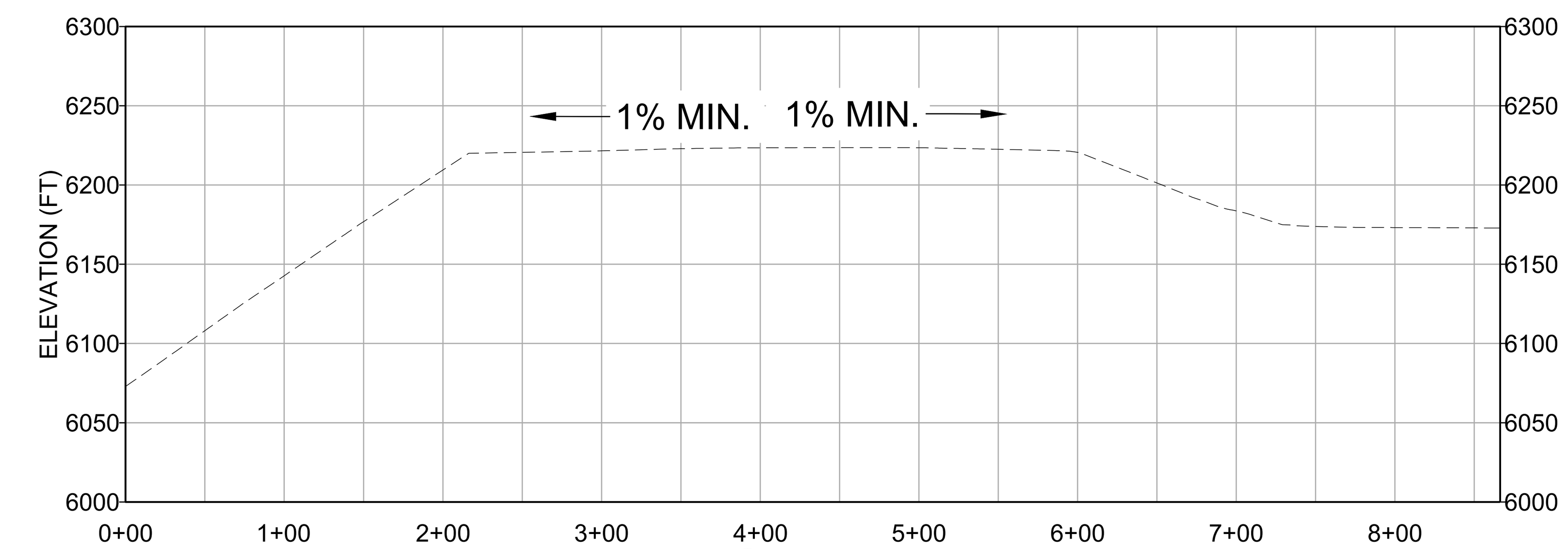
CENTROID OF CUT/FILL AREA

REFERENCE

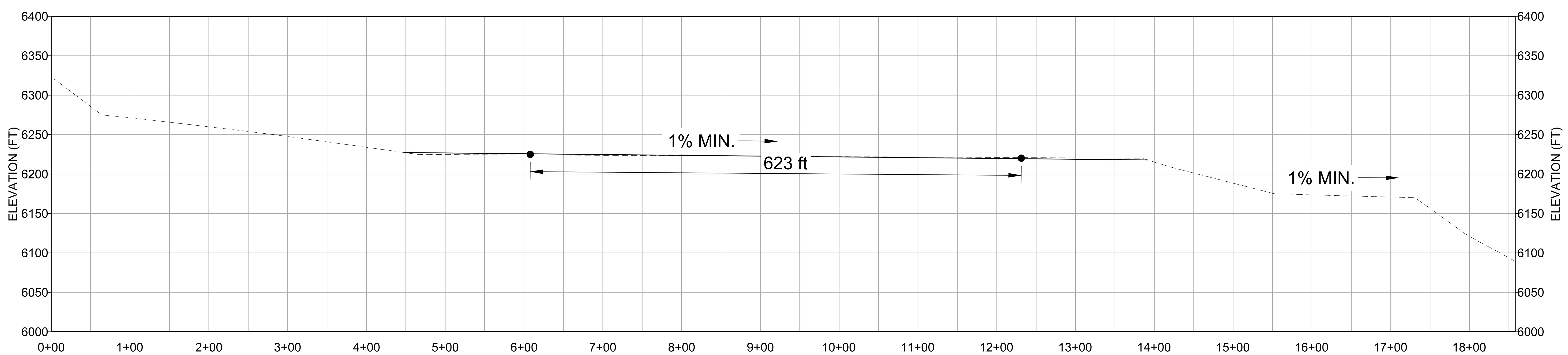
1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



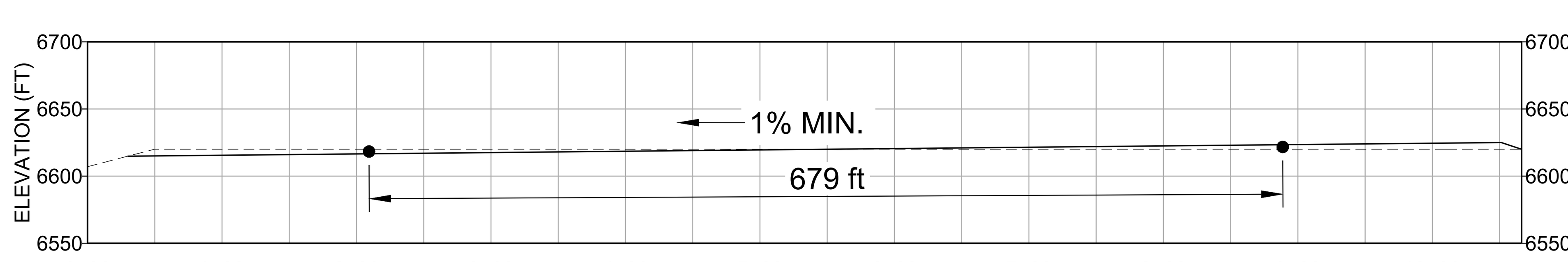
SCALE A LH-2 014 SECTION LH-2



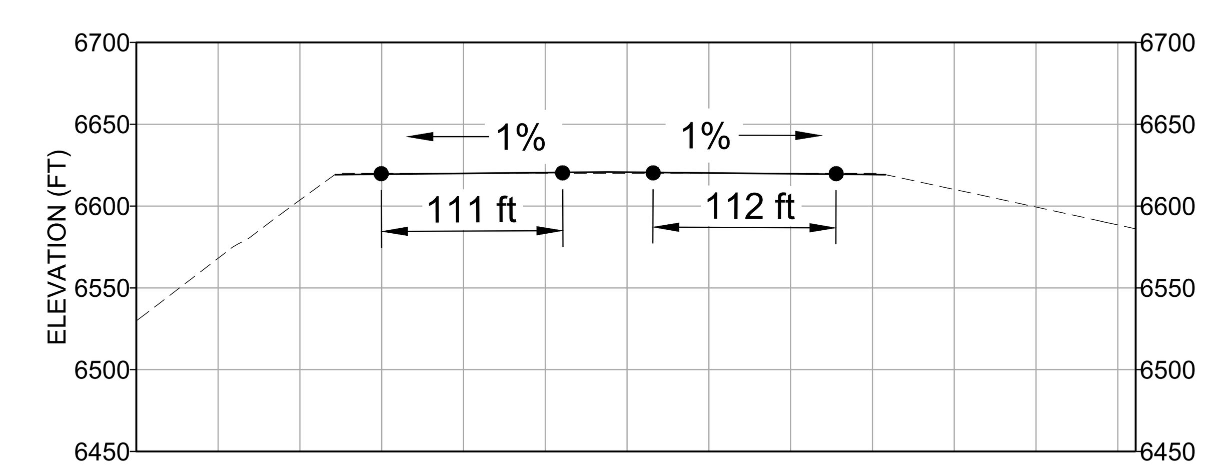
SCALE A LH-4 014 SECTION LH-4



SCALE A LH-3 014 SECTION LH-3



SCALE A N-1 014 SECTION N-1



SCALE A N-2 014 SECTION N-2

0 100 200
SCALE A FEET

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PROJECT

CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE

NORTH PIT AREA STOCKPILES DESIGN SECTIONS (1 OF 2)

PROJECT No. 1401129 | Rev. C | 15 of 30 | FIGURE 015

Path: \\Denver.golder.gds\acad\14\1401129\PRODUCTION_A CLOSURE & RECLAMATION DESIGN | File Name: 1401129A015.dwg

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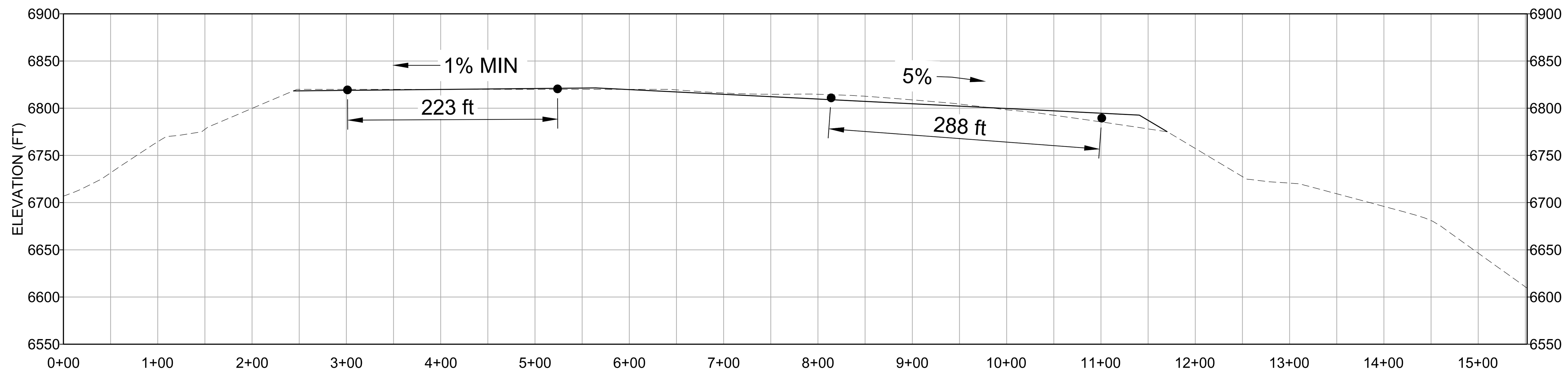
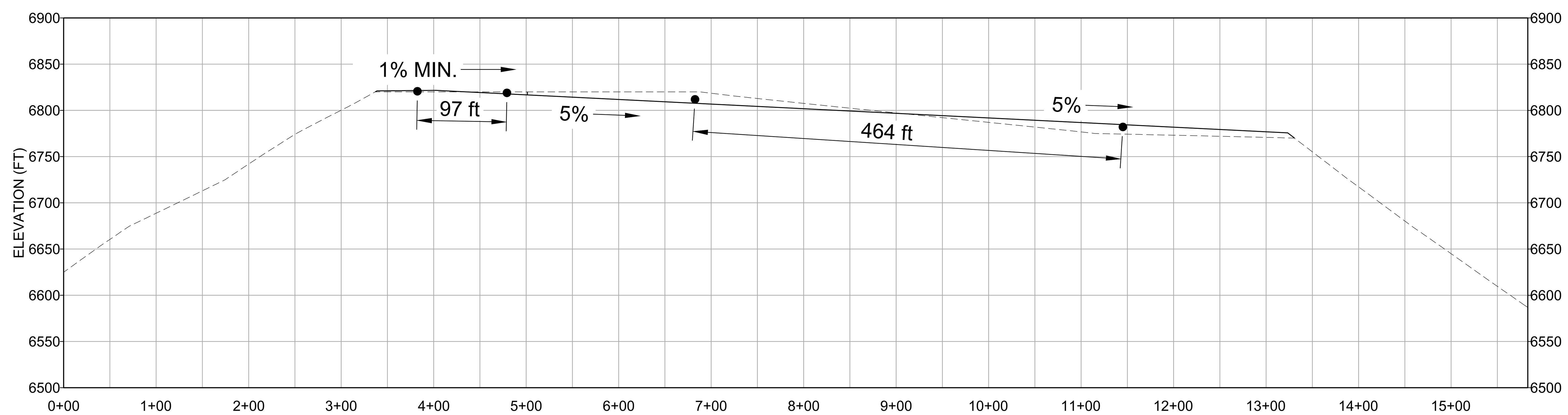
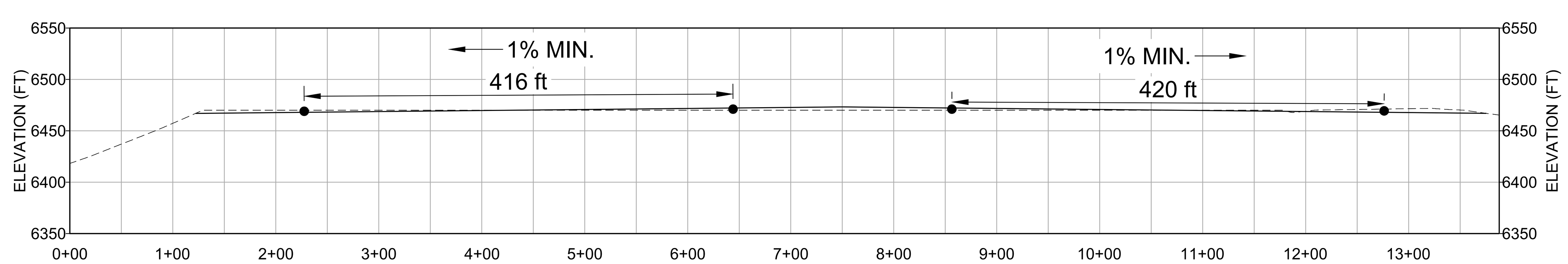


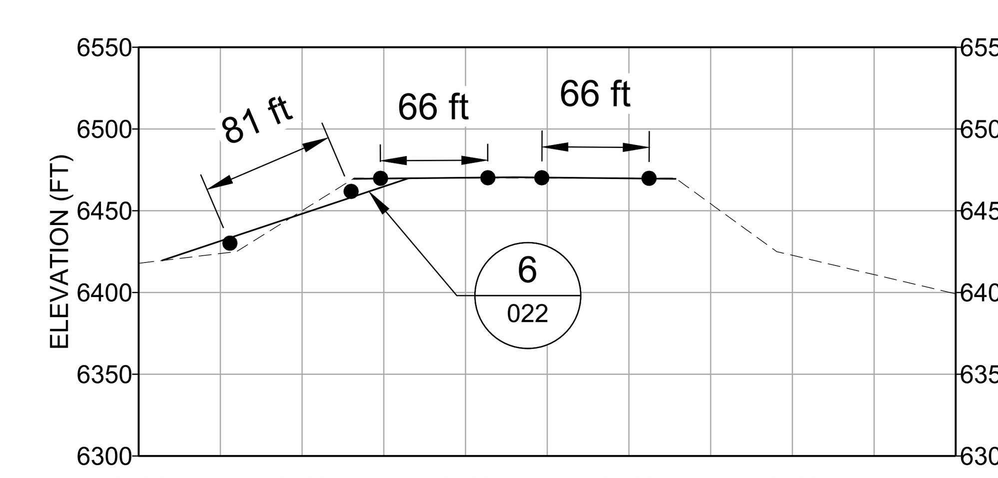
SCALE A NE-1 014 SECTION NE-1



SCALE A NE-2 014 SECTION NE-2



SCALE A NW-1 014 SECTION NW-1



SCALE A NW-2 014 SECTION NW-2

LEGEND

- EOY 2018 TOPOGRAPHY
- CCP DESIGN
- CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 100 200
SCALE A FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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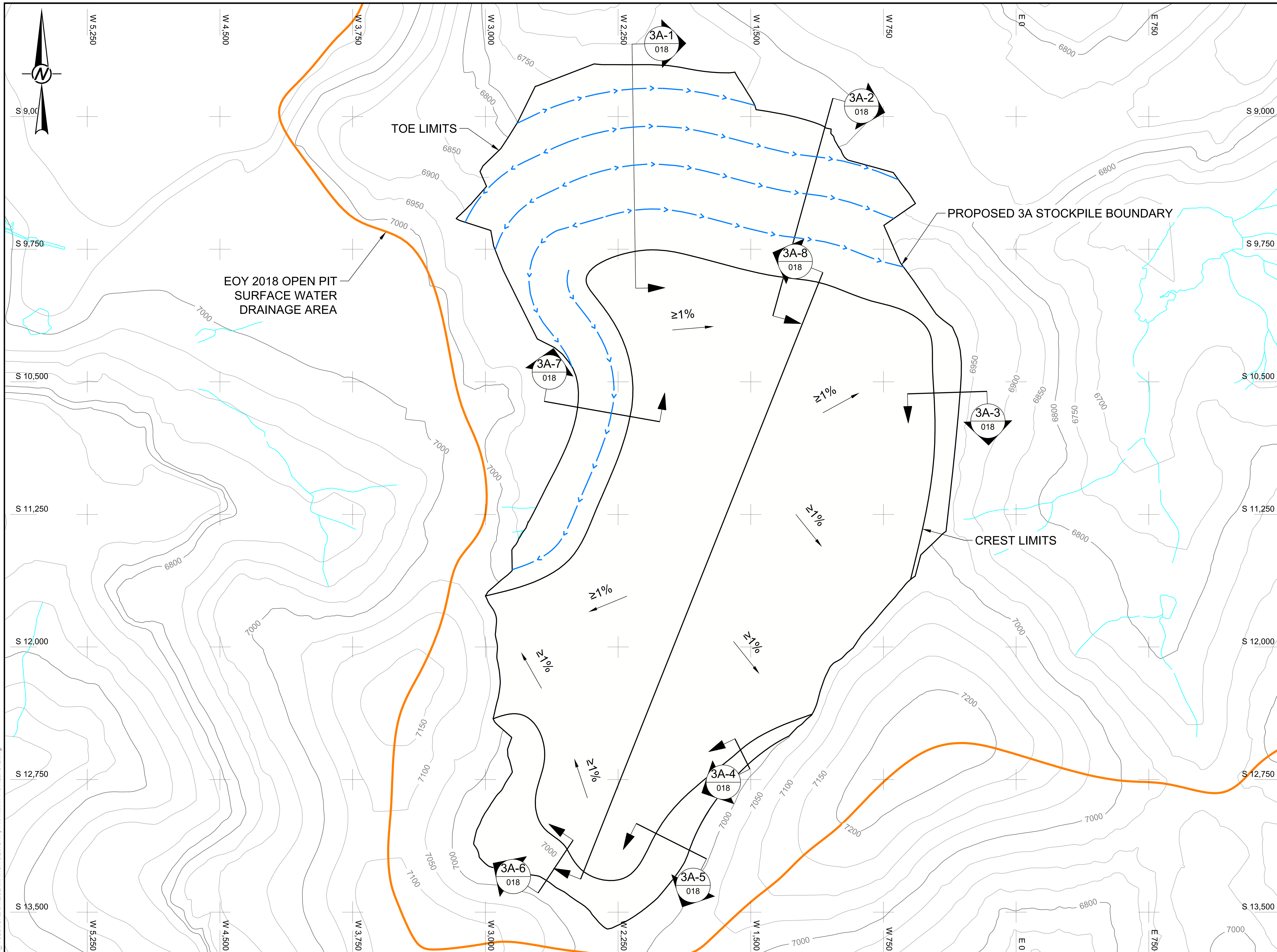
PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
NORTH PIT AREA STOCKPILES DESIGN SECTIONS (2 OF 2)

PROJECT No. 1401129 | Rev. C | 16 of 30 | FIGURE 016



LEGEND

- 5600 — EOY 2018 TOPO
- EXISTING DRAINAGE
- BENCH CHANNEL
- DOWNDRAIN
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- 3A-1 — CROSS SECTION LETTER
- 018 — SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 300 600
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE
PROPOSED 3A STOCKPILE GRADING AND DRAINAGE PLAN

PROJECT No. 1401129 | Rev. C | 17 of 30 | FIGURE 017

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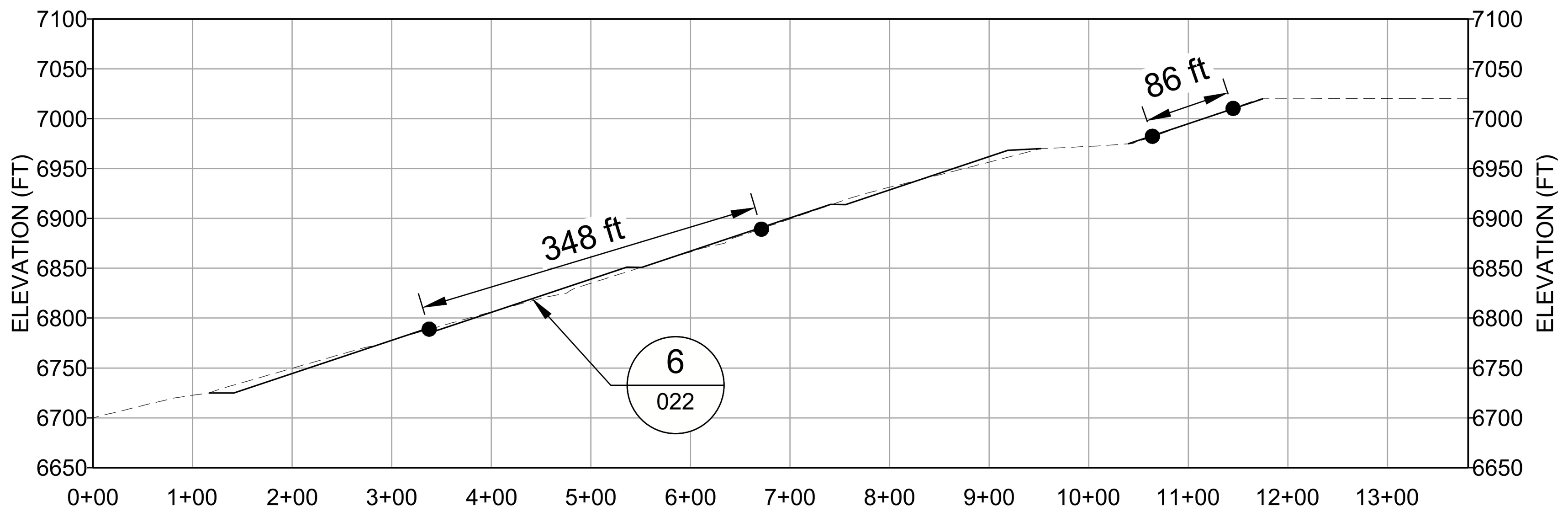
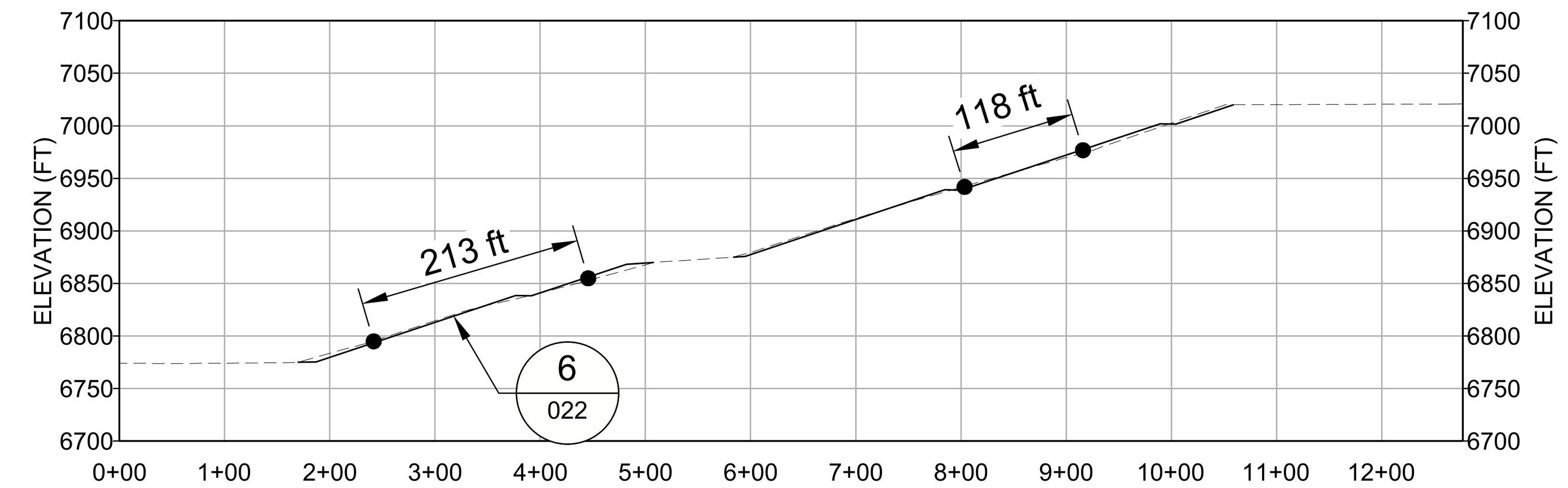


SCALE C 3A-1 017 SECTION 3A-1



SCALE C 3A-2 017 SECTION 3A-2

LEGEND

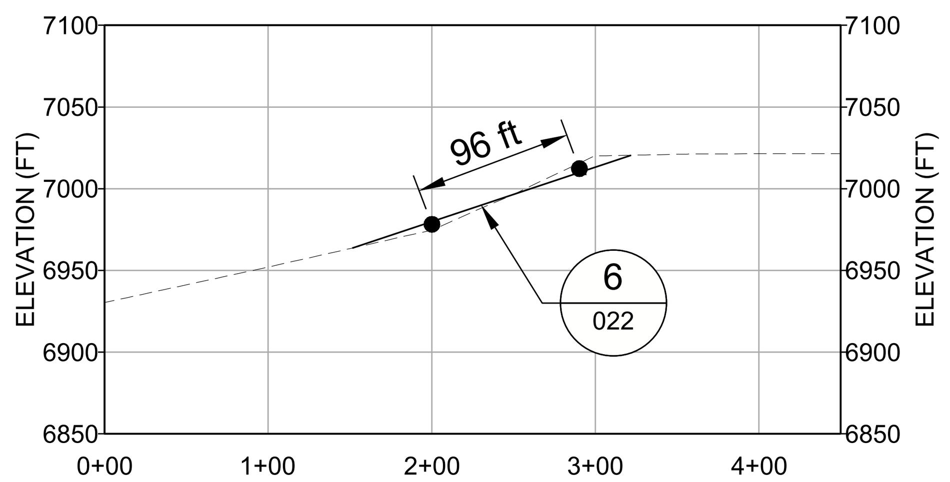
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

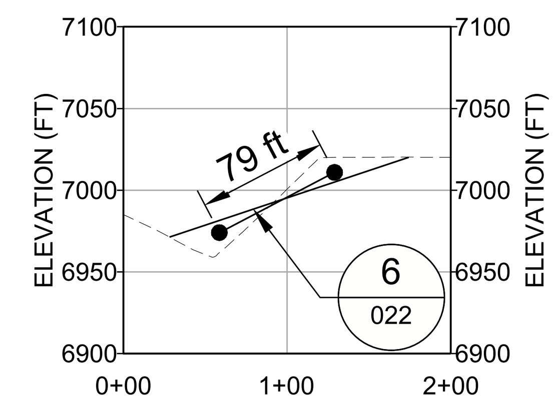
CENTROID OF CUT/FILL AREA

REFERENCE

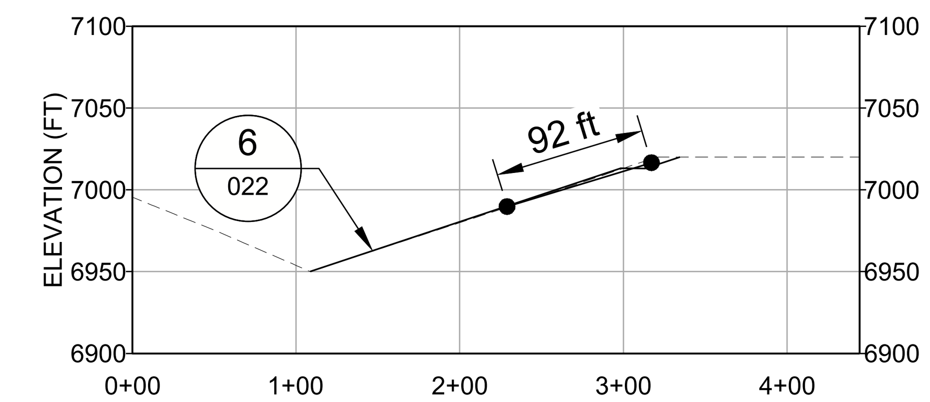
1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



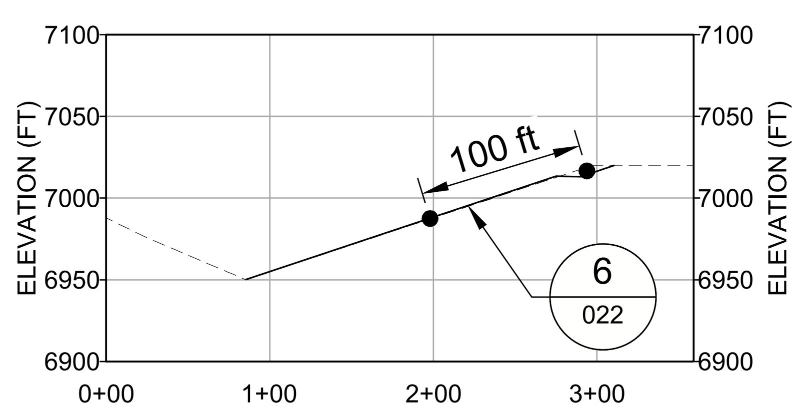
SCALE A 3A-3 017 SECTION 3A-3



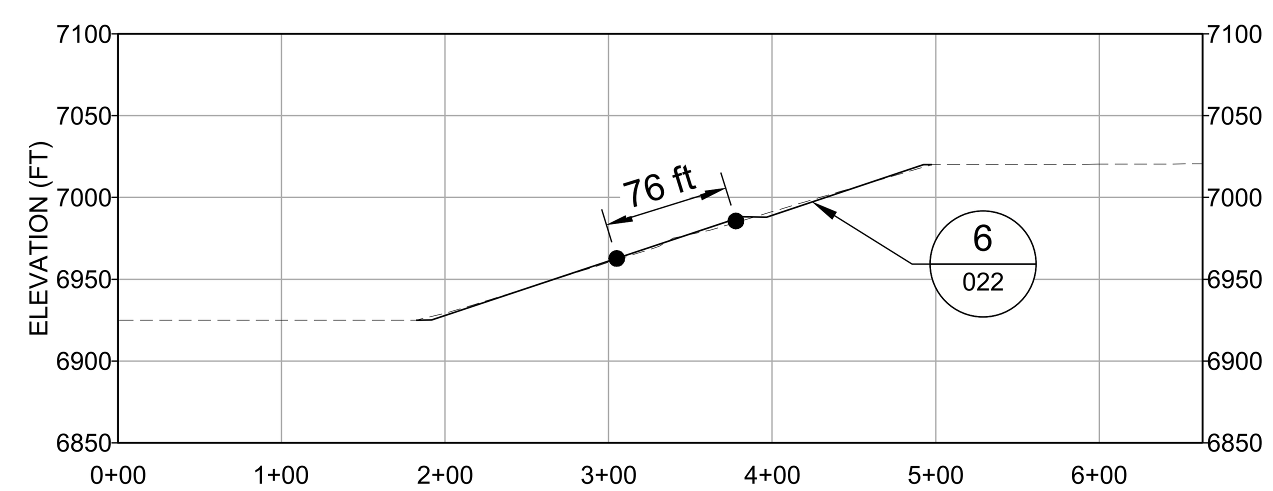
SCALE A 3A-4 017 SECTION 3A-4



SCALE A 3A-5 017 SECTION 3A-5



SCALE A 3A-6 017 SECTION 3A-6



SCALE A 3A-7 017 SECTION 3A-7

SCALE B 3A-8 017 SECTION 3A-8

0 100 200 SCALE A FEET

0 120 240 SCALE B FEET

0 150 300 SCALE C FEET

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PROJECT

CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE

PROPOSED 3A STOCKPILE DESIGN SECTIONS

PROJECT No. 1401129 Rev. C 18 of 30 FIGURE 018

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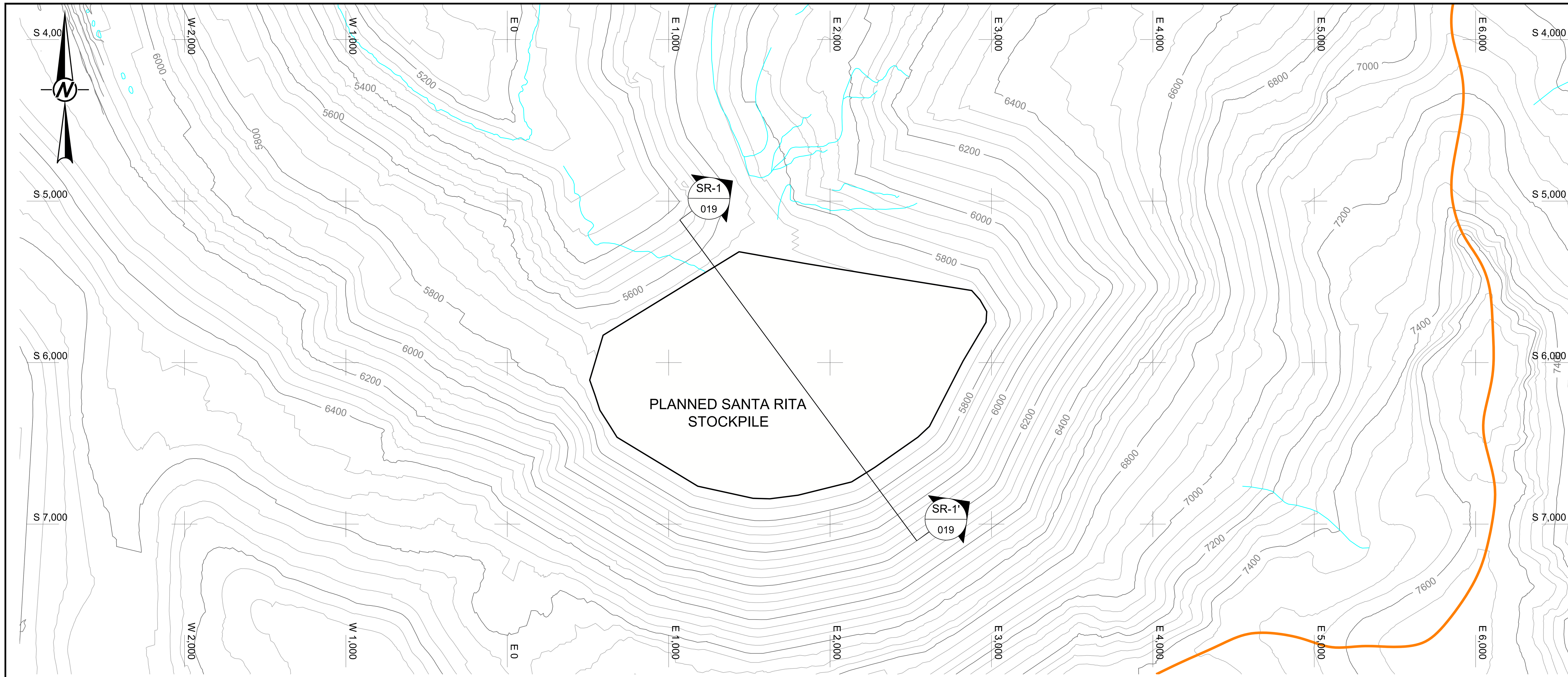


PLANNED SANTA RITA STOCKPILE PLAN VIEW

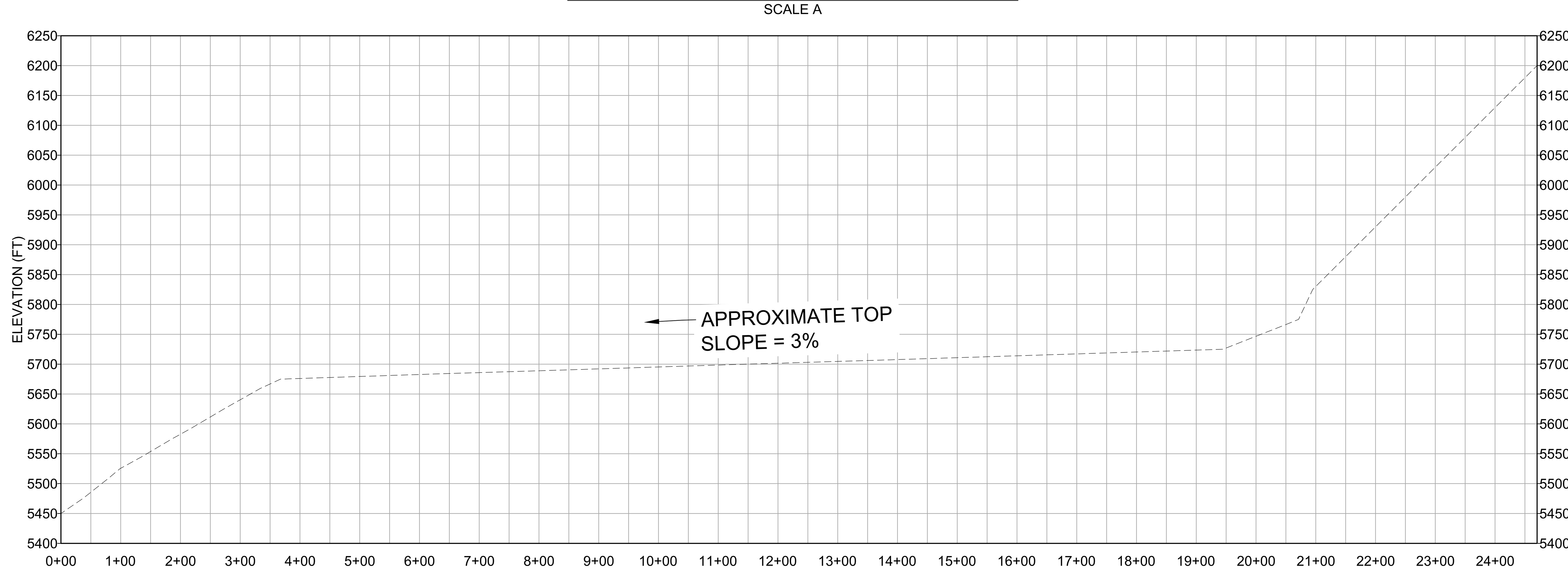
SCALE A

LEGEND

- 5600 — EOY 2018 TOPO
- BUILDINGS
- EXISTING DRAINAGE
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- SR-1 / 019 — CROSS SECTION LETTER; SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



SCALE B SR-1 019 SECTION SR-1

0 400 800 SCALE A FEET

0 150 300 SCALE B FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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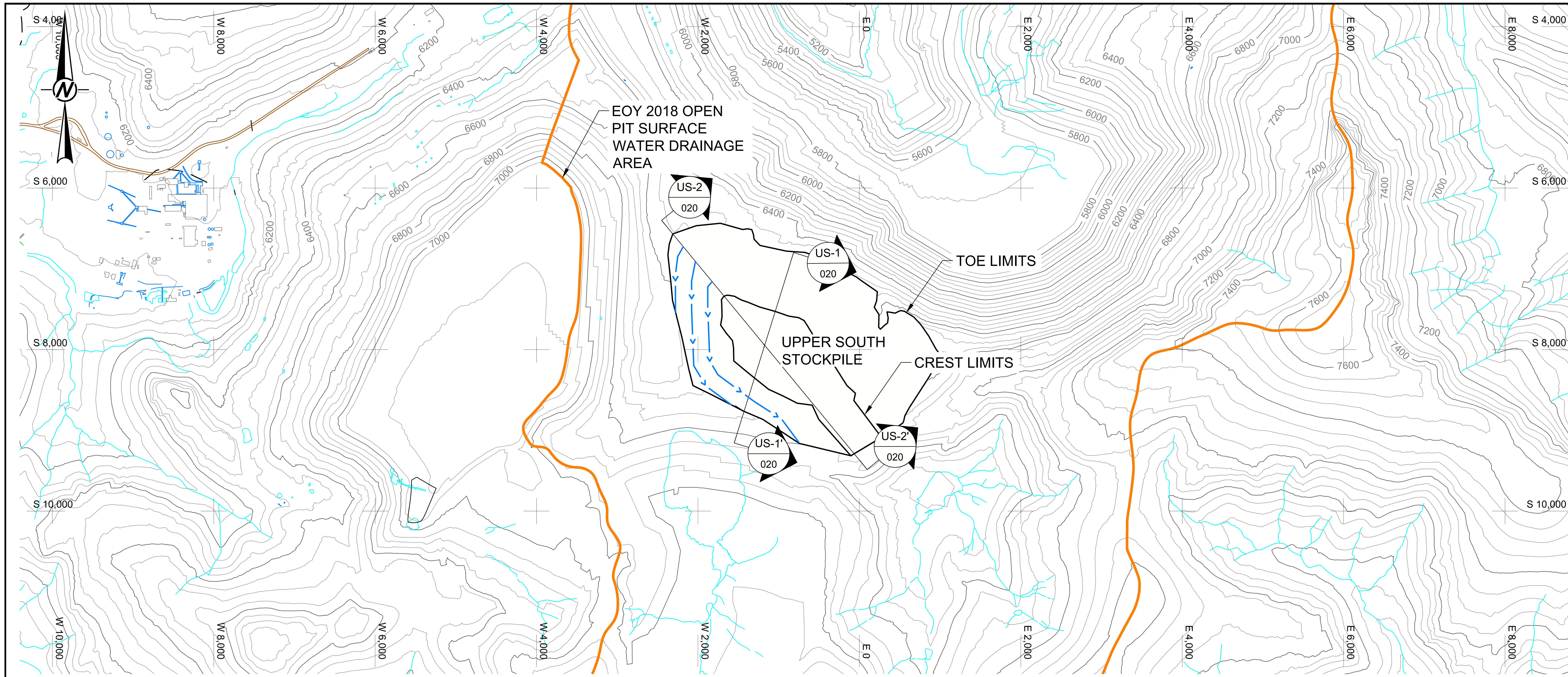
PROJECT

CLOSURE/CLOSEOUT PLAN UPDATE
CHINO MINES COMPANY
GRANT COUNTY, NEW MEXICO

TITLE

PLANNED SANTA RITA STOCKPILE GRADING AND DRAINAGE PLAN

PROJECT No. 1401129 | Rev. C | 19 of 30 | FIGURE 019



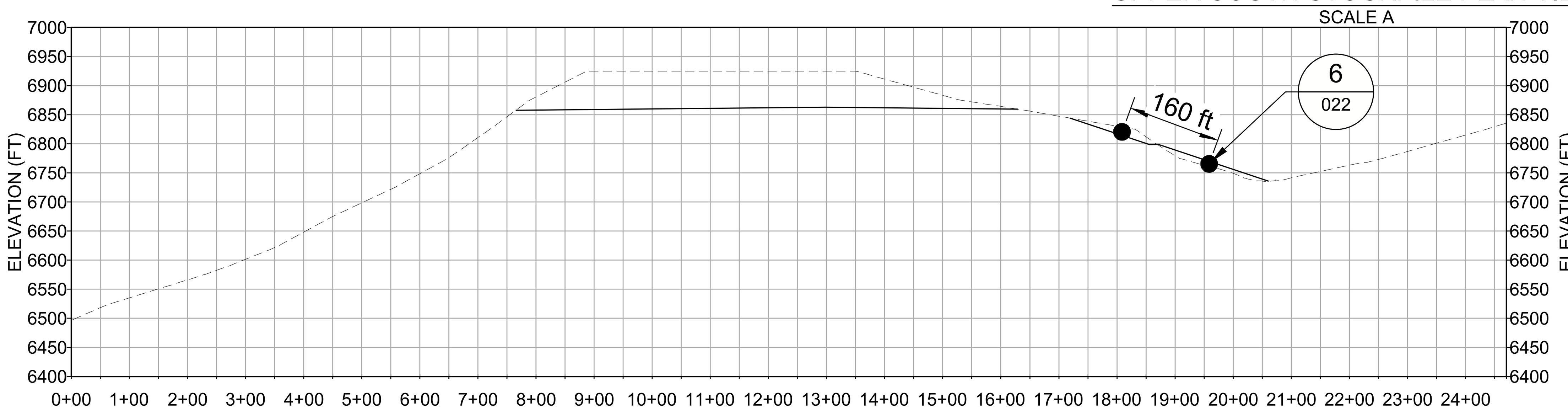
UPPER SOUTH STOCKPILE PLAN VIEW
SCALE A

LEGEND

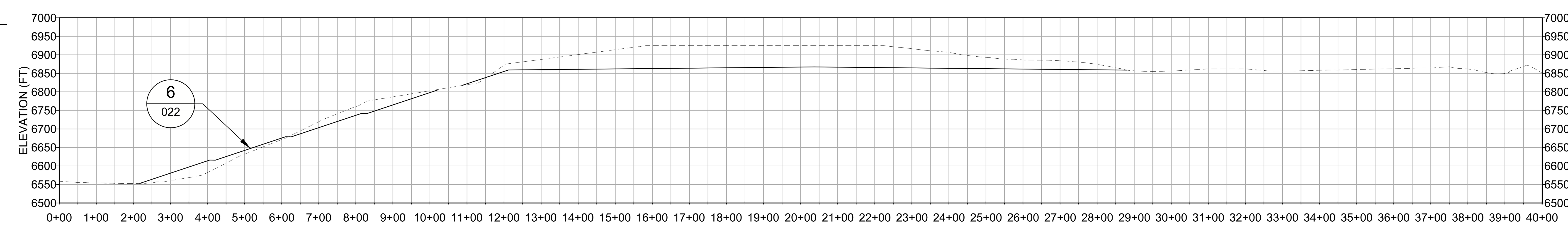
- 5600 — EOY 2018 TOPO
- BUILDINGS
- EXISTING DRAINAGE
- TOE AND TOP SURFACE OUTLINE
- EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
- US-1 — CROSS SECTION LETTER
- 020 — SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



SCALE B US-1 020 SECTION US-1



SCALE B US-2 020 SECTION US-2

0 800 1600
SCALE A FEET

0 200 400
SCALE B FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
UPPER SOUTH STOCKPILE GRADING AND DRAINAGE PLAN

PROJECT No.	CONTROL	Rev.	20 of 30	FIGURE
1401129		C		020

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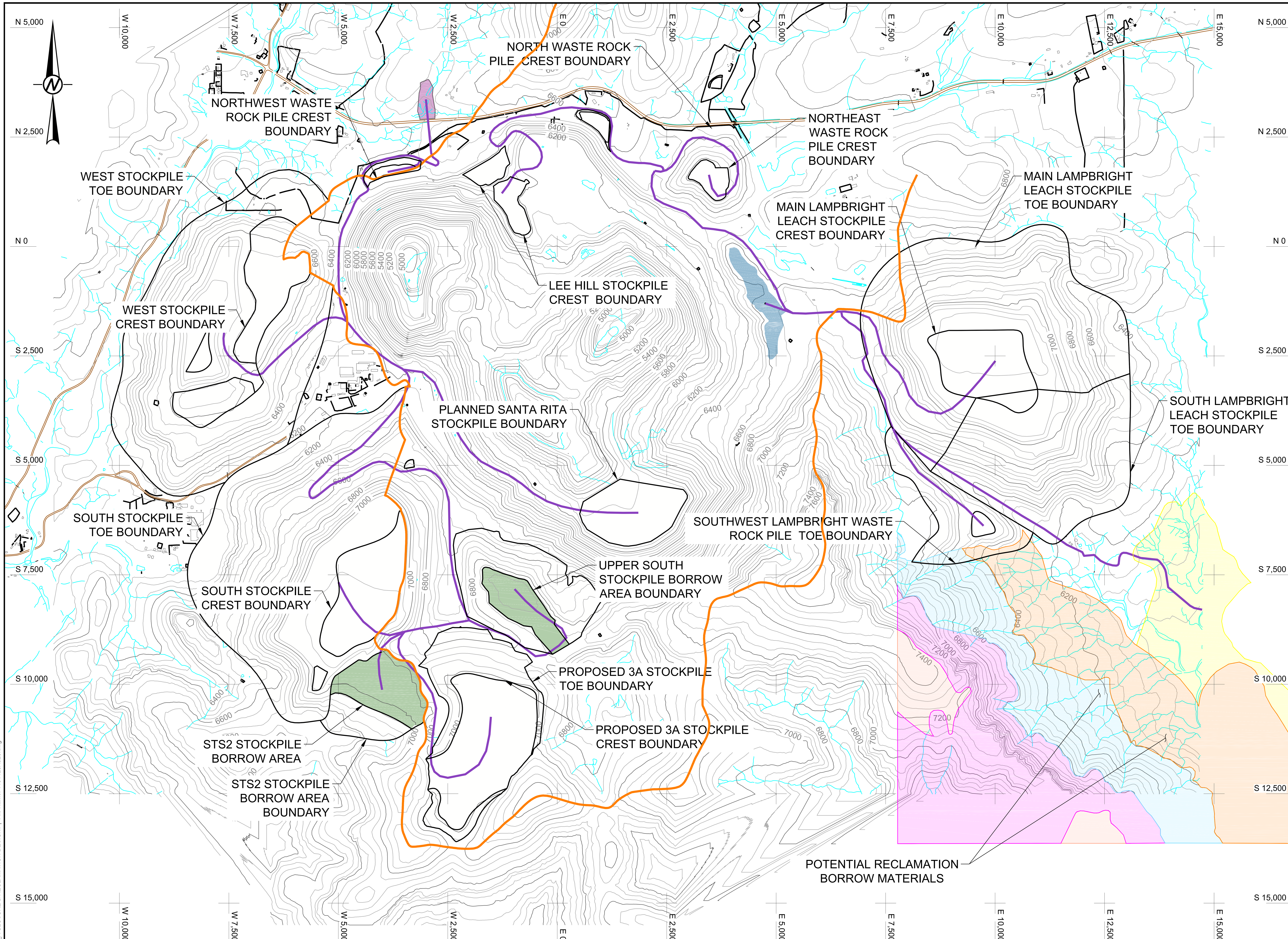

LEGEND

5600	EOY 2018 TOPO
	BUILDINGS
	PAVED ROAD
	TOE AND TOP SURFACE OUTLINE
	EOY 2018 OPEN PIT SURFACE WATER DRAINAGE AREA
	COVER MATERIAL HAUL ROUTE
	RUBIO PEAK CONGLOMERATE (COVER BORROW AREA)
	RUBIO PEAK FLOWS (RIPRAP)
	SUGARLUMP TUFF (COVER BORROW AREA)
	BEAR SPRINGS BASALT (RIPRAP)
	KNEELING NUN TUFF (RIPRAP)
	UPPER SOUTH AND STS2 STOCKPILE COVER BORROW AREAS
	KEARNEY CULVERT FILL MATERIAL
	WHITE HOUSE TEMPORARY COVER STAGING AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY 50 FOOT INTERVAL PROVIDED BY CHINO MINES CO.

0 1200 2400
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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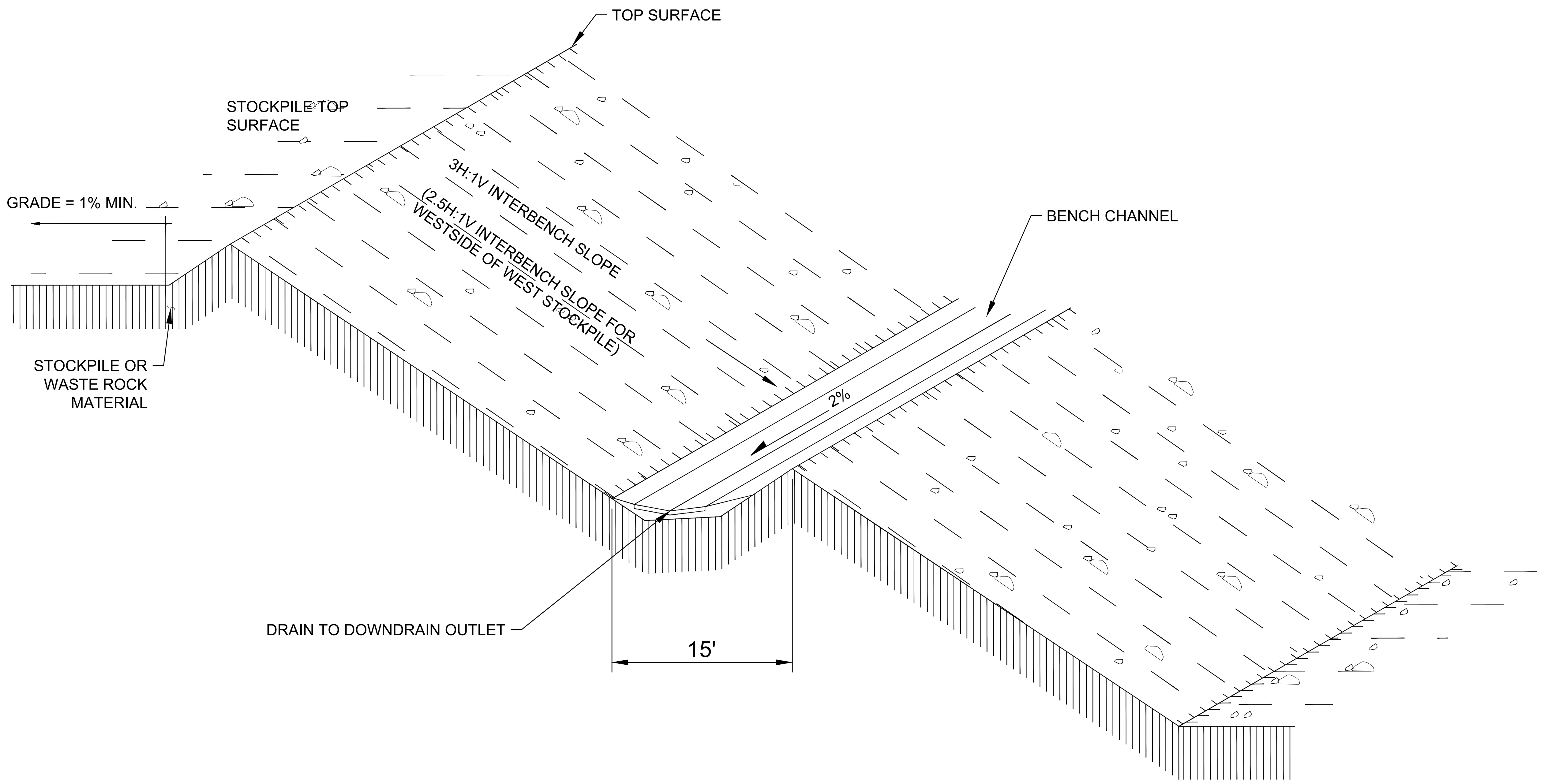
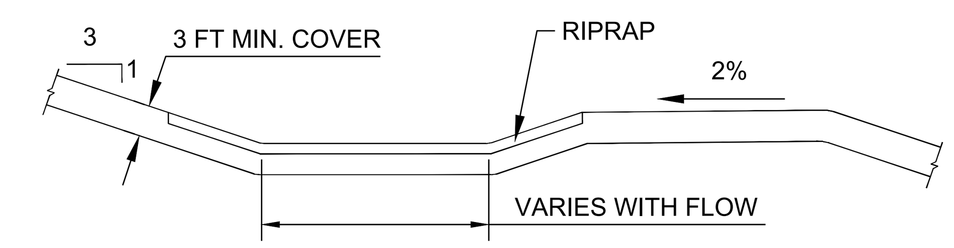
PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
NORTH MINE AREA BORROW LOCATIONS AND HAUL ROUTES

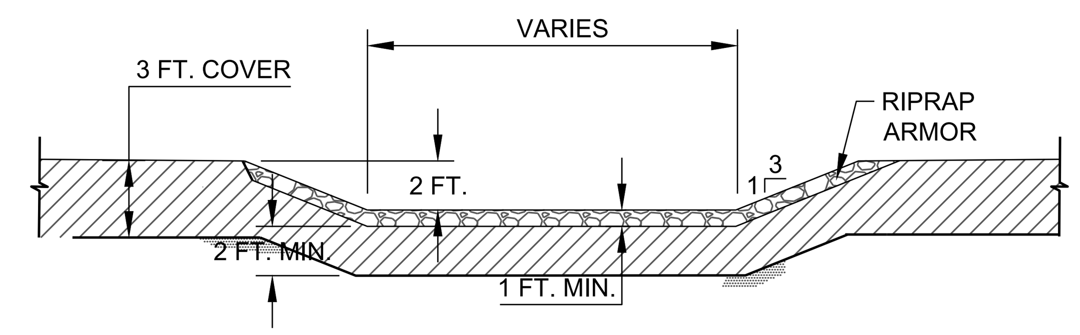
PROJECT No. 1401129 | CONTROL | Rev. C | 21 of 30 | FIGURE 021



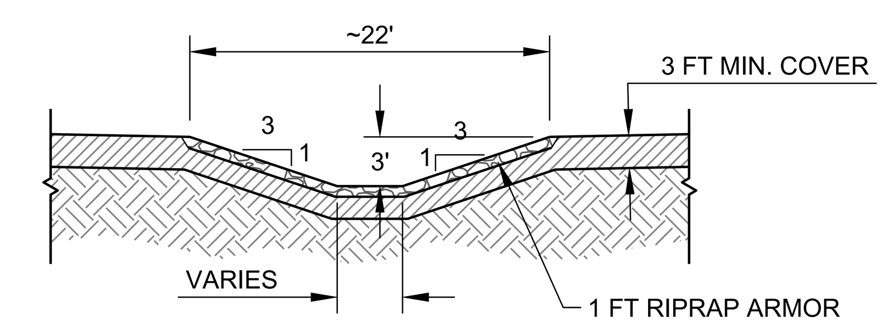
SCALE N.T.S. 1 022 TYPICAL OUTSLOPE PLAN



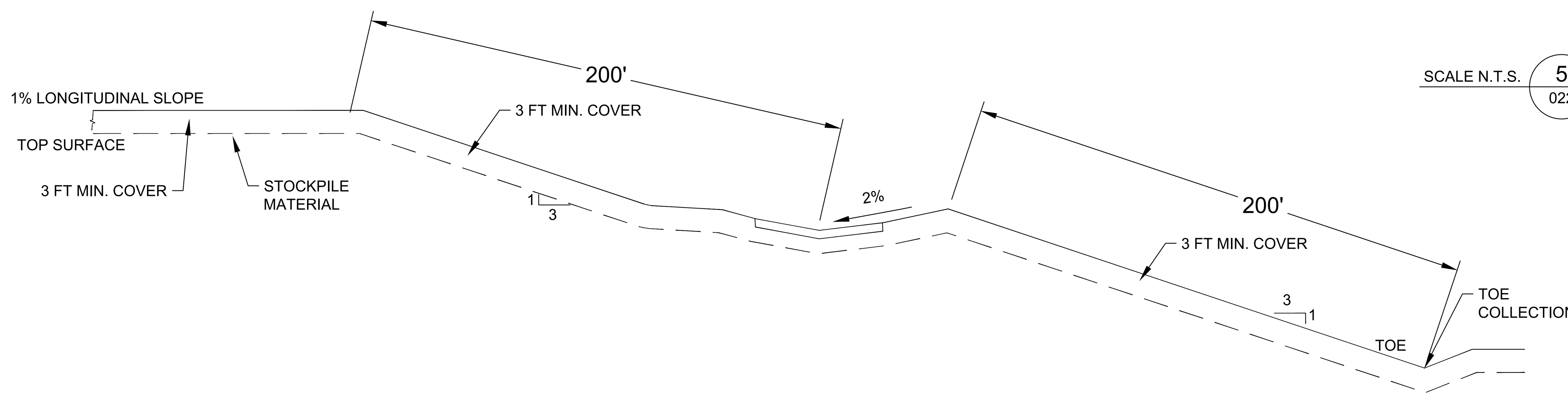
SCALE N.T.S. 3 022 TYPICAL OUTSLOPE BENCH



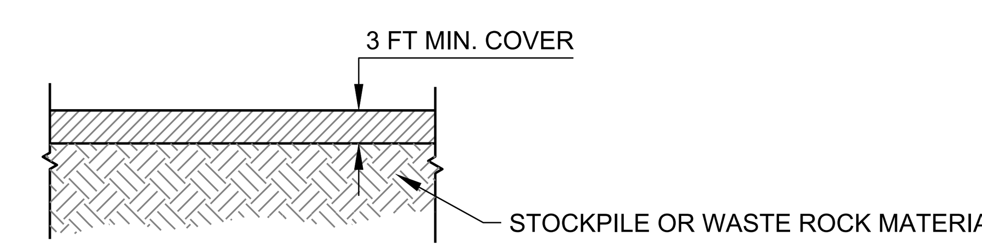
SCALE N.T.S. 4 022 DOWNDRAIN DETAIL



SCALE N.T.S. 5 022 WEST STOCKPILE - SOUTH STOCKPILE CONTACT SURFACE WATER CHANNEL



SCALE N.T.S. 2 022 TYPICAL RECLAIMED OUTSLOPE SECTION



SCALE N.T.S. 6 022 RECLAMATION COVER DESIGN DETAIL

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
TYPICAL RECLAMATION GRADING DETAILS

PROJECT No.	CONTROL	Rev.	22 of 30	FIGURE
1401129		C		022

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LEGEND

5600	EOY 2018 TOPO
	BUILDINGS
	PAVED ROAD
	EXISTING DRAINAGE

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY 5 FOOT INTERVAL PROVIDED BY CHINO MINES CO.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	CM	CM	TMF	BRB

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PROJECT

CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE

SOUTH MINE AREA END OF YEAR 2018 PRE-RECLAMATION TOPOGRAPHY

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	23 of 30	023

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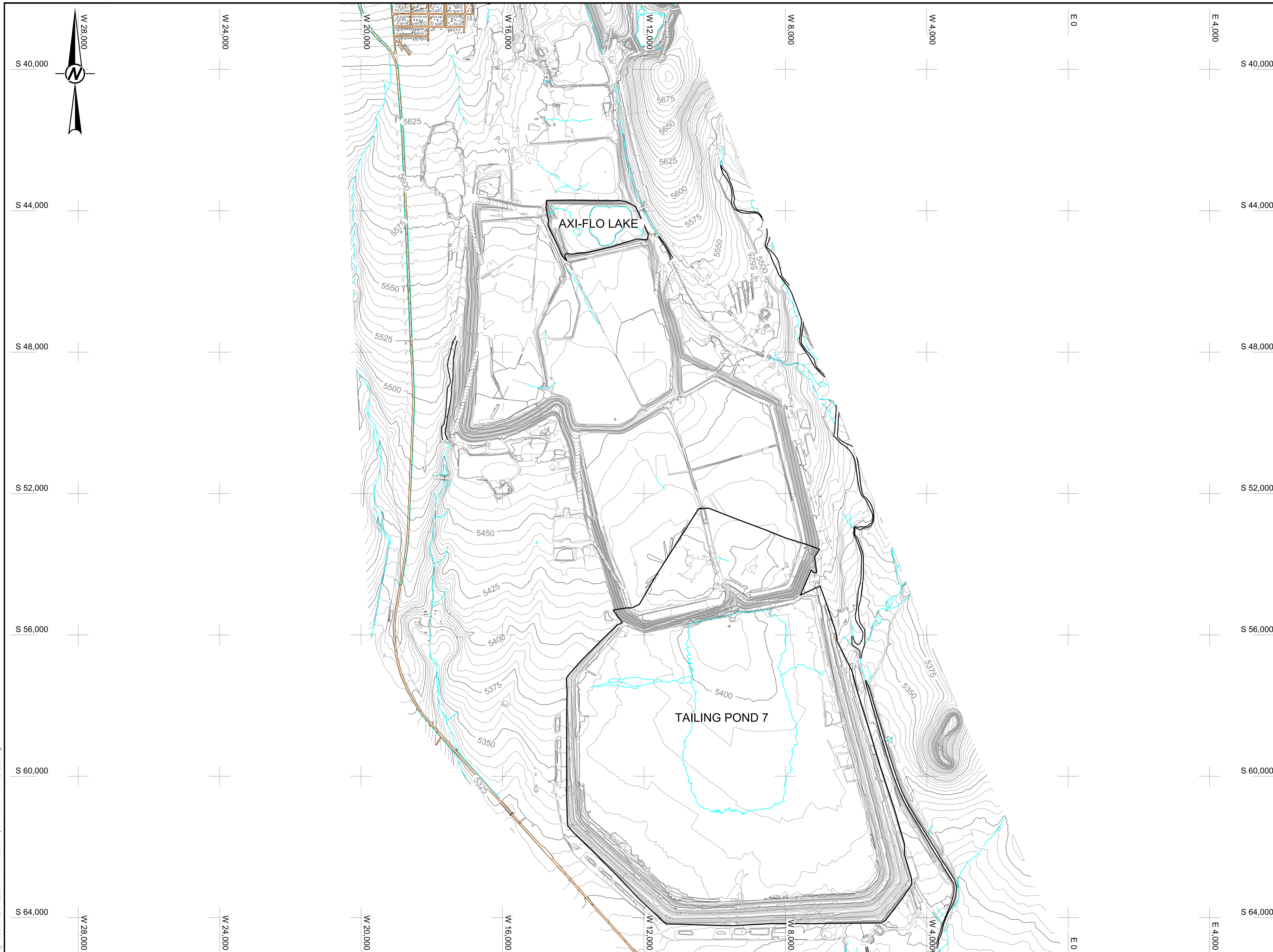

LEGEND

5600	EOY 2018 TOPO
	BUILDINGS
	PAVED ROAD
	EXISTING DRAINAGE
	FACILITY TOE LIMITS

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 1500 3000
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
A	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	LRS	DET	TMF	BRB

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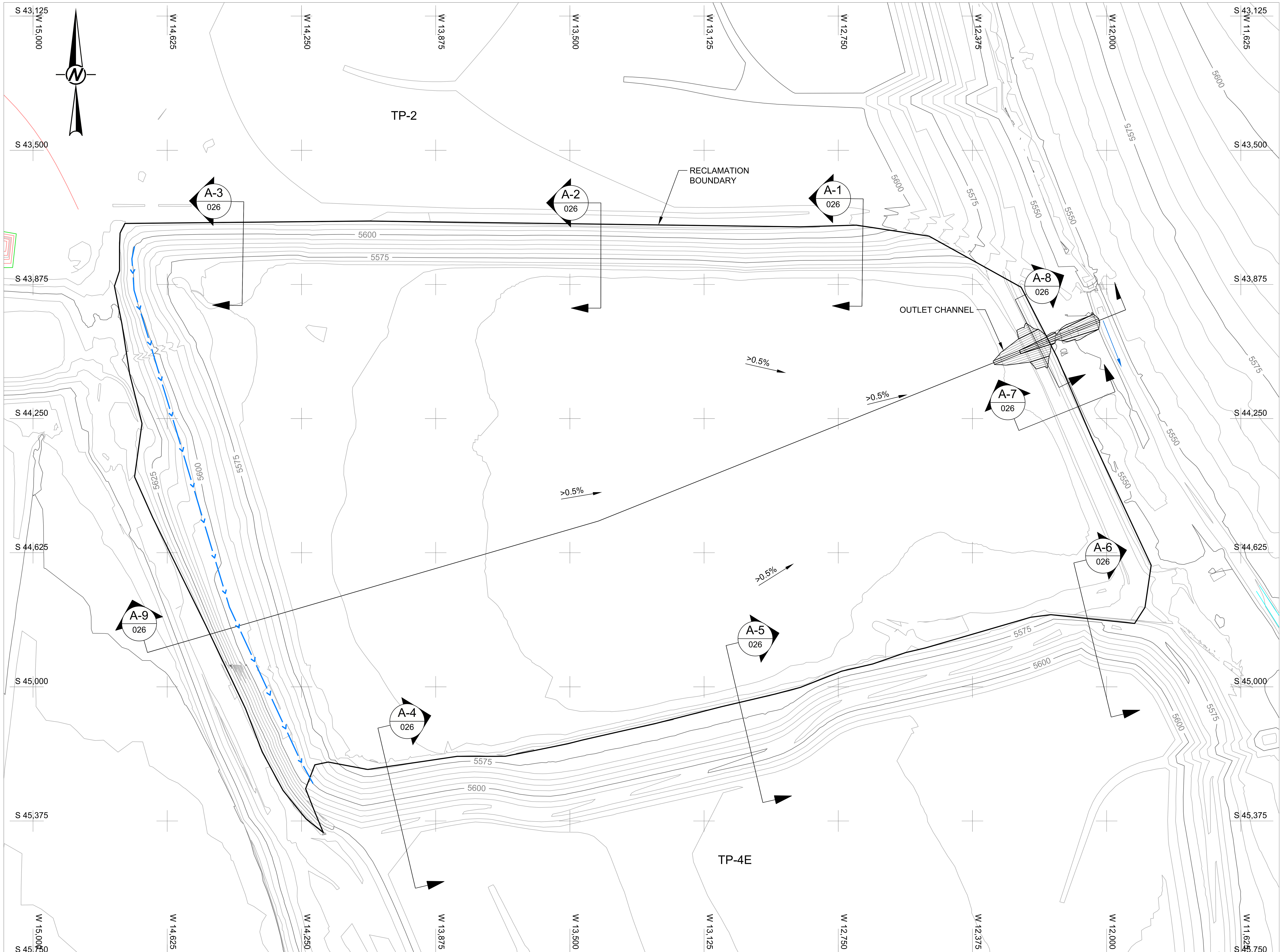
PROJECT

CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE

SOUTH MINE AREA POST-RECLAMATION TOPOGRAPHY

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		A	24 of 30	024



LEGEND

5600	EOY 2018 TOPO
	BUILDINGS
	OUTLET CHANNEL FLOW
	AREA TO BE RECLAIMED
	BENCH CHANNEL
A-1	CROSS SECTION LETTER
026	SHEET WHERE SECTION IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

0 150 300
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT

CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE

AXI-FLO LAKE GRADING AND DRAINAGE PLAN

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	25 of 30	025

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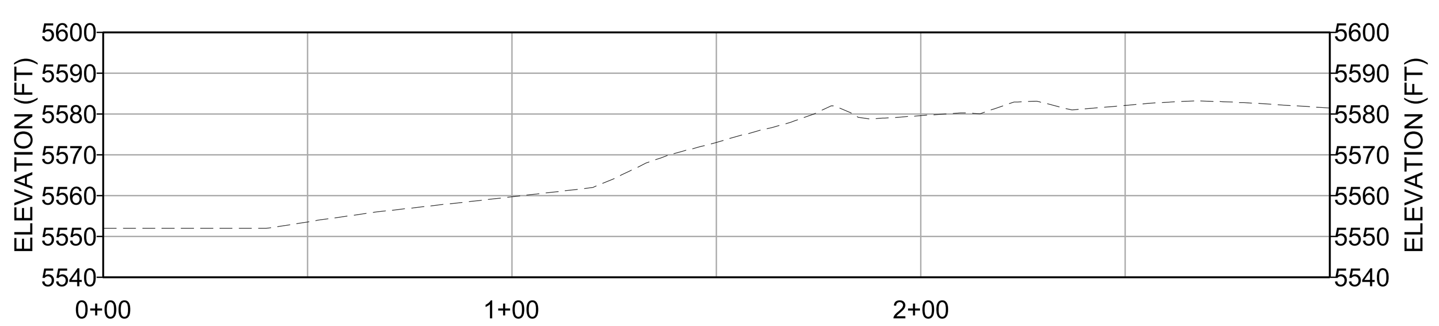
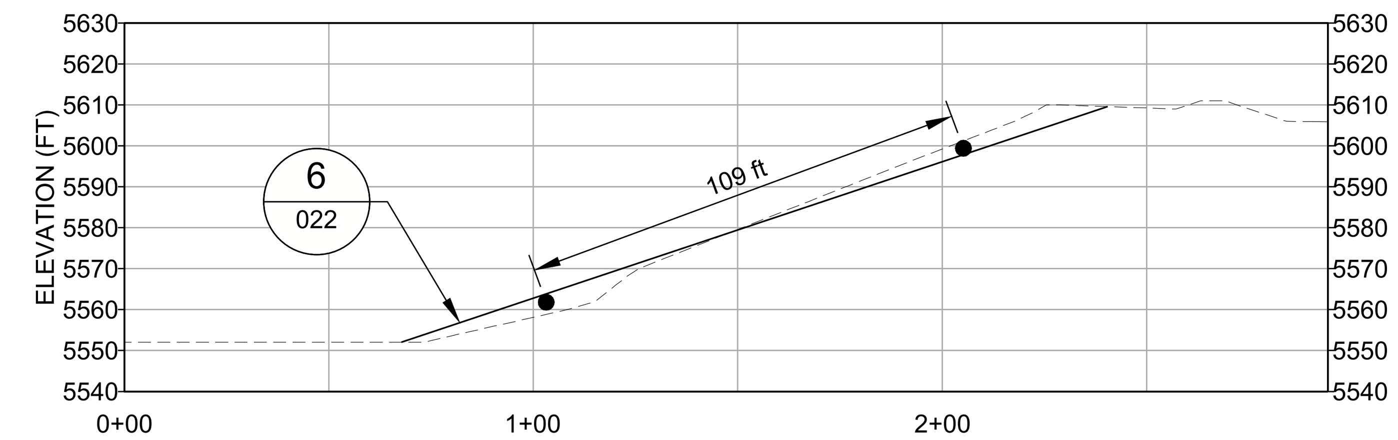


SCALE A A-1 025 SECTION A-1



SCALE A A-2 025 SECTION A-2

LEGEND

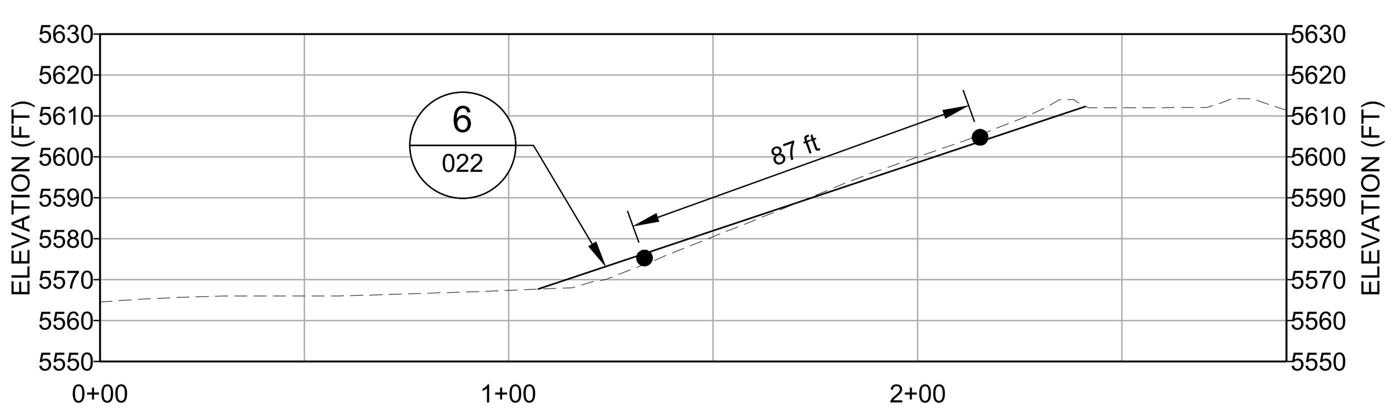
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



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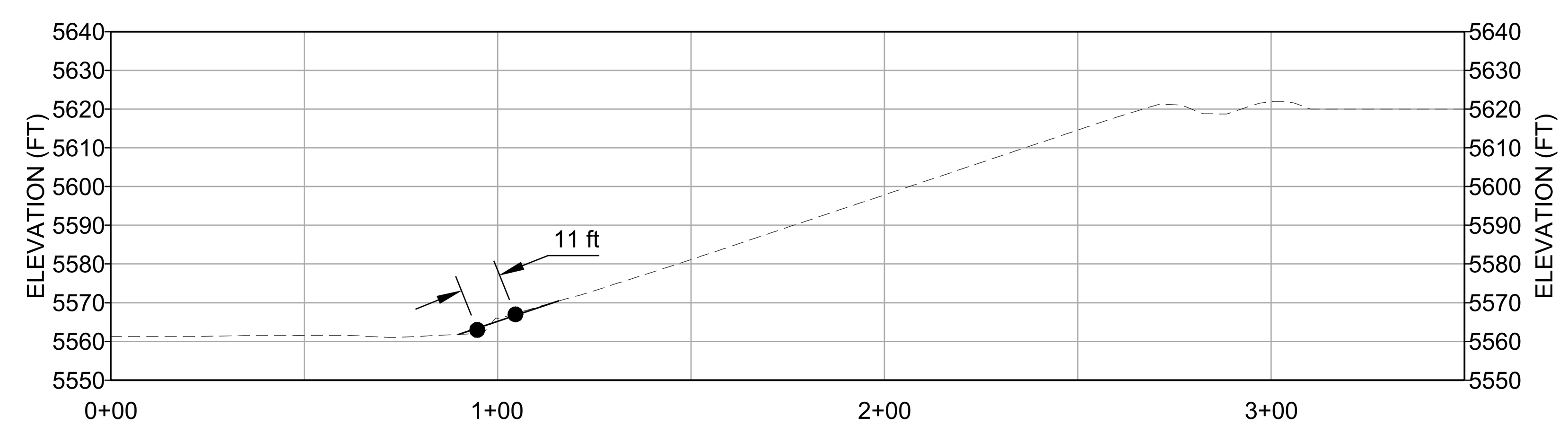

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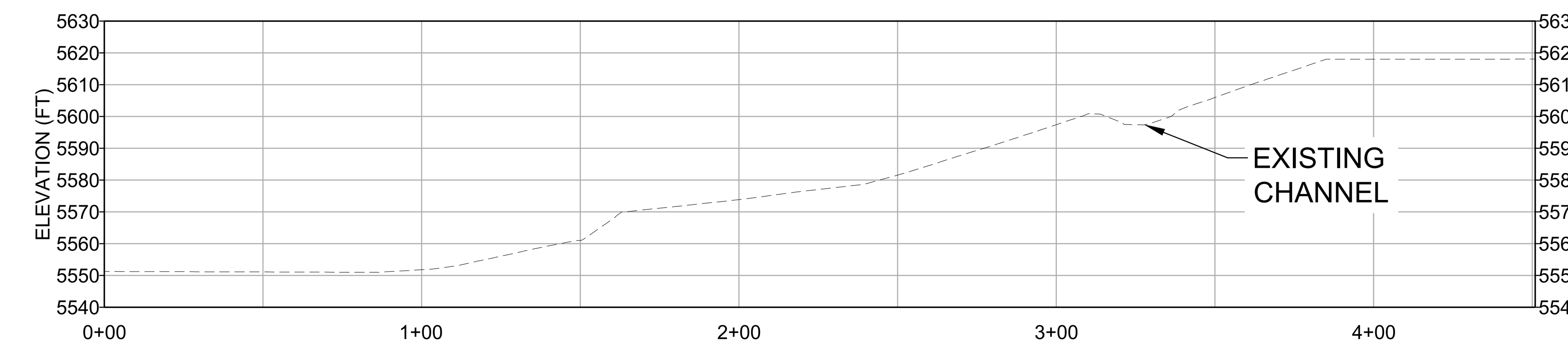

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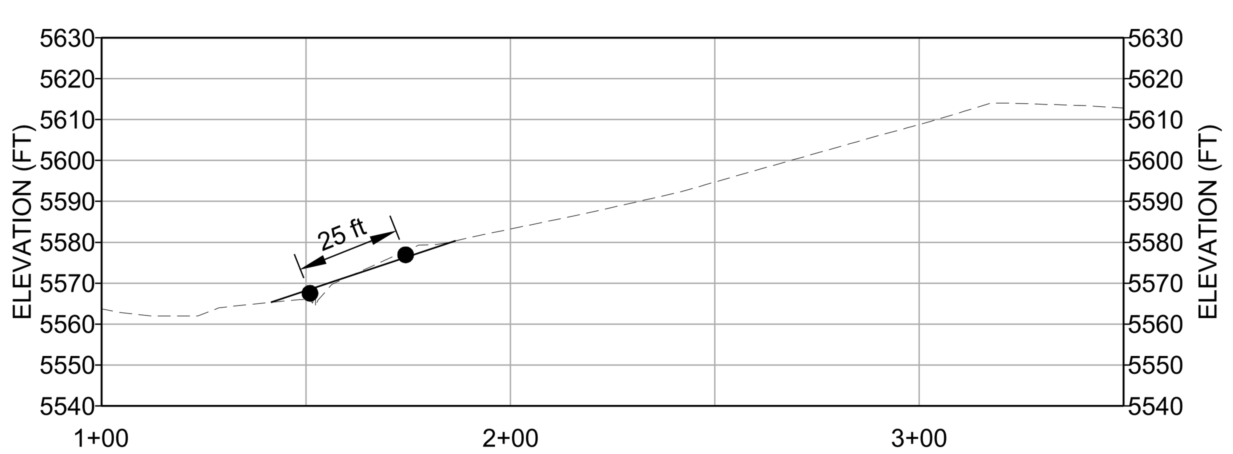

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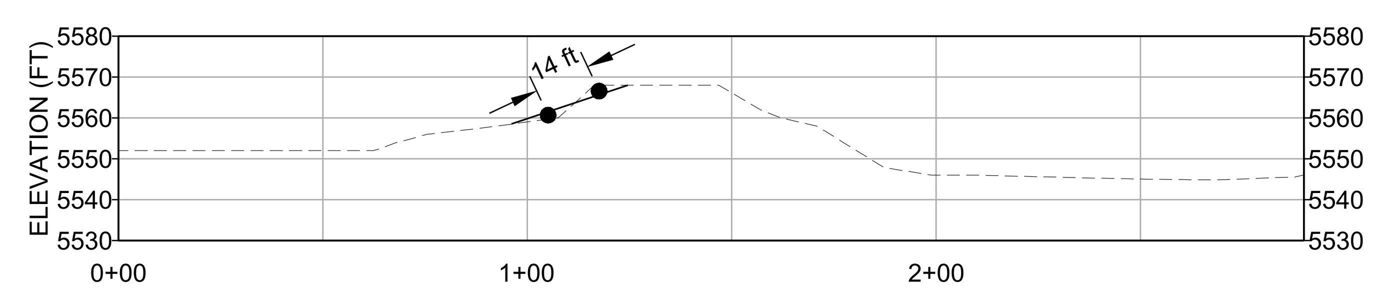

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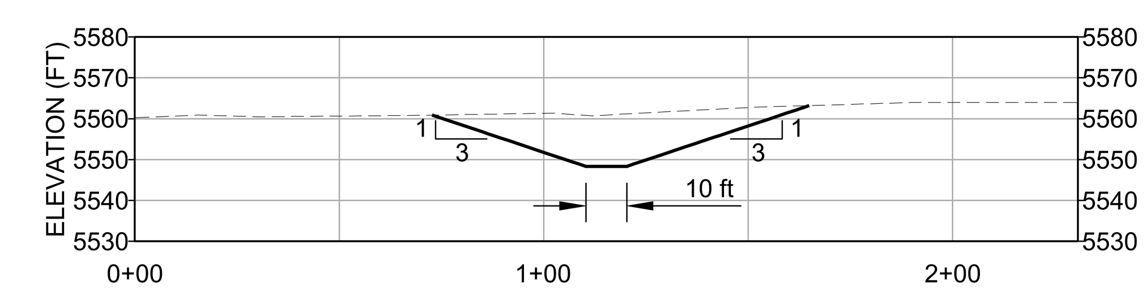

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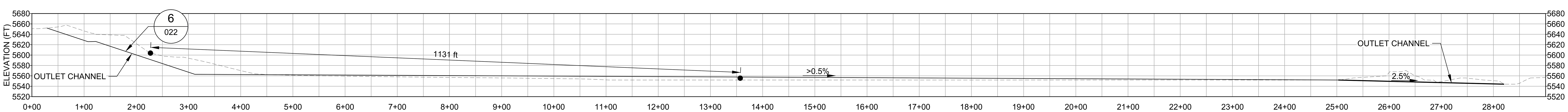
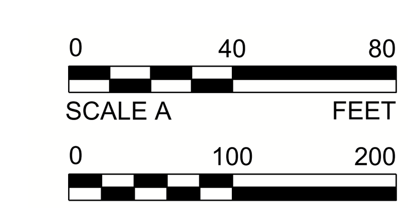


SCALE B A-9 025 SECTION A-9



Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT

CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE

AXI-FLO LAKE DESIGN SECTIONS

PROJECT No. 1401129 | CONTROL | Rev. C | 26 of 30 | FIGURE 026

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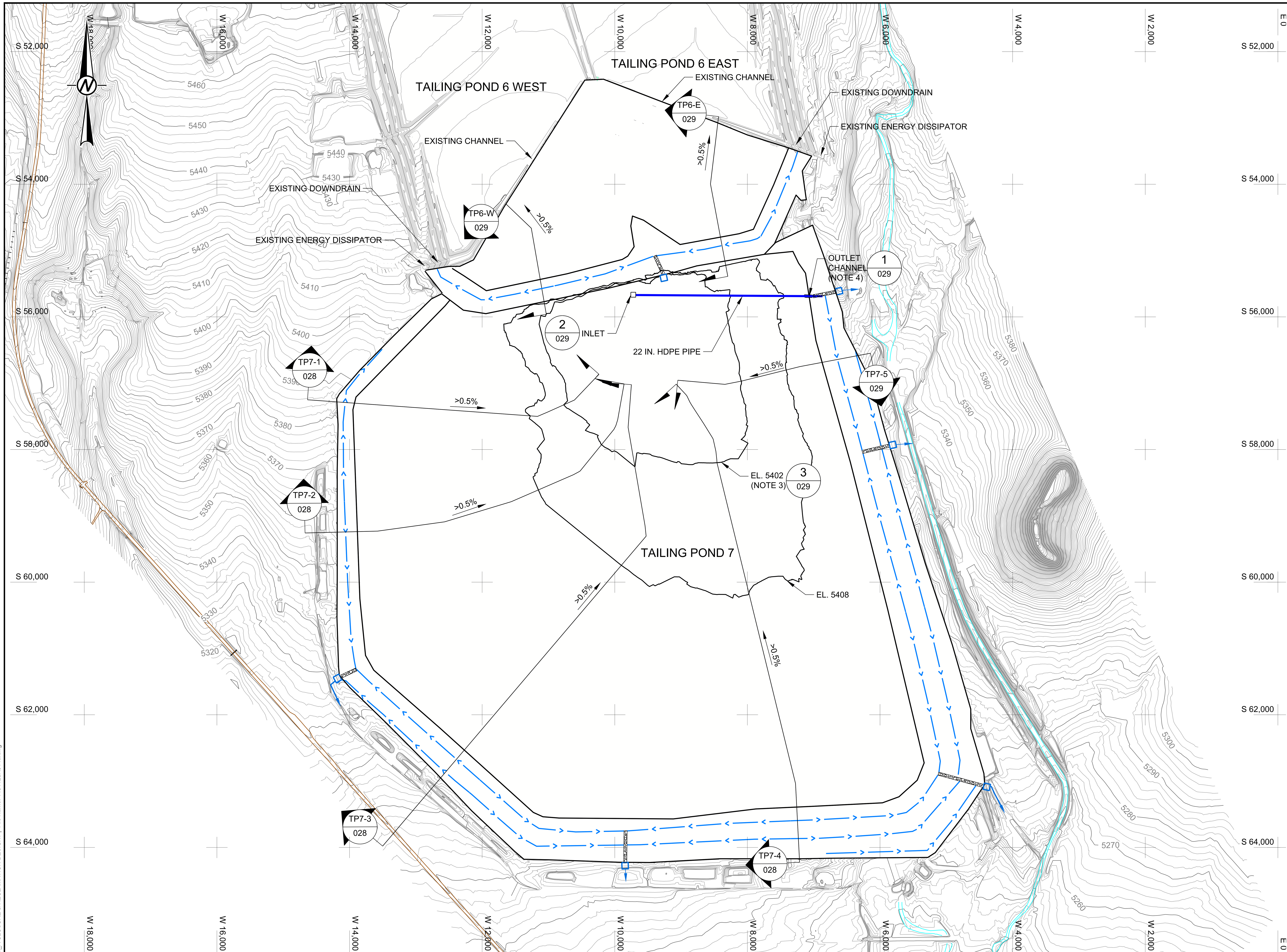

LEGEND

5600	EOY 2018 TOPO
	BUILDINGS
	PAVED ROAD
	DOWNDRAIN OUTFLOW
	EXISTING DRAINAGE
	BENCH CHANNEL
	DOWNDRAIN
	ENERGY DISSIPATOR
TP7-1	CROSS SECTION LETTER
028	SHEET WHERE SECTION IS REFERENCED
1	DETAIL NUMBER
025	SHEET WHERE DETAIL IS REFERENCED

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY 5 FOOT INTERVAL PROVIDED BY CHINO MINES CO.

0 800 1600
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
TAILING POND 6 EAST, 6 WEST AND 7 GRADING AND DRAINAGE PLAN

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	27 of 30	027

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LEGEND

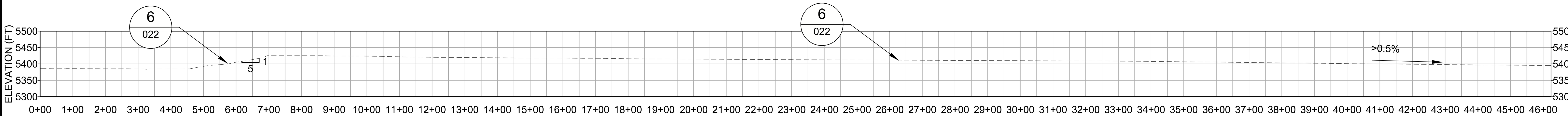
EOY 2018 TOPOGRAPHY

CCP GRADING DESIGN

CENTROID OF CUT/FILL AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.



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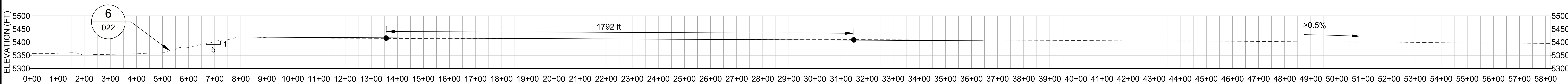

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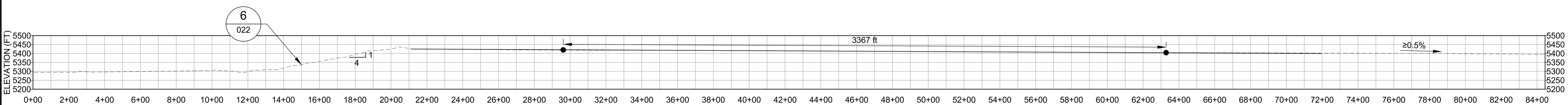

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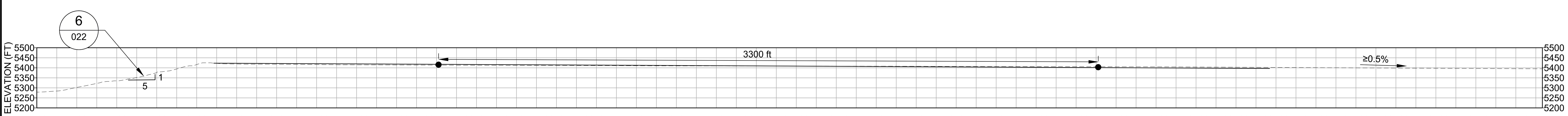

SCALE B TP7-4 027 SECTION TP7-4

0 200 400
SCALE A FEET

0 300 600
SCALE B FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT

CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE

TAILING POND 6 EAST, 6 WEST AND 7 DESIGN SECTIONS (1 OF 2)

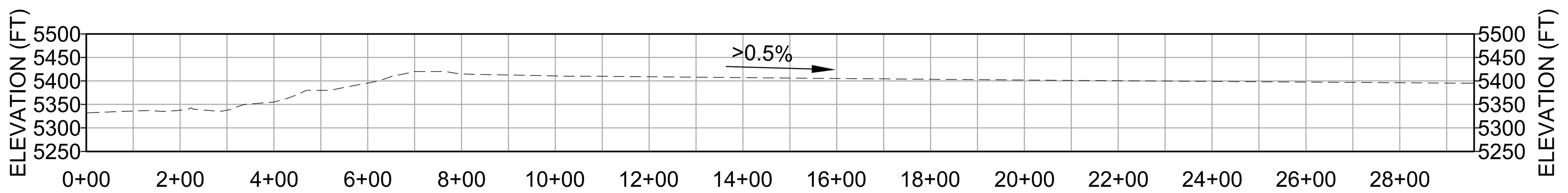
PROJECT No. 1401129 | CONTROL | Rev. C | 28 of 30 | FIGURE 028

LEGEND

- EOY 2018 TOPOGRAPHY
- CCP GRADING DESIGN
- CENTROID OF CUT/FILL AREA

1. END OF YEAR 2018 TOPOGRAPHY PROVIDED BY CHINO MINES CO.

REFERENCE



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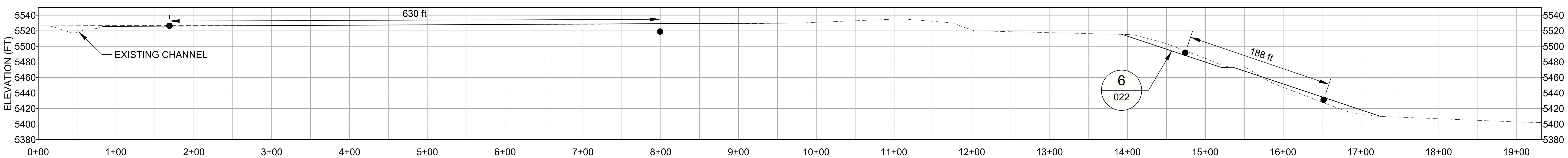

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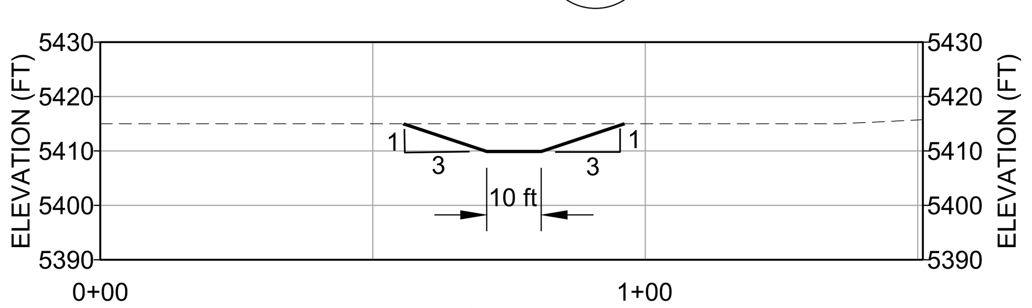
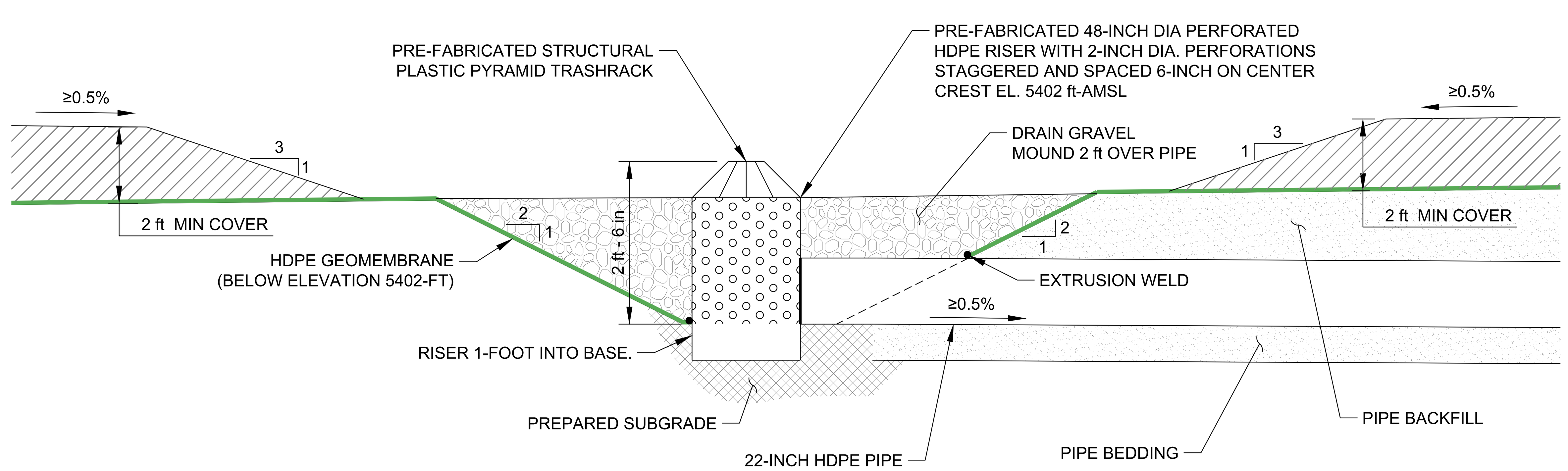
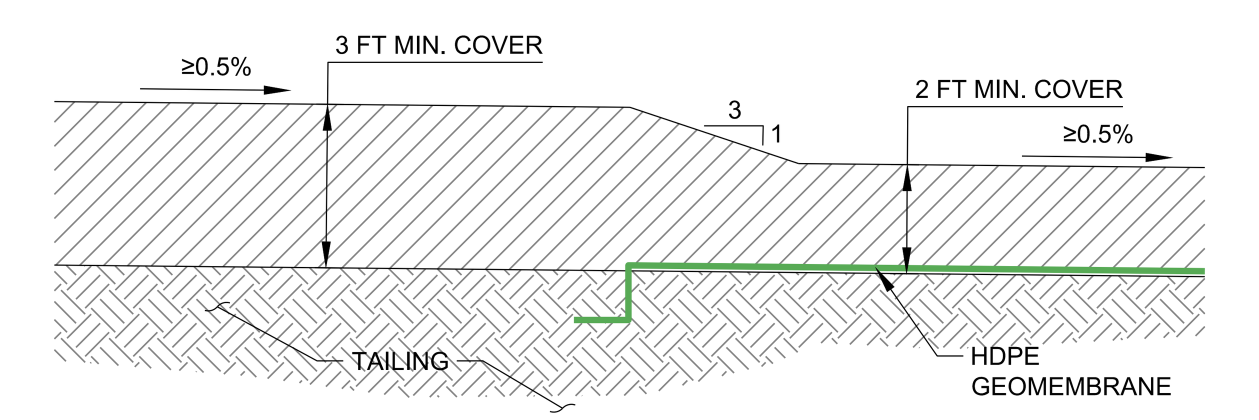
SCALE B TP6-E 027 SECTION TP6-E



SCALE N.T.S. 1 027 OUTLET CHANNEL DETAIL



SCALE N.T.S. 2 027 INLET DETAIL



SCALE N.T.S. 3 027 ELEVATION 5402 TRANSITION TO GEOMEMBRANE

0 300 600
SCALE A FEET

0 80 160
SCALE B FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
TAILING POND 6 EAST, 6 WEST AND 7 DESIGN SECTIONS (2 OF 2)

PROJECT No.	CONTROL	Rev.		FIGURE
1401129		C	29 of 30	029

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LEGEND

- 5600 — EOY 2018 TOPO
- BUILDINGS
- PAVED ROAD
- COVER MATERIAL HAUL ROUTE
- BORROW AREA

REFERENCE

1. END OF YEAR 2018 TOPOGRAPHY 5 FOOT INTERVAL PROVIDED BY CHINO MINES CO.

0 1200 2400
SCALE FEET

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
C	2016-04-12	INCORPORATE CLIENT COMMENTS & ISSUE FOR CLIENT REVIEW	DET	DET	TMF	BRB

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PROJECT
CHINO MINES AREA RECLAMATION
HURLEY, NEW MEXICO

TITLE
SOUTH MINE AREA BORROW AREAS & HAUL ROUTES

PROJECT No.	CONTROL	Rev.	30 of 30	FIGURE
1401129		C		030

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APPENDIX B
FACILITY CHARACTERISTICS FORMS

Chino Closure/Closeout
Facility Characteristics Form

Axiflo Lake

Function	Inactive Initiated 1919
Location Characteristics	Runon from Tailing Ponds 2, B, and 4 No downstream issues Depth to groundwater is greater than 75 feet, direction of flow is South Low upwind fetch, medium downwind fetch
Construction Method	Earthen dam
Physical Characteristics	Not applicable
Leach Status	Not applicable
Existing Engineering Measures	Undergoing closure

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	97.1
Item	Capital Cost
Cover Material	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Tailing Pond 6 West

Function	Tailing deposition Inactive since 1961 Temporary disposal of excess water in unreclaimed area Approximately 330 acres reclaimed previously
Location Characteristics	Runon from Tailing Pond 4, runoff to Tailing Pond 7 Regional depth to groundwater is greater than 75 feet, direction of flow is South Medium upwind fetch, medium downwind fetch
Construction Method	Upstream
Physical Characteristics	Fine to coarse grained Low to medium saturated hydraulic conductivity
Leach Status	Not applicable
Existing Engineering Measures	Outslopes modification project, Dust Cover

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	128
Item	Capital Cost
Cover Material	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Tailing Pond 6 East

Function	Tailing deposition Inactive since 1988 Temporary disposal of excess water in unreclaimed area Approximately 330 acres previously
Location Characteristics	Runon from Tailing Pond 4, runoff to Tailing Pond 7 Regional depth to groundwater is greater than 75 feet, direction of flow is South Medium upwind fetch, medium downwind fetch In Mimbres Basin drainage
Construction Method	Upstream
Physical Characteristics	Fine to coarse grained Low to medium saturated hydraulic conductivity
Leach Status	Not applicable
Existing Engineering Measures	Outslopes modification project, Dust Cover

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	469.6
<u>Item</u>	Capital Cost
Cover Material	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Tailing Pond 7

Function	Tailing deposition Active since 1988
Location Characteristics	Runon from Tailing Pond 6 East and 6 West, inflow from groundwater interceptor wells, no downstream issues, Regional depth to groundwater is greater than 75 feet, direction of flow is South Medium upwind fetch, medium downwind fetch
Construction Method	Upstream, cyclone application
Physical Characteristics	Fine to coarse grained Low to medium saturated hydraulic conductivity
Leach Status	Not applicable
Existing Engineering Measures	Interceptor well system, seepage collection sump Whitewater Creek diversions, dust cover capping on outslope

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	1,661
Item	Capital Cost
Cover Material	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Slag Pile

Function	Historical slag deposit from reclaimed smelter
Location Characteristics	Chino south mine area north of tailings impoundments
Construction Method	End dumped
Physical Characteristics	Coarse materials, light density
Leach Status	Non Leached
Existing Engineering Measures	Control stormwater

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	8.2
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Tailing Borrow Areas

Function	Cover material source
Location Characteristics	Adjacent to tailings facilities
Construction Method	Naturally placed
Physical Characteristics	Gila Conglomerate
Leach Status	Not applicable
Existing Engineering Measures	Grazing

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	368
Item	Capital Cost
Cover Material	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

South Stockpile

Function	Leach and Waste rock stockpile
Location Characteristics	Southwest of Main Pit Possible runon from undisturbed hillslope to south No downstream issues Regional depth to groundwater is less that 75 feet, direction of flow is to Upper Whitewater Creek and Main Pit Limited upwind fetch, limited to downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	No leach on extreme southern and northeast portions, Leach on remainder
Existing Engineering Measures	PLS and stormwater collection system, toe control systems All top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	585
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Northeast Stockpile

Function	Stockpile
Location Characteristics	Northeast of Main Pit No downstream issues Regional depth to groundwater is less that 100 feet, direction of flow is toward Main Pit
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Stormwater collection system, toe control systems Interceptor wells, all top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	24.4
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Upper South Stockpile

Function	Borrow Source Stockpile
Location Characteristics	South of Main Pit, southeast of South Stockpile Runon from hillslopes Reservoir 3A to the south No downstream issues Regional depth to groundwater is greater than 75 feet, direction of flow is to the Main Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Toe control systems All top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	142.7
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Northwest Stockpile

Function	Waste rock stockpile
Location Characteristics	Northwest of Main Pit No upstream issues No downstream issues Regional depth to groundwater is greater than 75 feet, direction of flow is to Hanover Creek and Main Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Toe control systems All top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	518
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

North Stockpile

Function	Ore stockpile
Location Characteristics	North of Main Pit No upstream issues No downstream issues Regional depth to groundwater is less than 15 feet to greater than 200 feet, direction of flow is toward Main Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Stormwater collection system, toe control systems All top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	12.3
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Lampbright Stockpile

Function	Leach Ore stockpile
Location Characteristics	East of Main Pit North Diversion Channel to the north Pre-existing downstream drainage into Lampbright Draw Regional depth to groundwater is less than 5 feet to greater than 100 feet, direction of flow is to Lampbright Draw and Main Pit Medium upwind fetch, medium downwind fetch In Mimbres Basin drainage
Construction Method	End dumped Top surface bermed for leaching
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Leach
Existing Engineering Measures	PLS and stormwater collection system, toe control systems, North Diversion Channel All top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	874
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Lampbright South Stockpile

Function	Waste rock stockpile
Location Characteristics	Southwest of Main Lampbright stockpile Runon from hillside to the west Pre-existing downstream drainage into Lampbright Draw (Tributary 1) Regional depth to groundwater is less than 5 feet to greater than 100 feet, direction of flow is to Lampbright Draw Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Bermed, graded, and watered for dust control

Matrix of Costs
Capital Cost/Facility[1]

Acres	94.3
Item	Capital Cost
Cover Material	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Groundhog No. 5 Stockpile

Function	Waste rock stockpile
Location Characteristics	South facing slope in Lucky Bill Canyon No upstream issues No downstream issues
Construction Method	End dumped
Physical Characteristics	Fine to coarse grained
Leach Status	Non-leach
Existing Engineering Measures	None

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	2.0
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

West Stockpile

Function	Ore stockpile/Waste rock stockpile
Location Characteristics	West of Main Pit No upstream issues Pre-existing downstream drainage into Hanover and former Santa Rita Creeks Regional depth to groundwater is less than 75 feet, direction of flow is to Hanover Creek and Main Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Eastern portion leach, western portion non-leach
Existing Engineering Measures	PLS and stormwater collection system, toe control systems Interceptor wells, all top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	607
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Santa Rita Stockpile

Function	Waste rock stockpile
Location Characteristics	No upstream issues No downstream issues Main pit dewatering capture zone controls regional groundwater level and flow direction
Construction Method	End dump
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders. Inside Santa Rita Open Pit
Leach Status	None
Existing Engineering Measures	None

Matrix of Costs
Capital Cost/Facility[1]

Acres Reclaimed	60.8
<u>Item</u>	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Lee Hill Stockpile

Function	Waste rock stockpile
Location Characteristics	North side of Chino Pit Drains to Chino Pit Regional depth to groundwater is less than 5 feet to greater than 100 feet, direction of flow is to Chino Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Bermed, graded, and watered for dust control

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	25.4
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

STS2

Function	Borrow Source Stockpile
Location Characteristics	South of Main Pit, south of South Stockpile Runon from hillslopes No downstream issues Regional depth to groundwater is greater than 75 feet, direction of flow is to the Main Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Toe control systems All top surfaces bermed

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	83.8
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

East Pit Access

Function	Waste rock stockpile, serves as access to southeastern portion of the open pit
Location Characteristics	East of Upper South stockpile Runon from hillslopes Reservoir 9A to the southwest No downstream issues Regional depth to groundwater is greater than 75 feet, direction of flow is to the Main Pit Medium upwind fetch, medium downwind fetch
Construction Method	End-dump
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	Runon controls, berming on top surface

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	3.7
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

3A Stockpile

Function	Waste rock stockpile
Location Characteristics	South side of Chino Pit in place of Reservoir 3A Drains south Regional depth to groundwater is less than 5 feet to greater than 100 feet, direction of flow is to Chino Pit Medium upwind fetch, medium downwind fetch
Construction Method	End dumped
Physical Characteristics	Range in size from very fine (silt and clay) to very large boulders High saturated hydraulic conductivity
Leach Status	Non-leach
Existing Engineering Measures	None yet, plan for stormwater control

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	213
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Haul Roads

Function	Access to various mining units
Location Characteristics	Various, outside of open it surface drainage area
Construction Method	Graded and compacted in place
Physical Characteristics	Compacted
Leach Status	Non-leach
Existing Engineering Measures	Watering for dust control, stormwater management

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	11.7
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Reservoirs

Function	Store process, stormwater and impacted stormwater throughout the site
Location Characteristics	Various
Construction Method	Various (some earthen, most lined, compacted earthen dams)
Physical Characteristics	Various sizes
Leach Status	Non-leach
Existing Engineering Measures	Pumps, gauges, spillways

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	69.4
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

Chino Closure/Closeout
Facility Characteristics Form

Dams

Function	Store process, stormwater and impacted stormwater throughout the site
Location Characteristics	Various
Construction Method	Concrete
Physical Characteristics	Various sizes
Leach Status	Non-leach
Existing Engineering Measures	Pumps, gauges, spillways

Matrix of Costs
Capital Cost/Facility[1]

Reclaimed Acres	1.7
Item	Capital Cost
Cover Material, Rip	
Outslope Adjustment	
Seed & Mulch	
Channels, Conduits & Berms	
Capital Cost Totals	
Capital Cost/Acre	

[1] – All costs will be based on a reclamation cost estimate that will be developed following the approval of the CCP scope of work. Once developed, the costs will include both direct and indirect costs associated with each reclamation component.

APPENDIX C
WATER MANAGEMENT AND TREATMENT
SCOPE OF WORK

REPORT

CHINO MINE CLOSURE/CLOSEOUT PLAN UPDATE

WATER MANAGEMENT AND TREATMENT SCOPE OF WORK

Freeport-McMoRan Chino Mine Company

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February 14, 2018 **113-01153**

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1.0 INTRODUCTION

This Freeport-McMoRan Chino Mine Company (Chino) report describes the cost basis for the updated post-closure mine water management and treatment system for the Chino Closure Closeout Plan (CCP). Chino operates an open-pit copper mine, concentrator, and solution extraction-electrowinning (SX/EW) plant located approximately 10 miles east of Silver City in Grant County, New Mexico (Figure 1). For the purposes of the updated CCP, the Chino Mine is separated into three geographical areas including; the North Mine Area (NMA), Pipeline Corridor Area (PCA), and South Mine Area (SMA). The principal mine facilities and main mine components within each of these three areas at Chino include:

- The NMA includes the Santa Rita Open Pit, waste rock and leach ore stockpiles, maintenance facilities, SX/EW Plant, Ivanhoe Concentrator, and most of the water management systems in the area of the Santa Rita Pit.
- The PCA, also referred to as the Middle Whitewater Creek Area (MWWCA), extends from the Ivanhoe Concentrator (in the NMA) to the north end of Lake One and the Hurley Operation Area. The PCA includes three tailings pipelines, one process water pipeline, one concentrate pipeline and associated infrastructure running between the Ivanhoe Concentrator and the SMA.
- The SMA includes: Lake One; reclaimed Older Tailings Ponds 1, 2, 4 East, 4 West, B, and C; partially reclaimed Older Tailings Ponds 6 East and 6 West; active Tailings Pond 7; and the Hurley Operation Area. The SMA encompasses the tract from the north end of Lake One to the confluence of Whitewater Creek with San Vicente Arroyo, approximately 12 miles to the south.

The associated water management system includes wells, tanks, pipelines, pumps, and process water ponds and impoundments. The ancillary infrastructure includes roads/railway, fuel storage tanks, power lines, and stormwater controls.

1.1 Sources of Water to be Treated

There are nine sources of process water that are likely to be sent to the proposed water 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 treatment over time. The process water streams that are likely to be sent to the proposed water treatment systems include the following:

Process Waters (High TDS and Sulfate):

Residual process solutions from the leach operation (pregnant leach solution [PLS] and raffinate);

Meteoric water that infiltrates through the leach stockpiles to seepage collection; and

Stormwater runoff that comes into contact with un-reclaimed leach stockpiles;

Process Waters (Low TDS and Sulfate):

Process waters from the Cobre Mine;

Meteoric water that infiltrates through the waste rock stockpiles to seepage collection;

Stormwater runoff that comes into contact with un-reclaimed waste rock stockpiles;

Stormwater runoff that comes into contact with un-reclaimed pit walls;

Dewatering water from the existing open pit sumps; and

Impacted groundwater captured in seepage collection and interceptor well systems.

These sources will be managed and or treated throughout site reclamation activities and for a duration of 100 years following cessation of mining operations.

1.2 Performance Objectives

The primary performance objectives for water management and treatment are 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 strategy will be utilized:

- A short-term evaporative treatment system (ETS) will be utilized to evaporate all process waters for the first six years following closure. The short-term ETS system will be shut down at the end of the sixth year following closure.
- A long-term ETS will be utilized to evaporate all high TDS and sulfate process waters beginning in year seven and continuing through year 100 following closure.
- A combined high-density sludge (HDS) and membrane system will be utilized beginning in year 6 and continuing through year 100 following closure to treat all the lower TDS and sulfate process waters in the SMA and NMA. This system is referred to as the South Treatment System (STS).
- Minimization of impacted surface runoff requiring treatment. Stormwater runoff will be managed through surface reclamation to preclude potential for contact with stockpiles and tailing. Impacted storm water runoff will be collected and treated for a period of 100 years following closure.
- Diversion of meteoric water and stormwater runoff away from potentially impacted sources, which will allow for discharge to an approved surface discharge area in accordance with state regulations. These water sources will not require treatment prior to discharge.
- Storage of stockpile seep water and groundwater from interceptor systems in surface impoundments will allow for sampling and analysis prior to final disposition. Water that is shown to be in compliance with NMWQCC water quality standards (Title 20, Chapter 6, Part 2, Subpart III, Section 3103),will be discharged to an approved surface discharge area in accordance with state regulations. Impacted water will be conveyed to the proposed ETS and STS water treatment plant.
- Pit lake water will be pumped to the short-term ETS during the first 6 years following closure and then residual groundwater in-flow into the open pit will be pumped to the STS water treatment plant for the remaining 100 years of post-closure water management.

This strategy will maximize the quantity of non-impacted water and minimize the quantity of process water that must be treated prior to release. These sources will be managed and/or treated throughout site reclamation activities and for a duration of 100 years following cessation of mining operations.

This report includes the following components:

- Description of processes for water management and treatment;
- Characterization of the influent design basis (IDB) from flow and water quality predictions; and
- Capital and operating and maintenance (O&M) cost development assumptions and strategies for post-closure water management and treatment

It is expected that when the concepts presented herein for development of costs for long-term water management and treatment is approved that the costs will be developed using this document as a basis.

2.0 BACKGROUND

The proposed water management and treatment plan was developed in accordance with Section 20.6.7.33H NMAC. The plan provides a conceptual level engineering document that describes the processes and methods that will be used at Chino 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 will be prepared for financial assurance. The Chino water treatment and management plan in part is based on previous evaporative treatment studies (M3, 2004), water treatment studies (Van Riper Consulting [VRC], 2002 and 2008), and sludge handling plans (Phelps Dodge Mining Company, 2004; Van Riper Consulting, 2004), with updated projected water flows and water quality for the various sources of water to be treated.

The components of the Chino water management and treatment plan include the following:

- Water Conveyance System includes pipelines and pumps required to move water to one of the water treatment facilities (ETS, STS);
- A short-term ETS for treatment of all process waters for the first six years following closure;
- A long-term ETS for treatment of all high TDS and sulfate process waters beginning in year seven and continuing to year 100 after closure;
- Membrane and lime/HDS treatment processes included in the planned STS water treatment system. The water treatment system will consist of an HDS and membrane system. The HDS system will be used to pretreat water from the NMA and to treat the brine from the membrane system. The membrane system will treat the HDS pre-treated water plus the SMA water. This strategy will be used for treatment of all process water streams (with the exception of high TDS and sulfate process waters) from Year 6 through Year 100 during the closure period; and
- A sludge disposal facility (SDF) for sludge produced by the HDS system.

Chino completed an ETS study (M3, 2004) as required by NMED's Supplemental Discharge Permit for Closure DP-1340 under Condition 88 (NMED, 2003). The concept for these components and proposed process for the specific treatment trains and associated primary and ancillary equipment sizing is based on the treatability studies conducted by VRC (2008), Hazen Research (VRC, 2008), and HW Process Technologies (VRC, 2008). The proposed concept and other associated information for the ETS and STS is presented in the following sections.

2.1 ETS System Overview

The ETS will include both a short-term program (first 6 years following closure) and a long-term program (years 7 through 100) for treating process waters at Chino. A detailed description of the ETS programs is included in Attachment A and summarized below.

The short-term ETS program will treat all process waters when mining operations cease. These waters will be collected and treated by evaporation by the short-term ETS to allow time for construction of the STS and to reduce the volume of impacted waters requiring treatment with the STS during the initial years of closure. Using the ETS for residual process solutions allows for minimization of secondary waste generation and associated optimization of operational costs. ETS cost estimates were originally developed as part of the 2004 PSE study conducted by M3 Engineering and Technology Corporation (M3, 2004). The results of this study has been updated herein with more current estimates of the volume and sources of residual fluids that would be required to be managed upon cessation of mining operations. In addition, updated information on new spray evaporative technology have been obtained, estimates of the volume of impacted water that will be required to be treated, and the impoundments available for use in the ETS have been updated as part of this CCP Update.

The short-term ETS consists of forced evaporation and wetted surface evaporation. Forced evaporation maximizes the evaporation rate through a network of mechanical spray systems. Wetted surface evaporation will occur from the impoundment surfaces and at the wetted rock surfaces through the existing drip irrigation network. The operational duration for the short-term ETS is projected over the first six years following closure; however, the time of operation may be slightly shorter or longer based on actual results.

The long-term ETS program includes proven technologies that has been employed at multiple mine closure projects and will be employed to treat high TDS and sulfate process waters (leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles). The collected water will be treated over the 100-year closure period, reducing the quantity of residuals generated by alternative treatment methods such as conventional chemical precipitation. Runoff from the uncovered portions of the leach stockpiles is included in the long-term ETS because this flow stream is collected and conveyed together with the leach stockpile seepage flow stream. The leach stockpile seepage flow stream with its high sulfate concentration would result in a high lime demand and sludge production if it were to be treated with the STS.

The long-term ETS system consists of forced evaporation and wetted surface evaporation. Forced evaporation will be conducted through a network of mechanical spray systems installed at the impoundments located at the toes of the leach stockpiles. Wetted surface evaporation will occur from the impoundment surfaces. The operational duration for the long-term ETS is projected between year 7 through year 100 following closure.

2.2 STS Water Treatment System

The Chino long-term water treatment system will include a membrane filtration and HDS lime precipitation system located at the STS. Both the ETS and the HDS systems will provide long-term metals and sulfate removal for the 100-year closure period. A flow diagram of the proposed water management system is presented in Figure 2. This conceptual treatment configuration results in a single plant site, increasing operating efficiency.

All process waters in the NMA (with the high TDS and sulfate process waters from the leach stockpile seepage and runoff flow streams) will be sent to the HDS system to increase the pH and precipitate any metals that could cause scaling in the membrane system. Effluent from the HDS system and a portion of the SMA waters will be sent to the membrane system consisting of microfiltration (MF) and reverse osmosis (RO) for treatment. A portion of the SMA waters will bypass the membrane treatment system and be recombined prior to effluent equalization. The MF unit provides suspended solids removal to prevent fouling of the RO membranes. 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 primarily dissolved monovalent and divalent (and higher valence) constituents including some metals and sulfate.

The MF and RO reject streams will be sent back to the HDS system to be treated by chemical precipitation using calcium hydroxide (lime) addition with sludge recycle to form HDS. Chemical precipitation is a conventional and widely used treatment for the removal of metals. A portion of the sulfate concentration will also be removed as part of this process. With the addition of lime, the pH is adjusted to 10 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 SMA bypass and the RO permeate prior to effluent equalization to ensure compliance with Section 20.6.2.3103 NMAC groundwater standards for discharge. Sulfuric acid will be added to the clarified process stream to achieve neutral pH prior to discharge. This bypass also allows ions that are not precipitated by the HDS systems such as sodium, potassium and chloride to pass to the effluent.

Precipitated solids removed during clarification will be further dewatered by pressure filtration. 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, 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.

2.2.1 Membrane System Assumptions

Recovery for the membrane system is projected based on the treatability studies conducted by Van Riper Consulting and HW Process Technologies, and adjusted based on current projected influent sulfate concentrations for the individual treatment streams. One membrane system is required to treat both the NMA and SMA sources located at the STS.

The NMA water has high concentrations of scaling and fouling constituents (aluminum, iron, manganese, sulfate, hardness) and very low pH making it difficult to RO directly, and so it will be pretreated using the HDS system prior to being mixed with the SMA water for treatment through the membrane. HW Process Technologies evaluated their proprietary Engineered Membrane System (EMS) during the treatability studies. This system is no longer manufactured but was a more robust system than other membrane systems in operation at the time the Van Riper report was completed. The STS water quality contains relatively little dissolved metals and has a much lower scaling tendency. It can be treated with a conventional membrane system using pretreatment by MF to remove suspended solids and removal of dissolved constituents by RO similar to the system proposed in the Tyrone Mine CCP Update (Golder, 2013). The recoveries and other information from the HW Process Technologies treatability study are applicable to the more conventional membrane system (RO) with the MF pretreatment.

2.2.2 HDS System Assumptions

The NMA waters and the brine from the membrane system will be sent to an HDS system located at the STS. The RO brine will be sent to HDS because it will be supersaturated with calcium and sulfate, which will precipitate out in the HDS system. Capital cost for the lime HDS system will be determined by previous vendor quotes and engineering experience based on recent construction of new HDS facilities for the Colorado Department of Public Health and Environment (CDPHE) for the Summitville Mine site (2009 construction) and the Central City/Clear Creek OU4 Water Treatment Plant (construction complete 2017).

Both the lime handling system and the sludge management systems will be resized from those presented in the previous treatability studies to reflect the lower lime usage and sludge production expected from the segregation of the leach stockpile seepage and runoff streams in the ETS. The lime usage is projected to decrease from approximately 95,000 to 27,000 pounds per day, and the sludge produced is projected to decrease from approximately 700,000 to 200,000 pounds per day (projected for year 6 as an example). The CCP cost estimates for sludge dewatering will include a filter press to dewater the sludge to approximately 50% solids before disposal in the sludge disposal facility. The 50% dewatered solids value was provided by Van Riper Consulting based on experience with other sludges that were primarily calcium sulfate. Table 1 shows a comparison of the sludge quantities produced and the proportion of calcium sulfate to the major metal hydroxide sludges. As shown, the assumption that the sludge will dewater similar to calcium sulfate is still valid.

Table 1: Summary Table of Solids Composition

Precipitates	2007 Van Riper Study		2016 With Leach Stockpile Flows to HDS		2016 Without Leach Stockpile Flows to HDS	
	mg/L	%	mg/L	%	mg/L	%
Projected Sludge	65,977	-	64,072	-	23,342	-
$CaSO_4$	48,086	73%	47,644	74%	19,062	82%
Metal Hydroxides	17,891	27%	16,428	26%	4,280	18%
$Al(OH)_3$	8,869	13%	7,810	12%	2,088	9%
$Fe(OH)_3$	7,034	11%	7,052	11%	1,516	6%
MnO_2	610	1%	721	1%	370	2%
Other Metal Hydroxides	1,378	2%	846	1%	306	1%

A belt press was originally selected for sludge dewatering in the previous CCP evaluation due to the high quantity of sludge produced which requires a fairly high polymer dose to aid in dewatering. With the reduced quantity of sludge projected for this update to the CCP, a filter press will be used instead of a belt press. There will be a slight increase in operational labor but a large decrease in polymer requirements over the operational period.

2.3 Sludge Disposal and Salt Disposal Facilities

Dewatered sludge will be hauled to and stored at the SDF expected to be located on or near Tailings Pond 7. 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 concentration. The capacity of the disposal facility is adequate for sludge produced for 95 years of operation of lime/HDS treatment plant.

Salts generated from the evaporation of the high TDS and sulfate process waters as part of the long-term ETS will be hauled to and stored at an HDPE-lined disposal facility constructed in accordance with 20.6.7.17.D NMAC. The total estimated amount of salts produced annually is summarized in Table 6 of Attachment A, and is based on the estimated water quality and flows associated with the leach stockpile seepage and runoff over the 100 year post-closure period. The amount of salt generation begins to drop off in year 12 when the stockpiles are planned to be reclaimed, and reaches a steady generation rate of approximately 4,100 tons/year beginning in year 32. It's anticipated that the HDPE-lined disposal facility will be located within the Ivanhoe Concentrator area or on top of the Santa Rita Stockpile. The capacity of the disposal facility will be adequate to handle the salts generated over the 93 years of long-term ETS operation.

3.0 INFLUENT DESIGN BASIS

Process waters will be managed and/or treated for 100 years following cessation of mining operations. Residual process solutions from the leach operation, pit dewatering water, and impacted surface water and groundwater will be treated by the ETS system during years one through six. During years 6 through 100, the high TDS and sulfate process water flow steams (leach stockpile seepage and runoff) will continue to be treated by the ETS while the remaining lower TDS and sulfate process water streams will be sent to the STS facility for treatment. A summary table of the post mining water management and water treatment flow rates for the ETS and STS is included in Table 4 of Attachment A.

3.1 ETS System

For the first year following closure, all collected solutions will be distributed through the existing drip irrigation network and into the existing surface impoundments and open-top process solution storage tanks, where the solutions will be exposed to surface evaporation. In addition, during this initial year, a series of spray evaporator systems will be installed on top of the Lee Hill, Main and South Lampbright, Santa Rita, and South leach stockpiles. Beginning at the end of year six following closure, most of the individual flow components will be sent to the membrane system described below. The ETS will then only handle high TDS and sulfate process waters. For years two through six, solution evaporation will be accomplished through a combination of drip irrigation on the stockpile surfaces, and spray evaporators on the Lee Hill, Main and South Lampbright, Santa Rita, and South leach stockpiles, and within the existing surface impoundments and tanks. It is assumed that the high TDS and sulfate process waters will be treated with the ETS for the remainder of the 100-year treatment period. Capital cost estimates will include spray evaporation units, piping, and pumps. A detailed analysis of the ETS influent design basis development is provided in the Evaporative Treatment System Plan Technical Memorandum dated February 16, 2018 in Attachment A.

3.2 Water Treatment and Sludge Systems

The influent design basis for the proposed WT and SDF systems were developed from data including flow and sulfate predictions for the various water sources on site for the 100-year treatment period. Estimates of the flow rates and sulfate concentrations for the individual process water flow streams at the Chino Mine were based on existing flow and water quality data for the individual systems that are recorded by Chino.

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 various closure activities have on its performance. DSMs and in particular GoldSim are commonly used at active and closed mine sites to predict water balance, concentration, and constituent load.

Tables 2, 3, and 4 present a summary of the modeled flow rates and sulfate predictions in years 0 through 100 for the NMA, SMA, and the HDS feed streams (some high-sulfate stream plus reject), respectively.

Estimated sludge volumes to be sent to the SDF were calculated from the projected sulfate concentrations. Table 5 presents the sludge mass predictions to be sent to the SDF; an estimated 1,031,834 tons of sludge will require storage at the SDF during the 100-year management plan.

Table 2: Summary of Water Flow and Sulfate Concentrations for NMA Streams Sent to the STS Treatment System

Year	Flow Rate (gpm)	Sulfate (mg/L)
0	0	-
6	615	6,590
10	522	7,416
15	468	4,082
25	431	3,257
32	405	2,605
40	405	2,242
100	405	2,242

Table 3: Summary of Water Flow and Sulfate Concentrations for SMA Streams Sent to the STS Treatment System

Year	Flow Rate (gpm)	Sulfate (mg/L)
0	0	-
6	784	1,100
10	638	1,100
15	418	1,100
25	267	1,100
32	267	1,100
40	267	1,100
100	267	1,100

Table 4: Summary of Water Flow and Sulfate Concentrations for HDS Feed

Year	Flow Rate (gpm)	Sulfate (mg/L)
0	0	-
6	920	6,932
10	798	7,512
15	639	5,110
25	573	4,507
32	541	4,018
40	541	3,746
100	541	3,746

Table 5: Annual Rate of Sludge Generation from Water Treatment Systems

Year	Sludge, 50% (ton/yr)
0	-
6	18,799
10	35,163
15	17,282
25	12,189
32	9,330
40	8,115
100	8,115

4.0 BASIS FOR CAPITAL AND OPERATION AND MAINTENANCE COST ESTIMATES

Capital and O&M cost estimates will be developed using similar methodology as previous CCP Updates for Chino and Tyrone. Cost-specific assumptions not discussed in previous sections are outlined in the following sections.

4.1 Capital Cost Development

Equipment cost estimates will be developed based on the information presented in Sections 2.0 and 3.0, will rely on updates of equipment costs obtained for previous versions of the Chino and Tyrone CCP's, and will be scaled for the revised flows and sulfate concentrations. Where appropriate, updated cost estimates will be obtained from equipment suppliers. Equipment installation and site construction will be estimated based on craft personnel, labor hours, and prevailing wage rates. Other costs, including mobilization/demobilization, freight, and commissioning, will be estimated as lump sums. The specific treatment train and associated primary and ancillary equipment costs will be estimated based on the treatability studies conducted by Van Riper Consulting (2008), Hazen Research (2007), and HW Process Technologies (2007). The results of the treatability studies have been updated with current water quality and water flow projections for the individual treatment streams, and updated treatment trains have been developed by the Freeport-McMoRan Inc. water treatment group. Other costs will be obtained from the 2007 Chino CCP Update (Golder, 2008), 2013 Tyrone CCP Update (Golder, 2013), engineering judgment, updated cost quotes, and previous Golder experience with treatment plant construction and equipment installation projects.

Indirect costs include:

- Mobilization and demobilization;
- Contingency;
- Engineering redesign;
- Contractor profit and overhead;
- Construction management; and
- Miscellaneous reclamation fees.

4.2 Operations and Maintenance Cost Development

O&M cost estimates will be provided for the 100-year treatment period. Costs will be presented as current costs and net present value rates will be calculated in accordance with prior NMED and Freeport agreements.

O&M cost estimates include labor, reagents, maintenance, sampling and analysis costs, and electrical power for conveyance and treatment. The cost basis for these items is described in the following sections.

4.2.1 Labor Rates

Labor rates and markup for benefits for all categories will be based off of New Mexico Department of Labor's 2017 prevailing wage rates, Golder's experience in operating similar water treatment plants in New Mexico and Colorado, and statistics from the United States Department of Labor Bureau of Labor Statistics. Staffing levels will be estimated based on Golder's experience.

4.2.2 Reagents

Lime, flocculent, and acid will be used for the HDS system, and anti-scalent and cleaning chemicals will be used for the membrane system as discussed in Section 2.3. Assumptions include:

- Lime:
  - Lime consumption will be projected based on the Van Riper Consulting treatability study and metal hydroxide removal rates, and adjusted based on the influent sulfate concentrations.
  - Lime cost will be obtained from a current vendor price from L'hoist North America (2016) using FMI bulk pricing.
- Flocculent:
  - Flocculent consumption for solid–liquid separation and clarification will be projected based on previous engineering experience and adjusted based on the influent sulfate concentrations.
  - Flocculent cost will be determined from a current vendor quote.
- Acid:
  - Acid consumption will be projected based on the Van Riper Consulting treatability study and adjusted based on the influent sulfate concentrations.
  - Acid cost will be obtained from a current vendor price from Univar.

4.2.3 Membrane System

The membrane system requires cleaning chemicals and anti-scalent to prevent membrane fouling and increase removal efficiency of the contaminants of concern. Assumptions for the membrane system include:

- Membrane chemical quantity will be estimated based on previous engineering experience.
- Chemical costs will be obtained from a current vendor price quotes.

4.2.4 Maintenance

Routine maintenance and capital replacement costs will be estimated to be 1.5 and 1.0%, respectively, of the total capital cost, similar to the 2013 Tyrone CCP Update.

4.2.5 Sampling and Analysis

Sampling and analysis is required for compliance with groundwater discharge permit conditions and for measurement of plant performance. Through the duration of water treatment operations, the frequency of sampling and analysis required drops from quarterly to semi- annually to annually as follows:

- Tailings: quarterly in years 2 through 8, semi-annually in years 9 through 18, and annually in years 19 through 28;
- Stockpiles: quarterly in years 9 through 13, semi-annually in years 14 through 18, and annually in years 19 through 100;
- Pit: quarterly in years 2 through 8, semi-annually in years 9 through 18, and annually in years 19 through 100; and
- Plant performance including influent and effluent discharge from water treatment plant: monthly.

Costs for sampling and analysis will be escalated from previous CCP updates and updated laboratory vendor quotes and will include shipping and materials.

4.2.6 Electrical Power Consumption

The unit cost for electric power will be based on the most currently available Public Service Company of New Mexico rate schedule for industrial power service.

4.2.7 Sludge and Salt Disposal

The previous CCP updates assumed that 50% solids can be obtained after dewatering via a belt press with sufficient flocculent based on the experience of Van Riper Consulting. Sludge volume will be projected based on the Van Riper Consulting treatability study and adjusted based on the influent sulfate concentrations. Adjustments to the sludge dewatering system were discussed in Section 2.3. The sludge is expected to dewater to 50% solids.

The total estimated amount of salts produced annually from the long-term ETS is based on the estimated water quality and flows associated with the leach stockpile seepage and runoff over the 100 year post-closure period. The amount of salt generation begins to drop off in year 12 when the stockpiles are planned to be reclaimed, and reaches a steady generation rate of approximately 4,100 tons/year beginning in year 32. As previously noted, the stockpiles are planned to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered seepage rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32. It's anticipated that the HDPE-lined disposal facility will be located within the Ivanhoe Concentrator area or on top of the Santa Rita Stockpile within the Open Pit Surface Drainage Area.

Cost for loading, hauling, unloading, and disposal of the sludge and salts will be scaled from a similar proposed sludge disposal facility from Van Riper Consulting in 2004 and scaled to current dollars.

HDPE-liner systems will be added to both the SDF and salt disposal facilities in accordance with 20.6.7.17.D NMAC. The costs for the additional HDPE liner material and associated HDPE liner installation will be added to the original costs developed by Van Riper Consulting in 2004 and scaled to current dollars. The HDPE liner and associated installation costs will be based on current vendor price quotes.

4.2.8 Indirect Costs

Indirect O&M costs includes contingency and profit and overhead. Indirect rates will be discussed once the CCP scope of work is approved.

5.0 CLOSING

We trust the foregoing provides the information you need at this time. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES INC.

Karen Budgell, PE
Process Engineer

Bridgette Hendricks
Senior Engineer

KB/BH/ap/js

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FIGURES

STATE OF NEW MEXICO

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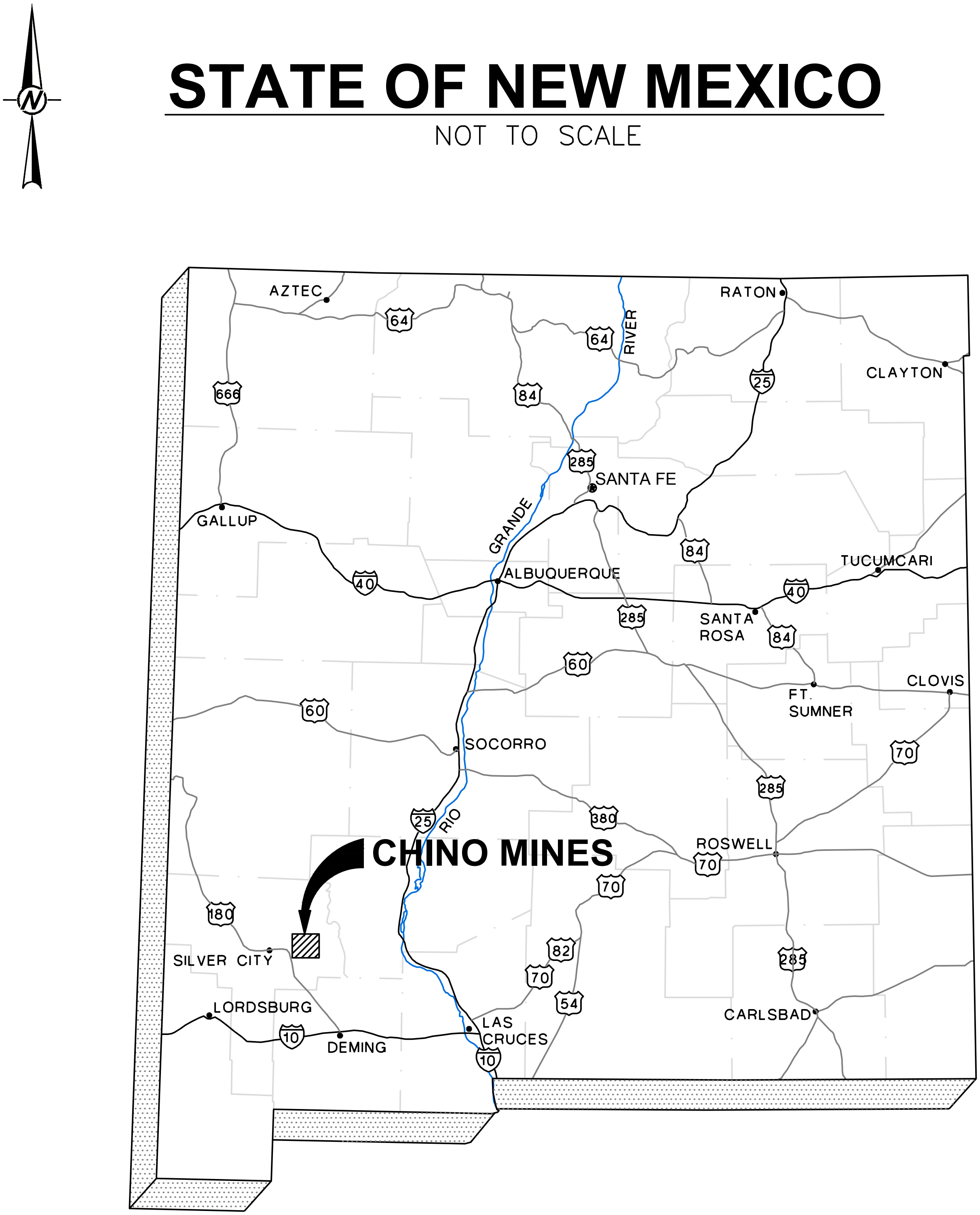

CLIENT FREEPORT-MCMORAN CHINO MINE COMPANY BAYARD, NEW MEXICO			PROJECT CLOSURE/CLOSEOUT UPDATE
CONSULTANT Golder Associates	YYYY-MM-DD	2016-05-02	TITLE **MINE LOCATION MAP**
	PREPARED	CM	
	DESIGN	TS	
	REVIEW	TS	PROJECT No. 11301153 · PHASE 6 · Rev. 0 · FIGURE 1
	APPROVED	TS	

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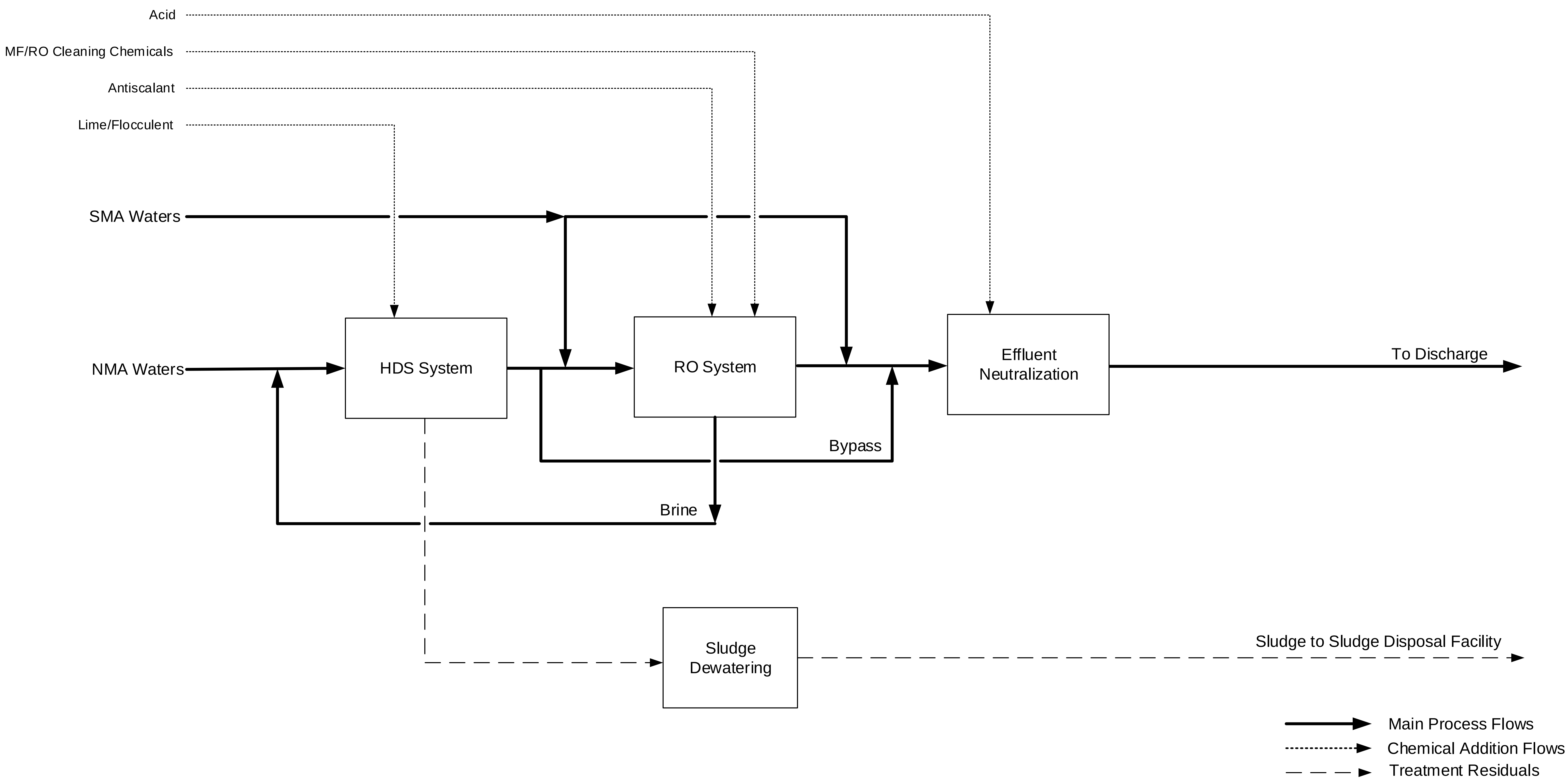

Golder Associates

Denver, Colorado

CLIENT/PROJECT

Freeport-McMoRan
Chino Mine

TITLE

Water Treatment System Block Flow Diagram Year 6

DRAWN	KMB	DATE	July 25, 2016	JOB NO.	11501153
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ATTACHMENT A

TECHNICAL MEMORANDUM – CHINO MINE EVAPORATIVE TREATMENT SYSTEM PLAN

TECHNICAL MEMORANDUM

Date:	February 14, 2018	**Project No.:**	113-01153
To:	Lynn Lande	**Company:**	Golder Associates Inc.
From:	Todd Stein		
cc:	Karen Budgell	**Email:**	tstein@golder.com
RE:	**CHINO MINE EVAPORATIVE TREATMENT SYSTEM PLAN**		

1.0 INTRODUCTION

The New Mexico Environment Department (NMED) issued Supplemental Discharge Permit for Closure, DP-1340 to Freeport-McMoRan Chino Mine Company (Chino) on February 24, 2003 (NMED, 2003). Condition 88 of DP-1340 required that Chino perform a process solution elimination study. Condition 88 states:

> *"Chino shall perform a process solution elimination study. Within 180 days after the Effective Date of this Supplemental Discharge Permit, Chino shall submit for NMED approval a work plan including an implementation schedule for a process solution elimination study. The purposes of the study is to evaluate alternatives and identify environmentally sound and cost effective methods to treat or eliminate the process solutions following Cessation of Operation or closure at the Chino Mines Facility. The study shall evaluate factors including but not limited to treatment plant size, pump size(s), number of pumps, pump rating, type of emitters, acreages and number of leach piles in the evaporation circuit, evaporation rates, and the use of evaporation ponds. Based upon the study results, Chino shall submit to NMED for approval a method for process water elimination."*

In accordance with Condition 88, an initial process solution elimination (PSE) study was conducted in 2004 (M3, 2004) based on post-mining water management and water treatment flow rates provided in the End of Year 2001 through Year 2006 Closure/Closeout Plan for the Chino Mine (M3, 2001). This technical memorandum provides an update to the 2004 PSE Study and is based on current post-mining water management and water treatment flow rates, more current information on mechanical evaporative spray units employed within the evaporative treatment system (ETS), and updated mine plans.

2.0 BACKGROUND

The purpose of the PSE study was to evaluate alternatives and identify proven and cost effective methods to treat or eliminate the process solutions following cessation of operation or closure at the Chino Mine

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Facility, including the open pits, leach stockpiles, mine waste stockpiles and the solvent extraction-electrowinning (SX/EW) facility. The study assumed that processing of residual fluids for copper recovery ceases at the close of operations. The purpose of this update to the original PSE study is to describe the current proposed water management plan to reduce the projected process water inventory over a six year period, and leach stockpile seepage and drainage for the entire 100 year post closure period in the event of a default mine closure scenario to allow treatment of the remaining solutions. In practice leach stockpiles will continue to operate and generate copper production for many years after ore shipment to stockpiles ends. Over time the copper production rate will decrease until leaching is no longer economic; therefore, this is a conservative water treatment plan only intended for closure/closeout planning.

Chino prepared and submitted for regulatory review the following PSE-related studies:

- Process Solution Elimination Study Work Plan Chino Mine Facility, Chino Mines Company. Hurley, New Mexico dated October 2003 (M3, 2003);
- Process Solution Elimination Study. Prepared for Chino Mines Company. June 2004. (M3, 2004);
- Report on Long-term Quality and Quantity Estimates, Chino Mines Water Treatment Feasibility Study. (Golder, 2007a); and
- DP-1340 Condition 93 Feasibility Study. (Golder, 2007b).

2.1 Climate

The Chino Mine is located in a semiarid region in southwestern New Mexico, with elevations ranging from about 5,200 to 7,700 feet above mean sea level. The climate at Chino is warm and dry, with mean annual precipitation of about 16 inches (400 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. 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. The average annual precipitation in the area is about 16 inches as reported for the Fort Bayard weather station. The average annual pan evaporation rate is estimated at 89.40 inches for the North Mine Area (measured at former Reservoir 3A). After applying a factor of 0.7 to the annual pan evaporation rate to approximate evaporation losses from free water surfaces, an evaporation rate of 62.58 inches per year is used in this updated analysis.

3.0 PREVIOUS PSE OPTIONS EVALUATED

The previous studies proposed process solution elimination by natural (passive) and forced evaporation on previously disturbed stockpile areas. The inventoried solutions to be handled by the PSE system were comprised of residual mine process solutions, and process water from stockpile seepage collections, stormwater runoff from stockpiles, and groundwater from interceptor wells and open pit sumps. Two PSE options were previously examined:

- Option 1: Recirculation; Forced Spray Evaporation and Drip Irrigation System; and
- Option 2: Pit Option with all Waters Transferred to the Estrella Pit with Forced Spray Evaporation.

The previous PSE studies projected both alternatives as capable of evaporating the inventoried process solutions within the prescribed five year time period. Option 1 was the recommended alternative due to the smaller stockpile surface areas required, higher evaporative loss rates, and overall lower costs. As such, this updated ETS analysis is based on recirculation of process water and residual process solutions with the existing drip irrigation systems at the mine and new forced spray evaporation systems over a six year period (short-term ETS program). Additionally this updated ETS analysis includes a long-term ETS program (years 7 through 100) for treating all high TDS and sulfate concentration process waters (leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles). These high TDS and sulfate concentration waters will be collected and treated over the 100-year closure period to provide life cycle operational cost benefits and reduce the quantity of residuals generated by alternative treatment methods such as chemical precipitation.

3.1 Estimated Quantity of Process Solutions

The first step of the updated ETS analysis is to identify the volume of the process solutions requiring treatment or elimination. During the mining and copper leaching operations approximately 21,000 gallons per minute (gpm) of leach solution is circulated through the copper production system (Chino, 2015). The mining operation envisioned under a default scenario, discontinues operation at a point in time under the most expensive closure scenario within the discharge permit period. This updated ETS plan supports financial assurance cost estimates for closure/closeout based on the end of year (EOY) 2018 mine plan. Use of the EOY 2018 mine plan is consistent with the snapshot in time philosophy that was adopted by Chino and the Agencies early in the closure planning process and represents the year with the greatest volume of regrading and cover placement required between 2014 and 2019. If mining activities were to cease between the years 2014 and 2019, the highest financial assurance requirements would be associated with the EOY 2018 conditions. Thus, the EOY 2018 plan is expected to represent the most onerous condition from a cost perspective. The NMED and MMD approved the use of the EOY 2018 configuration for the current CCP Update on September 3, 2014.

Figure 1 outlines the projected configuration of the stockpiles at the EOY 2018 from the Chino mine planning group and the associated areas that will be utilized for the short-term ETS program in the North Mine Area. **Table 1** presents the estimated volumes of residual process solutions to be evaporated from the individual sources at the mine, including:

- Residual process solutions from the leach operation [Average Circulated Inventory (ACI)]; and
- Surface impoundments, overflow ponds, tanks, and pit lakes.

Estimates of the volume of residual process solutions to be evaporated are assumed to be accurate within plus or minus 25 percent. Actual inventory fluctuates with seasonal variations in precipitation and other climatic conditions such as temperature and humidity and with the production goals of the SX/EW plant. **Table 1** identifies the total estimated quantity of residual process solutions to be evaporated at the beginning of the ETS operation at 2,575,110,200 gallons.

3.1.1 Solutions in Surface Impoundments, Overflow Ponds and Tanks

The estimated volume of process solutions within the surface impoundments, overflow ponds, tanks, and pit lakes requiring elimination at the cessation of operations is calculated according to the following methodology:

- Volumes of process solutions within the surface impoundments, storage tanks, and pit lakes at the start of the evaporation program are based on the following:
  - Volumes are assumed to be near their current levels for most surface impoundments and tanks (taken as the average volume of water within the individual surface impoundments, storage tanks, and reservoirs measured between May 2011 and December 2013).
  - For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, 2011) with a stage 10' below spillway crest was used.
  - For reservoirs with no storage data (5900 Sump, Lee Hill Sump #1 and #2, East Headwall Impoundment, East Lampbright Sumps), it was assumed that they were at 60% of their capacity at closure.
  - For the East Pit, Estrella Pit, Reservoirs 6, 7, 2, 4A values from EOY 2018 projections provided by Chino (2016b) were used.
- It is assumed that pregnant leach solution (PLS) will be added to the impoundments and tanks at the start of the evaporation program from the PLS circuit (i.e., to get to their permit allowed levels from there estimated levels at closure).
  - For Reservoirs 6 and 7, DP-591 requires a reserve capacity of 40,000,00 gallons for storm water between July and September, and operate at a 22,000,000 pre-runoff capacity the rest of year. Assumed 40,000,000 reserve capacity to handle storm water flows for the entire year, with the remaining capacity filled with added PLS.
  - For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, 2011) with a stage 10' below spillway crest was used.
  - For tailing thickeners, PLS will be added to 80% of their capacity.

A summary of the surface impoundments, overflow ponds, tanks, and pit lakes included in the short-term ETS analysis are provided in **Table 2** along with the estimated annual evaporation from each. A summary of the surface impoundments, overflow ponds, and tanks included in the long-term ETS analysis are provided in **Table 3**. The total volume of process solutions contained in the surface impoundments, tanks, and the pit lakes is estimated to be approximately 1,399,379,000 gallons, and the estimated volume of process solutions added to, and maintained within, the surface impoundments and tanks is approximately 86,017,900 gallons.

3.1.2 Average Circulated Inventory

The initial ACI is calculated based on experience with leach operations at Chino. During mining and copper leaching operations, approximately 21,000 gpm of leach solution (raffinate) is circulated through the copper leach circuit and onto the leach stockpiles, referred to as the initial raffinate flow rate. The make-up water requirement during leaching operations typically averages four percent of the initial raffinate flow rate. Therefore, after cessation of the mining operations, leaching operations are expected to be shut down and the process leach solution flow rate is estimated at 96 percent of the initial raffinate flow rate. Additionally, based on experience at Chino, the flow rate at a leach stockpile diminishes to approximately ten percent of the full flow rate in 45 days after leaching operations are halted. Based on these assumptions, the total estimated initial ACI is approximately 1,175,731,200 gallons (**Table 1**).

3.2 Estimated Quantity of Process Water

Estimated flows for the individual sources contributing process water to the ETS systems are provided in **Table 4**. The individual sources contributing process water to the ETS systems include the following:

- Water inflow to the system related to the Santa Rita Open Pit groundwater inflows. Estimated flow rates based on North Mine Area groundwater flow model simulations conducted as part of the North Mine Area Groundwater Flow Model Re-Calibration (Golder, 2016). The re-calibrated estimate of groundwater discharge to the open pit under EOY 2018 operational conditions was 377 gallons per minute (gpm). Currently this groundwater is removed via operational pit sumps and via evaporation. The model estimated groundwater discharge to the open pit after closure was 352 gpm for the re-calibrated model. The stockpiles are planned to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered recharge rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32.
- Water inflow to the system related to storm water run-on within the Santa Rita Open Pit. Estimated average flow rates from the Condition 93 Feasibility Study (Golder, 2007b). Based on a catchment area of 1,610 acres (pit rim area) and a curve number (CN) of 75. The EOY 2018 pit perimeter = 1,626 acres which represents a 1% increase in area. The Condition 93 flow estimates were increased by 1% (32 gpm to 32.3 gpm) to account for the increased catchment area.
- Water inflow to the system related to storm water run-off from leached and unleached (waste rock) stockpile outslopes outside the open pit watershed area (pit perimeter). The estimated average flow rates from the Condition 93 Feasibility Study (Golder, 2007b) were used as the basis. The Feasibility Study (FS) used a CN of 85 for uncovered stockpiles. The EOY 2018 stockpile outslope areas = 1,842.2 acres with Lee Hill and 1,814.6 acres

without Lee Hill which represents a 17% increase in the area previously used in the FS. Uncovered outslopes after year 12 = 195.7 acres w/o Lee Hill which represents 12.6% of the area previously used. FS flow estimates were increased by 17% for the EOY 2018 and decreased by 87% after year 12. Proportion of leached to unleached stockpiles were accounted for to scale current runoff estimates. Runoff from reclaimed stockpile surfaces is non-impacted and can be discharged to an approved surface discharge area in accordance with state regulations. These water sources will not require treatment prior to discharge.

- Water inflow to the system from the North Mine Area interceptor wells and the estimated average flow rate from this source. Estimated at 8.65 gpm combined from water extracted from the West Stockpile and the Lampbright areas (Chino, 2016a). Pumping from the Lampbright Cut (25.25 gpm) and Lampbright East (8.1 gpm) is for mine production and would be discontinued at closure (Birch, 2016).
- Water inflow to the system related to leach stockpile seepage and the estimated average flow rates from Condition 93 FS UNSAT-H Model Runs (Golder, 2007b). The stockpiles are assumed to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered seepage rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32. Long term average drainage rates of 2.67 cm/yr (1.05 in/yr) for uncovered stockpiles and 0.14 cm/yr (0.055 in/yr) for 3 foot cover stockpile surfaces.
- Water inflow to the system related to the Tailing Pond 7 Interceptor Well System. Initial flow of 1,480 gpm based on John Shoemaker and Associates (JSAI) Recommendations for 2016 Pond 7 Interceptor Well Pumping (JSAI, 2016). Tailing ponds 6E, 6W, and 7 are assumed to be regraded, covered and revegetated in year 12, and annual reduction in pumping of 5% each year after reclamation until you get to steady-state post closure flow. Revised South Mine Area Groundwater Flow Model has an estimated post-closure flow of 533 gpm (Golder, 2015).

4.0 OPERATIONAL PERIODS

There are two ETS programs and associated operational periods. The short-term ETS analysis is based on an operational period of six years and includes recirculation of all process solutions with both drip irrigation systems and operational spigots, and forced spray evaporation systems. Following cessation of the short-term ETS operation at the end of year six, the long-term ETS program will be initiated for treatment of all high TDS and sulfate process waters (leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles) and will operate for the remainder of the 100 year post closure water management and treatment period. All of the residual process water sources will be treated through the post-closure water treatment system (membrane and lime/high-density sludge treatment systems) for the remainder of the 100 year post-closure water management and treatment period. The ETS schedule for the 100 year post-closure treatment period is provided in **Table 5**.

4.1 Short-Term ETS Recirculation System

As part of the recirculation system in the North Mine Area, 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 Lee Hill, Main Lampbright, South Lampbright, South, and West leach stockpiles for a period of six years (**Figure 1**). Evaporation will mostly occur at the top surface of the leach stockpiles and to a lesser amount at the surface impoundments, overflow ponds, tanks, and pit lakes listed in **Table 2**. The residual process solutions will drain through the leach stockpiles and then will be recirculated through the existing mine process solution distribution system.

At the onset of the short-term ETS system operation in the North Mine Area, residual process solutions will drain from the active leach stockpiles into their respective surface impoundments or tanks. Initially the drain down water will be transferred to the SX/EW feed pond. Once the level in each of the surface impoundments, overflow ponds, and tanks have stabilized at sixty to eighty percent of their maximum capacities, or to their Operation Discharge Plan allowed levels, the transfer is complete. This is the assumed maximum fill level and operational level for these facilities for the 6 year short-term ETS operation. Water from the SX/EW feed pond will be transferred to the existing raffinate tanks. From the raffinate tanks the water will be pumped to the Lee Hill, Main Lampbright, South Lampbright, and South leach stockpiles through the existing raffinate distribution system. Residual process solutions that are not evaporated will drain through the stockpiles and be pumped through the existing distribution systems back to the existing PLS collection pond/tanks located adjacent to the leach stockpiles to complete the recirculation loop. All the other sources of process water in the North Mine Area listed in Section 3.2 will also be distributed within this system for the duration of the short-term ETS operation. At the end of year 6, all of these process waters (with the exception of the high TDS and sulfate process waters) will be conveyed to the water treatment system.

Within the South Mine Area, the existing Tailings Pond 7 interceptor well system will continue to operate and water from this system will be recirculated back up to the top of Tailings Pond 7 and allowed to be evaporated (**Figure 2**). This process will continue for a period of 6 years at which point the Tailings Pond 7 interceptor water will be treated through the post-closure STS water treatment system for the remainder of the 100 year post-closure water management and treatment period.

4.2 Short-Term ETS Forced Spray and Drip Irrigation System

The short-term ETS program in the North Mine Area will utilize a forced evaporation system and the existing PLS drip systems to maximize the evaporation rate of the impacted water and residual process solutions distributed to the top surface areas of the Lee Hill, Main Lampbright, South Lampbright, South, and West leach stockpiles. Forced evaporation of these waters will be accomplished with mechanical spray systems designed to handle flows up to 380 gpm per unit. Additional evaporation will occur from the top surface of the stockpiles from the existing drip irrigation system at Chino, and at the surfaces of the surface impoundments, overflow ponds, tanks, and pit lakes. The stockpile areas that will be utilized for both drip irrigation and forced spray evaporation are shown on **Figure 1**. The surface impoundments, overflow ponds, tanks and pit lakes to be utilized in the short-term ETS program are included in **Table 2**. The flow rate of the evaporation system will initially be as high as the flow rate during leaching operations and will be reduced each year thereafter as the water in storage is depleted. **Table 4** outlines the estimated quantity of impacted water and residual process solutions that will be handled as part of the North Mine Area short-term ETS, and **Table 5** provides a summary of the ETS schedule.

During the first year of the North Mine Area short-term ETS operation it is assumed that evaporation of the process waters will occur through drip irrigation alone. During this first year, mechanical forced spray systems will be installed on top of the Lee Hill, Main Lampbright, West, and South leach stockpiles and will be fully operational by the beginning of year 2 of ETS operation. The forced spray evaporation and drip irrigation evaporation systems will operate concurrently for years 2 through 6.

4.3 Long-Term ETS Forced Spray System

The long-term ETS program in the North Mine Area will utilize forced evaporation systems and wetted surface evaporation from the surface impoundments, tanks, and thickeners to maximize the evaporation rate of the high TDS and sulfate process waters beginning in year 7. These waters will be collected and treated over the 100-year treatment period to reduce the quantity of residuals generated by alternative treatment methods such as chemical precipitation.

Forced evaporation will be conducted through a network of mechanical spray systems designed to handle flows up to 45 gpm per unit installed at the surface impoundments located at the toes of the leach stockpiles, and at the tailing thickeners (**Figure 3**). Wetted surface evaporation will occur from the surfaces of the impoundments, open top tanks, and tailing thickener surfaces. The surface impoundments, open top tanks, and thickeners that will be utilized for the long-term ETS program are shown on **Figure 3** and summarized in **Table 3**. The flow rates of the evaporation system will drop off over time as the stockpiles are regraded, covered and revegetated in year 12. Runoff from the covered portions of the leach stockpiles will be discharged to an approved surface discharge area in accordance with state regulations and will not be conveyed to the long-term ETS. Stockpile seepage flows will also be reduced following reclamation of the leach stockpiles. The transition from uncovered to covered seepage rates is spread over a 20 year period with a linear rate decrease between year 12 and 32. **Tables 4 and 5** outline the estimated quantity of residual process solutions that will be handled as part of the long-term ETS.

Salts generated from the evaporation of the high TDS and sulfate process waters will be hauled to and stored at an HDPE-lined disposal facility. The total estimated amount of salts produced annually is summarized in **Table 6**, and is based on the estimated water quality and flows associated with the leach stockpile seepage and runoff over the 100 year post-closure period. As shown on **Table 6**, the amount of salt generation begins to drop off in year 12 when the stockpiles are planned to be reclaimed, and reaches a steady generation rate of approximately 4,100 tons/year beginning in year 32. It's anticipated that the HDPE-lined disposal facility will be located within the Ivanhoe Concentrator area or on top of the Santa Rita Stockpile. The capacity of the disposal facility will be adequate to handle the salts generated over the 93 years of long-term ETS operation.

4.4 Water Quality

The water quality of the process waters is estimated to be the same as that which is currently collected from the individual sources listed in Sections 3.1 and 3.2.

5.0 CONCLUSION

The short-term ETS program in the North Mine Area includes recirculation, forced spray evaporation and drip irrigation as a means to eliminate process waters that are expected to be present at mine closure. The North Mine area ETS utilizes evaporation to minimize the volume of process water that will require water treatment. This includes: leached stockpile drain down; groundwater inflows in the open pits; seepage from waste rock and leach stockpiles; groundwater extracted from interceptor systems; impacted surface water runoff; and residual process solutions at the mine. At the beginning of year 6, as the drain down solution volumes decrease significantly, all process waters (with the exception of leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles) will be conveyed to the water treatment system. The short-term ETS program in the North Mine Area will continue to operate through year 6 to evaporate the remaining drain down solution volumes and high TDS and sulfate process water flows from leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles.

The long-term ETS program in the North Mine Area will utilize forced evaporation systems and wetted surface evaporation from select surface impoundments, tanks, and tailing thickeners to maximize the evaporation rate of the high TDS and sulfate process waters beginning in year 7. These waters will be collected and treated over the 100-year treatment period to provide life cycle operational cost benefits and reduce the quantity of residuals generated by alternative treatment methods such as chemical precipitation. Salts generated from the evaporation of the high TDS and sulfate process waters throughout the long-term ETS program will be hauled to and stored at an HDPE-lined disposal facility.

Within the South Mine Area, the existing Tailings Pond 7 interceptor well system will continue to operate and water from this system will be recirculated back up to the top of Tailings Pond 7 and allowed to be evaporated. This process will continue for a period of 6 years at which point the Tailings Pond 7 interceptor water will be treated with the STS water treatment system for the remainder of the 100 year post-closure water management and treatment period.

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TABLES

Table 1: Inventoried Process Waters at the Beginning of the North Mine Area Short-Term Evaporative Treatment System Operation

Parameter	Volume
	gallons
Water In Pits	1,367,020,000
Process Waters in Reservoirs and Impoundments[1]	32,359,000
Average Circulated Inventory	1,175,731,200
Water In Open Pits	
Location	Estimated Volume at Start of Evaporation Program (gallons)
East Pit	181,933,102
Estrella Pit	1,185,086,818
Lee Hill Pit	---
Sub Total	*1,367,019,920*
Rounded Total	***1,367,020,000***
Reservoirs and Impoundments (Process Water in Storage at Start of Evaporation Program)	
Location	Estimated Volume at Start of Evaporation Program (gallons)
Reservoir 3A	0
Reservoir 6	3,391,832
Reservoir 7	11,412,298
Reservoir 9	0
Reservoir 8	0
Reservoir 5 (South)	0
Reservoir 5 (North)	0
Reservoir 4A Overflow Pond	5,486,875
Reservoir 2 Overflow Pond	684,288
Reservoir 17	0
SX/EW PLS Feed Pond	840,000
SX/EW Raff Pond	0
SX/EW Raff Tank	0
East Headwall Impoundment	273,715
East Lampbright Sumps	1,200,000
Lampright PLS Tank	371,846
6300 Booster Station	1,159,200
PLS Pond Between South SP & General Office	6,842,880
PLS Tank at Ivanhoe Concentrator	300,000
5900 Sump	299,993
Lee Hill Sump #1	60,000
Lee Hill Sump #2	36,000
Sub Total	*32,358,928*
Rounded Total	***32,359,000***
Reservoirs and Impoundments (Process Water added to Storage in First Year)	
Location	Estimated Volume of PLS Added (gallons)
Reservoir 6	49,708,168
Reservoir 7	30,587,702
Reservoir 8 (lined portion)	299,783
Tailing Thickeners (2)	5,422,168
Sub Total	*86,017,821*
Rounded Total	***86,017,900***
Average Circulated Inventory (ACI)	
Initial Raffinate Flow (gpm)	21,000
Make-Up Water Requirement	4%
PLS from Stockpile Diminish	10%
PLS from Stockpile Diminish Duration (days)	45
Sub Total	*1,175,731,200*
Rounded Total	***1,175,731,200***

Table 2: Surface Impoundment, Pond, Tank, and Pit Lake Evaporation Schedule - Years 1 through 6

Location	Calculated Reservoir Water Surface Area[1] (acres)	Estimated Reservoir Capacity[2] (Gallons)	Estimated Reservoir Volume at Start of Evaporation Program[3] (gallons)	Average Annual Evaporation (gallons per year)[4] Year 1	Estimated Reservoir Volume at Year 2 [3] (gallons)	Estimated Volume of Process Water Added at Closure[5] (gallons)	Estimated Number of Years to Compete Evaporation[6]
East Pit	6.41	---	181,933,102	8,177,291	145,546,481	---	---
Estrella Pit	36.1	---	1,185,086,818	46,053,071	948,069,455	---	---
Lee Hill Pit	0	50,000,000	---	---	---	---	---
Reservoir 6	11.50	93,100,000	3,391,832	14,670,646	53,100,000	49,708,168	3.6
Reservoir 7	7.41	82,000,000	11,412,298	9,452,999	42,000,000	30,587,702	4.4
Reservoir 8	0.09	470,000	0	114,814	299,783	299,783	2.6
Reservoir 4A Overflow Pond	1.50	15,000,000	5,486,875	1,913,563	5,486,875	---	2.9
Reservoir 2 Overflow Pond	0.22	1,140,480	684,288	280,656	684,288	---	2.4
SX/EW PLS Feed Pond	0.49	1,400,000	840,000	625,097	840,000	---	1.3
SX/EW Raff Tank	0.10	900,000	---	127,571	---	---	---
East Headwall Impoundment	0.46	456,192	273,715	590,653	273,715	---	0.5
East Lampbright Sump	0.51	2,000,000	1,200,000	650,611	1,200,000	---	1.8
Lampright PLS Tank	0.08	371,846	371,846	102,057	371,846	---	3.6
NE Lampright Booster Station	0.07	400,000	---	89,300	---	---	---
6300 Booster Station	0.03	1,932,000	1,159,200	38,271	1,159,200	---	30.3
6525 Raffinate Tank	0.05	100,000	---	63,785	---	---	---
PLS Pond Between South SP & General Office	1.59	11,404,800	6,842,880	2,028,376	6,842,880	---	3.4
PLS Tank at Ivanhoe Concentrator	0.05	500,000	300,000	63,785	300,000		4.7
Tailing Thickeners (2)	5.20	6,777,710	0	6,633,683	5,422,168	5,422,168	0.8
5900 PLS Sump	0.57	499,989	299,993	727,154	299,993	---	0.4
Lee Hill Sump #1	0.14	100,000	60,000	178,599	60,000	---	0.3
Lee Hill Sump #2	0.14	60,000	36,000	178,599	36,000	---	0.2
Total [7]	71.0	217,713,017	32,358,928	92,760,581	1,211,992,684	86,017,821	

Notes:

[1] - Reservoir water surface areas assuming they are at 60 percent full at the start of the evaporation program. From M3 (2004); Reservoir 8 surface area assuming stage 10 feet below spillwat crest at 6,145 ft MSL from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011). Pit Lake areas, Res 2, 4A, 17 based on Google Earth Pro areas between 8/2011 and 1/2013.

[2] - Estimated reservoir capacities provided in associated operational Dischrage Plans and from Appendix C of the Chino North Mine Area Application Requirements for a Copper Mine Facility's Discharge Permits 20.6.7.11 NMAC (FMI, 2015); Reservoir 8 Storage from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011).

[3] - Estimated reservoir/pit lake volumes at start of evaporation program. Volumes are assumed to be near there current levels for both the reservoirs and tanks (taken as the average volume of water within the individual reservoirs and tanks measured between May 2011 and December 2013). For the East Pit, Estrella Pit, Reservoirs 6, 7, 2, 4A values from EOY 2018 projections provided by FMI (Worthington, July 2016) were used. For estimated pit volumes to be evaporated for Estrella and East Pit, assumed that the volume of water in the pits gets reduced by 20% per year beginning in Year 2. For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011) with a stage 10' below spillway crest was used. For reserevoirs with no storage data (5900 Sump, Lee Hill Sump #1 and #2, East Headwall Impoundment, East Lampbright Sumps), it was assumed that they were at 60% of capacity at closure. It is assumed that process water will be added to the ponds at the start of the evaporation program from the PLS circuit (i.e., to get to there permit allowed levels from there estimated levels at closure).

[4] - Mean annual pan evaporation of approximately 89.4 inches calculated from historical pan evaporation data from the Chino Mine (Reservoir 3A). Mean annual evaporation for the reservoirs and pit lakes was estimated at 62.58 inches by applying a pan coefficient of 0.70. Total annual evaporation from reservoirs and pit lakes of 46.98 inches accounts for long-term (1897 to 2011) average annual precipitation of approximately 15.6 inches reported for the Fort Bayard weather station.

[5] - Estimates for Reservoirs 6 and 7 are for the volumes at closure plus the added volumes of process water at closure. For Reservoirs 6 and 7, DP-591 requires a reserve capacity of 40,000,00 gallons for stormwater between July and September, and operate at a 22,000,000 pre-runoff capacity the rest of year. Assumed 40,000,000 reserve capacity to handle stormwater flows for the entire year. For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011) with a stage 10' below spillway crest was used. For tailing thickeners, 80% of their capacity was used.

[6] -Estimated number of years to pasively evaporate the water from the facility. Maximum volume between years 1 and 2 used in estimate.

[7] - Total excluding the pit lakes.

Table 3: Surface Impoundment, Pond, Tank, and Pit Lake Evaporation Schedule - Years 7 through 100

Location	Calculated Reservoir Water Surface Area[1] (acres)	Estimated Reservoir Capacity[2] (Gallons)	Estimated Reservoir Volume at Start of Evaporation Program[3] (gallons)
Reservoir 8	0.09	470,000	299,783
Reservoir 4A Overflow Pond	1.50	15,000,000	5,486,875
Reservoir 2 Overflow Pond	0.22	1,140,480	0
East Headwall Impoundment	0.46	456,192	273,715
East Lampbright Sump	0.51	2,000,000	1,200,000
Lampright PLS Tank	0.08	371,846	371,846
PLS Pond Between South SP & General Office	1.59	11,404,800	6,842,880
Existing Frog Pond [4]	0.50	1,500,000	900,000
Proposed New West Stockpile PLS Pond [4]	0.50	500,000	300,000
PLS Tank at Ivanhoe Concentrator	0.05	500,000	300,000
Tailing Thickeners (2)	5.20	6,777,710	5,422,168
5900 PLS Sump	0.57	499,989	299,993
Lee Hill Sump #1	0.14	100,000	60,000
Lee Hill Sump #2	0.14	60,000	36,000

Notes:

[1] - Reservoir water surface areas assuming they are at 60 percent full at the start of the evaporation program. From M3 (2004); Reservoir 8 surface area assuming stage 10 feet below spillwat crest at 6,145 ft MSL from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011). Res 2, and 4A, 17 based on Google Earth Pro areas between 8/2011 and 1/2013.

[2] - Estimated reservoir capacities provided in associated operational Dischrage Plans and from Appendix C of the Chino North Mine Area Application Requirements for a Copper Mine Facility's Discharge Permits 20.6.7.11 NMAC (FMI, 2015); Reservoir 8 Storage from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011).

[3] - Estimated reservoir volumes at start of evaporation program. Volumes are assumed to be near there current levels for both the reservoirs and tanks (taken as the average volume of water within the individual reservoirs and tanks measured between May 2011 and December 2013). For Reservoirs 2 and 4A values from EOY 2018 projections provided by FMI (Worthington, July 2016) were used. For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011) with a stage 10' below spillway crest was used. For reserevoirs with no storage data (5900 Sump, Lee Hill Sump #1 and #2, East Headwall Impoundment, East Lampbright Sumps, Frog Pond, proposed West Stockpile PLS Pond), it was assumed that they were at 60% of capacity.

[4] - Frog Pond will be utilized for years 1 through 12. At year 12 it is assumed that the West Stockpile will be reclaimed and a new process water pond will be constructed at the regraded toe of the stockpile.

Chino Closure/Closeout Plan Update

Table 4. Post Mining Process Water Management and Water Treatment Flow Rates - Evaporative Treatment System and Water Treatment Plant Operation

100-Year Water Handling and Treatment Plan

		Evaporation System Water Flow Rates			System Inflows -Process Water: Process Water Inflows Into the Evaporative Treatment System and WTP									In-Flow to Water Treatment Systems					Water For Beneficial Use			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)		
EOY		Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In NMA Evaporation System Flow Rate (gpm)	Santa Rita Pit Groundwater Inflow (gpm)	Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Leached SP's Outside Pit Perimeter (gpm)	Storm Water Run-Off Waste Rock SP's Outside Pit Perimeter (gpm)	Pumping Rate of NMA Interceptor Wells (gpm)	Inflow from Cobre Sources (gpm)	Seepage from Leached SP's (gpm)	Seepage from Waste Rock SP's (gpm)	Tailings Pond 7 Interceptor Well System Flows (gpm)	Combined Process Water In-flow Rate (gpm)	Total Active In-Flows From SMA to STS Membrane Water Treatment Plant (gpm)	Total Active In-Flows From NMA to STS Membrane Water Treatment Plant (gpm)	Total Active In-Flows to STS Lime HDS Water Treatment Plant (gpm)	Water in Storage at the End of the Year (gallons)	Treated Water Flow Rate (gpm)	Total Water Flow Rate to Beneficial Use (gpm)	Year Following Closure	WT Year
2018	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,575,110,200	-	-	0	
2019	1	21,622	81,269,883	786	377	32	57	40	9	132	79	60	1,480	2,266	-	-	-	2,906,961,917	-	-	1	
2020	2	19,241	1,286,889,390	780	377	32	57	40	9	126	79	60	1,480	2,260	-	-	-	2,030,040,527	-	-	2	
2021	3	16,881	1,276,045,626	774	377	32	57	40	9	120	79	60	1,406	2,180	-	-	-	1,160,809,300	-	-	3	
2022	4	14,541	1,265,201,863	768	377	32	57	40	9	113	79	60	1,336	2,103	-	-	-	299,268,237	-	-	4	
2023	5	12,221	1,254,358,099	761	377	32	57	40	9	107	79	60	1,269	2,030	-	-	-	-	-	-	5	
2024	6	9,304	1,243,514,335	137	377	32	57	40	9	101	79	60	1,205	1,961	784	618	306	-	1,391	1,813	6	1
2025	7	137	499,581,380	137	377	32	57	40	9	29	79	60	1,145	1,828	744	546	277	-	1,281	1,682	7	2
2026	8	137	94,254,966	137	377	32	57	40	9	22	79	60	1,088	1,764	707	540	270	-	1,238	1,618	8	3
2027	9	137	94,254,966	137	377	32	57	40	9	15	79	60	1,034	1,703	672	533	263	-	1,196	1,557	9	4
2028	10	137	94,254,966	137	377	32	57	40	9	8	79	60	982	1,644	638	526	277	-	1,154	1,498	10	5
2029	11	137	94,254,966	137	377	32	57	40	9	4	79	60	933	1,591	606	521	272	-	1,118	1,444	11	6
2030	12	137	94,254,966	137	377	32	57	40	9	4	79	60	886	1,544	576	521	268	-	1,088	1,398	12	7
2031	13	82	55,525,578	82	376	32	6	5	9	0	76	57	842	1,402	547	479	248	-	1,017	1,312	13	8
2032	14	79	55,525,578	79	375	32	6	5	9	0	73	55	800	1,353	520	475	243	-	986	1,266	14	9
2033	15	75	55,525,578	75	373	32	6	5	9	0	69	52	760	1,306	418	471	172	-	884	1,226	15	10
2034	16	72	55,525,578	72	372	32	6	5	9	0	66	49	722	1,260	397	467	168	-	859	1,184	16	11
2035	17	68	55,525,578	68	371	32	6	5	9	0	63	47	686	1,217	377	463	165	-	835	1,144	17	12
2036	18	65	55,525,578	65	370	32	6	5	9	0	59	44	651	1,176	358	459	161	-	813	1,106	18	13
2037	19	62	55,525,578	62	368	32	6	5	9	0	56	42	619	1,136	340	455	158	-	791	1,070	19	14
2038	20	58	55,525,578	58	367	32	6	5	9	0	52	39	588	1,098	323	451	155	-	770	1,035	20	15
2039	21	55	55,525,578	55	366	32	6	5	9	0	49	36	558	1,061	307	448	152	-	750	1,002	21	16
2040	22	51	55,525,578	51	365	32	6	5	9	0	46	34	533	1,028	293	444	149	-	733	972	22	17
2041	23	48	55,525,578	48	363	32	6	5	9	0	42	31	533	1,021	293	440	148	-	729	969	23	18
2042	24	45	55,525,578	45	362	32	6	5	9	0	39	28	533	1,014	293	436	147	-	725	965	24	19
2043	25	41	55,525,578	41	361	32	6	5	9	0	35	26	533	1,006	267	432	143	-	695	961	25	20
2044	26	38	55,525,578	38	360	32	6	5	9	0	32	23	533	999	267	428	142	-	691	957	26	21
2045	27	35	55,525,578	35	358	32	6	5	9	0	29	21	533	992	267	424	141	-	687	953	27	22
2046	28	31	55,525,578	31	357	32	6	5	9	0	25	18	533	985	267	421	140	-	683	950	28	23
2047	29	28	55,525,578	28	356	32	6	5	9	0	22	15	533	977	267	417	139	-	679	946	29	24
2048	30	24	55,525,578	24	355	32	6	5	9	0	18	13	533	970	267	413	138	-	675	942	30	25
2049	31	21	55,525,578	21	353	32	6	5	9	0	15	10	533	963	267	409	137	-	672	938	31	26
2050	32	18	55,525,578	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	32	27
2051	33	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	33	28
2052	34	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	34	29
2053	35	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	35	30
2054	36	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	36	31
2055	37	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	37	32
2056	38	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	38	33
2057	39	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	39	34
2058	40	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	40	35
2059	41	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	41	36
2060	42	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	42	37
2061	43	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	43	38
2062	44	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	44	39
2063	45	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	45	40
2064	46	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	46	41

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Table 4. Post Mining Process Water Management and Water Treatment Flow Rates - Evaporative Treatment System and Water Treatment Plant Operation

100-Year Water Handling and Treatment Plan

		Evaporation System Water Flow Rates			System Inflows -Process Water Process Water Inflows Into the Evaporative Treatment System and WTP									In-Flow to Water Treatment Systems						Water For Beneficial Use		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)		
EOY		Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In NMA Evaporation System Flow Rate (gpm)	Santa Rita Pit Groundwater Inflow (gpm)	Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Leached SP's Outside Pit Perimeter (gpm)	Storm Water Run-Off Waste Rock SP's Outside Pit Perimeter (gpm)	Pumping Rate of NMA Interceptor Wells (gpm)	Inflow from Cobre Sources (gpm)	Seepage from Leached SP's (gpm)	Seepage from Waste Rock SP's (gpm)	Tailings Pond 7 Interceptor Well System Flows (gpm)	Combined Process Water In-flow Rate (gpm)	Total Active In-Flows From SMA to STS Membrane Water Treatment Plant (gpm)	Total Active In-Flows From NMA to STS Membrane Water Treatment Plant (gpm)	Total Active In-Flows to STS Lime HDS Water Treatment Plant (gpm)	Water in Storage at the End of the Year (gallons)	Treated Water Flow Rate (gpm)	Total Water Flow Rate to Beneficial Use (gpm)	Year Following Closure	WT Year
2065	47	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	47	42
2066	48	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	48	43
2067	49	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	49	44
2068	50	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	50	45
2069	51	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	51	46
2070	52	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	52	47
2071	53	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	53	48
2072	54	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	54	49
2073	55	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	55	50
2074	56	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	56	51
2075	57	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	57	52
2076	58	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	58	53
2077	59	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	59	54
2078	60	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	60	55
2079	61	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	61	56
2080	62	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	62	57
2081	63	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	63	58
2082	64	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	64	59
2083	65	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	65	60
2084	66	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	66	61
2085	67	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	67	62
2086	68	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	68	63
2087	69	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	69	64
2088	70	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	70	65
2089	71	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	71	66
2090	72	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	72	67
2091	73	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	73	68
2092	74	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	74	69
2093	75	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	75	70
2094	76	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	76	71
2095	77	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	77	72
2096	78	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	78	73
2097	79	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	79	74
2098	80	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	80	75
2099	81	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	81	76
2100	82	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	82	77
2101	83	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	83	78
2102	84	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	84	79
2103	85	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	85	80
2104	86	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	86	81
2105	87	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	87	82
2106	88	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	88	83
2107	89	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	89	84
2108	90	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	90	85
2109	91	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	91	86
2110	92	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	92	87
2111	93	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	93	88
2112	94	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	94	89
2113	95	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	95	90
2114	96	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	96	91

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Table 4. Post Mining Process Water Management and Water Treatment Flow Rates - Evaporative Treatment System and Water Treatment Plant Operation
100-Year Water Handling and Treatment Plan

		Evaporation System Water Flow Rates			System Inflows -Process Water / Process Water Inflows Into the Evaporative Treatment System and WTP										In-Flow to Water Treatment Systems						Water For Beneficial Use		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)		
EOY		Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In NMA Evaporation System Flow Rate (gpm)	Santa Rita Pit Groundwater Inflow (gpm)	Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Leached SP's Outside Pit Perimeter (gpm)	Storm Water Run-Off Waste Rock SP's Outside Pit Perimeter (gpm)	Pumping Rate of NMA Interceptor Wells (gpm)	Inflow from Cobre Sources (gpm)	Seepage from Leached SP's (gpm)	Seepage from Waste Rock SP's (gpm)	Tailings Pond 7 Interceptor Well System Flows (gpm)	Combined Process Water In-flow Rate (gpm)	Total Active In-Flows From SMA to STS Membrane Water Treatment Plant (gpm)	Total Active In-Flows From NMA to STS Membrane Water Treatment Plant (gpm)	Total Active In-Flows to STS Lime HDS Water Treatment Plant (gpm)	Water in Storage at the End of the Year (gallons)	Treated Water Flow Rate (gpm)	Total Water Flow Rate to Beneficial Use (gpm)	Year Following Closure	WT Year
2115	97	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	97	92
2116	98	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	98	93
2117	99	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	99	94
2118	100	18	17,570,777	18	352	32	6	5	9	0	12	8	533	956	267	405	136	-	670	936	100	95

Notes:

This table presents the water solution volumes and flow rates associated with a 100-year water handling plan. Identifed are:

a. System in-flow components of process water that must be handled and flow rates of the components,

b. Schedule for reduction of process water in storage through operation of an evaporation system,

c. A schedule of water treatment plant operating rates that correspond to process water in-flow rates that require treatment

(1) During the mining and copper leaching operations approximately **21,000 gpm** of process water is circulated through the copper production system. After cessation of the mining operation, the leaching operation will stop. However continued operation of the process water application system as an evaporation system will deplete the leach system water contained in storage. The flow rate of the evaporation system can be as high as the flow rate during leaching operation and it will be reduced as the water in storage is depleted. During the intial 6 years of operation, process water is added to the reservoirs to maximize passive evaporation from these facilities and this volume is taken out of the evaporative system flow rate. Beginning in Year 7, the ETS will only handle leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles.

(2) "Evaporation Sytem Water Water Loss" (EWL) is based on daily actual evaporation from UNSAT-H Model Run 185 (uncovered stockpile) from Chino DP-1340 Condition 93 Feasibility Study (Golder 2007b), and associated area under drip system. Spray evaporation based on daily evaporation chart for Model 1210 evaporator systems provided by Duane Thompson of Minetek on June 28, 2012. Fifth degree polynomial fit through data set. Number and type of spray units varies thoughout the post closure period. Evaporation from surface impoundments/tanks, and pit lakes is also included as well as the average annual precipitation (15.61 inches) on the stockpile areas under drip, surface impoundments/tanks, and pit lakes.

(3) For Years 1 through 6, Process Water In-flow (columns 4 through 11) will be included in the evaporation system. Tailing Pond 7 Interceptor Well System water (column 12) will be recirculated onto Tailing Pond 7 during the first 6 years following closure. For Years-7 through Year-100, all Process Water In-flows with the exception of leach stockpile seepage and runoff from uncovered portions of leach stockpiles will be included in the Flow Rate to STS Water Treatment Plant (column-15). A portion of the Tailing Pond 7 Interceptor Well System water (column 12) will be sent to the membrane treatment system (column 14), and the remainder will bypass this system and get mixed with the treated effluent from the membrane system. Leach stockpile seepage (column 10) and runoff from the uncovered portions of the leach stockpiles (column 6) will be treated through the evaporative treatment system for the entire post-cosure water treatment period.

(4) Sources of water in-flow to the system related to the Santa Rita Open Pit groundwater and the estimated flow rates based on North Area groundwater flow model simulations conducted as part of the North Mine Area Groundwater Flow Model Re-Calibration (Golder, 2016). The re-calibrated estimate of groundwater discharge to the open pit under end of year 2018 operational conditions was 377 gallons per minute (gpm). Currently this groundwater is removed via operational pit sumps and via evaporation. In the closure scenario, recharge to groundwater beneath the stockpiles was simulated at 0.14 cm/yr from UNSAT-H Model Run 187 (3-foot covered stockpile) from Chino DP-1340 Condition 93 Feasibility Study (Golder 2007b). The model estimated groundwater discharge to the open pit after closure was 352 gpm for the re-calibrated model. The stockpiles are assumed to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered recharge rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32.

(5) Sources of water in-flow to the system related to the Santa Rita Open Pit storm water run-on and the estimated average flow rates from Condition 93 Feasibility Study (Golder, 2007b). Based on a catchment area of 1,610 acres (= pit rim area) and a CN of 75. EOY 2018 MP pit perimeter = 1,626 acres which represents a 1% increase in area. FS flow estimates were increased were increased by 1% (32 gpm to 32.3 gpm) to account for increased catchment area.

(6) Sources of water in-flow to the system related to storm water run-off from leached stockpile outslopes outside pit watershed area (= pit perimeter) and the estimated average flow rates from Condition 93 Feasibility Study (Golder, 2007b). FS used CN of 85 for uncovered SPs. EOY 2018 leach SP areas = 1,842.2 acres w/Lee Hill and 1,814.6 acres w/o Lee Hill which represents a 17% increase in area previously used. Uncovered outslopes after year 12 = 195.7 acres w/o Lee Hill which represents 12.6% of area previously used. FS flow estimates were increased by 17% for EOY 2018 and decreased by 87% after year 12. Proportion of leached to unleached stockpiles were accounted for to scale current runoff estimates.

(7) Sources of water in-flow to the system related to storm water run-off from unleached stockpile outslopes outside pit watershed area (= pit perimeter) and the estimated average flow rates from Condition 93 Feasibility Study (Golder, 2007b). FS used CN of 85 for uncovered SPs. EOY 2018 SP areas = 1,842.2 acres w/Lee Hill and 1,814.6 acres w/o Lee Hill which represents a 17% increase in area previously used. Uncovered outslopes after year 12 = 195.7 acres w/o Lee Hill which represents 12.6% of area previously used. FS flow estimates were increased by 17% for EOY 2018 and decreased by 87% after year 12. Proportion of leached to unleached stockpiles were accounted for to scale current runoff estimates.

(8) Water inflow to the system from the North Mine Area interceptor wells and the estimated average flow rate from this source. Estimated at 8.65 gpm combined from water extracted from the West Stockpile and the Lampbright areas (Krueger, April 1, 2016 email). Pumping from the Lampbright Cut (25.25 gpm) and Lampbright East (8.1 gpm) is for mine production and would be discontinued at closure (Mark Birch email communication dated March 15, 2016).

(9) Sources of water in-flow to the system related to impacted waters from the Cobre Mine. Based on estimated flows presented in Table C.3 of Appendix C of the Freeport-McMoRan Cobre Mining Company's 2014 Continental Mine Closure/Closeout Plan Update (Telesto, 2014). No pumping projected from the Continental Pit.

(10) Sources of water in-flow to the system related to leach stockpile seepage and the estimated average flow rates from Condition 93 Feasibility Study June 2007 UNSAT-H Model Runs (Golder, 2007b). The stockpiles are assumed to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered seepage rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32. Long term average drainage rates of 2.67 cm/yr (1.05 in/yr) for uncovered SPs and 0.14 cm/yr (0.055 in/yr) for 3' cover stockpile surfaces. Total plan area (tops and outslopes) of leach stockpiles is 1,464 acres at the EOY 2018, and 1,635 acres at year 12 following regrading and cover placement (Based on March 10, 2016 reclamation design drawing set; Golder, 2016).

(11) Sources of water in-flow to the system related to waste rock stockpile seepage and the estimated average flow rates from Condition 93 Feasibility Study June 2007 UNSAT-H Model Runs (Golder, 2007b). The stockpiles are assumed to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered seepage rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32. Long term average drainage rates of 2.67 cm/yr (1.05 in/yr) for uncovered SPs and 0.14 cm/yr (0.055 in/yr) for 3' cover stockpile surfaces. Total plan area (tops and outslopes) of waste rock stockpiles is 1,102 acres at the EOY 2018, and 1,106 acres at year 12 following regrading and cover placement (Based on March 10, 2016 reclamation design drawing set; Golder, 2016).

(12) Sources of water in-flow to the system related to Tailing Pond 7 Interceptor Well System. Initial flow of 1,480 gpm based on JSAI Recommendations for 2016 Pond 7 Interceptor Well Pumping (February 2016). Tailing ponds 6E, 6W, and 7 are assumed to be regraded, covered and revegetated in year 12, and annual reduction in pumping of 5% each year after reclamation until you get to steady-state post closure flow. Revised SMA Groundwater Flow Model has estimated post-closure flow of 533 gpm (Golder, 2015).

(13) "Combined Process Water In-Flow Rate" (CPW) is total of in-flows columns, column-4 through column-12.

(14) "Total Active In-Flows from the SMA to the South Treatment System (STS) Membrane Water Treatment Plant (gpm)" is the in-flows from the SMA to the STS Membrane WTP (65% of tailing interceptor flows years 6 through 14; 55% years 15 through 24; and 50% years 25 through 100). STS membrane system recovery assumed to be 87% for years 6 through 100. Reject from the STS membrane system goes to the STS Lime HDS system.

(15) "Total Active In-Flows from the NMA to the STS Membrane Water Treatment Plant (gpm)" is the flow rate from the NMA sources (Columns 4,5,7,8,9, and 11). Assumed 67% recovery years 6 through 9; 63% recovery years 10 through 14; and 75% recovery years 15 through 100. Reject goes to the STS Lime HDS system.

(16) "Total Active In-Flows to the STS Lime HDS Water Treatment Plant (gpm)" is the in-flows to the STS Lime/HDS WTP from the membrane reject (years 6 through 100).

(17) Water in Storage to be removed through evaporation at the end of a year in the schedule. Initial 'Water in Storage' (WIS) = water in reservoirs, impoundments and pits plus 'Average Circulated Inventory' (ACI).

Initial WIS = **2,575,110,200 gal.**

"Average Circulated Inventory" (ACI) is calculated based on experience with leach operations at Chino: (1) when raffinate application is stopped, PLS flow rate from stockpiles diminishes to 10% of the full flow rate in 45 days; and (2) make-up water requirement = 4% of raffinate flow rate during leaching (based on average flows between May 2011 and December 2013, therefore 96% of the raffinate flow rate reports to PLS).

For an initial raffinate flow rate of 21,000 gallons per minute (average measured flow rates between May 2011 and December 2013), the ACI is calculated as follows:

ACI = ((21,000 gpm x 96%) x 60 min/hr x 24 hr/day x 45 day drain-down cycle) x 0.90

ACI = **1,175,731,200** gal.

The volume of WIS decreases as a result of calculating the difference between the initial WIS plus the water in-flows minus water out-flows (through evaporation or water treatment). For example: WIS Year 2 = (WIS Year-1) + (water inflow to NMA WTP/ETS (column 3) Year-2 x 60 min/hr x 24 hr/day x 365 days/yr) - (EWL (column 2) Year-2) - (Active In-flows to NMA WTP (15) Year-2 x 60 min/hr x 24 hr/day x 365 days/yr).

(18) "Treated Water Flow Rate" (TWFR) is treated effluent from the Water Treatment Plant that goes to beneficial use.

(19) Total Water Flow Rate to Beneficial Use (gpm)= TWFR + portion of Tailing Interceptor Water that bypasses the membrane treatment system.

Chino CCP Update
Table 5: Evaporation Treatment Schedule

Year Following Closure	EOY	Run 185 (Average Annual Evaporation for Uncovered Stockpile in Chino Feasibility Study (Golder, 2007))			Evaporation from Drip Areas			Evaporation from 380 GPM Sprayers			Evaporation from 45 GPM Sprayers			Evaporation from Reservoirs, Impoundments, and Pit Lakes (assume pit lake areas get reduced by 20% per year starting in year 2)			Precipitation on Drip Areas		Precipitation on Spray Areas		Precipitation on Reservoirs, Impoundments, and Pit Lakes		Total Evaporation	
		cm	in	ft	Drip Area (Acres)	acre-ft	gallons	No. of Spray Units	acre-ft	gallons	No. of Spray Units	acre-ft	gallons	Surface Area (acres)	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons
1	2019	37.43	14.74	1.23	391	480.2	156,459,253	0	0.0	0	0	0.0	0	71.0	370.2	120,639,485	508.6	165,736,455	0.0	0	92.4	30,092,399	249.4	81,269,883
2	2020	37.43	14.74	1.23	371	455.1	148,296,162	12	3,758.2	1,224,626,374	0	0.0	0	62.5	325.9	106,191,907	482.1	157,089,336	26.5	8,647,119	81.3	26,488,585	3,949.3	1,286,889,390
3	2021	37.43	14.74	1.23	371	455.1	148,296,162	12	3,758.2	1,224,626,374	0	0.0	0	54.0	281.6	91,744,329	482.1	157,089,336	26.5	8,647,119	70.2	22,884,771	3,916.0	1,276,045,626
4	2022	37.43	14.74	1.23	371	455.1	148,296,162	12	3,758.2	1,224,626,374	0	0.0	0	45.5	237.2	77,296,751	482.1	157,089,336	26.5	8,647,119	59.2	19,280,957	3,882.8	1,265,201,863
5	2023	37.43	14.74	1.23	371	455.1	148,296,162	12	3,758.2	1,224,626,374	0	0.0	0	37.0	192.9	62,849,173	482.1	157,089,336	26.5	8,647,119	48.1	15,677,143	3,849.5	1,254,358,099
6	2024	37.43	14.74	1.23	371	455.1	148,296,162	12	3,758.2	1,224,626,374	0	0.0	0	28.5	148.5	48,401,595	482.1	157,089,336	26.5	8,647,119	37.1	12,073,329	3,816.2	1,243,514,335
7	2025	37.43	14.74	1.23	0	0.0	0	4	1,252.7	408,208,791	7.3	268.9	87,617,183	6.7	34.7	11,300,446	0.0	0	14.5	4,726,244	8.7	2,818,791	1,533.2	499,581,380
8	2026	37.43	14.74	1.23	0	0.0	0	0	0.0	0	7.3	268.9	87,617,183	6.7	34.7	11,300,446	0.0	0	5.7	1,843,871	8.7	2,818,791	289.3	94,254,966
9	2027	37.43	14.74	1.23	0	0.0	0	0	0.0	0	7.3	268.9	87,617,183	6.7	34.7	11,300,446	0.0	0	5.7	1,843,871	8.7	2,818,791	289.3	94,254,966
10	2028	37.43	14.74	1.23	0	0.0	0	0	0.0	0	7.3	268.9	87,617,183	6.7	34.7	11,300,446	0.0	0	5.7	1,843,871	8.7	2,818,791	289.3	94,254,966
11	2029	37.43	14.74	1.23	0	0.0	0	0	0.0	0	7.3	268.9	87,617,183	6.7	34.7	11,300,446	0.0	0	5.7	1,843,871	8.7	2,818,791	289.3	94,254,966
12	2030	37.43	14.74	1.23	0	0.0	0	0	0.0	0	7.3	268.9	87,617,183	6.7	34.7	11,300,446	0.0	0	5.7	1,843,871	8.7	2,818,791	289.3	94,254,966
13	2031	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
14	2032	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
15	2033	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
16	2034	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
17	2035	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
18	2036	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
19	2037	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
20	2038	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
21	2039	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
22	2040	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
23	2041	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
24	2042	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
25	2043	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
26	2044	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
27	2045	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
28	2046	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
29	2047	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
30	2048	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
31	2049	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
32	2050	37.43	14.74	1.23	0	0.0	0	0	0.0	0	3.8	139.1	45,319,233	8.8	45.6	14,869,008	0.0	0	2.9	953,726	11.4	3,708,936	170.4	55,525,578
33	2051	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
34	2052	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
35	2053	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
36	2054	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
37	2055	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
38	2056	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
39	2057	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
40	2058	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
41	2059	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
42	2060	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
43	2061	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
44	2062	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
45	2063	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
46	2064	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
47	2065	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
48	2066	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
49	2067	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
50	2068	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
51	2069	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
52	2070	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
53	2071	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
54	2072	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
55	2073	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
56	2074	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
57	2075	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
58	2076	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
59	2077	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
60	2078	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
61	2079	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
62	2080	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
63	2081	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
64	2082	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
65	2083	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
66	2084	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
67	2085	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
68	2086	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
69	2087	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
70	2088	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
71	2089	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
72	2090	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
73	2091	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777

Table 5: Evaporation Treatment Schedule

Year Following Closure	EOY	Run 185 (Average Annual Evaporation for Uncovered Stockpile in Chino Feasibility Study (Golder, 2007))			Evaporation from Drip Areas			Evaporation from 380 GPM Sprayers			Evaporation from 45 GPM Sprayers			Evaporation from Reservoirs, Impoundments, and Pit Lakes (assume pit lake areas get reduced by 20% per year starting in year 2)			Precipitation on Drip Areas		Precipitation on Spray Areas		Precipitation on Reservoirs, Impoundments, and Pit Lakes		Total Evaporation	
		cm	in	ft	Drip Area (Acres)	acre-ft	gallons	No. of Spray Units	acre-ft	gallons	No. of Spray Units	acre-ft	gallons	Surface Area (acres)	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons
74	2092	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
75	2093	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
76	2094	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
77	2095	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
78	2096	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
79	2097	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
80	2098	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
81	2099	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
82	2100	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
83	2101	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
84	2102	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
85	2103	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
86	2104	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
87	2105	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
88	2106	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
89	2107	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
90	2108	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
91	2109	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
92	2110	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
93	2111	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
94	2112	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
95	2113	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
96	2114	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
97	2115	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
98	2116	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
99	2117	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
100	2118	37.43	14.74	1.23	0	0.0	0	0	0.0	0	0.32	11.9	3,867,241	10.8	56.4	18,366,199	0.0	0	0.2	81,385	14.1	4,581,278	53.9	17,570,777
Total		**3,743**	**1,473.62**	**122.8018**		**2,756**	**897,940,062**		**20,044**	**6,531,340,663.65**		**5,202**	**1,695,060,150.77**		**6,510**	**2,121,207,592.63**	**2,919**	**951,183,133.77**	**251**	**81,789,880.91**	**1,624**	**529,115,540.44**	**29,717**	**9,683,459,831.54**

Table 6: Annual Rate of Salt Generation from Long-Term Evaporative Treatment System

Year Following Closure	Salt Generation (Tons/Year)
7	28,534
10	28,534
15	24,801
25	12,612
32	4,096
40	4,096
100	4,096

FIGURES

LEGEND

RECLAIMED AREAS

APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

AREAS TO BE USED IN EVAPORATIVE TREATMENT SYSTEM (DRIP SYSTEM AND SPRAY EVAPORATION)

IMPOUNDMENT AREA USED FOR PASSIVE AND ACTIVE EVAPORATION

NOTE

SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COORDINATE SYSTEM.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

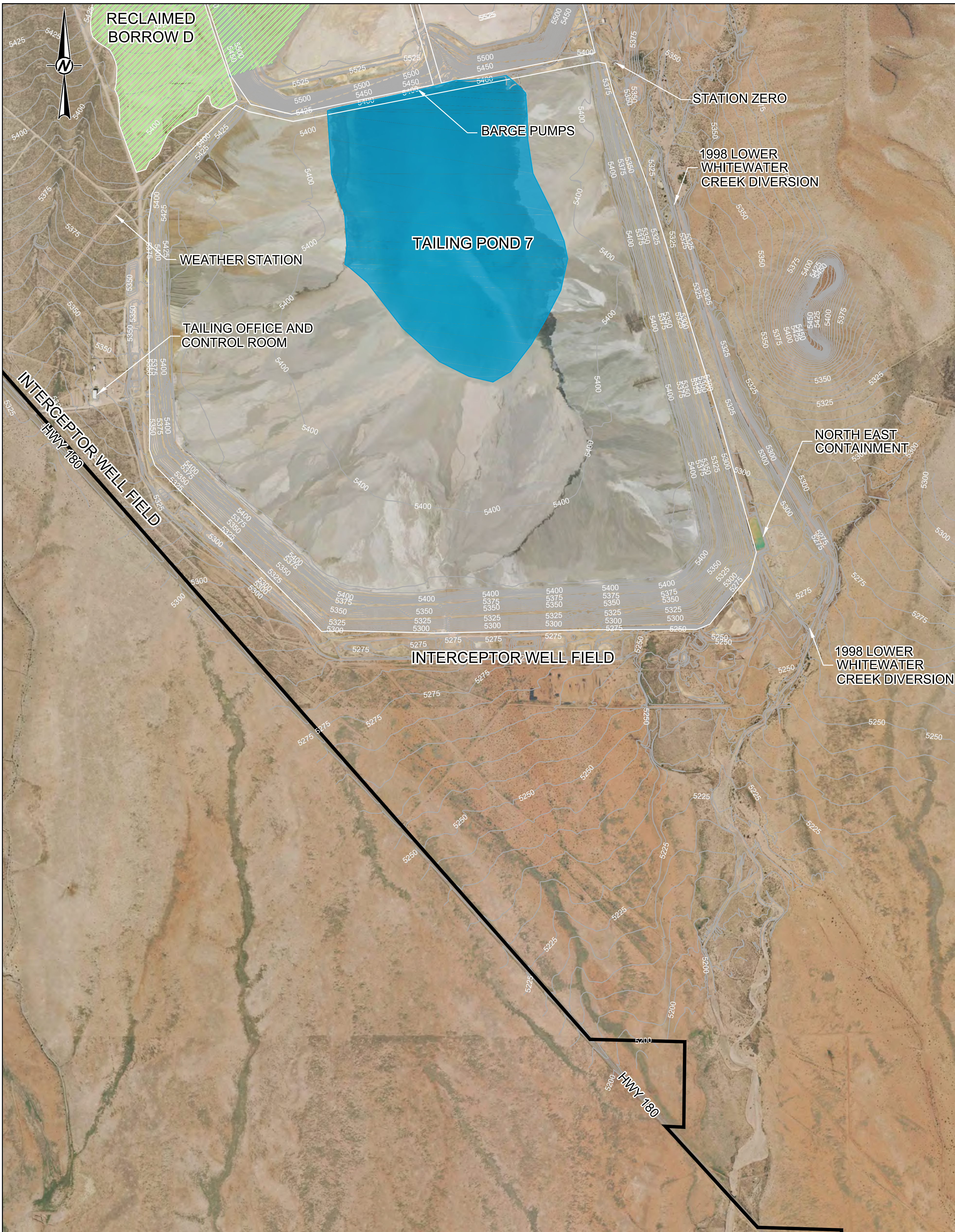
PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE

TITLE
AREAS TO BE UTILIZED FOR THE NORTH MINE AREA SHORT-TERM EVAPORATIVE TREATMENT SYSTEM

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	1



LEGEND

- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- 5 FOOT CONTOURS
- RECLAIMED AREAS
- CHINO MINE PERMIT BOUNDARY
- IMPOUNDMENT AREA USED FOR PASSIVE EVAPORATION

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY (TOPOGRAPHY ONLY SHOWN FOR SURVEY COVERAGE.
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-484 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-484 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 750 1500 2250
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

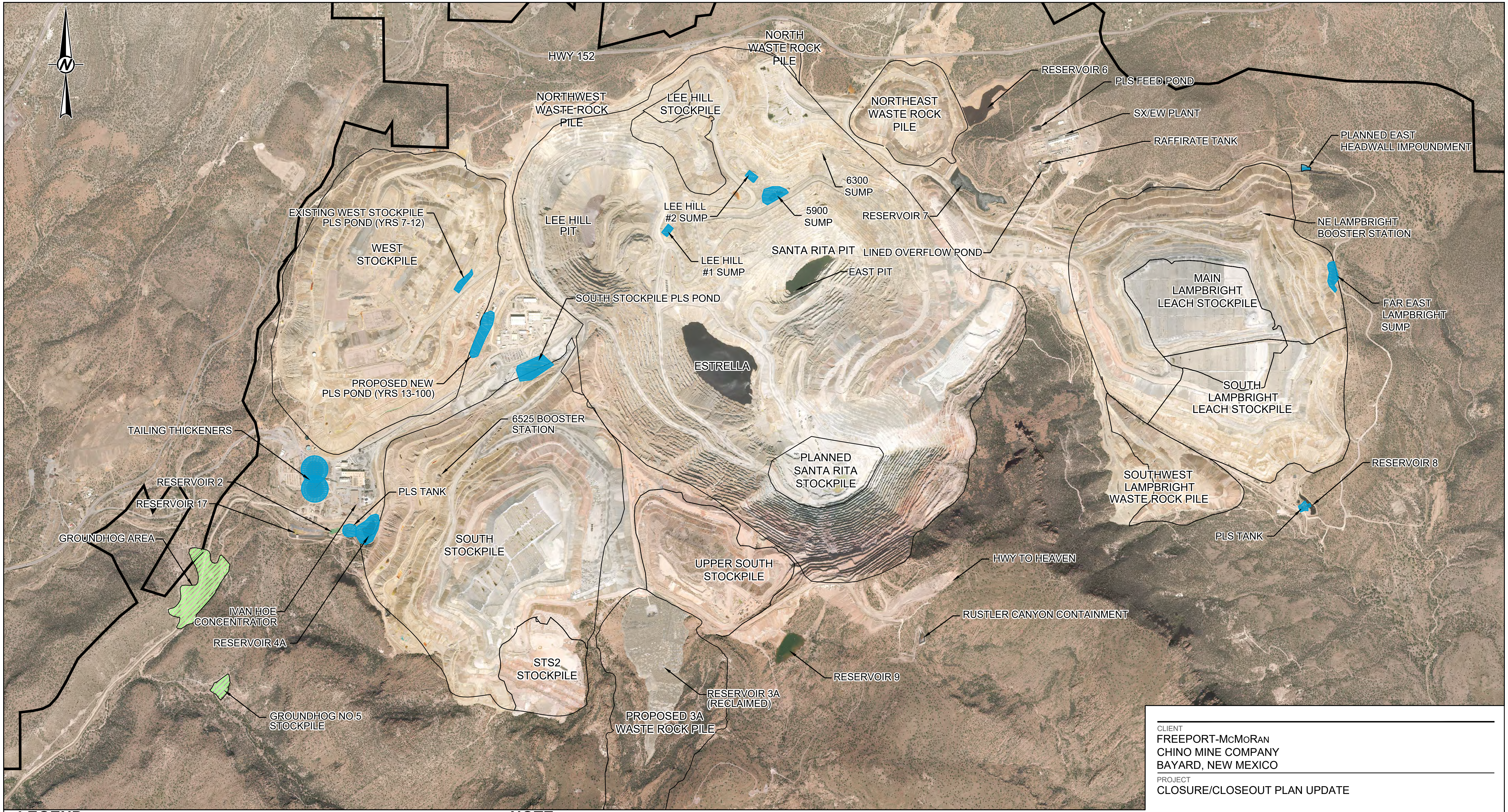
PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE

TITLE
AREA TO BE UTILIZED FOR THE SHORT-TERM SOUTH MINE AREA EVAPORATIVE TREATMENT SYSTEM

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	2



LEGEND

- RECLAIMED AREAS
- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- CHINO MINE PERMIT BOUNDARY
- AREAS TO BE USED FOR THE NORTH MINE AREA LONG-TERM EVAPORATIVE TREATMENT SYSTEM (PASSIVE EVAPORATION AND SPRAY EVAPORATION)

NOTE

SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COORDINATE SYSTEM.

CLIENT
FREEPORT-McMoRAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE

TITLE
AREAS TO BE UTILIZED FOR THE NORTH MINE AREA LONG-TERM EVAPORATIVE TREATMENT SYSTEM

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3

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