Golden Sunlight Mine
Amendment 015 To Operating Permit No. 00065
Final Environmental Impact Statement

Prepared for:

State of Montana
Department of Environmental Quality

December 2013

Montana Department of Environmental Quality

PO Box 200901
Helena, MT 59620-0901

Date: December 19, 2013

Dear Interested Party:

Enclosed is the final Environmental Impact Statement (EIS) on Golden Sunlight Mine's proposed amendment for its operating permit (00065) prepared by the Montana Department of Environmental Quality (DEQ). You can obtain an electronic version of the final EIS on DEQ's web site: http://deq.mt.gov/eis.mcpx.

The Golden Sunlight Mine is an existing open pit gold mine located near Whitehall, Montana. The state of Montana issued Operating Permit No. 00065 to the mine in 1972. DEQ has previously approved fourteen amendments to the operating permit, several of which have allowed expansion of the mine. In September of 2012, DEQ received GSM's application for Amendment 15, which would allow further expansion of the Mineral Hill Pit and the mining of a new pit located to the north of the Mineral Hill Pit. On April 30, 2013, DEQ determined the company's application for Amendment 15 was complete and compliant and issued a draft permit for the proposed expansion, pursuant to Section 82-4-337, MCA.

DEQ issued a draft EIS on September 17, 2013 that included a detailed statement on the environmental impacts of a No Action Alternative, a Proposed Action Alternative (the company's proposal), an Agency-Modified Alternative, and a North Area Pit Backfill Alternative.

DEQ has chosen the Agency-Modified Alternative as the preferred alternative because it is more protective of water quality. In the analysis, DEQ concludes that if the North Area pit were backfilled the mine would not be able to implement a secondary water capture system if pump back wells were to fail. The Agency-Modified Alternative is the same as the Proposed Action Alternative, except it requires the mine to implement closure and geodetic and ground-movement monitoring for the North Area Pit and the East Waste Rock Dump expansion area to ensure safe access and to keep reclamation cover systems working. In addition, the Agency-Modified Alternative requires the preparation of a detailed bat and raptor reclamation plan for the North Area Pit highwall to ensure some utility to wildlife.

DEQ's decision on a preferred alternative was made after reviewing public comments on the draft EIS and completing additional environmental analysis in response to those comments. DEQ will set forth its final decision in a record of decision (ROD) in no less than 15 days from the transmittal of this final EIS to the public, Environmental Quality Council, and office of the Governor, per ARM 17.4.620.

DEQ appreciates the public's involvement in preparing the final EIS. Additional copies are available from DEQ (contact Kristi Ponozzo, 406-444-2813), or on the DEQ web site. A copy of the ROD will be sent to everybody who receives the final EIS.

Sincerely,

Tracy Stone-Manning, Director
Montana Department of Environmental Quality

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Golden Sunlight Mine Draft EIS Summary of October 8, 2013 Public Meeting

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Summary

S.1 Introduction

This final environmental impact statement (EIS) has been prepared for the proposed expansion of the Golden Sunlight Mine (GSM) in Jefferson County, Montana (**Figure S-1**). GSM submitted an Application for Amendment 015 to Operating Permit No. 00065 in September 2012 (GSM 2012a). The Department of Environmental Quality (DEQ) provided a first deficiency letter on November 2, 2012 and GSM responded to those comments on December 21, 2012 (GSM 2012b). DEQ sent a second deficiency letter on January 18, 2013 and GSM responded to the comments on February 1, 2013. DEQ issued a draft amendment to the operating permit on April 30, 2013. The mining and reclamation activity described in the Amendment 015 Application is the Proposed Action Alternative.

DEQ is the lead agency and prepared the EIS for the mine expansion. The EIS presents the analysis of possible environmental consequences of four alternatives: No Action Alternative, which is GSM current Operating Permit 00065; Proposed Action Alternative (Amendment 015); Agency-Modified Alternative which includes mitigations proposed by DEQ, and the North Area Pit Backfill Alternative. The four alternatives are described in detail in Chapter 2. This EIS is tiered to the *Final Supplemental Environmental Impact Statement Golden Sunlight Mine Pit Reclamation* (SEIS) prepared by DEQ and the Bureau of Land Management (BLM) in 2007 (DEQ and BLM 2007).

S.2 Purpose and Need

GSM currently mines ore containing gold and other metals from the Mineral Hill Pit under Operating Permit 00065, issued by DEQ under the Montana Metal Mine Reclamation Act ([MMRA]; 82-4-301 *et seq.*, Montana Code Annotated [MCA]).

The application for amendment to mine additional ore reserves was developed to extend the life of the mine. The amendment would extend the current mining operation by up to two years beyond the current operating permit.

The Montana Environmental Policy Act (MEPA) requires an environmental review of actions taken by the State of Montana that may significantly affect the quality of the human environment. This EIS was written to fulfill the MEPA requirements. The Director of DEQ will decide which alternative should be approved in a Record of Decision (ROD) based on the analysis set forth in the final EIS, including the comments received on the draft EIS and the agency's responses to those comments.

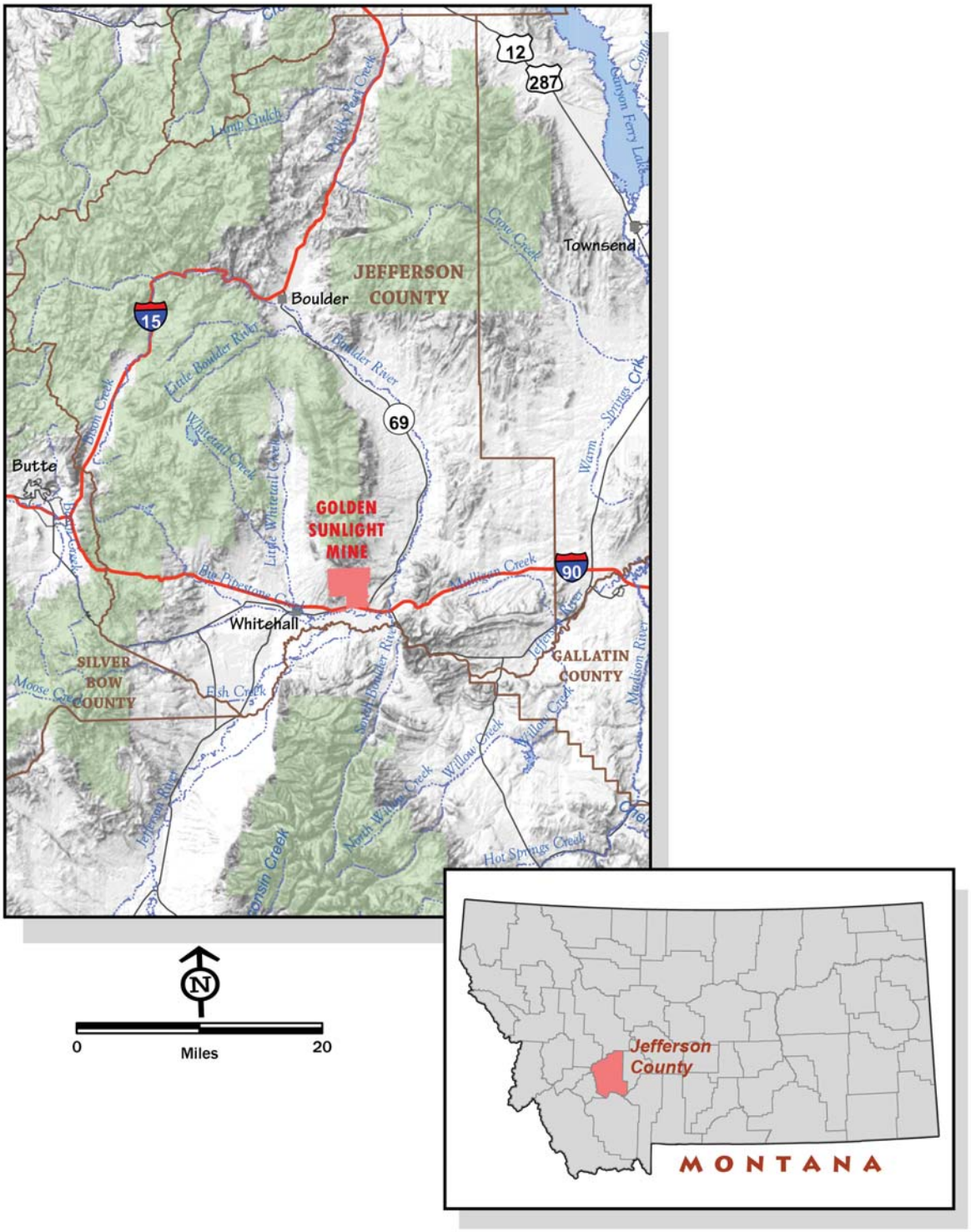


Figure S-1
Location Map

S.3 Issues of Concern

There were no adverse issues of concern raised by the public during scoping for the proposed GSM Amendment 015 expansion. The 118 comments were in support of the mine expansion and continued mining by GSM and included general comments about (1) socio-economic benefits, (2) company environmental stewardship, (3) safety, (4) only minor changes for this amendment, and (5) to not delay the approval timeline. There were 10 comments that contained specific technical aspects about GSM or the Proposed Action Alternative and they are described in the Scoping Report (Tetra Tech 2013).

The issues of concern identified by DEQ while preparing the draft EIS and agency modifications to the Proposed Action Alternative include:

- **Geotechnical Engineering** - The open pits and rock faces must be reclaimed to stable and structurally competent slopes capable to withstand geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

- **Water Resources –** Surface water and groundwater from the North Area Pit must be captured and properly handled during mine operation and post-closure. There was some uncertainty of the groundwater flow paths from the North Area Pit toward the Mineral Hill Pit. Mining-related seeps in the East Waste Rock Dump Complex (EWRDC) expansion area could be contaminated with metals and be acidic and cause off-site surface water and groundwater contamination.

- **Pit Backfill** - Under the Metal Mine Reclamation Act (MMRA), the use of backfilling as a reclamation measure is neither required nor prohibited in all cases. Backfilling the proposed South Area Layback (part of the Mineral Hill Pit) is not an issue needing detailed analysis in this EIS because DEQ previously determined backfilling the Mineral Hill Pit did not provide adequate protection of groundwater and surface water resources. Backfilling the North Area Pit is different from backfilling the Mineral Hill Pit and an independent analysis is required.

- **Social and Economic Considerations** - Beneficial impacts were expressed regarding good-paying jobs provided by GSM.

- **Soils, Vegetation, and Reclamation** - GSM supplements borrow materials for reclamation plant growth medium and these materials may not always provide the necessary characteristics for successful reclamation. Also, GSM did not propose to salvage some fine-grained lake bed sediments in the North Area Pit that may be suitable as plant growth medium on level areas.

- **Wildlife –** The reclamation of the open pits and rock faces must provide sufficient measures that afford some utility to humans or the environment.

- **Aesthetics** - The reclamation of the open pits and rock faces must help mitigate or prevent post-reclamation visual contrasts between reclaimed lands and adjacent lands.

Through an interdisciplinary team (IDT) review, it was determined that a number of resource areas and associated issues would not be affected or would be minimally affected and therefore would not be discussed further. The resource areas considered but not studied in detail included air quality; fisheries and aquatic resources; noise; cultural and paleontological resources; transportation; wetlands and Waters of the U.S.; areas of critical environmental concern; prime or unique farmlands; wild and scenic rivers; wilderness; water rights, and safety.

S.4 Alternatives Analyzed in Detail

Four alternatives are described and evaluated in detail in this EIS: the No Action Alternative; the Proposed Action Alternative (proposed Amendment 015); the Agency-Modified Alternative; and the North Area Pit Backfill Alternative.

Brief summaries of the four alternatives are presented below. Detailed descriptions of the alternatives are provided in Chapter 2.

S.4.1 No Action Alternative

The No Action Alternative reflects the current operations conducted under Operating Permit 00065 (through Amendment 014), including mining of the 5B Optimization Project in the Mineral Hill Pit. The main mine facilities consist of the Mineral Hill Pit, the East Pit, the milling and ore processing complex, two tailings storage facilities (TSF-1 and TSF-2), and five waste rock disposal areas. The mine would continue to operate 24-hours per day, 7 days per week, through the end of 2014 or early 2015. GSM is currently approved for mining and associated facilities disturbance on 3,104 acres in a permit boundary of 6,125 acres.

S.4.2 Proposed Action Alternative

Under the Proposed Action Alternative, GSM would expand their current mining operation with the addition of one new pit called the North Area Pit, and an expansion to the existing Mineral Hill Pit known as the South Area Layback. The expansion would allow GSM to mine an additional 4.2 million tons of gold ore that would be processed at the existing mill facility. Mining would be consistent with current mining operations using conventional open pit mining methods.

Approximately 52.6 million tons of non-ore waste rock would be generated from the proposed new mining areas and would be primarily placed in the EWRDC expansion area (Section 2.3). Amendment 015 would increase the size of the permitted disturbance boundary by approximately 68.1 acres and would extend current mining operations by about two years.

S.4.3 Agency-Modified Alternative

The Agency-Modified Alternative is the same as the Proposed Action Alternative with modifications developed by DEQ to mitigate the environmental impacts from the Proposed Action Alternative. These modifications include the following:

1. The implementation of closure geodetic and ground-movement monitoring for the North Area Pit and EWRDC expansion area to ensure safe access and to keep reclamation cover systems working;

2. Prepare a detailed bat and raptor habitat reclamation plan for the North Area Pit Highwall.

S.4.4 North Area Pit Backfill Alternative

Up to 9.2 million tons of waste rock from the South Area Layback would be used to backfill the North Area Pit rather than being hauled to the EWRDC expansion area or the Buttress Dump Extension area.

S.5 Summary of Impacts

Table S-1 summarizes and compares the impacts of the four alternatives considered and evaluated in detail.

TABLE S-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
	Disturbed Acreage			
Permit Boundary and Permitted Disturbance Boundary	Disturbance area = 3,104 acres Permit area = 6,125 acres	Increase permitted disturbance boundary by 87.4 acres (55.1 acres outside permitted disturbance boundary + 32.3 acres in Buffer Area)	Similar to the Proposed Action Alternative but would increase permitted disturbance boundary by 19.3 acres to include the Buffer Area around the southeast portion of the EWRDC expansion area.	Same as Agency-Modified Alternative.
North Area Pit	No acres of disturbance	Expand 1,000 feet northeast of Mineral Hill Pit Total disturbance = 49.4 acres; New disturbance = 15 acres	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
South Area Layback	No additional acres of disturbance	Layback along southern wall of Mineral Hill Pit Total disturbance = 69.4 acres; New disturbance = 10.9 acres	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
East Waste Rock Dump Complex (EWRDC) Expansion Area	EWRDC permitted for 174 million tons of waste rock with a disturbed area of about 683 acres. Includes 5B Optimization. Maximum elevation is 5,850 feet which is approximately 520 feet above the natural topography.	Increase EWRDC dump size to permitted disturbance boundary of 721 acres; Total new disturbance = 179.6 acres; Disturbance within permitted disturbance boundary = 141.9 acres; Disturbance outside permitted disturbance boundary = 37.7 acres; Up to additional 48.6 million tons of waste rock; Maximum height above natural topography is approximately 290 feet. Up to 6 Mt of waste rock could go to permitted Buttress Dump Extension.	Same as the Proposed Action Alternative.	Similar to the Proposed Action Alternative except the waste rock dump may be of a lesser height if South Area Layback waste rock backfills the pit rather than going to EWRDC expansion area.
Tailings Disposal	TSF-1 ceased in 1995 and has been reclaimed. GSM would continue to treat drainage water from TSF-1 at 8 to 23 gpm. TSF-2 began receiving tailings in 1993. Approved for storage of 42 million tons of tailings at an embankment elevation of 4,770 feet. Includes 5B Optimization.	Increase TSF-2 tailings height by 4 feet with a corresponding 4.5 acres of additional disturbance. Approximately 5.0 million tons of tailings (4.2 million tons from mine + legacy mine materials) would be stored with a new ultimate embankment elevation of 4,774.5 feet.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
Haul and Access Roads	Mine contains an extensive network of access and haul roads from 100 feet wide to two-tracks. Road disturbances are included in the 198.5 acres approved for “Stockpiles, borrow areas, roads, and miscellaneous”.	Construction of new access road in East Waste Rock Dump Complex across Sheep Rock Creek Drainage. The road across Sheep Rock Creek has been approved and permitted but portion of road on the 37.7 acre EWRDC expansion would be bonded under Amendment 015.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Reclamation	GSM is currently approved for mining and associated facilities disturbance on 3,104 acres in a permit boundary of 6,125 acres. As of December 31, 2012 (2012 Annual Report), the actual disturbance was 2,361 acres. GSM reports 1,168 acres of reclamation successfully revegetated (2012 Annual Report).	About 75.4 acres (91 - 15.6) of previously reclaimed land would be redisturbed by the North Area Pit, South Area Layback, and EWRDC expansion. GSM would revegetate 22 acres of South Area Layback and 30 acres of the east wall of the North Area Pit. EWRDC expansion would be reclaimed at 2H:1V slope angles.	Same as the Proposed Action Alternative except GSM would provide plans for bat and raptor habitat in new North Area Pit highwalls and how visual contrasts with adjoining areas would be mitigated in the North Area Pit.	Same as the Agency-Modified Alternative except the North Area Pit would be backfilled and all acres would be covered with growth medium and revegetated.
General Plant Operations				
Mill Processing	May be completed in early 2015	Continuous through 2017.	Same as the Proposed Action Alternative.	Same as Proposed Action Alternative.
Ore Recovery and Processing	Same as current until closure.	4.2 million tons added; Processes same as No Action until closure.	Same as the Proposed Action Alternative.	Same as Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Mining and Geotechnical Engineering				
North Pit Area	Would not be constructed	Some erosion of the North Area Pit highwall and raveling of material onto benches would likely continue during the life of mine. The North Area Pit would expose zones of poor rock quality within some of the highwalls resulting in more potential small highwall instability problems, especially in and around the Range Front Fault. Bozeman area clay seams could potentially be encountered in the east wall locations. If this layer is extensive and prevalent over a large horizontal extent in stratigraphy it could affect stability of benches in local areas and require adjusting the pit highwall design.	Same as the Proposed Action Alternative except that GSM would develop a post-mining geodetic and ground movement monitoring plan and create bat and raptor features in the North Area Pit.	North Area Pit would be backfilled and all acres would be covered with growth medium and revegetated eliminating any instability problems.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Mineral Hill Pit Erosion (No Action Alternative) South Area Layback (Action Alternatives)	Some erosion of the Mineral Hill Pit highwalls and raveling of material onto benches would likely continue during the life of mine and after mining. GSM has to maintain access into pit by maintaining 5,700-foot pit bench. GSM has to maintain access to underground workings to repair water collection and routing equipment to get underground pit sump water to treatment plant.	Structure is favorable for pit highwall stability. However, some areas would be developed in the hanging wall of the Corridor Fault, the Telluride Fault, and the Splay Fault which are associated with poor rock quality. Careful controlled blasting and scaling should mitigate rockfall concerns and stability risks associated with lower rock mass quality. After mining, GSM would have to maintain Mineral Hill Pit access the same as No Action.	Similar to the Proposed Action Alternative with modifications for additional ground movement monitoring to identify potential for mass movement after mining in the South Area Layback if needed to access the Mineral Hill Pit after closure.	Same as the Agency-Modified Alternative.
Mineral Hill Pit Stability (No Action Alternative) South Area Layback (Action Alternatives)	During operations pit highwall stability would continue to be monitored using the existing system of survey prisms and extensometers. Mining activities in the pit would continue to be modified as necessary both to ensure worker safety and to minimize potential damage to mining equipment. GSM has to provide safe access into the pit to maintain water management facilities.	During operations, effective groundwater depressurization would be required and controlled blasting techniques would be used in the South Area Layback mine pit development to maintain the integrity of the benches and minimize raveling to ensure the benches remain capable of containing future rock falls. No additional monitoring is proposed after closure	Same as the Proposed Action Alternative GSM would be required to do additional monitoring if South Area Layback affects access into the Mineral Hill Pit at closure.	Same as the Proposed Action Alternative Same as the Agency-Modified Alternative

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Mineral Hill-Pit Stability (No Action Alternative) South Area Layback (Action Alternatives)	There would be the potential for smaller scale slope failures on pit highwalls and release of rock into the mine pit during operations and closure.	Same as No Action Alternative The proposed mine pit development should relieve loading pressures in the head area of the Swimming Pool Earth Block thus likely relieve loading pressures in the head area and is not predicted to instigate further movement in the block.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
Tailings Storage Facility-2 and Embankment	The final surface of the tailings would have a 0.5-percent to 5-percent slope toward the east end of the embankment to facilitate surface water drainage to the spillway. The outside slope of the tailings storage facility embankment would be reclaimed by reducing the slope to 2.5H: 1V.	The final surface of the tailings storage facility and outside slope slopes would be graded the same as the No Action Alternative.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Soil, Vegetation, and Reclamation				
Soil and Other Growth Medium Resources	Loss of soil development and horizons, soil erosion from the disturbed areas and stockpiles, reduction of favorable physical and chemical properties, reduction in biological activity, and changes in nutrient levels. Reclamation and revegetation would minimize long-term effects.	Impacts to soils, vegetation, and reclamation would be similar to those described under the No Action Alternative but would apply to a larger area of disturbance. An additional 302.9 acres would be disturbed or redisturbed as a part of this action. 152.1 acres of new disturbance outside of permitted disturbance boundary and not previously disturbed and 150.8 acres in permitted disturbance boundary and previously disturbed.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Vegetation and Reclamation	Reclamation seed mixtures have been developed for various slope configurations and facilities. Mine operations have not successfully reclaimed any areas to Douglas-fir or mixed shrub plant communities. Noxious weed infestations are monitored and treated every year, 159 acres of the Mineral Hill Pit would be regraded to 2H:1V slopes, covered with soil, and revegetated. The remaining 158 acres of the pit would be left unvegetated as rock faces with some bat and raptor habitat.	The seedbed preparation and revegetation plans for the additional areas under the Proposed Action would be similar to the No Action Alternative. Same as the No Action Alternative. Approximately 30 acres of the North Area Pit and 22 acres of the South Area Layback would be regraded to 2H:1V slopes, covered with soil, and revegetated.	Same as the Proposed Action Alternative	Same as Proposed Action except the North Area pit would be completely backfilled and all 49.4 acres of the North Area Pit would be covered with growth medium and revegetated.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Water Resources				
Surface Water	There are minimal environmental consequences to surface water under this alternative. Surface water drainage patterns and runoff volumes and rates would remain as approved. Over the long-term and as more project facilities are reclaimed and vegetation on reclaimed surfaces becomes more dense, ephemeral surface water runoff rates would decrease.	The increased pit disturbance areas would capture more rainfall and snowmelt and contribute to stormwater during runoff events. The disturbed EWRDC expansion surfaces would be more permeable with less surface runoff but with a greater contribution to groundwater. Following reclamation, the revegetated surfaces would result in some surface runoff with a smaller contribution to groundwater.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative except the North Area Pit would be backfilled and more captured precipitation would be routed out of the backfilled pit.
Groundwater South Area Layback	The South Area Layback would not be constructed.	The groundwater flow paths for the Mineral Hill Pit would remain the same, and the groundwater pumping and capture systems on the site are designed to address impacts from Mineral Hill Pit operations. The South Area Layback would be an extension of the Mineral Hill Pit and would drain into the main pit where water would be captured by the underground pit sump and pumped from the pit to the WTP.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Groundwater North Area Pit	The North Area Pit would not be constructed.	The North Area Pit would be dewatered using two vertical dewatering wells around the perimeter of the pit. If vertical dewatering wells are not successful horizontal dewatering wells may be needed. If dewatering is incomplete, some groundwater would report to the pit and migration of the impacted groundwater out of the pit could occur.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
		Maintains the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail.	Same as the Proposed Action Alternative.	Does not maintain the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail.
		The water would report to the identified pit flowpaths and water would have to be captured by the Rattlesnake drainage capture wells.	Same as the Proposed Action Alternative.	Backfilling the North Area Pit would eliminate the benefit of redirecting groundwater from the head of the EWRDC flow path into the North Area Pit.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Groundwater EWRDC expansion area	The EWRDC expansion area would not be constructed.	Groundwater quality impacts – Seepage from EWRDC expansion area predicted to take 33 to 72 years (same as EWRDC) to arrive at base of dump and 100 years before groundwater impacted. Volume of potential seepage estimate at 2.1 gpm. Conceptual system would collect seepage at the end of the mixing zone with sufficient number of wells and pump water via pipeline to the water treatment plant.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	**General Impact**			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Wildlife and Fisheries				
South Area Layback/ North Area Pit	There would be no additional effects on wildlife or fish species within or adjacent to the Project area.	Construction and operational noise may cause a continued short-term, temporary disturbance to wildlife. The South Area Layback may reduce the approved wildlife highwall habitat approved in the No Action Alternative. 22 acres would be covered with growth medium and reclaimed to grassland habitat. No detailed plan provided for bat and raptor habitat in the North AreaPit. 30 acres would be covered with growth medium and reclaimed to grassland habitat.	Same as the Proposed Action Alternative except GSM would provide a more detailed plan to provide bat and raptor habitat in South Area Layback highwalls to provide some utility to the environment. GSM would provide a plan to provide bat and raptor habitat in North Area Pit highwalls to provide some utility to the environment.	Same as the Agency-Modified Alternative except North Area Pit would be backfilled creating more vegetated grassland habitat and less bat and raptor habitat.

TABLE S-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Aesthetic Resources				
South Area Layback/ North Area Pit	Post-closure, portions of the highwalls and benches would remain visible. Overall visual contrasts would be reduced to a level where they are noticeable but not dominant in the landscape, following successful reclamation and revegetation of some areas of the pit highwall.	Similar to the No Action Alternative with additional disturbed areas including the expanded and new pit highwalls. 22 acres of the South Area Layback and 30 acres of the North Area Pit covered with soil (plant growth medium) and then seeding with grasses.	Effects would be similar to the Proposed Action Alternative. The additional geodetic and geotechnical monitoring and expanded creation of bat and raptor habitat in the North Area Pit highwall may slightly reduce visual impacts under this alternative compared to the Proposed Action Alternative.	Backfilling the North Area Pit would produce an additional 12 acres for seeding and tree planting that when successful established would help reduce visual contrast with adjacent lands.
Social and Economic Conditions				
Additional wages, salaries, and benefits paid in 2016	$0	$13,580,305	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
Tax Revenues paid 2013-2016	Price of gold $1,300-$1,700/oz.	Price of gold $1,300-$1,700/oz.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
	2013 $4.615-$5.855 million	$4.677 - $5.915 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.
	2014 $3.544-$4.420 million	$4.197 - $5.275 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.
	2015 $1.005-$1.276 million	$2.871 - $3.556 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.

TABLE S-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES					
Resource, Land Use, or Activity	**General Impact**				
	No Action Alternative (Current Operating Permit)		**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
	2016	$0.416 million	$2.538. -$3.242 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.

Notes:

2H:1V	Two horizontal to one vertical
DEQ	Montana Department of Environmental Quality
EWRDC	East Waste Rock Dump Complex
GPS	Global positioning system
GSM	Golden Sunlight Mines, Inc.

S.6 Preferred Alternative

DEQ has chosen the Agency-Modified Alternative as the preferred alternative and the proposed decision. DEQ's final decision will be set forth in a record of decision (ROD) in no less than 15 days from the transmittal of this final EIS to the public, Environmental Quality Council (EQC), and office of the Governor, per ARM 17.4.620.

S.6.1 Rationale for the Preferred Alternative

The Agency-Modified Alternative is the same as the Proposed Action Alternative except that it requires GSM to implement closure and geodetic and ground-movement monitoring for the North Area Pit and the EWRDC expansion area to ensure safe access and to keep reclamation cover systems working. The Agency-Modified Alternative also requires the preparation of a detailed bat and raptor reclamation plan for the North Area Pit highwall to ensure some utility to wildlife. DEQ is imposing these modifications with the consent of GSM.

DEQ considered the North Area Pit Backfill Alternative in detail. Overall, the North Area Pit Backfill Alternative is not predicted to substantially alter long-term groundwater management and treatment requirements when compared with the Proposed Action or Agency-Modified Alternatives.

Backfilling the North Pit would eliminate the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail. Backfilling could also eliminate the potential benefits of redirecting groundwater from the head of the EWRDC flowpath into the North Area Pit, where it could be more easily captured.

The analysis contained in this final EIS, which is informed by comments received by DEQ on the draft EIS and DEQ's responses to those comments, did not change DEQ's previous determination that the proposed amendment complied with the reclamation requirements for open pits by providing the required structural stability, utility to humans or the environment, mitigation of post reclamation visual contrasts, and mitigation or prevention of undesirable contrasts. In addition, the analysis did not change DEQ's previous determination that the proposed amendment prevented the pollution of water resources.

Purpose of and Need for Action

1.1 Introduction

This final environmental impact statement (EIS) has been prepared for the proposed expansion of the Golden Sunlight Mine (GSM) in Jefferson County, Montana (**Figure 1-1**). GSM submitted an Application for Amendment 015 to Operating Permit No. 00065 in September 2012 (GSM 2012a). The Department of Environmental Quality (DEQ) provided a first deficiency letter on November 2, 2012 and GSM responded to those comments on December 21, 2012 (GSM 2012b). DEQ sent a second deficiency letter on January 18, 2013 and GSM responded to the comments on February 1, 2013. DEQ issued a draft amendment to the operating permit on April 30, 2013. The mining and reclamation activity described in the Amendment 015 Application is the Proposed Action Alternative.

DEQ is the lead agency and prepared the EIS for the mine expansion. The EIS presents the analysis of possible environmental consequences of four alternatives: No Action Alternative, which is GSM current Operating Permit 00065; Proposed Action Alternative (Amendment 015); Agency-Modified Alternative which includes mitigations proposed by DEQ, and the North Area Pit Backfill Alternative. The four alternatives are described in detail in Chapter 2. This EIS is tiered to the *Final Supplemental Environmental Impact Statement Golden Sunlight Mine Pit Reclamation* (SEIS) prepared by DEQ and the Bureau of Land Management (BLM) in 2007 (DEQ and BLM 2007).

1.2 Purpose and Need

GSM currently mines ore containing gold and other metals from the Mineral Hill Pit under Operating Permit 00065, issued by DEQ under the Montana Metal Mine Reclamation Act ([MMRA]; 82-4-301 *et seq.*, Montana Code Annotated [MCA]).

The application for amendment to mine additional ore reserves was developed to extend the life of the mine. The amendment would extend the current mining operation by up to two years beyond the current operating permit.

The Montana Environmental Policy Act (MEPA) requires an environmental review of actions taken by the State of Montana that may significantly affect the quality of the human environment. This EIS was written to fulfill the MEPA requirements. The Director of DEQ will decide which alternative should be approved in a Record of Decision (ROD) based on the analysis set forth in the final EIS, including the comments received on the draft EIS and the agency's responses to those comments.

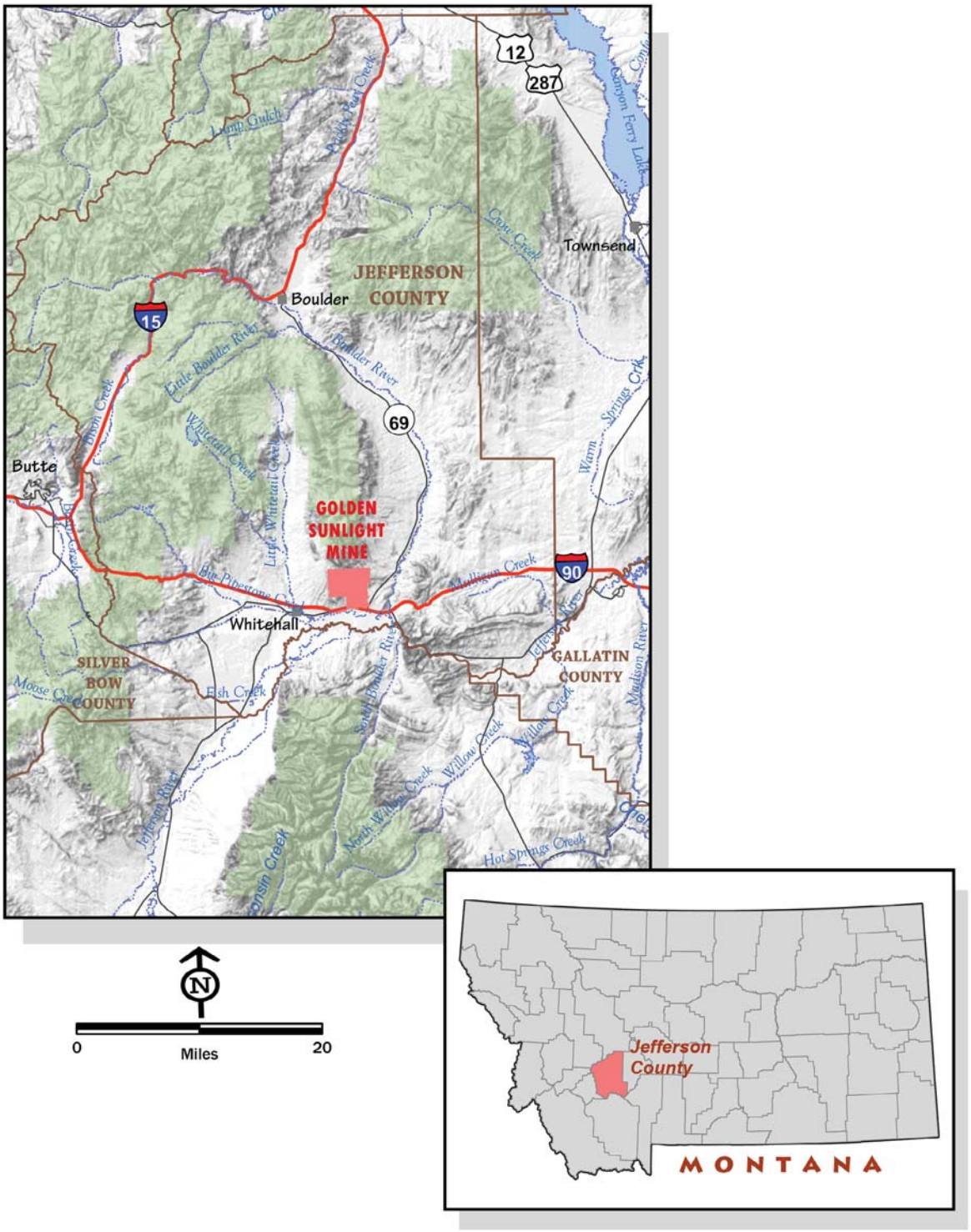


Figure 1-1
Location Map

1.3 Project Location and History

GSM currently operates an open pit gold mine in southern Jefferson County near Whitehall, MT (**Figure 1-1**). The mine has a 3,104-acre permitted disturbance boundary in a total mine permit area of 6,125 acres. GSM also has an approved Plan of Operations with the BLM.

1.4 Scope of the Document

Four alternatives are described and evaluated in detail in this EIS. Chapter 2 describes the No Action Alternative, the Proposed Action Alternative (proposed Amendment 015), the Agency-Modified Alternative, and the North Area Pit Backfill Alternative. Chapter 3 describes the existing environment that may be affected by the alternatives. Resource areas discussed in detail include: geotechnical engineering; soil, vegetation, and reclamation; water resources including surface water, groundwater, and geochemistry; wildlife including threatened and endangered species; social and economic conditions, and aesthetics. Chapter 4 describes the environmental impacts that may occur under the alternatives.

The EIS does not include alternatives to, or reconsideration of, previously approved pit reclamation actions discussed and evaluated in the 2007 Final Supplemental EIS (SEIS).

Brief summaries of the four alternatives are presented below. Detailed descriptions of the alternatives are provided in Chapter 2.

1.4.1 No Action Alternative

The No Action Alternative reflects the current operations conducted under Operating Permit 00065 (through Amendment 014), including mining of the 5B Optimization Project in the Mineral Hill Pit. The main mine facilities consist of the Mineral Hill Pit, the East Area Pit, the milling and ore processing complex, two tailings storage facilities (TSF-1 and TSF-2), and five waste rock disposal areas. The mine would continue to operate 24-hours per day, 7 days per week, through the end of 2014 or early 2015. GSM is currently approved for mining and associated facilities disturbance on 3,104 acres in a permit boundary of 6,125 acres.

1.4.2 Proposed Action Alternative

Under the Proposed Action Alternative, GSM would expand their current mining operation with the addition of one new pit called the North Area Pit, and an expansion to the existing Mineral Hill Pit known as the South Area Layback. The expansion would allow GSM to mine an additional 4.2 million tons of gold ore that would be

processed at the existing mill facility. Mining would be consistent with current mining operations using conventional open pit mining methods.

Approximately 52.6 million tons of non-ore waste rock would be generated from the proposed new mining areas and would be primarily placed in the East Waste Rock Dump Complex (EWRDC) expansion area (Section 2.3). Amendment 015 would increase the size of the permitted disturbance boundary by approximately 68.1 acres and would extend current mining operations by about two years.

1.4.3 Agency-Modified Alternative

The Agency-Modified Alternative is the same as the Proposed Action Alternative with modifications developed by DEQ to mitigate the environmental impacts from the Proposed Action Alternative. These modifications include the following:

1. The implementation of closure geodetic and ground-movement monitoring for the North Area Pit and EWRDC expansion area to ensure safe access and to keep reclamation cover systems working;

2. The preparation of a detailed bat and raptor habitat creation plan for the North Area Pit to provide habitat and add utility to the North Area Pit highwall.

1.4.4 North Area Pit Backfill Alternative

Up to 9.2 million tons of waste rock from the South Area Layback would be used to backfill the North Area Pit rather than being hauled to the EWRDC expansion area or the Buttress Dump extension area.

1.5 Agency Roles and Responsibilities

Operating Permit No. 00065 was issued on June 27, 1975. GSM has subsequently obtained fourteen amendments to Operating Permit No. 00065. These amendments are listed in **Table 1-1**. Numerous other minor revisions have been approved.

TABLE 1-1
SUMMARY OF AMENDMENTS AND REVISIONS
GSM OPERATING PERMIT 00065

Permit Amendments	Change	Date Approved
Operating Permit 00065	Permit 00065 issued.	June 27, 1975
Amendment 001	10-year Operating Plan, New Mill Support Facilities, Tailings Storage Facility-1, and Pit Stages 1, 2, and 3. Increased allowed disturbance to 1,022 acres.	April 24, 1981
Amendment 002	Utility corridor added. Increased allowed disturbance to 1,028 acres.	October 7, 1981
Amendment 003	North Dump extension. Increased allowed disturbance to 1,098 acres.	April 15, 1983
Amendment 004	South Dump added. Increased allowed disturbance to 1,218 acres.	March 14, 1984
Amendment 004A	Pumpback wells added. Increased allowed disturbance to 1,241 acres.	July 31, 1984
Amendment 005	North Dump expansion. Increased allowed disturbance to 1,370 acres.	August 14, 1987
Amendment 006	Stage III mining and sump expansion. Increased allowed disturbance to 1,749 acres.	January 12, 1989
Amendment 007	Borrow pit added. Increased allowed disturbance to 1,764 acres.	August 4, 1989
Amendment 008	Add Stages 4 & 5, add Tailings Storage Facility- 2. Increasing allowed disturbance to 2,264 acres.	July 1, 1990
Amendment 009	Interim Dump Plan.	April 1, 1997
Amendment 010	Extend active mining through Stage 5B Optimization and modify reclamation plans. Increased allowed disturbance to 2,967 acres.	July 9, 1998
Amendment 011	SEIS Record of Decision – Underground Sump Pit Dewatering, add 21 Stipulations	August 17, 2007
Amendment 012	Reconfigure East Buttress Dump and extend mining with 5B Optimization Pit. Realigned permitted disturbance boundary and increased allowed disturbance to 3,101 acres.	February 17, 2010
Amendment 013	Authorize construction of Sulfide Flotation Plant (not yet implemented). Increased allowed disturbance to 3,102 acres.	June 4, 2010
Amendment 014	Mining in East Area Pit	November 22, 2010

Table 1-2 lists the permits DEQ has issued for GSM.

TABLE 1-2 PERMITS ISSUED TO GSM	
Permit or Review Required (Statutory Reference)	**Purpose of Permit or Review**
Montana Department of Environmental Quality	
Montana Metal Mine Reclamation Act, Operating and Reclamation Plans (82-4-301, MCA) Operating Permit 00065	To allow mine development. Mining must comply with state environmental laws and regulations. Approval may include stipulations for mine operation and reclamation. A sufficient reclamation bond must be posted with the state before an operating permit or amendment is issued.
MEPA Analysis of Impacts (75-1-102, MCA)	To disclose possible impacts.
Montana Water Quality Act, Montana Pollutant Discharge Elimination System (MPDES) for Active Mine Area (75-5-101, MCA) Permit No. MTR300199	To establish effluent limits, treatment standards, and other requirements for point source discharges to state waters including groundwater for active mine areas. Discharges to waters may not violate water quality standards.
Montana Water Quality Act, MPDES for Inactive Mine Area (75-5-101, MCA) Permit No. MTR300012	To establish effluent limits, treatment standards, and other requirements for point source discharges to state waters including groundwater for inactive mine areas. Discharges to waters may not violate water quality standards.
Clean Air Act of Montana, Air Quality Permit (75-2-Parts 1-4) Air Quality Permit No. 1689-06	To control particulate emissions of more than 25 tons per year.

1.6 Public Participation

DEQ published a legal notice in the Butte *Montana Standard* and *Whitehall Ledger* newspapers on March 31, 2013, and April 7, 2013, and issued a press release on April 1, 2013. The scoping meeting was held on April 10, 2013, at the Whitehall Community Center in Whitehall, Montana. 140 people signed in to the scoping meeting; attendees included a Jefferson County Commissioner (Leonard Wortman), the Mayor of Whitehall (Mary Janacaro Hensleigh), GSM employees, and the interested public. The legal notice and press release requested scoping comments be sent to DEQ by May 6, 2013. DEQ received 118 written comments submitted at the scoping meeting, by regular mail, or by electronic mail.

The 30-day comment period on the draft EIS started September 17, 2013 and ended October 17, 2013. During that period, DEQ received comments at the public meeting, by regular mail, and by electronic mail. Chapter 9 presents a compilation of comments and responses.

1.7 Issues of Concern

There were no adverse issues of concern raised by the public during scoping for the proposed GSM Amendment 015 expansion. The 118 comments were in support of the mine expansion and continued mining by GSM and included general comments about (1) socio-economic benefits, (2) company environmental stewardship, (3) safety, (4) only minor changes for this amendment, and (5) to not delay the approval timeline. There were 10 comments that contained specific technical aspects about GSM or the Proposed Action Alternative and they are described in the Scoping Report (Tetra Tech 2013).

The issues of concern identified by DEQ while preparing the EIS and agency modifications to the Proposed Action Alternative are listed below.

Geotechnical Engineering

Geodetic and ground-movement monitoring

The reclamation plan must provide sufficient measures for reclamation of open pits and rock faces to a condition of stability structurally competent to withstand geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

Geodetic and ground-movement monitoring of the EWRDC expansion area may be needed to identify ground-movement in the EWRDC expansion area after reclamation. Additional monitoring would help ensure the reclamation covers on the EWRDC expansion area are maintained to minimize infiltration into the acidic waste rock.

Water Resources

With regard to open pits and rock faces, the reclamation plan must provide sufficient measures for reclamation to a condition that mitigates or prevents undesirable offsite environmental impacts, including those to water resources. In addition, the reclamation plan must provide measures that prevent objectionable post-mining ground water discharges.

Capture and routing of North Area Pit surface water runoff and groundwater during mine operation and post-closure

Concerns were expressed regarding the uncertainty of the groundwater flow paths from the North Area Pit toward the Mineral Hill Pit. GSM described the potential quality and quantity of groundwater to be intercepted and captured by the North Area

Pit operational dewatering system and how that dewatering may affect groundwater that reports to the Mineral Hill Pit (GSM 2012b). GSM would divert surface water runoff around the North Area Pit. GSM would install dewatering wells to lower the water table to allow mining. Any water that collects in the pit during operations would be managed as needed to allow continued mining.

After mine closure, the dewatering wells would continue to dewater the North Area Pit. Precipitation, snowmelt, and groundwater seeps could collect in the bottom of the pit during closure. The water that collects in the pit could be contaminated by exposure to acid-generating rock. This post-mining pit water would either evaporate or infiltrate into fractures and report to the groundwater flow paths.

The methods for collecting and transporting the North Area Pit surface water and groundwater would include dewatering wells, an internal sump, and a pipe delivery system.

Mining-related seeps in the EWRDC expansion area could be contaminated with metals and be acidic and cause surface water and groundwater contamination. GSM is required to monitor for seeps associated with the EWRDC expansion area. Additional seep collection ponds and interception wells may be needed downgradient of the EWRDC expansion area to capture groundwater that has contacted mine waste rock.

Pit Backfill

Under the MMRA, the use of backfilling as a reclamation measure is neither required nor prohibited in all cases. Rather, a DEQ decision to require backfill must be based on whether and to what extent the backfilling is appropriate under the site-specific circumstances and conditions. In the permitting action that culminated in the issuance of a Record of Decision in August of 2007, DEQ considered in detail two alternatives that provided for backfill of the Mineral Hill Pit. DEQ determined that the backfill alternatives did not provide adequate protection of groundwater and surface water resources and, therefore, did not select either of the alternatives providing for backfill of the pit. The proposed South Area Layback to the Mineral Hill Pit does not change any of the environmental analysis regarding pit backfill that was relied on by DEQ in 2007. Therefore, backfill of the Mineral Hill Pit, including the proposed South Area Layback, is not an issue needing detailed analysis in this EIS.

While the North Area Pit is in close proximity to the Mineral Hill Pit, its size, pit configuration, hydrology, and other conditions may be materially different than the Mineral Hill Pit. Thus, an independent analysis is required to determine whether backfill should be required based on site-specific circumstances and conditions presented by the proposed North Area Pit.

Social and Economic Considerations

Beneficial impacts were expressed regarding good-paying jobs provided by GSM. GSM is an important part of the community and two more years of mine operations would benefit the GSM employees and the multiple contractors, suppliers, and vendors. GSM provides tax revenue to Jefferson County and the State tax base that benefits the area, state, and schools.

Soils, Vegetation, and Reclamation

Prior to mining, soils on the site were inventoried for their suitability for reclamation. The estimated volume of soil was not sufficient to meet all reclamation needs. GSM identified sources of borrow material to supplement the soil for reclamation. While the borrow material has a high coarse-fragment content and is not as fertile as the naturally developed soils, it has been used to successfully reclaim disturbances at the mine.

GSM did not propose to salvage a geologic layer containing fine-grained lake bed sediments in the North Area Pit. These materials may be suitable to supplement available growth media sources for use on level areas such as the TSF-2 surface. Lake bed sediments typically require the use of organic amendments to limit crusting of the growth media surface and to enhance successful establishment of vegetation.

Successful long-term revegetation would be impacted by an increase of invasive non-native species. Weed species are aggressive and fast-growing and could out-compete the reseeded native grasses for nutrients and available moisture. GSM has a noxious weed control program but the disturbance of additional acres would increase the risk of more weeds. Reclamation using predominantly native species would reduce impacts to vegetation and reclamation but impacts would potentially increase and therefore this issue has been carried forward.

Wildlife

With regard to open pits and rock faces, the reclamation plan must provide sufficient measures for reclamation to a condition that affords some utility to humans or the environment.

Aesthetics

The reclamation plan must provide sufficient measures for reclamation of open pits and rock faces to a condition that mitigates or prevents post-reclamation visual contrasts between reclaimed lands and adjacent lands.

1.8 Issues Considered but Not Studied in Detail

Through an Interdisciplinary Team (IDT) review, it was determined that a number of resource areas and associated issues would not be affected or would be minimally affected and therefore would not be discussed further in the EIS. The resource areas and rationale for the determination are:

Air Quality

GSM currently operates under Air Quality Permit No. 1689-06. There would not be significant changes to air quality under Amendment 015 as there would be similar rates of mining and milling and no new emission sources. This issue has not been carried forward in the analysis.

Fisheries and Aquatics

No concerns were expressed about impacts to fisheries and aquatic resources. There is no fish habitat in the permitted disturbance boundary and any water discharged offsite would be treated to meet state water quality standards. This issue has not been carried forward in the analysis.

Noise

GSM is in a mountainous, rural environment. The mine has been operating since 1975 and is the main source of noise in the area. Noise sources associated with the open pit mining and milling activities include drilling, blasting, loading, hauling, and ore processing. Noise is primarily from heavy equipment (haul trucks, shovels, front end loaders, rotary drills, bulldozers, graders, dump trucks, and other vehicles) and by ore processing equipment (crushers, rod and ball mills, circuit equipment, and other machinery) that is primarily inside the mill processing buildings.

The nearest community to GSM is Whitehall, Montana about 5 miles from the permitted disturbance boundary. Noise impacts are not expected to change as a result of the mine expansion and this issue has not been carried forward in the analysis.

Cultural and Paleontological Resources

Cultural resource studies were completed for the mine area in 1994 (Peterson et al. 1994), 1996 (Peterson 1996), and 2012 (Garcia and Associates [GANDA] 2012a). No cultural resources were documented in the North Area Pit and one historic mine road was inventoried for the South Area Layback area. A 1985 survey (Herbort 1985)

identified three cultural resource sites in the EWRDC and EWRDC expansion area but the sites are located away from the Proposed Action Alternative disturbance areas.

No paleontological resources have been found in more than 38 years of mining. The possibility of finding a paleontological resource in the increased disturbance area for the North Area Pit and South Area Layback is low. Cultural and paleontological resource issues have not been carried forward in the analysis. Mitigation measure P-1 on page 376 of the November 1997 Draft EIS would apply to any previously undocumented paleontological resources.

Transportation

Transportation impacts are not expected to change and have not been carried forward in the analysis. The Montana Department of Transportation (MDT) provided a comment during scoping stating they do not expect any changes to the present operation on MDT routes because extending the life of the mine does not increase the number of employees or change the present operation.

Wetlands and Waters of the U.S.

No concerns were expressed regarding impacts to wetlands and Waters of the U.S. GSM has purchased some land surrounding the mine to mitigate for riparian and wildlife habitat lost during mining. No wetlands would be disturbed by the proposed disturbances. The Candlestick Ranch has some areas that provide year-round water and cover for wildlife. These mitigation areas are routinely inspected by GSM personnel. Two sites on the ranch have perennial spring flows and evidence of wildlife use by deer, elk, and turkey. This issue has not been carried forward in the analysis.

Areas of Critical Environmental Concern

No BLM areas of critical environmental concern would be affected by any of the alternatives.

Prime or Unique Farmlands

No prime or unique farmlands would be affected by any of the alternatives.

Wild and Scenic Rivers

No wild and scenic rivers would be affected by any of the alternatives.

Wilderness

No wilderness, wilderness study, or inventoried roadless areas would be affected by any of the alternatives.

Water Rights

GSM uses water from the Jefferson River for a potable water supply. The EIS evaluates impacts on water quantity for all alternatives. Water rights holders would have to pursue action in water rights courts over any unavoidable impacts to water rights. There would be no increased use of potable or other water sources and therefore no new impact on water rights holders so this issue has not been carried forward in the analysis.

Safety

GSM is regulated by the Mine Safety and Health Administration (MSHA). This issue has not been carried forward in the analysis as it is outside the scope of the EIS.

Description of Alternatives

2.1 Introduction

The No Action Alternative reflects the status quo and serves as a benchmark against which the Proposed Action Alternative and other alternatives can be evaluated. For this analysis, the No Action Alternative is GSM's Operating Permit 00065 and the previously approved amendments (through Amendment 014), including mining of the Stage 5B Optimization Project and approved waste rock dump designs. The Proposed Action Alternative is the proposed expansion of GSM's mining operations set forth in its Application for Amendment 015 to Operating Permit No. 00065. MEPA requires the evaluation of reasonable alternatives to the Proposed Action. Reasonable MEPA alternatives are those that are achievable under current technology and that are economically feasible. The Agency-Modified Alternative includes mitigation measures addressing specific technical issues that the IDT considered relevant to mitigating environmental impacts from the Proposed Action Alternative. The Agency also considered a North Area Pit Backfill Alternative.

Alternatives considered but eliminated from further study are discussed in Section 2.6.

2.2 No Action Alternative

GSM's Operating Permit No. 00065 was issued by the Department of State Lands, now DEQ, on June 27, 1975. Operating Permit No. 000165 has been modified a number of times since then, including major amendments allowing expansion. The most recent modification, Amendment 14, was approved in November of 2010. The No Action Alternative consists of the current approved operating plan, including all previously approved major and minor amendments and revisions through Amendment 014.

The main mine facilities (**Figure 2-1**) include the Mineral Hill Pit, milling and ore processing complex, two tailings storage facilities (one active and one decommissioned), and five rock disposal areas located east, west, and south of the Mineral Hill Pit. Mine support facilities include maintenance shops, an assay lab, fuel bays, a blasting contractor facility, administration buildings, and other infrastructure such as roads, water tanks, and power lines.

GSM uses conventional open pit mining methods consisting of drilling, blasting, loading, and hauling the waste rock and ore. The mine operates 22 hours per day, 7 days per week, with a 10-hour day shift and a 12-hour night shift. The mill operates 24-hours per day, 7 days per week on 12-hour shifts.

2.2.1 Permitted Disturbance Boundary and Disturbances

GSM is currently approved for mining and associated facilities disturbance on 3,104 acres in a permit boundary of 6,125 acres. As of December 31, 2012 (GSM 2013), the actual disturbed area was 2,399 acres. **Table 2-1** summarizes the disturbed acres by the main mining areas and facilities and **Figure 2-1** shows the permit and disturbance area boundaries.

Current mining activities are primarily associated with the Mineral Hill Pit Stage 5B Optimization Project.

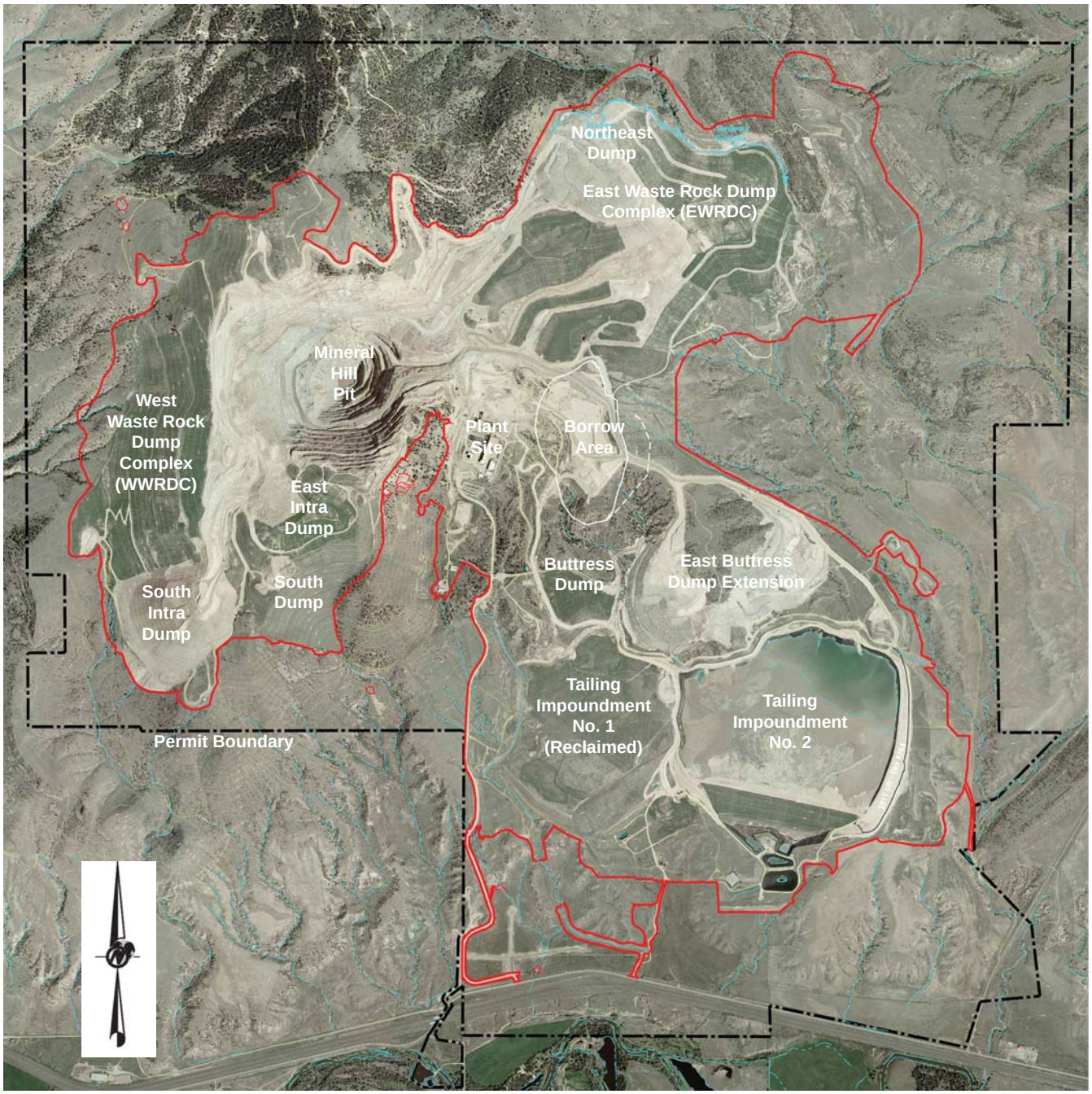
TABLE 2-1
GSM APPROVED DISTURBANCE AREAS (AS OF DECEMBER 31, 2012)

Facility	Approved Disturbance Acres
Mineral Hill Open Pit	336
East Area Pit	30
East Waste Rock Dump Complex	683
West Waste Rock Dump Complex	627
Buttress Dump Complex	327
Tailings Impoundments	865
Facilities	35
Stockpiles, Borrow Areas, Roads, and Misc.	201
TOTAL	3,104

2.2.2 Mining Method and Pit Description

Mining in the Mineral Hill Pit began in 1982 and will continue through 2015 under the currently approved operating permit. Mining has been completed through pit Stages 1 to 5B while current mining is occurring under the Stage 5B Optimization Project. GSM developed two phases of underground mining in 2002 with portals in the open pit. GSM would mine over 400 million tons of ore and waste rock from the 336-acre Mineral Hill Pit. The ultimate pit floor elevation would be 4,400 feet (all elevations are in reference to GSM datum, which is 91.4 feet higher than North American Vertical Datum of 1988 (NAVD88).

The current Stage 5B Optimization Project was approved in 2008. Slope instability issues were addressed by reducing slope angles, modifying bench heights and widths, controlling blasting techniques, installing horizontal drain holes, and continuing automated monitoring. Approximately 10 million tons of ore would be extracted from the Stage 5B Optimization Project pit over the 5-year mine life.



SCALE: 1" = 4,000 Feet

LEGEND

- Permit Boundary (July 2012)
- Permitted Disturbance Boundary (November 2012)
- Drainages

Source: Golden Sunlight Mine 2012a

Figure 2-1
No Action Alternative - Mine Facilities, Permitted Disturbance Boundary, and Permit Boundary

2.2.3 Ore Processing

Gold is extracted from the ore using physical and chemical processes as shown on the generalized ore processing diagram (**Figure 2-2**). Ore is crushed using a primary, secondary, and tertiary crushing circuit. Modifications to the standard crushing circuit have been used at times to improve gold recovery. The crushing circuit reduces the ore particles to less than 3/4-inch. Wet grinding in rod and ball mills further reduces the particles to approximately 150 microns or about 0.0058 inch. The finely ground ore is thickened; pumped through carbon columns; mixed with sodium cyanide, lime, and compressed air; leached, and processed through carbon for the absorption of the gold. The gold is removed from the carbon, returned to solution for electrowinning onto steel wool cathodes, smelted, and poured into bars that assay about 75 percent gold, 8 percent silver, and 17 percent other metal impurities. Typically, approximately 7,000 tons of ore can be processed per day.

After the gold is recovered from the ore, the cyanide concentration in the tailings slurry is greater than 200 milligrams per liter (mg/L). GSM built a sulfur dioxide (SO_2)/air cyanide destruction plant in 1998 that normally reduces the cyanide concentration in the tailings to less than 5 mg/L (equivalent to 5 parts per million [ppm]). The final treated tailings slurry is transported to the tailings storage facility (TSF-2).

Water for ore processing is pumped from the Jefferson Slough but the mill also uses reclaimed water pumped from the tailings impoundment. Surface water is used because groundwater of suitable quantity is not available.

2.2.4 Water Resources

Water management primarily involves pit dewatering, storm water and sediment control, tailings impoundment water, and managing water after mine closure. These key areas of water resources management are discussed below.

2.2.4.1 Pit Dewatering

One main aspect of water management is controlling the accumulation of precipitation and groundwater in the Mineral Hill Pit. Water is removed from the pit (pit dewatering) to avoid accumulation of water in active mining areas and to reduce pore pressures in the open pit highwalls. Since July 2002, a combination of wells in the pit bottom and wells in the underground workings have been used. The pit inflows are collected and temporarily stored in the underground mine workings.

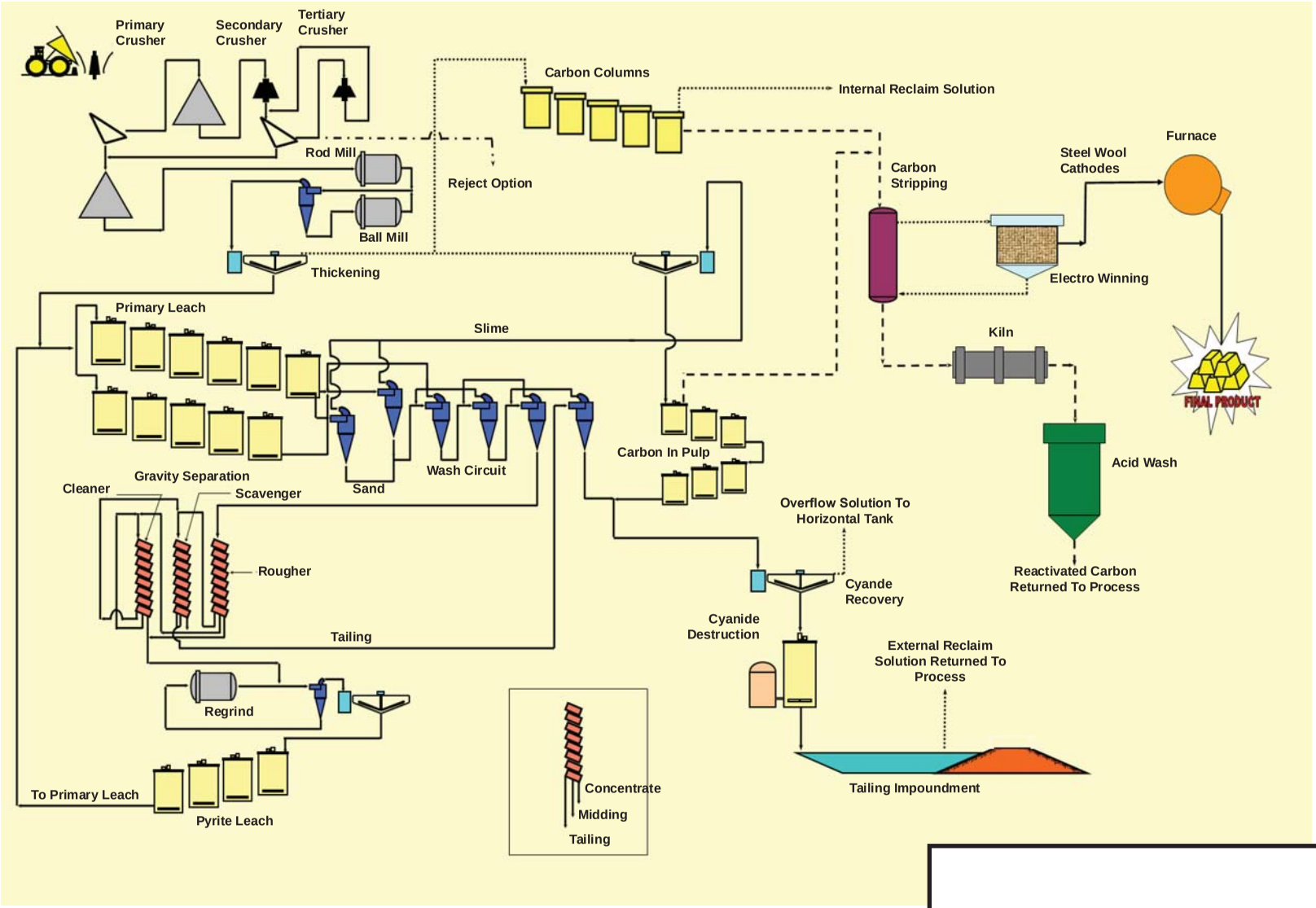


Figure 2-2
Generalized Ore Processing Diagram

Source: Golden Sunlight Mine

Storm water within the pit drains to the underground workings through holes drilled in the bottom of the pit. Water is pumped from the underground workings to consecutive booster stations at 4,700 feet, 4,850 feet, and 5,000 feet through high-density polyethylene (HDPE) lines. Finally, the water is pumped out of the pit at the 5,000-foot bench booster station to a lined holding pond below the mill. The underground workings can store more than four million gallons of water before there is accumulation in the pit bottom. Up to 15.8 million gallons of water have been pumped out of the pit annually. Water from the lined holding pond is routed to the water treatment plant in the mill building.

2.2.4.2 Storm Water Management and Sediment Control

Storm water discharges are covered under General Permit MTR300199. Site storm water routing utilizes sumps and conveyances to collect and divert storm water into natural drainages for discharge. Additional best management practices are used in the drainages to control velocity and sedimentation transport. Storm water sampling locations are established in these drainages near the mine's permit boundaries. All regulated process waters or mine drainage not discharged to natural drainages are contained on site and managed using diversion ditches, capture systems, treatment systems, infiltration, land application, and reuse. Mine drainage waters are infiltrated to groundwater in internal drainage areas or diverted to the tailings impoundment and do not discharge from the permit boundary.

2.2.4.3 Tailings Impoundment Waters

GSM has evaluated the quantity of water from mine sources requiring treatment once mining has ceased. The mine sources include water drainage collected from the TSF-1 pumpback system and the dewatering of TSF-2. The estimated quantity of water to capture and treat from TSF-1 was estimated at 200 gpm but recent observed flows have been lower than 200 gpm and continue to decline. A volume of 25 gpm was estimated to be collected and treated for TSF-2 which includes 15 gpm of ambient groundwater flux from the Bozeman group. An estimated 225 gpm of groundwater from the tailings impoundments would be captured and treated at the water treatment plant after mining.

2.2.4.4 Water Management after Closure

After closure, mine waters would be treated using a standard lime treatment plant below TSF-2. The 1998 ROD approved the mine water treatment plant with a design capacity of 392 gallons per minute (gpm) which includes an estimated 65 gpm from the dewatering of the Mineral Hill Pit. The water treatment plant would dispose of the treated water in a percolation pond below TSF-2.

2.2.5 Tailings Storage Facilities

The mine has two tailings storage facilities, TSF-1 and TSF-2. Construction of these facilities disturbed approximately 865 acres. Approximately 271 acres associated with TSF-1 have been reclaimed. GSM deposited tailings in TSF-1 from 1983 to 1995 and in TSF-2 since 1993. TSF-1 contains approximately 27 million tons of tailings. The design capacity for TSF-2 with a tailings dam elevation of 4,770 feet is approximately 42 million tons.

GSM's tailings embankment design uses centerline construction techniques; initial construction includes a toe dike and a starter embankment using compacted, homogeneous, granular fill. The fill is taken from borrow areas in the permit boundary or from the floor of the impoundment.

Since operations ceased at the unlined TSF-1 in 1995, the facility has undergone tailings dewatering, consolidation, and final reclamation. Dewatering from TSF-1 has reached an equilibrium drainage rate of 8 to 23 gpm (Telesto 2007) which continues today (GSM 2013). Surface reclamation was completed and the reclamation bond for the regrading, soil covering, and reseeding was released. Downgradient leakage from TSF-1 was first noted in 1983 beyond the bentonite cut-off wall. GSM completed several corrective actions including installing a series of downgradient pump-back wells, installing a series of upgradient capture wells, and implementing a monitoring system.

Due to issues with TSF-1, GSM developed several new design features to improve the environmental performance of TSF-2 and the tailings delivery system. Improvements to the tailings pipeline included use of double-lined HDPE pipe with leak detection. New design features for TSF-2 were the use of a 60-mil HDPE geomembrane liner over the compacted soil material under the TSF-2 basin and a system of designed drains in the impoundment to convey water from the overlying tailings to the reclaim water basins. Changes to the TSF-2 drainage system were intended to minimize uncontrolled leakage from TSF-2 and to improve the drainage of the tailings water after closure. The ultimate crest elevation of the TSF-2 embankment under the Stage 5B Pit Optimization Project (current plan) is 4,750 feet.

2.2.6 Waste Rock Storage Areas

Waste rock is extracted from the Mineral Hill Pit and is currently hauled to one of three waste rock dump complexes for disposal. The waste rock dump complexes are the EWRDC, the West Waste Rock Dump Complex (WWRDC), and the Buttress Dump Complex/East Buttress extension (**Figure 2-2**). The disturbed areas and volumes of waste rock for these disposal areas are shown in **Table 2-2**. The permitted disturbance area for each waste rock dump complex includes a buffer zone that extends 100 to 300

feet from the dump toe. Buffer zones are typically used for access roads, sediment ponds, temporary laydown areas, boneyards, staging and equipment storage areas, soil stockpiles, retention berms, monitoring wells, and borrow areas. Waste rock dump slopes would be regraded to slopes ranging from two feet horizontal to one foot vertical (2H:1V) to three feet horizontal to one foot vertical (3H:1V) prior to covering with growth media and final reclamation. Where practical, reclamation regrading incorporates a "natural regrade" hybrid design.

TABLE 2-2
DISTURBED AREAS AND PERMITTED VOLUMES FOR WASTE ROCK DUMPS

Waste Rock Dump	Acres	Million Tons
East Waste Rock Dump Complex	683	174
West Waste Rock Dump Complex	627	265
Buttress Dump Complex and East Buttress Extension	327	45
Total	1,637	484

The EWRDC facility is permitted to hold up to 174 million tons of waste rock and has a permitted disturbance area, including buffer zones, of 683 acres. Maximum elevation would be approximately 5,850 feet.

The WWRDC is permitted to hold up to 265 million tons of waste rock with a permitted disturbance, including buffer zones, of 627 acres. The WWRDC was reclaimed (including resloping, soil cover installation, and seeding), but some of the reclaimed area was redisturbed for disposal of approximately 42 million tons of additional waste rock from the 5B Optimization Project.

The Buttress Dump Complex and East Buttress Dump extensions are permitted to hold up to 45 million tons of waste rock in a permitted disturbance area, including buffer zones, of 327 acres. The original Buttress Dump, constructed in 1994 and 1995, is a 66-acre dump containing approximately 3 million tons of waste rock. The original dump was placed at the toe of the Rattlesnake ground-movement block to aid in stabilizing the ground movement. This dump is completely reclaimed. The East Buttress Dump extension is 144 acres.

Most of the waste rock could generate acid when exposed to air and water. GSM monitors reclaimed areas and evaluates vegetation establishment and erosion after reseeding. Unsuccessful revegetated areas that exceed 0.5 contiguous acres are investigated to determine if underlying acid-generating material may be affecting plant growth in the reclamation soil material. GSM is required to notify DEQ when a suspect area is identified.

2.2.7 Haul Roads and Access Roads

Main haul roads connect the Mineral Hill Pit to the EWRDC, WWRDC, and Buttress Dump Complex, and to the crusher and maintenance shops. Haul roads are approximately 100 feet wide and have berms along the sides for safety. Haul roads in the lower part of the Mineral Hill Pit are about 40 feet wide. As of December 31, 2012, about 28 acres of road disturbances are included in the permitted disturbance boundary.

In addition to haul roads, the entire mine site contains an extensive system of access roads to mine facilities. Access roads are typically 20 feet wide with a berm on each side. Access roads to remote areas of the mine site are typically unimproved and are two wheel tracks.

The main access road would remain at closure and currently meets county road specifications.

2.2.8 Topography after Mining

GSM would use a natural regrade design for regrading slopes, where possible, to create an aesthetically pleasing, natural, and stable landform. Natural regrade design techniques would be used for many slopes in the EWRDC and WWRDC areas. Previously reclaimed areas would remain in their completed configuration. Previously regraded slopes incorporated diversion benches and dozer divots and were regraded to between 2H:1V and 3H:1V slopes.

Final slope configurations for the upper lift of the EWRDC are intended to blend with the adjacent undisturbed hill slope north of the dump. The EWRDC upper lift would block a portion of the view of the Mineral Hill Pit from the northeast. The final EWRDC topography would divert surface water runoff around the mine disturbance area and increase stability of the Sunlight Block and Midas Slump by moving material farther from these features.

Existing slopes on the WWRDC were reduced to 2H:1V after erosion and access benches constructed every 200 vertical feet along the dump slopes. New WWRDC slopes would be regraded using some aspects of the natural regrade design to produce an overall slope of approximately 2.3H:1V.

The existing Buttress Dump Complex slopes have been substantially reclaimed with slopes of 3H:1V. Newer areas of the East Buttress Dump extension would be reclaimed using natural regrade design techniques with overall slopes of about 2.5H:1V. Regrading would not be required for support areas and buffer areas. These areas

would be ripped prior to soil capping and reseeding to provide suitable planting conditions. Pit reclamation for the Mineral Hill Pit was approved in August of 2007. No backfill is to be placed in the Mineral Hill Pit. A groundwater dewatering system would be designed and constructed at closure to maintain the groundwater level below the final 4,525 –foot pit bottom elevation. The dewatering system would use the underground mine workings as a sump. Water collected in the sump would be pumped to the water treatment plant.

Under the permit amendment approved after a review in the 2007 SEIS, approximately 37 acres in the pit will be treated to the following measures, if the work can be done safely, to comply with MMRA 82-4-336 (9) (b) (iii):

1. End dumping and/or cast blasting will occur along the upper portion of the northwest and west highwalls, and these areas will be soiled, seeded, and planted with trees;

2. Dozer work will be completed on the area of the west highwall that sloughed in 2005 or a replacement area approved by DEQ, and this area will be soiled, seeded, and planted with trees;

3. Soil sampling on the old slide area on the northwest highwall will be completed, and this area will be seeded and planted with trees;

4. Soil will be placed on the highwall bench above the 5,700-foot safety bench, and the area will be seeded and planted with trees, if it is safe to do so;

5. Trees will be planted where possible on the 5,700- and 5,400-foot safety benches.

Permit stipulations in place prior to the 2007 approval require GSM to construct nesting cavities for raptors and bats in the highwalls reclaimed as rock faces in the Mineral Hill Pit.

Approval of Minor Revision (MR) 07-007 on February 5, 2008 changed the pit reclamation requirements to comply with MMRA 82-4-336 (9) (b) (iii). The modified west wall of the pit approved in MR07-007 included reclaiming the upper portion of the west pit highwall which intercepted the WWRDC.

2.2.9 Revegetation

Operating Permit No. 00065 requires reclamation of lands disturbed by GSM, except the rock faces of the Mineral Hill Pit, to comparable stability and utility as that of adjacent undisturbed areas. The approved post-mining land uses include grazing and wildlife habitat. As of December 31, 2012, GSM has revegetated (regraded, covered with soil and/or growth media, and reseeded) approximately 1,178 mined acres. Reclamation seed mixtures have been developed for various slope configurations. Most of the reclaimed areas have successfully reestablished a grassland vegetation cover. Some plantings of shrubs in the revegetated grasslands have partially survived. The only shrubs established successfully from the seed mix have been fourwing saltbush and rubber rabbitbrush. Fourwing saltbush has subsequently died out in most areas and has not reproduced from self-seeding.

The rocky and well-drained soils used for reclamation minimize soil erosion and sedimentation from the reclaimed areas during the initial establishment periods. Specific erosion control procedures are listed in the reclamation plan. Noxious weed infestations are monitored through field reconnaissance and controlled using standard practices that are summarized in each annual report to the agencies.

2.2.10 Operational and Post-Closure Monitoring and Control Programs

GSM currently has approved operational monitoring plans described in the 2010 Operating and Reclamation Plan (SPSI 2010) for (1) Water Quality and Quantity, (2) Ground-Movement/Geodetic, (3) Waste Rock Steam Vents, and (4) Revegetation (including Reclamation Test Plots). GSM currently monitors the mine for soil erosion, waste rock geochemistry, noxious weeds, and wildlife.

Post-closure, GSM would continue monitoring the soil, vegetation, water, air, and wildlife resources. GSM would develop and implement a remote monitoring system for pit dewatering components including pumps, pipelines, powerlines, and other components to ensure water is captured efficiently. Final design specifics of the remote monitoring program would be submitted to the agencies for approval.

Long-term mine water monitoring would include impacts on springs from long-term pit dewatering. Post-closure storm water monitoring would be designed to have minimal maintenance and repair but would require long-term, routine sediment removal. Post reclamation monitoring would consist of inspections and maintenance of runoff and sediment control structures across the mine site.

Water quality management would continue after mining until all water management facilities are reclaimed and regulatory requirements are met. Pumping rates from the

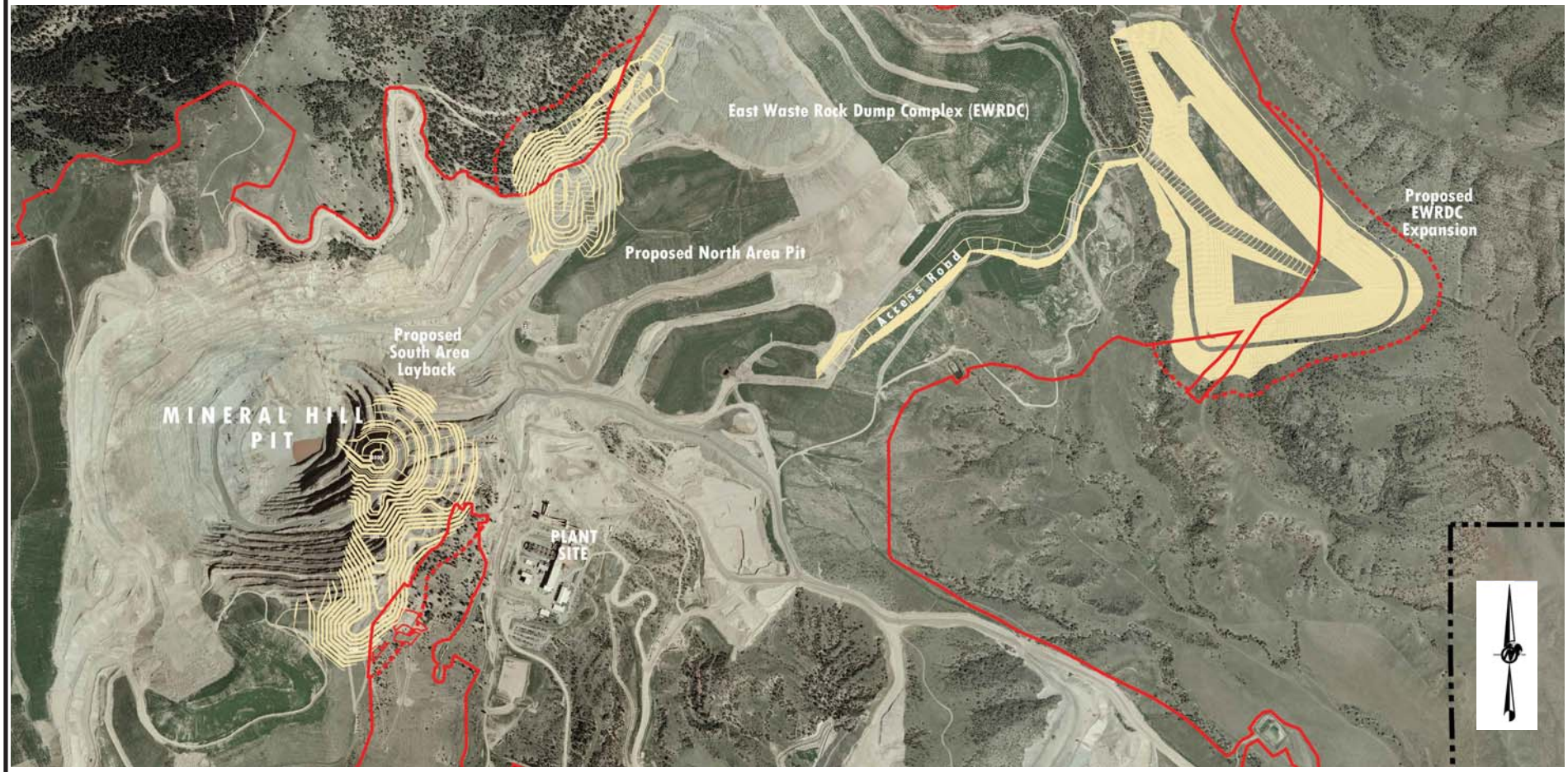
pumpback wells would be recorded monthly and reviewed annually to determine long-term trends in dewatering and seepage capture. With agency concurrence, the locations and frequency of long-term monitoring may be reduced as the facilities are reclaimed. Specific post-closure water resources monitoring requirements would be determined by GSM and the agencies at the end of mining.

Monitoring, data analysis, and annual reporting would continue after mine closure and after reclamation. Post-mine reclamation success would be determined by measuring revegetation canopy cover, erosion rates, stability of reclamation covers, and soil chemistry. Revegetation cover success would be evaluated through comparisons with undisturbed reference areas. Erosion rates and ground stability would be evaluated by visual observation and in comparison with reference areas. Soil geochemistry would be evaluated by sampling and analysis. Reclaimed areas that do not achieve a level comparable to the native reference areas would be fertilized, reseeded, or have additional soil applied, depending on site-specific conditions. All reclaimed surfaces would be inspected annually and checked for vegetative cover, acid seepage development, and noxious weeds.

GSM would monitor reclamation success for the pit highwalls through visual observations for raveling, sloughing, erosion, and noxious weeds. Where safe to access with appropriate equipment, rock that has raveled or sloughed on revegetated areas would be removed or covered with new soil and reseeded. Additional soil placement and reseeding would be done in areas that have settled or had soil eroded and are safe to access. Where safe to access, noxious weeds would be controlled. GSM would conduct annual post-reclamation monitoring until GSM and the agencies agree the reclamation cover would be stable over the long term. GSM anticipates the frequency of reclamation monitoring would be reduced in three to five years after final revegetation. GSM would then develop a revised monitoring plan.

2.3 Proposed Action Alternative

In its application for Amendment 015, GSM proposes to expand its mining operations by extracting ore at a new North Area Pit and at an expansion of the Mineral Hill Pit known as the South Area Layback (**Figure 2-3**). The mine expansions would allow GSM to mine approximately 4.2 million tons of additional ore, to be processed at the existing mill. Mining at the North Area Pit and the South Area Layback would generate up to 52.6 million tons of waste rock. All proposed facilities are on land owned by GSM.



LEGEND

- Permit Disturbance Boundary February 2010
- Proposed Permitted Disturbance Boundary
- Permit Boundary July 2012

SCALE: 1" = 1,000 Feet

Figure 2-3
Proposed Action Alternative Features

Source: Golden Sunlight Mine 2012a

The North Area Pit would extend below the natural water table so dewatering would be necessary. A dewatering program is proposed for the North Area Pit through installation of dewatering wells peripheral to the pit, or by drilling horizontal holes into the pit highwalls to drain trapped water (Schlumberger Water Services [SWS] 2011). Any surface water runoff and precipitation along with water collected from pit highwall dewatering wells would be removed from the pit by pumping the water through a series of staging tanks to a common pit sump and then transferred to the tailings storage facility where would be used as process water.

Like the current dewatering of the Mineral Hill Pit, the water would be used in the milling process to offset fresh water use during operations.

As an expansion of the Mineral Hill Pit, the South Area Layback area would naturally drain into the Mineral Hill Pit so operational and closure dewatering in the Mineral Hill Pit would handle this water. After mining and milling is completed, the captured water from the North Area Pit dewatering wells and the Mineral Hill Pit underground sump would be pumped to a water treatment plant.

Up to 48.6 million tons of acid-producing waste rock from the North Area Pit and South Area Layback areas would be placed in the EWRDC expansion area (**Figure 2-3**). Up to 6 million tons of waste rock could also be placed in the Buttress Dump extension. Approximately 4 million tons of non-acid generating waste rock from the Bozeman Group/Landslide Debris material excavated from the east wall of the North Area Pit would be stockpiled and used for reclamation growth media materials. GSM would not salvage some fine-grained lake bed sediments in the east wall of the North Area Pit.

Mining activity at the North Area Pit and South Area Layback would be completed in late 2016 or early 2017. The proposed amendment would extend the mine life by approximately two years beyond the current operating permit. GSM also processes off-site ore in their mill, mostly from legacy mining materials in southwest Montana. The proposed amendment would facilitate an additional two years of processing these legacy materials, depending on gold prices and grade of the materials.

2.3.1 Permitted Disturbance Boundary and Disturbances

Table 2-3 lists the proposed disturbances for the Proposed Action Alternative mine components. The operating permit boundary would not change. The total proposed disturbance for all Amendment 015 components would be 302.9[1] acres (215.5 acres in the current permitted disturbance boundary and 87.4 acres in the expanded permitted disturbance boundary). The current approved size of the permitted disturbance boundary is 3,104 acres. This would increase to 3,191.9 acres for the Proposed Action Alternative.

TABLE 2-3
PROPOSED ACTION ALTERNATIVE DISTURBANCE ACRES

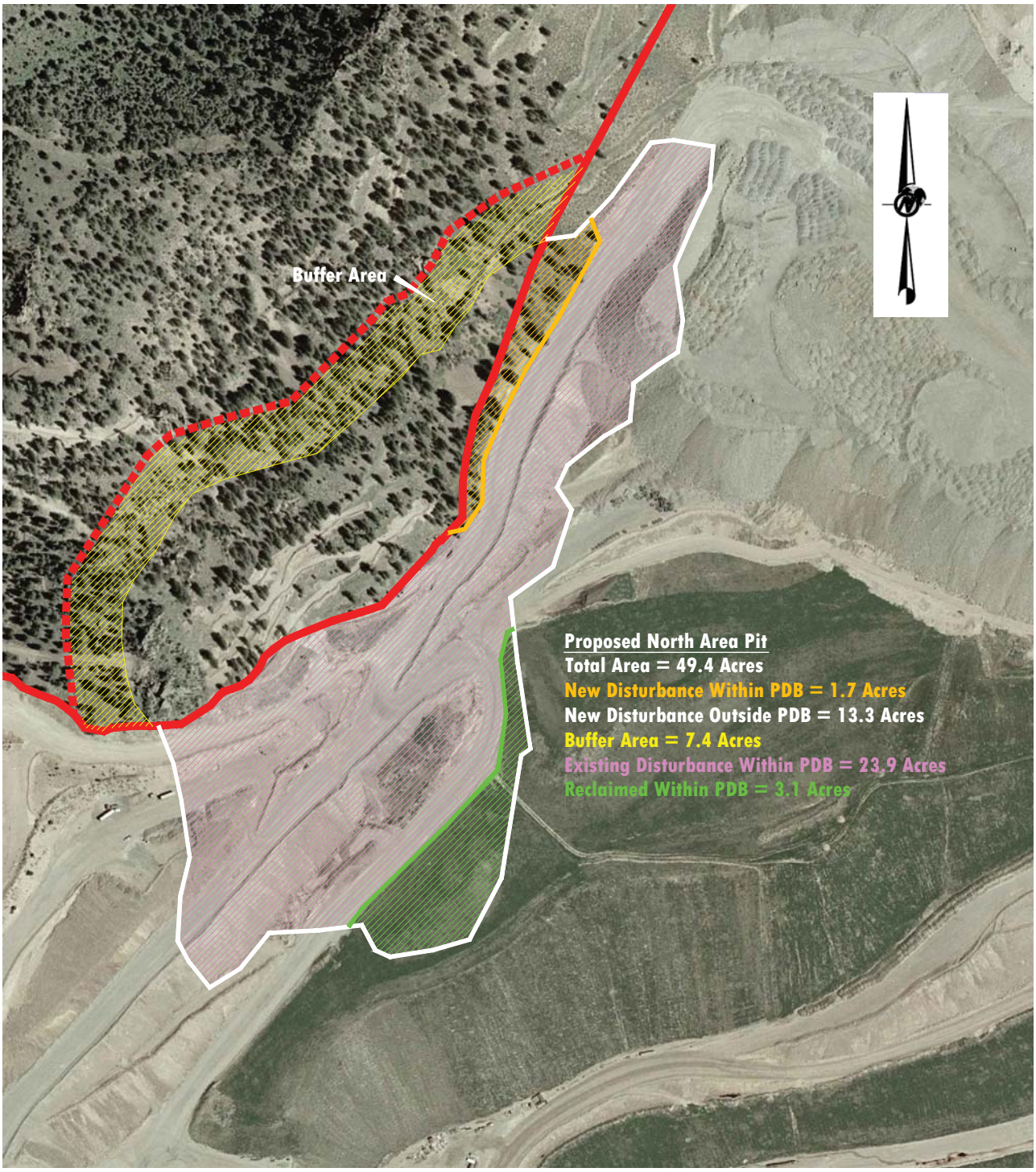
Mine Component	New Disturbance in Permitted Disturbance Boundary	New Disturbance Outside Permitted Disturbance Boundary	Buffer Area	Existing Disturbance in Permitted Disturbance Boundary	Disturbed Reclaimed Areas	Total Acres
North Area Pit	1.7	13.3	7.4	23.9	3.1	49.4
South Area Layback	6.8	4.1	5.6	46.4	6.5	69.4
EWRDC Expansion	51.7	37.7	19.3	5.1	65.8	179.6
TSF-2	4.5	0	0	0	0	4.5
Total	64.7	55.1	32.3	75.4	75.4	302.9

2.3.2 Mining Method and Pit Description

Mining in the North Area Pit and South Area Layback areas would be consistent with existing GSM mining operations using conventional open pit methods. The area to be mined is drilled and blasted and the broken material loaded with hydraulic and electric shovels and front-end loaders into haul trucks. Other mining equipment includes drill rigs, shovels, loaders, haul trucks, bulldozers, motor graders, excavators, water and sand trucks, and light-duty vehicles. The viability of the Proposed Action Alternative depends on the blending of ores from the North Area Pit and the South Area Layback areas.

The North Area Pit would be approximately 49.4 acres, about 1,750 feet by 1,140 feet (**Figure 2-4**). The pit would require dewatering to lower the water table about 200 feet. GSM would initially dewater at 50 gpm for six months to draw down the water table. After the drawdown elevation target is met, the dewatering would decrease to a

[1] *The permitted disturbance area should be 19.3 acres larger to include the buffer area around the southeast portion of the EWRDC expansion area. The new disturbance acres outside the permitted disturbance boundary for the EWRDC expansion area would total 57.0 acres (compared to 37.7 acres) and the revised total permitted disturbance boundary area would be 3,191.9 acres (compared to 3,172.6 acres).*



SCALE: 1" = 1,000 Feet

LEGEND

- Permit Disturbance Boundary February 2010
- Proposed Permitted Disturbance Boundary

Source: Golden Sunlight Mine 2012a

Figure 2-4
Proposed Action Alternative - North Area Pit

maintenance rate of less than 10 gpm. During mining, the groundwater would be used in the milling process water circuit. After mining, the captured water would be pumped to the water treatment plant and managed consistent with existing permit requirements approved for a conventional lime water treatment system to treat up to 392 gpm of mine water. The North Area Pit would produce an additional 1.2 million tons of ore and 8 million tons of waste rock, of which 4 million tons would be acid-producing and 4 million tons would be non-acid producing rock from the Bozeman group/Landside Debris. The North Area Pit would disturb an additional 15 acres (not including the 7.4 acres of buffer area) not previously disturbed by mining.

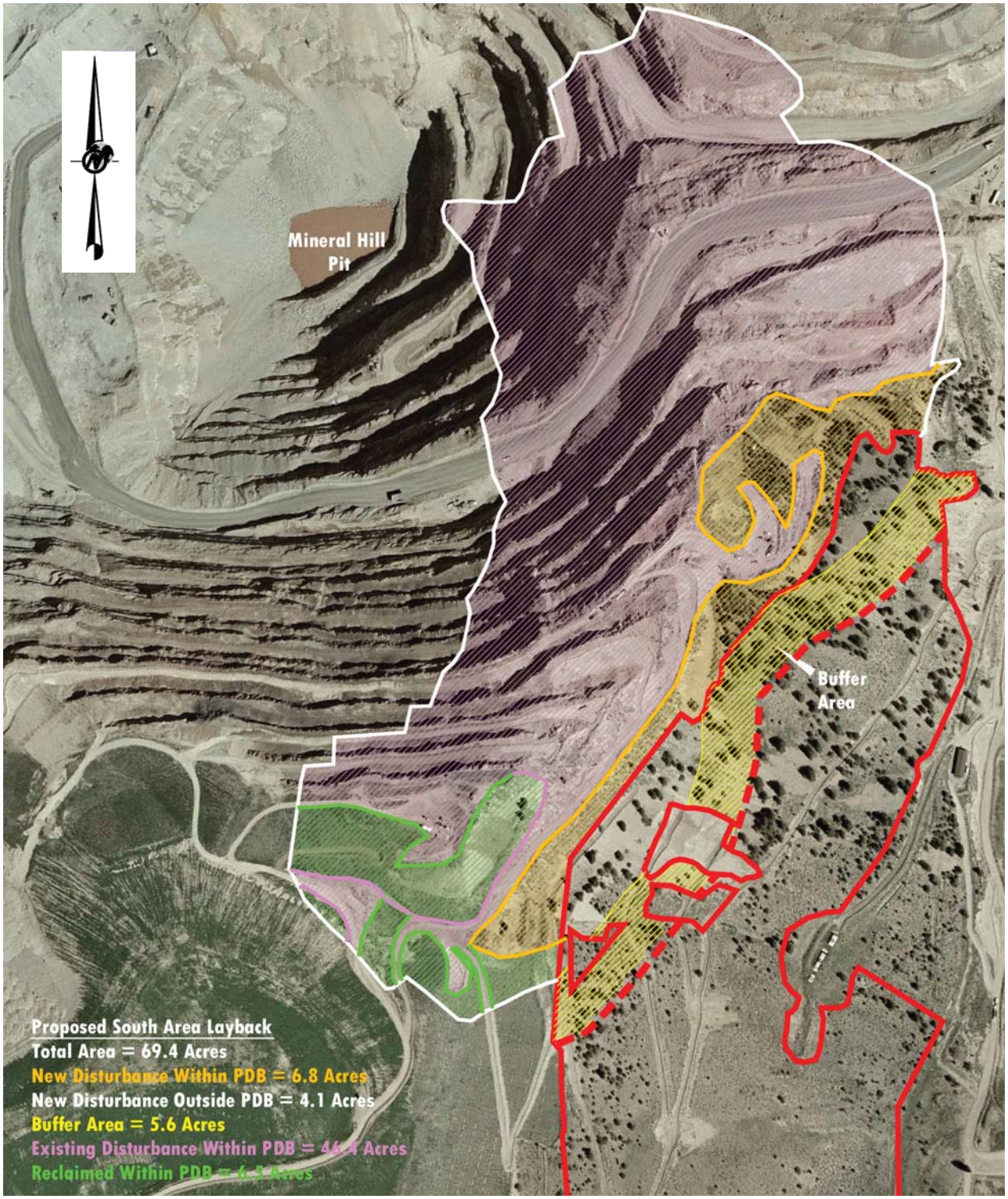
The South Area Layback in the Mineral Hill Pit would be approximately 69.4 acres and would expand the Mineral Hill Pit to the east and south (**Figure 2-5**). Dewatering of the South Area Layback would not be necessary as it is above the water table and stormwater would drain to the lower portion of the Mineral Hill Pit. The South Area Layback would disturb an additional 10.9 acres with 4.1 acres outside the current permitted disturbance boundary. The South Area Layback would produce an additional 3 million tons of ore and 44.6 million tons of waste rock. Up to 6 million tons of acid-generating waste rock could be placed in the Buttress Dump extension and the remaining 38.6 million tons of the waste rock would be placed in the EWRDC expansion area.

2.3.3 Ore Processing

Ore processing would continue as described for the No Action Alternative. The additional ore would extend operations for approximately two years. During this period, legacy waste rock and tailings would continue to be processed.

2.3.4 Water Resources

Two vertical dewatering wells would be installed adjacent to the North Area Pit. One would intercept and capture the southern area bedrock groundwater and one would dewater the northern area. These wells would maintain the groundwater level in the North Area Pit below the pit floor elevation of 5,375 feet (GSM datum). If the pit dewatering wells do not dewater the pit adequately, GSM would drill horizontal holes into the pit highwalls to drain trapped water. Any surface water runoff and precipitation along with water collected from pit highwall dewatering wells would be removed from the pit by pumping the water through a series of staging tanks to a common pit sump and then transferred to the tailings storage facility where it would be used as process water.



SCALE: 1" = 1,000 Feet

LEGEND

Permit Disturbance Boundary February 2010

Proposed Permitted Disturbance Boundary

Source: Golden Sunlight Mine 2012a

Figure 2-5
Proposed Action Alternative - South Area Layback

The South Area Layback would not require any additional water management. During mining, water captured in the Mineral Hill Pit sump and from the North Area Pit wells would be used in the mill, offsetting some of the makeup water currently obtained from the Jefferson Slough. After mining, the water from the Mineral Hill Pit sump (same as the No Action Alternative) and from the North Area Pit dewatering wells and water from the pit sump would be pumped to the water treatment plant and managed as required in the existing permit.

The stormwater pollution prevention plan (SWPPP) would be revised to include stormwater from all new or expanded facilities.

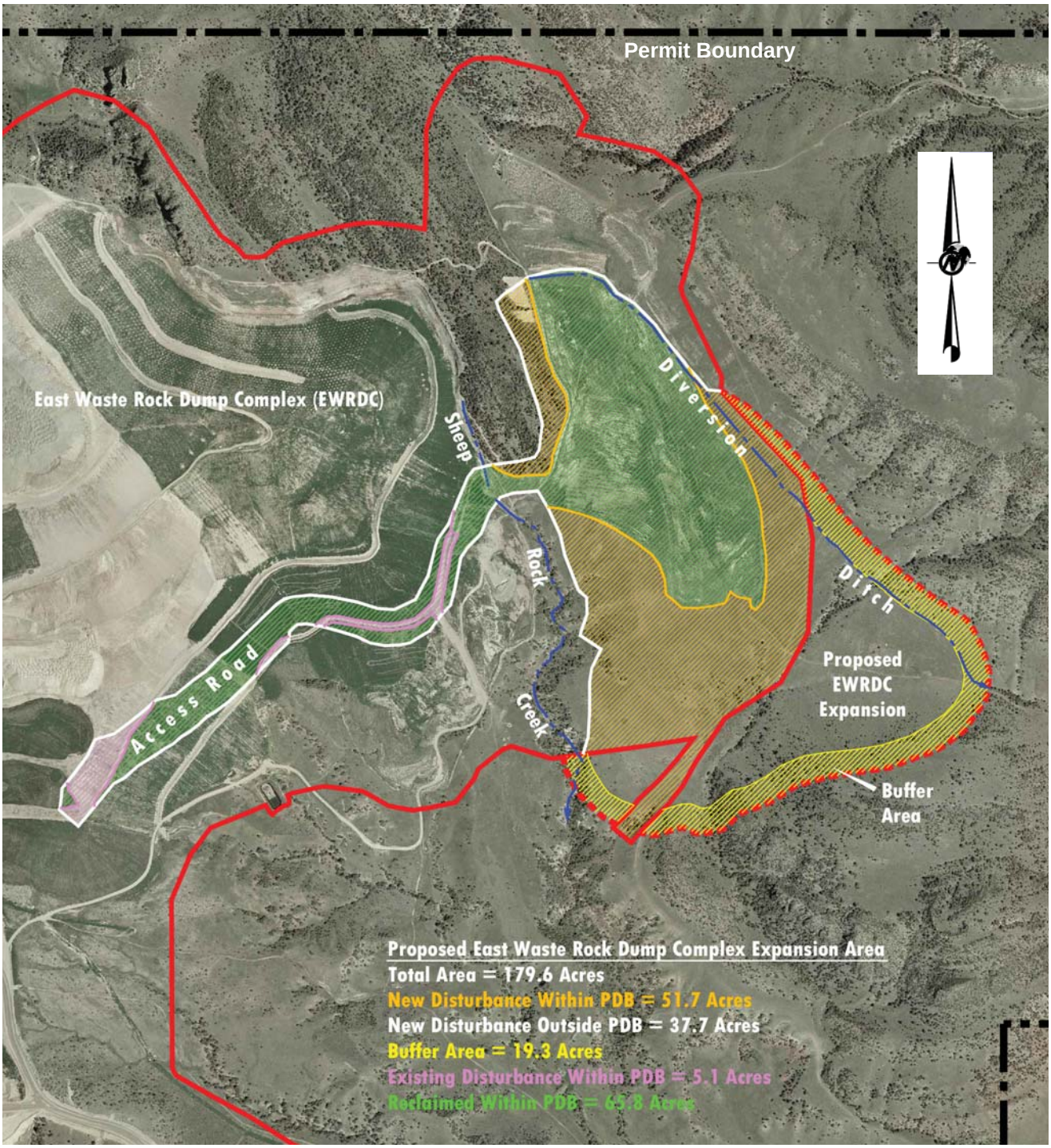
2.3.5 Tailings Storage Facilities

The Proposed Action Alternative would increase the capacity of impoundment TSF-2 by approximately 5.0 million tons. The additional tailings would be generated from the processing of ore from the South Area Layback and North Area Pit (4.2 million tons), and from processing of mine waste rock and tailings from legacy mine sites. Raising TSF-2 would create a footprint disturbance increase of 4.5 acres; all in the permitted disturbance boundary.

The only new disturbance would be to raise the east wing wall to 4,774 feet (GSM datum) which would disturb approximately 4.5 acres.

2.3.6 Waste Rock Storage Areas

The acid-generating waste rock from the North Area Pit (4 million tons) and South Area Layback (44.6 million tons) would be placed in existing rock disposal areas or in a stand-alone extension of the EWRDC rock disposal area called the EWRDC expansion area located on the east side of Sheep Rock Creek (**Figure 2-6**). A majority of the 179.6 acre EWRDC expansion area is within the current permitted disturbance boundary, but about 57 acres (37.3 disturbed acres + 19.3 buffer area acres) would be outside the current permitted disturbance boundary. Amendment 015 would expand the permitted disturbance boundary to include the entire EWRDC expansion area. The approximately 4 million tons of non-acid generating Bozeman Group/Landslide Debris material waste rock from the North Area Pit would be stockpiled and used for subsoil cover material for reclamation of the existing EWRDC or TSF-2. GSM would not salvage some fine-grained lake bed sediments removed from the North Area Pit.



SCALE: 1" = 1,000 Feet

LEGEND

- Permit Disturbance Boundary February 2010
- Proposed Permitted Disturbance Boundary
- Permit Boundary July 2012

Source: Golden Sunlight Mine 2012a

Figure 2-6
Proposed Action Alternative -
East Waste Rock Dump Complex
(EWRDC) Expansion

The proposed EWRDC expansion area would have a maximum height of 290 feet above the natural topography and an average thickness of 140 feet. The proposed outer slopes would have an overall angle of 2.0H:1.0V. GSM would construct the EWRDC expansion area in 3 to 4 lifts with a total design capacity to hold up to 48.6 million tons of waste rock.

2.3.7 Haul Roads and Access Roads

The Proposed Action Alternative would include the construction of new haul roads in the proposed North Area Pit and South Area Layback footprints. Access to the North Area Pit would be from the east side. The haul road for the South Area Layback would be from the northeast side of the Mineral Hill Pit. Haul roads in upper portions of the pits would be approximately 100 feet wide with the sides bermed for safety. The lower pit and layback haul road would be about 40 feet wide.

A new haul road would be constructed for the EWRDC expansion area and would include a temporary crossing of Sheep Rock Creek (**Figure 2-6**). An 8-foot diameter culvert (or equivalent), sized to convey a 100-year 1-hour storm, would be installed at the crossing. After final reclamation of the EWRDC expansion area, the culvert would be removed and Sheep Rock Creek would be reestablished in its natural channel.

Haul roads and access roads would be reclaimed in accordance with the approved plan.

2.3.8 Topography after Mining

Regrading would be implemented concurrently where feasible. The eastern portion comprising more than half of the North Area Pit would be developed as a 2H:1V slope during operations. Minor regrading would be required at closure. The remaining North Area Pit highwall would not be regraded at closure. It would measure approximately 575 feet in height as measured from the bottom of the pit.

No portions of the South Area Layback would be regraded at closure.

The EWRDC expansion area and the East Buttress Dump extension would be regraded to 2H:1V slopes or less steep once waste rock production from the North Area Pit and the South Area Layback ceases. Natural regrade practices would be implemented where feasible on the waste rock dumps.

2.3.9 Revegetation

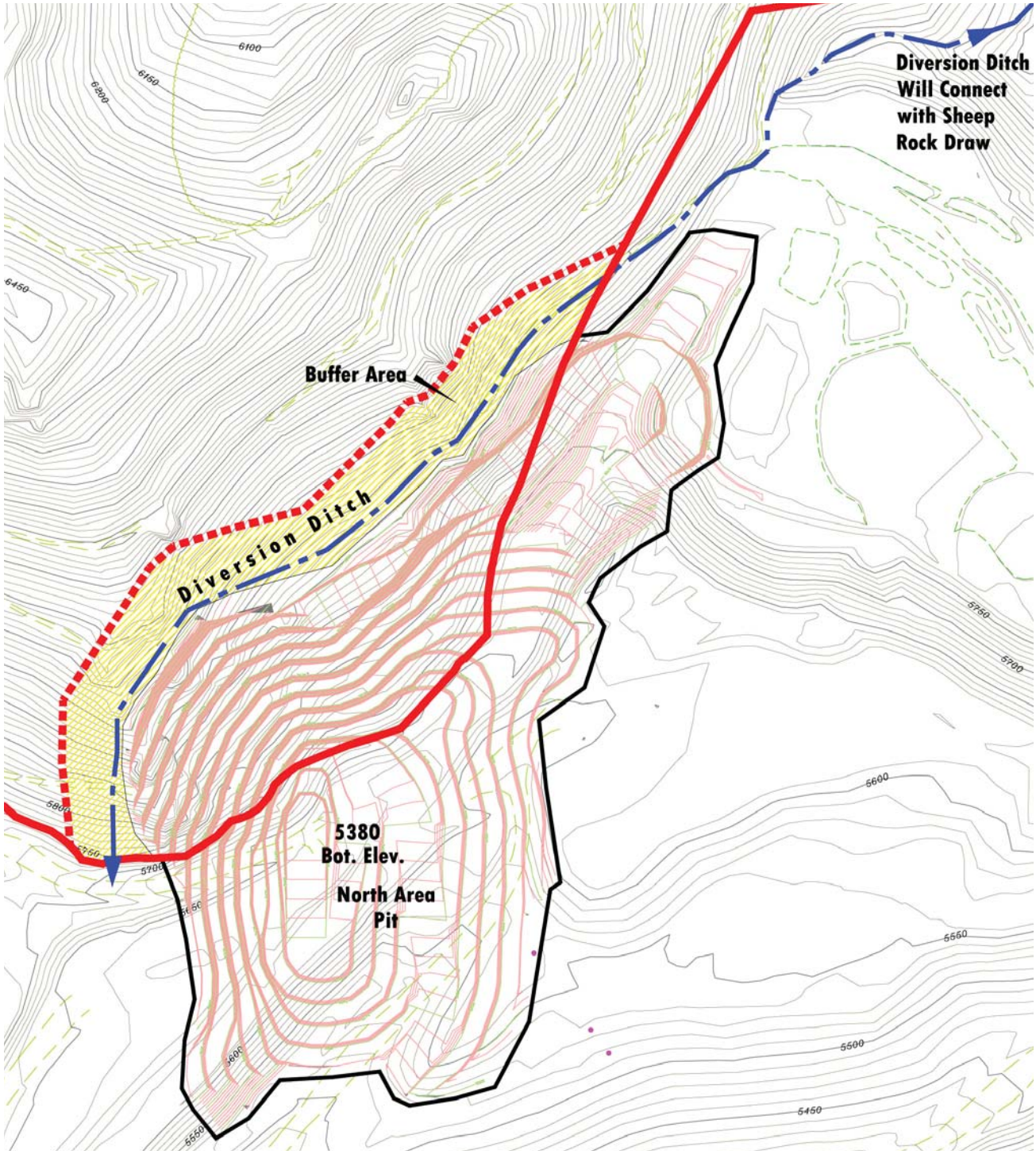
GSM's reclamation methods for the additional areas disturbed by the Proposed Action Alternative would be similar to GSM's existing approved reclamation plan. All disturbed areas would be reclaimed. The reclamation goal would be the same as the No Action Alternative goal which is to return the mine site, other than open pits and rock faces, to stability and utility comparable to the adjacent unmined areas. The approved post-closure land uses are primarily grazing and wildlife habitat. GSM in conjunction with local governmental and business entities has developed a business park along the southern edge of the mine site for commercial use. After mining, the mine office buildings and some of the mill buildings could be available for public or private industrial use.

GSM would continue using its current practice for rock disposal area reclamation at the EWRDC expansion Area. Placement of the rock within the proposed footprint of the expansion area would result in a slope configuration of 2.H:1.V (overall slope factoring in the benches formed with each lift would be 2.5H:1V). The EWRDC expansion Area would be capped with placement of 31 inches of calcareous growth media with a coarse fragment content of at least 25 percent. Following placement of the growth media, the EWRDC would be seeded with an approved seed-mix.

The eastern portion that comprises more than half of the North Area Pit and has a 2H:1V slope would be covered with plant growth media and seeded with an approved seed mix (**Figure 2-7**).

To the extent that pit benches in the South Area Layback could be safely accessed, GSM would place growth media on the pit benches to support establishment of vegetation, or tree seedlings would be planted on berms and benches. In addition, GSM would place growth media on large benches within the South Area Layback prior to loss of access to these areas. The growth media would be seeded with an approved seed mix. The revegetated portions of the South Area Layback would total approximately 22 acres and would promote water infiltration, reduce runoff, and provide wildlife habitat. The rest of the highwalls in the South Area Layback would be reclaimed as rock faces and not revegetated (**Figure 2-8**).

About 30 acres on the south and east non-reactive walls of North Area Pit would be amended or capped if needed and revegetated. The rest of the North Area Pit highwalls would be reclaimed as rock faces. Raveling of the north and west wall rock faces would eventually cover some of the revegetated portion of the pit floor. GSM is required to keep the external dewatering wells in place at closure to prevent a pit lake from forming in the pit.



SCALE: 1" = 1,000 Feet

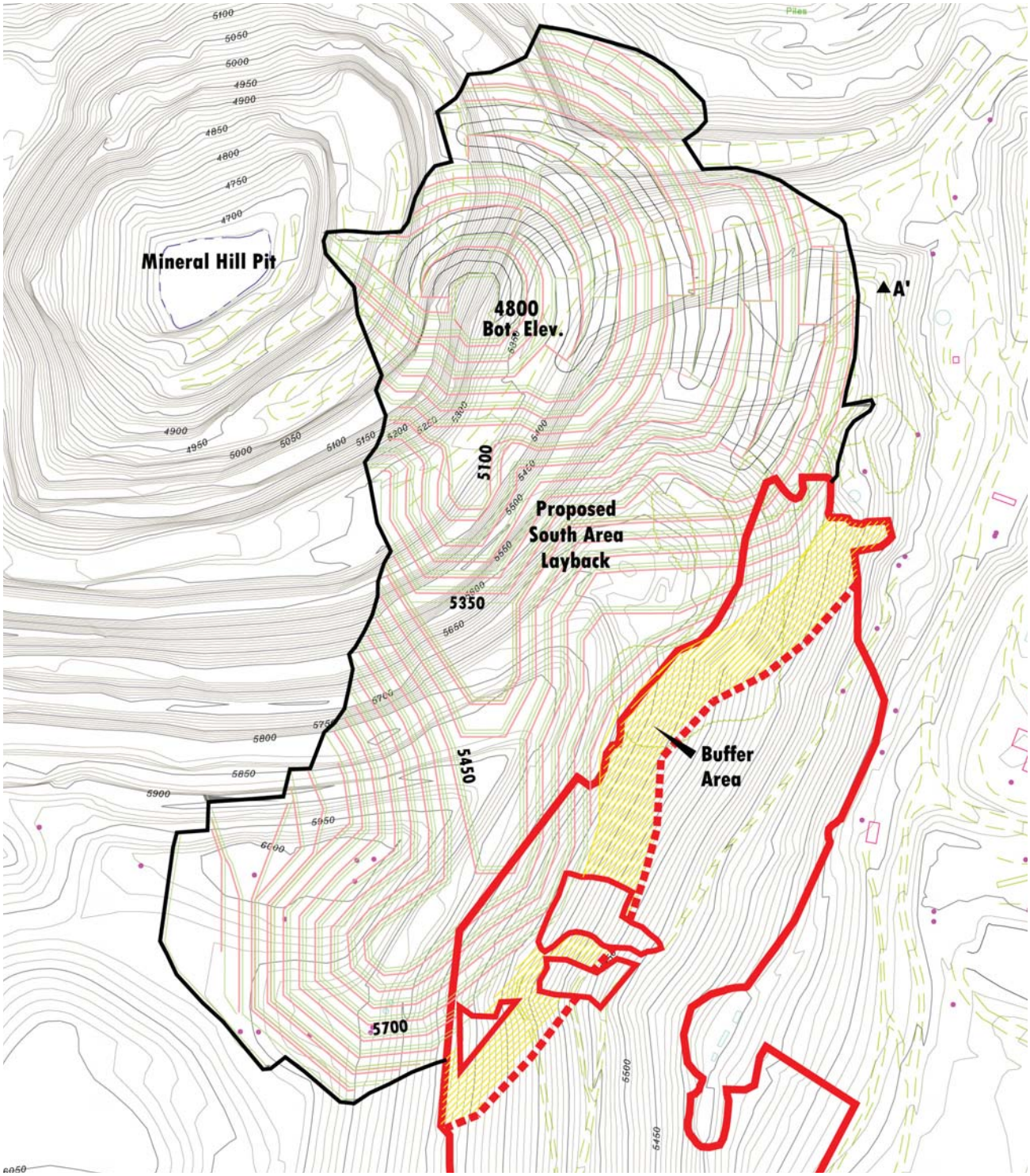
LEGEND

Permit Disturbance Boundary
February 2010

Proposed Permitted Disturbance
Boundary

Source: Golden Sunlight Mine 2012a

Figure 2-7
Proposed Action Alternative -
North Area Pit Design Topography



SCALE: 1" = 1,000 Feet

LEGEND

Permit Disturbance Boundary
February 2010

Proposed Permitted Disturbance
Boundary

Source: Golden Sunlight Mine 2012a

Figure 2-8
Proposed Action Alternative -
South Area Layback Design Topography

2.3.10 Operational and Post-Closure Monitoring and Control Programs

GSM's approved operational monitoring plans are described in the 2010 Operating and Reclamation Plan (GSM 2010) for (1) Water Quality and Quantity, (2) Ground-Movement/Geodetic, (3) Waste Rock Steam Vents, and (4) Revegetation (including Reclamation Test Plots). GSM currently monitors the mine for soil erosion, waste rock chemistry, noxious weeds, and wildlife. The existing post-closure monitoring and control plans would be amended to include monitoring of the additional areas.

2.4 Agency-Modified Alternative

The Agency-Modified Alternative would be similar to the Proposed Action Alternative with additional project modifications. The issues and the modifications are described below along with the project specific modifications to be incorporated into the Agency-Modified Alternative.

Issue 1: Implement Closure Geodetic and Ground-Movement Monitoring for the North Area Pit and EWRDC expansion area to ensure safe access and to keep reclamation cover systems working

GSM has monitored ground movement operationally at the mine since 1994 using geodetic survey data, inclinometers, piezometers, and other methods. The Proposed Action Alternative would modify their existing operational ground-movement monitoring program to include the proposed North Area Pit and South Area Layback area. GSM's Amendment 015 application (Appendix A-2) also included additional ground-movement monitoring plans for the EWRDC expansion area.

Aspects of GSM's operational geodetic and ground-movement monitoring for the Agency-Modified Alternative would be similar to the Proposed Action Alternative with the following additional information and clarification for use during closure:

Geodetic and ground-movement monitoring would be needed after mining to monitor the potential for long-term ground movement for the North Area Pit and EWRDC expansion area. The monitoring is needed to allow safe access into the North Area Pit for maintaining the water removal systems from a pit sump if needed. Monitoring should also be used to monitor waste rock dumps expanded as part of Amendment 015 to keep reclamation cover systems working.

Agency Modification:

1. GSM would develop a conceptual post-mining geodetic and ground movement monitoring plan.

Issue 2: Prepare a detailed bat and raptor habitat reclamation plan for the North Area Pit Highwall.

To meet the requirements of the MMRA, GSM must provide sufficient reclamation measures for open pits and rock faces that afford some utility to humans or the environment after mining. GSM has stated their intent to reclaim the north and west highwalls of the North Area Pit to promote bat and raptor habitat but have not provided a detail reclamation plan for this task. Approximately 19 acres of benches and vertical faces in the North Area Pit would remain after mining and would be available for this measure.

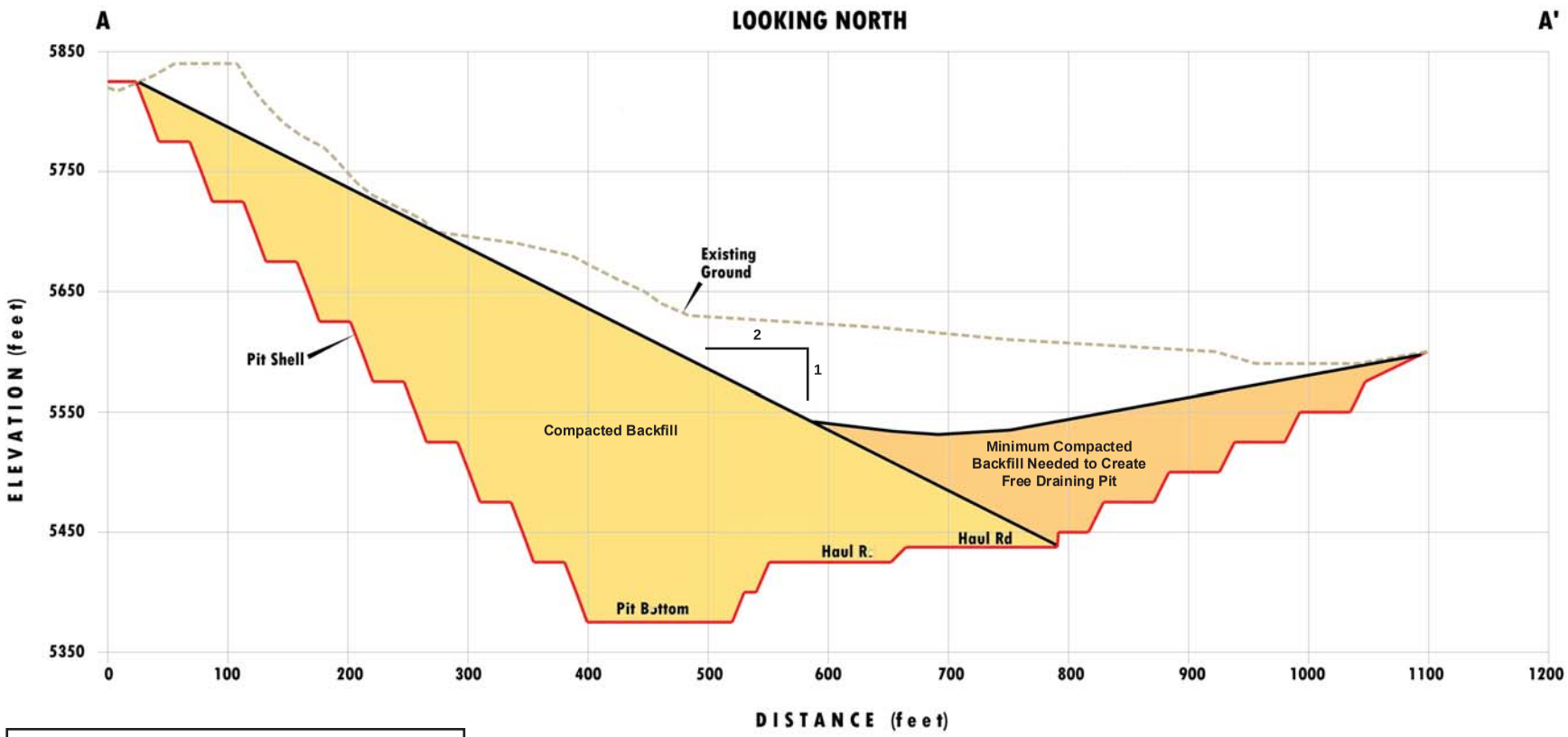
Agency Modification:

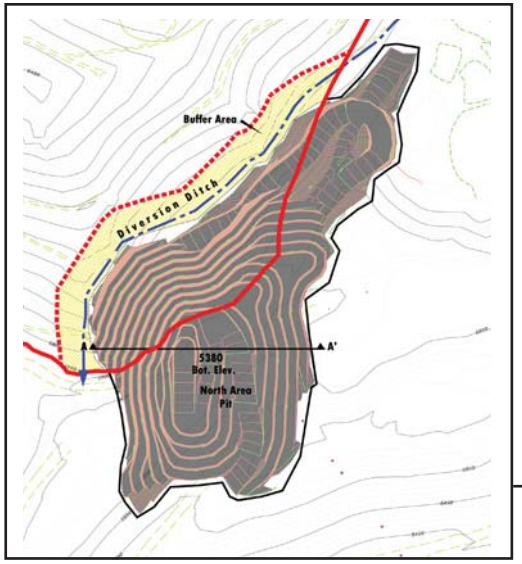
1. GSM will prepare a comprehensive highwall reclamation plan that includes the creation of bat and raptor habitat in the North Area Pit highwalls. The bat and raptor habitat reclamation plan would be submitted to DEQ with the Updated Operations and Reclamation Plan.

2.5 North Area Pit Backfill Alternative

Under the North Area Pit Backfill Alternative, the North Area Pit would be mined concurrently and the North Area Pit would likely be mined out before the South Area Layback. Ore extracted from the North Area Pit would be stockpiled in the mill area. During preparation for and mining of the South Area Layback, up to 9.2 million tons of the 44.6 million tons of acid producing waste rock from the South Area Layback would be used to backfill the North Area Pit rather than hauling the waste rock to the EWRDC expansion area or the Buttress Dump extension area. A cross-section view of the backfilled North Area Pit is in **Figure 2-9**.

The North Area Pit would be backfilled to achieve a 2H:1V waste rock dump slope from the top of the pit west highwalls (**Figure 2-9**). The 2H:1V waste rock dump slope would toe into the east wall of the North Area Pit. Final adjustments would be needed to ensure the backfilled pit would be free-draining to prevent precipitation and snowmelt from collecting in the pit area where it may infiltrate into underlying acid-producing waste rock. If the surface flow of precipitation and snow melt could not be routed safely to drainages below acid-producing waste rock, then the water would be routed to a lined pond and gravity fed to a drainage below acid-producing materials or routed to the treatment plant.





Cross-Section Location

Figure 2-9
North Area Pit Backfill Alternative

Reclamation of the backfilled pit would be consistent with the reclamation of other 2H:1V slopes in the waste rock dump complexes. The 2H:1V slopes would be covered with plant growth media containing the necessary rock content to control erosion. The slopes on the east side of the pit would also be covered with plant growth media and seeded. All acidic waste rock in the pit would be covered with backfill and revegetated. Pit dewatering wells located outside the pit would continue to keep the water table depressed below the level of the pit backfill. The downgradient dewatering well would collect some of the water that infiltrates through the backfill.

2.6 Related Future Actions

Related future actions are those related to the Proposed Action Alternative by location or type. For this EIS, other opencut and metal mine projects in Jefferson and nearby counties were considered for evaluation. The development of the Sunlight Business Park, new residential subdivisions, permitted Butte Highlands gold mine, and potential reactivation or closure of the Montana Tunnels Mine near Jefferson City, Montana have been established as related future actions for this EIS. Descriptions of these future actions are provided in Chapter 4.

2.7 Alternatives Considered But Dismissed

Additional alternatives were considered and evaluated. Two of them were dismissed from detailed consideration in the EIS due to the reasons explained below.

2.7.1 Mining only the North Area Pit or only the South Area Layback

The primary reason for dismissing this alternative is that GSM would not be able to mine half the resource because they rely on ore blending (high silver in one ore and high copper in the other ore) to control costs and keep production viable. The amount of gold would likely not support the capital investment, and one small pit area would not have enough working faces to supply continuous ore to the mill. The production sequence and scheduling of ore delivery from both pits is important to continuous mill operations.

2.7.2 Partial Pit Backfill Alternative for South Area Layback of the Mineral Hill Pit

In 2007, DEQ approved Amendment 011 to GSM's operating permit, selecting the Underground Sump Alternative. DEQ determined that the alternatives under which GSM would partially backfill the Mineral Hill Pit did not provide sufficient control of pit discharges to assure protection of the Jefferson River alluvial aquifer and the Jefferson River Slough. In addition to the problems associated with drilling and maintaining wells up to 875 feet deep in unconsolidated waste rock required for the Partial Pit Backfill with

In-Pit Collection Alternative, the settling of fines may cause reduced permeability in the crusher reject used to create the pumping zone. The reduced permeability may cause the crusher reject to lose its ability to function as a sink to collect pit seepage. Additionally, perched groundwater paths may form in the backfill material, permitting seepage to leave the pit without being captured by the wells. Finally, the low permeability of the backfill material would likely make the control of pit seepage with vertical wells drilled in the backfill unreliable.

Under the Partial Pit Backfill with Downgradient Collection Alternative, DEQ believed that a maximum of 80 percent of groundwater would likely be captured by each of two capture systems, providing a combined capture efficiency of 92 percent. This capture efficiency would result in violations of water quality standards. DEQ-7 human health quality standards for nickel and copper would be exceeded within the Jefferson River alluvial aquifer. Nondegradation criteria for groundwater quality in the Jefferson River alluvial aquifer would fail for arsenic, cadmium, copper, iron, and nickel. The chronic aquatic life standard for aluminum would be exceeded in the Jefferson River Slough. Nondegradation criteria for surface water quality in the Jefferson River Slough would fail for aluminum, copper, and iron.

Mining of the proposed South Area Layback and North Area Pit would not change the analysis resulting in DEQ's 2007 decision not to require partial pit backfill of the Mineral Hill Pit. Drilling and maintaining wells in deep unconsolidated waste rock, reduced permeability due to the settling of fines, perched groundwater paths, and low permeability of the backfill material would still be problematic in a backfilled Mineral Hill Pit. Additionally, the results of the dynamic system model used to predict water impacts in 2007 are still valid even considering a reduction in groundwater flow through the primary pit flow path as a result of pumping of the North Area Pit. Furthermore, recent pit water pumping rates from the Mineral Hill Pit are greater than what was estimated in the 2007 SEIS. Thus, seepage volumes under the backfill alternatives would be greater than what was estimated in the 2007 SEIS. Any increase in the pit seepage rate would cause nickel and likely other metals to exceed groundwater quality standards even more so than that predicted in the 2007 SEIS. Because the analysis resulting in DEQ's 2007 decision remains valid, DEQ is not considering a partial pit backfill alternative for the South Area Layback in detail.

Affected Environment and Environmental Consequences

Information in this chapter describes the relevant resource components of the existing environment. Only resources that could be affected by the alternatives are described and include: geotechnical engineering; soils, vegetation, and reclamation; water resources; wildlife; aesthetics; and social and economic considerations. After the environment of each resource has been described, the impacts of the No Action Alternative, Proposed Action Alternative, Agency-Modified Alternative, and North Area Pit Backfill Alternative are discussed.

3.1 Location Description and Study Area

The project location and associated study area for the mine include all lands and resources in the mine permit boundary, plus those additional areas identified by technical disciplines as "resource analysis areas" that are beyond the mine permit boundary. Resource analysis areas are identified for each technical discipline. Additional information on analysis areas is in Chapter 4. By definition, the resource analysis areas that extend beyond the mine permit boundary are included in the "study area" for this EIS.

3.2 Geotechnical Engineering

A discussion of slope stability concerns for the highwalls in the North Area Pit and the South Area Layback of the Mineral Hill Pit and the stability of waste rock storage area slopes is in this section. The effects on ground movement blocks are also discussed.

3.2.1 Analysis Methods

3.2.1.1 Analysis Area

The analysis area for geotechnical engineering includes the North Area Pit and the South Area Layback Area, the expanded waste rock storage areas and the active TSF-2.

3.2.1.2 Information Sources

Information for the analysis of geotechnical engineering issues was found in Application for Amendment 015 to Operating Permit 00065 for the Golden Sunlight Mine (GSM 2012a) and Appendix A (Geotechnical Reports) of the referenced document.

3.2.1.3 Methods of Analysis

Geotechnical engineering slope stability was analyzed by Golder Associates using limited equilibrium techniques or kinematic design based on stereographic analysis of the rock discontinuities (naturally occurring breaks in rock by bedding planes, joints, fractures, faults, and shear zones) to assess the stability of the North Area Pit, the South Area Layback of the Mineral Hill Pit, and the expanded waste rock storage areas under both static (long-term gravitational loading) and seismic (earthquake ground motion) loading conditions. Kinematic design by stereographic analysis involves studying the spatial relationships between the orientation of the rock discontinuities and any given slope face accounting for structural orientation, persistence, roughness, and infilling in relation to the trend of the excavation slope.

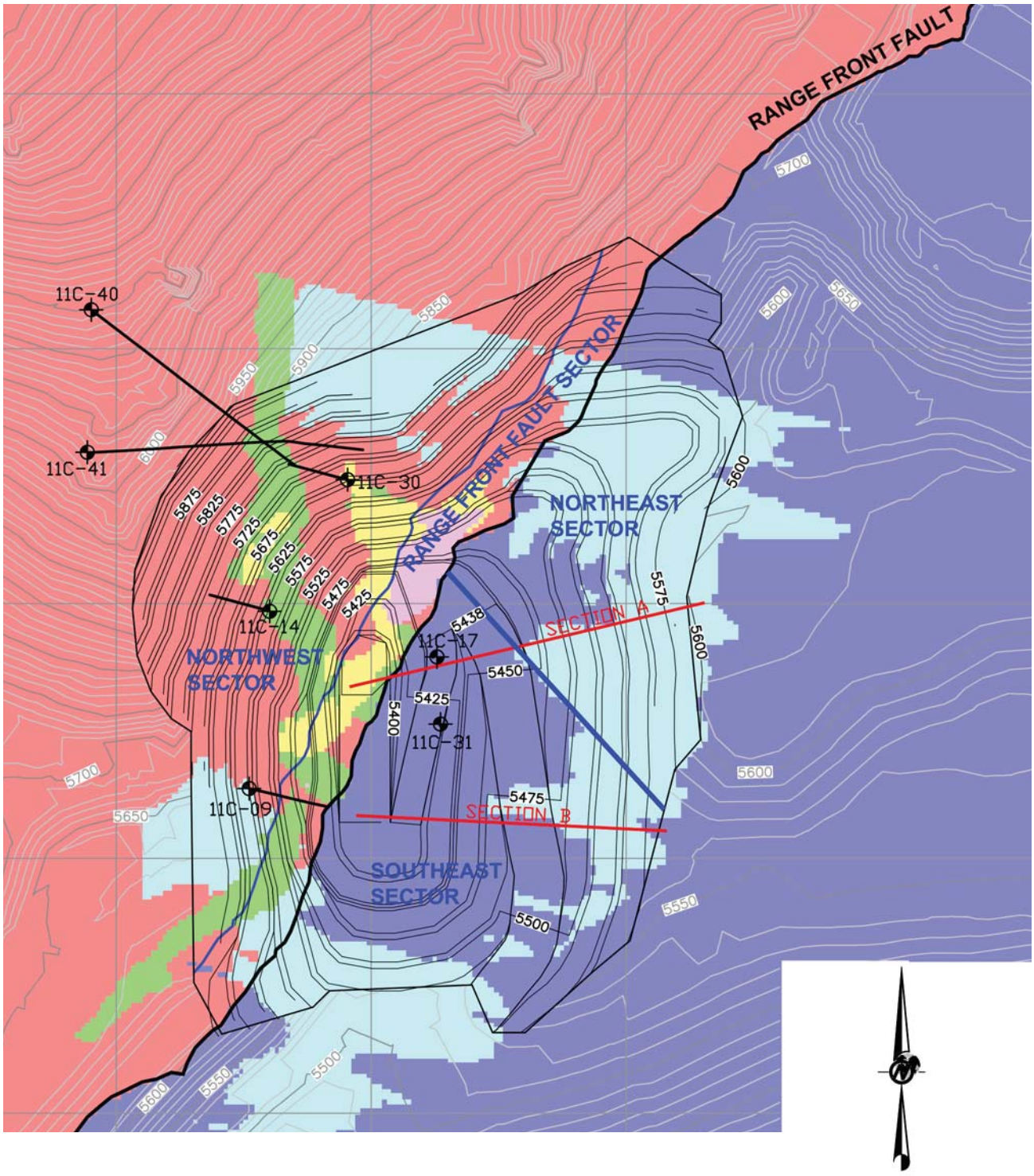
Computer software including the SLIDE V 5.044 program developed by RocScience (2010) was used in the analysis to evaluate the slope conditions with development of the North Area Pit in the Tertiary sediments and landslide deposits (**Figure 3-1**). Other sectors of the pit slopes developed in the bedrock units west of the Range Front Fault were evaluated using computer software programs SLIDE or DIPs developed by RocScience (RocScience, 2009). Pit slopes for the South Area Layback were evaluated using the RocScience software programs. The expansion of the EWRDC area was also analyzed using the SLIDE software program.

This SLIDE software program provided an estimate for a factor of safety (FOS) against a large-scale failure of a pit highwall and of the inter-ramp slopes during operational conditions. In traditional limit equilibrium analysis which accounts for a summation of forces across a failure plane, an FOS is the ratio of resisting forces to acting forces. The generally accepted FOS when working with slopes is 1.3 for short-term stability, 1.5 for long-term stability, and greater than 1.1 for slopes subjected to earthquake forces. A minimum FOS of 1.2 for pit operational conditions is consistent with stability objectives accepted for non-critical slopes at other large-scale mining operations (Read & Stacey, 2009).

3.2.2 Affected Environment

3.2.2.1 North Area Pit

The North Area Pit would be mined to a bottom elevation of 5,375 feet (GSM datum), resulting in pit dimensions of 1,750 feet by 1,140 feet. The highest slope in the pit would be along the northwest wall projected to be 575 feet (elevation 5,950 feet GSM datum).



SCALE: 1" = 300 Feet

LEGEND

- 11C-03 Geotechnical Coreholes
- Fault
- Sector Boundary
- Layback Outline
- Latite
- Siltite
- Quartzite
- Sunlight Vein
- Lamprophyre

Source: Golden Sunlight Mine 2012a

Figure 3-1
North Area Pit
Geology

The North Area Pit intersects geologic deposits of Cretaceous age latite and Proterozoic siltite, argillite, and quartzite as well as Quaternary landslide and debris flow materials overlying bedrock (**Figure 3-1**). The pit is bisected by the Range Front Fault zone, a steep east-dipping structural contact that trends northeast through the bottom of the pit and adjacent highwalls. Bedrock along the fault zone up to about 100 feet wide is characterized by a high degree of shattering and a corresponding low rock quality designation (RQD) and rock mass rating (RMR). Slopes northwest of the fault zone would be developed in the Cretaceous and Proterozoic aged bedrock formations and to the southeast in the Tertiary aged sedimentary rocks of the Bozeman Formation, landslide deposits, and debris flow materials.

The North Area Pit mining practices, including drilling, blasting, loading, and hauling, would generally take place on either single or double benches separated by 25-foot highwalls. According to the proposed mine plan and draft amendment to the mine operating permit application, rock-fall catch benches varying in width from 22 to 44 feet have been planned on the pit highwalls depending on the materials excavated and the actual inter-ramp angle constructed. Either 22 to 24 feet wide benches would be constructed in the latite, siltite, argillite, or quartzite bedrock slopes and 39 to 44 foot wide benches in the Tertiary sediments (Bozeman Formation and landslide deposits). A single 90-foot wide haul road at a maximum grade of 12 percent would be used to access the pit, entering on the south side of the mine at an elevation of 5,550 feet. The haul road switchbacks on north to south headings on the east side of the mine pit to reach ore and waste rock at depth. Slope design recommendations for bedrock slopes were 50 degrees for a base case with controlled blasting, 55 degrees for an upside potential given favorable rock and structural control, and 45.6 degrees in the Range Front Fault zone using controlled blasting techniques.

Excavation of the pit below the groundwater table would require lowering of the water table and mitigating inflow of groundwater into the pit. Subsequent slope design recommendations are predicated on effective depressurization of the pit walls. Initial drilling information indicates that groundwater levels in the North Area Pit generally decrease to the south from an elevation of about 5,540 feet in bedrock in the north to about 5,440 feet in bedrock to the south. Water levels in the Tertiary sediments range from about 5,518 to 5,401 feet (GSM Datum). A dewatering program is proposed for the North Area Pit through installation of dewatering wells peripheral to the pit, or by drilling horizontal holes into the pit highwalls to drain trapped water (SWS 2011). Any surface water runoff and precipitation along with water collected from horizontal dewatering wells installed in the pit highwall would be removed from the pit by pumping the water through a series of staging tanks to a common pit sump and then transferred to TSF-2 where it is used as process water.

At closure, the water from a new common pit sump would be pumped to the treatment plant. Treated water would be pumped to an infiltration basin below TSF-2.

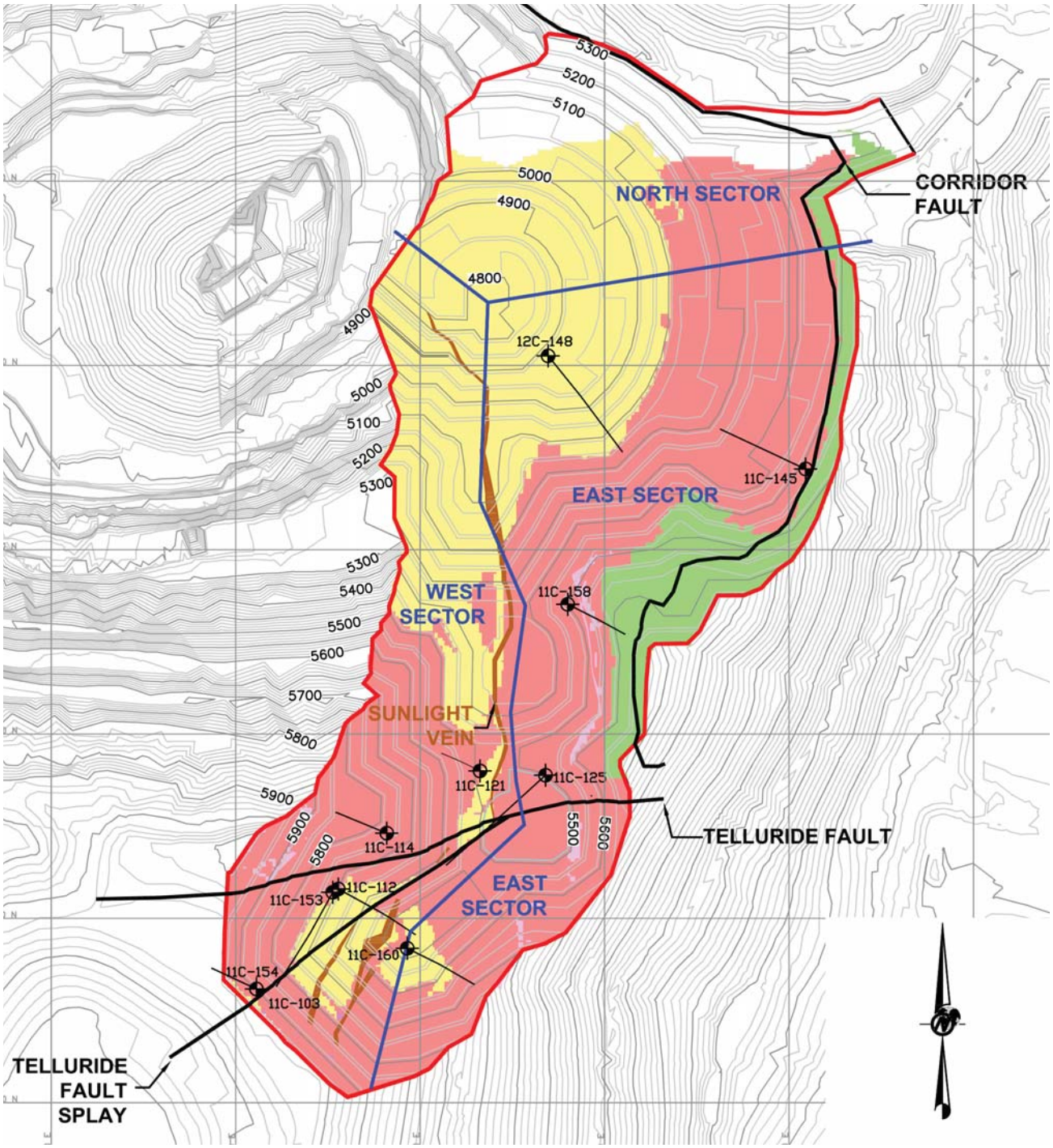
3.2.2.2 South Area Layback

The South Area Layback in the Mineral Hill Pit would be mined to a bottom elevation of 4,800 feet (GSM datum), resulting in a pit having maximum dimensions of approximately 2,800 feet by 1,300 feet at its greatest distances. The highest slopes in the pit would be along the north portion projected to be 550 to 650 feet (elevation 5,350 feet GSM datum) (Golder Associates 2012a). The haul ramp is in the northeast and east wall slopes and switches back repeatedly, resulting in overall slope angles of 42 degrees in the north wall and 36 degrees in the north part of the east wall. Through completion of the South Area Layback mining operation, an estimated 44.6 million tons of waste rock and 3.0 million tons of ore would be recovered.

The South Area Layback would be excavated entirely in bedrock composed of geologic deposits of Cretaceous age latite and Proterozoic siltite, argillite, and quartzite of fair to good rock quality (**Figure 3-2**). Ore-bearing mineralization occurs along the Sunlight Vein which dips westerly at about 80 degrees and trends north-south through the pit but turns southwest at the southern margins. The pit bottom increases in elevation from north to south along the Sunlight Vein having its deepest excavation in the east wall of the Mineral Hill Pit.

Latite and siltite bedrock along the east pit wall is bisected by the Corridor Fault. This fault dips gently to the east to southeast at about 25 degrees and is truncated in the south by the Telluride Fault. The main part of the Telluride Fault strikes east-northeast through the south part of the layback area and dips steeply to the north at 75 degrees. A fault splay bifurcates from the main fault to the southwest and dips northwest at 85 degrees. A zone of bedrock in the vicinity of both faults some 60 to 150 feet wide is characterized by a high degree of intense shearing, fracture, and decreased corresponding low RQD and RMR.

Pit mining practices would be similar to those described for the North Area Pit. A single 90-foot wide haul road at a maximum grade of 12 percent would be used to access the layback, entering on the northeast side of the mine at an elevation of 5,310 feet. The haul road switchbacks on north to south headings on the northeast side of the mine pit to reach ore and waste rock at depth. Interramp angle slope design recommendations for bedrock slopes were 50 degrees for a base case with controlled blasting, 55 degrees for an upside potential given favorable rock and structural control, and in the 45.6 degrees Corridor Fault Zone using controlled blasting techniques.



SCALE: 1" = 500 Feet

LEGEND

- 11C–03 Geotechnical Coreholes
- Fault
- Sector Boundary
- Layback Outline
- Latite
- Siltite
- Quartzite
- Sunlight Vein
- Lamprophyre

Source: Golden Sunlight Mine 2012a

Figure 3-2
South Area Layback
Geology

Groundwater in the South Area Layback is already controlled by Mineral Hill Pit dewatering and any additional inflow due to the pit development would be managed by the current operational dewatering system for the Mineral Hill Pit. Only the pit bottom in the northern portion of the layback is anticipated to extend below current groundwater levels, at about 5,150 feet. Slope recommendations for the South Area Layback also assume effective depressurization of the slopes.

3.2.2.3 East Waste Rock Dump Complex Expansion Area

A majority of the waste rock would be disposed of in the planned expansion of the EWRDC located in the northeastern portion of the mine permit boundary. The proposed EWRDC expansion area would cover 179.6 total acres, 37.7 acres of which would be located outside of the current permitted disturbance boundary. The EWRDC expansion area would contain up to 48.6 million tons of waste rock composed of 4 million tons sourced from the North Area Pit and up to 44.6 million tons from the South Area Layback. Up to 6 million tons could be placed in the Buttress Dump extension. The average thickness of the EWRDC expansion would be 140 feet reaching as much as 290 feet above natural topography at the greatest extent. The reclaimed design condition would have an outslope along the dump face ratio of 2H: 1V (Golder Associates 2012a). The EWRDC expansion area would be constructed over Quaternary and Tertiary sediments underlain by extensive thicknesses of Paleozoic sedimentary limestone from the Mission Canyon and Lodgepole formations.

The existing EWRDC area was originally designed to be constructed using 50-foot lifts. There have been no waste rock storage area slope stability problems. The investigation for the expansion area confirmed the location of the eastern limit of the Sunlight Block and that the EWRDC lies outside of the limits of all of the known earth blocks.

3.2.3 Environmental Consequences

3.2.3.1 No Action Alternative

Work at the mine would continue until the Mineral Hill Pit reaches a bottom elevation of 4,250 feet through the approved 5B Optimization Project to ensure continuous mill processing through 2015. During this period, tailings would continue to be deposited in TSF-2 and waste rock would continue to be placed on the existing waste rock storage areas.

Mineral Hill Pit

Mining operations would cease after the pit reaches the permitted limits described above. During operations, pit highwall stability would continue to be monitored using

the existing system of survey prisms and extensometers. Mining activities in the pit would continue to be modified as necessary both to ensure worker safety and to minimize potential damage to mining equipment.

Some erosion of the Mineral Hill Pit highwalls and raveling of material onto benches would likely continue during the life of mine. There would be the potential for smaller scale slope failures on pit highwalls and release of rock into the mine pit similar to the failures that have previously occurred during operations.

Monitoring and maintenance of safety precautions would continue until all approved reclamation in the pit has been completed. GSM would have to maintain the 5,700 foot safety bench and road access to the underground workings for maintenance of the underground sump so pit water can be routed to the water treatment plant. No long - term stability monitoring is proposed or bonded in the pit.

Tailings Storage Facility and Embankment

After mining operations cease, the surface of TSF-2 would be dewatered and capped. The final surface of TSF-2 would have a 0.5 percent to 5 percent slope toward the east end of the embankment to facilitate surface water drainage to the spillway. The tailings would be capped with a minimum of 36 inches of nonacid-generating cap rock and 24 inches of soil on top of the tailings. The capped TSF-2 surface would be seeded. The outside slope of the TSF-2 embankment would be reclaimed by reducing the slope to 2.5H: 1V. The regraded embankment surface would be covered with 16 inches of soil and seeded. Under the No Action Alternative, there are no adverse impacts to TSF-2 and embankment stability provided final slope contours are achieved and good reclamation practices coupled with adequate site drainage occur across the final top surface.

Waste Rock Storage Areas

After mining operations cease, the waste rock storage areas would be reclaimed as required by the operating permit. The tops of waste rock storage areas would be essentially flat (less than 2 percent slope). The waste rock storage area tops would be regraded to eliminate depressions and to provide surface water flow away from the steeper side slopes. Shallow drainageways would be created on the waste rock storage area tops to direct flows to undisturbed ground.

Final waste rock storage area reclamation would include slope reduction from angle-of-repose to slopes ranging from 2H:1V to 3H:1V. Natural regrade would be practiced where possible to diversify slope angles and to make the dumps appear more natural. The dumps would have drainage diversions constructed to divert runoff. Waste rock dumps would be covered with covers ranging from 16-36 inches of growth media

depending on slope angle. The growth media would consist of nonacid-generating cap rock where necessary, and placement of 16 inches of soil. The waste rock dumps would be revegetated with approved seed mixes.

Where reclamation has been completed on waste rock storage areas, these reclamation practices have been successful, resulting in stable, well-vegetated tops and slopes. Under the No Action Alternative, there are no adverse impacts to the waste rock storage areas and embankment stability provided final slope contours are achieved and good reclamation practices coupled with adequate site drainage occur across the areas.

3.2.3.2 Proposed Action Alternative

Under the Proposed Action Alternative, mining would begin concurrently on both the North Area Pit and South Area Layback once the Mineral Hill Pit reaches the planned bottom elevation and layback configuration in the 5B Optimization Project. During mining, tailings would continue to be deposited in TSF-2, and waste rock would continue to be placed on the waste rock storage areas with the 48.6 million tons of non-ore rock placed in the EWRDC expansion area. Up to 6 million tons of waste rock could also be placed in the Buttress Dump extension.

North Area Pit

Operations. The North Area Pit design in terms of highwall stability is divided into three sectors defined by differing geomaterials (**Figure 2.7**). The Northwest Sector is predominantly competent bedrock consisting of siltite and latite with minor intrusions of lamprophyre sills on the northwest side of the Range Front Fault. The Range Front Fault is a 100-foot shear zone of broken, poor quality bedrock. The Southeast Sector is composed of Tertiary sediments consisting of landslide deposits and Bozeman Group fluvial facies overbank clay deposits and occasional unconsolidated channel sand interlayers.

Northwest Sector: Drilling information and the RQD data indicate the siltite and latite are good quality bedrock and should support relatively steep slopes with good presplit and best practices perimeter blasting. Slope recommendations are 50 degrees for a base case with controlled blasting and 55 degrees for an upside potential assuming the bedrock and structure quality are as favorable as geomechanics information indicates. Current steep natural slopes developed in the bedrock support this general supposition. Bedding orientations and dip are mostly favorable and relatively flat such that bedding is not expected to be a pervasive control on stability. Lamprophyre sills parallel to bedding could cause local planar failures in the benches if they are highly clay-altered and of weaker rock strength than anticipated. Should the dip on bedding planes in localized areas having dip direction of 90 degrees increase to 30 to 35 degrees, a potential exists for plane type failures to occur primarily at bench crests.

Joint sets of primary and secondary structure were measured in the bedrock fabric (Golder Associates 2012, Appendix A). The primary sets are oriented favorably for slope stability. The secondary set dips south-southwest at about 45 degrees and could represent a stability risk for slope orientations between about 160 and 245 degrees. According to the measurements of structural data and stereographic contour results, the set is not prominent in the structural data and is anticipated to be limited in distribution or continuity. Where the secondary set is encountered in slopes oriented within plus or minus 30 degrees (dip direction 160 to 245 degrees), it is anticipated to only control stability of bench crests and upper benches versus full bench heights.

Range Front Fault: The character and extent of the fractured and sheared zone associated with the Range Front Fault is currently poorly defined. Current recommendations are for a highwall design of 45.6 degrees in this location. Pit highwall stability may require reassessment upon further refinement of the bedrock characteristics either prior to or during mining. Mining activities in the pit would continue to be modified as necessary both to ensure worker safety and minimize potential damage to mining equipment.

Southeast Sector: Limit equilibrium stability analysis of the Tertiary sediments was completed for two sections (Section A and Section B) drawn through the east wall of the North Area Pit design using the RocScience program SLIDE V5.044 (RocScience, 2010). Stability analysis results determined that a slope angle of 24 degrees was required for a FOS of 1.2 in the northern locations of this sector and a slope angle of 26 degrees was required for the southern portion of the sector. The analysis also assumes fully depressurized pit slopes.

Initial stability calculations determined a FOS 1.16, slightly below the recommended minimum of 1.2 for the slope above the uppermost ramp area in the north portion of the sector (Section A). Failure surfaces generated for the early slope designs above the uppermost ramp passed through a larger percentage of low strength Tertiary sediments than through overlying landslide and mine waste rock of known higher strength characteristics. To improve calculated stability design, iterations required raising the ramp 10 feet to achieve a FOS of 1.23; above the requisite of 1.2. Raising the ramp elevation increased the percentage of the critical failure surface passing through the stronger landslide and mine waste materials. The FOS for circular failure of the overall slope is calculated to be 1.42.

In the southern portion of the east highwall (Section B), the slope below the ramp is composed entirely of Tertiary sediments and the slope above the ramp is in landslide deposits and mine waste. A FOS of 1.73 was calculated by modeling of the overall slope and FOS 1.42 against failure for the lower slope in the Tertiary sediments.

The 70-foot thick seam of high-plasticity clay encountered in corehole 11C-17 is highly unfavorable for development of slopes on both a bench scale and an inter-ramp and overall slope scale. The extent of this clay zone is not yet fully understood both vertically and laterally in the east pit highwall areas, and it is poorly defined by the limited subsurface data available. For example, similar high-plasticity clay was encountered in borehole 11C-31 at differing depths having thicknesses of 1 and 3 feet respectively. Thus, the clay occurrence does not seem to be laterally extensive. Further definition by subsurface exploration or during pit development may require re-evaluation of the pit highwall design in this zone. Continued efforts should focus on further definition of the zone of poor quality rock at the fault location and defining the character and extent of the high plasticity clay seam intersected in borehole 11C-17.

Some erosion of the North Area Pit highwalls and raveling of material onto benches would likely continue during the life of mine. The North Area Pit would expose zones of weaker rock of poor rock quality in some of the highwalls resulting in higher potential for small highwall instability problems, especially in and around the Range Front Fault.

Ground Movement Blocks. Mining of the North Area Pit would not affect the ground movement block at GSM. Pit development should relieve loading pressures in the head area and should not instigate further movement in the block. Dewatering the area may help limit water movement into the Midas Slump area which would help stabilize that area.

Closure. The operational dewatering program for the North Area Pit using dewatering wells peripheral to the pit, and/or horizontal holes drilled into the pit highwalls to drain trapped water would need to be modified at closure. During operations, any surface water runoff, precipitation, and snowmelt, along with any water collected from pit highwall dewatering wells or natural seeps in highwalls not captured by dewatering wells would be removed from the pit by pumping the water through a series of staging tanks to a common pit sump and then transferred to TSF-2 where it is used as process water. Raveling and minor failures of portions of the highwalls could threaten the pit water collection and routing system. The operational capture and routing system would need to be modified at closure.

At closure, the Northwest Sector would be left as completed during operations. Minor raveling and small wall failures could occur over time but would not present a risk to human health or the environment. The same conditions would apply for the Range Front Fault sector except this area would be expected to ravel more often. The Southeast Sector Tertiary sediments, landslide debris, mine waste, and the high-plasticity clay seam would be final graded to a 2H:1V slope, covered with salvaged growth media if needed, and revegetated. The potential for slope failure on these portions of the pit would be minimal. Erosion of the fine-grained Bozeman Group materials on the 2H:1V

southeast portion of the east highwall would be the largest potential for movement of materials.

A pit pond would be prevented from forming in the North Area Pit at closure.

South Area Layback

Operations. The South Area Layback would be developed along the southern wall of the Mineral Hill Pit resulting in an approximate 69.4-acre expansion to the existing Mineral Hill Pit to the east and south. Through completion of the South Area Layback mining operation, an estimated 44.6 million tons of waste rock and 3.0 million tons of ore would be recovered.

The South Area Layback pit would be mined to a bottom elevation of 4,800 feet (GSM datum), resulting in a pit having maximum dimensions of approximately 2,800 feet by 1,300 feet at its greatest distances. The highest slopes in the pit would be along the north portion projected to be 550 to 650 feet (elevation 5,350 GSM datum). The haul ramp is in the northeast and east wall slopes and switches back repeatedly, resulting in overall slope angles of 42 degrees in the north wall and 36 degrees in the north part of the east wall.

The South Area Layback design in terms of highwall stability is divided into three sectors defined by differing rock structure, two fault zones and the Sunlight ore vein (**Figure 3-2**). Rock mass quality is generally good with some exceptions in and near the Corridor and Telluride Fault zones and the Telluride Splay Fault. In general, weathered bedrock from the surface to a depth on the order of 100 feet exhibits increased fracturing and oxidation. The North Sector is predominantly competent bedrock consisting of quartzite and siltite. The East Sector is composed of siltite, latite, and lamprophyre dikes of lesser rock quality. The West Sector is composed of siltite, quartzite, and the Sunlight ore vein.

North Sector: Geologic data indicate east-dipping bedding and steep structural joint sets orthogonal to bedding or parallel to the Sunlight vein and Telluride Fault. Structure appears to be favorable in this sector. The uppermost bench would be developed in the hanging wall of the Corridor Fault of known poor-quality rock. Slope ratios have been reduced to 45.6 degrees in this location and local modification to the pit wall design may be required to reflect the areas of poor rock quality. Careful controlled blasting and active post-blast rock scaling would be essential to ensure worker safety and minimize potential damage to mining equipment.

East Sector: Structure is favorable for pit highwall stability in this sector. Bedding dips east into the wall at an inclination of 25 degrees and joint sets are steeply dipping either

parallel to the Sunlight vein or orthogonal to bedding. These steep joint sets are expected to control the development of bench face angles, which should enhance their stability. The uppermost two benches in the north portion of this sector would be developed in the hanging wall of the Corridor Fault associated with poor rock quality. A similar geologic setting of lesser rock quality would occur near the Telluride Fault and the Splay Fault to the south. Careful controlled blasting and scaling should mitigate rockfall concerns and stability risks associated with lower rock mass quality.

West Sector: Structure is favorable for slope stability and data indicate that bedding dips out of the slope at an angle of 15 to 25 degrees or less. Based on performance of the Mineral Hill Pit, this angle is too flat to develop structural control of slope stability as occurred in the west wall of the Mineral Hill Pit and would create planar instabilities. Dip angles of failures increased to 35 degrees at that location. A stereographic plot of structure sets shows steep northeast striking structures orthogonal to bedding and a second set that dips southeast having variable dip and dip direction. These features may control bench face angles when oriented within 30 degrees of the dip direction of the bench face.

General: During operations, effective groundwater depressurization would be required and controlled blasting techniques would be used in the mine pit development to maintain the integrity of the benches and minimize raveling to ensure the benches remain capable of containing future rock falls. GSM would mine slopes at 50 degrees for a base case with controlled blasting, and 55 degrees for an upside potential assuming the bedrock and structure quality is as favorable as geomechanics information indicates. GSM would mine slopes at a reduced slope inclination of 45.6 degrees for the upper 100 feet of weathered bedrock and within the influence zone of the Corridor Fault.

The South Area Layback would remove approximately one-half of the Swimming Pool Earth Block. Movement of this block has been attributed to loading of the lower portion of the block and not to actions affecting the head of the block. As such, the proposed South Area Layback development should relieve loading pressures in the head area and should not instigate further movement in the block (Golder Associates, 2012b).

Closure. Raveling and minor failures of the South Area Layback highwalls would occur over time but would not present a risk to human health or the environment.

TSF-2 and Embankment

Operations. Approximately 4.2 million tons of tailings generated from processing ore would be placed in TSF-2. TSF-2 is currently permitted to a minimum embankment elevation of 4,770 feet (GSM datum) and the current elevation of the embankment is at 4,762 feet (GSM datum). The Proposed Action Alternative would result in milling into year 2017 and would result in an embankment raise of 4.5 feet to elevation 4,774.5 feet

(GSM datum) (AMEC 2012). Based on previous analysis, no adverse operational geotechnical impacts from the TSF-2 expansion are anticipated.

Closure. After mining operations cease, the ponded water in TSF-2 would be drained or pumped to the south pond and the tailings surface would be capped with a minimum of 48 inches of soil on top of the tailings. The final surface of TSF-2 would have a 0.5 percent to 5 percent slope toward a drainage ditch along the west side. The capped surface would be seeded. The outside slope of the TSF-2 embankment would be reclaimed by reducing the slope from angle of repose to 2.5H: 1V. The regraded embankment surface would be covered with 16 inches of soil and seeded. Based on previous analysis, no adverse closure geotechnical impacts from the TSF-2 expansion are anticipated.

Waste Rock Storage Areas

Operations. A majority of the waste rock would be disposed of in the EWRDC expansion area with up to 44.6 million tons from the South Area Layback, and 4 million tons from the North Area Pit. A stability evaluation of the proposed EWRDC expansion was performed (Golder Associates 2012a). This evaluation included review of existing subsurface information and geotechnical monitoring data, new subsurface information obtained from four coreholes drilled within the proposed footprint of the EWRDC, geotechnical laboratory test data, and a sensitivity study of the limit equilibrium analysis.

The stability analysis reported acceptable FOS greater than 1.4 for three of four sections analyzed in the EWRDC and a FOS of 1.2 for the west slope of Section D under a potential block failure mode. No large scale or catastrophic failures were indicated by the stability evaluations performed for the proposed expansion.

Subsequent modeling of Section D for seismic displacements using the design earthquake ground motions and conservative strength data for sediments in the Tertiary Bozeman Group suggested potential slope displacements on the order of two to three feet could potentially develop. However, the estimated magnitude of movement is considered to be acceptable for non-critical mine facilities (waste rock disposal facilities) and would not impact other mine facilities.

Geotechnical recommendations incorporated into the EWRDC expansion design placed limits on the expansion footprint to avoid cultural areas, the headwaters to Sheep Rock Creek Tributary and a tributary of Conrow Creek, shallow groundwater locations near PW-79, and locations underlain by Madison Group limestone with a potential for development of karst features. In addition, GSM is required to perform operational geotechnical monitoring of inclinometers, GPS points, and groundwater monitoring of wells and piezometers during periods of active dumping. Slope stability modeling

concluded that as currently designed the planned EWRDC expansion area dump would have no effect on the stability of the Sunlight Block (Golder Associates 2012a).

Up to 6 million tons of waste rock could go to the Buttress Dump extension. This waste rock would not exceed earlier volumes of waste rock approved for the facility so no additional geotechnical evaluations were completed.

Closure. No closure geotechnical monitoring of inclinometers and GPS points was proposed for the waste rock dump areas. If ground movement occurs after closure, reclamation cover systems could be compromised allowing more infiltration into the acidic waste rock dumps.

3.2.3.3 Agency-Modified Alternative

The Agency-Modified Alternative would be similar to the Proposed Action Alternative with additional project modifications. No agency modifications are proposed for the South Area Layback and TSF-2.

No closure geodetic and geotechnical monitoring of inclinometers and GPS points is proposed, in the Proposed Action Alternative, for the waste rock dump areas or the North Area Pit. Additional remote monitoring for highwall rock failures and ground movement under the Agency-Modified Alternative may provide advanced warning of potential problems or would identify that ground movements have occurred. When highwall rock failures occur, solutions to restore pit water collection systems can be engineered. If ground movement occurs, reclamation cover systems may be compromised. Early identification of these movements and implementation of remedial measures would minimize potential increased infiltration into acidic waste rock.

For the North Area Pit, GSM would develop and provide a post-closure geodetic and geotechnical monitoring program as a contingency and in association with the design and construction of the North Area Pit water collection sump if needed. The geodetic and geotechnical monitoring would identify North Area Pit highwall failures that could compromise worker safety and safe access to the collection sump, which would improve worker safety and allow planning in the event of a likely failure. GSM would also provide a closure ground movement monitoring program that would identify if the EWRDC expansion area settled or moved laterally such that the reclamation cover system was compromised. GSM would provide conceptual plans on how the instability problems would be remedied.

3.2.3.4 North Area Pit Backfill Alternative

Closure. The raveling and minor failures of portions of the highwalls that may occur under the Proposed Action Alternative at closure would not occur under the North Area Pit Backfill Alternative. Minor settlement of the backfilled waste rock would occur over time as acid-generating waste rock weathers. Backfilling the eastern portion of the North Area Pit would add mass near the upper end of the Sunlight Block, which could decrease the stability of this landslide block. However, less material would be placed back into this area of the pit during backfilling than would be removed during mining of the North Area Pit (**Figure 2-10**), so overall effects on geotechnical stability after backfilling would be comparable to the No Action Alternative.

3.3 Soil, Vegetation, and Reclamation

The 1997 Draft EIS (DEQ and BLM 1997) described the soil and vegetation resources in the GSM permit area. The SEIS (DEQ and BLM 2007) refers to the 1997 Draft EIS and provides some additional information about the borrow source north of TSF-1 to be used to supplement soils used for reclamation.

This section discusses the soil, vegetation, and reclamation resources in the GSM study area.

3.3.1 Analysis Methods

3.3.1.1 Analysis Areas

The analysis area for soils, vegetation, and reclamation includes the GSM operating permit area of 6,051 acres. All areas to be disturbed by mining, including the North Area Pit, South Area Layback, and expanded EWRDC, are in the analysis area. The analysis area for sensitive plants and plant communities includes the area within a 10-mile radius of the mine site.

3.3.1.2 Information Sources - Soils

A mine-site soil survey was completed as part of GSM's 1995 Permit Amendment Application and included soil profile descriptions and laboratory analyses. Jefferson County soils have been mapped as part of the U.S. Department of Agriculture (USDA), County Soil Survey (USDA 2003). The major part of the USDA soil survey and mapping was completed in 1996 but the survey was not issued until 2003. The Jefferson County Soil Survey is not available as a published soil survey but is available electronically from the Montana Natural Resource Information System (NRIS) website (nris.mt.gov/). GSM also uses borrow and other nonacid producing geologic materials for growth

media. GSM Annual Reports (most recent is for 2012) contain detailed information on soil, borrow, and other growth media volumes available for reclamation.

3.3.1.3 Information Sources – Vegetation

The vegetation communities were identified in 1995 by Westech Inc. for the 1995 Permit Amendment Application (Westech 1995). An updated vegetation study was completed by Bighorn Environmental Sciences in 2011 and is Appendix H of the proposed Amendment 015 Application (GSM 2012).

3.3.1.4 Information Sources – Reclamation

The Operating and Reclamation Plan was prepared in 2010 (SPSI 2010) with revisions in February 2011 and May 2011. GSM Annual Reports (most recent is for 2012) contain detailed information that pertains to the mining, reclamation, environmental monitoring, and reclamation bonding. Reclamation is proposed for all disturbed areas including waste-rock disposal areas, tailings storage facilities, mine pits, haul and access roads, and the facilities areas. Some of the mine facilities would be left for post-mine industrial uses.

3.3.1.5 Methods of Analysis

Soil salvage and borrow replacement volumes needed for reclamation were verified. Soil and growth media quality for post-mine land use have been documented in the reclamation of over 1,000 acres to date and has not been readdressed. For vegetation, the acres of vegetation disturbed during the mine operations were evaluated and compared for each alternative. The potential to impact any recorded sensitive plant species or plant community was also analyzed. Reclamation was analyzed for the probable success of current reclamation methods. The ability of reclamation to stabilize disturbed areas and re-establish vegetation was evaluated and compared for each alternative.

3.3.2 Affected Environment

3.3.2.1 Soil Resources

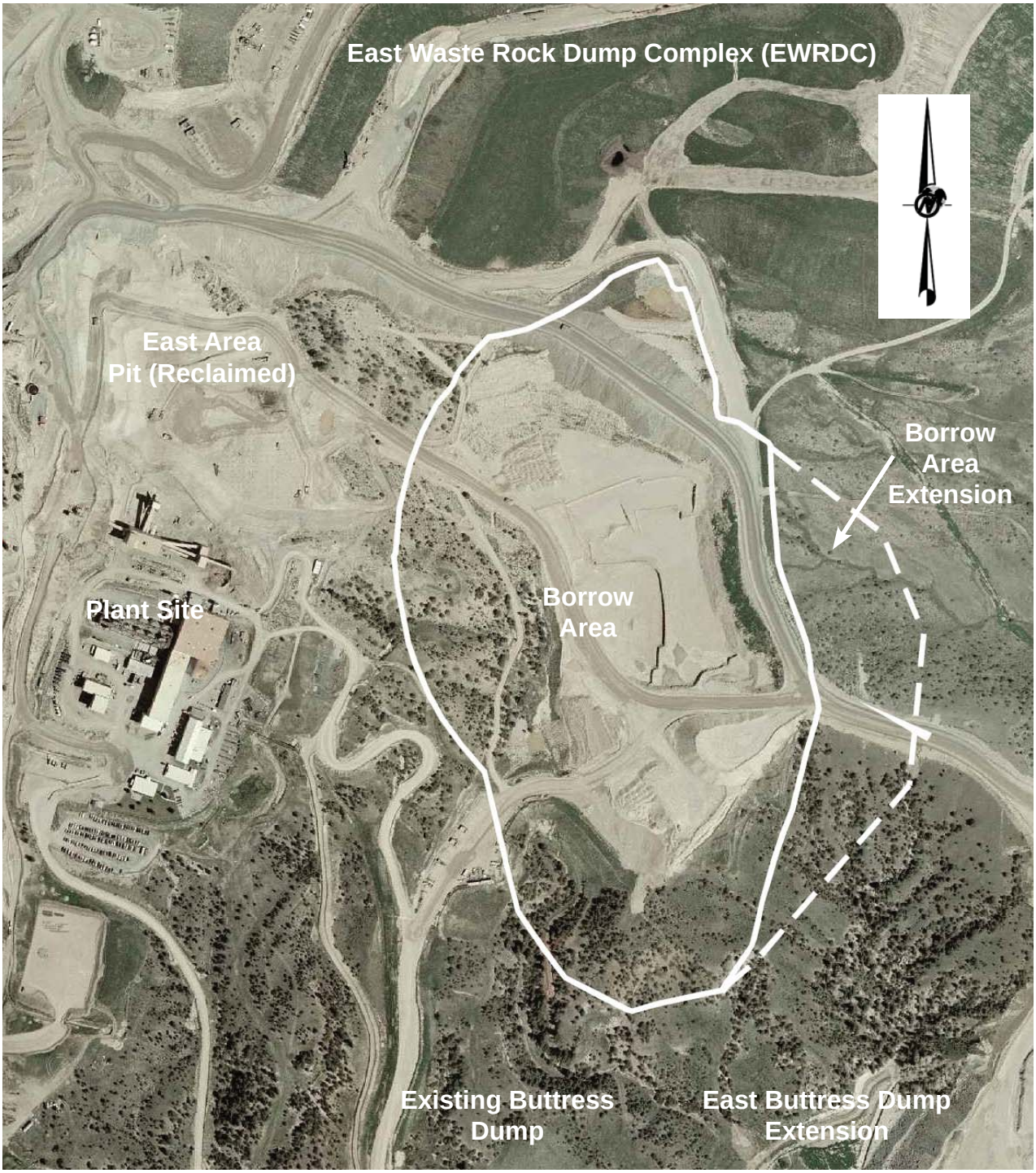
Soils around the mine site are generally characterized as rocky, shallow, and poorly developed on hillsides with 25 to 60 percent slopes. As of December 31, 2011, 2,361 acres have been disturbed, with soils salvaged from most of these areas. Some of the mine areas have soils mapped as a “Soil Complex” with part of the complex being boulder or rock outcrop. Information from the Jefferson County Soil Survey was used to identify and evaluate the dominant soil types on the mine site (USDA 2003).

DEQ policy considers soils on slopes over 50 percent as generally unsalvageable due to equipment limitations and worker safety. Depth of soil, percent of rock fragments in the soil, pH, and soil texture are the main properties used to determine the soil's use in reclamation. Soil salvage depths vary greatly from area to area but GSM is committed to salvaging all available soil. Soils used on steep slopes must contain at least 20 percent rock fragments over one inch in size to limit erosion. Removal depths are determined in the field and the equipment operators make site-specific adjustments. Salvaged soils are stockpiled for reclamation.

Available soils from the North Area Pit, South Area Layback, and EWRDC expansion area would be salvaged except for soils on slopes greater than 50 percent and from any silt-textured lake bed sediments. Soil salvage estimates for the North Area Pit and South Area Layback are not easily determined due to steep slopes. Nonacid generating rip rap material may be salvaged from the scree slopes in the North Area Pit areas and stockpiled for reclamation. GSM estimates approximately 121,000 cubic yards (CY) of soil would be salvaged as part of the EWRDC expansion area.

There is an overall shortfall of stockpiled soil for reclamation. GSM has used Bozeman Group materials for borrow for many years. GSM has identified a source of borrow material (**Figure 3-3**), that when combined with the stockpiled soil, has been used successfully as a plant growth medium. The combined volume of stockpiled soil and borrow materials would provide the volume of soils needed for final reclamation of all disturbed areas.

There is an estimated 2 feet of additional soil that would be salvaged from the EWRDC expansion area. GSM would excavate holes in the areas where soils have already been salvaged to determine if additional soil materials are available. The volume of additional soil to be salvaged in the EWRDC expansion area has not been quantified.



SCALE: 1" = 250 Feet

Figure 3-3
Borrow Pit Area Closeup

Source: Golden Sunlight Mine 2012a

3.3.2.2 Vegetation Resources

A vegetation study was completed as part of the Amendment 015 application to map vegetation communities in the undisturbed areas of the proposed North Area Pit, South Area Layback, and EWRDC expansion area (Bighorn Environmental Sciences 2011). The reasons for the recent vegetation study were to determine changes in the vegetation communities since the previous vegetation inventory (Westech 1995), inventory areas not previously surveyed, and determine presence of special status species. Primary changes in the vegetation communities since 1995 have been an increase in size and quantity of the woody plants and increased invasive or noxious weeds. No plant species of concern or special status species were identified during the 2011 vegetation inventory.

The North Area Pit vegetation was mapped as Douglas-fir/scree (big sagebrush/ bluebunch wheatgrass). Other vegetation mapping units included mountain mahogany/rock outcrop and Douglas-fir/bluebunch wheatgrass types. The forest type along the eastern edge of the proposed North Area Pit is Douglas-fir/bluebunch wheatgrass.

The vegetation in the southern part of the South Area Layback is sagebrush/bluebunch wheatgrass and Douglas-fir/bluebunch wheatgrass. The northern part of the South Area Layback contains big sagebrush growing on talus, big sagebrush and wheatgrass on talus, and Douglas-fir, without distinct boundaries between the plant communities. Other shrubs in the northern part of the South Area Layback are wax currant, mock orange, and chokecherry (Bighorn Environmental Sciences 2011).

Vegetation communities in the EWRDC expansion area consist of sagebrush, mixed shrubs, and grassland types with no distinct boundaries between them. The sagebrush community contains both low and big sagebrush. The mixed shrub type has a mixture of shrubs with an understory of grasses. The short to medium height grassland type is found in the southern portion of the EWRDC expansion area.

Noxious and other weeds have increased on the mine site since 1995 and were identified in areas to be disturbed by the Amendment 015 expansion. Although the GSM operations include a weed-control program, weed distribution has increased through continued mining and land disturbance, traffic, and from off-site sources. Noxious weeds observed in the proposed North Area Pit, South Area Layback, and EWRDC expansion area include: leafy spurge, Canada thistle, musk thistle, spotted knapweed, mullein, whitetop, and Dalmatian toadflax. Cheatgrass and black henbane (non-noxious weeds) were also present in the North Area Pit, South Area Layback, and EWRDC expansion areas.

The Montana Natural Heritage Program (MTNHP) database was queried and reported one potential plant species of concern within Townships T2N, R3W and T2N, R4W, Jefferson County, Montana. Limestone larkspur (*Delphinium bicolor*) has been verified as occurring in Jefferson County but was not identified by Bighorn Environmental Sciences during the 2011 vegetation study.

3.3.2.3 Reclamation

Reclamation, including soil salvage, soil redistribution, and revegetation, was discussed in the 2007 Final SEIS (DEQ and BLM July 2007) and in the approved Operating and Reclamation Plan (GSM 2010). GSM's mine reclamation plan is designed to return disturbed land other than open pits and rock faces to stability and utility comparable to that of adjacent areas. GSM's reclamation plan requires the regrading and revegetation of most disturbed areas to achieve post-closure land uses of grazing and wildlife habitat; some areas would be reclaimed for post-mine industrial uses.

3.3.3 Environmental Consequences

3.3.3.1 No Action Alternative

Mining causes adverse impacts to soils and vegetation. With successful implementation of the approved reclamation plan, including erosion control procedures, impacts to soils and vegetation would be minimized. According to GSM's 2012 Annual Progress Report, GSM mining operations have disturbed 2,399 acres at the mine and GSM has partially reclaimed 1,178 acres.

Impacts on soil may result from the removal and storage of soils and redisturbance during replacement after mining. Soil has been salvaged from a majority of the 2,399 disturbed acres except on most slopes steeper than 2H:1V where there are equipment limitations and worker safety issues. GSM has salvaged soil on slopes steeper than 2H:1V and with rock content that exceeds 50 percent on the west side of the mine because of the limited soil resources on less steep slopes in that area.

Specific impacts to soils under the No Action Alternative would include loss of soil development and horizons, soil erosion from the disturbed areas and stockpiles, reduction of favorable physical and chemical properties, reduction in biological activity, and changes in nutrient levels. The degree or level of these specific impacts would influence the potential success of reclaiming the disturbed areas to grazing and wildlife habitat.

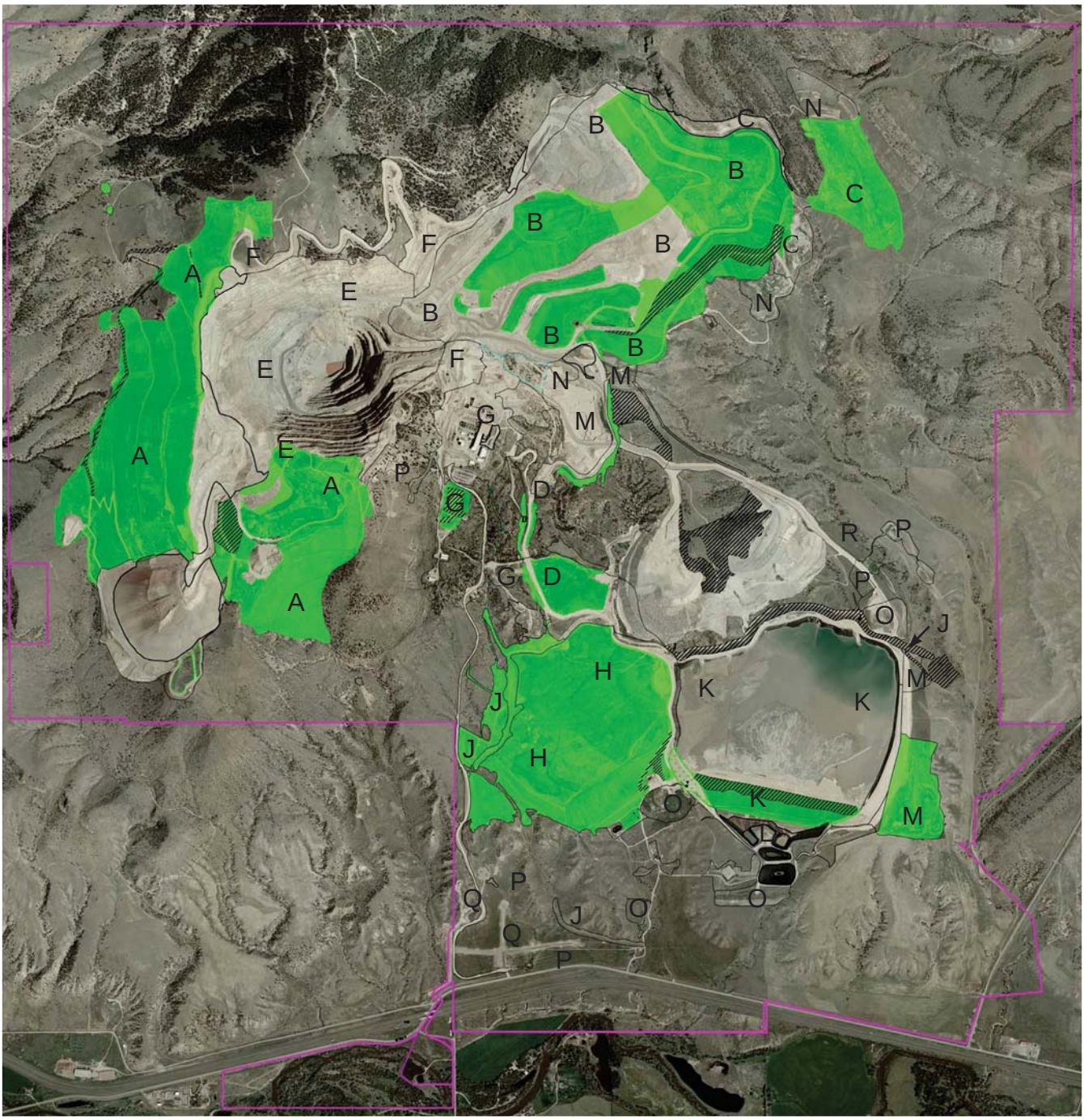
As of December 31, 2012, GSM reported a balance of 3,670,476 CY of soil needed for reclamation and a combined total of 6,392,244 CY of stockpiled soil and in situ borrow materials available for reclamation (GSM 2012 Annual Report, June 2013). GSM is required to replace approximately 31 to 36 inches of soil on 59 acres in the Mineral Hill Pit; 31 to 36 inches on most areas of the West Waste Rock Dump Complex, EWRDC, and Buttress Dumps; 48 inches on the tailings impoundments; 6 to 36 inches over the plant site; and 6 inches on the buffer areas. The soil stockpile volume is dynamic and changes yearly.

GSM identified suitable reclamation growth media in the 03 Borrow source (**Figure 3-3**). The 03 Borrow area has a higher percentage of coarse-fragment content ranging from 35 to 60 percent. The high rock fragment amounts may limit the water holding capacity and fertility but those soils have been used successfully for reclamation on steeper slopes. Some beneficial effects of the high rock fragment content soil are high infiltration, lower soil erosion, and less compaction during soil redistribution operations. Reclamation and revegetation completed at GSM do not appear to be limited by high rock fragment content in the native soils and borrow materials. Native soils on the steep slopes in the area have the same high coarse fragment contents.

GSM has reclaimed approximately 1,178 acres across the entire mine site (**Figure 3-4**). Some of the reclaimed areas have successfully re-established a grassland vegetation cover. Reclamation seed mixtures have been developed for various slope configurations and facilities. The rocky and well-drained soils used for reclamation appear to help minimize soil erosion and sedimentation from the reclaimed areas during the initial establishment periods. Specific erosion control procedures are listed in the reclamation plan. Noxious weed infestations are monitored through field reconnaissance and controlled using standard practices that are summarized in each annual report to the agencies.

GSM has not successfully reclaimed any areas to Douglas-fir or mixed shrub plant communities. Some plantings of shrubs on the revegetated grasslands have partially survived. The only successful shrubs established from seed are rubber rabbitbrush and fourwing saltbush. Fourwing saltbush has not successfully reseeded itself.

Vegetation impacts to date have included the loss of native plant communities, temporary loss of vegetation productivity and canopy cover, reduction in species diversity, and increased invasive species including noxious weeds. Salvage and replacement of soil and seeding with native species on over 1,000 acres have reduced some of these impacts but the diverse native vegetation communities have not returned. These are the unavoidable impacts of allowing soil disturbance.



Legend

- Disturbance Boundary
- Reclaimed Areas
- Permit Boundary
- Disturbed
- Un-Disturbed

Area

A West and South Waste Rock Dumps
B East Waste Rock Dumps
C East Waste Rock Dumps Misc.
D Buttress Waste Rock Dump and Road
E Mineral Hill Open Pit
F Mineral Hill Open Pit Misc.
G Facilities
H Tailing Pond #1
J Tailing Ponds Misc.
K Tailing Pond #2
L Tailing Pond #2 Process Ponds
M Borrow Areas
N Stockpiles, Mine Area
O Stockpiles , Tailing Area
P Miscellaneous
Q Jefferson Local Development Corp.
R 5BOP Buttress Dump

SCALE: 1" = 4,000 Feet

Source: Golden Sunlight Mine 2012a

Figure 3-4
Golden Sunlight Mine Disturbed and Reclaimed Areas (December 2012)

3.3.3.2 Proposed Action Alternative

Impacts to soils, vegetation, and reclamation would be similar to those described under the No Action Alternative but would apply to a larger area of disturbance. An additional 302.9 acres would be disturbed or redisturbed as part of the Proposed Action Alternative. Approximately 152.1 acres of new disturbance would be outside the permitted disturbance boundary and not previously disturbed, and 150.8 acres would be in the permitted disturbance boundary and previously disturbed. Approximately 75.4 acres of the previously disturbed land has been reclaimed.

Soil would be stripped from a majority of the 302.9 acres but not from slopes over 50 percent or from soils that developed from silt-textured lake bed sediments. Salvaging the available soil from the 75.4 acres of reclaimed land would follow the method described in Permit Revision MR 08-003 where GSM would salvage soil to within 6 inches of the original acid generating waste rock surfaces rather than from a stipulated salvaged depth (e.g., 24 inches).

Soils from areas around the EWRDC expansion area are typically fine-grained and calcareous and would be salvaged. These soils would not be used for steep slope reclamation (e.g. 2H:1V slopes) but would be used for reclaiming gentle sloping and flat areas. The higher coarse fragment content borrow materials would be used for steep slope reclamation in the EWRDC expansion area and for covering the additional acres of TSF-2. Reclamation efforts completed to date at the mine have been successful and do not appear to be limited by soil rock fragment content.

The volume of soil to be salvaged from the 302.9 acres of disturbance was not totally estimated but would be a minimum of 121,000 CY (estimated volume of soil from the EWRDC expansion area). Two feet of soil salvaged from the 75.4 acres of reclaimed land would equal about 243,000 CY. Soil salvage estimates for the North Area Pit and South Area Layback were not easily determined due to steep slopes. Nonacid generating rip rap would be salvaged from the scree slopes in the North Area Pit and stockpiled for reclamation. Salvaged soil would be placed in stockpiles and seeded with the approved seed mix for soil stockpiles.

The Proposed Action Alternative would increase the area requiring revegetation compared to the No Action Alternative by an additional 152.1 acres. The additional area would be reclaimed using methods and procedures outlined in the approved GSM Operating and Reclamation Plan. Approximately 32.3 acres of the additional 152.1 acres are buffer areas and would be used for access roads, reclamation material stockpiles, monitoring wells, power lines, pipelines, and potential borrow sources. It is not anticipated that any acid-generating material would be deposited in the buffer areas. Reclamation of the buffer areas would require some grading and ripping, prior to covering with 6 inches of soil and reseeding.

The seedbed preparation and revegetation plans for the additional areas under the Proposed Action Alternative would be nearly identical to the current plans to be used for the No Action Alternative. The mine currently has five site-specific revegetation seed mixtures designed for various slope angles and slope aspect, and for the TSF areas, buffer areas, and support areas. The seed mixtures contain predominantly native vegetation and any changes or modifications are approved at the time of seeding.

Impacts to vegetation would be similar to the No Action Alternative, except approximately 77 acres of the Mineral Hill Pit and North Area Pit highwalls would be reclaimed as rockfaces and would not be covered with soil or revegetated.

3.3.3.3 Agency-Modified Alternative

The soils, vegetation, and reclamation resources impacted by mining under the Agency-Modified Alternative would be similar to impacts described under the Proposed Action Alternative. No additional modifications are needed for soils, vegetation, and reclamation resources except that GSM would prepare a comprehensive highwall reclamation plan describing the creation of bat and raptor habitat in the North Area Pit highwalls. A plan completed under this alternative would help ensure bat and raptor habitat development is planned for and implemented.

Impacts to vegetation would be the same as listed for the No Action Alternative and Proposed Action Alternative.

3.3.3.4 North Area Pit Backfill Alternative

Backfilling of the North Area Pit would result in additional acres of 2H:1V slope revegetated landscape, compared with the Proposed Action Alternative and the Agency-Modified Alternative. Elimination of the pit highwall would prevent potential damage to revegetated areas near the base of the highwall that could otherwise be affected by highwall raveling and/or acidic storm water runoff.

3.4 Water Resources

The water resources at the Golden Sunlight Mine include surface water, seeps, springs, and groundwater. The expansion of the site to include the proposed North Area Pit, South Area Layback, and EWRDC expansion area could impact surface water due to increased sediment load depending on how stormwater is diverted to reduce water entering the pits, the amount of recharge to groundwater, impacts to groundwater quality, and the water treatment system capacity. This section will evaluate the impact of the proposed activities on the overall water resources of the site.

3.4.1 Analysis Method

The proposed amendment, annual reports, and other documents related to the site, and comments and reviews by DEQ were reviewed to evaluate the impact of the Proposed Action Alternative on the water resources.

3.4.2 Affected Environment

3.4.2.1 Surface Water

Riverine surface water features near the project area consist of the Jefferson River, Boulder River, and Whitetail Creek. Jefferson Slough contains surface water, but is generally fed by groundwater in the floodplain of the Jefferson River except during high flows. All of these features are located off the project area. In the project area, surface water generally only exists as ephemeral flow in several channels for a short period following rainfall or snowmelt. The major ephemeral channels include Sheep Rock Creek, Saint Paul Gulch, and Conrow Creek. Several unnamed tributaries exist to these major channels.

Ephemeral surface water flow from Sheep Rock Creek and Saint Paul Gulch would report to the Jefferson Slough. Ephemeral surface water flow in Conrow Creek and its unnamed tributaries reports to the Boulder River not far above its confluence with the Jefferson River.

Ephemeral drainages rarely flow, so records of flow in these drainages are rare. GSM (1995) reported flow in Sheep Rock Creek of three to four cubic feet per second (cfs) following a precipitation event during July of 1995. GSM (ibid) also noted flow in various unnamed tributaries of Conrow Creek on two occasions during May of 1995. Flow in these unnamed tributaries was estimated to be as much as four to five cfs.

Flow in the Jefferson River has been measured by the U. S. Geological Survey at several locations and for many years. The nearest long-term measuring station on the Jefferson River is approximately 32 miles downstream of the project area, near Three Forks, Montana where the mean flow is 2,750 cfs.

There are springs and seeps in the mine area, generally associated with geologic contacts, topographical depressions, bedrock fractures, and collapsed adits (SWS 2012). **Figure 3-5** shows these water features. In general, these springs and seeps flow at less than 1 gpm. The exception is Beaver Spring north of the mine, which can flow at rates of 25 gpm for a month in the spring.

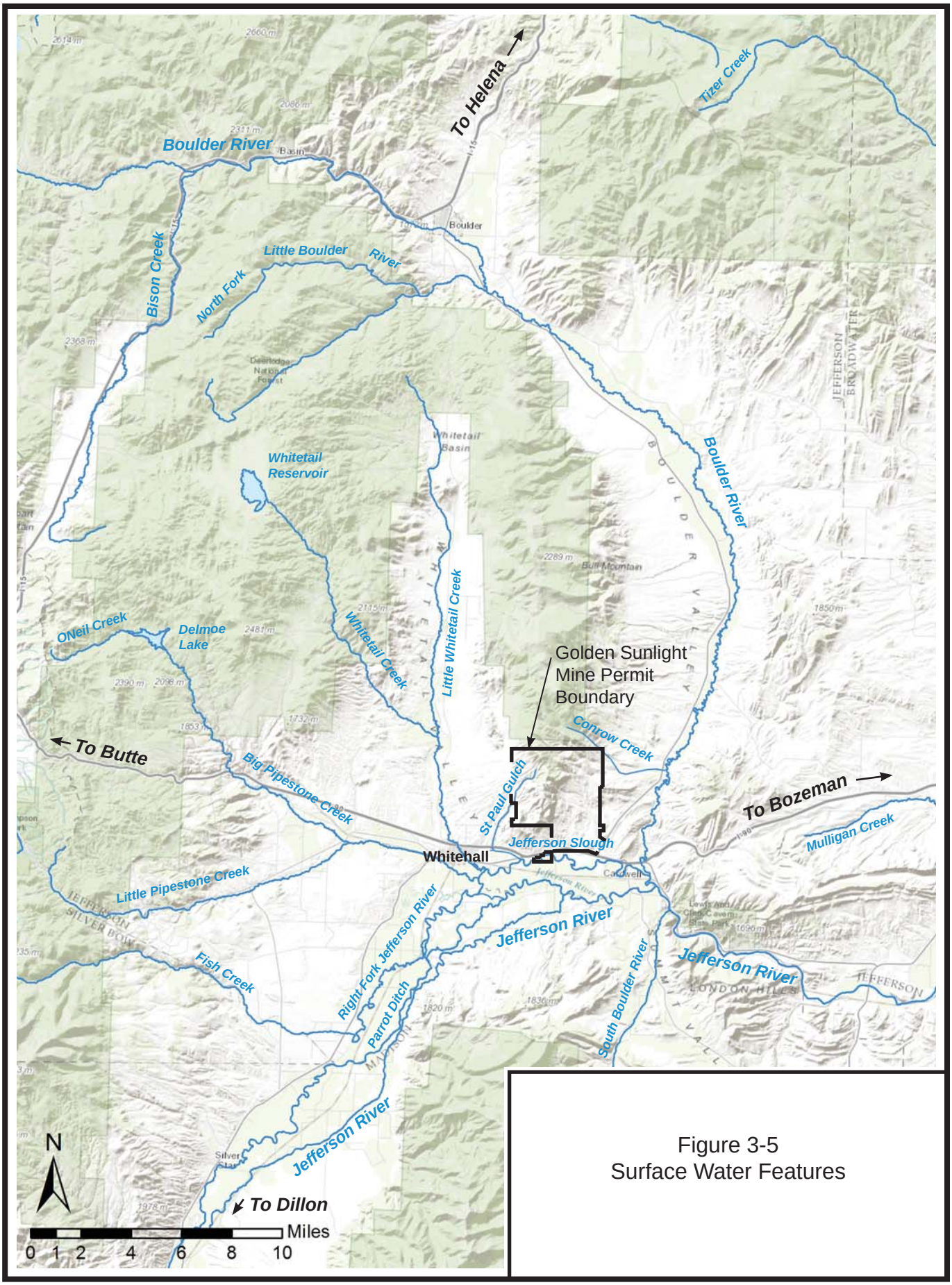


Figure 3-5
Surface Water Features

3.4.2.2 Groundwater

Groundwater in the area is present in four lithologic units:

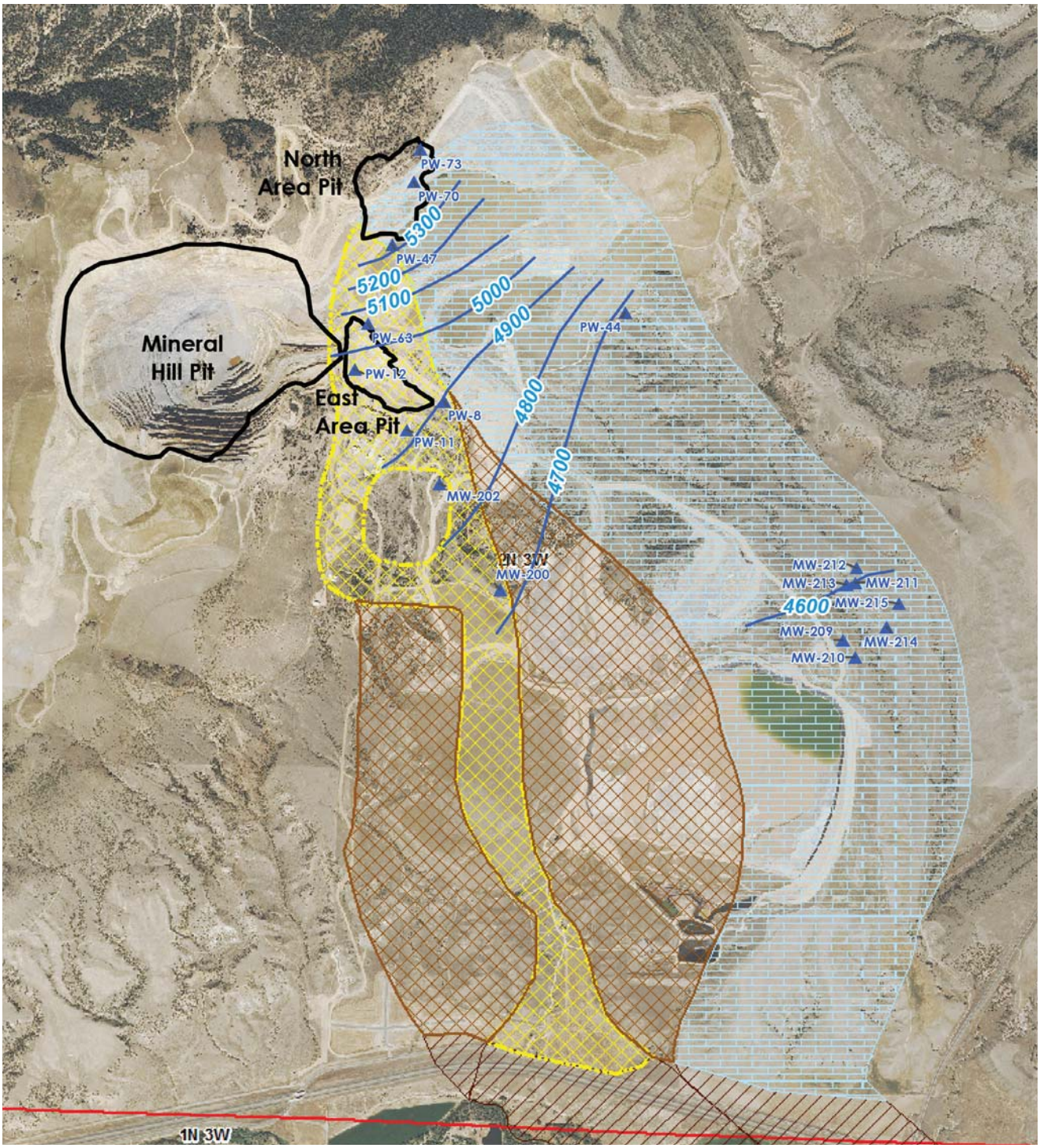
The Tertiary debris flow and landslide unit (Tdf/ls) originates in the north area. Groundwater in the unit is generally perched and discontinuous above the Bozeman Formation which has a lower permeability. In areas where the Bozeman Formation is not present, it is not clear if the Tdf/ls forms a continuous system with the bedrock. The hydraulic conductivity is estimated to be 1×10^{-3} to 1×10^{-4} centimeters per second (cm/s).

The Bozeman Group (Tb) is a combination of unconsolidated and consolidated sand, gravel, silt, and clay. Due to the high clay content this unit generally has low hydraulic conductivity on the order of 2.5×10^{-5} to 7×10^{-6} cm/s. In areas with sand and gravel lenses, the permeability can be higher locally.

Bedrock in the area has low primary permeability and high secondary permeability due to fractures. Flow rates in this unit vary from 2 to 100 gpm depending on location. The average hydraulic conductivity for this unit is 1×10^{-7} cm/s. It is believed that the bedrock system is compartmentalized into blocks that can be easily dewatered, and that in some areas the recovery from dewatering can be rapid. This would affect the dewatering rate required for the North Area Pit.

The Jefferson River alluvium is present along the southern boundary of the property and is connected to the Tertiary debris flow aquifer. The unit is composed of unconsolidated gravel, sand, and finer grained overbank and channel deposits. The approximate hydraulic conductivity is 2×10^{-1} cm/s. In general, flow in this unit is from the west with smaller amounts from the north associated with the mine site.

The primary groundwater flow paths and potentiometric surface are shown in **Figure 3-6** for the Tertiary aquifer (HydroSolutions 2012). In general, groundwater flow in this aquifer is south to southeast towards the Jefferson River. The hydraulic conductivity of the groundwater provides an indication of the rate that the water flows in the different aquifers. Therefore, travel through the Tdf/ls and Jefferson River alluvium aquifers are higher than travel times through the bedrock aquifer, which is dependent on the secondary porosity of the fractures.



LEGEND

SCALE: 1" = 2,000 feet

- Tertiary Well Completion
- 100 ft Potentiometric Contour
- Digitzed Area Features

Flowpath/Conduits

- Primary Pit Flow Path
- East Waste Rock DumpComplex Flow Path
- Alluvial Flow Path
- Secondary Pit Flow Path

(SOURCE: 2007 SEIS)

Source: Hydro Solutions - 2011

Figure 3-6
Primary Groundwater
Flowpaths

3.4.3 Environmental Consequences

3.4.3.1 No Action Alternative

Surface Water

There would be minimal environmental consequences to surface water if the No Action Alternative is selected. Current surface water drainage patterns and runoff volumes and rates would likely remain substantially as they are now. Over the long-term and as more project facilities are reclaimed and vegetation on reclaimed surfaces becomes more dense, ephemeral surface water runoff rates would likely decrease. GSM would maintain surface water runoff features on the mine site post-closure.

Groundwater

There are no additional environmental consequences to groundwater if this alternative is adopted. The groundwater flow paths would remain the same, and the groundwater pumping and capture systems on the site are already designed to address impacts from current operations. GSM would maintain groundwater pumping and capture systems post-closure.

3.4.3.2 Proposed Action Alternative

Surface Water

The Proposed Action Alternative would affect surface water in a number of ways. The proposed North Area Pit and South Area Layback extend the surface area of pits at the site. These extensions would capture rainfall and snowmelt that previously contributed to stormwater during runoff events. The proposed EWRDC expansion area and its associated diversion ditch capture and reroute stormwater and snowmelt from several unnamed drainages and route the captured flow into another unnamed drainage on the northeast side of the project area.

The proposed EWRDC expansion area changes the runoff characteristics during construction and through reclamation. During construction and prior to reclamation, the waste rock dumps would be highly permeable and unvegetated which would likely result in high infiltration with little or no surface runoff and a greater potential contribution to groundwater. Following reclamation, the soiled surface and revegetation would result in more evapotranspiration and limited surface runoff with a smaller contribution to groundwater under the facilities. Detailed descriptions of the consequences of the Proposed Action Alternative are included in the following sections.

North Area Pit

The ephemeral runoff from the undisturbed North Area Pit area generally reports to groundwater and is contained within the mine area. The proposed North Area Pit would modify drainage patterns by creating an internally draining pit on approximately 42 acres. Runoff and precipitation would be captured within the pit and would either pond and evaporate or infiltrate into groundwater. Annual potential evaporation is approximately 30 inches per year which exceeds average annual precipitation of approximately 12 to 14 inches. During operations, GSM would pump the pit sump to the treatment plant or TSF-2 if needed to operate. At closure, most of the precipitation that falls in the North Area Pit would evaporate if the pit bottom is not rocky and fractured. The pit bottom would eventually become covered with rocks raveling off the west pit walls.

At closure, if the pit bottom is rocky and if the Bozeman Group sediments do not seal fractures in the pit bottom during intense precipitation or snowmelt, precipitation and runoff are likely to encounter fractures in the bedrock and would infiltrate into groundwater. The net effect of the proposed North Area Pit would be to diminish surface runoff with a chance of increased runoff and precipitation infiltration into the groundwater under the pit.

A diversion ditch along the uphill (north) edge of the pit would capture runoff from upgradient areas and route it around the pit. Some of the diverted stormwater and snowmelt would be diverted toward Sheep Rock Creek while the remainder would be diverted toward the Jefferson Slough.

South Area Layback

The area that would become the South Area Layback consists of undisturbed ground, reclaimed ground, and portions of the existing Mineral Hill Pit. Stormwater and snowmelt from the undisturbed ground currently flows east and south toward Jefferson Slough. Precipitation and stormwater runoff within the existing Mineral Hill Pit are captured in the underground pit sump. The proposed South Area Layback would modify drainage patterns by capturing additional precipitation and runoff from approximately 19 acres that currently report to groundwater and contained within the mine area. Captured runoff would contribute to the water that would be collected in the underground sump.

EWRDC Expansion Area

Currently, the area under the proposed EWRDC expansion area consists of undisturbed ground, reclaimed ground, and small portions of existing disturbance. Stormwater runoff from this area currently drains either to Sheep Rock Creek or to an unnamed

tributary north of Sheep Rock Creek. The proposed expansion would alter runoff patterns in a couple of ways. During construction and prior to reclamation, the waste rock dumps would be highly permeable and unvegetated which would likely result in high infiltration with little or no surface runoff and a greater potential contribution to groundwater. The predicted volume of seepage from the EWRDC was estimated at 6 to 10 gpm from precipitation and run-on (1997 Draft EIS – Appendix I). The additional contribution from the expansion is estimated to be approximately 2.1 gpm. It is anticipated that it would take 33-72 years to saturate the system, and seepage would be attenuated by Bozeman Group sediments (2007 SEIS). In addition, annual evaporation rates at this site far exceed average precipitation. As a result, infiltration would occur mainly during wet years and when vegetation is dormant.

Following reclamation, the soiled surface and revegetation would result in more evapotranspiration and limited surface runoff with a smaller contribution to groundwater under the facilities. After reclamation of the EWRDC expansion area, some portion of the stormwater runoff would report to Sheep Rock Creek and its unnamed tributary to the north.

A diversion ditch along the northeast side of the EWRDC expansion area would intercept runoff from upgradient areas to the east and north of the dump and divert it into another unnamed drainage further to the north. This unnamed drainage does not appear to have a well-defined channel over much of its length and it flows to the Boulder River rather than toward the Jefferson Slough. Although the ephemeral flow is infrequent, a large storm event would result in channel cutting and sediment transport on this unnamed tributary as a result of diverting more flow into this drainage. GSM has proposed an outfall structure that would consist of an energy dissipation basin sized appropriately for the final as-built hydraulic grade break and designed flow capacity. The outfall structure and natural channel below the structure would be monitored and maintained as needed.

In summary, the proposed additional disturbance in the pits would capture more run off and precipitation, and increase potential discharges to groundwater. All water that is treated at closure would be discharged to groundwater. The increase is within the design capacity of the treatment plant - an increase of 10 gpm for the South Area Layback and an increase of 10 to 20 gpm for the North Area Pit would be captured. Water would be captured, treated, and discharged to meet groundwater standards, per GSM's existing plan.

Groundwater

The impacts of concern are ability to capture and treat water with potential degradation of groundwater quality and potential changes in groundwater flow paths.

North Area Pit

Baseline groundwater chemistry in the region of the proposed North Area Pit is highly variable and largely dependent upon the geologic unit in which individual wells are completed. Bedrock (Precambrian sedimentary rocks and Cretaceous intrusive rocks) groundwater is generally acidic with pH ranging from 3.2 up to 6.3, and contains elevated sulfate and metals concentrations. Groundwater within the debris flow/landslide deposits is slightly acidic (pH 6.3) with low metals concentrations, and groundwater within the Bozeman Group in this area is slightly alkaline (pH 7.2) with low metals concentrations.

Due to low primary permeability structural controls and lithologic contacts, the bedrock is compartmentalized and groundwater flow through the bedrock is believed to be limited. Groundwater is primarily contained in fractures within the bedrock aquifer. The majority of groundwater flow occurs along the Range Front Fault from the northeast to the southwest through the area where North Area Pit would be. Dewatering of the North Area Pit would reverse the groundwater flow path in the southern half, resulting in groundwater flowing northeastward along the Range Front Fault into the dewatering wells. Although groundwater flow is currently limited due to faulting which offsets the structures along which groundwater can move, an estimated 10 to 20 gpm currently flows southwestward along the Range Front Fault toward the primary pit flow path. It is likely that this groundwater currently either flows into the Mineral Hill Pit sump due to the cone of depression maintained in the groundwater table via continued dewatering of the Mineral Hill Pit sump, or flows toward the Rattlesnake drainage and TSF-1 capture wells. Maintenance of dewatering wells associated with the North Area Pit may intercept groundwater that currently is intercepted by the dewatered Mineral Hill Pit or other existing capture systems.

The Tertiary debris flow aquifer contains perched water, but is not believed to be continuously saturated. The Bozeman Group on the east side of the proposed pit may or may not have permeable lenses. Groundwater within the Bozeman Group likely flows to the southeast along the topographic gradient (SWS 2012) toward the EWRDC flow path. Dewatering of the North Area Pit may redirect some groundwater flow within the Bozeman Group to the northwest, reducing the volume of water moving beneath the EWRDC. This may reduce the flow of seeps such as the Midas Seep, which is currently intercepted where it discharges from beneath the EWRDC.

The North Area Pit would extend approximately 150 feet below the groundwater table, and would need to be dewatered to allow for mining. Continued dewatering would be required to prevent the contamination of groundwater from acid-producing pit highwalls. Mixing of seepage and runoff from the highwall with underlying groundwater may further lower the pH and increase metals concentrations in groundwater; however, this water would be intercepted by dewatering wells. The water

would be used as process water during mine operations, and sent to the water treatment plant post-closure. The initial dewatering rate in the bedrock would be 50 gpm but would decline to 10 to 20 gpm during mining. If pumping ceases, recharge would be fairly rapid due to the Range Front Fault and water infiltration through fractures to the north. Dewatering of the Bozeman Group would be addressed separately from the bedrock dewatering, if required. Dewatering would keep the pit dry during operations by pumping any water produced from pit seeps, precipitation, and snowmelt to the mill.

If the pit accumulates water at closure, a post-mining pit sump would be used. This would happen if dewatering is incomplete, there is flow from fractures, or there is accumulation of precipitation. To minimize groundwater impacts and maximize potential contaminated groundwater recovery, the pit would not be backfilled. The east wall in the Bozeman Group would be revegetated. The northwest wall would not be covered with soil or revegetated, but would be reclaimed to rockfaces with some bat and raptor habitat. As proposed, the pit would remain open after closure and would be pumped post-closure to comply with water quality standards.

Groundwater would be recharged from infiltration in the surrounding area and from the pit. Water that contacts the ore body and waste rock would increase impacts to groundwater. The primary control mechanism for groundwater would be to maintain dewatering long-term. The proposed post-mining dewatering plan assumes that the dewatering or a sump would keep the pit dry and that reclamation on the east side Bozeman Group 2:1 slopes would reduce infiltration. GSM has not provided detailed plans to grade and seal the pit bottom and collect and pump water to the treatment plant at closure.

Because of the compartmentalized nature of the area, and limited knowledge on the interaction between the Tdf/ls and bedrock aquifers, the impacts to groundwater from the North Area Pit should be monitored.

Any water that escapes the North Area Pit would enter the regional groundwater flow path. The groundwater flow path from the proposed North Area Pit would be influenced by the dewatering of the Mineral Hill Pit because the primary flow path would be through the Tertiary debris flow. Groundwater from the North Area Pit would be captured by the North Area Pit dewatering wells, or the dewatering of the Mineral Hill Pit or Rattlesnake drainage capture wells.

Dewatering of the bedrock around the North Area Pit would occur rapidly using a couple of dewatering wells, but additional wells could be required. If the pumps fail or do not completely dewater an area adjacent to the pit, there would be potential for more groundwater to enter the pit and for migration of impacted groundwater to the regional

groundwater flow paths. Ground water bypassing the dewatering wells, precipitation, and snowmelt would be pumped out of the pit during operations.

Based on the information available from the pump test at PW-75A, it appears that the influence of dewatering is limited to the immediate pit area or an area less than 1,000 feet diameter. The test reflects the drawdown on the west side of the Range Front Fault. The potentiometric surface shown in **Figure 3-6** (Figure 9, Appendix G, HydroSolutions 2012) for the TDf/ls aquifer could flow to the EWRDC flow path, depending on the continuity of the perched zones and potential contact between the Tertiary debris flow aquifer and the bedrock aquifer. The potentiometric surface for the EWRDC area (northeast of the North Area Pit) indicates that the flow follows the topography and flows southwesterly (**Figure 3-6**). If groundwater from the North Area Pit enters the EWRDC flow path it could enter the primary flow path and would be captured by the Rattlesnake drainage capture systems.

Degradation of groundwater quality resulting from development of the North Area Pit would be limited to the immediate vicinity of the North Area Pit. The majority of this groundwater is already of poor quality and likely currently flows into the Mineral Hill Pit sump where its quality is further reduced, or else flows toward the Rattlesnake drainage and TSF-1 capture wells. Overall, the impacts to groundwater quality would be minor and local. Impacts to long-term water management at the Golden Sunlight Mine would be slight (the 10 to 20 gpm intercepted by dewatering wells and/or pit sump would increase the volume of water requiring long-term treatment by only a few percent) and may be positive (the water intercepted may reduce the volumes of water currently intercepted in other locations such as the Mineral Hill pit sump and the Midas seep).

South Area Layback

The South Area Layback would be an extension of the Mineral Hill Pit and water from the layback area would drain into the Mineral Hill Pit and would be captured by the underground pit sump. Groundwater enters the Mineral Hill Pit area predominately through the Corridor Fault and fractures. The total additional flow from the South Area Layback would be approximately 10 gpm and would be the result of increased storm water runoff captured by the expanded pit. The current volume of groundwater pumped from the Mineral Hill Pit is 60 gpm so the additional 10 gpm would be a manageable increase.

The mining of the South Area Layback is unlikely to alter any of the existing groundwater flow paths for the Mineral Hill Pit. The dewatering system and post-closure sump are in place and the impacts from mining the South Area Layback on groundwater would be manageable under the currently approved water management and treatment plans.

Because groundwater beneath the proposed South Area Layback currently flows into the Mineral Hill Pit sump and would continue to do so after the pit expansion, no additional groundwater degradation, and no changes to groundwater flowpaths, are predicted to result from mining of the South Area Layback.

EWRDC Expansion Area

The EWRDC expansion area has an undifferentiated sedimentary bedrock unit that has produced less than 5 gpm of groundwater. A Quaternary-Tertiary undifferentiated unit with water bearing gravels has produced 15 gpm. The groundwater levels are generally 300 to 450 feet below surface. The groundwater flow is southwest, and would be part of the EWRDC flow path (**Figure 3-7**) (SPSI, 2012). Impacts to groundwater from infiltration are expected to be minimal if the design recommendations are followed to avoid sensitive areas. Water quality would be monitored in downgradient wells to confirm that water quality trends are within the predicted range of concentrations. The currently approved method for monitoring, capturing, and routing of any seeps would be applicable to the expansion area.

3.4.3.3 Agency-Modified Alternative

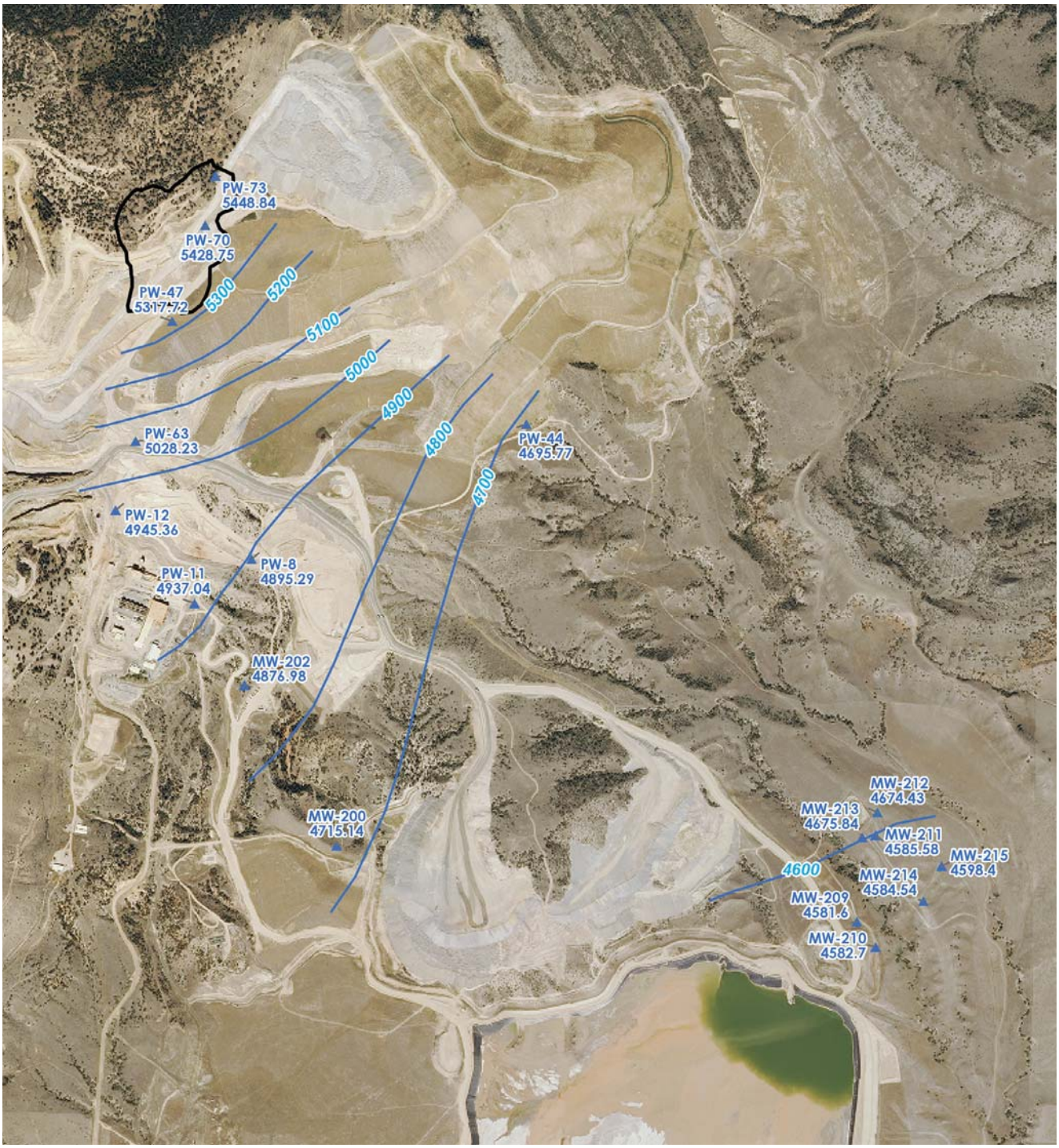
The modifications identified would result in effects similar to those described for the Proposed Action Alternative, with the following exceptions.

North Area Pit

The Agency-Modified Alternative requires GSM to develop and provide a post-closure geodetic and geotechnical monitoring program for the North Area Pit in association with the installation and operations of an in-pit sump and dewatering system. The pit sump system would be installed as a contingency or backup plan if the external pit dewatering wells fail or do not completely dewater the North Area Pit. This would allow time for planning or quicker response to a dewatering problem.

Dewatering of the bedrock around the North Area Pit would occur rapidly using dewatering wells, but additional wells could be required. If the pumps fail or do not completely dewater an area adjacent to the pit, there would be potential for groundwater to enter the pit.

The time between failure of dewatering wells associated with the North Area Pit and the initiation of discharge of contaminated water from the pit area is largely dependent upon the elevation at which a pit lake would begin to discharge either to groundwater or via surface outflow. All 12 test wells drilled within the limits of the proposed North Area Pit have static water levels ranging between 5,518 feet and 5,540 feet elevations.



LEGEND

Well Name
SWL (ft AMSL) — Tertiary Well Completion

100 ft Potentiometric Contour

Digitzed Area Features

SCALE: 1" = 1,250 feet

Source: Hydro Solutions - 2011

Figure 3-7
Potentiometric Surface For
East Waste Rock Dump Complex
(EWRDC)

The southern rim of the proposed pit would have an elevation of approximately 5500 feet; however, it is anticipated that pit inflows would be balanced by re-infiltration of the water to unsaturated bedrock along the southern pit margin prior to reaching the spill-over elevation.

The nearest monitoring wells to the south of the proposed pit area, PW-47 and PW-76, have static water levels of 5,401 feet and 5,440 feet. It is assumed that pit dewatering would result in the formation of a groundwater divide somewhere between these wells and the dewatering wells to the north; however, the potential elevation of such a divide is uncertain. To estimate the minimum time between dewatering well failure and discharge, DEQ assumed discharge would begin when the water level recovers to the 5,400 feet elevation. The proposed pit bottom elevation is 5,380 feet. Given the dimensions of the proposed pit below the 5,400 foot elevation and an assumed inflow rate of 20 gpm, the pit lake would reach this elevation in 5 to 6 months. This estimate does not take into account the time required for resaturation of bedrock within the cone of depression beneath the pit; however, both the low porosity of undisturbed bedrock and the rapid recovery times indicated by pump tests conducted on test wells within the proposed pit area indicate that the time required for groundwater to begin to enter the pit would be one to two weeks. If the groundwater divide south of the pit were higher (for example, similar to the static water level at PW-76 (5,440 feet), then it would take over 4 years for a pit lake filling at 20 gpm to reach the outflow elevation. DEQ is confident that failed dewatering wells could be replaced within the 5 to 6 month timeframe that is the estimated minimum before discharge of water from the pit area would begin. It should also be noted that installation of a temporary pump within the pit sump could occur much more rapidly.

Open pits developed below the water table in Montana have generally used both dewatering wells for groundwater interception in conjunction with in-pit sumps for the collection of storm water plus groundwater inflows, if any, that bypass the dewatering well system. These are all operational examples, as all such pits have historically been allowed to flood as soon as mining has ceased.

Keeping the pit open and not backfilling it more than is needed to collect water would assure that almost all water collecting in the pit could be collected and routed to the water treatment facility. The Agency-Modified Alternative would minimize inflows into the groundwater system from the pit.

South Area Layback

No modifications were identified. Effects would be the same as the Proposed Action Alternative.

EWRDC Expansion Area

No modifications were identified. Effects would be the same as the Proposed Action Alternative.

3.4.3.4 North Area Pit Backfill Alternative

Surface Water

All stormwater runoff would be routed out of the pit area if it is backfilled. Some of the precipitation would infiltrate the reclamation cover system over the backfill. The 2007 SEIS (DEQ and BLM 2007) estimated rates of infiltration (into reclaimed waste rock dumps, similar to the North Area Pit) to range between 0.5 inches per year and 1.1 inches per year (between 4 percent and 8 percent of average annual rainfall). This water would migrate down through the backfill but would be collected by the downgradient dewatering well(s). The overall effect on surface water from backfilling of the North Area Pit would be to provide up to 42 acres of additional reclaimed land from which storm water could run off and potentially provide additional flow into surface water bodies (Sheep Rock Creek, Jefferson Slough) during extreme precipitation events. During smaller rain or snowmelt events, all runoff from the backfilled pit would likely infiltrate to groundwater prior to reaching surface water bodies.

Groundwater

Dewatering wells in the North Area Pit perimeter could be maintained unlike dewatering wells in the Mineral Hill Pit. The geometry of the North Area Pit and the Range Front Fault through the pit allows for ease of maintaining dewatering wells, if necessary, because no dewatering well would have to be drilled in the acidic backfill. The Mineral Hill Pit highwalls are less stable than the North Area Pit highwalls would be and the Mineral Hill Pit has multiple faults running through it making long-term collection of Mineral Hill Pit water via dewatering wells much less reliable. In addition, the underground sump in the Mineral Hill Pit provides a reliable method of keeping the water level below the Mineral Hill Pit bottom and ensures the pit is maintained as a sink forcing all regional groundwater to report to the pit where it can be collected for treatment.

As noted above, a fraction (4 to 8 percent) of precipitation that falls on a backfilled, revegetated North Area Pit would infiltrate through the cover soil and result in groundwater recharge. The fate of this infiltrated stormwater would be less certain than in the unbackfilled scenarios evaluated in the Proposed Action Alternative and the Agency-Modified Alternative, because there is the potential for lateral flow along compacted layers of waste rock within the backfill. Some precipitation would be absorbed by and retained within the waste rock backfill. Some would migrate through

the backfill into the underlying bedrock near the Range Front Fault, where it could be recovered by dewatering wells completed within the fault zone to the north and south of the backfilled pit. As analyzed in the 2007 SEIS (DEQ and BLM 2007), groundwater would be buffered by the heterogeneous Bozeman Group. Because a portion of the North Area Pit would be located at the head of the EWRDC Flow Path, as defined in the 2007 SEIS, infiltration into the eastern portion of the backfilled pit may enter the underlying Bozeman Group and landslide/debris flow materials, from which it may discharge at the Midas Seep or enter the EWRDC flow path.

Assuming an average 8 percent infiltration of precipitation over the entire 42 acre backfilled pit, discharge to groundwater from the North Area Pit backfill could be as much as 2.4 gpm. Under the Proposed Action or Agency-Modified Alternatives, this volume of storm water would be slightly more and would either be collected in the pit sump or would infiltrate to groundwater. Pumping rates from the perimeter dewatering wells (predicted to be 10 to 20 gpm under the Proposed Action Alternative) would not likely be altered by the pit backfill alternative. Additional metals loading may occur due to interaction of seepage with the backfilled waste rock; however, these increases may be offset by decreased weathering of sulfide material that would remain exposed in the west highwall under the action alternatives that do not require backfill.

Because the eastern margin of the North Area Pit deposit is already overlain by a portion of the EWRDC, backfilling of the North Area Pit with waste rock is unlikely to alter metals loading to the EWRDC flow path compared with the No Action Alternative. A slight increase in metals loading to groundwater that follows the EWRDC flowpath may occur if the North Area Pit were developed then backfilled, at least when compared with the Proposed Action (no backfill) Alternative. As noted above, alternatives that include development of the North Area Pit followed by reclamation of the pit without backfilling may decrease recharge into the EWRDC flowpath compared with existing conditions because development of the pit would remove a portion of the existing waste rock dump as well as Bozeman Group sediments that currently underlie the waste rock dump near the head of this flowpath.

Overall, the North Area Pit Backfill Alternative is not predicted to substantially alter long-term groundwater management and treatment requirements when compared with the Proposed Action Alternative or Agency-Modified Alternative. Backfilling would preclude the construction of an in-pit sump, which would eliminate the option of having a second method of seepage collection in the event that the proposed dewatering wells fail. It is anticipated that any failed wells could be replaced within a reasonable timeframe such that recovery of contaminated groundwater would not be compromised. Backfilling could also eliminate the potential benefit of redirecting groundwater from the head of the EWRDC flowpath into the North Area Pit, where it could be more easily captured.

In contrast to the Proposed Action Alternative and Agency-Modified Alternative, given a backfilled pit, groundwater level recovery to a level at which discharge would occur would be more rapid and would be largely dependent on the volume of pore space within the backfill. It is assumed that compaction of the waste rock during backfill placement would decrease this pore space and that subsequent weathering of the waste rock would further decrease this volume. Assuming a 10% porosity, the water level within the backfill would reach the outflow point ten times faster than in the unbackfilled pit scenario, and discharge could begin within a month of dewatering well failure. It is unlikely that replacement wells could be installed within this timeframe, and the option of temporarily maintaining the cone of depression via pumping from an in-pit sump would not be available.

3.5 Wildlife and Fisheries

3.5.1 Analysis Methods

Habitat for Montana species of concern may be disturbed by the Proposed Action Alternative. Endangered Species Act listed or candidate species (black-footed ferret, bull trout, Canada lynx, wolverine, and Sprague's pipet) may occur in Jefferson County (US Fish and Wildlife Service 2013), but the project area does not provide suitable habitat, so they are not discussed further.

Information on species' presence is from biological field surveys in 2011 and 2012 (Garcia and Associates [GANDA] 2012), other reports for the mine, and a desktop review of available literature and databases. These sources included the Montana Field Guide (Montana Natural Heritage Program [MTNHP] and Montana Fish, Wildlife and Parks [MFWP] 2013), MTNHP Animal Species of Concern Database, Birds of North America Online (Birds of North America [BNA] 2013), and Nature Serve Explorer (Nature Serve 2013).

3.5.2 Montana Species of Concern

Table 3-1 lists the Montana species of concern tracked by MTNHP in Jefferson County whose habitat may be affected by the project. The project area does not provide suitable habitat for other wildlife or fish species of concern in Jefferson County.

TABLE 3-1
MONTANA SPECIES OF CONCERN THAT MAY BE IN THE PROJECT AREA

SPECIES	HABITAT AND GEOGRAPHIC RANGE IN MONTANA	CONSIDERATION FOR ANALYSIS
Mammals		
Black-tailed Prairie Dog (*Cynomys ludovicianus*)	Central and eastern Montana, east of the Rocky Mountains.	Project area provides suitable habitat and is located in this species' geographic range. Known to occur near the project area.
Fringed Myotis (*Myotis thysanodes*)	Likely occurs throughout Montana except for the most northern latitudes.	Project area provides suitable forest habitat and caves are in the vicinity. There are records of the species from the region around the mine.
Hoary Bat (*Lasiurus cinereus*)	All of Montana.	Project area provides suitable forest habitat and is in this species' geographic range.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	All of Montana except north-central portions of the state. Distribution is strongly correlated with available cave and mines for roosting.	Project area provides suitable forest habitat and caves are in the vicinity. There are records of the species from the region around the mine.
Birds		
Brewer's Sparrow (*Spizella breweri*)	Breeds throughout Montana where habitat is suitable.	Documented in the project area in 2011/2012.
Cassin's Finch (*Haemorhous cassinii*)	Year-round in western, central, and south-central Montana.	Documented in the project area in 2011/2012.
Clark's Nutcracker (*Nucifraga columbiana*)	Found year-round throughout Montana with the exception of the northeast portion of the state.	Documented in the project area in 2011/2012.
Ferruginous Hawk (*Buteo regalis*)	Breeds east of the Continental Divide.	The project area provides suitable breeding habitat.
Flammulated Owl (*Otus flammeolus*)	Breeds in western Montana.	May occur in coniferous forest in the project area.
Golden Eagle (*Aquila chrysaetos*)	All of Montana	Documented in the project area in 2011/2012.
Loggerhead Shrike (*Lanius ludovicianus*)	Breeds east of the Rocky Mountains.	The Project area provides suitable breeding habitat.
Long-billed Curlew (*Numenius americanus*)	Breeds throughout Montana.	The project area provides suitable grassland habitat. Known to occur near the project area.
Mountain Plover (*Charadrius montanus*)	Breeds east of the Continental Divide.	The project area provides suitable grassland habitat. Known to occur near the project area.
Peregrine Falcon (*Falco peregrinus*)	Occurs throughout Montana year-round.	Falcons nesting nearby may hunt in the project area.
Pinyon Jay (*Gymnorhinus cyanocephalus*)	Year-round resident in south-central Montana.	Has been documented near the project area.

Source: MTNHP and MFWP 2013, MTNHP Animal Species of Concern Database, BNA 2013, and Nature Serve 2013.

3.5.3 Environmental Consequences

3.5.3.1 No Action Alternative

There would be no additional effects on wildlife or fish species in or adjacent to the project area from the No Action Alternative. Areas of disturbance other than open pits and rock faces are being reclaimed for wildlife habitat. GSM is required to revegetate portions of the highwall which would serve as wildlife habitat. GSM is also required to construct bat and raptor habitat/nesting sites in the remaining highwall (DEQ and BLM, 2007).

3.5.3.2 Proposed Action Alternative

Operations. Construction and operational noise may cause a short-term, temporary disturbance. Approximately 75 acres of grassland (previously reclaimed areas) that may be used by ground nesting birds or for forage would be redisturbed. This disturbance would have a minimal effect on habitat or individuals. There is sufficient available habitat adjacent to the disturbance areas to supply adequate nesting habitat. No forest habitat used by some bat and bird species would be affected. Raptors would not be affected as no raptor nests are in or near the area where activities would occur.

Closure. Portions of the pits would be revegetated. GSM would cover 22 acres of the South Area Layback and 30 acres of the North Area Pit with growth medium and then revegetate those acres.

The remaining 23 acres of the highwalls would be reclaimed as rock faces. Bat and raptor habitat/nesting sites and mountain sheep habitat will be created in the highwalls that remain.

3.5.3.3 Agency-Modified Alternative

The Agency-Modified Alternative would have similar effects on wildlife and fisheries as described for the Proposed Action Alternative with the following modification to promote bat and raptor habitat. GSM would prepare a comprehensive bat and raptor habitat reclamation plan for approximately 19 acres along the north and west highwalls in the North Area Pit. The bat and raptor habitat would be created after mining. The bat and raptor habitat reclamation plan would be submitted to DEQ as part of the Updated Operations and Reclamation Plan.

Mining of the South Area Layback area would not result in loss of bat and raptor habitat but would provide an additional 25 acres of highwall in the south area of the Mineral Hill Pit that would be available for bat and raptor habitat.

3.5.3.4 North Area Pit Backfill Alternative

Under this alternative, the North Area Pit highwall would not be reclaimed as rock faces, which would reduce the amount of raptor, bat, and bighorn sheep habitat, while increasing the amount of grassland habitat re-established following closure. Backfilling would produce another 12 acres of revegetated habitat in the North Area Pit.

3.6 Aesthetic Resources

This section discusses the aesthetic resources in the GSM area which were addressed in the 1997 Draft EIS (DEQ and BLM 1997) and referenced in the 2007 SEIS (DEQ and BLM 2007).

3.6.1 Analysis Methods

Aesthetic resources were addressed in the earlier EIS documents which compared the existing scenic quality, viewer sensitivity, and distance zone with post-mining conditions.

3.6.2 Affected Environment

The areas around the mine support wooded mountain slopes, shrub and grass covered open ranges, and intervening river valleys. The mine is located on the southern flank of Bull Mountain at the southern tip of a prominent north-south trending ridgeline. The Jefferson Slough and Jefferson River flow west to east approximately two miles south of the mine and the Boulder River runs north to south through the valley approximately two to three miles east of GSM. The towns of Whitehall and Cardwell are each located within five miles of the mine.

The primary viewers include travelers on the major roadways, local residents, recreationists, and workers at the mine. As discussed in the 1997 Draft EIS (DEQ and BLM 1997), recreational use in the mine area includes hunting, hiking, and fishing along the Jefferson and Boulder Rivers and most users are local residents.

The GSM area contains a variety of vegetation including limber pine, Douglas-fir, and juniper trees. Open areas support a mixture of sagebrush, other shrubs, grasses, flowers, and herbaceous species.

3.6.3 Environmental Consequences

3.6.3.1 No Action Alternative

The existing mine waste rock dumps are visible from the west and east while the Mineral Hill Pit highwall and portions of the pit benches are only visible from the east. The unvegetated mine features have contrasting colors and shades compared to the vegetated natural landscape. The more pronounced horizontal and vertical lines, and geometric forms of mine features contrast with the softer and more rounded and rolling forms of the natural landscape. The mine is visible up to 15 miles from I-90 and State Highway 69.

Post-closure, portions of the highwalls and benches would remain visible. Overall visual contrasts would be reduced to a level where they are noticeable but not dominant in the landscape, following successful reclamation and revegetation of some areas of the pit highwall.

GSM was required under Stipulation 011-15 (SEIS Mitigation Measure 21) to mitigate aesthetic impacts associated with their existing mine operations. Under this stipulation, about 37 acres in the Mineral Hill Pit would be treated with the following measures to reduce the visual contrast with adjacent lands, if the work can be accomplished safely:

- End dumping and/or cast blasting will occur along the upper portion of the northwest and west highwalls, and these areas will be covered with soil, seeded, and planted with trees.
- Dozer work will be completed on the area of the west highwall that sloughed in 2005 or a replacement area approved by DEQ, and this area covered with soil, seeded, and planted with trees.
- Soil sampling on the old slide area on the northwest highwall of the Mineral Hill Pit will be completed, and this area seeded and planted with trees.
- Soil will be placed on the highwall bench above the 5,700-foot safety bench, and the area seeded and planted with trees, if it is safe to do so.
- Trees will be planted where possible on the 5,700- and 5,400-foot safety benches.

This stipulation was superceded by approval of Minor Revision 07-007 which required a portion of the west wall of the Mineral Hill Pit to be reclaimed to a 2:1 slope where it intercepted the WWRDC.

3.6.3.2 Proposed Action Alternative

Impacts to aesthetic resources would be similar to those described under the No Action Alternative but would apply to additional disturbed areas including the expanded and new pit highwalls. GSM is required to mitigate visual contrast with the adjacent lands by revegetating acres around the existing Mineral Hill Pit, if it is safe to do so. GSM has proposed to complete additional revegetation efforts on 22 acres of the South Area Layback and 30 acres of the North Area Pit by covering these areas with soil (plant growth medium) and then seeding with grasses. Some of the additional 52 acres of pit revegetation would be planted with trees to help reduce visual contrast with adjacent lands.

Mining in the South Area Layback area would do away with some of the pit areas and benches in the Mineral Hill Pit designated for revegetating and planting trees. The areas designated for revegetation but impacted by the proposed South Area Layback mining, would need to be replaced with other areas of the Mineral Hill Pit.

The north and west portions of the North Area Pit highwall would remain visible as rock faces to travelers on I-90 and State Highway 69.

3.6.3.3 Agency-Modified Alternative

The modifications for the Agency-Modified Alternative would have similar effects on aesthetic resources as described for the Proposed Action Alternative. Reclamation and revegetation practices similar to those prescribed under the No Action Alternative to mitigate aesthetic impacts from the Mineral Hill Pit would be applied to the proposed North Area Pit highwall. GSM would modify their visual mitigation plan. The modified visual mitigation plan would be due to DEQ concurrent with the first annual report, if this Alternative is selected. The additional geodetic and geotechnical monitoring and expanded creation of bat and raptor habitat in the North Area Pit highwall may slightly reduce visual impacts under this alternative compared to the Proposed Action Alternative.

3.6.3.4 North Area Pit Backfill Alternative

Under this alternative, all areas within the North Area Pit would be regraded, covered with plant growth medium, and suitable for seeding and planting with trees. Backfilling the North Area Pit would produce an additional 12 acres for seeding and tree planting that when successfully established would help reduce visual contrast with adjacent lands.

3.7 Social and Economic Conditions

3.7.1 Analysis Methods

The social and economic conditions analysis area will be Jefferson County for employment, income, and property taxes. The analysis area for other taxes will be the GSM's operation. Current and predicted rates, amounts, and percentages will be compared between the mine and the county or even state averages for context. The analysis period will include current operation (as measured by 2012 data) through the end of calendar year 2016 when the mine would go into closure under the Proposed Action Alternative.

Because impacts of the current operations are known and measureable, no modeling was done to calculate the impacts. Data from GSM, Jefferson County, and the State of Montana were used.

3.7.1.1 Issues

Employment and Income

There was public concern about the continuing employment offered by the mine and the benefits that contributed to the community and county. The mining industry frequently pays a higher than average wage, so income from mine employment is important to the economy.

Tax Revenues

GSM pays several different types of taxes and fees to the county and the state and employees pay income and property taxes. This revenue and potential changes in the amounts over time are important to the community and state.

3.7.2 Affected Environment

3.7.2.1 Employment and Income

In Jefferson County, mining is an important employment sector, accounting for 12.6 percent of the total employment in 2011, compared to 1.9 percent of the total employment in Montana (U.S. Department of Commerce 2012a). To protect the identity and trade information of business and personal identity, the Bureau of Labor Statistics does not publish mining sector annual wages and employment for Jefferson County due to the low number of proprietors. The Bureau does report that the average annual wage for a mining sector job in Montana was $80,743, higher than the overall average of

$36,543. The same trend is visible in the U.S. as a whole, where mining sector wages average $72,542 per year compared to the overall average of $49,049. One can assume that Jefferson County wages for mining are similar at least to the extent that they are higher than the average of all sectors.

Table 3-2 compares three measures of individual prosperity (unemployment, average earnings per job, and per capita income) for the overall economy. These measures are different from the mining sector information provided above.

TABLE 3-2
SELECTED EMPLOYMENT AND INCOME MEASURES, 2011

LOCATION	ANNUAL UNEMPLOYMENT[1]	AVERAGE EARNINGS PER JOB[2]	PER CAPITA INCOME[3]
Jefferson County	5.5%	$32,806	$40,047
Montana	6.6%	$39,684	$36,772
US	8.9%	$54,897	$42,433

Source: (US Department of Commerce 2012b), (US Department of Labor 2013)
1 Unemployment Rate: The sum of total unemployment divided by the sum of the labor force.
2 Average Earnings per Job: The sum of wage and salary disbursements plus other labor and proprietors' income divided by total full-time and part-time employment.
3 Per Capita Income: The sum of total personal income divided by the sum of total population.

Unemployment Rate: The number of people who are jobless, looking for jobs, and available for work divided by the labor force.

Average Earnings per Job: Total earnings divided by total employment. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included.

Per Capita Income is the total personal income (from labor and non-labor sources) divided by total population.

3.7.2.2 Tax Revenues

The individual income tax is the largest source of state tax revenue for Montana. Income tax revenue is collected primarily through withholding from wages and other periodic payments, quarterly estimated tax payments, and payments made when a return is filed. In 2012, Montana collected $898,851,201 in income tax.

The mine operates 22-hours per day, 7 days per week, with mining occurring during a 10-hour day shift and a 12 hour night shift. The mill operates 24 hours per day, 7 days per week on 12 hour shifts. GSM currently employs approximately 205 workers. Additional contract manpower is used for blasting, service, repair, maintenance,

contract mining, reclamation, and construction of mine facilities. Approximately 75 contract personnel are currently engaged at the mine (GSM 2012).

In 2012, Golden Sunlight produced 98,000 ounces of gold at total cash costs of $708 per ounce. Proven and probable mineral reserves as of December 31, 2012, were 318,000 ounces of gold (Barrick 2013). The estimated total Montana taxes paid by GSM in 2012 are shown in **Table 3-3.**

TABLE 3-3
STATEWIDE ESTIMATED TAXES PAID IN TAX YEAR 2012

	PROPERTY	METAL MINES GROSS PROCEEDS [1]	METAL MINES LICENSE	TOTAL OF SELECTED TAXES PAID
FY 2012	$1,342 million	$16.4 million	$17.6 million	$1,359.6 million

Source (MDOR 2013)
1 The Metal Mines Gross Proceeds tax is a property tax included in the total property tax.

3.7.2.3 Property Taxes

Property taxes are collected by the county based on the value of the property. In 2012, Jefferson County collected $14,533,743 in property taxes and fees (special improvement districts and fees) (Jefferson County Treasurer 2013). Property taxes collected are shared with the state of Montana.

3.7.2.4 Montana Metal Mines Gross Proceeds Tax

This tax is a property tax collected by the county treasurer. Generally, the tax base is allocated to taxing jurisdictions based on their associated relative economic impacts.

A yearly ad-valorem tax is imposed on the gross proceeds of metal mines, pursuant to MCA 15-23-801. Gross proceeds means the monetary payment or refined metal received by the mining company from the metal trader, smelter, roaster, or refinery, determined by multiplying the quantity of metal received by the quoted price for the metal and then subtracting basic treatment and refinery charges, quantity deductions, price deductions, interest and penalty, metal impurity, and moisture deductions as specified by contract.

The taxable value of metal mines is equal to three percent of annual gross proceeds. This amount is subject to local mill levies in the jurisdiction in which the taxable value of the mining operation is allocated.

3.7.2.5 Montana Metal Mines License Tax

Metal mining operations are subject to a license tax, based on the gross value of the product. Revenue from this tax mostly goes into the general fund (58 percent) and counties experiencing fiscal and economic impacts under an impact plan (24 percent), while the rest is split up into the abandoned mines, reclamation and development grants, and hard rock mining impact trust.

3.7.3 Environmental Consequences

3.7.3.1 No Action Alternative

Employment and Income

By 2015, GSM would temporarily suspend or permanently cease operations resulting in layoff of a trained work force. **Table 3-4** displays GSM's estimated salaries, wages, bonus, and fringe benefits that would be paid during the life of mine under the No Action Alternative. Employees pay income tax to the state of Montana on the salary, wages, and bonuses. Additionally, employees' real property (largely within Jefferson and Silver Bow Counties) is taxed with revenue going to the county.

TABLE 3-4
ESTIMATED EMPLOYMENT COSTS UNDER NO ACTION ALTERNATIVE

	2012	2013	2014	2015	2016
Salaries	$3,633,480	$4,116,576	$3,170,024	$1,154,752	$0
Wages	$8,461,683	$9,228,432	$5,905,628	$1,814,662	$0
Wages Premium Operations	$1,163,806	$714,323	$499,865	$13,709	$0
Restricted Share Units (RSU)	$195,409	$253,405	$253,405	$0	$0
Bonus Expense- Year End/Bos	$553,726	$148,583	$125,673	$48,247	$0
Bonus Expense- Production/Safety	$652,873	$1,381,643	$909,540	$260,348	$0
Employee Severance / Redundancies	$61,635	$61,636	$2,596,636	$2,545,273	$0
Fringe Benefit (Allocation)	$4,994,774	$5,764,326	$3,925,962	$1,223,080	$0
	$19,717,386	$21,668,924	$17,386,733	$7,060,071	$0

Estimates provided by GSM, June 18, 2013.
Metal production subject to the metal mines license tax is exempt from Resource Indemnity and Groundwater Assessment Tax. (MDOR 2013)

Tax Revenue Paid by the GSM

GSM would continue to pay taxes for two years at a rate similar to what was paid in 2012. **Table 3.5** shows the estimate tax contribution GSM would make over the period of 2012 through 2017 under the No Action Alternative.

TABLE 3-5 GSM ESTIMATED TAXES PAID 2012 THROUGH 2017 UNDER NO ACTION ALTERNATIVE						
	PROPERTY	METAL MINES LICENSE		METAL MINES GROSS PROCEEDS		TOTAL RANGE
2012 (actual)	$656,750	$2.374 million		$1.921 million		$4.952 million
	Projected	Price of Gold				
		$1,300/oz.	$1,700/oz.	$1,300/oz.	$1,700/oz.	$1,300-$1,700/oz.
2013	$592,800	$2.299 million	$3.009 million	$1.723 million	$2.254 million	$4.615-$5.855 million
2014	$703,200	$1.623 million	$2.125 million	$1.217 million	$1.592 million	$3.544-$4.420 million
2015	$130,000	$0.499 million	$0.654 million	$0.376 million	$0.492 million	$1.005-$1.2760 million
2016	$416,600	$0	$0	$0	$0	$0.416 million
2017	$65,000	$0	$0	$0	$0	$ 0.065 million

3.7.3.2 Proposed Action Alternative

Employment and Income

Employment at the mine would be extended for two years for the current work force. It is not anticipated that the number of employees would increase.

Table 3-6 displays GSM's estimated salaries, wages, bonuses, and fringe benefits that would be paid during the life of mine under the Proposed Action Alternative. Employees pay income tax to the state of Montana on the salary, wages, and bonuses. Additionally, employees' real property (largely within Jefferson and Silver Bow Counties) is taxed with revenue going to the county.

TABLE 3-6 ESTIMATED EMPLOYMENT COSTS UNDER PROPOSED ACTION ALTERNATIVE					
	2012	2013	2014	2015	2016
Salaries	$3,633,480	$4,409,880	$4,409,880	$4,409,880	$1,879,743
Wages	$8,461,683	$9,228,432	$9,228,432	$9,436,104	$3,430,686
Wages Premium Operations	$1,163,806	$714,323	$714,323	$714,323	$296,219
Restricted Share Units (RSU)	$195,409	$253,405	$253,405	$0	$0
Bonus Expense- Year End/Bos	$553,726	$148,583	$148,583	$148,583	$75,655
Bonus Expense-Production/Safety	$652,873	$1,381,643	$1,381,643	$1,381,643	$529,276
Employee Severance / Redundancies	$61,635	$61,636	$61,636	$10,273	$5,070,000
Fringe Benefit (Allocation)	$4,994,774	$5,884,580	$5,884,580	$5,969,726	$2,298,726
	$19,717,386	$22,082,483	$22,082,483	$22,070,532	$13,580,305

Estimates provided by GSM, June 18, 2013.

Tax Revenue

There would be tax revenue for two additional years compared to the No Action Alternative. GSM would continue to pay taxes for four years at a rate similar to what was paid in 2012. **Table 3-7** shows the estimate tax contribution GSM would make over the period of 2012 through 2017 under the Proposed Action Alternative, depending on the price of gold.

TABLE 3-7
GSM ESTIMATED TAXES PAID 2012 THROUGH 2017 UNDER PROPOSED ACTION ALTERNATIVE

	PROPERTY	METAL MINES LICENSE		METAL MINES GROSS PROCEEDS		TOTAL RANGE
2012 (actual)	$656,750	$2.374 million		$1.921 million		$4,951,750
Projected	Price Of Gold	$1,300/oz.	$1,700/oz.	$1,300/oz.	$1,700/oz.	$1,300-$1,700/oz.
2013	$651,600	$2.299 Million	$3.009 Million	$1.723 Million	$2.254 Million	$4.677 - $5.915 Million
2014	$703,200	$1.997 Million	$2.614 Million	$1.497 Million	$1.958 Million	$4.197 - $5.275 Million
2015	$652,000	$1.268 Million	$1.660 Million	$0.951 Million	$1.244 Million	$2.871 - $3.556 Million
2016	$255,000	$1.304 Million	$1.707 Million	$0.978 Million	$1.280 Million	$2.538. -$3.242 Million

Projected taxes paid are indicated for the year they would be generated. Actual payment would be later.

3.7.3.3 Agency-Modified Alternative

The effects of the Agency-Modified Alternative on social and economic conditions would be the same as described for the Proposed Action Alternative.

3.7.3.4 North Area Pit Backfill Alternative

This would be similar to the Proposed Action Alternative with some minor differences in cost. Hauling backfill material from the South Area Layback to the North Area Pit would decrease truck hauling distance and cost, including Employment Costs (**Table 3-6**). However, scheduling issues may mean double handling of any stockpiled ore near the mill and some increased employee cost.

Cumulative, Unavoidable, Irreversible and Irretrievable, and Secondary Impacts

4.1 Cumulative Adverse Impacts

Cumulative effects are the collective effects on the human environment when considered in conjunction with other past, present, and future actions by location and generic type. Cumulative impact analysis under the MEPA Model Rules requires an agency to consider all past and present state and non-state actions. For future actions, an agency need evaluate only those actions under concurrent consideration by any state agency. Concurrent actions include state agency actions through pre-impact statement studies, separate impact statement evaluation, or permit process procedures. Analysis of cumulative environmental effects includes other actions that are related to all action alternatives by location or generic type, recognizing that effects on biological resources, socioeconomics, water, and other resources might be manifested beyond the project site.

The geographical extent of the study area was selected for each resource evaluated in this EIS based on the extent and duration of anticipated effects caused by the Proposed Action Alternative. The cumulative effects region of influence includes all areas in which planned or expected actions might affect one or more study areas.

Resource	Study Area
Geotechnical Engineering	Permit boundary
Soil, Vegetation, and Reclamation	Permit boundary
Groundwater and Surface Water	Permit boundary, Sheep Rock Creek, and Jefferson River Slough
Wildlife	Permit boundary
Social and Economic	Jefferson County
Aesthetics	Permit Boundary

The purpose of this cumulative effects analysis is to ensure that DEQ's decisions consider the full range of effects of its action on the human environment.

Future actions near the project area are described in Section 2.8. Present and past actions near the mine that may have similar impacts include mining, reclamation, grazing, hunting, general recreation, weed management, fire and fuel mitigation, and road maintenance. DEQ evaluated the following sources for the most up-to-date information regarding ongoing projects and activities in the mine area:

- DEQ Environmental Management Bureau regarding new hardrock mines or small miners (Rolfes 2013). The Butte Highlands Joint Venture has a signed memorandum of understanding (MOU) with GSM (January 5, 2010) for processing ore from the Butte Highlands Project at the GSM mill. Cumulative effects from the proposed Butte Highlands Mine are discussed below.

- DEQ Industrial and Energy Minerals Bureau regarding opencut mining sites (Mapping DEQ's Data Website, Montana DEQ, July 5, 2013). Three permitted opencut mining sites are located south and east of Whitehall, MT in the Jefferson River valley. The opencut mines are about 4 miles from the Golden Sunlight Mine. No cumulative effects would be expected.

- DEQ regarding the reprocessing of legacy mine waste rock and tailings from abandoned mine reclamation projects in the area (Rolfes 2013). Cumulative effects from the processing of the legacy mine wastes are discussed below.

- Jefferson Local Development Corporation regarding use of existing Sunlight Business Park and other areas of the mine after closure (Harrington 2013). Cumulative effects from the development of the Sunlight Business Park and use of other areas of the mine after mine closure are discussed below.

The following projects or activities were identified as reasonably foreseeable in the cumulative effects study area for the mine: (1) processing of the proposed Butte Highlands Mine ore, (2) reprocessing of legacy mine wastes from reclamation of abandoned mines in the area, and (3) development of the GSM Industrial Park by the Jefferson Local Development Corporation and use of some mine facilities after closure. Only the projects in the resource study areas that affect those resources are discussed for these projects or activities.

Proposed Butte Highlands Mine

The Butte Highlands mining project is owned and operated by the Butte Highlands Joint Venture (JV), LLC. The mine has not proposed building an on-site mill therefore the ore would need to be transported to another mill for processing. An MOU was signed by the Butte Highlands JV and GSM on January 5, 2010 for processing the Butte Highlands Project ore at the GSM mill facility. However, the MOU is not binding and the Butte Highlands Mine could process their ore at a different mill or build their own mill. The Butte Highlands mine project is currently proposed as a five year project with an additional year for development before mining starts. Additional mineable ore resources could be identified to extend the mine life. Processing the Butte Highland ore at GSM would cumulatively affect social and economic considerations but would have minimal effects on geotechnical engineering; soils, vegetation, and other reclamation resources; groundwater and surface water resources; wildlife; and aesthetic resources. The amount of ore currently proposed to be removed from the mine would be 1.2

million tons over a five year period. The ore would add less than three percent to the tailings in TSF-2.

Social and Economic Considerations. If the Butte Highlands Mine decides to use the GSM mill facility to process their ore, the mill could retain a small staff and other areas of the mine would remain operational beyond the time period for the Proposed Action Alternative. The volume of ore from the Butte Highlands Mine (i.e. 400 tons/day) to be processed would not be sufficient to keep the GSM mill (i.e. 7,000 tons/day) operating by itself. The GSM employees would continue to pay taxes and help benefit local businesses by purchasing goods and services in the area. Depending on the agreement with GSM, either GSM or Butte Highlands could pay additional Mineral Mines License Tax or Resource Indemnity and Groundwater Tax, and Metal Mines Gross Proceeds Tax. Information is not available to estimate the increased taxes, or when or where they would be paid.

Soils, Vegetation, and Reclamation. The mill processing of Butte Highlands Mine ore could require some GSM mine areas to remain operational beyond the estimated two more years for the Proposed Action Alternative. Tailings could continue to be generated and would require disposal in TSF-2, delaying final reclamation of TSF-2. A continued need for water in the mill processes would delay the need to construct a post-mining water treatment plant. The cumulative effects on soil, vegetation, and reclamation caused by the Butte Highlands Mine ore processing would be the same as those described for the Proposed Action Alternative, although the effects could extend into the future if mixing of Butte Highlands ore can be done operationally while GSM is still mining Mineral Hill Pit, North Area Pit, and South Area Layback ores, or if processing of legacy waste rock and tailings, or stockpiled low grade ores continues. The overall affect would be minimal as only approximately 1.2 million tons of ore from Butte Highlands could be processed. This is about 1.8 percent of the total ore produced at GSM to date.

Reclamation of Abandoned Mines

Numerous abandoned hardrock mine sites with waste rock piles and tailings are located near the mine. Several previous abandoned mine reclamation projects in the area have hauled legacy mine wastes to the mine for processing.

Social and Economic Considerations. Continued reprocessing of legacy mine wastes from abandoned mine reclamation projects in the Mine area could provide some continued operations for the GSM mill to process the ore, but the volume of legacy mine wastes would not be of sufficient quantity to keep the mill operating without other sources of ore. Depending on the reclamation schedules, the GSM mill could retain mill facility staff beyond the 2 year extension for the Proposed Action Alternative. Mill facility workers would continue to pay taxes and help benefit local businesses by

purchasing goods and services in the area. GSM would continue to pay taxes on the revenue generated from this reprocessing when necessary. Historically, the cost of the reprocessing has equaled the value of the minerals obtained, but without other sources of ore, the volume of legacy mine waste would not be sufficient to keep the mill operating.

Soils, Vegetation, and Reclamation. The mill processing of the legacy mine wastes could require some mine areas to remain operational beyond the period for the Proposed Action Alternative. An area for handling the legacy mine waste could remain unreclaimed and tailings could continue to be generated. Final closure and reclamation of TSF-2 could be delayed.

Development of the GSM Industrial Park and Other Post Mine Uses

The 48.2-acre Sunlight Business Park along the south side of the GSM permit area currently has thirteen lots in Phase 1 of a planned 200-acre Business Park. The land use was changed from mining to light industrial use and the Business Park has all zoning and infrastructure approvals for development. An additional 10 acres could be added to the 48.2 acres if needed. Potential businesses that would locate in the Sunlight Business Park are warehouses and construction companies.

An MOU has been executed between the Jefferson Local Development Corporation (JLDC) and GSM to be implemented at the end of mining. The MOU states that the JLDC would be allowed to complete an assessment and inspection of all buildings and infrastructure on the mine and determine which facilities would be donated and transferred for reuse by the JLDC. The MOU also contains a tabulated list of mine facilities designed to remain after mine closure.

Social and Economic Considerations. If the Sunlight Business Park is a successful venture, additional property taxes and income taxes may be collected by the county and the state. Information is not available to estimate the increased taxes, or when or where they would be paid. A successful Business Park and reuse of buildings and areas on the mine would lessen impacts to social and economic resource areas after mine closure.

4.2 Unavoidable Adverse Effects

4.2.1 Geotechnical Engineering

Under the Proposed Action Alternative and Agency-Modified Alternative, a new North Area Pit would be created and the South Area Layback in the Mineral Hill Pit would be developed. The mine expansion would result in additional pit highwall areas that would expose weaker rock in some of the highwalls resulting in potential short-term

highwall instability in small localized portions of the pits. See the discussion in Section 3.3, Geotechnical Engineering.

4.2.2 Soil, Vegetation, Reclamation

Loss of soil development, soil compaction, soil erosion from the disturbed areas and stockpiles, reduction of favorable physical and chemical properties, reduction in biological activity, and changes in nutrient levels are adverse soil impacts that cannot be avoided. The degree, level, and timeframe of impacts determine, in part, the potential success of reclaiming the areas to forested areas, grazing lands, and wildlife habitat. Revegetated communities would develop comparable vegetation productivity and canopy cover but the species diversity of the premine plant communities would not be reestablished. Native species reestablishment would be limited by the indirect impacts from weed control programs.

4.2.3 Groundwater and Surface Water Resources

The creation of the 49.4 acre North Area Pit and expansion of the Mineral Hill Pit by 69.4 acres with the South Area Layback would increase the surface water catchment areas of the open pits. The increased capture and diversion of surface water by the open pits would be an unavoidable adverse impact to existing surface water flows, and captured surface water and groundwater reporting to the North Area Pit would need to be treated in the water treatment plant. Treated water could be released to groundwater.

4.2.4 Wildlife

There would be no unavoidable adverse impacts on wildlife as the Proposed Action Alternative is a short-term continuation of current activities. Impacts to wildlife populations may never return to pre-mine levels because of mine disturbances. Some raptor and bat habitat would be created on the South Area Layback and North Area Pit highwalls.

4.2.5 Aesthetics

The mine expansion alternatives would result in additional exposed pit highwalls in the Mineral Hill Pit and North Area Pit areas creating additional visible highwalls that would contrast with the adjacent hillsides and mountain slopes. Under the North Area Pit Backfill Alternative, visual impacts would be reduced for the North Area Pit. The additional visual impacts would be unavoidable adverse impacts. The visual contrasts could be reduced by successful establishment of vegetation and trees on the highwall benches and slopes but the pre-mine terrain and appearance cannot be reestablished.

4.2.6 Social and Economic Considerations

Social and economic changes in Jefferson County would include the long-term adverse impact of the loss of approximately 200 full-time jobs in Jefferson County in 2015 under the No Action Alternative and two years' mineral taxes compared to the retention of these jobs if the operation ran to 2017 under the Proposed Action, Agency-Modified, and North Area Pit Backfill alternatives. Ultimately, southern Jefferson County residents would be adversely impacted at a personal level by loss of wages, and county government would be impacted by the loss of royalty and tax income.

4.3 Irreversible and Irretrievable Commitment of Resources

Irreversible resource commitments are generally related to the use of nonrenewable resources, such as minerals or cultural resources, and the effects this use could have on future use options. Irreversible commitments are usually permanent, or at least persist for a long time. Irretrievable resource commitments involve a temporary loss of the resource or loss in its value.

Irreversible or irretrievable commitments of resources are described below for those disciplines where they were identified. Irreversible or irretrievable commitments of resources were not identified for several disciplines, including geotechnical engineering and socioeconomics.

4.3.1 Soil, Vegetation, Reclamation

The impacts to soil would be considered irreversible because natural soil development and mine soil redevelopment are continual processes, but would take decades. The redeveloped mine soils could ultimately achieve a similar level of soil quality as the premine soils.

Irretrievable impacts to vegetation resources would occur under all EIS alternatives. Soil and nonacid generating geologic materials would be salvaged and redistributed over most areas, and all covered areas would be reseeded with the approved reclamation seed mixtures. As a result, the loss of soil and vegetation habitat would not likely be permanent. Noxious weeds and weed control would increase and would decrease native species in reclaimed communities. Pit highwalls reclaimed as rock faces would not be soiled and vegetated. Loss of vegetation on the acid-producing rock faces would be irretrievable. Diverse native plant communities would be lost because of the presence of aggressive invasive species as well as indirect losses due to weed control efforts.

4.3.2 Groundwater and Surface Water

Groundwater would be contaminated as it flows through the pit areas and the EWRDC expansion area. GSM would have to collect and treat contaminated groundwater long-term at the water treatment plant. No irreversible commitments of groundwater have been identified.

The new North Area Pit and the expanded Mineral Hill Pit would increase the surface water catchment areas by approximately 105.8 acres. The loss of surface water flows to the GSM drainages would be an unavoidable impact.

4.4 Regulatory Restrictions

Alternatives and mitigation measures are designed to further protect environmental, cultural, visual, and social resources, but they also add to the cost of the project. MEPA requires state agencies to evaluate the regulatory restrictions proposed to be imposed on the proponent's use of private property (Section 75-1-201(1)(b)(iv)(D), MCA). Alternatives and mitigation measures required by federal or state laws and regulations to meet minimum environmental standards do not need to be evaluated for extra costs to the proponent.

A regulatory restrictions analysis was performed for the mine operations in the 1997 Draft EIS and referenced in the 2007 SEIS. Costs for the No Pit Pond Alternative, Partial Pit Backfill Alternatives, and Underground Sump Alternative were provided and referenced in those documents.

All of the components of the Agency-Modified Alternative that might be imposed by DEQ are required by federal or state laws and regulations to meet minimum environmental standards and therefore do not need to be evaluated for costs. The complete description of the Agency-Modified Alternative DEQ may adopt is provided in Section 2.4.

Comparison of Alternatives

5.1 Comparison of Alternatives

Table 5-1 (on page 5-5) summarizes important components of the alternatives and the effects of implementing each alternative. Information in **Table 5-1** quantitatively or qualitatively lists effects among the No Action Alternative (status quo), Proposed Action Alternative (Amendment 015 Expansion), the Agency-Modified Alternative, and the North Area Pit Backfill Alternative.

The alternatives compared are described in detail in Chapter 2 and summarized below.

5.1.1 No Action Alternative

GSM's Operating Permit No. 00065 was issued by the Department of State Lands, now DEQ, on June 27, 1975. Operating Permit No. 00165 has been modified a number of times since then, including major amendments allowing expansion. The most recent modification, Amendment 14, was approved in November of 2010. The No Action Alternative consists of the current approved operating plan, including all previously approved major and minor amendments and revisions through Amendment 014.

The main mine facilities include the Mineral Hill Pit, milling and ore processing complex, two tailings storage facilities (one active and one decommissioned), and five rock disposal areas located east, west, and south of the Mineral Hill Pit. Mine support facilities include maintenance shops, an assay lab, fuel bays, a blasting contractor facility, administration buildings, and other infrastructure such as roads, water tanks, and power lines.

5.1.2 Proposed Action Alternative

GSM proposes to expand its mining operations by extracting ore at a new North Area Pit and at an expansion of the Mineral Hill Pit known as the South Area Layback (**Figure 2-3**). The mine expansions would allow GSM to mine approximately 4.2 million tons of additional ore, to be processed at the existing mill. Mining at the North Area Pit and the South Area Layback would generate up to 52.6 million tons of waste rock. All proposed facilities are on land owned by GSM.

Up to 48.6 million tons of acid-producing waste rock from the North Area Pit and South Area Layback areas would be placed in the EWRDC expansion area (**Figure 2-3**). Up to 6 million tons of waste rock could also be placed in the Buttress Dump extension. Approximately 4 million tons of non-acid generating waste rock from the Bozeman Group/Landslide Debris material excavated from the east wall of the North Area Pit

would be stockpiled and used for reclamation growth media materials. GSM would not salvage some fine-grained lake bed sediments in the east wall of the North Area Pit.

Mining activity at the North Area Pit and South Area Layback would be completed in late 2016 or early 2017. The proposed amendment would extend the mine life by approximately two years beyond the current operating permit. GSM also processes off-site ore in their mill, mostly from legacy mining materials in southwest Montana. The proposed amendment would facilitate an additional two years of processing these legacy materials, depending on gold prices and grade of the materials.

5.1.3 Agency-Modified Alternative

Modifications to the Proposed Action Alternative are discussed in Section 2.4. Specific modifications would be incorporated into the Agency-Modified Alternative to address specific issues. Modifications are described below.

Issue 1: Implement Closure Geodetic and Ground-Movement Monitoring for the North Area Pit and EWRDC expansion area to ensure safe access and to keep reclamation cover systems working

Agency Modification:

1. GSM would develop a conceptual post-mining geodetic and ground-movement monitoring plan. For the North Area Pit, the post-mining geodetic and ground-movement monitoring would be completed in combination with installation and operations of a contingency internal pit sump to ensure worker safety.

Issue 2: Wildlife mitigations; documentation of loss of bat and raptor habitat in the Mineral Hill and North Area Pits and plan for replacement of habitat

Agency Modification:

1. GSM addressed replacement of bat and raptor habitat in the Mineral Hill Pit under the No Action Alternative and this plan would apply to the South Area Layback area. GSM would provide a more detailed plan for creating bat and raptor features for the North Area Pit in an updated Operations and Reclamation Plan.

5.1.4 North Area Pit Backfill Alternative

Under the North Area Pit Backfill Alternative, the North Area Pit would likely be mined before the South Area Layback. Ore extracted from the North Area Pit would be stockpiled in the mill area. During preparation for and mining of the South Area Layback, up to 9.2 million tons of the 44.6 million tons of acid producing waste rock from the South Area Layback would be used to backfill the North Area Pit rather than hauling the waste rock to the EWRDC expansion area or the Buttress Dump extension.

The North Area Pit would be backfilled to achieve a 2H:1V waste rock dump slope from the top of the pit west highwall. The 2H:1V waste rock dump slope would toe into the east wall of the North Area Pit. Final adjustments would be needed to ensure the backfilled pit would be free-draining to prevent precipitation and snowmelt from collecting in the pit area where it may infiltrate into underlying acid-producing waste rock. If the surface flow of precipitation and snow melt could not be routed safely to drainages below acid-producing waste rock, then the water would be routed to a lined pond and gravity fed to a drainage channel below acid-producing materials or routed to the treatment plant.

Reclamation of the backfilled pit would be consistent with the reclamation of other 2H:1V slopes in the waste rock dump complexes. The 2H:1V slopes would be covered with growth media containing the necessary rock content to control erosion. The slopes on the east side of the pit also would be covered with growth media and seeded.

All acidic waste rock in the pit would be covered with backfill and revegetated. Pit dewatering wells located outside the pit would continue to keep the water table depressed below the level of the pit backfill. The downgradient dewatering well would collect some of the water that infiltrates through the backfill.

5.2 Preferred Alternative

DEQ has chosen the Agency-Modified Alternative as the preferred alternative and the proposed decision. DEQ's final decision will be set forth in a record of decision (ROD) in no less than 15 days from the transmittal of this final EIS to the public, Environmental Quality Council (EQC), and office of the Governor, per ARM 17.4.620.

5.2.1 Rationale for the Preferred Alternative

The Agency-Modified Alternative is the same as the Proposed Action Alternative except that it requires GSM to implement closure and geodetic and ground-movement monitoring for the North Area Pit and the EWRDC expansion area to ensure safe access and to keep reclamation cover systems working. The Agency-Modified Alternative also

requires the preparation of a detailed bat and raptor reclamation plan for the North Area Pit highwall to ensure some utility to wildlife. DEQ is imposing these modifications with the consent of GSM.

DEQ considered the North Area Pit Backfill Alternative in detail. Overall, the North Area Pit Backfill Alternative is not predicted to substantially alter long-term groundwater management and treatment requirements when compared with the Proposed Action or Agency-Modified Alternatives.

Backfilling the North Pit would eliminate the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail. Backfilling could also eliminate the potential benefits of redirecting groundwater from the head of the EWRDC flowpath into the North Area Pit, where it could be more easily captured.

The analysis contained in this final EIS, which is informed by comments received by DEQ on the draft EIS and DEQ's responses to those comments, did not change DEQ's previous determination that the proposed amendment complied with the reclamation requirements for open pits by providing the required structural stability, utility to humans or the environment, mitigation of post reclamation visual contrasts, and mitigation or prevention of undesirable contrasts. In addition, the analysis did not change DEQ's previous determination that the proposed amendment prevented the pollution of water resources.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
	Disturbed Acreage			
Permit Boundary and Permitted Disturbance Boundary	Disturbance area = 3,104 acres Permit area = 6,125 acres	Increase permitted disturbance boundary by 87.4 acres (55.1 acres outside permitted disturbance boundary + 32.3 acres in Buffer Area)	Similar to the Proposed Action Alternative but would increase permitted disturbance boundary by 19.3 acres to include the Buffer Area around the southeast portion of the EWRDC expansion area.	Same as Agency-Modified Alternative.
North Area Pit	No acres of disturbance	Expand 1,000 feet northeast of Mineral Hill Pit Total disturbance = 49.4 acres; New disturbance = 15 acres	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
South Area Layback	No additional acres of disturbance	Layback along southern wall of Mineral Hill Pit Total disturbance = 69.4 acres; New disturbance = 10.9 acres	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
East Waste Rock Dump Complex (EWRDC) Expansion Area	EWRDC permitted for 174 million tons of waste rock with a disturbed area of about 683 acres. Includes 5B Optimization. Maximum elevation is 5,850 feet which is approximately 520 feet above the natural topography.	Increase EWRDC size to permitted disturbance boundary of 721 acres; Total new disturbance = 179.6 acres; Disturbance within permitted disturbance boundary = 141.9 acres; Disturbance outside permitted disturbance boundary = 37.7 acres; Up to additional 48.6 million tons of waste rock; Maximum height above natural topography is approximately 290 feet. Up to 6 Mt of waste rock could go to permitted Buttress Dump extension.	Same as the Proposed Action Alternative.	Similar to the Proposed Action Alternative except the waste rock dump may be of a lesser height if South Area Layback waste rock backfills the pit rather than going to EWRDC expansion area.
Tailings Disposal	TSF-1 ceased in 1995 and has been reclaimed. GSM would continue to treat drainage water from TSF-1 at 8 to 23 gpm. TSF-2 began receiving tailings in 1993. Approved for storage of 42 million tons of tailings at an embankment elevation of 4,770 feet. Includes 5B Optimization.	Increase TSF-2 tailings height by 4 feet with a corresponding 4.5 acres of additional disturbance. Approximately 5.0 million tons of tailings (4.2 million tons from mine + legacy mine materials) would be stored with a new ultimate embankment elevation of 4,774.5 feet.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
Haul and Access Roads	Mine contains an extensive network of access and haul roads from 100 feet wide to two-tracks. Road disturbances are included in the 198.5 acres approved for “Stockpiles, borrow areas, roads, and miscellaneous”.	Construction of new access road in East Waste Rock Dump Complex across Sheep Rock Creek Drainage. The road across Sheep Rock Creek has been approved and permitted but portion of road on the 37.7 acre EWRDC expansion would be bonded under Amendment 015.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Reclamation	GSM is currently approved for mining and associated facilities disturbance on 3,104 acres in a permit boundary of 6,125 acres. As of December 31, 2012 (2012 Annual Report), the actual disturbance was 2,361 acres. GSM reports 1,168 acres of reclamation successfully revegetated (2012 Annual Report).	About 75.4 acres (91 - 15.6) of previously reclaimed land would be redisturbed by the North Area Pit, South Area Layback, and EWRDC expansion. GSM would revegetate 22 acres of South Area Layback and 30 acres of the east wall of the North Area Pit. EWRDC expansion would be reclaimed at 2H:1V slope angles.	Same as the Proposed Action Alternative except GSM would provide plans for bat and raptor habitat in new North Area Pit highwalls and how visual contrasts with adjoining areas would be mitigated in the North Area Pit.	Same as the Agency-Modified Alternative except the North Area Pit would be backfilled and all acres would be covered with growth medium and revegetated.
General Plant Operations				
Mill Processing	May be completed in early 2015	Continuous through 2017.	Same as the Proposed Action Alternative.	Same as Proposed Action Alternative.
Ore Recovery and Processing	Same as current until closure.	4.2 million tons added; Processes same as No Action until closure.	Same as the Proposed Action Alternative.	Same as Proposed Action Alternative.

TABLE 5-1 SUMMARY OF IMPACTS FROM ALL ALTERNATIVES				
Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Mining and Geotechnical Engineering				
North Pit Area	Would not be constructed	Some erosion of the North Area Pit highwall and raveling of material onto benches would likely continue during the life of mine. The North Area Pit would expose zones of poor rock quality within some of the highwalls resulting in more potential small highwall instability problems, especially in and around the Range Front Fault. Bozeman area clay seams could potentially be encountered in the east wall locations. If this layer is extensive and prevalent over a large horizontal extent in stratigraphy it could affect stability of benches in local areas and require adjusting the pit highwall design.	Same as the Proposed Action Alternative except that GSM would develop a post-mining geodetic and ground-movement monitoring plan and create bat and raptor features in the North Area Pit.	North Area Pit would be backfilled and all acres would be covered with growth medium and revegetated eliminating any instability problems.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Mineral Hill Pit Erosion (No Action Alternative) South Area Layback (Action Alternatives)	Some erosion of the Mineral Hill Pit highwalls and raveling of material onto benches would likely continue during the life of mine and after mining. GSM has to maintain access into pit by maintaining 5,700-foot pit bench. GSM has to maintain access to underground workings to repair water collection and routing equipment to get underground pit sump water to treatment plant.	Structure is favorable for pit highwall stability. However, some areas would be developed in the hanging wall of the Corridor Fault, the Telluride Fault, and the Splay Fault which are associated with poor rock quality. Careful controlled blasting and scaling should mitigate rockfall concerns and stability risks associated with lower rock mass quality. After mining, GSM would have to maintain Mineral Hill Pit access the same as No Action.	Similar to the Proposed Action Alternative with modifications for additional ground-movement monitoring to identify potential for mass movement after mining in the South Area Layback if needed to access the Mineral Hill Pit after closure.	Same as the Agency-Modified Alternative.
Mineral Hill Pit Stability (No Action Alternative) South Area Layback (Action Alternatives)	During operations pit highwall stability would continue to be monitored using the existing system of survey prisms and extensometers. Mining activities in the pit would continue to be modified as necessary both to ensure worker safety and to minimize potential damage to mining equipment. GSM has to provide safe access into the pit to maintain water management facilities.	During operations, effective groundwater depressurization would be required and controlled blasting techniques would be used in the South Area Layback mine pit development to maintain the integrity of the benches and minimize raveling to ensure the benches remain capable of containing future rock falls. No additional monitoring is proposed after closure	Same as the Proposed Action Alternative GSM would be required to do additional monitoring if South Area Layback affects access into the Mineral Hill Pit at closure.	Same as the Proposed Action Alternative Same as the Agency-Modified Alternative

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Mineral Hill-Pit Stability (No Action Alternative) South Area Layback (Action Alternatives)	There would be the potential for smaller scale slope failures on pit highwalls and release of rock into the mine pit during operations and closure.	Same as No Action Alternative The proposed mine pit development should relieve loading pressures in the head area of the Swimming Pool Earth Block thus likely relieve loading pressures in the head area and is not predicted to instigate further movement in the block.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
Tailings Storage Facility-2 and Embankment	The final surface of the tailings would have a 0.5-percent to 5-percent slope toward the east end of the embankment to facilitate surface water drainage to the spillway. The outside slope of the tailings storage facility embankment would be reclaimed by reducing the slope to 2.5H: 1V.	The final surface of the tailings storage facility and outside slope slopes would be graded the same as the No Action Alternative.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Soil, Vegetation, and Reclamation				
Soil and Other Growth Medium Resources	Loss of soil development and horizons, soil erosion from the disturbed areas and stockpiles, reduction of favorable physical and chemical properties, reduction in biological activity, and changes in nutrient levels. Reclamation and revegetation would minimize long-term effects.	Impacts to soils, vegetation, and reclamation would be similar to those described under the No Action Alternative but would apply to a larger area of disturbance. An additional 302.9 acres would be disturbed or redisturbed as a part of this action. 152.1 acres of new disturbance outside of permitted disturbance boundary and not previously disturbed and 150.8 acres in permitted disturbance boundary and previously disturbed.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	**Proposed Action Alternative (Extended Mine Life)**	**Agency-Modified Alternative**	**North Area Pit Backfill Alternative**
Vegetation and Reclamation	Reclamation seed mixtures have been developed for various slope configurations and facilities. Mine operations have not successfully reclaimed any areas to Douglas-fir or mixed shrub plant communities. Noxious weed infestations are monitored and treated every year, 159 acres of the Mineral Hill Pit would be regraded to 2H:1V slopes, covered with soil, and revegetated. The remaining 158 acres of the pit would be left unvegetated as rock faces with some bat and raptor habitat.	The seedbed preparation and revegetation plans for the additional areas under the Proposed Action would be similar to the No Action Alternative. Same as the No Action Alternative. Approximately 30 acres of the North Area Pit and 22 acres of the South Area Layback would be regraded to 2H:1V slopes, covered with soil, and revegetated.	Same as the Proposed Action Alternative	Same as Proposed Action except the North Area pit would be completely backfilled and all 49.4 acres of the North Area Pit would be covered with growth medium and revegetated.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Water Resources				
Surface Water	There are minimal environmental consequences to surface water under this alternative. Surface water drainage patterns and runoff volumes and rates would remain as approved. Over the long-term and as more project facilities are reclaimed and vegetation on reclaimed surfaces becomes more dense, ephemeral surface water runoff rates would decrease.	The increased pit disturbance areas would capture more rainfall and snowmelt and contribute to stormwater during runoff events. The disturbed EWRDC expansion surfaces would be more permeable with less surface runoff but with a greater contribution to groundwater. Following reclamation, the revegetated surfaces would result in some surface runoff with a smaller contribution to groundwater.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative except the North Area Pit would be backfilled and more captured precipitation would be routed out of the backfilled pit.
Groundwater South Area Layback	The South Area Layback would not be constructed.	The groundwater flow paths for the Mineral Hill Pit would remain the same, and the groundwater pumping and capture systems on the site are designed to address impacts from Mineral Hill Pit operations. The South Area Layback would be an extension of the Mineral Hill Pit and would drain into the main pit where water would be captured by the underground pit sump and pumped from the pit to the WTP.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Groundwater North Area Pit	The North Area Pit would not be constructed.	The North Area Pit would be dewatered using two vertical dewatering wells around the perimeter of the pit. If vertical dewatering wells are not successful horizontal dewatering wells may be needed. If dewatering is incomplete, some groundwater would report to the pit and migration of the impacted groundwater out of the pit could occur.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
		Maintains the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail.	Same as the Proposed Action Alternative.	Does not maintain the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail.
		The water would report to the identified pit flowpaths and water would have to be captured by the Rattlesnake drainage capture wells.	Same as the Proposed Action Alternative.	Backfilling the North Area Pit would eliminate the benefit of redirecting groundwater from the head of the EWRDC flow path into the North Area Pit.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Groundwater EWRDC Expansion Area	The EWRDC expansion area would not be constructed.	Groundwater quality impacts – Seepage from EWRDC expansion area predicted to take 33 to 72 years (same as EWRDC) to arrive at base of dump and 100 years before groundwater impacted. Volume of potential seepage estimate at 2.1 gpm. Conceptual system would collect seepage at the end of the mixing zone with sufficient number of wells and pump water via pipeline to the water treatment plant.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Wildlife and Fisheries				
South Area Layback/ North Area Pit	There would be no additional effects on wildlife or fish species within or adjacent to the Project area.	Construction and operational noise may cause a continued short-term, temporary disturbance to wildlife. The South Area Layback may reduce the approved wildlife highwall habitat approved in the No Action Alternative. 22 acres would be covered with growth medium and reclaimed to grassland habitat. No detailed plan provided for bat and raptor habitat in the North AreaPit. 30 acres would be covered with growth medium and reclaimed to grassland habitat.	Same as the Proposed Action Alternative except GSM would provide a more detailed plan to provide bat and raptor habitat in South Area Layback highwalls to provide some utility to the environment. GSM would provide a plan to provide bat and raptor habitat in North Area Pit highwalls to provide some utility to the environment.	Same as the Agency-Modified Alternative except North Area Pit would be backfilled creating more vegetated grassland habitat and less bat and raptor habitat.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact			
	No Action Alternative (Current Operating Permit)	Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
Aesthetic Resources				
South Area Layback/ North Area Pit	Post-closure, portions of the highwalls and benches would remain visible. Overall visual contrasts would be reduced to a level where they are noticeable but not dominant in the landscape, following successful reclamation and revegetation of some areas of the pit highwall.	Similar to the No Action Alternative with additional disturbed areas including the expanded and new pit highwalls. 22 acres of the South Area Layback and 30 acres of the North Area Pit covered with soil (plant growth medium) and then seeding with grasses.	Effects would be similar to the Proposed Action Alternative. The additional geodetic and geotechnical monitoring and expanded creation of bat and raptor habitat in the North Area Pit highwall may slightly reduce visual impacts under this alternative compared to the Proposed Action Alternative.	Backfilling the North Area Pit would produce an additional 12 acres for seeding and tree planting that when successful established would help reduce visual contrast with adjacent lands.
Social and Economic Conditions				
Additional wages, salaries, and benefits paid in 2016	$0	$13,580,305	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
Tax Revenues paid 2013-2016	Price of gold $1,300-$1,700/oz.	Price of gold $1,300-$1,700/oz.	Same as the Proposed Action Alternative.	Same as the Proposed Action Alternative.
	2013 $4.615-$5.855 million	$4.677 - $5.915 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.
	2014 $3.544-$4.420 million	$4.197 - $5.275 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.
	2015 $1.005-$1.276 million	$2.871 - $3.556 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.

TABLE 5-1
SUMMARY OF IMPACTS FROM ALL ALTERNATIVES

Resource, Land Use, or Activity	General Impact				
	No Action Alternative (Current Operating Permit)		Proposed Action Alternative (Extended Mine Life)	Agency-Modified Alternative	North Area Pit Backfill Alternative
	2016	$0.416 million	$2.538. -$3.242 million	Same as the Proposed Action Alternative	Same as the Proposed Action Alternative.

Notes:

2H:1V	Two horizontal to one vertical
DEQ	Montana Department of Environmental Quality
EWRDC	East Waste Rock Dump Complex
GPS	Global positioning system
GSM	Golden Sunlight Mines, Inc.

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amsl	Above mean sea level
BLM	Bureau of Land Management
BMP	Best Management Practices
BNA	Birds of North America
cfs	Cubic feet per second
cm/s	Centimeters per second
CY	Cubic Yard
DEIS	Draft Environmental Impact Statement
DEQ	Department of Environmental Quality (Montana)
EIS	Environmental Impact Statement
EQC	Environmental Quality Council
EWRDC	East Waste Rock Dump Complex
FEIS	Final Environmental Impact Statement
FOS	Factor of Safety
GANDA	Garcia and Associates
gpm	Gallons per minute
GSM	Golden Sunlight Mine, Inc. and Golden Sunlight Mine
HDPE	High-density polyethylene
HDS	High Density Sludge
IDT	Interdisciplinary Team
JLDC	Jefferson Local Development Corporation
MCA	Montana Code Annotated
MDOR	Montana Department of Revenue
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MFWP	Montana Fish, Wildlife and Parks
mil	Millimeter thick
MMRA	Metal Mine Reclamation Act
MOU	Memorandum of Understanding
MPDES	Montana Pollutant Discharge Elimination System
MSHA	Mine Safety and Health Administration
MT	Montana
MTNHP	Montana Natural Heritage Program
NEPA	National Environmental Policy Act
NRIS	Natural Resource Information System
RMR	Rock Mass Rating
ROD	Record of Decision
RQD	Rock Quality Designation
RSU	Restricted Share Units
SEIS	Supplemental Environmental Impact Statement
SWPPP	Stormwater Pollution Prevention Plan
Tdf/ls	Tertiary debris flow and landslide formation
TSF	Tailings Storage Facility

USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
WWRDC	West Waste Rock Dump Complex

Acid Rock Drainage – Water from pits, underground workings, waste rock, and tailings containing free sulfuric acid.

Best Management Practices - Structural, non-structural, and managerial techniques that are recognized to be the most effective and practical means to control non-point source pollutants.

Bond – Financial assurance posted by an applicant/permittee to guarantee performance by the state and/or federal agencies of all the reclamation obligation associated with an operating permit or license, including water treatment if needed, in the event the permittee is unable to unwilling to do so.

Buffer Area - A minimal area delineated around a disturbance area for the purpose of providing a buffer adjacent to all disturbances.

Cyanide leach process – Recovery of gold and other metals by soaking an ore in a cyanide solution.

Deficiency Letter – In this case, DEQ's response to an operating permit amendment application identifying additional items needing clarification so an application can be called complete and compliant with the MMRA.

Draft Operating Permit/Operating Permit Amendment – Permit or permit amendment issued upon completion of the completeness and compliance review, prior to the completion of the required MEPA review.

Factor of Safety - A calculation defining the relationship of the strength of the resisting force on an element (C) to the demand or stress on the disturbing force (D) where Force = C/D. When F is less than 1, failure can occur.

Geodetic – Application of mathematics concerned with the determination of the size and shape of the earth and the exact positions of points on its surface.

Geotechnical - Pertaining to the application of scientific methods and engineering principles to the acquisition, interpretation, and use of knowledge of materials of the earth's crust for the solution of engineering problems. It embraces the fields of soil mechanics and rock mechanics, and many of the engineering aspects of geology, geophysics, hydrology, and related sciences.

Highwall - The face of overburden and ore in an open pit mine.

Highwall stability – The potential for a highwall to have a structural failure.

Interdisciplinary team – A group of technical experts conducting an impact analysis.

Legacy mining materials – Processed ore (tailings) or waste rock from closed or abandoned mines. These materials may have recoverable minerals because of inefficiencies in earlier processing methods or changes in mineral prices making recovery profitable at this time. Reprocessing offers an opportunity to safely dispose of the mining materials.

Mitigation - A measure used to reduce impacts by (1) avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or (5) compensating for an impact by replacing or providing substitute resources or environments.

Montana Environmental Policy Act – Title 71, Chapter 1 of the Montana Code Annotated.

Open pit mining – A surface mining method where rock is ripped or drilled and blasted if necessary, then removed as overburden or removed as ore for further processing.

Operating Permit –Permit issued by DEQ to mine, process ore, construct or operate a hard-rock mill, use cyanide ore-processing reagents or other metal leaching solvents or reagents, or disturb land in anticipation of those activities in the state.

Ore – A mineral or an aggregate of minerals from which a commodity can be profitably mined or extracted.

Permitted disturbance boundary – The area in an operating permit that is designated to be disturbed.

Permit Area or Boundary- The disturbed land as defined in 82-4-303 , MCA, and a minimal area delineated around a disturbance area for the purposes of providing a buffer adjacent to all disturbances.

Reclamation – Returning a surface disturbance to support desired post-mining uses, including recontouring and plant growth, and minimizing hazardous conditions, ensuring stability, and protecting against wind or water erosion.

Scoping – Determining the scope of the analysis, i.e. the range of reasonable alternatives, mitigation, issues, and potential impacts to be considered in an environmental assessment or an environmental impact statement.

Soil salvage – Soil or other growth media removed and saved for use during future reclamation.

Sump – The bottom of a pit or any other place in a mine that is used as a collecting point for drainage water.

Tailings – The non-economic constituents of processed ore material that remain after the valuable minerals have been removed from raw materials by milling.

Tailings storage facility – The engineered location where tailings are stored.

Waste rock - Rock that is removed for access, but does not contain enough mineral to be mined and processed at a profit.

Waste rock dump – Engineered location where waste rock is stored.

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Response to Comments

9.1 DEIS Comment Period

The 30-day comment period on the draft EIS started September 17, 2013 and ended October 17, 2013. During that period, DEQ received comments at the public meeting, by regular mail, and by electronic mail. This chapter presents a compilation of all comments received as described below.

9.2 Comment Summary

Many of the comments contained expressions of support for the mine and requests to approve the permit amendment as soon as possible. Many also stated opposition to the No Action Alternative, or the alternative requiring backfilling of the North Area Pit. Non-substantive comments were not responded to individually; however, DEQ has reviewed all of the comments.

- Forty individual comments, supportive of the mine, were submitted directly to DEQ during the October 8, 2013 Public Meeting in Whitehall or through email or regular mail. These comments are provided only in electronic format on the Golden Sunlight Mine final EIS CD, or by contacting the DEQ office. PDF File Name: "**40 Comments to DEQ**".
- A total of 536 comments on the draft EIS were submitted to DEQ via a website and comments are provided only in electronic format on the Golden Sunlight Mine final EIS CD, or by contacting the DEQ office. PDF Name: "**536 Comments from Website**".
- A summary of the public meeting held by DEQ to discuss the draft EIS on Tuesday, October 8, 2013 from 6:00 to 8:00 p.m. at the Whitehall Community Center in Whitehall, Montana is provided in **Appendix A**. Information about the meeting format and a complete copy of the court reporter's transcript of the public comments is also provided in Appendix A.

9.3 Comment Responses

Written responses to comments with specific questions or concerns related to the content of the draft EIS are shown below. Many resulted in modifications to the EIS as reflected in the final EIS. When a modification was made to the EIS, the section in which the modification was made is indicated. Comments with written responses and the page each comment begins on in this chapter are shown below. A comment was made at the public meeting that the EIS inaccurately described the Jefferson Slough as an abandoned oxbow. DEQ agrees and has changed the description in section 3.4.2.1.

1. Mark Thompson, Barrick Golden Sunlight Mine 9-2
2. James Kuipers, PE. Montana Environmental Information Center 9-18
3. Jean A. Riley, P.E. Montana Department of Transportation 9-35
4. Jeremiah Langston, National Wildlife Federation 9-36
5. Patrick Flowers, Montana Fish, Wildlife and Parks 9-44
6. Tom Hopgood, Montana mining Association 9-45
7. Stan Wilmoth, Ph.D. Montana Historical Society 9-51

1. **Mark Thompson, Barrick Golden Sunlight Mine**

October 18, 2013

Ms. Kristi Ponozzo

Department of Environmental Quality

P.O. Box 200901, Helena, MT 59601

Re: Barrick Golden Sunlight Mine's comments on the Draft Environmental Impact Statement for Amendment 15 to Operating Permit No. 00065

Dear Ms. Ponozzo,
Barrick Golden Sunlight Mine (GSM) appreciates the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for Amendment 15 to Operating Permit No. 00065.

Comment 1
Overall, GSM finds the DEIS to be a thorough review and analysis of the project proposed by GSM. Further, GSM appreciates DEQ's expeditious, yet detailed, MEPA review of the North Area and South Area (NASA) proposal.

Response 1: Comment noted.

1. North Area Pit Backfill

Not able to be considered in application

Comment 2
GSM gave great consideration to backfilling the North Area (NA) Pit when developing its initial application as the NA Pit had a potential to be an advantageous rock disposal area (RDA) for the non-ore rock generated from the South Area Layback.

Response 2: Comment noted.

Comment 3
However, after conducting the hydrogeological investigation contained in Appendix B of the application, GSM believed that there was sufficient evidence to propose that exterior wells could dewater the NA Pit operationally, but lacked the confidence to propose this method as a

Response 3: Comment noted.

means of long term closure groundwater control without a robust contingency plan of proven effectiveness.

Comment 4

Further, even though the NA Pit would be contained in a significantly less complex hydrogeological setting than the Mineral Hill Pit, the stratigraphy and structures in the North Area are far from simple. The NA Pit would intersect several different rock domains encompassing both fracture flow and porous media flow, and is bisected by a fault, which is believed to be the primary water bearing structure, somewhat compartmentalizing groundwater flow paths in the area. These features limit the accuracy of modeling and other forward predicting techniques. Additional complication in analyzing groundwater flow in a backfilled pit include the unpredictable nature of the backfill itself, and if, where, and in what direction the fill could develop its own flow paths.

Response 4: Comment noted. DEQ agrees that the North Area Pit has unique hydrogeology.

Comment 5

For these reasons, GSM believes that it would not be possible to demonstrate that peripheral dewatering wells alone (e.g. backfilled pit) without a contingency to reenter the pit and collect water in a sump could ensure complete groundwater capture over the long term and comply with water quality standards. Therefore, GSM could not include a pit backfill option in its application and have the application be deemed complete and compliant.

Response 5: Comment noted. DEQ agrees that not backfilling the North Area Pit maintains the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail.

Regulatory Infeasibility

Comment 6

GSM understands that physically placing fill into an open pit is feasible and that DEQ must analyze feasible alternatives to a proposed action during a MEPA review. As described above, GSM believes that compliance with water quality standards could not be demonstrated to a sufficient level of certainty without a proven technique as a contingency to external dewatering wells. Therefore, NA Pit backfill could have or should have been considered legally or regulatorily infeasible and the alternative could have been dismissed without further analysis.

Response 6: In regard to the feasibility of an alternative, DEQ considers whether the alternative is achievable under current technology and whether the alternative is economically feasible as determined solely by the economic viability for similar projects having similar conditions and physical location. DEQ makes this determination without regard to the economic strength of the specific project sponsor. DEQ does not consider environmental impacts in determining the feasibility of an alternative.

Applicant is Liable for Risk

Comment 7
The applicant, GSM, has proposed a pit closure plan that places a high value on ensuring that its activities do not impact adjacent water users. This is in part because GSM believes that it understands the values held by the community in which it operates, but also because GSM alone bears the liability of potential impacts that could result from exceedances of water quality standards. These liabilities include both personal property damages as well substantial regulatory penalties.

Response 7: Comment noted.

Comment 8
The DEIS proposes 2 alternatives for no pit backfill and one alternative to backfill the pit. The advantages of backfill include the potential for enhanced pit stability and visual impact mitigation. The advantage to not backfilling the pit is maintaining a robust contingency to ensure compliance with water quality standards.

Response 8: Comment noted.

Comment 9
By the shear depth of regulatory statute and rules, the State has already selected a preferred alternative. The State has no statute or rules that quantify visual impacts or even defines what a positive or negative visual impact is. There are no stipulated penalties for violating some visual impact threshold. A similar statement is true for pit wall stability. However, “clean water” is well defined and is quantifiable in both statute and rule. Further, failure to ensure “clean water” carries significant stipulated penalties.

Response 9: Comment noted.

Comment 10
To some, enhancing unquantifiable values on private property would be worth risking water quality, but GSM has chosen not to take that risk, and since GSM bears the full burden of the liability and is the property owner, its choice should be given deference.

Response 10: Comment noted.

Socioeconomic Impacts

Comment 11
While GSM has not developed a detailed mining schedule to mine the NA Pit and South Area Layback in series, due to the small physical size of both projects, it is likely that mining rates would have to be reduced resulting in a work force reduction.

Response 11: Comment noted.

Comment 12
Additionally, the bulk of the South Area Layback non-ore rock comes early in the mining sequence; therefore sustainable ore production would be delayed until the NA Pit was backfilled from material being stripped from the South Area (SA) Layback. As discussed with DEQ, mineral processing of these ore bodies will be a delicate balance between blending of ores from the NA Pit, South Area Layback and stockpiled 5B Optimized ore. Since backfilling the NA Pit would not allow for the proposed mining schedule and the projects would need to be mined in series instead of simultaneously, there likely would need to be a suspension of mill operation for some period of time until sufficient ore supply was exposed in the SA Layback. Suspended mill operations would also likely include delays in receiving off-site ores for the period of time when the mill was not operating.

Response 12: Comment noted.

Comment 13
Finally, stockpiling NA Pit ores adds additional costs for rehandling. These costs increase the cutoff grade resulting in a decrease of economically feasible resource. The net result would likely be smaller pits, shorter mine life and a smaller workforce.

Response 13: Comment noted.

Additional Resources

Comment 14
GSM has been engaged in extensive mineral exploration in areas around the Mineral Hill Pit. Results for exploration conducted in 2013 indicate a potential for mineral resource adjacent and possibly contiguous with the NA Pit. Backfilling the NA Pit could burden the feasibility to develop these resources.

Response 14: Comment noted.

Visual Mitigation

Comment 15
In the overall scope of the activities at GSM, the NA Pit is physically very small in size. Attempting to potentially mitigate a small visual contrast does not add significant value to the larger picture. This minimal value added cannot be considered as an offset to risking water quality. As stated repeatedly, to ensure water quality, the pit cannot be backfilled.

Response 15: Comment noted.

Stability

Comment 16
While it is true that backfilling a pit reduces the potential for instabilities, MMRA does not quantify or define what acceptable stability is. For example, small bench scale failures and sloughing has typically been viewed as a desirable mitigation to visual contrasts. GSM provided DEQ with engineering design documents prepared by independent third-party professional engineers that specialize in geotechnical designs for open pits. As those reports state, the NA Pit and SA Layback were designed to meet or exceed industry standards and those standards required by the Mine Safety and Health Administration (MSHA), the agency responsible for miner's safety. Further, GSM committed to the protection of public safety both during operation and post closure through exclusion by fencing, berming, signing and other institutional controls. Further, the projects are located on private property and there are criminal penalties for trespassing. DEQ has consistently determined that these design criteria and other controls constitute "stable". While little in this world is stable under sufficient seismic loading and/or geologic timescales, once something is determined to be stable, to say that it can be made more stable is similar to saying that someone can be made more "pregnant".

Response 16: Comment noted.

2. Utility

Comment 17

Throughout the DEIS and particularly in Table S-1, it is stated that the Agency Modified Alternative and the Pit backfill Alternative "provide some utility". GSM believes that the Proposed Alternative provides utility to all lands used for resource development at the site. The alternatives may change the nature of the utility, but the manner in which it is described in the document could lead a reader to believe that "some" utility is being provided were none existed under other alternatives.

Response 17: As discussed in Section 3.5.3.2, in the Proposed Action Alternative, 22 acres of the South Area Layback and 30 acres of the North Area Pit would be revegetated. The remaining 44 acres of the highwall would be reclaimed to provide bat and raptor habitat/nesting sites. Thus, the EIS acknowledges that reclamation under the Proposed Action Alternative would provide some utility to the environment.

Habitat

Comment 18

In some places in the DEIS including Table S-1, a reader could be led to believe that grassland habitat offers more utility than steep slope habitat. Obviously habitat utility value is a subjective determination; is Golden Eagle habitat more valuable than mule deer habitat? GSM's reclamation plan reclaims 90% of the mining related disturbance to grassland habitat. Most of the remaining areas are reclaimed to steep slope habitat. Steep slope habitat is somewhat unique in the area and is highly valuable to niche specific species for nesting, brooding, rearing and escape. With a recent increase in tolerance for predator species, escape habitat is becoming increasingly more valuable. While the backfill option would add a minimal amount of additional grassland habitat, it would eliminate the valuable steep slope habitat provided by the NA Pit.

Response 18: No inference should be drawn from the EIS that revegetation to grassland habitat offers more utility than reclamation of the remaining highwalls to provide habitat to bats and raptors.

3. Agency Modified Alternative

Comment 19

Issue 1: Capture and Routing of Seeps in the EWRDC Expansion Area

Mining-related seeps in the EWRDC Expansion area could be contaminated with metals and be acidic and cause surface water and groundwater contamination. GSM proposes to monitor and capture water from mining-related seeps. The volume of seepage water has been estimated at 2.1 gpm. GSM is required to monitor for seeps associated in the EWRDC Expansion area and to continue monitoring for seeps across the mine site.

Agency Modification:

1. GSM would provide a conceptual plan for how to collect and route EWRDC Expansion area seepage water to water treatment plant.

Response: Section 5.4 of the Amendment 015 application describes the conceptual seepage collection system that would be implemented to capture seepage that infiltrates into the foundation of the EWRDC Expansion area. As discussed in **Section 5.4.1, *Flow Path*** of the application: "Predicted volume of seepage from the EWRDC was estimated at 6 – 10 gpm sourced from precipitation and run-on (1997 Draft EIS – Appendix J). Seepage in the EWRDC was predicted to require 33 – 72 years (2007 SEIS) to saturate the facility and this seepage would be attenuated as a consequence of contact with the Bozeman Group sediments and a mixing zone and therefore would not exceed groundwater standards at the end of the mixing zone. As described below, the volume of potential seepage contributed by the proposed EWRDC Expansion is approximately 2.1 gpm. The attenuation mechanisms that would affect the seepage from the EWRDC would also be available for seepage from the EWRDC Expansion RDA."

Response 19: DEQ acknowledges there is a conceptual design for the 683 acres of the EWRDC and Section 5.4 of the Amendment 015 application ("EWRDC Expansion RDA") describes how a similar conceptual seepage collection and pumpback system is proposed for the EWRDC expansion area. DEQ will require GSM to provide a more detailed design for the EWRDC expansion area seepage collection and pumpback system prior to construction The final EIS has been revised. See Section 2.2.10, Operational and Post-Closure Monitoring and Control Programs.

As described in **Section 5.4.1** ***Seepage Collection and Pumpback System***, "Given the predicted time frames for seepage to form in the EWRDC Expansion RDA to a condition where flow would discharge to the foundation of the facility, it is not certain at this time where the actual collection point would be developed to capture seepage. Several factors would influence the location and design of the seepage collection system including the availability and characteristics of a groundwater mixing zone; the quality of seepage and vadose zone attenuation; and the physical characteristics of the end of the mixing zone (depth to groundwater; access; aquifer characteristics; capture zone configuration – well array). Assuming that collection of seepage at the end of the mixing zone is required, the system would be comprised of pump-back wells of sufficient number and size to effectively create a cone of depression in the aquifer to capture seepage. The captured seepage would be pumped to the surface into a water pipeline to the water treatment plant."

While there is a likely potential that attenuation and mixing will achieve water quality standards, it is difficult to predict water quality and duration of attenuation. Therefore, a contingency for seepage and groundwater collection has been included in the plan for the EWRDC Expansion and for the existing EWRDC.

GSM recognizes that a more detailed plan for construction and operation of a contingency interception well and pipeline system to convey seepage from the EWRDC Expansion RDA area to the water treatment plant could be produced. GSM recommends and would commit to providing a more detailed design for the contingency seepage collection system for the entire EWRDC, including the Amendment 15 expansion in an updated Operating and Reclamation.

Comment 20

Issue 2: Capture and Routing of North Area Pit Surface Water Runoff and Groundwater after Mine Closure

Response 20: DEQ acknowledges that Figure 6 and Sections 3.3.3, 3.10.1, and 5.1.1 provide information about how surface water and groundwater associated with the North Area Pit will be managed during and after mining. In addition, there is a conceptual design provided in Section 5.4 of the Amendment 015 application. See response 19 above. The final EIS has been revised. See Section 2.2.10, Operational and Post-Closure Monitoring and Control Programs.

Agency Modification:
1. GSM would provide a conceptual design to capture and convey pit water to the water treatment plant after mining, including:

- final pit regrading plan;
- partial pit backfill with compacted Bozeman Group materials, as needed, to direct groundwater, precipitation, and snowmelt to a closure pit sump and to create a safe pit floor working surface;
- cover soil/growth media appropriate for the 2H:1V slope angles, and seed; design collect water and convey to the closure water treatment plant;
- plan for location and maintenance of access road into the pit to service the sump, pump, and water lines; and install a berm in the bottom of the pit to capture north and west wall pit raveling rock which would protect workers in the pit bottom.

Comment 20 (Cont.)
Response: Figure 6 of the Amendment application represents the final as-built slope configuration for the North Area Pit[1].

The as-built configuration of the southern portion of the North Area Pit results in an area of approximately 30 acres with slopes not exceeding 2.0H:1.0VGSM. As depicted on **Figure 6**, a haul road would remain in the pit entering from the southern end. The southern pit walls will be capped with growth media and seeded with the approved seed mix. As designed, run-off (precipitation captured by the open pit) during the post-closure period would report to the bottom of the pit where it would evaporate and/or infiltrate into bedrock where it would be collected via the external dewatering well system.

[1] Pit shape and size are determined by mine modeling based on a specific commodity price. The pit shapes submitted in the application for Amendment 15 were based on the highest reasonably anticipated gold price and constitute the largest pit that the particular resource could support. Actual pit shapes will be based on commodity prices projected over the duration of the pit development, but will not exceed the size portrayed in the application.

Comment 20 (Cont.)

GSM has not identified a need to construct and operate a pit sump system for purposes of collecting runoff from within the North Area Pit during the post-closure period. Based on experience and observations made on reclaimed areas throughout the GSM area, growth media and vegetation established on the reclaimed portion of the North Area Pit (totaling approximately 30 acres) will not produce substantial runoff and this slope would absorb nearly all precipitation on an annual basis.

Seasonal runoff from the remaining exposed highwall on the north side of the pit (totaling approximately 19.4 acres) would report to the bottom of the pit. Therefore, water collected in a sump as envisioned in this mitigation measure would also contact exposed rock in the north highwall of the North Area Pit. Given the type of rock exposed in the highwall, the expectation is that this runoff water quality would be affected by contact with these rock materials. Any water collected in the pit sump could not be directly discharged without treatment and as such, GSM would be required to convey the sump water to the water treatment plant for management. Consequently, the cost of installing a sump system combined with routine maintenance, and water treatment of sump water would not have an advantage over the proposed method of allowing interior pit seasonal runoff water to report to the groundwater pumping system and/or evaporate. Amendment 015 states (**Section 3.3.3**):" To effectively dewater the North Area Pit with wells during operation, the cone of depression created by the dewatering wells will extend well below the bottom of the pit creating an unsaturated zone. <u>There may be temporary, short term and shallow accumulations of storm water in the North Area Pit, much like what currently accumulates on Mineral Hill pit benches. GSM does not intend to manage these short term accumulations post closure, other than through infiltration and capture in the external wells</u> ". (*underline emphasis added*)

Comment 20 (Cont.)

Section 3.10.1 of the application states: "In the event that the North Area Pit dewatering plan, both during operation and at closure, fails to achieve the necessary objectives, additional dewatering wells may need to be installed. Furthermore, the pit would remain open at closure for visual observation and access in the pit would be reestablished if it becomes necessary to dewater the pit using an internal sump. Should this situation occur at some time in the future, GSM would prepare a detailed plan for agency review. " (*underline emphasis added*)

As described in **Section 5.1.1**, "GSM has proposed to continue to operate external dewatering wells during the post-closure period to ensure that groundwater that would normally flow into the pit and form a pit lake is captured and sent to the water treatment plant. GSM has determined that continuing to intercept groundwater prior to inflowing into the pit would result in reducing impacts to water, reducing contaminant loading to the water treatment plant, and reducing reagent consumption at the water treatment plant because the water would not contact exposed rock in the pit walls of the North Area Pit and would therefore, maintain its ambient quality."

GSM recognizes that a more detailed plan for construction and operation of a contingency in pit sump in the NA Pit bottom should the external well dewatering system not achieve the desired level of groundwater control could be produced. GSM recommends and would commit to providing a more detailed design for the contingency sump in an updated Operating and Reclamation. Additionally, GSM would commit to implementing the contingency in pit sump plan should storm water and snowmelt accumulations in the pit bottom exceed the short-term temporary durations currently anticipated or the accumulations are demonstrated to threaten wildlife. The more detailed plan would include a program to ensure worker safety when having to perform maintenance activities within the NA Pit.

Comment 21

Issue 3: Implement Closure Geodetic and Ground Movement Monitoring for the North Area Pit and EWRDC Expansion area to ensure safe access and to keep reclamation cover systems working.

Agency Modification:

1. GSM would develop a conceptual post-mining geodetic and groundwater monitoring plan.

Response: GSM committed to implement a monitoring program associated Amendment 15 in its application.

However, GSM recognizes that more detail could be provided in the plan. GSM recommends and would commit to providing a more detailed plan in an updated Operating and Reclamation Plan. Please note that GSM is not currently anticipating the need for a sump in the NA Pit. Therefore, monitoring of the NA Pit to ensure worker safety would be included in the contingency plan discussed in Issue 2 above.

Response 21: GSM will provide a final post-mining geodetic and ground-movement monitoring plan for the EWRDC expansion area and North Area Pit. GSM provided a conceptual ground-movement monitoring plan in Appendix A-2 of the Application (Slope Stability Evaluation for the Far East Rock Disposal Area) but it was only for the EWRDC expansion area and primarily for mining operations. DEQ agrees the post-mining geodetic and ground-movement monitoring plan for the North Area Pit can be a contingency plan based on the need for safe access to maintain and operate an in-pit sump. The in-pit sump is also a contingency to dewater the North Area Pit if the current groundwater well dewatering plan fails to keep water out of the pit.

Comment 22

Issue 4: Salvage Available Fine-grained Lakebed Sediments in the North Area Pit and incorporate Organic Amendments in the Sediments when the Sediments are used as Growth Media in Reclamation Cover Systems.

While GSM would salvage the available soils and nonacid generating Bozeman Group and landslide debris materials from the North Area Pit, South Area Layback, and EWRDC Expansion area, GSM would not salvage any fine-grained silt-textured lakebed sediments. These fine-grained sediments would be suitable for reclamation on flat and gentle slopes and would support vegetation. An organic amendment incorporated into the upper layer would minimize soil crusting and enhance seedling establishment in these materials.

Agency Modification:

1. GSM would salvage and stockpile silt-textured lake bed sediments. GSM would incorporate compost or other organic matter to achieve 1 percent by volume organic matter when the sediments are used for reclamation growth media.

Response: The Bozeman Formation is a lakebed sediment formation; these are one in the same. GSM's experience with using the fine grained portion of the Bozeman Formation lake bed sediments as growth media has shown the material to be of limited value; the material is easily compacted, subject to wind erosion before covered, and once compacted, does not exhibit proper tilth to support vegetation. This experience includes the use of various amendments including organics in excess of 1%.

Other proven quality growth media materials are available at the GSM site and are superior to the fine-grained lake bed materials and do not exhibit the same limitations. In GSM's application, it was demonstrated that there was more than ample reclamation material of proven quality available.

Response 22: DEQ will remove this modification from the Agency Modified Alternative because GSM has demonstrated there is sufficient quantity of other proven quality materials available for reclamation growth media.

Whilst the use of Bozeman Formation fine-grained lake bed sediment may have value in capping selected facilities at GSM (e.g., TSF-2) where compaction of cover materials would limit infiltration during reclamation, sources of this material are considerably closer to the TSF-2 site than hauling from the EWRDC Expansion RDA site.

Comment 23

Issue 5:

The modifications for the Agency Modified Alternative would have the similar effects on wildlife and fisheries as described for the Proposed Action Alternative. GSM would be required to document the loss of bat and raptor habitat in the Mineral Hill Pit resulting from the South Area Layback expansion. GSM would propose additional bat and raptor habitat in the South Area Layback upper highwalls and the North Area Pit highwall to mitigate the loss of the bat and raptor habitat. The plan for replacement bat and raptor habitat would be due by the date of the first annual report if this alternative is selected.

Response: Development of the South Area Layback would not result in loss of bat and raptor habitat. A highwall would remain following mining of the layback. The existing highwall area within the proposed footprint of the South Area Layback contains approximately 22 acres of benches and vertical walls between benches in the southeastern portion of the Mineral Hill Pit. Approximately 47 acres of highwall areas (benches / vertical walls between benches) would remain after closure/reclamation of the South Area Layback resulting in a net 25-acre increase in raptor and bat habitat over the existing highwall condition in this portion of the Mineral Hill Pit.

The remaining highwall in the North Area Pit (totaling approximately 19 acres of benches/vertical wall between benches) would also promote raptors and bat habitats. The north and west walls of the pit would be reclaimed as highwall, providing excellent raptors and bats habitat.

Response 23: DEQ acknowledges that GSM did address bat and raptor habitat for the Mineral Hill Pit in Amendment 11 as well as in MR07-007. The draft EIS described the proposed action as requiring the construction of bat and raptor habitat in the North Area Pit highwall. DEQ will require GSM to develop a detailed plan for creating bat and raptor features in the North Area Pit highwall prior to construction.

GSM recommends and would commit to compiling a comprehensive highwall reclamation plan which would include development of raptor and bat habitat within the various highwall configurations at GSM. The plan will be provided as part of the updated Operating and Reclamation Plan for Operating Permit No. 00065.

Comment 24

Issue 6:

The modifications for the Agency Modified Alternative would have the similar effects on aesthetic resources as described for the Proposed Action Alternative. GSM would be required to identify replacement areas for the portions of the 37 acres of designated revegetation under Stipulation 011-15 for the Mineral Hill Pit that would be eliminated by the South Area Layback mining operations. Reclamation and revegetation practices similar to those prescribed under Stipulation 011-15 to mitigate aesthetic impacts from the Mineral Hill Pit would be applied to the proposed North Area Pit highwall. GSM would modify their visual mitigation plan that was approved and bonded for the 2007 SEIS. The modified visual mitigation plan would be due to DEQ concurrent with the first annual report, if this Alternative is selected. This alternative may reduce visual impacts slightly over the Proposed Action Alternative.

Response: Minor revision MR07-007 which authorized the 5B Optimization expansion of the Mineral Hill Pit superseded Stipulation 011-15. The specific elements associated with the 37-acre designated revegetation areas envisioned in Stipulation 011-15 were supplanted by the reclamation plan authorized in MR07-007 that provided for grading the upper portion of the west highwall of the Mineral Hill Pit and placement of growth media and seeding to reduce the visual effects of the highwall.

Response 24: DEQ acknowledges that GSM addressed mitigating visual impacts of the Mineral Hill Pit highwall in Amendment 11 as well as in MR07-007. DEQ will remove this modification from the Agency Modified Alternative.

However, as discussed in Issue 5 above, GSM recommends and would commit to development of comprehensive highwall reclamation plan which would identify areas for revegetation and development of raptor and bat habitat within the various highwall configurations at GSM. The plan would be provided as part of the updated Operating and Reclamation Plan for Operating Permit No. 00065.

Comment 25

3. Draft Permit

Since turning the Draft Permit into a Final Permit is the agency action that triggered this MEPA review, perhaps the Draft Permit and Compliance Report (Draft Amendment Approval for Amendment 15, Golden Sunlight Mine Operating Permit #00065) should at least be included in the references section of the DEIS.

If there are any questions or concerns regarding these comments, please contact me at 406-287-2018.

Sincerely,

Mark Thompson

Environmental Superintendent

Barrick Golden Sunlight Mine

Response 25: The draft permit amendment and compliance report is a public record and was referenced in the text of the draft EIS

2. James Kuipers, PE. Montana Environmental Information Center

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October 14, 2013

To: Tracy Stone Manning, Director, Montana DEQ

From: Jim Kuipers P.E., Kuipers & Associates

Re: **Review and comments on GSM Amendment 015 to Operating Permit No. 00065 DEIS**

Comment 26
The following comments are submitted on behalf of the Montana Environmental Information Center (MEIC) based on my review of the Golden Sunlight Mine (GSM) Amendment 015 to Operating Permit No. 00065 Draft Environmental Impact Statement (DEIS). The comments are focused on the issue of backfill of the new proposed North Area Pit which the DEIS addresses.

Comment 27
Contrary to the regular and accepted practice under the Montana Environmental Protection Act (MEPA), DEQ does not provide a recommended action. While MEPA rules allow an agency to not include a preferred alternative if it has not chosen one (A.R.M. 17.4.616 (3) (d), it is baffling to this commentator that the agency would **not** have a preferred alternative, given that the EIS clearly identifies the backfill alternative as the **best** alternative. These comments will underscore that fact, and will show how the backfill alternative is the best alternative under the criteria in § 82-4-336 (9-12), MCA, as well as Judge Tucker's decision in *MEIC v. DEQ,* Cause No. DV-08-10896 (June 30, 2011).

Comment 28
The DEIS does not consider backfill of the existing Mineral Hill Pit as part of the pit expansion proposal, relying on the previous 2007 pit backfill EIS to support that proposal in the current DEIS. While it is my professional opinion that many of the assumptions in the 2007 EIS are either biased or incorrect, these comments have not addressed the current proposal relative to the Mineral Hill Pit expansion other than where they impact the North Area Pit proposal.

These comments take the following approach to analyzing the proposed alternative actions for the North Area Pit: 1) A comparison of the information as provided in the DEIS specific to water quality, mined land reclamation, cost and cumulative impacts is provided; 2) Areas of uncertainty, lack of necessary information, or disagreement with the information provided are identified, and; 3) An evaluation and recommendation is made.

1

Response 26: Comment noted.

Response 27: DEQ did not specify a preferred alternative in the draft EIS because it did not have a preferred alternative, recognizing the respective advantages and disadvantages of backfilling versus not backfilling the North Area Pit.

Response 28: Comment noted

Review and comments on GSM Amendment 015 to Operating Permit No. 00065 DEIS

Comparison of EIS Information

Comment 29
Table 1 provides a summary comparison of information in the DEIS relative to the alternative actions being evaluated (e.g. no pit backfill alternative vs pit backfill alternative.

Comment 30
The DEIS summaries in Section S and Section 5 do not address aesthetics, even though the DEIS clearly indicates this is an area of concern (S-4). Failure to include this critical aspect in the summary tables that clearly favors the pit backfill alternative creates the impression that the analysis is biased as presented in the DEIS.

Comment 31
The DEIS does not contain cost information for comparison purposes but does suggest that there would not be substantial additional costs for the pit backfill alternative because it would result in a shorter haul distance than hauling to the waste rock dump.

Comment 32
The summary comparison suggests that the Pit Backfill Alternative would result in positive outcomes as compared to the Proposed Action and Agency Modified Alternative in terms of geotechnical engineering, reclamation, surface water and groundwater, wildlife and aesthetics. No areas where the Pit Backfill Alternative would result in a negative outcome were identified in the DEIS although the discussion indicates some areas of uncertainty in large part due to the lack of substantive technical analysis performed in support of and presented in the DEIS.

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Response 29: DEQ does not agree with all of the representations on Table 1 that was prepared by the commenter including, but not limited to, its equation of reclamation to revegetation. Under Section 82-4-336(8), MCA, provisions for vegetative cover must be required in a reclamation plan if appropriate to the future use of the land as specified in the reclamation plan. Thus, an area disturbed by mining does not need to be revegetated in order to be reclaimed. Revegetation is not required where remaining highwalls are reclaimed to provide bat and raptor habitat.

Response 30: Aesthetic impacts were evaluated and are described in Section 3.6, but a specific listing was mistakably left out of Tables S-1 and 5-1. A specific listing for aesthetic impacts for all alternatives was added to the tables in the final EIS.

Response 31: As described in the North Area Pit Backfill Alternative on page 2-28 of the DEIS, the North Area Pit would be mined prior to mining the South Area Layback. During the course of mining the South Area Layback, non-ore rock from the South Area Layback would be direct hauled, as backfill, to the North Area Pit.

Since the North Area Pit is a shorter haul distance than the EWRDC Expansion, there is actually a slight reduction in mine operating resources necessary to implement the backfill alternative as opposed to the Proposed Action Alternative. GSM has not modeled nor created a detailed schedule for the backfill alternative, but it is estimated that mining activities (employment) would be reduced by approximately several weeks to a month if the backfill alternative were implemented. No substantial changes in long-term (post closure) employment to monitor and maintain the North Area pit would be anticipated.

Long-term highwall stability monitoring and maintenance would be performed, as it is now, by locally employed technicians, most likely the same employees that would be operating the water treatment plant and maintaining other site facilities.

Response 32: DEQ disagrees that Table S-1 “suggests” that the Pit Backfill Alternative would result in positive outcomes in all of the resources identified by the commenter. The summary table does indicate that more areas of the North Area Pit would be covered with growth media and revegetated under the Pit Backfill Alternative. This would result in the elimination of any instability and a greater reduction of post reclamation visual contrasts.

Table 1 – Comparison of Alternatives

	Proposed Action	Agency-Modified Alternative	Pit Backfill Alternative
Geotechnical Engineering	Potential highwall instability problems (S-9)	Similar to Proposed Action (S-9) with ground-movement monitoring (S-5)	Eliminates any instability problems (S-9)
Reclamation	49.4 acres disturbed with 30 acres regarded to 2H:1V slopes, covered with soil, and revegetated (S-14)	Similar to Proposed Action (S-9)	All disturbed acres reclaimed (S-14)
Surface Water	The increased pit disturbance areas would capture more rainfall and snowmelt and contribute to stormwater during runoff events. (S-15)	Similar to Proposed Action (S-15)	More captured precipitation would be routed out of the backfilled pit (S-15)
Groundwater	If dewatering is incomplete, some groundwater would report to the pit and migration of the impacted groundwater out of the pit could occur. The water would report to the identified pit flowpaths and water would have to be captured by the Rattlesnake drainage capture wells. (S-16)	Similar to Proposed Action with modification to limit the amount of water that could seep into groundwater (S-16)	Same as Agency Modified Alternative except further limits the amount of water reporting to groundwater through acidic waste rock (S-16)
Wildlife	30 acres would be reclaimed to grassland habitat. (S-17)	GSM would be required to also provide a plan to provide bat and raptor habitat in highwalls to provide some utility to the environment. (S-17)	Same as Agency Modified Alternative except more vegetated grassland habitat and less bat and raptor habitat. (S-17)
Aesthetics	The North Area Pit will create additional visible highwalls that would contrast with the adjacent hillsides and mountain slopes. (4-5)	Same as Agency Modified Alternative	Visual impacts would be reduced for the North Area Pit. (4-5)

Response 32 (Cont.): Table S-1 also indicates that under the Pit Backfill Alternative more precipitation would be captured and routed out of the pit, preventing it from reporting to groundwater. However, the precipitation reporting to groundwater that may come in contact with acid generating material would be captured and treated under the Proposed Action and Agency Modified Alternatives. Table S-1 does not indicate that the Pit Backfill Alternative creates more wildlife habitat than the other alternatives.

Table S-1 did not indicate that the Proposed Action and Agency Mitigated Alternative maintain the option of having a secondary method of seepage collection in the event that the proposed dewatering wells fail. In addition, Table S-1 did not indicate that the Pit Backfill Alternative would eliminate the potential benefit of redirecting groundwater from the head of the EWRDC flowpath into the North Area Pit, where it could be more easily captured. These omissions have been corrected in the final EIS.

Review and comments on GSM Amendment 015 to Operating Permit No. 00065 DEIS

Areas of Uncertainty, Lack of Supporting Information, and Disagreement with Analysis

Comment 33

According to the DEIS (S-3) "There was some uncertainty of the groundwater flow paths from the North Area Pit toward the Mineral Hill Pit." The uncertainty was not resolved in the DEIS, therefore the sentence should have been revised to say "There is..." rather than "There was..." as the use of was suggests the uncertainty was resolved.

Comment 34

According to the DEIS (S-3) "Mining related seeps in the EWRDC Expansion area could be contaminated with metals and be acidic and cause off-site surface water and groundwater contamination." If this rationale is applied to the 4M tons of North Area Pit waste stored in the EWRDC Expansion it equally should be applied to the tens of millions of tons of South Area Layback material from the Mineral Hill Pit. Similarly, the same issue exists with the hundreds of millions of tons of material already placed in the EWRDC. Given the comparatively small mass of waste rock that would be placed in the EWRDC as a result of the North Area Pit compared to the other existing and proposed actions the consequences of this additional amount of material should be considered inconsequential.

Comment 35

According to the DEIS (S-3) "Backfilling the North Area Pit is different from backfilling the Mineral Hill Pit and an independent analysis is required." While we agree with this statement, the analysis in the DEIS, instead of being independent, appears to be entirely based on the assumptions and findings of the previous Mineral Hill Pit 2007 EIS as noted elsewhere in this analysis. In addition, the analysis is based on a paucity of actual project specific data concerning materials characterization and water quality predictions, instead depending on the 2007 EIS, as noted elsewhere in this analysis. Given these aspects it is incorrect to characterize the analysis as independent of either prior analysis or of the Mineral Hill Pit analysis.

Comment 36

According to the DEIS (S-5) "Approximately 52.6 million tons of non-ore waste rock would be generated from the proposed new mining areas and would be primarily placed in the East Waste Rock Dump Complex (EWRDC) Expansion area (Section 2.3). Amendment 015 would increase the size of the permitted disturbance boundary by approximately 68.1 acres and would extend current mining operations by about two years." The DEIS should present information for the two actions (South Expansion Area and North Pit Area) independently for analysis purposes.

Comment 37

According to the DEIS (S-5) the Agency-Modified Alternative would require "The implementation of closure geodetic and ground-movement monitoring for the North Area Pit and EWRDC Expansion area to ensure safe access and to keep reclamation cover systems working." Based on the past history of mass instability issues at GSM, particularly with respect to the Mineral Hill Pit, there is no evidence that these measures will be highly effective and it is our professional opinion that reliance on these measures does not ensure safe access to the pit in particular. The DEIS should have provided additional information and discussion concerning past pit wall failures in the Mineral Hill Pit as well as analyzed recent mass failures such as that which occurred at the Kennecott Bingham Canyon Pit. While we agree that monitoring such as that proposed in the DEIS can be effective in

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Response 33: Comment noted. See change on Page S-3.

Response 34: All waste rock removed from the South Area Layback and the 4 million tons removed from the North Area Pit will be acidic. An additional 2.1 gpm of seepage would result from placing this waste rock into the EWRDC expansion area. This additional seepage would be captured along with the other seepage from the EWRDC under the currently approved reclamation plan.

Response 35: An independent hydrological assessment was performed for the North Area Pit, HydroSolutions, Inc. 2012, Hydrogeologic Assessment of Barrick Golden Sunlight Mine's Amendment for North Area Pit Project, March 27, 2012.

Response 36: See Section 2.7.1 for the explanation to the "Mining only the North Area Pit or only the South Area Layback Alternative."

Response 37: Ground-movement monitoring will continue at closure because of the instability that has occurred with the Rattlesnake and Sunlight Blocks. Reclamation caps covering the tailings impoundments and waste dumps need to remain intact to minimize infiltration.

To design the North Area Pit for stable highwalls, GSM contracted Golder and Associates (Golder). Golder's report is contained in Appendix A-1 of the Amendment 15 application. Golder was provided with data collected from an extensive program of subsurface drilling, surface geologic mapping, subsurface high-resolution video camera surveys of drill holes, drill core logging, groundwater monitoring wells and instruments, and laboratory strength testing of rock samples. Golder used these data to develop a geotechnical model and engineering analyses. Based on modeled results and the geologic setting, highwalls of 50°-55° slope in bedrock, a 24°-26° slope in unconsolidated sediments, and a 45°

along the Range Front Fault Zone were recommended.

As indicated in the figures in the Amendment 15 application, GSM selected the more conservative 50°, 24°, and 45° slopes, which allow for more predictable slope performance over an extended period.

GSM employs a variety of monitoring techniques that provide layered network to predict potential highwall instability. These techniques include: slope stability RADAR, robotic total stations, time domain reflectometry (TDR) cables, shape acceleration arrays, vibrating wire piezometers, and inclinometers. Post closure, GSM would be required to continue these types of techniques to ensure worker safety under the Agency Modified Alternative.

Access to the general mine site and the pits in particular, would be controlled with maintained fencing and signage. As it is the responsibility of GSM to maintain a safe working environment and access to the pit bottoms, DEQ will defer those matters to GSM. In the event GSM is not able to meet their obligations, DEQ will bond to maintain access.

Section 3.2, Geotechnical Engineering, does discuss slope stability concerns for the highwalls in the North Area Pit and the South Area Layback. In the Mineral Hill Pit closure plan, GSM is required to provide safe access to the pit for maintenance of water management facilities. The North Area Pit would include a similar requirement. DEQ will bond for a reasonable closure scenario including establishing a new dewatering system and maintaining access from raveling and slope failure in the North Area Pit. The Bingham Canyon pit is much bigger and does not compare to a pit as small as the North Area Pit.

Review and comments on GSM Amendment 015 to Operating Permit No. 00065 DEIS

Comment 37 (continued)

predicting potential failures[1], the DEIS should have noted that, like occurred at Bingham Canyon, the actual movement far exceeded projections and resulted in extensive damage to equipment and only circumstance prevented a loss of human life (e.g. the slide was not expected to reach the equipment area and at other times people had been working in that area).[2] Lacking this analysis the DEIS fails to address the real potential for pit wall failures relative to the proposed South Area Layback and North Area Pit based on an analysis of current knowledge or site-specific knowledge. The DEIS does not address the potential technical and financial implications if a large failure occurs in any event, and similarly does not provide information related to financial assurance for such an event. It should be noted that if a failure did occur at any point in the future, the cost would most likely be borne by taxpayers rather than the project proponent, both because the event was not adequately included in existing financial assurance, and because the existence of the project proponent's financial viability in the future to pay for such an unplanned event cannot be assured.

Comment 38

According to the DEIS (S-5) "Up to 9.2 million tons of waste rock from the South Area Layback would be used to backfill the North Area Pit rather than being hauled to the EWRDC Expansion area or the Buttress Dump Extension area." It is a well understood fact that in-place rock, when blasted results in material "swelling" which creates waste rock and ore combined having greater volumes than the pit from which the material was excavated. Typical assumptions used by industry assume that swelling by as much as 40 percent occurs.[3] Given this fact, if the intent is to fill the pit back to original contours as suggested by the SEIS (cite page) then the statement should have said "Up to X.X million tons of waste rock, based on a total mass of XX.X million tons of ore and waste removed from the North Area Pit, and a typical assumed 40% expansion factor, from the..." All impacts analysis for backfilling the North Area Pit should similarly have been based on this mass of waste rock rather than the "Up to 9.2 million tons..." incorrectly stated throughout the EIS.

Comment 39

However, also according to the DEIS (2-15) "The North Area Pit would produce an additional 1.2 million tons of ore and 8 million tons of waste rock." Based on this information the statement made on S-5 is both incorrect in terms of the amount of waste rock as well as not addressing material swelling. If an area with a volume that holds 9.2 million tons is excavated and backfilled to the original topography, assuming a 40% swelling factor, 60% of the original volume, or 9.2 M tons x .6 = 5.5 M tons of waste rock would be used to backfill the North Area Pit. This suggests the DEIS would have benefitted from a thorough review by a qualified environmental professional/professional engineer prior to publication as this is a first principle.

Comment 40

According to the DEIS (2-7) "Due to issues with TSF-1, GSM developed several new design features to improve the environmental performance of TSF-2..." "Changes to the TSF-2 drainage system were intended (underline added) to minimize uncontrolled leakage from

[1] Careful Monitoring: The Key to Pit-wall Safety, Engineering and Mining Journal, 12 May 2013.
[2] Huge Landslide Halts Ore Production at Rio Tinto's Bingham Canyon Mine, Engineering and Mining Journal, 14 May 2013.
[3] SMGB Information Report 2007-02, STATE MINING AND GEOLOGY BOARD, Report on Backfilling Of Open-Pit Metallic Mines in California, Department of Conservation Resources Agency, January 2007

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DEQ has bonded a pit closure plan for the Mineral Hill Pit. GSM has to maintain a safety bench, the access road, and has to replace any water management facilities damaged by raveling rock or slope failures. DEQ concluded the South Area Layback reduces the potential for long-term instability in the Mineral Hill Pit and removes a large portion of the head of the Swimming Pool ground movement block.

Response 38: DEQ understands swell factor when rock is mined. Facilities have been sized based on this swell factor. The actual amount (mass) of waste rock needed to backfill the North Area Pit was not calculated but stated as "up to 9.2 million tons" based on the reported quantities of ore plus waste rock to be mined out of the North Area Pit. The actual amount of backfill needed would vary depending upon the final topography of the recontoured backfill, and may be less because of the swell factor and the amount needed to achieve a 2H:1V slope from the top of the pit highwall with adjustments to achieve a free-draining pit floor

Response 39: See response above.

Response 40: The action alternatives would increase the capacity of TSF-2 by approximately 5 million tons and create an expanded footprint of 4.5 acres, all within the permitted disturbance boundary. The design of TSF-2 has been addressed in previous environmental documents and no design changes are proposed as part of the action alternatives. There is no significant leakage from TSF-2. In response to the adaptive management plan comment, DEQ continually reviews monitoring data at the site and changes monitoring as a result.

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Comment 40 (continued)

TSF-2." It appears the last statement is incorrect in identifying TSF-2 as having "uncontrolled leakage" and instead should have referred to TSF-1. The DEIS should provide details on the design changes (e.g. geosynthetic liner versus clay liner). The DEIS should also provide information on the rate of "uncontrolled leakage" from TSF-1 versus the results of the design changes to TSF-2. It is our understanding that despite the design changes significant leakage has resulted from TSF-2 requiring installation and operation of an extensive pumpback system to prevent contamination from reaching both residential wells as well as the Jefferson River slough. DEQ should recognize that mitigation, however well "intended", often times does not result in the desired outcome and additional measures are required. DEQ should apply this finding to the mitigation proposed throughout this DEIS and in all cases identify the secondary and tertiary means of mitigation which might also be necessary. In a larger context this is typically addressed in an Adaptive Management Plan which should be required as part of the operating permit for the GSM and other mines.[4]

Comment 41

According to the DEIS (2-9) "Most of the waste rock could generate acid when exposed to air and water." Similar general statements are contained elsewhere in the EIS concerning water quality predictions. However, these statements are not supported by any geochemical or hydrogeological data or analysis to support these statements. While we believe the statements to be generally true, the DEIS should provide summary information concerning the geochemical and hydrogeological characterization and water quality modeling predictions in support of this statement, particularly with respect to the new materials being mined from the South Layback Expansion Area and North Pit Area.

Comment 42

According to the DEIS (2-12) "The North Area Pit would extend below the natural water table so dewatering would be necessary." Was an alternative considered which would mine the North Area Pit without extending below the natural water table so as to mitigate

[4] Adaptive management planning is recommended for management of natural resources by the US Department of Interior in their 2009 Adaptive Management Technical Guide. The guide describes the purpose and approach to adaptive management as follows:

The learning that is at the heart of adaptive management occurs through a comparison of model-based predictions against estimated responses based on monitoring data. It is by means of these comparisons that monitoring is used to understand resource dynamics, and thus to confirm the most appropriate hypotheses about resource processes and their responses to management. By tracking useful measures of system response, well designed monitoring programs facilitate evaluation and learning in adaptive management.

In general, monitoring provides data in adaptive management for four key purposes:

(i) to evaluate progress toward achieving objectives;
(ii) to determine resource status, in order to identify appropriate management actions;
(iii) to increase understanding of resource dynamics via the comparison of predictions against survey data; and
(iv) to enhance and develop models of resource dynamics as needed and appropriate.

Monitoring programs should be designed from the outset to inform decision making with data that are relevant to the management issues in the adaptive management project (55,56). But monitoring in the context of adaptive management is much more efficient and effective if it targets specific attributes for the specific purposes listed above. Simply put, the value of monitoring in adaptive management is derived from its contribution to adaptive decision making, and monitoring efforts should be designed with that goal in mind (57).

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Response 41: Information concerning geochemistry and water quality is provided in Section 3.4, Water Resources. The geochemistry and water quality at GSM have been addressed in previous environmental documents. The water quality and geochemistry of the materials to be mined are no different from those previously evaluated in detail. The waste rock placed in the waste rock dump complexes, as well as the tailings to be placed in the impoundment, would be acid producing.

Response 42: Data indicates most of the minable ore is located below the water table. Even if the North Area Pit was not mined below the water table, water infiltrating through highwalls or backfilled acidic waste rock would reach the water table and contaminate it requiring the same level of water management.

Statutes are entitled to a presumption of constitutionality. Section 82-4-336, MCA, sets the reclamation standards enacted by the Montana Legislature and there is no provision in that statute prohibiting perpetual water treatment. Section 82-4-336 (7), MCA, specifically allows for treatment of water from reclaimed open pits.

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Comment 42 (continued)

potential impacts from doing so? It is generally acknowledged that mining below the water table almost by necessity results in perpetual treatment of groundwater and potentially surface water where high contaminant leaching potential such as exists at GSM is present. Perpetual treatment is in violation of Article IX, Section 2 of the Montana Constitution, as well as the provisions of the MMRA. Recognizing that it may have been excluded merely for economic reasons, this alternative should nevertheless have been addressed in the DEIS, and DEQ's failure to do so is a violation of MEPA.

Comment 43

According to the DEIS (2-12) "The approximately 4 million tons of non-acid generating Bozeman Group/Landslide Debris material waste rock from the North Area Pit would be stockpiled and used for subsoil cover material for reclamation of the existing EWRDC or TSF-2." As noted previously the amount of backfill needed to recreate the original topography would be approximately 5.5M tons if calculated correctly. Although the 4 million tons of non-acid generating waste rock would not result in original topography, its use as backfill would eliminated any water quality concerns. The DEIS should have considered using this material as backfill as an alternative to using acid generating material as proposed, realizing that this might result in additional costs for double-handling and might not result in original topography.

Comment 44

According to the DEIS (2-30) "2.7.1 Mining only the North Area Pit or only the South Area Layback. The primary reason for dismissing this alternative is that GSM would not be able to mine half the resource because they rely on ore blending (high silver in one ore and high copper in the other ore) to control costs and keep production viable, the amount of gold would likely not support the capital investment, and one small pit area would not have enough dig faces to supply continuous ore to the mill." The DEIS should provide identification of the high silver ore (which we assume would be from the Mineral Hill Pit expansion as Mineral Hill Pit ore has traditionally contained high amounts of silver) and high copper ore. The present mill configuration should not require blending to accommodate the high silver ore as it has treated it in the past, whereas we have no doubt that the high copper ore, which could have deleterious impacts on gold and silver recovery circuit presently in place, will require blending. We also believe the coincidence of high copper in the North Area Pit and copper impacting the Midas Spring noted elsewhere in the DEIS (3-X) may be connected and should be evaluated and addressed. In addition to the identification of the ore, the "high copper ore" suggests a different geochemical signature from that of the Mineral Hill Pit ore which should be further discussed and evaluated in the DEIS in terms of potential water quality impacts.

Comment 45

According to the DEIS (3-2) "The generally accepted FOS when working with slopes is 1.3 for short-term stability, 1.5 for long-term stability, and greater than 1.1 for slopes subjected to earthquake forces. A minimum FOS of 1.2 for pit operational conditions is consistent with stability objectives accepted for non-critical slopes (underline added) at other large-scale mining operations (Read & Stacey, 2009)." This FOS is used to suggest the unreclaimed North Area Pit would meet stability requirements (3-10). This analysis is fundamentally flawed and misstates the application of the principles of FOS. The generally accepted approach is when a reasonable amount of testing has been carried out and the consequences of failure are likely to be damage to property then a figure such as 1.3 is

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Response 43: DEQ has independently reviewed backfilling the North Area Pit with Bozeman Group/Landslide Debris materials to a free-draining condition. This would minimize surface water runoff from precipitation and snowmelt from entering the backfilled pit. If the exterior pit dewatering wells were decommissioned, the groundwater table would rebound in the backfilled materials. Groundwater flows through the North Area Pit would likely flow east into other Bozeman Group/Landslide Debris materials or south to the Mineral Hill groundwater sink. The regional groundwater quality would be similar to that before mining; however some new areas of exposed pit highwall and the acidic rock in the pit floor may produce acidity from exposure to air and water. Some of the generated acidity in groundwater could be neutralized by the Bozeman Group materials.

DEQ does not agree backfilling the North Area Pit, even with neutral materials, would eliminate all groundwater quality concerns or eliminate eventual water treatment for this area. DEQ assumes exterior pit dewatering wells would eventually be needed to capture and treat contaminated groundwater and provide greater certainty for regional groundwater quality.

The Bozeman Group/Landslide Debris materials will be used for reclamation of other disturbances on the mine site.

A 40 percent swell factor applies to mined rock. Four million tons of rock with a 40 percent swell factor would result in over three-million cubic yards of material (based on 2,650 pounds per loose cubic yard). The total volume of the final pit is not known, but the re-establishment of original topography was not a consideration in the development of the pit backfill alternative.

Response 44: The mining of the North Area pit would require blending due to its high copper content. The suggestion that just the expansion of the Mineral Hill Pit be approved ignores the fact that mining just half the resource would not support the capital investment. Unless it cannot be conducted in accordance with the

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Comment 45 (continued)

often deemed an acceptable factor of safety. Where failure is likely to lead to loss of human life then 1.5 is likely to be preferred. In a situation where the soil parameters and groundwater conditions, for example, are poorly known and where failure may result in widespread loss of life, then it may be necessary to consider 1.7 to be the lowest acceptable factor of safety.[5] Similarly, the Montana Department of Transportation requires that highway slopes meet a long-term FOS of at least 1.3, and if the consequence of slope instability could be significant (damage to major structure) an FS of at least 1.5 or higher may be desirable.[6] As noted by the DEIS (3-13) "A pit pond would be prevented from forming in the North Area Pit at closure. Raveling and minor failures of portions of the highwalls could threaten the pit water collection and routing system. A conceptual plan is needed to address safe access into the pit to maintain the closure collection sump and pipeline." It is our opinion that the potential for damage to the proposed pit lake dewatering structures proposed for the Mineral Hill Pit and potentially for the North Area Pit if left unreclaimed to be damaged requires an FOS of at least 1.5. In addition, GSM employees will have to enter the pit, or DEQ employees may have to enter the pit if GSM were to at some point be unable to perform the necessary functions, which requires travel of roads and doing site maintenance beneath potentially unstable slopes, therefore a factor of safety of 1.5 or greater would be appropriate. It is our opinion that the only way to avoid the liability associated without requiring these FOS would be to eliminate the need for perpetual access into the pits and backfill all the pits at the GSM. As also noted in the DEIS (3-15) "the Agency-Modified Alternative may provide advanced warning of potential problems or would identify that ground movements have occurred." It is our opinion that "may" poses an unacceptable risk where human life is concerned, and that identification "that ground movements have occurred" will do little to prevent injury or loss of life.

Comment 46

According to the DEIS (3-32) "...seepage would be attenuated by the Bozeman Group sediments (2007 SEIS). As was commented on in the 2007 SEIS attenuation is not a proven or potentially even viable form of mitigation. As noted by the National Academy of Sciences natural attenuation is an established remedy for only a few types of contaminants, rigorous protocols are needed to ensure that natural attenuation potential is properly analyzed, and natural attenuation should be accepted as a remedy only when the processes are documented to be working and are sustainable (underline added).[7] The attenuation processes proposed as mitigation for the GSM are at best speculative and lack adequate documentation, particularly with respect to sustainability over thousands of years such as will be necessary to mitigate potential GSM impacts to underlying groundwater and the Jefferson River. It is our opinion that all original water quality mitigation assumptions for the GSM which have relied on attenuation, including those in the 1997 EIS and 2007 EIS as well as the DEIS, be re-evaluated in this regard.

[5] Appendix A3: Guidelines for slope stability analysis in risk modelling, from Development of glacial hazard and risk minimization protocols in rural environments, John Reynolds, 2003.

[6] MDT Geotechnical Manual, Roadway Slopes and Embankments, July 2008.

[7] NATURAL ATTENUATION FOR GROUNDWATER REMEDIATION, Committee on Intrinsic Remediation, Water Science and Technology Board, Board on Radioactive Waste Management, Commission on Geosciences, Environment, and Resources, NATIONAL ACADEMY PRESS, Washington, D.C., 2000.

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MMRA, withholding approval of the North Area Pit may result in a taking action against the state.

Response 45: As recognized in the EIS and the comment, a FOS of 1.3 is appropriate for this analysis where human life is not at risk. GSM would be required to provide a final post-mining geodetic and ground-movement monitoring plan for the North Area Pit that would provide information to protect worker safety in the pit if, and when, needed. GSM is not currently anticipating the need for a sump in the North Area Pit but would install one if the pit accumulates water at closure due to unsuccessful groundwater dewatering efforts. Installation, operation, and maintenance of the pit sump would require safe access to the pit and may include additional measures such as safety berms. The reclaimed 2:1 slope on the east wall of the North Area pit would make it easy to maintain access into all but the bottom of the pit.

DEQ respectfully disagrees that a highwall failure would result in any "loss of life" due to the monitoring DEQ is requiring at closure. DEQ believes the increased FOS is unnecessary. The Mineral Hill Pit has an approved plan to ensure worker safety in the pit. DEQ believes the South Area Layback increases safety in portions of the Mineral Hill Pit. See also response 37.

Response 46: The 1998 FEIS noted that natural attenuation by the underlying Bozeman Group is expected to occur if, or when, acidic seepage discharges from the EWRDC into underlying geologic materials. Groundwater monitoring data collected to date indicate that the waste rock dumps are not currently discharging to groundwater. GSM has not proposed to modify the groundwater mixing zone described in Appendix 1 of the 1998 FEIS. While that mixing zone analysis notes that natural attenuation is anticipated to occur within Bozeman Group sediments beneath the EWRDC, the post-closure water management plan does not rely solely upon the continued effectiveness of natural attenuation. Active pumping and treatment of groundwater would be required in the

open pit area and also downgradient of the tailings impoundments where pumpback wells are currently required. Interception and treatment of seepage from the west dumps, which do not overlie Bozeman Group sediments, was also anticipated. DEQ may also require seepage capture systems as a contingency for the EWRDC if future groundwater monitoring indicates that natural attenuation processes are not sufficient to maintain compliance with water quality criteria outside of the approved mixing zone.

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Comment 47

The DEIS identifies aesthetics as an Unavoidable Adverse Effect in Section 4.2 (4-5). According to the DEIS "The mine expansion alternatives would result in additional exposed pit highwalls in the Mineral Hill Pit and North Area Pit areas creating additional visible highwalls that would contrast with the adjacent hillsides and mountain slopes. Under the North Area Pit Backfill Alternative, visual impacts would be reduced for the North Area Pit. The additional visual impacts would be unavoidable adverse impacts. The visual contrasts could be reduced by successful establishment of vegetation and trees on the highwall benches and slopes but the pre-mine terrain and appearance can be not be reestablished." This statement in the DEIS blatantly ignores the fact that pit backfill alternative would eliminate the highwall benches and slopes and could be designed to closely mimic the pre-mine terrain and appearance. It is our opinion that the analysis presented in the DEIS is clearly incorrect.

Comment 48

We are disappointed that the DEIS did not address financial assurance relative to the proposed action or the alternatives that were considered. We believe the requirement for adequate financial assurance is a critical mitigation measure which the implementation of the proposed other mitigation measures requires for them to be effective in the event of bankruptcy of the project proponent. Montana DEQ has included this information in past DEIS (e.g. Rock Creek Mine) and should have done so in this as well as all other DEIS.

Conclusions and Recommendations

Sections 82-4-336 (9) (10) and (12), MCA provide the statutory framework that DEQ must follow in determining which is the best alternative.

Comment 49

1. Section 82-4-336 (9) (b) (i), MCA, requires reclamation to a condition *"of stability structurally competent to withstand geologic and climatic conditions without significant failure that would be a threat to public safety and the environment."* DEQ recognized this requirement at DEIS S-3.

The pit backfill alternative is the only alternative that addresses potential geotechnical issues which could affect both public safety and financial assurance. Potential pit wall failures cannot be absolutely predicted or mitigated in a manner which ensures public safety and similarly cannot be adequately assured from a financial standpoint because it is impossible to predict what mass of material, where failures will be, and when a failure will occur. As a professional engineer with an ethical responsibility for ensuring both worker and public safety it is my opinion that the pit backfill alternative is the only alternative which can provide assurance without significant risk of loss of human life and taxpayer cost. This same opinion exists for the existing Mineral Hill Pit and it is our opinion that the current mitigation for that pit similarly poses an unacceptable risk of loss of human life and if an accident does occur the State of Montana should be held liable having failed to adequately address this matter by requiring backfill of open pits.[8]

[8] While the author does not desire that a failure ever occurs, he strongly feels that this statement needs to be made so that any loss of human life due to a pit wall failure post-reclamation can be recognized as having been preventable,

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Response 47: The draft EIS accurately reflects that visual impacts would be reduced under the North Area Pit. DEQ believes that its recognition that the pre-mine terrain and appearance can't be reestablished is consistent with the commenter's statement that the reclamation under the backfill alternative would closely mimic the pre-mine terrain and appearance.

Response 48: While DEQ does not consider it a "mitigation measure" per se, DEQ agrees that it is important to require a bond satisfying the requirements of Section 82-4-338, MCA. Under that provision, the reclamation bond may not be less than that estimated cost to the State to ensure compliance the Water Quality and Clean Air Acts, the Metal Mine Reclamation Act, the administrative rules promulgated under the Metal Mine Reclamation Act, and requirements in the issued operating permit. DEQ does not calculate financial assurance until an alternative is selected because the alternative development process can change bond requirements. The bond will be calculated after the final EIS is completed and the ROD is issued.

Response 49: The Agency Modified Alternative is the preferred alternative for reasons discussed in the final EIS section 5.1.5.

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Comment 50

2. Section 82-4-336 (9) (b) (ii), MCA requires reclamation to a condition *"that affords some utility to humans or the environment"*; as recognized by DEQ at DEIS S-4.

As previously stated the North Area Pit if left unbackfilled consistent with the Proposed Action and Agency Modified Alternative will present an ongoing threat to human safety minimizing or eliminating any utility to humans. Likewise, the Proposed Action does not contain any measures to mitigate wildlife impacts. While the Agency Modified Alternatives does require GSM to provide a plant to provide bat and raptor habitat in the North Area Pit "to provide some utility to the environment" the Pit Backfill Alternative would create more vegetated grassland habitat and less bat and raptor habitat. Given that the existing habitat is vegetated habitat the Pit Backfill Alternative should be preferred because it restores more of the pre-existing land use by pre-existing species.

Comment 51

3. Section 82-4-336 (9)(b)(iii and iv), MCA require "reclamation to a condition *"that mitigates postreclamation visual contrasts between reclamation lands and adjacent lands; and (iv) that mitigates or prevents undesirable offsite environmental impacts."*

The North Area Pit backfill alternative is the only alternative that meets the requirement to mitigate post-reclamation visual impacts. In fact, the pit backfill alternative, if properly designed to closely mimic the pre-mine terrain and appearance, could eliminate the post-reclamation visual impacts for the North Area Pit entirely. The North Area Pit backfill, by utilizing material destined for the EWRDC and instead allowing for a shorter haul distance, would minimize offsite environmental impacts because it would result in less fuel consumption and equipment emissions as compared to the other alternatives considered in the DEIS. In terms of offsite environmental impacts from potential groundwater or surface water pollution, the pit backfill alternative would most likely lead to no greater pollution than the other alternatives, and in comparison to previous allowed actions by DEQ resulting in hundreds of millions of tons of acid generating waste being addressed by questionable approaches such as "attenuation" any offsite pollution would likely be undetectable and of no significant contribution to already existing water quality impacts which have been previously allowed.

Comment 52

4. Section 82-4-336 (10), MCA requires *"The reclamation plan must provide sufficient measures to ensure public safety and to prevent the pollution of air or water and the degradation of adjacent lands".*

The Pit Backfill Alternative is the only alternative that, by eliminating the pit highwalls altogether, addresses post-reclamation public safety, as well as the safety of future workers whom would be required to maintain required dewatering and other features within the open pit. The only way to prevent the pollution of air or water and the degradation of adjacent lands would be to select the No Action alternative. In comparison to the other action alternatives presented in the DEIS the Pit Backfill Alternative results in less air

and therefore would occur as a result of negligence on the part of the project proponent and the regulatory authorities.

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Response 50: The Proposed Action Alternative and Agency Modified Alternative reclaim the North Area Pit highwall to satisfy the structural stability requirement of Section 82-4-336(9)(b)(i), MCA. DEQ has determined that these alternatives satisfy the utility requirement of Section 82-4-336(9)(b)(ii), MCA, because of the utility to the environment, not humans. The MMRA does not require that land disturbed by mining be reclaimed to the use prior to mining. See ARM. 27.24.115. The reclamation plan includes reclaiming about 30 acres of the east side of North Area Pit by regrading slopes to 2H:1V, covering with soil, and revegetating. Bat and raptor habitat would be created on the upper portions of the highwall.

Response 51: Under Section 82-4-336(9)(b)(iii), MCA, DEQ may not approve a reclamation plan unless it provides for the mitigation of post-reclamation visual impacts between reclaimed lands and adjacent lands. Section 82-4-301, MCA, reflects the finding of the Montana Legislature that many types of mining operations preclude complete restoration of the land to its original condition. Thus, the MMRA does not require elimination of the post-reclamation visual impacts. Moreover, there are some existing cliffs in the area of the North Area Pit which would not be mimicked if the entire area were covered with growth media. In regard to offsite impacts, the North Area Pit Backfill Alternative would eliminate the second method of seepage collection if the proposed dewatering wells fail and eliminate the potential benefit of redirecting groundwater from the head of the EWRDC flowpath into the North Area Pit. Emissions from equipment hauling waste rock will not violate the Clean Air Act of Montana.

Response 52: Section 82-4-336(9), MCA, does not require the elimination of highwalls, but requires remaining highwalls to be of sufficient structural stability to withstand geologic and climatic conditions without failure that would be a threat to public safety. The preferred alternative complies with Title 75, chapters 2 and 5.

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pollution due to less fuel consumption and equipment emissions, and no greater pollution of water or degradation of adjacent lands.

Comment 53

5. Section 82-4-336 (12), MCA requires *"The reclamation plan must provide for permanent landscaping and contouring to minimize the amount of precipitation that infiltrates into disturbed areas that are to be graded, covered, or vegetated, including but not limited to tailings impoundments and waste rock dumps. The plan must also provide measures to prevent objectionable postmining ground water discharges."*

The Pit Backfill Alternative, by covering the acid generating pit highwalls, is the only alternative considered by the DEIS that provides for permanent landscaping and contouring of all new disturbed areas to minimize the amount of precipitation that would infiltrate the pit highwalls. The Pit Backfill Alternative also contains additional measures which on an equal basis to the other alternatives considered in the DEIS would minimize post-mining ground water discharges. It should be noted that the only alternative which would prevent additional objectionable discharges likely to result from the proposed actions to groundwater would be the No Action alternative.

In summary, as noted by the Montana Fifth Judicial District Court, Jefferson County[9] (underline added) "...reclamation involves two factors. First, reclamation requires a change from the disturbed condition. Second, the change compared to the disturbed state must be positive rather than negative."

As noted by our previous comments the Proposed Action and Agency Modified Alternative both leave the North Pit Area pit walls unchanged from the disturbed condition. As also noted, the change resulting from the Pit Backfill Alternative in terms of geotechnical stability, human safety and land reclamation are substantially positive. In terms of surface water and groundwater the DEIS appears to suggest that the Pit Backfill Alternative would result in positive changes by reducing the exposure of surface water to the pit walls and limiting the amount of water reporting to groundwater through acidic waste rock backfill. It should be noted that due to the lack of substantive lack of technical information on both geochemistry and hydrogeology provided in the DEIS any changes for all the North Pit Area alternatives proposed are equally uncertain, and at the most are inconsequential compared to the existing highly significant threats to water quality posed by past permitted activities as well as those which would be created by the proposed South Layback Area expansion of the existing Mineral Hill Pit. Based on these criteria the North Pit Area Pit Backfill Alternative is not only clearly the best alternative in every respect, but also is the only alternative in the DEIS which meets both the requirements identified by the Court.

Comment 54

As a final comment, my analysis of **this** DEIS suggests that the original Mineral Hill Pit decision not to backfill is based on highly uncertain and unsupported facts and should be considered flawed. The analysis conducted by DEQ does not weigh potential and highly uncertain impacts to water quality against the very significant threat to public safety and

[9] *MEIC, NWF, GWA v Montana DEQ and GSM, Inc.*, Cause No.DV-08010896, Order Granting Summary Judgment for Montana DEQ and GSM Inc., filed June 30, 2011.

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Response 53: The Agency Modified Alternative was developed to address issues raised during public scoping and comment period on the draft EIS, and to mitigate environmental impacts identified in Chapter 3. The Agency Modified Alternative is the preferred alternative for reasons discussed in the final EIS Section 5.1.5.

Leaving the pit unbackfilled and reclaiming the north and west highwalls to rock faces provides several benefits. The upper oxidized portions of the highwalls would be reclaimed as bat and raptor habitat. DEQ has concluded that reclaiming the slopes by backfilling the pit, soiling, and revegetating would not allow for a contingency for control of water collecting in the pit. Continued dewatering in the perimeter wells and visual observation of water accumulation provides for water collection and treatment.

While Section 82-4-336(12), MCA, requires reclamation plans to provide for permanent landscaping and contouring to minimize the amount of precipitation that infiltrates into disturbed areas that are to be regraded, covered or vegetated, there is another statutory provision that specifically deals with open pits. Under Section 82-4-336(7), MCA, when mining has left an open pit exceeding 2 acres of surface areas and the composition of the floor or walls are likely to cause formation of objectionable effluents on exposure to moisture, the reclamation plan must include provisions that adequately provide for: 1) insulation of all faces from moisture or water contact by covering the faces with material or fill not susceptible itself to generation of objectionable effluents in order to mitigate the generation of objectionable effluents, 2) processing of any objectionable effluents in the pit before they are allowed to flow or be pumped out of the pit to reduce toxic or other objectionable ratios to a level considered safe to humans and the environment by the department, 3) drainage of any objectionable effluents to settling or treatment basins when the objectionable effluents must be reduced to levels considered safe by the department before release from the settling basin, or 4)

Response 53 (Cont.):

absorption or evaporation of objectionable effluents in the open pit itself and prevention of entrance into the open pit by persons or livestock lawfully upon adjacent lands. Thus, DEQ or permittee is not required to cover acid generating highwalls under Section 82-4-336(7), MCA.

The Proposed Action and Agency Modified Alternative do not leave the highwall of the North Area Pit unchanged from disturbed conditions. Under these alternatives, About 30 acres of the south and east non-reactive walls of the North Area Pit, which is an area comprising more than half of the 49.4 acre pit, would be amended or capped if needed and revegetated. The northwestern portion of the highwall would remain an area where cliffs exist in the pre-mining landscape. GSM would be required to create bat and raptor habitat in the remaining highwall of the North Area Pit.

Response 54: DEQ did not weigh water quality concerns as being of greater consequence than probable human safety concerns and future taxpayer liability in the 2007 ROD. DEQ determined that all alternatives under consideration, even those not requiring backfill, provided for reclamation of the Mineral Hill pit to a condition that would not result in a highwall failure threatening public safety or the environment outside the pit. DEQ further determined that only the alternatives not requiring backfill (Underground Sump and No Pit Pond Alternatives) provided adequate assurance that ground and surface water pollution would not occur; sufficient control of pit seepage could not be reliably assured under the pit backfill alternatives. Between the alternatives not requiring backfill, DEQ selected the Underground Sump Alternative because placing the water capture system underground posed less risk to workers and required less maintenance (2007 ROD, p. 16). The 2007 ROD did not address taxpayer liability. All alternatives, even those not requiring backfill, satisfy the stability requirement in Section 82-4-336(9)(b)(i), MCA.

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Comment 55

taxpayer liability that leaving the pit in an unreclaimed condition presents. The 2007 EIS analysis weighs possible water quality concerns as being of greater consequence than probable human safety concerns and future taxpayer liability. Based on my ethical responsibility with regards to public safety as a professional engineer I strongly disagree with the analysis leading to the decision not to backfill the Mineral Hill Pit and therefore also question the analysis in **this** DEIS which relies on the 2007 EIS to not consider backfill of the South Layback Area of the Mineral Hill Pit as part of the impact evaluation.

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Response 55: DEQ has concluded that water quality protection is the most important issue in the analyses and that safety concerns have been addressed. Future taxpayer liability is limited in by having a reclamation bond.

3. Jean A. Riley, P.E. Montana Department of Transportation

MDT

Montana Department of Transportation
2701 Prospect Avenue
PO Box 201001
Helena MT 59620-1001

Michael T. Tooley, Director
Steve Bullock, Governor

October 2, 2013

OFFICIAL RECORD

Kristi Ponozzo
Department of Environmental Quality
PO Box 200901
Helena, MT 59601

Subject: Draft EIS on Golden Sunlight Mine's Proposed Amendment
MDT Comments

Dear Kristi,

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (EIS) for the Golden Sunlight Mine, Amendment 015 to Operating Permit No. 00065. The Montana Department of Transportation (MDT) staff has reviewed the document and has the following comments:

Comment 56

On Section 3.4.3.2 Proposed Action Alternative – Surface Water

The Draft EIS indicates there will be a diversion ditch that will capture and reroute stormwater and snowmelt from several unnamed drainages into another unnamed drainage on the northeast side of the project area. MDT staff is concerned this may impact the down gradient MDT facilities (MT 69 and I-15). MDT requests, the mine complete a hydraulics/drainage report that defines what impact the change in flow patterns will have on the State's highway system with respect to drainage and demonstrates the historical peak runoff flows will not be exceeded prior to changing the historic flow patterns.

Comment 57

On Section 4.1 Cumulative Adverse Impacts

The Draft EIS discusses the proposed Butte Highlands Mine and reclamation of abandoned mines, that the ore from these will be processed at the Golden Sunlight mine operation and the GSM Industrial Park. MDT requests, prior to initiating a change of types and volumes of vehicles using the existing approach(s), the mine review the approach(s) to determine if there are impacts to MDT routes and if mitigation of the impacts are required.

If you have any questions concerning the above comments, please contact me at (406)444-9456 or email at jriley@mt.gov

Sincerely,

RECEIVED
OCT 03 2013
DEQ DIRECTORS OFFICE

Jean A. Riley, P.E.
Transportation Planning Engineer
Policy, Program & Performance Analysis Bureau
Montana Department of Transportation

Copies: Jeff Ebert, P.E. – MDT Butte District Administrator
Walt Ludlow, P.E. – MDT Butte District Hydraulics Engineer
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Response 56: Tetra Tech completed an analysis of the flow pattern using a 25-year flood event calculation and evaluated the potential impact on drainage structures for the crossings of Highway 69 and the Interstate. For the Highway 69 culvert, a 25-year event would result in 110 cubic feet per second of water and that "the water depth on the culvert entrance during the design event with the expanded drainage area is well below the crest of the culvert. This is entirely within MDT's guidelines for allowable headwater on culverts."

Regarding the Interstate, the crossing is at the Boulder River. The flow of the diversion ditch returns to the Boulder River by the time it reaches the Interstate 15 crossing. The proposed diversion would not change the peak runoff in the Boulder River.

Response 57: Processing the ore from the Butte Highlands Mine would result in 30 truckloads per day. This amount of additional use would not result in a noticeable change in the types and volumes of vehicles using the existing Interstate approaches or exits. Mitigation is not required. This activity may occur even under the No Action Alternative.

4. Jeremiah Langston, National Wildlife Federation

October 20, 2013

Kristi Ponozzo
Department of Environmental Quality
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deqgoldensunlighteis@mt.gov
406-444-2813

Dear Ms. Ponozzo:

Comment 58

Golden Sunlight Mine's (GSM) construction of an additional pit implicates both Montana citizens' constitutional rights to reclamation and a clean and healthful environment. Montana courts have found on four separate occasions that these rights require full reclamation and apply to GSM's open pits. *Montana Wildlife Federation v. Montana Department of State Lands*, No. CDV-92- 486 (Mont. 1st Dist. Dec. 15, 1992) (Holding that Article IX, Section 1 is self executing); *National Wildlife Federation v. Montana Department of State Lands*, CDV-92-486 (Mont. 1st Dist. Sept. 6, 1994) (Holding M.C.A. 82-4-366(7) is in conflict with the constitution); *National Wildlife Federation v. Montana Department of State Lands*, CDV-92-486 (Mont. 1st Dist. Feb. 16, 2000) (Finding full reclamation is technically feasible and required under M.C.A. 82-4-336(7) and the constitution); *National Wildlife Federation v. Montana Department of Environmental Quality*, No. CDV-92-486, (Mont. 1st Dist. Mar. 21, 2002) (Holding M.C.A. 82-4-336(9)(c) eliminates an effective reclamation tool and violates Article IX, section 2). Without a doubt, the constitutional requirement to full reclamation applies to this pit.

Comment 59

For the purposes of reclaiming the land to the fullest extent possible, the North Area Pit Backfill Alternative is by far the best choice presented by the draft Environmental Impact Statement (EIS). This option would regrade and revegetate 49.4 acres of former pit area, compared with 30 acres under the Agency Modified Alternative. Montana Dep't of Env't Quality, *Golden Sunlight Mine Amendment 015 to Operating Permit No. 00065 Draft Environmental Impact Statement* S-14 (2013). Additionally, the North Area Pit Backfill Alternative would remove the highwall whereas the Agency Modified Alternative would not. Montana Department of Environmental Quality (DEQ) admits "[p]it highwalls reclaimed as rock faces

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Response 58: Comment noted. DEQ does not entirely agree with the characterization of the cases cited.

Response 59: Under the reclamation standards enacted by the Montana Legislature in Section 82-4-336(9)(c), MCA, the use of backfilling as a reclamation measure is neither required nor prohibited in all cases. Rather, a decision to require any backfill measure must be based on whether and to what extent the backfilling is appropriate under site-specific circumstances and conditions in order to achieve the stability, utility, visual contrast mitigation, and mitigation or prevention of off-site impacts required under Section 82-4-336(90(b), MCA. The MMRA does not require reclamation of land disturbed by mining "to the fullest extent possible."

Ms. Ponozzo
October 20, 2013
Page 2

would not be soiled and vegetated. Loss of vegetation on the acid-producing rock faces would be irretrievable."Dep't of Env't Quality, *supra*, at 4-6.

Comment 60
Regarding GSM's legal obligation to reclaim open pit mines, there appears to be no advantage in choosing the Agency Modified Alternative over the North Pit Backfill Alternative; except cost and possibly GSM's ability to install pit-pumps in the Agency Modified Alternative. In light of these facts and GSM's legal obligation to reclaim open pit mines, National Wildlife Federation (NWF) is concerned the Agency Modified Alternative appears to be DEQ's preferred option. NWF requests a clearer evaluation of the merits of these two options; specifically, on the following issues.

Comment 61

1. **Feasibility of dewatering well without the additional help of a pit sump as required under the North Area Pit Backfill Alternative.**

Water treatment is likely the most significant issue facing the North Area Pit Backfill Alternative and has been the DEQ's primary justification for not requiring full reclamation of open pits at GSM in the past. The draft EIS states "[b]ackfilling would preclude the construction of an in-pit sump, which would eliminate the option of having a second method of seepage collection in the event that the proposed dewatering wells fail. It is anticipated that any failed wells could be replaced within a reasonable timeframe such that recovery of contaminated groundwater would not be compromised." Dep't of Env't Quality, *supra*, at 3-40 (2013). NWF requests further explanation of the assumptions and decision making that went into this conclusion. Further, NWF wishes DEQ to provide examples, if known, where dewatering wells have worked without pit sumps. NWF also asks for a direct comparison of the Agency Modified Alternative's water treatment capabilities to the North Area Pit Backfill Alternative.

Comment 62

2. **Availability of low-permeable, alkaline material such as the Bozeman Group sediments, to cover acidic fill material if the North Area Pit Backfill Alternative is chosen.**

Much of DEQ and GSM's plan focuses on the ability to use Bozeman Group sediments to prevent seepage of contaminated water and buffer acidity. NWF is interested if similar tactics could be implemented in the North Area Pit Backfill Alternative. Presumably, these materials would be placed under the lake bed sediments, to be used as top soil, and on top of the acidic fill material. This plan would depend on whether there is enough Bozeman Group materials to accomplish this task and if these materials are well suited to sit atop the acidic fill material rather than at the bottom of the pit as suggested by the Agency Modified Alternative. NFW requests more information on these issues and any other

Response 60: DEQ has selected the Agency Modified Alternative as its preferred alternative. See Section S.6 for an explanation of that selection.

Response 61: Under the Agency Modified Alternative, the time between failure of dewatering wells associated with the North Area Pit and the initiation of discharge of contaminated water from the pit area is largely dependent upon the elevation at which a pit lake would begin to discharge either to groundwater or via surface outflow. All 12 test wells drilled within the limits of the proposed North Area Pit have static water levels ranging between 5518′ and 5540′ elevations. The southern rim of the proposed pit would have an elevation of approximately 5500′; however, it is anticipated that pit inflows would be balanced by re-infiltration of the water to unsaturated bedrock along the southern pit margin prior to reaching the spill-over elevation.

The nearest monitoring wells to the south of the proposed pit area, PW-47 and PW-76, have static water levels of 5401′ and 5440′. It is assumed that pit dewatering would result in the formation of a groundwater divide somewhere between these wells and the dewatering wells to the north; however, the potential elevation of such a divide is uncertain. To estimate the minimum time between dewatering well failure and discharge, DEQ assumed discharge would begin when the water level recovers to the 5400′ elevation. The proposed pit bottom elevation is 5380′. Given the dimensions of the proposed pit below the 5400′ elevation and an assumed inflow rate of 20 gpm, the pit lake would reach this elevation in 5 to 6 months. This estimate does not take into account the time required for resaturation of bedrock within the cone of depression beneath the pit; however, both the low porosity of undisturbed bedrock and the rapid recovery times indicated by pump tests conducted on test wells within the proposed pit area indicate that the time required for groundwater to begin to enter the pit would be in the range of one to two weeks. If the groundwater divide

Response 61 (Cont.):

south of the pit were higher (for example, similar to the static water level at PW-76 (5440'), then it would take over 4 years for a pit lake filling at 20 gpm to reach the outflow elevation. DEQ is confident that failed dewatering wells could be replaced within the 5 to 6 month timeframe that is the estimated minimum before discharge of water from the pit area would begin. It should also be noted that installation of a temporary pump within the pit sump could occur much more rapidly.

In contrast, given a backfilled pit, groundwater level recovery to a level at which discharge would occur would be much more rapid, and would be largely dependent on the volume of pore space within the backfill. It is assumed that compaction of the waste rock during backfill placement would decrease this pore space and that subsequent weathering of the waste rock would further decrease this volume. Assuming a 10% porosity, the water level within the backfill would reach the outflow point ten times faster than in the unbackfilled pit scenario, and discharge could begin within a month of dewatering well failure. It is unlikely that replacement wells could be installed within this timeframe, and the option of temporarily maintaining the cone of depression via pumping from an in-pit sump would not be available.

Open pits developed below the water table in Montana have generally used both dewatering wells for groundwater interception in conjunction with in-pit sumps for the collection of storm water plus groundwater inflows, if any, that bypass the dewatering well system.

These are all operational examples, as all such pits have historically been allowed to flood as soon as mining has ceased.

Response 61 (Cont.):

The focus of NWF's comment on comparison of water treatment capabilities is unclear. Both alternatives would involve similar water treatment facilities and capacities. The quantity of water requiring treatment would be similar regardless of whether the North Area Pit is backfilled. The primary difference would be the ability to maintain dewatering of the pit area, as discussed above.

Response 62: Low permeable alkaline material such as the Bozeman Group sediments could be used as a layer underneath the growth media to cover the acid-generating fill material. A low permeable alkaline material layer may reduce the amount of precipitation that infiltrates into the acid-generating fill material. It would not, however, buffer the objectionable effluent that would result when the acid-generating fill material comes into contact with a rebounding and fluctuating water table. In regard to use of the Bozeman Group sediments as the fill material, see DEQ's previous response to Kuipers and Associates' letter suggesting use of the Bozeman Group/Landslide debris materials for pit backfill.

Ms. Ponozzo
October 20, 2013
Page 3

potential problems or benefits in applying the Bozeman group materials in this manner.

Comment 63

3. **Tradeoffs of dispersing acidic rocks in the North Area Pit Backfill and East Waste Rock Dump Complex (EWRDC) rather than concentrating all waste rock at EWRDC.**

The report mentions both the North Area Pit Backfill Alternative and the Agency Modified Proposal could have some benefit to water quality with regard to EWRDC. On one hand, the reports states "[a] slight increase in metals loading to groundwater that follows the EWRDC flowpath may occur if the North Area Pit were developed then backfilled, at least when compared with the Proposed Action (no backfill) Alternative." Dep't of Env't Quality, *supra*, at 3-39. On the other hand, "[b]ackfilling could also eliminate the potential benefit of redirecting groundwater from the head of the EWRDC flowpath into the North Area Pit, where it could be more easily captured." Dep't of Env't Quality, *supra*, at 3-40. Given the proposed backfill alternative presents water quality tradeoffs, a cost benefit analysis of each plan's effects should be implemented.

Other considerations appear to exist between the choices of dispersing acidic rock in two places and storing waste rock in one place. A dispersed method might have the benefit of more balanced PH levels at the respective locations as a result of lower concentration of acidic rock. This method may also have the benefit of introducing additional alkaline rocks and soil, such as the Bozeman Group, over a larger area allowing these buffer materials greater opportunity to dissolve and counteract the already more balanced PH in the water. The possible downside of this plan is that affected water could be further spread out, reducing containment efforts, and increasing the amount of acidic water escaping the water treatment plan. Location of the waste rock presents a multitude of considerations and NWF requests DEQ further examine this issue and any other related concerns that arise.

Comment 64

4. **Cost of monitoring highwall stability.**

DEQ's draft EIS states "GSM would provide a conceptual closure monitoring program that would identify pit highwall failures in areas where the North Area Pit collection sump would be compromised or where access into the North Area Pit would be blocked." Dep't of Env't Quality, *supra*, at 3-15. The report goes on to say "[h]owever, less material would be placed back into this area of the pit during backfilling than would be removed during mining of the North Area Pit (Figure 2-10), so overall effects on geotechnical stability after backfilling would be comparable to the No Action Alternative." Dep't of Env't Quality, *supra*, at 3-16. Monitoring

Response 63: A cost benefit analysis was not completed comparing costs of collecting and treating water from a backfilled pit with most waste rock still going to the EWRDC versus a non-backfilled pit and all waste rock going to the EWRDC. DEQ believes the water quality tradeoffs between the two alternatives do not require a cost benefit analysis for the following reasons.

In the no backfill alternatives, the pit would be maintained as a groundwater sink and 100 percent control of groundwater can be maintained by perimeter dewatering wells and/or a pit bottom collection sump if needed. No groundwater would escape to the EWRDC flow path. Water treatment systems are bonded and would be in place and the additional increment of 10-20 gpm needed to keep the pit dry is already designed into the treatment plant capacity. Some additional bond would be added to maintain and/or replace North Area Pit dewatering wells. All acidic waste rock would be kept high and dry in the EWRDC or the Buttress Dump extension. No major changes in water capture, routing, and maintenance of treatment systems are needed.

In the backfilled alternative for the North Area Pit, if the perimeter wells failed or if the backfill created a perched layer in the backfill (regardless of whether the backfill is acidic or not) there is some potential for the perched water to move laterally into the EWRDC flowpath. DEQ concluded that the potential could result in a slight increase in metals loading to the EWRDC flowpath. Again, the amount of water escaping would not exceed the capacity of the EWRDC seepage collection, routing, and maintenance of water treatment systems that would be in place. DEQ concluded that keeping all acidic waste rock in a high and dry location and out of a fluctuating groundwater zone in a backfilled pit would be preferable.

Response 64: DEQ disagrees that the placement of the additional waste rock presents “a multitude of considerations”. As mentioned in response to comment 63 above, the proposed EWRDC seepage and collection system can handle the increased acres of acidic waste rock in the proposed EWRDC expansion area and potential seepage from the area. The expansion area would result in a need for additional monitoring for seeps from the toe of the new waste rock dump and continued monitoring of groundwater wells in the area, watching for an increase in sulfates indicating that an acidic seep has developed and the Bozeman Group is attenuating the acid. When seeps develop, or wells indicate an underground seep has formed, GSM would implement the construction of a seepage collection (either in a collection sump at the toe of the waste rock dump or a pump in a dewatering well) and pipeline system to the treatment plant.

Ms. Ponozzo
October 20, 2013
Page 4

programs will surely have an impact on the environment. NWF requests an analysis concerning which alternative will have a lesser impact on the environment.

Comment 65

5. **Socio-economic benefits of a full reclamation for local community.**

The final EIS should account for the potential benefits the backfill alternative may have for the local community. Rather than hiring a high priced consultant to monitor the stability of the highwall and perform the arduous task of correcting the problem, GSM should consider immediately addressing the issue though full reclamation. If North Area Pit Backfill Alternative is chosen, the mine would presumably employ members of local community for a longer period of time. The wages paid for the backfill would largely go to the local community due to the highly labor intensive process involved with reclamation. Furthermore, the local workforce would likely already possess many of the skills needed for this project though their mining experience with GSM's regular operations.

These socio-economic benefits should be compared to the highly technical work required under the agency plan, which would require a conceptual closure monitoring program. This program would likely need specialized consultant work from outside the local community. If work stabilizing the highwall is required from the local community, it would probably be done on an ad hoc basis. This would provide a less consistent and reliable source of work for the local community than full scale reclamation. NWF requests DEQ examine the socio-economic effects of Agency Modified Alternative and North Area Pit Backfill Alternative to this effect.

Comment 66

6. **Alternative habitat for bats and raptors.**

The report states "North Area Pit highwall would not be reclaimed as rock faces, which would reduce the amount of raptor, bat, and big horn sheep habitat, while increasing the amount of grassland habitat re-established following closure." Dep't of Env't Quality, *supra*, at 3-41. NWf is interested in what alternative habitat would be available to these animals under the North Area Pit Backfill. NWF also requests analysis of natural habitat compared to habitat artificially created in a manmade highwall.

Thank you for hearing our concerns. NWF looks forward to working with DEQ in developing the best management plan for GSM. Please contact us if any of these issues need clarification.

Response 65: As described on page 2-28 of the DEIS, the North Area Pit would be mined prior to mining the South Area Layback. During the course of mining the South Area Layback, the wasterock from the South Area Layback would be direct hauled, as backfill, to the North Area Pit. Since the North Area Pit is a shorter haul distance than the EWRDC, there is actually a slight reduction in mine operating resources necessary to implement the backfill alternative as opposed to the Proposed Alternative. Thus, it is not expected that the North Area Pit Alternative would have a significant positive effect on the local economy in terms of jobs and wages.

Long-term highwall stability monitoring and maintenance would likely be performed, as it is now, by locally employed technicians --- most likely the same employees that would be operating the water treatment plant and maintaining other site facilities.

Response 66: Bat habitat in the GSM area was created by abandoned mine workings, which have been excavated by GSM's mining activities in the Mineral Hill Pit. If the North Area Pit were backfilled, bats and raptors could use the highwalls within the reclaimed Mineral Hill Pit for habitat. DEQ is not aware of any other suitable habitat for bats and raptors in the immediate vicinity of the Golden Sunlight Mine.

Ms. Ponozzo
October 20, 2013
Page 5

Sincerely,

Jeremiah R. Langston
Law Clerk
National Wildlife Federation
jeremiah.r.langston@gmail.com
(801) 557-3719

5. Patrick Flowers, Montana Fish, Wildlife and Parks

RECEIVED
OCT 21 2013
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Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman MT 59718-5496

October 17, 2013

Krisit Ponozzo
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59601

Dear Ms. Ponozzo:

Thank you for the opportunity to provide input regarding the Golden Sunlight Mine expansion proposal. Our staff reviewed the Draft EIS, and we have relatively general comments relating to long-term fisheries and aquatic resources.

Comment 67
In Chapter 1 of the Draft EIS, you state that, "No concerns were expressed about impacts to fisheries and aquatics." Although we understand that there are no fish within the permitted disturbance boundary, we believe that long-term groundwater protection associated with this project is critical to preventing future impacts to fisheries and aquatic life in nearby waters such as the North Boulder and Jefferson Rivers.

Comment 68
The various alternatives presented in the Draft EIS appear to focus on differences between methods to dispose of millions of tons of waste rock. There are differing aesthetic issues, cost issues, and groundwater quality issues depending on the sites selected for disposal. Montana Fish, Wildlife & Parks strongly encourages you to select the waste rock disposal alternative that provides the most effective, long-term protection of groundwater quality while not limiting future access to ground water treatment alternatives (i.e. it appears that the North Area pit backfill alternative would not meet this intent). Appropriate disposal of waste rock and a commitment to pump and treat contaminated pit water in perpetuity is probably the best long-term strategy to protect fisheries resources in nearby surface waters.

We appreciate the opportunity to provide input to this project.

Sincerely,

Patrick J. Flowers
Region 3 Supervisor

CC: Ron Spoon, Trevor Selch, Travis Horton

Response 67: DEQ agrees that potential impacts to water quality and long-term groundwater protection are significant issues and were used to select the preferred alternative.

Response 68: The Agency Modified Alternative was developed by DEQ to address issues raised during the public scoping process and comment period on the draft EIS, and to mitigate, to the extent possible, those environmental impacts identified in Chapter 3 of this EIS. The Agency Modified Alternative is the preferred alternative because it results in less environmental impact than the Proposed Action and North Area Pit Backfill alternatives. The Agency Modified Alternative is preferred over the North Area Pit Backfill Alternative because it would provide the opportunity to access and install a sump in the event the exterior wells failed.

6. Tom Hopgood, Montana mining Association

MONTANA MINING ASSOCIATION

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October 21, 2013

Ms. Kristi Ponozzo
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59601

RE: Golden Sunlight Mine DEIS

Dear Ms. Ponozzo:

Comment 69

On behalf of the Montana Mining Association (MMA), thank you for the opportunity to comment on the Golden Sunlight Mine (GSM) Draft Environmental Impact Statement (DEIS). We offer our genuine appreciation to the agency for conducting the necessary analyses and for producing the DEIS in a timely manner. We also thank the DEQ for hosting the public meeting in Whitehall on October 8 and for allowing us to join the other witnesses in verbally voicing our vigorous support for the GSM expansion. And finally, we thank the department for the opportunity to submit the following comments as a supplement to our October 8 comments. So, without further ado, please accept the following as our comments on the GSM DEIS.

Comment 70

By way of summary, the MMA stands in solid support of the Proposed Action Alternative described in the DEIS. Conversely, we are adamantly opposed to both the No Action Alternative and the North Area Backfill Alternative. We have concerns about the Agency Modified Alternative and will comment more specifically below:

DEIS Proposed Action Alternative

Comment 71

MMA Comment:

For this proposed mine expansion, the DEQ assembled a compliance report (Draft Amendment Approval for Amendment 15, Golden Sunlight Mine Operating Permit #00065; dated April 30, 2013) which details the findings of the agency in completing review of Amendment 15 for compliance with the Metal Mines Reclamation Act (MMRA) and other requirements.

GSM's application, specifically the Proposed Action Alternative stated therein, clearly meets all requirements of both statute and administrative rule. We therefore support the Proposed Action Alternative as the DEQ final action. We recommend a permit be issued which allows GSM to move forward with its work as soon as possible.

There is clearly public sentiment in support of the Proposed Action since the scoping process yielded 118 comments and all were supportive of the applicant and the application.

Response 69: Comment noted.

Response 70: Comment noted.

Response 71: Comment noted.

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DEIS No Action Alternative

Comment 72

MMA Comment:

The No Action Alternative is untenable. There is no benefit whatsoever to anyone whomsoever from precluding GSM from continuing its mining operations. On the other hand, there is significant wide spread harm in the selection of the No Action Alternative. That alternative would inexorably lead to the closure of the GSM. The harm would fall, first of all, on the many Montanans employed directly and indirectly by the mine. It would needlessly take away their livelihoods. It would unhinge the local economy and would, no-doubt, present a serious problem statewide. It would remove necessary dollars from the tax coffers at the County and State levels.

DEIS Agency Modified Alternative

Comment 73

MMA Comment:

We would respectfully direct your attention to SB 312 passed by the 2011 Montana Legislature and codified as part of the Metal Mine Reclamation Act at Section 82-4-301 *et seq*, MCA. The bill modified the permitting process for hard rock mines under the Metal Mine Reclamation Act. The intent of SB 312 is to require an applicant to do some heavy lifting on the front end of the permitting process and submit a complete and compliant application that demonstrates the proposed Project would meet or exceed the requirements of all substantive Montana requirements. What it does in fact is to require applicants to make larger investments in developing the science of the project.

Significantly, SB 312 then requires DEQ to make a "front-end" determination of compliance with applicable permitting laws and regulations. It requires this *prior* to starting the MEPA review. This requires the applicant and DEQ to cooperatively obtain the necessary data for the "compliance" determination. It avoids a lengthy and expensive MEPA review process without knowing whether a project can even be permitted. Fundamentally, SB 312 eliminates the imposition of 11th hour mitigations and stipulations that sometimes change the engineering of a project or make a project uneconomical. The agency is required to impose stipulations or mitigation measures required to meet substantive environmental laws *before* MEPA review.

This DEIS Agency Modified Alternative includes six proposed modifications developed by the DEQ to mitigate environmental impacts from the proposed action. In light of SB 312, the MMA would respectfully question the late addition of these modifications to the DEIS. If the agency believed that modifications were necessary to the GSM's application, that should have been brought to light before the applicant began the lengthy and costly MEPA process.

Response 72: Comment noted.

Response 73: DEQ is aware of the procedural changes that SB 312 made to the permitting of a mine under the Metal Mine Reclamation Act. These changes include a determination that a permit, including a permit amendment application, is complete and complies with the substantive requirements of the Metal Mine Reclamation Act prior to the beginning an environmental review. The changes to the permitting process made under SB 312 are set forth in Section 82-4-337, MCA. Section 82-4-337(1)(f), MCA, provides that the "issuance of a draft permit as a final permit is the proposed state action subject to review **required by Title 75, chapter 1**." Similarly, Section 82-4-337(1)(h)(iv), MCA, generally provides that "a final permit may not be issued until **the review pursuant to Section Title 75, chapter 1**, is completed or 1 year has elapsed after the draft permit was issued." Of course, Title 75, chapter 1 is the codification of the Montana Environmental Policy Act (MEPA). Thus, SB 312 directs DEQ to comply with MEPA after DEQ's determination that an application is complete and compliant and issuance of a draft permit, or permit amendment. SB 312 did not make any substantive changes to MEPA. Under MEPA, state agencies are required to consider alternatives to a proposed action in an environmental impact statement (Section 75-1-201(1)(b)((iv)(C), MCA).

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Under the requirements of SB 312, the time to bring these issues forward is during the front end of the process, not upon conclusion. We are confident that GSM and DEQ would have cooperated amicably to resolve any questions, differences of opinions or outstanding issues. We respectfully submit that it was not necessary to surprise the applicant and the public with the proposed modifications. The addition of the mitigation items for this project seems to be unnecessary and, at a minimum, contrary to the legislative intent of SB312. It is the very thing SB 312 was aimed at preventing.

Mitigation issues suggested in the Agency Mitigated Alternative and MMA comment on each:

Issue 1: Capture and Routing of Seeps in the EWRDC Expansion Area (P. 2-25)

Agency Modification:

GSM would provide a conceptual plan for how to collect and route EWRDC Expansion area seepage water to water treatment plant.

Comment 74

MMA Comment:

Section 5.4 of the Amendment 015 application describes the conceptual seepage collection system that would be implemented to capture seepage that infiltrates into the foundation of the EWRDC Expansion area. This mitigation measure is not required.

Issue 2: Capture and Routing of North Area Pit Surface Water Runoff and Groundwater after Mine Closure (P. 2-25)

Agency Modification:

GSM would provide a conceptual design to capture and convey pit water to the water treatment plant after mining, including a final pit regrading plan; a partial pit backfill with compacted Bozeman Group materials, as needed, to direct groundwater, precipitation, and snowmelt to a closure pit sump and to create a safe pit floor working surface; use of cover soil/growth media appropriate for the 2H:1V slope angles, and seed; design collect water and convey to the closure water treatment plant; and a plan for location and maintenance of an access road into the pit to service the sump, pump, and water lines; and install a berm in the bottom of the pit to capture north and west wall pit raveling rock which would protect workers in the pit bottom.

Response 73 (continued)
The Agency Modified Alternative and the North Area Pit Backfill Alternative, were developed by DEQ to satisfy its statutory obligation to consider alternatives to a proposed action under MEPA. These alternatives were not developed at the eleventh hour, but were disclosed in the normal course of the MEPA review during which GSM and the public, including the Montana Mining Association, were given an opportunity to comment on the alternatives.

Moreover, the statement that SB 312 requires DEQ to impose stipulations or mitigation measures before the MEPA review is not entirely accurate. Section 82-4-337(2)(b), MCA, expressly gives DEQ the authority to include stipulations in a final permit that were not included in the draft permit. DEQ may do so either with the applicant's consent or upon providing the applicant with a written explanation as to the reason for the stipulation (including a citation to DEQ's substantive authority for the stipulation) and the reason the stipulation was not included in the draft permit. Thus, SB 312 contemplated situations in which issues were first identified in the MEPA review. SB 312 provided DEQ with an avenue for addressing those issues by giving it authority to include stipulations in the final permit that were not included in the draft permit issued prior to the environmental review.

Response 74: Issue 1: See DEQ Response 19 to Barrick comment.

MONTANA MINING ASSOCIATION

Office Address: 2301 Colonial Drive, Suite 3A ~ Helena, MT 59601
Mailing Address: P.O. Box 5567 ~ Helena, MT 59604
Telephone: (406) 495-1444
Email: info@montanamining.org
Website: http://www.montanamining.org

Comment 75
MMA Comment:

GSM has provided the information requested in its application including a final plan describing re-sloping of the south and east pit walls, capping, growth media placement, seeding and run-off control. The GSM application outlines the planned water management system including water treatment. And the application covers the contingency should failure of the North Area Pit dewatering plan occur. It is the opinion of the Montana Mining Association that this modification's requirements have already been covered in the application in sufficient detail.

Issue 3: Implement Closure Geodetic and Ground Movement Monitoring for the North Area Pit and EWRDC Expansion area to ensure safe access and to keep reclamation over systems working. (P. 2-27)

Agency Modification:

GSM would develop a conceptual post-mining geodetic and groundwater monitoring plan.

Comment 76
MMA Comment:

Golden Sunlight Mine's application renders the above modification unnecessary. As described in Section 3.9.3 of the application: "Although no ground movement is projected to occur as a result of Amendment 015, GSM would modify the ground movement monitoring program to include the proposed North Area Pit, South Layback Area, and EWRDC Expansion RDA. Proposed locations of ground monitoring geodetic stations and inclinometers for the EWRDC Expansion RDA are included in Appendix A-2."

Issue 4: Salvage Available Fine-grained Lakebed Sediments in the North Area Pit and incorporate Organic Amendments in the Sediments when the Sediments are used as Growth Media in Reclamation Cover Systems. (P. 2-27)

Agency Modification:

GSM would salvage and stockpile silt-textured lake bed sediments. GSM would incorporate compost or other organic matter to achieve 1 percent by volume organic matter when the sediments are used for reclamation growth media.

Comment 77
MMA Comment:

GSM included the necessary information and the rationale for its proposed handling of the referenced lake bed sediments. Section 3.8.1 of the application states: "To facilitate this advantage, GSM would commit to salvage as much usable reclamation material as possible. However, GSM would not commit to

Response 75: Issue 2: See DEQ Response 20 to Barrick comment.

Response 76: Issue 3: See DEQ Response 21 to Barrick comment.

Response 77: Issue 4: See DEQ Response 22 to Barrick comment.

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Website: http://www.montanamining.org

salvage silt-textured lake bed sediments as GSM's past experience has demonstrated that this material would not accomplish GSM's reclamation objectives."

Amendment 015 includes GSM's commitment to salvage growth media from the fine-grained lakebed sediments in the North Area Pit (Bozeman Group/Landslide Debris).

This modification is not only unnecessary to meet Montana law, but in the applicant's professional opinion and based on actual experience in the proper reclamation of its site, the very materials the agency wants to require the mine to salvage, do not produce good results and are not a suitable material for use in much of the mine's reclamation.

Comment 78

MMA Comment on 3.5.3.3 Agency-Modified Alternative

The modifications for the Agency Modified Alternative would have the similar effects on wildlife and fisheries as described for the Proposed Action Alternative. GSM would be required to document the loss of bat and raptor habitat in the Mineral Hill Pit resulting from the South Area Layback expansion. GSM would propose additional bat and raptor habitat in the South Area Layback upper highwalls and the North Area Pit highwall to mitigate the loss of the bat and raptor habitat. The plan for replacement of bat and raptor habitat would be due by the date of the first annual report if this alternative is selected.

Development of the South Area Layback would not result in loss of bat and raptor habitat and the reclamation plan for the North Area Pit would provide habitat for raptors and bats. The north and west walls of the pit would be reclaimed as highwall, providing excellent raptor and bat habitat. The agency states the prosed action and the agency modified alternative would have similar results. It is not necessary for GSM to modify its proposal.

Comment 79

MMA Comment on 3.6.3.3 Agency-Modified Alternative

The modifications for the Agency Modified Alternative would have similar effects on aesthetic resources as described in the Proposed Action Alternative. GSM would be required to identify replacement areas for the portions of the 37 acres of designated re-vegetation under Stipulation 011-15 for the Mineral Hill Pit that would be eliminated by the South Area Layback mining operations. Reclamation and revegetation practices similar to those prescribed under Stipulation 011-15 to mitigate aesthetic impacts from the Mineral Hill Pit would be applied to the proposed North Area Pit highwall. GSM would modify its visual mitigation plan that was

Response 78: See DEQ Response 23 to Barrick comment.

Response 79: See DEQ Response 24 to Barrick comment.

MONTANA MINING ASSOCIATION

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Website: http://www.montanamining.org

approved and bonded for the 2007 SEIS. The modified visual mitigation plan would be due with GSM's first annual report if this Alternative is selected. This alternative may reduce visual impacts slightly over the Proposed Action Alternative.

None of the activities associated with the South Area Layback would affect areas specified in Stipulation 011-15, the agency states the applicant's proposal and the agency proposal would have similar effects. It is not necessary for GSM to have its proposed plan modified.

Comment 80

In conclusion, the Montana Mining Association regards the Montana Department of Environmental Quality as a partner and respects the work the agency does in assuring the people of Montana a clean and healthy environment. We are especially appreciative of DEQ's stated intention to listen to the public most closely involved in the social, economic, and environmental issues being analyzed for this DEIS.

Comment 81

We urge the Montana DEQ to complete its very necessary and important work and issue a Record of Decision approving the Golden Sunlight Mine application to continue its operations.

Sincerely,

Tom Hopgood, Executive Director

Response 80: Comment noted.

Response 81: Comment noted.

7. Stan Wilmoth, Ph.D. Montana Historical Society

Big Sky. Big Land. Big History.
Montana Historical Society

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OCT 08 2013
DEQ DIRECTORS OFFICE

Historic Preservation
Museum
Outreach & Interpretation
Publications
Research Center

October 7, 2013

Kristi Ponozzo
DEQ

RE: DEIS Golden Sunlight Amendment

Dear Kristi:
Comment 82
We noticed a reference to a cultural resource inventory on page 1-10. The reference is given as GANDA 2012. In chapter 8 References this is listed as:

GANDA. 2012. Garcia and Associates. Golden Sunlight Mine bird and general wildlife surveys; 2011 and 2012. Golden Sunlight Mine.

If that is the correct reference for a 2012 cultural inventory we do not have it, at least not under that title. Could you please confirm the title, and provide a copy to us for state cultural records system?

Thank you,

Stan Wilmoth, Ph.D.
State Archaeologist/Deputy, SHPO

225 North Roberts Street
P.O. Box 201201
Helena, MT 59620-1201
(406) 444-2694
(406) 444-2696 FAX
montanahistoricalsociety.org

Response 82: The reference on page 1-10 will be revised to "GANDA 2012a" which refers specifically to the Cultural Resource Reconnaissance completed by GANDA for the Golden Sunlight Mine. The Cultural Resource Reconnaissance Report (GANDA 2012a) was forwarded to SHPO.

Two references for two GANDA reports will be included in Chapter 8 (see page 8-1):

- Garcia and Associates (GANDA) 2012a. Cultural Resource Reconnaissance of North Area Pit, South Area Layback, Far East Rock Disposal Area, and South West Rock Disposal Area; Golden Sunlight Mine, Jefferson County, Montana. June 22.
- GANDA 2012b. Golden Sunlight Mine bird and general wildlife surveys; 2011 and 2012. Golden Sunlight Mine, Jefferson County, Montana. June 21.

APPENDIX A

GOLDEN SUNLIGHT MINE DRAFT EIS
SUMMARY OF OCTOBER 8, 2013 PUBLIC MEETING

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Attachment B: Public Meeting Sign-In Sheet
Attachment C: Transcript
Attachment D: Draft EIS Public Meeting Newsletter
Attachment E: Public Meeting Comment Form

1.0 Introduction

Golden Sunlight Mines, Inc. (GSM) is proposing to expand the company's current mining operation with the addition of one new pit called the North Area Pit, and an expansion to the existing Mineral Hill Pit known as the South Area Layback. The company anticipates mining approximately 4.2 million tons of gold ore that will be processed at the existing mill facility, and generating up to 52.6 million tons of non-ore rock. Mining would be consistent with existing mining operations using conventional open pit methods including drilling, blasting, loading, and hauling. All proposed facilities are located on private land owned by GSM.

The proposed North Area Pit would extend below the natural water table so dewatering would be necessary. During mining operations, water would be used in the milling process and would offset fresh water usage. After mining is completed, captured water would be pumped to a water treatment plant and processed consistent with existing permit requirements. The South Area Layback would be free-draining into the Mineral Hill Pit so dewatering would be combined with the existing Mineral Hill Pit dewatering operations.

Non-ore rock from the two proposed mine areas would be placed in the proposed East Waste Rock Dump Complex (EWRDC) rock disposal area.

GSM expects to complete the proposed mining at the North Area Pit and South Area Layback in late 2016 or early 2017. Reclamation would include placement of topsoil and seeding. The EWRDC rock disposal area would be reclaimed consistent with approved methods and practices currently used at GSM.

The amendment would extend the projected mine life by 2 years and would also provide an additional 2 years of processing off-site ore mostly from legacy mining materials in southwest Montana.

DEQ is preparing an Environmental Impact Statement (EIS) that will discuss the potential impacts of the proposed amendment. This report briefly describes the scoping process and summarizes the scoping comments.

2.0 Draft EIS Public Meeting

Public meetings provide an opportunity for interested parties to gather additional information, submit comments, and contribute to the overall EIS process. DEQ held a public meeting to discuss the draft EIS on Tuesday, October 8, 2013 from 6:00 to 8:00 p.m. at the Whitehall Community Center in Whitehall, Montana. This section summarizes how the meeting was advertised and conducted.

2.1 Notification Process

The draft EIS public meeting was advertised as follows:

- DEQ sent a letter to more than 160 individuals, dated September 17, 2013. The letter provided details about the release of the draft EIS, briefly described the alternatives, announced the date and time of a public meeting, and described how comments on the draft EIS could be submitted.
- DEQ issued a press release on September 17, 2013 with the same information as in the mailed letter. The press release is available on DEQ's website: http://svc.mt.gov/deq/press/pressDetail.asp?id=1361.

The letter is in **Attachment A**.

2.2 Public Meeting

The public meeting was organized as follows:

- Public participants were encouraged to sign in when they entered the Whitehall Community Center. Ninety-seven people attended the meeting. A copy of the sign-in sheet is in **Attachment B**.
- Kristi Ponozzo with DEQ provided opening comments and introductions and explained that the purpose of the public meeting was to obtain public comments on the draft EIS. Ms. Ponozzo also briefly described the draft EIS, including the four alternatives that were evaluated by DEQ.
- The public was then given an opportunity to provide oral comments. Five minutes was allotted to each commenter. Seventeen individuals provided oral comments. A full transcript of the public meeting, including all comments, is included in **Attachment C**.

The following materials were available at the public meeting:

- A draft EIS Public Meeting Newsletter was available at the sign-in table. **Attachment D** contains a copy of this newsletter.
- Both hard and electronic copies of the draft EIS were available.
- Forms for submitting comments on the draft EIS were also available. A copy of this comment form is included in **Attachment E**.

ATTACHMENT A: LETTER NOTIFICATION OF DRAFT EIS AND PUBLIC MEETING

Montana Department of Environmental Quality

PO Box 200901
Helena, MT 59620-0901

File Code: 1950

Date: September 17, 2013

Dear Interested Party:

The Department of Environmental Quality (DEQ) has completed a Draft Environmental Impact Statement (draft EIS) on Golden Sunlight Mine's proposed amendment for its operating permit (00065). You can obtain an electronic version of the draft EIS on DEQ's web site http://deq.mt.gov/eis.mcpx. DEQ will accept public comment on this draft EIS until October 20, 2013. DEQ will hold a public meeting and accept public comments on the draft EIS on October 8th from 6 to 8 pm at the Whitehall Community Center.

The Golden Sunlight Mine is an existing open pit mine located near Whitehall, Montana. The state of Montana issued Operating Permit No. 00065 to the mine in 1972. DEQ has previously approved fourteen amendments to the operating permit, several of which have allowed expansion of the gold mine. In September of 2012, DEQ received Golden Sunlight's application for Amendment 15, which would allow further expansion of the Mineral Hill Pit and the mining of a new pit located to the north of the Mineral Hill Pit. On April 30, 2013, DEQ determined that the company's application for Amendment 15 was complete and compliant and, pursuant to Section 82-4-337, MCA, issued a draft permit for the proposed expansion.

Pursuant to Section 82-4-337(1)(f), MCA, issuance of the draft permit as a final permit is the proposed state action subject to the environmental review required by the Montana Environmental Policy Act (MEPA) (Section 75-1-201, *et seq*., MCA). Section 75-1-201(1)(iv), MCA, requires the preparation of an environmental impact statement for state actions that may significantly affect the quality of the human environment. The environmental impact statement must include a detailed statement on the environmental impact of the proposed action, alternatives to the proposed action, and a no action alternative. Pursuant to this statute, the draft EIS analyzed a No Action Alternative, a Proposed Action Alternative (the company's proposed amendment), an Agency-Modified Alternative, and a North Area Pit Backfill Alternative.

ARM 17.4.617 requires DEQ to include in an environmental impact statement an identification of the agency's preferred alternative, if any, and the reasons for the preference. At this juncture, DEQ does not have a preferred alternative. The alternatives that do not require backfill of the North Area Pit (the Proposed Action Alternative and the Agency-Modified Alternative) and the North Area Pit Backfill Alternative each have their respective advantages and disadvantages.

The alternatives that do not require backfill would provide some terrestrial wildlife habitat and habitat for bats and raptors and would allow for the construction of a secondary system to capture impacted groundwater should the proposed perimeter dewatering wells fail. These alternatives would also impact visual resources, although that impact would be mitigated.

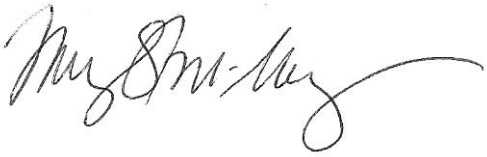
The North Area Pit Backfill Alternative would provide terrestrial wildlife habitat and, because the pit would be backfilled and revegetated, would have noticeably less visual impact than the alternatives that do not require backfill. The backfill in the pit, however, would likely foreclose the opportunity to implement secondary systems to capture the impacted groundwater in the event that the perimeter dewatering wells fail.

DEQ will make its decision after reviewing public comments on the draft EIS and the additional environmental analysis that will likely be generated in response to those comments. For more information, or to comment, please contact:

Kristi Ponozzo
Department of Environmental Quality
P.O. Box 200901, Helena, MT 59601
deqgoldensunlighteis@mt.gov.
406-444-2813

I welcome and look forward to your participation.

Sincerely,



Tracy Stone-Manning, Director
Montana Department of Environmental Quality

ATTACHMENT B: PUBLIC MEETING SIGN-IN SHEET

Golden Sunlight Mines, Inc. Draft EIS Public Meeting Sign-In Sheet

Whitehall Community Center **October 8, 2013** **6 to 8 PM**

No.	Name	Company (if applicable)	Mailing Address	Phone
1	PATRICK PLANTENBERG	DEQ	PO Box 200901 HELENA, MT 59620	431-4615
2	Tom Harrington	JCDC	Box 1079, Whitehall 59759	287-3282
3	Ed Surbrugg	Tetra Tech	7 West 6th Ave. Helena	442-5588
4	Allan Jensen	Barrick	P.O. Box 64 Whitehall	498-9068
5	Brandon Nicholl	Nicholl Ex.	617 Waterloo Rd. Whitehall	287-5659
6	Joe Nicholl	" "	" "	498-3773
7	Marilyn Nicholl	" "	" "	287-5659
8	Jhard Uphub	GSM	PO Box 857 Whitehall	491-5036
9	Keith Barkell	Barkell Trucking	P.O. Box 743 Philipsburg	239-2846
10	Gary Barker	Legends	Box 563 White Hall	439-0846
11	MARK LAMBRECHT	Treasure State Resource Industry Assoc.	3117 Cooney Dr. Helena MT 59602	443-5541
12	John Downing	GSM	P.O. Box 976 Whitehall	437-1987
13	Toby Edwards	GSM	366 MT Hwy 55 Whitehall 59759	580-3393
14	Meryl Fitzpatrick		3 Ballard Ln.	287-3786
15	Jim Looms	Retired GSM	PO Box 238 Whitehall	287-3644

No.	Name	Company (if applicable)	Mailing Address	Phone
16	Betsy Hovida	DEQ	Helena	444-4946
17	Jim Castro	DEQ	Helena	444-1967
18	Kelly Jessop	ODFL	Butte	564-9737
19	Jim Doskin	TetraTech	Helena	442-5588
20	Mark Thompson	GSM	Butte	287-2018
21	Larry McGillvray	GSM	Butte	533-0860
22	Wayne Jessop	DEQ	Helena	444-0529
23	Shari Milligan	DEQ	Helena	444-0988
24	Tammy Baxter	Chamber	Box 563 Whitehall	459-6866
25	Martha Schwabel	N/A	131 Mayflower Rd, Whitehall	287-5860
26	W. Ruth Schwabel		" " "	" "
27	Chuck Burns	Barrett's	P.O. Box 1072 Ennis	287-2016
28	Ray Fitzpatrick	Spherion	3 Ballard Ln. Whitehall	287-3786
29	James A. Lewis	GSM	35 sheep camp rd.	287-5169
30	Paul Smith	Smith Const	162 Hwy 2 west whitehall	287-3451
31	Tom Hopgood	MT Mining Assoc.	P.O. Box 5567 Helena MT 59604	495-1444
32	Kitt Dale	GSM	3435 Hwy 287, Sheridan, MT	533-5725

No.	Name	Company (if applicable)	Mailing Address	Phone
84	SHANE PARROW	GSM	842 MT HWY 2W WHITEHALL, MT 59759	406-490-9474
85	DAVE CERISE	Fickler Oil	1480 Continental Butte 59701	406-782-0616
86	Mark Briggs	GSM	81 Daly Rd Whitehall, MT 59759	406-498-1332
87	BOB SIMS	SELF	1554 N Hwy 69 BOULDER 59632	287-5117
88	ED HANDL	SELF	P.O. BOX 38, WHITEHALL, MT	287-5381
89	NANCY OYER	GSM	HOME: 527 EDISON ST. BUTTE MT 59701	490.9989
90	Jerad Docva ll	GSM	P.O. Box 49 Whitehall MT 59759	406-491-6589
91	Steve Sharkey	GSM	P.O. Box 4601 Butte MT	
92	KELLY WHITE	MT HOUSE DIST 70	4000 BIRCHWOOD RD BOZ	600-4228
93	Tim Mulligan	self	P.O Box 694 Whitehall	287 3787
94	Steven Schwab	GSM	P.O. BOX 73, WHITEHALL, MT	287.3465
95	Darrell Scharf	GSM	P.O. BOX 263, WHITEHALL	287-5802
96	MAXINE SAMUELSON	—	PO Box 412 Whitehall	287-9898
97	Rodney Mills	GSM	69 Pipestone Rd. Whitehall	490-3828
98	DAVE LAWRENCE	GSM	45 CHARNEY LN. WHITEHALL	287-9147
99	Mark Kockler	GSM	P.O. Box 1079 Three Forks	533-8774
100	Rick Jordan	GSM	2425 Harvard Butte MT	494-7646

No.	Name	Company (if applicable)	Mailing Address	Phone
33	LARRY Smith	Smith & Sons	330 Hwy 2 west Whitehall	406-491-1289
34	Sam Graham	Golden Sunlight	392 Lewis+Clark Trl. Bozeman 59718	406-490-4000
35	Harold Sant	Golden Sunlight	765 Hwy 359 Cardwell MT 59721	406 287-2052
36	Terry Murphy	State Senate	Cardwell, MT	
37	RICK WILLIAMS	GOLDEN SUNLIGHT	PO BOX 961, WHITEHALL MT 59759	406 550-1415
38	Bob Sunderland	Golden Sunlight	Box 184 Whitehall, MT 59759	406 287-3464
39	Charmaine Weyer	Golden Sunlight	379 NW 455 Whitehall MT 59759	406-498-8375
40	Tom Phillips	Golden Sunlight	6330 Pawn Dr. Belgrade, MT 59714	406-491-1648
41	JOE DILLON	GOLDEN SUNLIGHT	60 FIRST RD WHITEHALL, MT 59759	406 287-5757
42	David Odt	Golden Sunlight	PO BOX 6232 Bozeman 59771	406-599-3164
43	TOM DONNELLY	SECE amp.	130 McKenzie LA Cardwell 59721	510 365 0541
44	Greg Cor	Whitehall Schools	PO Box 163	406-498-2000
45	Jeff Jonacaro	GSM	P.O. Box 526 Whitehall	406-287-5750
46	DAN HAPPEL	MADISON CO.	PO BOX 278, VIRGINIA CITY 59755	406-843-4277
47	Karen Burt	c/o Weyener MINING Co	78 Yellowstone - Whitehall	287-5204
48	Ryan Turner	Golden Sunlight	915 Point of Rocks Rd. Whitehall, MT 59759	775-397-6500
49	Paul Buckley	Golden Sunlight	80 Burning Tree Ln	406-533-0465

No.	Name	Company (if applicable)	Mailing Address	Phone
50	Tim Huckenberry	Golden Sunlight	PO Box 654 Whitehall	287-2019
51	Martin Johnson	Golden Sunlight	P.O Box 624 Whitehall	498-8480
52	Don Drake		Po Box 755 Whitehall	287-5875
53	Chris Nelson	Golden Sunlight	Po Box 908 Whitehall	287-5752
54	Aaron Norby	Childs Geoscience Inc	4320 Glenwood Dr. A, Bzn, MT 59718	775-388-0243
55	Tom Wheeler	N/A	Po Box 252 Whitehall	406-287-5843
56	Nancy Wheeler	N/A	PO Box 252 Whitehall	406-287-5843
57	Jeff Johnson	Pacific Steel	905 Gaylord, Butte	782-0402
58	Zane Pegos	Pacific Steel & Recycling	905 Gaylord Butte	782 0402
59	Twila Harrington		PO Box 897 Whitehall	287-3497
60	Linda Hicks	Golden Sunlight	77 Irving Ln. Cardwell	775-340-0049
61	Amy French	Golden Sunlight Mine	PO Box 894 Whitehall MT	775-530-9469
62	Leslie Donnelly	Self	PO Box 21 59721	310.365.4627
63	Ann Geiger	Liberty Place, Inc	PO Box 446 Whitehall	406-287-3154
64	Steve Enriquez	Golden Sunlight	40 East st Whitehall	406-490-4549.
65	Jess Tasker	Montana	21 Rural Dr. Rd Whitehall	406-570-1069
66				

No.	Name	Company (if applicable)	Mailing Address	Phone
67	Debby Barrett	SD 36	18580 Hwy 324 Dillon	681-3177
68	Ron Hisquet	Rogers Mechanical	1305 Westside Blvd, Butte, MT	560-3563
69	Frank Sholey	Barrick	5 Whitetail DR Whitehall MT	498-6946
70	Tom Phillips	Barrick	6330 Dawn Dr. Belgrade MT 59714	539-5188
71	Joe Scypihers	Reclamm	1700 W. Kogit Unit 6	579-1977
72	Tammy Johnson	Enviroenomics	PO Box 624 Whitehall, MT	491-1714
73	Jeff Lamb	motion	1384 Hwy 69 Cardwell MT	439-0199
74	Holli Parron		842 Mt Hwy 2W Whitehall	—
75	Darko Smilovic	DisMining	522 Jetway Dr Belgrade	4065993124
76	Dave Crain	GSM	542 Hwy 2 west	(406)-491-1421
77	Peter Bory	Self	1 Coyote Trail, Whitehall	494-5558
78	Josh Harned	GSM	1300 Sunset Rd Butte	(406)-498-0573
79	Donna Harris	Whitehall School District	35 Sheep Camp Rd	406-287-5169
80				
81				
82				
83				

No.	Name	Company (if applicable)	Mailing Address	Phone
101	Mary Schonsberg		1106 W Central Belgrade 59714	406 388 7871
102	Jim Haley		279 Poplar Dr. Bozeman 59718	406-551-4116
103				
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ATTACHMENT C: TRANSCRIPT

In Re:

In the Matter of

Golden Sunlight Mine

Transcript of the Public Meeting

October 08, 2013

LESOFSKI COURT REPORTING, INC.

Original File DEQ - GOLDEN SUNLIGHT.txt

Min-U-Script®

DRAFT ENVIRONMENTAL IMPACT STATEMENT

GOLDEN SUNLIGHT MINE
AMENDMENT 015 TO OPERATING PERMIT NO. 00065

TRANSCRIPT OF THE PUBLIC MEETING

On the 8th day of October 2013, beginning at 6:08 p.m., the public meeting on the Draft Environmental Impact Statement of Amendment 015 to Operating Permit No. 00065, Golden Sunlight Mine, was held at the Whitehall Community Center in Whitehall, Montana, before Cheryl Romsa, Court Reporter, Notary Public.

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WHEREUPON, the proceedings were had as follows:

MS. PONOZZO: Hello. Welcome this evening. Thanks for coming. We're going to go ahead and get started so we can get through our public comments and then have some time afterwards for people to ask questions of our specialists.

My name is Kristi Ponozzo; I'm with the Department of Environmental Quality. And this is a public meeting on the draft environmental impact statement for the Golden Sunlight Mine expansion.

I'm going to point out some other DEQ folks that are in the room tonight, so after we get finished with the public comment portion of the meeting, you can go and talk with them and ask them questions. We have Warren McCullough, who is over here (indicating); we have Herb Rolfes, who is behind me here; Betsy Hovda is right here (indicating); Wayne Jepson in the back; Patrick Plantenberg, right there (indicating); and Shari Milligan, who is up there at the front helping out. And Shari is going to be our timekeeper, so she's going to come up here and help us keep time for the public comments.

We also have a lot of folks from Golden Sunlight here. We have Mark Thompson in the back; he'll be here as well to help answer questions. We also have folks from Tetra Tech. They are our contractors who are working on

the EIS and helping us write the EIS. We have Ed Surbrugg in the back there, and we have Jim Dushin in the back there (indicating). Thanks, guys.

MR. McCULLOUGH: Kristi, you omitted Dr. Castro.

MS. PONOZZO: Oh, I'm sorry. We also have Jim Castro. Sorry, Jim.

So we received an amendment proposal from Golden Sunlight last fall, and we deemed their application complete and compliant with the Metal Mine Reclamation Act last April, April of 2013. We had a scoping meeting here in April of 2013. And since then, we've been working on the draft EIS. So right now we have the comment period open, and the comment period closes on October 20th. We hope to have a final EIS out in December of this year, with a record of decision the following 15 days after that.

We have a newsletter at the front that I think everyone picked up; or if you didn't, you're welcome to pick one up on your way out. That has our e-mail address, where you can e-mail your comments or you can look at the EIS on our website. There are also extra hard copies and CD copies of the EIS on that back table back there in the corner if you'd like to take one of those home with you. There's also a mail-in address on that brochure that folks picked up so people can send in hard copy comments. And

you can also fill out a comment form and put it in our box that's up there at the front table and leave those with us on your way out, so you don't have to mail them or e-mail them or anything.

We will be here and available until 8 o'clock tonight to answer questions and give you guys any more information that you need. We have maps in the back corner over here (indicating) that show just kind of the general schematics of the mine and then two of the different alternatives.

So the purpose of this meeting is to accept public comments. The draft EIS discloses the potential impacts of the proposed expansion. DEQ is neither opponents nor proponents of the proposed action. We are evaluating the potential environmental impacts, and we really need your input to do that. We welcome public comments; they're very valuable to us in preparing our final EIS. And just so everyone knows, all comments will be part of the administrative record, and they will be available for public review in preparation of the final EIS.

So we evaluated four different alternatives in this EIS. A No Action Alternative, which is current mining operations, includes mining of the Mineral Hill Pit; the 5B Optimized Project in the Mineral Hill Pit; East Pit; milling and ore processing complex; two tailings storage facilities; and five waste rock disposal areas. The mine

would continue to operate 24 hours a day, seven days a week, through the end of 2014 or early 2015.

We have the Proposed Action Alternative, which was the application that we received from Golden Sunlight Mine to expand their current mining operation, with the addition of one new pit, called the North Area Pit; the expansion of the existing Mineral Hill Pit, known as the South Area Layback. They would mine an additional 4.2 million tons of gold ore that would be processed at the existing mill facility. Mining would be consistent with the current mining operations, using conventional open pit methods. It would increase the size of the permitted disturbance boundary by approximately 68.1 acres and would extend current mining operations by about two years and increase the height of Tailings Impoundment -- Tailings Impoundment 2.

The Agency-Modified Alternative is similar to the proposed action, with additional project modifications that would capture and route mining-related seeps in the East Waste Rock Dump Complex Expansion Area that could contaminate groundwater and off-site surface water; capture and route North Area Pit surface water runoff and groundwater after mine closure; implement closure geodetic and ground-movement monitoring for the North Area Pit and East Waste Rock Dump Complex Expansion Area to ensure safe

access and to keep reclamation cover systems working; salvage available fine-grained lake bed sediments in the North Area Pit and incorporate organic amendments in the sediments when the sediments are used as growth media in reclamation cover systems.

The fourth alternative is the North Area Pit Backfill Alternative. For this alternative, the South Area Layback waste rock would be direct hauled to the North Area Pit to completely backfill the pit to a free-draining condition. The entire pit area would be soiled and seeded, and stormwater runoff would be diverted out of the pit area. Operational dewatering wells would be maintained to keep the pit area dewatered. Pit backfill was analyzed in the 2007 supplemental EIS for the Mineral Hill Pit; it was not considered in the alterative analysis because compliance with groundwater quality standards could not be reliably assured without in-pit collection of contaminated groundwater. There is distinction between the Mineral Hill Pit and the North Area Pit. The North Area Pit is not connected to the Mineral Hill Pit, and, unlike the Mineral Hill Pit, the geometry of the North Area Pit and the Front Range Fault through the pit allows for ease of maintaining and replacing dewatering wells. Groundwater in the North Area Pit would enter either the Bozeman Formation and be attenuated and diluted there and meet

standards, or flow to the Mineral Hill Pit. Final adjustments would be needed to ensure the backfill of the pit would be free-draining so precipitation and snowmelt would not collect in the pit area over the acid-producing waste rock.

We have not identified a preferred alternative, and we want to hear from the public on this issue. We will identify a preferred alternative in the final EIS.

So I'm just going to discuss the specifics of the hearing. So if you guys signed up to speak -- Do we have that signup sheet? If you guys signed up to speak, you can come up to the microphone and give your comments. If you didn't sign up, that's okay, too, because you can still come up to the -- you can still come up and give comments.

But we will have five minutes for folks to give comments. And Shari will be our timekeeper, and she's going to wave her finger when you have one minute left, and when you're done, she's going to wave her hands. And there might be time afterwards, so if you have more that you want to say, save it and we'll try to get to you again. It's not a question-and-answer session. If you have questions, again, our specialists will be on hand afterwards to answer your questions. Oral comments will be recorded by our court reporter here, Cheryl Romsa, and

they will be verbatim and will be part of the administrative record.

So I will call your name, and come up and please state your name and then spell it and let us know if you are affiliated with any group or organization. If you do have a prepared statement, if you wouldn't mind giving it to Cheryl afterwards, that helps her put together the record. Please do not engage in debate with audience members, and please be respectful of everyone's comments.

And that's it. I'm going to start calling folks up. I'm going to move this around so people can face us.

So our first speaker is Tom Harrington, and after Tom is Debby Barrett.

MR. HARRINGTON: Thank you. I'm Tom Harrington, T-O-M, H-A-R-R-I-N-G-T-O-N. I work with the Jefferson Local Development Corporation here in Whitehall. I appreciate the opportunity to comment on the Golden Sunlight draft EIS.

Barrick/Golden Sunlight is really an integrated community partner. We all understand the huge economic benefit the mine brings to us in terms of wages, purchase of goods and services, and tax base. It's more important than just the economics; it's the social and environmental responsibility they bring to the table that is also very important.

What you don't see in the EIS is the community support to help when we have a downtown fire, community flooding; we need picnic tables, grills, and gazebos in our park; or support the Community Foundation so they can build local infrastructure, or assist the Chamber with Black Tie and Blue Jeans, rodeo, futurity fund raising efforts; donating vehicles to assist the local search and rescue organization; purchasing 4-H animals and then donating the meat to Liberty Place, a brain injury facility, and the local senior center; also helping with the Boulder Library expansion, which is out of our town area; supporting drought management plan, local sportsman group with wildlife habitat improvement resources, opening lands to Block Management, and being a major investor in downtown historic renovation that will ultimately help with community vitalization.

This community commitment list goes on and on and is further reinforced with CTAC, which is the Community Transition Advisory Committee, a community group that meets monthly and has been doing so since 2001. This community and mine interaction is an information conduit that is based on transparency, trust, and mutual discussions on what is best for the constituency. A key component is discussion and reporting on current operations, ongoing reclamation plans, and environmental

impacts.

All these above items are related to corporate sustainability, and Barrick/GSM is one of the top ten percent of national and international companies that have the prestigious distinction of being listed on the Dow Jones Sustainability Index for meeting stringent criteria relating to social, economic, and environmental criteria in their operations. This world-class company understands doing things right and the importance of involving those impacted into their operations.

For all the reasons above, trust, transparency, and community wellbeing, Barrick/Golden Sunlight Mine, as a world leader in mining, fully understands environmental and water quality protection standards, that these are a primary focus for any mining operation that wants to continue successfully in the future. Ultimately, they are responsible for the reclamation and water treatment post-mining. This said, being the on-the-ground operator, they are the best one to understand the importance of water quality protection standards and environmental stewardship in their expanded mining operations, and I trust their judgment to do it right.

After a review of the EIS and alternatives, without a preferred alternative from the agency, it appears the Proposed Action Alternative would logically become the

preferred action plan, since this was developed by mining experts who currently are the operators and will be implementing the proposed expansion plan. GSM's application is complete and compliant with existing regulations. The Proposed Action Alternative appears to be the most environmentally responsible plan that will ensure the best possible water protection standards, and I support this course of action.

MS. PONOZZO: Thank you.

Now we have Debby Barrett, and Ed Handl is afterwards.

SENATOR BARRETT: Thank you. And good evening. My name is Debby Barrett. I'm a senator from District 36. Whitehall is in my district; the mine, however, is not.

MS. PONOZZO: Would you spell your name, please. I'm sorry.

SENATOR BARRETT: My name is spelled B-A-R-R-E-T-T.

I was one of the 118 who participated in the scoping process, and I'm glad to see that all of those comments were positive. It is natural resources in my district and in southwestern Montana that employ the people and pay the taxes. I was glad to see and to hear again tonight that this is a complete and compliant proposal before you. It takes place on the mine's private property. And this mine has been under scrutiny and has always raised to the

occasion, over three decades and 15 amendments. And I would commend the director of DEQ for stating in the local papers that the local comments here will drive the process and do matter.

I would also state that the mine has been a solid corporate citizen and a trusted community partner in Whitehall and the surrounding area. So I am totally in support of the proposed amendment. And I will submit my written comment by the 20th.

Thank you very much for coming to Whitehall.

MS. PONOZZO: Thank you.

Now we have Ed, I think it's Handl, and after Ed we have Joe Scyphers -- I'm not sure. Sorry if I don't pronounce your name right.

MR. HANDL: Thank you. My name is Ed Handl. It's spelled E-D, H-A-N-D-L. I am speaking on behalf of myself as a citizen here in Whitehall. I live just north of town. I am a professional engineer in Montana; I work in the environmental field. I have 40 years of experience in the environmental consulting arena and a master's in chemical engineering.

I, first of all, want to express my unwavering support for Golden Sunlight. They have been an excellent neighbor as long as I have been a community member here for the last 25 years or so. They have supported the community in

numerous different efforts. When I was on the school board, they played a major part in putting a new roof on the school. This is just one example of the kind of citizens that they have been. I've known a lot of the employees; they're all upstanding citizens. And the Sunlight Mine has contributed to the local economy of this area, and it really has improved the wealth and the wellbeing of Whitehall.

In addition, the environmental ethic that the company has is unsurpassed. I've seen a lot of companies in my work, all the way from South America through North America, and I can say that Golden Sunlight Mine, by far, has the best environmental ethic that I have ever seen amongst any company.

I would ask for your quick approval of this environmental impact statement and the permit application that goes with it. I believe that the environmental impact statement is well written.

I do have a couple specific comments. I am somewhat surprised by the point that there is no preferred alternative. My personal opinion, and this is a technical opinion as well as a professional opinion, is that the Proposed Action Alternative is the most preferable alternative. And the reason I state this is I believe, as much as Mr. Harrington stated also, that there are fewer

complexities in the Proposed Action Alternative. I think it was put together by knowledgeable people with great expertise, and I don't believe there's any need to add additional burdens to the Golden Sunlight Mine as are present in the Agency-Modified Alternative.

I'm not a particular fan of the Agency-Modified Alternative due to the specific -- one specific problem, and that is the placement of backfill on the bottom of the pit to construct the sump. It's my belief that in so doing, we would create a condition where the surface of the bottom of the pit could well become saturated. I believe that the goal of producing a dry-bottom pit is better achieved by the Golden Sunlight alternative, where the water would be pumped from wells at the base of the pit, rather than constructing a sump at the bottom of the pit. The definition of a sump, in my mind, is that it is one that is a depression that will collect water. Once it collects water, you have saturated conditions. And we don't want that saturation to enter the base of the pit. And there is no detail, in terms of the Agency-Modified Alternative, for the construction of that liner in the bottom of the pit. But I believe it is -- it does have some problems associated with it.

Another point that I'd like to make is that I think there's a potential trap in the -- in the environmental

impact statement, and I'd like to refer to page 4-2 of impact statement, which indicates that ARM 17.4.617 requires DEQ to include in an environmental impact statement -- oh, excuse me, I've got the wrong citation here. 4-7 states, and I quote, "All of the components of the Agency Modified Alternative and the North Area Pit Alternative for the current GSM Amendment 015 that might be imposed by DEQ are required by federal or state laws and regulations to meet minimum environmental standards," and it goes on from there. So my problem is that if those are requirements, then why not just be up front about it and state that the preferred alternative would be the agency alternative.

So those are my comments, and I appreciate your listening. Thank you.

MS. PONOZZO: Thank you.

Next we have Joe Scyphers, and after Joe we have Kerry White.

MR. SCYPHERS: Thank you. As she said, my name is Joe Scyphers, S-C-Y-P-H-E-R-S. I am a professional geologist and general manager of a company called Reclaim, based out of Bozeman, Montana. We work closely with Golden Sunlight Mine in reclaiming and recovering abandoned mine dump and sometimes tailings waste piles.

I just wanted to come today and give my support as an

individual and basically as a company also, as their spokesperson, to say that it's been my experience, in working with Golden Sunlight, that they act very responsibly, not only within the community, but also professionally and when they deal with us on a professional level. All of the constituents of the properties that we look at are taken into a high level of detail and scrutinized for their safety and also the safety of the community and what they are expected to bring into their lines, a very up-to-date tailings pile.

So not only do they have a social impact within the immediate area, all the peripheral communities -- you know, myself being from Bozeman, people as far away as from a hundred-mile radius of Golden Sunlight Mine -- are affected by the life of this mine and the benefit of its expansion.

Just some quick numbers. Since 2011 to 2013, about 508,000 tons of outside ore has been processed at Golden Sunlight, for a payout revenue of $38,000,000. In 2012, 237,000 tons of ore was processed, for $17,000,000. And another way to look at that as an extrapolation, that if we were to reduce the mine life by two years, that there would be a $34,000,000 loss to the private sector to reprocess and clean roughly 474,000 tons of this legacy waste material that Golden Sunlight is currently

accepting.

As a manager of this company, I can tell you that we employ, through contractors and employees, roughly 10 to 15, sometimes 20 people on varying project sites. That also helps to go to impact the local communities and benefit the ongoing expansion of Golden Sunlight's mine.

Thank you.

MS. PONOZZO: Thank you.

And now we have Kerry White, and after Kerry we have Tom Donnelly.

CONGRESSMAN WHITE: Thank you. My name is Kerry White. That's like the color white. I represent House District 70, and I appreciate what Joe said. We have a lot of direct benefit from Golden Sunlight in this community, but you also have the indirect effect going out across the state. In my district, I represent Four Corners to West Yellowstone, the south end of Gallatin County. Gallatin and the Bozeman area, Belgrade, Manhattan, Three Forks, all of those are positively impacted by Golden Sunlight Mine.

I talked to a friend of mine a few years ago, and we are really blessed to have that deposit of minerals in this area. We don't get to pick and choose where these minerals are; they just are. And we're very blessed to have a company like Golden Sunlight to be able to put

their investment dollars forward and create a community like Whitehall and contribute to that community. I think we've heard testimony on a lot of the things that Golden Sunlight gives to this community and also provides jobs and those indirect impacts, provides jobs for other people outside of the area. I think they've done a great job of stewardship of the land. They have a great record.

One thing that's, you know, required through DEQ and MEPA is an assessment of the environmental impacts. And a lot of times, agencies within the government, both state and federal, when they talk about environmental impacts, they talk about fish and wildlife and land and resources and such. But I'd like to remind DEQ that environmental impacts are both social and economic, and it has to do with the health and wellbeing of the citizens.

My wife and I took a tour of seven states this summer, on our motorcycle, on two-lane highways. And it very saddened me about the rural America that is slowly drying up or dying, so to speak. And that's from the lack of the ability to get to our resources, whether it be on federally managed public lands or over regulation. And so I would encourage DEQ to really look at the social and economic impact that Golden Sunlight has on this community and Montana. We have a $5.4 billion budget in the state of Montana, and a lot of that depends on -- that spending

on our schools, roads, and public services, health, safety, fire, depends on companies like Golden Sunlight.

So I would support wholeheartedly the Proposed Action Alternative and ask DEQ to propose that without modification. Thank you.

MS. PONOZZO: Thank you.

Now we have Tom Donnelly, and after Tom we have Mark Lambrecht.

MR. DONNELLY: Good evening. My name -- Can we adjust this rather shaky mic?

My name is Tom Donnelly, D-O-N-N-E-L-L-Y. I'm a citizen of Cardwell, Montana. It's nice that we live in a democracy, so I'll be the odd man out. We've heard a lot of good things now. I just want to make a statement based on a question.

Ms. Ponozzo, even you, who have seen this document before that you were reading to us, had a little trouble reciting it back to me. I have an undergraduate degree and a postgraduate degree. I'm at a loss, I don't know what the proposals really mean.

No question, there's an economic plus side: Putting people to work. Most politicians run on that and win or lose based on that. The history is long. But beyond that, the environmental impact: The state is littered with the history of things that have gone wrong and some

that have gone right. The environment lasts longer than I'll be alive. I guess I'm just speaking for my grandchildren. I don't know, I don't know what the guarantees are for safety.

I know in, I believe it was 2008, Golden Sunlight had a breach, and there was contaminated groundwater, contaminated by cyanide. And some of my friends', and people I don't know, land was purchased as a buffer zone, and the land was given back to some of them on a no-cost lease -- you can stay here, but we own the land -- and, therefore, there were no lawsuits. They did recover from that. Golden Sunlight is the largest gold producer in the entire world. There was a time, I was told by a friend of mine at Goldman Sachs, that I was even a stockholder in that company. It's an enormous company.

In the first quarter of this year, Golden Sunlight posed a record 8.3 million loss, the largest in Canadian publically held companies, the largest ever recorded. My question, then, is the following: With all of these safeguards and all of this stuff that's supposed to be done after they are gone, probably after I'm in the ground, what is to stop a mine, a company, from going bankrupt? We've all watched Wall Street; the biggest can tumble. What guarantees do we have, and will the agencies look after them, real guarantees that we're not going to

get stuck with what they have in Butte, what they have in Anaconda, and the list is long. And it's long all over the country, never mind just Montana.

That's all I need to know. I'm in favor of jobs. I'm in favor of -- of industry. I make money that way. And it's been good to me, very good. But there are limits. And maybe as you get older, you start to care a little bit about your little grandchildren and you're not so self-centered anymore. That's where I am.

And I just leave you with that: I don't know. I'm not convinced about that end of it. It does mean jobs, I know that. And I know a lot of the people who work in that mine. Troy Smith, who did your reclamation on that ridge, is one of my oldest and dearest friends. I need to know those answers, and I think the people need to know those answers, and not techno jargon. That is confusing and it's not clear and it's evasive.

That's all I have to say.

MS. PONOZZO: Thank you.

Next we have Mark Lambrecht, and after Mark we have Tammy Johnson.

MR. LAMBRECHT: Good evening. For the record, my last name is spelled L-A-M-B-R-E-C-H-T. I'm Mark Lambrecht; I'm executive director of the Treasure State Resource Industry Association in Helena. We have about a

hundred different members from throughout the state, everything representing hard rock, coal mining, timber, agriculture, transportation, recreation. Generally, we're the catch-all industry association in Montana.

I wanted to convey that the entirety of our membership stands in support of the proposed alternative that's before you today, for three primary reasons. Number one, developing the North Area Pit and expanding the Mineral Hill Pit presents an opportunity to access an additional 4,000,000 tons of ore and keep over 200 Montanans working at really good jobs. Number two, the project will provide significant tax revenue to the state of Montana and help out the local economy as well. Number three, Golden Sunlight Mine has demonstrated significant commitment to environmental protection, reclamation, safety, and community support for many years. It's not expected to change now.

What you have before you is a tremendous opportunity to provide economic opportunity for the future for a vibrant community. I would ask that you take that opportunity very seriously and expedite the Proposed Alternative as quickly as possible. Thank you.

MS. PONOZZO: Thank you.

And now we have Tammy Johnson, and after Tammy we have Dan Happel.

MS. JOHNSON: Thank you, and good evening. For the record, my name is Tammy Johnson. That is T-A-M-M-Y, J-O-H-N-S-O-N. Thank you for the opportunity and for holding the public hearing down here. We always very much appreciate allowing us to come together and talk about a very important part of our community.

I also want to go on record as voicing my very deep appreciation for Director Stone-Manning and the agency in stating their desire to hear from the public and from the local community. And also, since people are part of the affected environment, it is very important for those of us who live closest to the impacts, both positive and negative, to have our voice heard. So thank you very much for telling us that we matter.

I'd also like to thank the agency for understanding the importance of keeping this permitting on track and on time. And I'm really -- I want to say I'm confident in your ability and, in fact, your desire to continue the remainder of this process in a timely fashion.

I am here to support the Proposed Action Alternative. And I'd like to urge you to do the same and select that as your preferred alternative. The way our process works in this state is that the applicant, the owner of the company, they know as much as anyone else about how this property needs to be mined, needs to be reclaimed,

et cetera. It is their job to do the necessary heavy lifting on the front end, to submit to you an application that is complete, that does demonstrate to you, the agency in charge of ensuring our environmental quality, that they can do so in a manner that is protective of the environment and still allows the business of mining to be conducted. The Proposed Alternative does just that.

I also want to express my opposition to the North Area Backfill Alternative. The two primary reasons given in the document, just to summarize, for the benefit of that action is to provide additional areas of grass/vegetation through a different reclamation plan and some improved visual appearance. The old adage of beauty being in the eye of the beholder really is true. For me, the Golden Sunlight landscape is impressive. And if I drive -- if I'm coming from the north on Highway 69 or I'm returning home, coming to the west off of I-90, when I see the Golden Sunlight landscape, and at night when that's lit up, that's my lighthouse; I'm almost home.

For me and many others in this room, we're some of the most fortunate people in this state, maybe even in America. Our family, for 27 years, has put food on the table, heated our home, provided for our children, contributed to college educations, et cetera, with that paycheck. We have never wanted. That's amazing.

So when we're talking about aesthetics, it really, it really is a judgment, isn't it? Others will make a different judgment about that; I understand that. And it might be based on economic, political, moral values; I get that. But the reason fundamentally I'm opposed to that Backfill Alternative is that there is no question, when we're talking about a subjective thing like aesthetics or appearance versus the very hard reality that without backfilling that pit we can more assure the water quality in the Jefferson River Watershed -- water quality trumps aesthetics any day of the week and twice on Sunday, so far as I'm concerned -- that alternative should be dismissed.

In conclusion, I want to thank you again; I want to express to you how important it is to keep this on track and on time; and, once more, urge you to accept the Proposed Action Alternative as the means of mining this ore body, protecting the environment, and continuing the contribution to this community and this state. Thank you.

MS. PONOZZO: Thank you.

And we have Dan Happel, and then I'll open it up to folks who have not signed in to come up and give comments after Dan.

COMMISSIONER HAPPEL: Thank you for the opportunity to address your group. I stand here -- Again, my name is Dan Happel, H-A-P-P-E-L. I am a Madison County

commissioner, and I am here representing the Madison County Commission.

I am here to stand in strong support of this draft EIS. Golden Sunlight has been a tremendous partner of Jefferson and Madison County. And we've been working with an environmental group on the Headwaters remining effort, and it would have been impossible to do some of the cleanups that we've done without the Golden Sunlight. It's absolutely imperative that they stay here and that they be supported in a very strong way. They are a great corporate partner. They've done a tremendous job in working with the remining effort in southwest Montana.

We need to remember that we are the Treasure State and our that flag has that motto, gold and silver. And in my mind, it's imperative that we start supporting mining in a stronger way in southwest Montana. The reason I say that is, we cannot be a civilized society without mining being an integral part of that. And Golden Sunlight is a very, very important part of that process, because they are environmentally sensitive. They go out of their way to do a good job. And we cannot promote mining and we cannot improve mining without a profit motive to do that. It's imperative that we keep them here and that we do everything we can to ensure their success.

Again, I thank you for the opportunity to speak. And

we in Madison County are in very strong support of this proposal. Thank you.

MS. PONOZZO: Thank you.

Now, is there anyone who didn't sign up who would like to come up and speak?

We'll start with you, sir, and then you, sir, afterwards. And please state your name and spell it for our court reporter, and keep it to five minutes. Thank you.

SENATOR MURPHY: Actually, I thought I had signed up. I signed something when I came in anyway. My name is Terry Murphy; I'm state senator of District 39, which includes the Golden Sunlight property.

I've been a resident of this area virtually all my life. I was a member of the Whitehall school board in the late '70s when Golden Sunlight first came to the area. And I can tell you, in my opinion, there is no way they could have been a better corporate neighbor than they have been through the years. So I would certainly urge that you approve the amendment as they proposed it.

Many people, young families through those years have been able to stay here and make a living, raise their children, send them to college, who would otherwise have had to leave the state of Montana, probably, to make a good living if that mine had not been here. It's a

crucial part of the tax base of my senate district, it's a crucial part of the employment base of my senate district. So I urge you to go along with them and approve the plan as they have proposed it.

Thank you.

MS. PONOZZO: Thank you.

Go ahead, come on up.

MR. MULLIGAN: My name is Tim Mulligan, as in Timothy M-U-L-L-I-G-A-N. My family owns a ranch on the Jefferson Slough, just below where 69 intersects with Highway 2. It would be just east and a little south of the mine.

I want to state very clearly I am adamantly opposed to any backfill options that would prevent full, unfettered access to treatment of the water in that pit. We look up, we see the mine, we see the aesthetic impact. Those impacts are irrelevant compared to potential impact to groundwater. It would be my family's ranch, my family's water, groundwater, our way of life, our land values that would be seriously impacted if something happened with that water.

The other thing I wanted to say is the -- I can't remember the reference number, but you'll know it. In the document, it talks about the Jefferson Slough being an abandoned oxbow fed predominantly by groundwater. That is

totally inaccurate. The Jefferson Slough is a live stream. It's made up of the Pipestone Creek, Whitetail Creek, and a piece of water off of the Jefferson River that comes via the Slaughterhouse Slough. It's a very important waterway to a number of ranchers, agricultural operations. It's the focus of a very intense operation of effort right now to address some water quality issues in that slough. And any idea or concept of trumping aesthetics over the protection of that water is just totally unacceptable.

Thank you.

MS. PONOZZO: Thank you.

Go ahead and come up. Spell your name, please.

MR. FOSTER: My name is Fess Foster, F-E-S-S, F-O-S-T-E-R. I'm a geological and environmental consultant here in Whitehall. I'm also vice president of exploration and on the board of directors of a small company called Montag. And we are one of the companies shipping waste from these historical mine sites to the Golden Sunlight.

So I'd like to make just one comment, a substantive comment relative to the No Action Alternative. The implications for these offsite shipments to Golden Sunlight are not addressed in the No Action Alternative, and I think they should be. If you select the No Action

Alternative, it's going to preclude shipment of about 500,000 tons of this material over a two-year period. That's going to result in a negative environmental impact, because there will be less cleanup of these historic legacy sites; and, also, it's going to result in the loss of on the order of $38,000,000 in payout from Golden Sunlight.

I've done exploration here most of the last 35 years. I've looked at a lot of these historic sites, and, in my opinion, I think that with continued participation of Sunlight, we can continue these types of shipments over the next two years or more. So, again, I would just encourage you to evaluate this in the No Action.

Thank you.

MR. CHILDS: My name is John Childs, J-O-H-N, C-H-I-L-D-S. I'm a registered geologist and I'm president of Childs Geoscience, Inc., in Bozeman, Montana. We have approximately 11 geologists, and five of them at any given time typically are involved in Golden Sunlight projects.

I want to comment on the dump reclamation program that Fess just commented on. While a contractor of Golden Sunlight, I was privileged to help establish this program to receive dump material from offsite. And one of the many -- This is one of the many innovative programs that have been described that Golden Sunlight has been involved

in over the years.

Golden Sunlight has been a major client of ours for approximately ten years. In addition to hiring our geologists directly at the mine, we have also benefitted by having our geologists work with companies that are shipping the dumps offsite to the mine, and I think this program has been a huge benefit both to the taxpayers and to the community. And Golden Sunlight has really gotten behind this. It's been doubly beneficial for us because our guys are working both directly for the mine as well as for a company that's shipping dumps to the mine.

So I'm in full support of the EIS that's being considered here tonight. Thank you.

MS. PONOZZO: Is there anyone else who would like to speak who hasn't gotten a chance to speak?

Come on up. Spell your name, please.

MR. HOPGOOD: My name is Tom Hopgood, H-O-P-G-O-O-D. I'm the executive director of the Montana Mining Association.

First of all, I thank the DEQ for having this meeting, and, moreover, I thank you for having it in the locality that will be most affected by the DEQ's action. And I think you've heard tonight a number of people talk about the great things that Golden Sunlight has done for this area. And I would agree with Mr. Donnelly's statement

that one of the things that the Department has to consider in an EIS is the social and economic impacts of the proposed government action. Absolutely. Absolutely.

The Montana Mining Association supports reasonable environmental regulation. And I think we've heard about the proposed action plan, and I won't tell you that I'm conversant with all of the engineering and the geology that's gone into it, but I will defer to the experts on that. And I think that Golden Sunlight's track record, where they have proved again and again and again that they are environmentally responsible stewards of our resources, speaks volumes. And on behalf of the Mining Association, I would urge the adoption of the proposed action plan.

Thank you.

MS. PONOZZO: Thank you.

Anyone else? Going once.

MR. SCHWABEL: My name is Warren Schwabel, S-C-H-W-A-B-E-L. Most people know me as Rick. I hadn't planned to speak or anything tonight.

But I formerly worked for the Bureau of Land Management up through 1998. I was not involved in the preparation of the original EIS for the Golden Sunlight Mine. I was involved in preparation, from a reclamation standpoint, a vegetation standpoint, when several of the subsequent environmental analyses were done. At the time

some of those were done, there was some skepticism about whether Golden Sunlight could meet some of the goals that were laid out for reclamation. All I can say now is, looking back from the period of years back, they have done excellent work in meeting those goals and in stabilizing their dumps and generally meeting their environmental objectives.

The dumps -- I live directly across from the mine up at the top of Mayflower Road. I look at it all the time. You can see those dumps because the vegetation on them is a lighter color because it's almost entirely grass. As shrubs come in, those impacts are going to fade out. So I think they -- We can only judge their future performance by their past performance, and I think they've done an excellent job.

Thank you.

MS. SCHONSBERG: My name is Mary Schonsberg. And Golden Sunlight has supported a lot of my family over the years.

MS. PONOZZO: Please spell your name. I'm sorry.

MS. SCHONSBERG: S-C-H-O-N-S-B-E-R-G.

And I'm here to support the Proposed Action Alternative. Thanks.

MS. PONOZZO: Anyone else?

I would like to encourage everyone to stay and talk

with our experts from DEQ that are here, as well our consultants, Tetra Tech folks that are here, and Golden Sunlight folks that are here as well. I really appreciate everyone coming to this meeting and submitting your comments.

Would you like to -- Yes, come on up.

MR. ODT: My name is David Odt, D-A-V-I-D, O-D-T. I'm the chief geologist at Golden Sunlight Mine and was involved in the exploration and planning for the North Area and South Area Pits.

I can say that in my close to three years of experience at Golden Sunlight, as an employee of the corporation Barrick Gold Company, has been some of the most rewarding times I've ever spent in my life. I've had an opportunity to work with extremely knowledgeable and expert employees and contractors at the site, but have also had an opportunity to develop a working relationship with the North American Regional Business Unit or NARBU, which is the main operation unit of Barrick Gold.

NARBU -- in the world of gold mines, Golden Sunlight is a relatively small gold deposit. North America is endowed with some of the greatest gold deposits in the world. And along with that goes a tremendous amount of technical, environmental, and planning expertise, of which we are a lucky recipient. So the process of making the

NASA plan involved not only people at Golden Sunlight, but a strong working relationship with people from NARBU, but also contractors and consultants that support the company literally globally.

I support the Proposed Alternative because our technical analysis determined that was the best alternative from an environmental and socioeconomic long-term impact.

I would also like to ask DEQ to, as best as they can, maintain their timeline so that we can obtain, if we meet all the proper measures and marks, approval for this additional operation so that we can avoid socioeconomic impacts, layoffs, and a mine and mill shutdown.

Thank you.

MS. PONOZZO: Thank you.

So, yes, stay, ask questions. We really appreciate all of your comments. You're welcome to submit written comments as well. We have the brochure that has my contact information. If you're having trouble submitting comments or you can't find something, please call and I will help you out.

I really appreciate it. Have a good evening. Thank you.

(The proceedings were concluded at 7:04 p.m.)

COURT REPORTER'S CERTIFICATE

STATE OF MONTANA)
ss.
COUNTY OF LEWIS AND CLARK)

I, CHERYL ROMSA, Court Reporter in and for the County of Lewis and Clark, State of Montana, do hereby certify:

That the foregoing proceedings were reported by me in shorthand and later transcribed into typewriting; and that the -36- pages contain a true record of the proceedings to the best of my ability.

DATED this 11th day of October, 2013.

s/Cheryl A. Romsa
CHERYL A. ROMSA

ATTACHMENT D: DRAFT EIS PUBLIC MEETING NEWSLETTER

Golden Sunlight Mines, Inc.

Amendment 015 to Operating Permit No. 00065

Draft EIS Public Meeting Newsletter Oct. 2013

Montana Department of Environmental Quality

The Montana Department of Environmental Quality (DEQ) has completed a Draft Environmental Impact Statement (draft EIS) on Golden Sunlight Mine's proposed amendment for its operating permit (00065). You can obtain an electronic version of the draft EIS on DEQ's web site http://deq.mt.gov/eis.mcpx. DEQ will hold a public meeting for the draft EIS on October 8th from 6 to 8 pm at the Whitehall Community Center.

The Golden Sunlight Mine is an existing open pit mine located near Whitehall, Montana. The state of Montana issued Operating Permit No. 00065 to the mine in 1972. DEQ has previously approved fourteen amendments to the operating permit, several of which have allowed expansion of the gold mine. In September of 2012, DEQ received Golden Sunlight's application for Amendment 15, which would allow further expansion of the Mineral Hill Pit and the mining of a new pit located to the north of the Mineral Hill Pit. On April 30, 2013, DEQ determined that the company's application for Amendment 15 was complete and compliant and, pursuant to Section 82-4-337, MCA, issued a draft permit for the proposed expansion.

The Montana Environmental Policy Act (MEPA) (Section 75-1-201, et seq., MCA) requires the preparation of an EIS for state actions that may significantly affect the quality of the human environment. Pursuant to this statute, the Golden Sunlight Mine's draft EIS describes the analysis of environmental impacts from the No Action Alternative, a Proposed Action Alternative (the company's proposed amendment), an Agency Modified Alternative, and a North Area Pit Backfill Alternative. At this juncture of the EIS process, DEQ does not have a preferred alternative as the three action alternatives have advantages and disadvantages.

The Proposed Action and Agency Modified alternatives would not require backfill of the North Area Pit. These alternatives would provide some terrestrial wildlife habitat, habitat for bats and raptors, and allow for the construction of a secondary system to capture impacted groundwater should the proposed perimeter dewatering wells fail. These two alternatives would also impact visual resources, although that impact would be mitigated.

The North Area Pit Backfill Alternative would have noticeably less visual impacts and would provide more terrestrial wildlife habitat than the alternatives that do not require backfill. However, the backfill in the North Area Pit would likely exclude the opportunity to implement secondary systems to capture the impacted groundwater in the event the perimeter dewatering wells fail.

DEQ will make its decision after reviewing verbal comments during the public meeting, written public comments on the draft EIS, and completing any additional environmental analysis generated in response to those comments.

For more information, or to comment, please contact:

Kristi Ponozzo

Department of Environmental Quality
P.O. Box 200901,
Helena, MT 59601
406-444-2813
deqgoldensunlighteis@mt.gov.

Draft EIS Alternatives

Four alternatives are described and evaluated in detail in the draft EIS:

No Action Alternative - Reflects the current operations conducted under Operating Permit 00065 (through Amendment 014), including mining of the 5B Optimization Project in the Mineral Hill Pit. The mine would continue to operate 24-hours per day, 7 days per week, through the end of 2014 or early 2015. GSM is currently approved for mining and associated facilities disturbance on 3,104 acres in a permit boundary of 6,125 acres.

Proposed Action Alternative - GSM would expand their current mining operation with the addition of one new pit called the North Area Pit, and an expansion to the existing Mineral Hill Pit known as the South Area Layback. GSM would mine an additional 4.2 million tons of gold ore that would be processed at the existing mill facility using conventional open pit mining methods. Approximately 52.6 million tons of non-ore waste rock from the proposed new mining areas would be primarily placed in the East Waste Rock Dump Complex (EWRDC) Expansion area. The permitted disturbance boundary would increase by approximately 68.1 acres and mining operations extended by about two years.

Agency Modified Alternative - Is the same as the Proposed Action Alternative with modifications developed by DEQ to mitigate the environmental impacts from the Proposed Action Alternative. The modifications include:

1. The capture and routing of mining-related seeps in the EWRDC Expansion area that could contaminate groundwater and off-site surface water;
2. The capture and routing of North Area Pit surface water runoff and groundwater after mine closure;
3. The implementation of closure geodetic and ground-movement monitoring for the North Area Pit and EWRDC Expansion area to ensure safe access and to keep reclamation cover systems working;
4. The salvage of available fine-grained lakebed sediments in the North Area Pit and incorporation of organic amendments in the sediments when the sediments are used as growth media in reclamation cover systems;
5. The documentation of loss of bat and raptor habitat in the Mineral Hill Pit and plan for replacement of habitat;
6. The identification of replacement areas for the portion of the 37 acres of designated revegetation for the Mineral Hill Pit that would be eliminated by the South Area Layback.

North Area Pit Backfill Alternative - Is similar to the Agency Modified Alternative but includes backfilling of up to 9.2 million tons of waste rock from the South Area Layback into the North Area Pit rather than being hauled to the EWRDC Expansion area or the Buttress Dump Extension area.

How to Provide Comments on the draft EIS

DEQ will accept public comment on the draft EIS until October 20, 2013. You can:

1. Email comments to: *deqgoldensunlighteis@ mt.gov.*
2. Attend the October 8, 2013 public meeting and provide written comments to DEQ staff there.
3. Send written comments to:

Montana Department of Environmental Quality
Attn: Ms. Kristi Ponozzo
PO Box 200901
Helena, MT 59620-0901
Facsimile: 406-444-4386
Email: *deqgoldensunlighteis@mt.gov*

Please include your address, phone number, email address, or other personal identifying information in your comment. You should be aware that your entire comment (including your personal identifying information) may be made publicly available at any time.

Please submit all comments by October 20, 2013.

For questions regarding the EIS process, please contact Kristi Ponozzo at 406-444-2813 or by email at *kponozzo@mt.gov.*

Additional Information

GSM's amendment application is posted on DEQ's website: *www.deq.mt.gov*

Attachment E: Public Meeting Comment Form

Welcome To The Golden Sunlight Mine Draft EIS Public Meeting

Thank you for participating in the EIS process by your attendance at the public meeting and by providing comments on the draft EIS. The Montana Department of Environmental Quality (DEQ) has completed a draft Environmental Impact Statement (draft EIS) on Golden Sunlight Mine's proposed amendment for its operating permit (00065). The draft EIS describes the analysis of environmental impacts from the No Action Alternative, a Proposed Action Alternative (the company's proposed amendment), an Agency Modified Alternative, and a North Area Pit Backfill Alternative. At this time, DEQ does not have a preferred alternative as the three action alternatives have advantages and disadvantages. DEQ will make its decision after reviewing verbal comments during the public meeting, written comments on the draft EIS, and completing any additional environmental analysis generated in response to those comments.

DEQ will accept public comment on the Golden Sunlight Mine's draft EIS until October 20, 2013. To provide comments you can:

1. Email your comments to: deqgoldensunlighteis@mt.gov
2. Attend the October 8, 2013 public meeting and provide written comments there
3. Send written comments to:

   Montana Department of Environmental Quality
   Attn: Ms. Kristi Ponozzo
   PO Box 200901, Helena, MT 59620-0901
   Facsimile: 406-444-4386

Comments:

Name: _____

Organization and Address: _____

_____

Phone: _____ Fax: _____

Email: _____ Date: _____

☐ Yes, please add me to the EIS mailing list.

All comments become part of the public record.

40 copies of this public document were published at an estimated cost of $25.00 per copy,
for a total cost of $1,000.00 for printing and binding and $0.00 for distribution.