OPERATING PERMIT APPLICATION

MONTANA LIMESTONE RESOURCES PROJECT

GRANITE COUNTY, MONTANA

Prepared for:

Montana Limestone Resources, LLC
P.O. Box 16630
Missoula, MT 59808-6630

Compiled by:

WESTECH Environmental Services, Inc.
P.O. Box 6045
Helena, MT 59604

October, 2014

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1.0 INTRODUCTION

1.1 GENERAL PROJECT DESCRIPTION AND LOCATION

Montana Limestone Resources, LLC (MLR) is proposing to develop a quarry and plant to extract and process limestone to produce lime. The 546-acre permit area is located approximately 2.5 miles west of Drummond, Montana, in Granite County (Figure 1.0-1). The permit area includes the mine site (pit, plant, waste stockpiles, topsoil stockpiles, impoundments, haul roads) and access road from State Highway 1 to the mine. The permit area occurs mostly on property owned by Washington Limestone Resources, LLC (WLR). WLR intends to negotiate the purchase of a state-owned quarter section (SW ¼ Section 36, T11N, R13W) through which the access road passes, and will either purchase or obtain legal right to cross a parcel at the junction of the access road and State Highway 1.

The MLR project will consist of:

- An open pit mine from which 7,000 tons of limestone per week will be extracted by drilling and blasting along benches and loading the rock into mine haul trucks
- A crushing/screening plant that reduces rock to a desired size for the processing operation
- A preheater rotary kiln that processes limestone to produce lime
- Storage/loading/shipping facilities to transport the lime
- Mine infrastructure to support the operation (access road, haul roads, natural gas pipeline, power line, water wells, water lines, sediment control structures, and mining equipment).

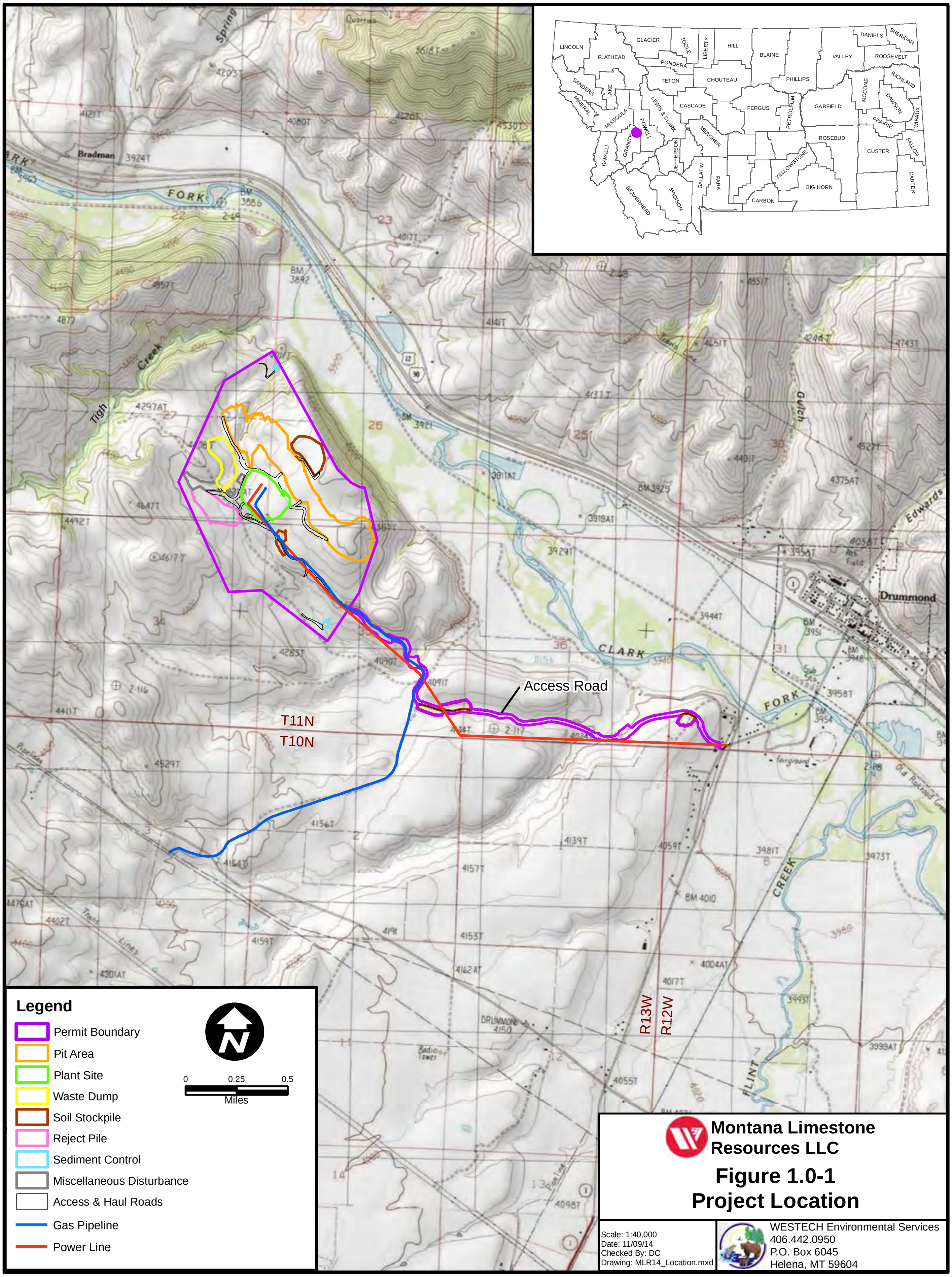
Exhibit 1-1 provides an overview of the project.

The principal uses of the lime include: 1) pH control of water in flotation cells of the Montana Resources concentrator in Butte, and potentially at other ore processing plants; 2) the neutralization of acidic mine water at the Montana Resources Butte operation, and potentially at other mines; and 3) other commercial purposes that may develop for the lime, rejects, or waste rock, as described in Section 3.2.5.1.

1.2 REGULATORY COMPLIANCE

This Operating Permit Application has been designed to meet the requirements of the Montana Metal Mine Reclamation Act (Title 82, Chapter 4, Part 3, MCA) and the Rules and Regulations governing the Act. Compliance with regulatory requirements is cross-referenced with components of this Operating Permit Application in Table 1.0-1.

MLR submitted environmental baseline plans of study to the Montana Department of Environmental Quality (MDEQ) for review and comment in 2013. On October 3, 2014, MLR and its subcontractors met with MDEQ in Helena to describe the Project, respond to agency questions, and seek regulatory clarification.



Legend
Permit Boundary
Pit Area
Plant Site
Waste Dump
Soil Stockpile
Reject Pile
Sediment Control
Miscellaneous Disturbance
Access & Haul Roads
Gas Pipeline
Power Line
0 0.25 0.5
Miles
N
Access Road
T11N
T10N
R13W
R12W
Drummond
CLARK
FORK
Montana Limestone Resources LLC
Figure 1.0-1
Project Location
Scale: 1:40,000
Date: 11/09/14
Checked By: DC
Drawing: MLR14_Location.mxd
WESTECH Environmental Services
406.442.0950
P.O. Box 6045
Helena, MT 59604

Table 1.0-1
Montana Limestone Resources Operating Permit Application Compliance Cross-Reference

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	2.3	TERRESTRIAL WILDLIFE		
	2.4	VEGETATION		
	2.5	WETLANDS AND WATERBODIES		
	2.6	GEOLOGY		
	2.7	SOILS		
	2.8	LAND USE		
	2.9	ENERGY		
	2.10	TRANSPORTATION		
	2.11	NOISE LEVELS		
	2.12	SOCIOECONOMICS		
	2.13	CULTURAL RESOURCES		
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		3.1.2	Permit Boundary	ARM 17.24.116(3)(d)
		3.1.3	Disturbances and Acreage	
		3.1.4	Employment	ARM 17.24.116(3)(q)
	3.2	MINING		
		3.2.1	Mining Operations and Schedule	ARM 17.24.116(3)(f)
			3.2.1.1 Introduction	
			3.2.1.2 Mine Phases	
			3.2.1.3 Mine Schedule	
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		3.2.3	Ore Characterization and Volume	ARM 17.24.116(3)(i)
		3.2.4	Blasting Plan	ARM 17.24.116(3)(d)
		3.2.5	Waste Rock Management	ARM 17.24.116(3)(d) MCA 82-4-335(5)(n)
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			3.2.5.2 Waste Rock Volume and Storage	
		3.2.6	Mine Water Management	ARM 17.24.116(3)(k)
			3.2.6.1 Mine Water Sources	
			3.2.6.2 Mine Water Consumption	
			3.2.6.3 Mine Water Treatment and Discharge	
			3.2.6.4 Pit Dewatering	ARM 17.24.116(3)(k) MCA 82-4-336(5)
			3.2.6.5 Impoundments, Diversions and Drainages	ARM 17.24.116(3)(g) MCA 82-4-335(5)(l)

Table 1.0-1
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	3.3.2.1	Process Flow and Plot Plan	
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Table 1.0-1
Montana Limestone Resources Operating Permit Application Compliance Cross-Reference

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4.1 INTRODUCTION	MCA 82-4-336(9); 82-4-336(10)
4.2 POST-OPERATION LAND USE	MCA 82-4-303(15)(a); 82-4-336(8) ARM 17.24.115(1)(a)(i)-(iii)
4.3 POST-OPERATION TOPOGRAPHY AND GRADING	MCA 82-4-303(15)(b); 82-4-336(12) ARM 17.24.115(1)(b)
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4.3.2 Waste Rock Dump	
4.3.3 Rejects Pile	
4.3.4 Plant Site	
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4.5 REVEGETATION	MCA 82-4-303(15)(c) ARM 17.24.115(1)(c),(k)(iii) and (l)
4.5.1 Permanent Revegetation Mixtures	
4.5.2 Seeding and Planting Rates	
4.5.3 Seeding and Planting Methods	
4.5.4 Interim Revegetation	
4.5.5 Seeding and Planting Periods	
4.5.6 Cultural Practices	
4.6 PERMANENT EROSION AND SEDIMENT CONTROL	ARM 17.24.115(1)(k)(iv)
4.7 POST-OPERATION SOLID WASTE DISPOSAL	MCA 82-4-303(15)(e) ARM 17.24.115(1)(i) and (m)
4.8 RECLAMATION OF SURFACE SUPPORT FACILITIES	ARM 17.24.115(1)(m)
4.9 PIT RECLAMATION	ARM 17.24.115(1)(b) MCA 82-4-336(7)(a)-(e) and (9)(b)(i)-(iv)
4.10 REVEGETATION MONITORING	ARM 17.24.115(1)(c) and (n); 17.24.116(3)(u)
4.11 REVEGETATION MANAGEMENT	MCA 82-4-303(15)(d) ARM 17.24.116(3)(u)

Table 1.0-1
Montana Limestone Resources Operating Permit Application Compliance Cross-Reference

SECTION	RULES (ARM)/ACT (MCA) CITATION
4.12 WEED MANAGEMENT PLAN SUMMARY	MCA 82-4-303(15)(d); 82-4-336(8) ARM 17.24.116(3)(u)
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4.12.2 Monitoring and Management of Noxious Weeds	
4.12.3 Herbicide Application and Reporting	
4.13 POST-OPERATION WATER MONITORING	ARM 17.24.115(1)(d),(e),(f),(n); 17.24.116(3)(l)
4.14 RECLAMATION SCHEDULE	MCA 82-4-303(15)(i); 82-4-336(3)
4.15 CESSATION OF OPERATIONS	ARM 17.24.115(1)(m); 17.24.150 MCA 82-4-335(5)(i)
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Appendix A-1 Air Quality Report	
Appendix A-2 Hydrology Report	
Appendix A-3 Terrestrial Wildlife Report	
Appendix A-4 Vegetation Report	
Appendix A-5 Wetlands Report	
Appendix A-6 Geology Report	
Appendix A-7 Soils Report	
Appendix A-8 Land Use Report	
Appendix A-9 Energy Report	
Appendix A-10 Transportation Report	
Appendix A-11 Noise Report	
Appendix A-12 Socioeconomics Report	
Appendix A-13 Cultural Resources Report	
Appendix B Watershed Information	-
Appendix C Dust Control Plan for Fugitive Particulate Matter	ARM 17.24.116(c)
Appendix D Spill Control Plan for Oil and Hazardous Materials	ARM 17.24.116(l) and (n) MCA 82-4-335(5)(m)
Appendix E Operational Noise Assessment	ARM 17.24.116(s)
Appendix F Weed Management Plan	MCA 82-4-303(15)(d); 82-4-336(8) ARM 17.24.116(3)(u)
LIST OF EXHIBITS	
Exhibit 1-1 Project Overview Map	ARM 17.24.115(1)(k)(i)-(iv); 17.24.116(4)
Exhibit 3-1 MLR Mine Plan Map	ARM 17.24.115(1)(k)(i)-(iv); 17.24.116(4)
Exhibit 3-2 Ultimate Disturbance Map	ARM 17.24.116(f)
Exhibit 3-3 End-of-Year 1 Mining Disturbance	ARM 17.24.115(1)(k)(i)
Exhibit 3-4 End-of-Year 5 Mining Disturbance	ARM 17.24.115(1)(k)
Exhibit 3-5 Lime Plant Site Map	ARM 17.24.116(1)(d)
Exhibit 3-6 Lime Plant Flow Sheets	ARM 17.24.116(1)(d)
Exhibit 3-7 Soils Salvage Map	ARM 17.24.115(1)(k)(ii); 17.24.116(3)(b)
Exhibit 4-1 Post-Mining Topography Map	ARM 17.24.115(1)(b)
Exhibit 4-2 Revegetation Map	ARM 17.24.115(1)(k)(iii)

2.0 EXISTING ENVIRONMENT SUMMARIES

MLR conducted baseline inventories in 2013-2014 of their limestone project area approximately one mile west of Drummond, Montana in northeastern Granite County. Baseline inventories are listed below:

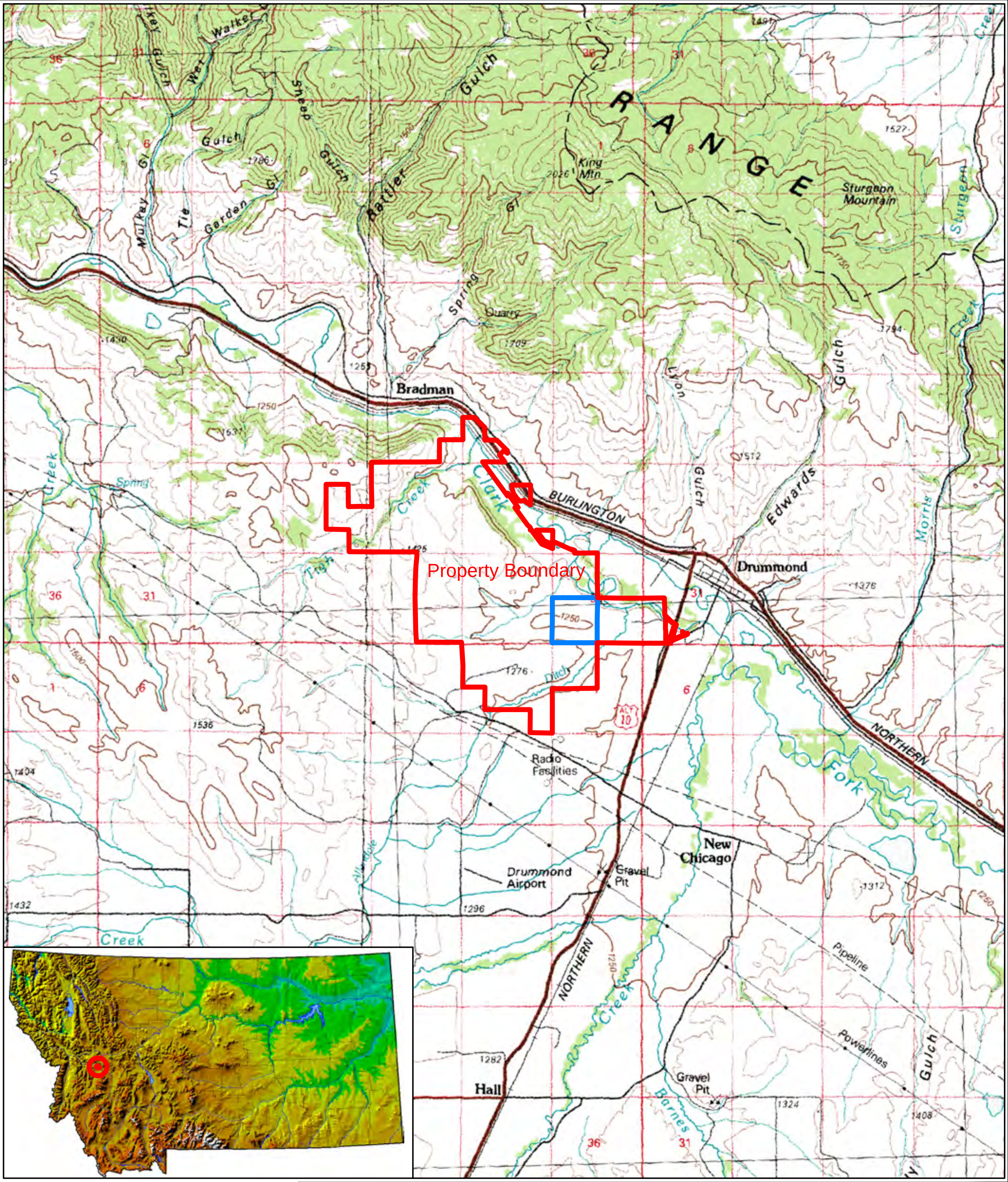
Summary Section	Inventory	Baseline Report Appendix
2.1	Air Quality	A-1
2.2	Hydrology	A-2
2.3	Terrestrial Wildlife	A-3
2.4	Vegetation	A-4
2.5	Wetlands	A-5
2.6	Geology	A-6
2.7	Soils	A-7
2.8	Land Use	A-8
2.9	Energy	A-9
2.10	Transportation	A-10
2.11	Noise	A-11
2.12	Socioeconomics	A-12
2.13	Cultural Resources	A-13

The project area (Figure 2.0-1) is located in all or portions of Sections 1 and 2, T10N, R13W; Section 31, T11N,R12W; and Sections 23, 25-28 and 34-36, T11N, R13W, comprising the former Bar-Four-Bar Ranch property totaling 3520 acres (5.5 square miles). The baseline inventories were designed to address current and potential environmental concerns related to various resources of the project area listed above; the plans of study were reviewed with the MDEQ to solicit agency comments. These inventories are used to assist mine permitting and reclamation planning in accordance with the laws and regulations administered by MDEQ's Hard Rock Section.

The study area climate is "modified continental", having cold winters and warm summers with a growing season extending from April to September in most years. Weather data collected at Drummond were examined for the 30-year period (NRCS 2003). The average annual temperature is 43 degrees Fahrenheit (F), ranging from an average minimum of 11 degrees F in January to an average maximum of 84 degrees F in July. During the growing season average temperatures range from 43 to 65 degrees F. Precipitation averages 12.6 inches annually, ranging from 0.6 inches in February to 2.0 inches in May, with the greatest precipitation occurring in May and June.

Geology of the area (Montana Bureau of Mines and Geology (MBMG) 2009) consists of Tertiary sedimentary formations at lower elevations in the southern portion of the study area. Higher elevations in the northern portion of the study area are comprised of a Mississippian carbonate formation (limestone), and Tertiary igneous formations comprised of andesite, basalt and rhyolite. The Clark Fork River floodplain comprises Quaternary unconsolidated alluvium.

Following are summaries for each of the baseline environmental inventories listed above. Baseline reports and maps are presented in their entirety in Appendix A.



Montana Limestone Resources Project
Existing Environment Study Area

USGS 100k: Missoula East

WESTECH
Environmental Services, Inc.
P.O. Box 6045
(406) 442-0950
Helena, Montana 59604

SCALE: 1:100,000	FIGURE
DATE: 09/24/14	2.0-1
DRAWN BY: DC	
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FILE: MLR13_Location.dwg	SHEET: 1 of 1

2.1 AIR QUALITY

Baseline air quality and meteorological monitoring is being conducted by Bison Engineering, Inc. in the vicinity of the proposed MLR facility near Drummond, Montana. Table 2.1-1 lists the parameters being monitored, including start and end dates when applicable. The locations of the monitoring sites in relation to the community of Drummond are shown in Figure 2.1-1. Results of monitoring performed to date are summarized from the baseline report (Appendix A-1) in Sections 2.1.1 and 2.1.2 below.

Table 2.1-1
MLR Baseline Air Quality / Meteorology Monitoring Parameters

Site Location	Parameter(s)	Start Date	End Date
MLR Meteorological Tower	Wind direction, 19 meters Wind direction sigma, 19 meters Wind speed, 19 meters Temperature, 2 meters and 19 meters Delta temperature (19 meters – 2 meters) Solar radiation, 3 meters	09/24/2013	Ongoing
	Relative humidity, 2 meters	04/10/2014	Ongoing
Particulate Monitors[1]	$PM_{2.5}$ and PM_{10}	08/17/2013	08/30/2014
Sulfur Dioxide Shelter	Sulfur dioxide	01/09/2014	Ongoing
	Barometric pressure	02/03/2014	Ongoing
	Precipitation	05/22/2014	Ongoing

$PM_{2.5}$ denotes particulate matter smaller than 2.5 microns in diameter
PM_{10} denotes particulate matter smaller than 10 microns in diameter

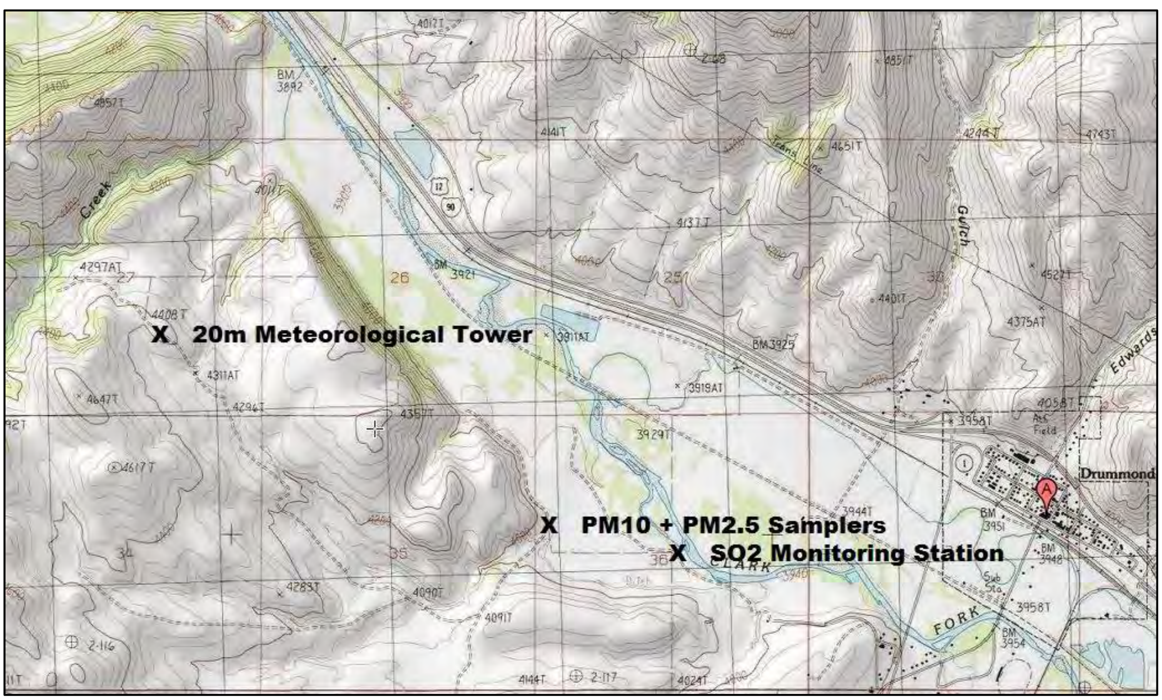


Figure 2.1-1 MLR Monitoring Locations

2.1.1 Air Quality Data Summary

Monitoring for both fine particulates ($PM_{2.5}$) and inhalable particulates (PM_{10}) began in August 2013 and ended in August 2014. The data have been quality-assured and reported through June 2014. For the August 2013 - June 2014 data period, the average $PM_{2.5}$ concentration was 4.0 micrograms per cubic meter ($\mu g/m^3$), and the maximum 24-hour concentration was 20 $\mu g/m^3$. These values are well below the respective annual standard of 12 $\mu g/m^3$ and the (98th-percentile) 24-hour standard of 35 $\mu g/m^3$.

From August 2013 - June 2014, the average PM_{10} concentration was 7 micrograms per cubic meter ($\mu g/m^3$) and the maximum 24-hour concentration was 31 $\mu g/m^3$. These values are well below the respective annual standard of 50 $\mu g/m^3$ and the 24-hour standard of 150 $\mu g/m^3$.

Sulfur dioxide monitoring began in January 2014 and will continue until one full year of data has been collected. The data have been quality-assured and reported through June 2014. During this period the average sulfur dioxide concentration was 0 parts per billion (ppb). The 99th-percentile of the one-hour daily maximum concentrations was 1 ppb. The maximum 3-hour concentration was 9 ppb, compared to the federal standard of 500 ppb.

The baseline air quality data is summarized and compared against applicable federal and Montana standards in Table 2.1-2.

Table 2.1-2
Summary of MLR Baseline Air Quality Data

Pollutant	Averaging Period	Measured Background Concentration	NAAQS	MAAQS	Units
SO_2	1-hr	1 [a]	75 [a]	---	ppb
		0.028	---	0.5 [b]	ppm
	3-hr	0.009	0.5 [c]	---	ppm
	24-hr	0.001	---	0.1 [c]	ppm
	Annual	0.000	---	0.02	ppm
PM_{10}	24-hr	31	150 [d]	150 [e]	$\mu g/m^3$
	Annual	7	---	50 [f]	$\mu g/m^3$
$PM_{2.5}$	24-hr	20	35 [g]	---	$\mu g/m^3$
	Annual	4	12	---	$\mu g/m^3$

[a] Based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. Reported background value is 2nd highest daily one-hour maximum.
[b] Not more than 18 exceedances in 12 months.
[c] Not more than one exceedance per year.
[d] Not to be exceeded more than once per year on average over 3 years.
[e] Not to be exceeded more than once per year, as determined in accordance with 40 CFR 50 Appendix K.
[f] Not to be exceeded in a calendar year, as determined in accordance with 40 CFR 50 Appendix K.
[g] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).

2.1.2 Meteorological Data Summary

As shown in Table 2.1-1, most of the meteorological monitoring began in September 2013; barometric pressure, relative humidity and precipitation monitoring was added during 2014. The objective of that monitoring is to provide a meteorological dataset suitable for dispersion modeling. Because the purpose of this narrative is to describe the climatology of the MLR site, Table 2.1-3 presents the long-term (1971-2000) data record from the Drummond Aviation site located approximately 2.5 miles south-southwest of Drummond. The climate can be described as "modified continental," and is characterized by semi-arid conditions and large daily and seasonal temperature ranges. Annual average precipitation is 12.61 inches, with approximately half occurring between May and August. Precipitation during the winter months is comparatively light, with much of it occurring as snow. There is generally a snow cover from December through February.

Table 2.1-3
Climatological Data for Drummond Aviation Site[1]

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Avg. Max (°C)[2]	-0.8	3.2	9.0	14.7	19.3	24.0	28.7	28.4	22.3	14.6	4.2	-1.1	13.9
Avg. Min (°C)[2]	-11.3	-9.1	-5.3	-2.1	1.9	5.7	7.1	6.6	2.3	-2.2	-6.8	-11.0	-2.0
Avg. Precip. (inches)	0.79	0.61	0.75	0.98	1.96	1.66	1.15	1.29	1.06	0.77	0.79	0.80	12.61
Avg. Snowfall (inches)[3]	8.3	5.3	6.1	4.2	1.9	0.4	0.0	0.1	0.7	1.2	5.5	8.1	41.7
Avg. Snow Depth (inches)[3]	4	3	1	0	0	0	0	0	0	0	1	2	1

[1]Source: Western Regional Climate Center.
[2]Values converted from original degrees F values to facilitate comparison with Table 2.1-4.
[3]Snowfall data based on 1963-2005 period.

Approximately nine months of quality-assured data have been collected at the MLR meteorological tower, and they are summarized in Table 2.1-4. It should be emphasized that those data are based on conditions during a single nine-month period, and do not necessarily represent long-term climatology. For example, February of 2014 was drastically colder than both December 2013 and January 2014; climatologically, February is warmer than both December and January, as shown in Table 2.1-3. Also, note that the 9-month average temperature values for the MLR site are skewed downward since no data from the warmest months of July and August are included.

By contrast, the nine-month data period is sufficient to evaluate the general wind conditions at the MLR site, which one would expect to be reasonably consistent from year to year since they are strongly influenced by localized terrain effects. Figure 2.1-2 presents a graphical wind rose, wherein each "petal" in the wind rose represents the percentage of the time that the wind blew from a particular direction. It is evident that the site is dominated by winds from the west through northwest, occurring over half of the time. A slight secondary maximum occurs for winds from the southeast quadrant. Winds are generally light; the average wind speed to date has been 3.1 meters per second (6.9 miles per hour). West-northwest winds tend to be the strongest, with an average speed of 4.9 meters per second (11.0 miles per hour).

Table 2.1-4
Summary of MLR Meteorological Data

Month	Wind Speed (m/s) Avg	Wind Direction (degrees from) Avg	Standard Deviation of Horiz. WD (degrees) Avg	Temp 19m (deg C) Avg	Temp 2m (deg C) Avg	Delta Temp 19m-2m (deg C) Avg	Relative Humidity (%) Avg
Sep 2013	3.1	247	32	6.8	6.8	-0.04	---
Oct 2013	2.7	241	36	4.5	4.4	0.11	---
Nov 2013	2.4	247	36	0.3	0.1	0.20	---
Dec 2013	3.1	274	30	-4.8	-5.1	0.25	---
Jan 2014	2.8	245	36	-2.1	-2.4	0.24	---
Feb 2014	2.7	181	33	-9.4	-9.6	0.21	---
Mar 2014	3.2	267	33	0.8	0.6	0.15	---
Apr 2014	3.8	295	33	5.2	5.3	-0.15	55.5
May 2014	3.3	313	38	10.7	10.9	-0.21	53.9
Jun 2014	3.6	299	34	13.2	13.5	-0.27	56.0
9 month period[1]	3.1	261	34	2.5	2.5	0.05	55.1

[1]Calculated as arithmetic average of monthly means

September 24, 2013 to June 30, 2014

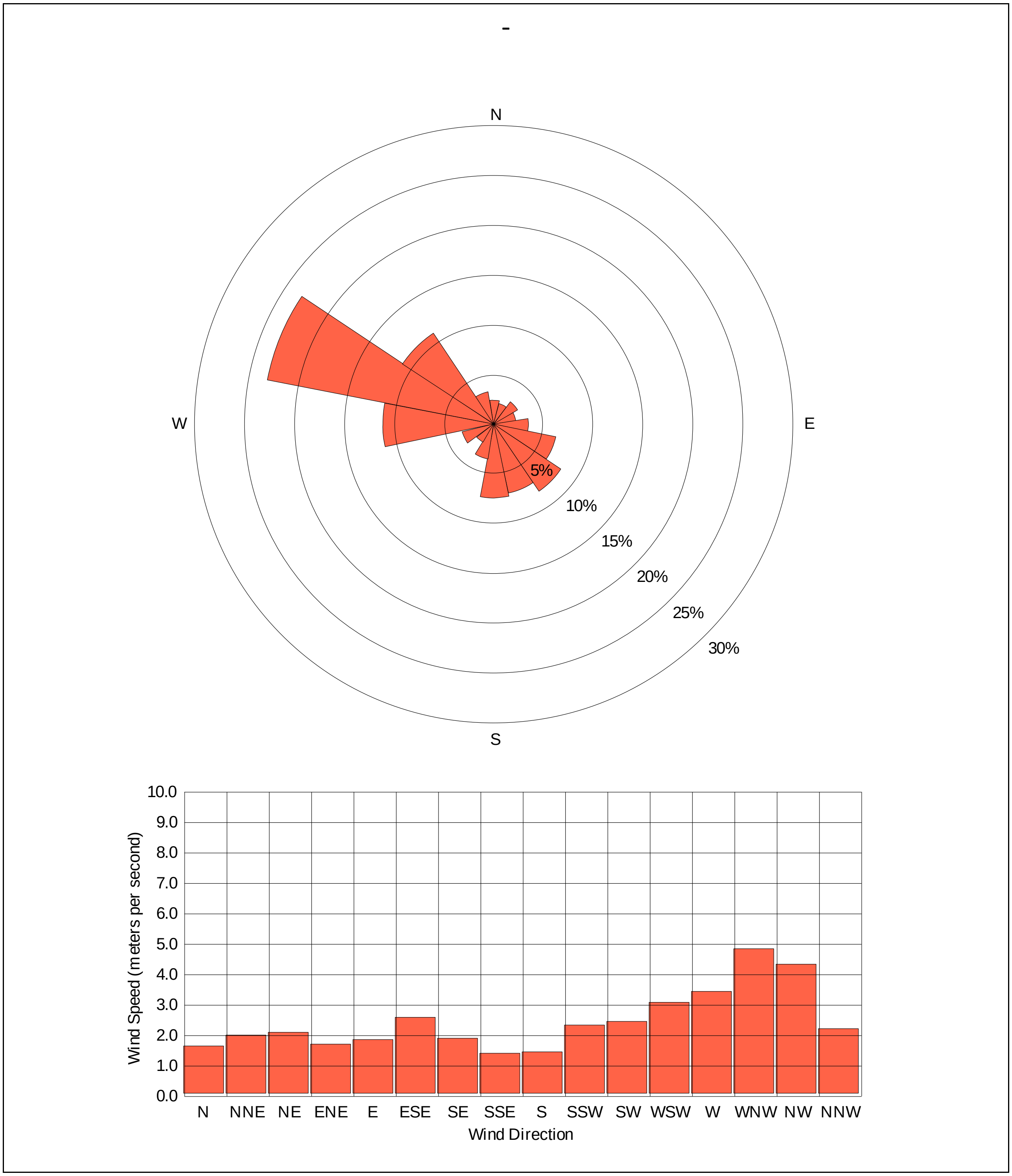


Figure 2.1-2 Wind Rose for MLR Drummond Site

2.2 HYDROLOGY

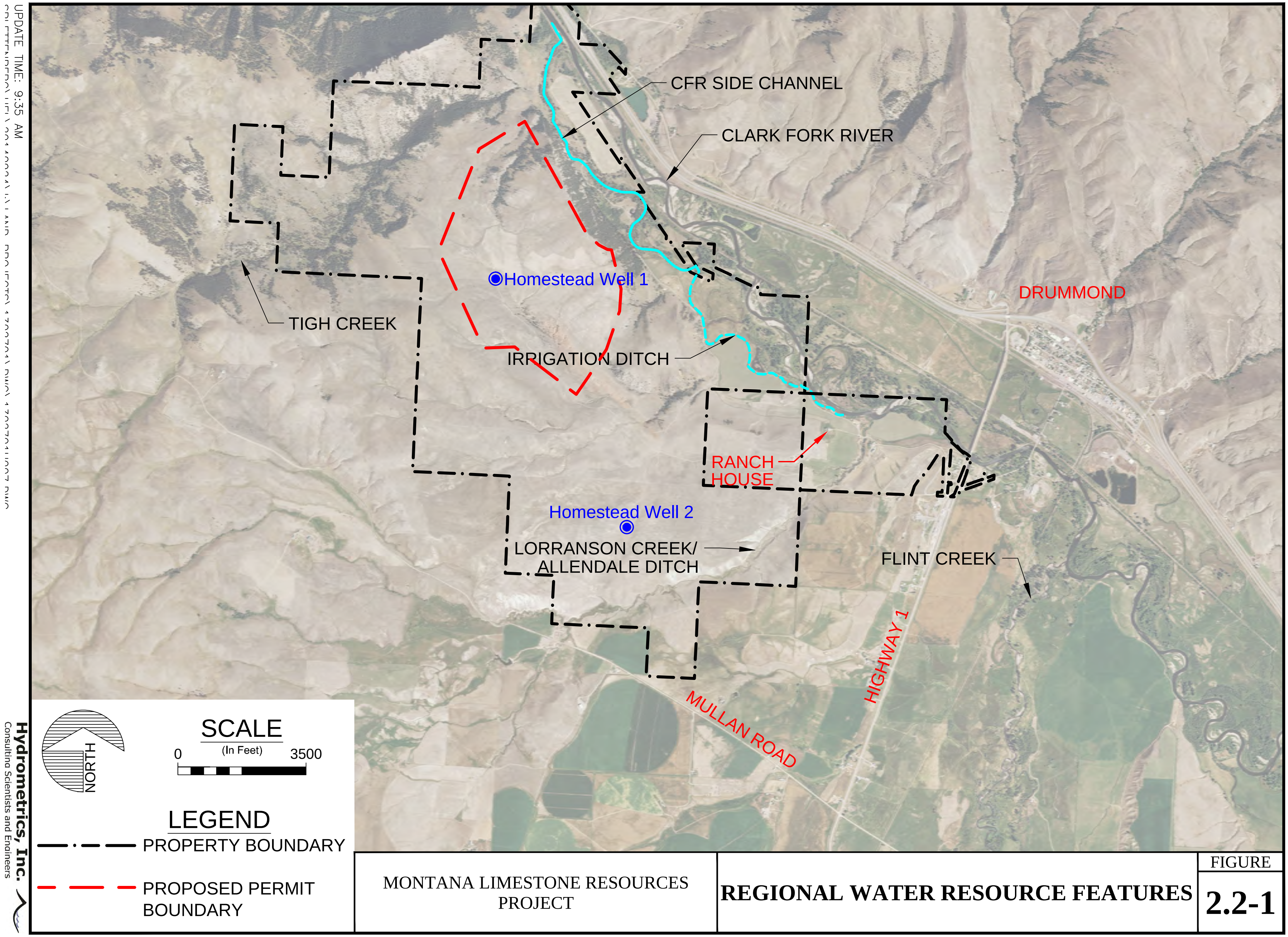
This section describes hydrologic features and conditions in and around the project area, and the MLR Project hydrologic monitoring program and results to date. Additional detail is included in Appendix A-2, with supporting information provided in various sections of this application, including Sections 3.2.6 "Mine Water Management", 3.11 "Operational Water Monitoring", and 4.13 "Post-Operation Water Monitoring".

2.2.1 Local Water Resources

The MLR Project lies within the Clark Fork River drainage, a major tributary to the Columbia River (hydrologic unit code 17010202). Primary surface water features in the general vicinity of the MLR project include the Clark Fork River (CFR), a slough or side channel associated with the CFR, Tigh Creek, a small creek southeast of the project site, and Flint Creek (Figure 2.2-1). The Clark Fork River drainage bottom lies immediately northeast of the project site with the main river channel approximately 0.5 miles northeast of the proposed limestone pit. Continuous streamflow data from USGS gaging station 12331800, located approximately 13 miles downstream of the project area, includes a maximum and minimum daily average flow rate of 7740 cfs on June 10, 2011 and 185 cfs on August 22, 2013, respectively, for the October 2007 through August 2014 period of record (Appendix A-2).

A small slough or side channel of the Clark Fork River flows from southeast to northwest along the western edge of the floodplain between the river and proposed mine site. The side channel receives seasonal flow from the Clark Fork River via an irrigation ditch, from irrigation return flows, and possibly from shallow groundwater recharge. Based on the relative elevations of the side channel invert and river at their upstream junction, the side channel does not receive direct flow from the Clark Fork River (other than via the irrigation ditch) except during very high runoff years.

The Tigh Creek drainage lies approximately 0.5 miles northwest of the proposed mine facilities and is a tributary to the Clark Fork River. Despite the considerable drainage size, Tigh Creek is typically dry. Since initiation of baseline monitoring activities in 2013, no flow has been observed in Tigh Creek and no indications of recent flow, such as newly scoured sections of the creek bottom or recent debris piles, have been recorded. Based on conversations with local ranchers, Tigh Creek typically flows only in response to very high intensity precipitation or snowmelt events. The large cobble/boulder creek bed material indicates the drainage does experience periodic high intensity, short-duration flows. The abundant Madison Limestone outcrops in the drainage suggest that any ephemeral surface flow that may occur quickly infiltrates into the limestone. The lack of surface flow also indicates that the local and regional groundwater tables lie some distance below the creek bed, even in the lower reaches of Tigh Creek.



MONTANA LIMESTONE RESOURCES PROJECT

REGIONAL WATER RESOURCE FEATURES

FIGURE 2.2-1

A small creek is located south/southeast of the proposed mine facilities (Figure 2.2-1). Although unnamed on the USGS topographic map, the creek is referred to as Lorranson Creek (MBMG 1997) and as Allendale Ditch elsewhere; both names are used to refer to the unnamed creek in this report. The majority of creek flow is derived as tail water from Allendale Ditch (fed by Flint Creek approximately 10 miles south of the project area) and other irrigation return flows. The creek is also fed by a number of springs located two to three miles south of the project area and south of Mullan Road (Figure 2.2-1). The creek would likely be dry most of the year if not for the irrigation return flows (MBMG 1997).

Flint Creek is located east of Highway 1, about 3.5 miles east of the proposed limestone pit and plant site. Flint Creek is a major tributary of the Clark Fork River extending approximately 36 miles from Georgetown Lake to the Clark Fork River. As noted above, flow in Lorranson Creek is derived in part from Flint Creek through the Allendale Ditch. Otherwise, Flint Creek is not considered to be a significant hydrologic feature in terms of mine planning due to its distance from the limestone pit and plant site.

Pre-existing information on local groundwater resources is limited due to a general lack of development in the immediate project area. Two old wells associated with former homesteads are located within the general project area including Homestead Well 1 and Homestead Well 2 (Figure 2.2-1). Homestead Well 1 is a 6-inch-diameter steel-cased well located near the proposed plant site. The well is 47 feet deep with the depth to water about 29 feet below ground surface (bgs) (see Section 2.2.2.2). Homestead Well 2 is a four-foot-diameter dug well located southeast of the proposed plant site. This well is 55 feet deep with a water level of about 52 feet bgs. Both of the homestead wells are believed to be completed in shallow perched groundwater systems within tertiary sediments, although well logs are not available for either well.

Two domestic water supply wells are located at the ranch house about one mile west of the proposed mine area (Figure 2.2-1). One of the wells is 65 feet deep and is completed in "blue-green shale". According to the well log, the static water level was 20 feet bgs and well yield was 20 gpm in May 2010 when the well was completed. According to the home owner, the second well is 200 feet deep although no log or water level data are available for that well. Water levels and yields in both wells have reportedly declined in recent years to the point where a new domestic well will be required to supply the ranch house in the future (Appendix A-2).

Based on the scant hydrologic information outlined above, it is apparent that water resources in the proposed mine area are limited despite its proximity to the Clark Fork River. The lack of flow in Tigh Creek indicates that local and regional groundwater levels occur below the elevation of Tigh Creek. The two closest surface water features, the CFR side channel and Lorranson Creek both flow only in response to irrigation return flows. Limited yields in the two ranch house wells at depths of up to 200 feet also suggest a general lack of water resources in the immediate mine area. Additional information collected through MLR's baseline hydrologic investigations is presented in the following sections.

2.2.2 Water Resource Monitoring Program

Hydrologic data collection has been ongoing at the MLR site since spring 2013. Hydrologic data have been obtained through MLR's baseline water resources monitoring program as described in the project water resources monitoring plan (Hydrometrics 2014), as well as from MLR's exploration drilling program. MLR's baseline monitoring program scope and results are described below, with additional detail provided in Appendix A-2.

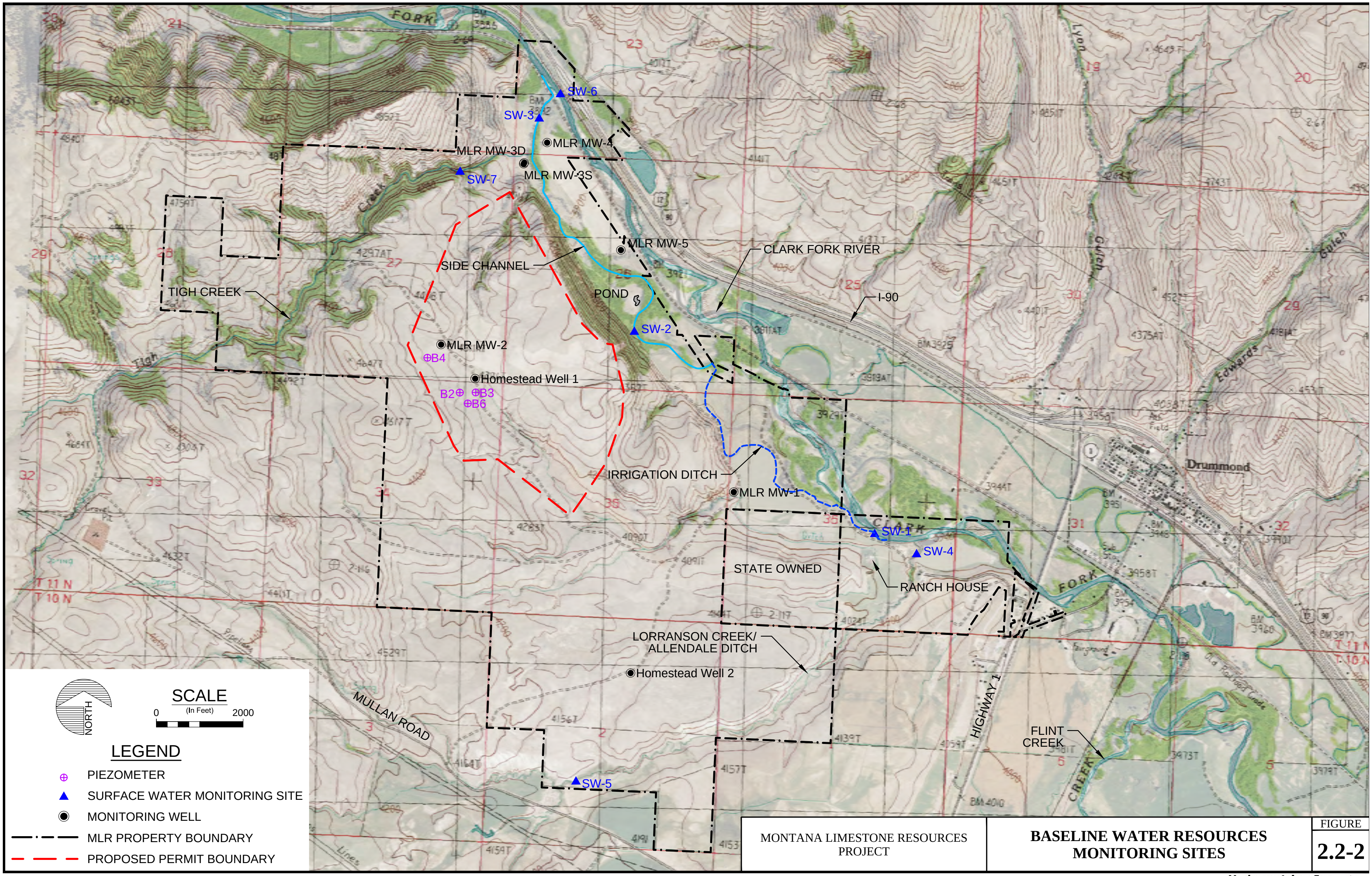
2.2.2.1 Surface Water Monitoring

Baseline surface water monitoring began in June 2013 in accordance with the draft project baseline water resources monitoring plan. The surface water program includes seasonal monitoring at eight stations. The eight sites include two sites on the Clark Fork River side channel immediately northeast of the proposed mine facilities, one site on the irrigation ditch feeding the side channel, one site on the Clark Fork River downstream of the project site, two sites on Lorranson Creek, one at the mouth of Tigh Creek, and one at a manmade pond on the Clark Fork River floodplain. Surface water monitoring locations are described in Table 2.2-1 and shown on Figure 2.2-2. The monitoring schedule is shown in Table 2.2-2.

Table 2.2-1
Baseline Water Resources Monitoring Sites – Montana Limestone Resources Project

Site	Coordinates (approx.)		Description
	Lat	Lon	
SW-1	46.6641	-113.1713	Head of irrigation ditch feeding side channel. Represents Clark Fork River water quality.
SW-2	46.6763	-113.1947	Clark Fork River side channel intermediate to SW-1 and SW-3.
SW-3	46.6898	-113.2045	Clark Fork River side channel near downstream end.
SW-4	46.6625	-113.1686	Unnamed creek near downstream end.
SW-5	46.6474	-113.2083	Unnamed creek upstream section; below Mullan Road crossing.
SW-6	46.6914	-113.2034	Clark Fork River downstream of project.
SW-7	46.6863	-113.2110	Mouth of Tigh Creek
Pond	46.6785	-113.1951	Excavated pond on CFR Floodplain

Monitoring locations are shown on Figure 2.2-2.



MONTANA LIMESTONE RESOURCES PROJECT

BASELINE WATER RESOURCES MONITORING SITES

FIGURE **2.2-2**

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Hydrometrics, Inc.
Consulting Scientists and Engineers

Table 2.2-2
Baseline Water Resources Monitoring Schedule

	June 2013	August 2013	June 2014	August 2014	October 2014
Surface Water					
SW-1	X	X	X[1]	X	X[1]
SW-2	X	Dry	X[1]	X	X[1]
SW-3	X	Dry	X[1]	X	X[1]
SW-4	X	X	X[1]	X	X[1]
SW-5	X	X	X[1]	X	X[1]
SW-6	X	X	X	X	X
SW-7	Dry	Dry	Dry	Dry	Dry
Pond Site	X	X	X	X	X
Groundwater					
MW-1	---	---	X	X	X
MW-2	---	---	X	X	X
MW-3	---	---	X	X	X
MW-4	---	---	X	X	X
MW-5	---	---	X	X	X

[1]Bed sediment sampling conducted in June and October 2014 as part of surface water monitoring activities.
Note: Groundwater levels will be recorded on a monthly basis.

Monitoring site SW-1 is located on the main irrigation ditch supplying the majority of flow to the Clark Fork side channel. SW-1 is located at the headgate on the Clark Fork River, and as such, water at this site is representative of the Clark Fork River water. Information collected from SW-1 provides data on upgradient surface water conditions in both the side channel and the Clark Fork River. Monitoring sites SW-2 and SW-3 are located at the middle and downstream end of the Clark Fork River side channel, respectively (Figure 2.2-2). SW-3 is located downstream of all currently proposed mine facilities. Site SW-2 is located intermediate to the upstream and downstream monitoring sites to further define baseline conditions within the side channel. Monitoring stations SW-1, SW-2 and SW-3 allow establishment of baseline surface water conditions along the Clark Fork River drainage bottom adjacent to the proposed mine facilities, for both mine permitting purposes and for comparison to future mine operational phase hydrologic data.

Surface water sites SW-4 and SW-5 are located on Lorranson Creek/Allendale Ditch south/southeast of the project area. SW-4 is located near the downstream end of the drainage immediately downstream of the current access road. SW-5 is located upstream of the proposed mine facilities downstream of Mullan Road. The two sites span the area of the proposed access road creek crossing.

Site SW-6 is located on the Clark Fork River downstream of the proposed mine facilities. Although monitoring sites SW-1, SW-2 and SW-3 (along the Clark Fork River side channel) are intended to provide baseline surface water data upgradient and downgradient of the site, SW-6 is included to provide downgradient surface water data in the event that the side channel goes dry seasonally.

SW-7 is located at the mouth of the deeply incised drainage of Tigh Creek. Although Tigh Creek has been dry during all sampling events, SW-7 is visited during each monitoring event and will be sampled if flow is observed. The “Pond” site is located on the Clark Fork River floodplain northeast of the proposed mine facilities. Monitoring the pond provides data on the CFR alluvial groundwater system adjacent to the proposed facilities.

In addition to surface water sampling, bed sediment samples were collected in June and October 2014 at all surface water monitoring locations exhibiting flow, including Surface Water Monitoring Sites 1 through 6 (Figure 2.2-2). The streambed sediment sampling is intended to document baseline sediment metals concentrations in light of historic mining activities upstream of the MLR site. Sediment samples were collected concurrently with the June and October surface water monitoring events.

Surface water monitoring results are summarized in Table 2.2-3, with complete results provided in Appendix A-2. As noted above, most surface water samples have been sampled twice in 2013 and three times in 2014 (Table 2.2-2), except when dry.

The baseline monitoring data show surface waters in the project area to be alkaline, with average field-measured pH values ranging from 7.79 at SW-2 (Clark Fork River side channel) to 8.29 at SW-1 (the irrigation ditch at upstream Clark Fork River). Average TDS (total dissolved solids) concentrations at sites SW-1, -2, -3 and -6, all on or connected to the river, range from 251 mg/L at site SW-6 (downstream Clark Fork River) to 329 mg/L at SW-2. TDS concentrations were higher at the two Allendale Ditch sites, with an average TDS of 854 mg/L at upstream site SW-5 and 801 mg/L at SW-4. The higher TDS at these sites is attributed to the effects of irrigation return flows south of the project area. Sulfate concentrations show similar trends, with average concentrations ranging from 47 to 79 mg/L at the Clark Fork River and side channel sites, and 345 to 358 mg/L at the two Allendale Ditch sites (Table 2.2-3).

Nutrient concentrations are variable across the site with individual total nitrogen concentrations ranging from <0.01 mg/L to 0.50 mg/L at all sites. No significant differences were noted in total nitrogen at the Allendale Ditch sites compared to the other monitoring sites. Average phosphate concentrations ranged from 0.039 to 0.057 mg/L at the river and side channel sites, and 0.077 to 0.098 mg/L at the two Allendale Ditch sites (SW-4 and SW-5). Again, the higher phosphate concentrations are attributed to the irrigation return water comprising most of the flow at these sites.

Trace metal concentrations generally were low in the 2013/2014 surface water samples, with many constituents near or below the analytical detection limits. Constituents consistently near or below the detection limits include aluminum, beryllium, chromium, cobalt, nickel, silver and thallium. Of all these parameters, arsenic was the most elevated relative to applicable surface water quality standards, with arsenic exceeding the 0.01 mg/L human health standard in most surface water samples (only the Pond site on the Clark Fork River floodplain was consistently below the 0.01 mg/L concentration). Copper, iron and mercury also exceeded applicable water quality standards but on a less consistent basis, with the most exceedences recorded at Clark Fork River site SW-6. The entire water quality database and exceedence summary is provided in Appendix A-2.

Table 2.2-3
Summary of Baseline Surface Water Quality Data – Montana Limestone Resources

		MLR SW-1				MLR SW-2				MLR SW-3				MLR SW-4				MLR SW-5				MLR SW-6			
FIELD PARAMTERS	**Units**	Min	Max	Ave	N	Min	Max	Ave	N	Min	Max	Ave	N	Min	Max	Ave	N	Min	Max	Ave	N	Min	Max	Ave	N
Flow (cfs)	cfs	3.81	15.95	9.52	4	1.22	4.25	2.38	3	0.15	1.13	0.60	3	2.67	6.98	4.80	4	0.10	2.29	1.52	4				
Dissolved Oxygen	mg/L	7.7	11.92	9.31	4	5.09	9.11	7.27	3	5.73	8.63	7.26	3	7.69	11.00	9.31	4	8.42	10.55	9.67	4	6.6	10.9	8.8	4
pH	S.U.	8.03	8.66	8.29	4	7.56	8.02	7.79	3	7.83	8.20	8.01	3	7.97	8.31	8.12	4	8.08	8.27	8.19	4	7.90	8.26	8.06	4
Conductivity	µmhos/cm	332	582	461	4	474	502	492	3	421	495	460	3	1052	1106	1092	4	1109	1237	1147	4	298	448	384	4
Water Temperature	°C	16.5	19.2	17.7	4	16	19.4	17.2	3	15.6	18.2	17.2	3	14.7	16.1	15.3	4	15.0	17.8	16.0	4	14.9	15.6	15.3	4
PHYSICAL PROPERTIES																									
Total Suspended Solids	mg/L	14	41	24	4	<10	<10	NA	3	<10	41.00	NA	3	20	50	32	4	<10	17	NA	4	<10	58	NA	4
Total Dissolved Solids	mg/L	220	392	306	4	305	351	329	3	273	323	298	3	757	828	801	4	813	964	854	4	212	291	251	4
INORGANICS																									
Total Alk-as CaCO3	mg/L	120	200	162.5	4	170	170	170	3	150	170	163	3	240	260	250	4	240	270	258	4	120	180	153	4
Chloride	mg/L	3	14	7.5	4	6	8	7	3	5	8	7	3	20	31	24	4	9	42	34	4	3	11	6	4
Sulfate	mg/L	35	120	75	4	69	85	79	3	54	82	70	3	320	370	345	4	300	480	358	4	23	71	47	4
Fluoride	mg/L	0.3	0.5	0.4	4	0.4	0.4	0.4	3	0.4	0.4	0.4	3	0.5	0.6	0.5	4	0.5	0.5	0.5	4	0.3	0.5	0.4	4
NUTRIENTS																									
Nitrogen, Total	mg/L	<0.01	0.41	NA	4	<0.01	0.5	NA	3	<0.01	0.41	NA	3	<0.01	0.30	NA	4	<0.01	0.37	NA	4	0.30	0.50	0.40	4
Orthophosphate as P	mg/L	0.027	0.063	0.045	4	0.053	0.060	0.057	3	0.030	0.055	0.040	3	0.053	0.095	0.077	4	0.066	0.154	0.098	4	0.018	0.074	0.039	4
TOTAL RECOVERABLE METALS																									
Aluminum (dissolved)	mg/L	<0.009	<0.009	NA	4	<0.009	<0.009	NA	3	<0.009	0.011	NA	3	<0.009	0.011	NA	4	<0.009	0.017	NA	4	<0.009	0.03	NA	4
Antimony	mg/L	0.0005	0.0008	0.000625	4	<0.005	0.0006	NA	3	<0.0005	0.0006	NA	3	<0.0005	<0.0005	NA	4	<0.005	<0.005	NA	4	0.0006	0.0009	0.0008	4
Arsenic	mg/L	0.013	0.018	0.0155	4	0.011	0.015	0.012	3	0.013	0.015	0.014	3	0.017	0.019	0.018	4	0.003	0.013	0.010	4	0.012	0.019	0.015	4
Barium	mg/L	0.057	0.074	0.066	4	0.062	0.068	0.065	3	0.058	0.077	0.068	3	0.055	0.062	0.058	4	0.061	0.087	0.069	4	0.058	0.081	0.069	4
Beryllium	mg/L	<0.0008	<0.0008	NA	4	<0.0008	<0.0008	NA	3	<0.0008	<0.0008	NA	3	<0.0008	<0.0008	NA	4	<0.0008	<0.0008	NA	4	<0.0008	<0.0008	NA	4
Cadmium	mg/L	<0.00003	0.00019	NA	4	0.00003	0.00007	0.00005	3	0.00007	0.00011	0.00010	3	<0.00003	0.00004	NA	4	<0.00003	<0.00003	NA	4	0.00004	0.00026	0.00013	4
Calcium	mg/L	43	76	59.5	4	55	62	59	3	53	61.00	57	3	125	147	134	4	140	195	157	4	39	57	50	4
Chromium	mg/L	<0.005	<0.01	NA	4	<0.005	<0.01	NA	3	<0.005	<0.01	NA	3	<0.005	<0.01	NA	4	<0.005	<0.01	NA	4	<0.005	<0.01	NA	4
Cobalt	mg/L	<0.005	<0.01	NA	4	<0.005	<0.01	NA	3	<0.005	<0.01	NA	3	<0.005	<0.01	NA	4	<0.005	<0.01	NA	4	<0.005	<0.01	NA	4
Copper	mg/L	0.005	0.043	0.01975	4	0.007	0.009	0.008	3	0.009	0.018	0.013	3	<0.002	0.002	NA	4	<0.002	<0.002	NA	4	0.006	0.055	0.025	4
Iron	mg/L	0.13	0.98	0.4375	4	0.04	0.09	0.07	3	0.05	0.37	0.16	3	0.39	0.93	0.70	4	0.22	0.48	0.32	4	0.08	1.20	0.50	4
Lead	mg/L	0.0005	0.0074	0.002975	4	<0.0003	0.0005	NA	3	0.0003	0.0014	0.0007	3	<0.0003	0.0007	NA	4	<0.0003	0.0003	NA	4	0.0004	0.0095	0.0037	4
Magnesium	mg/L	10	20	14.75	4	12	15	14	3	12	16	14	3	35	40	37	4	27	36	33	4	9	15	12	4
Manganese	mg/L	0.023	0.128	0.0725	4	0.009	0.031	0.020	3	0.005	0.028	0.014	3	0.040	0.051	0.048	4	0.090	0.142	0.108	4	0.022	0.154	0.083	4
Mercury	mg/L	0.000006	0.00015	4.85E-05	4	<0.000005	<0.000005	NA	3	<0.000005	0.0000071	NA	3	<0.000005	<0.000005	NA	4	<0.000005	<0.000005	NA	4	0.000006	0.00026	0.000081	4
Molybdenum	mg/L	0.003	0.006	0.0045	4	0.003	0.004	0.004	3	0.004	0.005	0.0047	3	0.017	0.021	0.019	4	<0.002	0.007	0.007	4	0.002	0.004	0.003	4
Nickel	mg/L	<0.001	<0.002	NA	4	<0.001	<0.002	NA	3	<0.002	0.001	NA	3	<0.001	<0.002	NA	4	<0.001	0.001	NA	4	<0.001	<0.002	NA	4
Potassium	mg/L	3	6	4.5	4	4	5	5	3	4	5	5	3	17	18.00	17.8	4	4	15	12	4	2	4	3.3	4
Selenium	mg/L	<0.001	0.0005	NA	4	<0.001	0.0002	NA	3	<0.0002	<0.001	NA	3	0.0010	0.0020	0.0015	4	<0.0002	0.003	NA	4	<0.0002	<0.001	NA	4
Silver	mg/L	<0.02	0.0002	NA	4	<0.0002	<0.02	NA	3	<0.0002	<0.02	NA	3	<0.0002	<0.02	NA	4	<0.0002	<0.02	NA	4	<0.0002	0.0003	NA	4
Sodium	mg/L	10	24	16.75	4	14	17	16	3	14	18	16	3	49	54	51	4	45	54	49	4	9	17	12.8	4
Strontium	mg/L	0.26	0.624	0.4235	4	0.39	0.421	0.407	3	0.350	0.428	0.399	3	1.62	1.82	1.69	4	1.51	2.22	1.70	4	0.200	0.374	0.276	4
Thallium	mg/L	<0.0002	<0.0002	NA	4	<0.0002	<0.0002	NA	3	<0.0002	<0.0002	NA	3	<0.0002	<0.0002	NA	4	<0.0002	<0.0002	NA	4	<0.0002	<0.0002	NA	4
Uranium	mg/L	<0.008	0.0055	0.00445	4	<0.008	0.0047	NA	3	<0.008	0.00	NA	3	0.010	0.011	0.010	4	<0.008	0.011	NA	4	<0.008	0.0049	NA	4

2.2.2.2 Groundwater Monitoring

Six monitoring wells have been completed by MLR in the project area for groundwater characterization and baseline monitoring. Monitoring well locations are shown on Figure 2.2-2 and described in Table 2.2-4. The monitoring wells are distributed throughout the proposed mine area to provide information on groundwater hydraulic gradients and generalized flow directions. All monitoring wells were drilled between May and July 2014 using standard air rotary drilling techniques and completed with 4-inch ID schedule 40 PVC casing and 20-slot PVC screen. Well completion and lithologic logs are included in Appendix A-2.

Table 2.2-4
Monitoring Well Completion Details

Well	Northing	Easting	MP Elevation	Screen Interval	Lithology
MW-1	902799.305	1044110.863	3957.83	95-125	Cretaceous
MW-2	906199.81	1037363.945	4321.50	480-600	Madison Limestone
MW-3D	910384.423	1039279.038	3907.80	58-98	Cretaceous
MW-3S	910361.281	1039268.653	3907.16	20.5-30.5	Alluvium/Colluvium
MW-4	910852.06	1039808.397	3902.07	8-18	Alluvium
MW-5	908375.252	1041507.273	3910.54	7.5-17.5	Alluvium

Monitoring well locations are shown on Figure 2.2-2.
MP-Water level measuring point at top of PVC casing.
Coordinates in MT State Plane NAD83, International Feet; Elevations NAVD88

Groundwater levels have been monitored on an approximately biweekly schedule since the wells were completed in June/July 2014, with groundwater depths and elevations summarized in Table 2.2-5. With the exception of well MW-3D, groundwater levels have remained relatively constant through the July to August monitoring period. Average depths to groundwater during this period range from about ten feet at wells MW-4 and MW-5, located on the Clark Fork River floodplain, to almost 500 feet at well MW-2, located on top of the limestone ridge near the proposed mine facilities. Depths to water at wells MW-2 and MW-3S, both located near but slightly above the floodplain, each average about 25 feet.

Based on the measured groundwater depths, groundwater elevations range from about 3935 feet above mean sea level (AMSL) at well MW-1 to 3833 feet at MW-2. Average groundwater elevations in Clark Fork River alluvial wells MW-4 and MW-5 are about 3890 to 3900 feet AMSL (Table 2.2-5).

Table 2.2-5
Monitoring Well Groundwater Level Data

	Depth to Groundwater - feet below top of casing					
	MW-1	**MW-2**	**MW-3D**	**MW-3S**	**MW-4**	**MW-5**
Min	24.63	494.72	30.59	23.45	8.53	8.70
Max	28.48	496.14	80.81	25.70	11.41	11.38
Ave	26.50	495.62	43.13	25.12	10.03	10.35

Table 2.2-5
Monitoring Well Groundwater Level Data

	Groundwater Elevation - feet above mean sea level					
	MW-1	**MW-2**	**MW-3D**	**MW-3S**	**MW-4**	**MW-5**
Min	3929.35	3825.36	3826.99	3881.46	3890.66	3899.16
Max	3933.20	3826.78	3877.21	3883.71	3893.54	3901.84
Ave	3931.33	3825.88	3864.67	3882.04	3892.04	3900.19

The groundwater elevation at well MW-2, completed in Madison Limestone at 480 to 600 feet below ground surface (bgs), is of interest for two reasons. First, the groundwater elevation at MW-2 is 65 to 75 feet lower in elevation than the Clark Fork River alluvial groundwater (MW-4 and MW-5), and the Clark Fork River itself. The lower bedrock groundwater elevation within the proposed pit area compared to the Clark Fork River/alluvial groundwater system suggests either a limited interconnection between the two systems, or that the creek loses flow to groundwater in this area. Either way, the relative groundwater levels indicate that groundwater in the mine area does not recharge the Clark Fork River in the vicinity of the MLR project. Second, the groundwater elevation at MW-2, 3833 feet, is 150 to 200 feet lower in elevation than the proposed depth of limestone quarrying, meaning all mining will occur well above the regional bedrock groundwater system. This is consistent with the lack of groundwater encountered during MLR's exploration drilling program, where extensive drilling throughout the limestone orebody encountered no groundwater down to the proposed ultimate pit depth (Appendix A-2, Section 3.2.3).

In addition to the five monitoring wells, and the exploration drill holes noted above and discussed in Appendix A-2, Section 3.2.3, MLR completed a number of geotechnical boreholes near the proposed plant site. The boreholes encountered Tertiary-age Renova Formation sediments overlying volcanic rock (see Section 2.6), with all of the boreholes encountering saturated conditions near the base of the Renova formation. The saturated zone varied from about 10 feet to 20 feet in thickness, and is perched on top of a coal seam at the base of the Renova. The shallow perched groundwater system appears to be localized within the Renova formation and is most likely responsible for minor seepage observed in the drainage bottom immediately to the east (Appendix A-2). Four of the geotechnical boreholes (B-2, -3, -4, -6, Figure 2.2-2) were completed as piezometers, and are included in MLR's groundwater level monitoring program.

The five monitoring wells were sampled for water quality in June or July 2014 (when first completed), and again in late August and October. The June/July results are presented in Table 2.2-6, with the complete groundwater quality dataset included in Appendix A-2. Similar to the surface water, groundwater in the project area is alkaline with pH values all above 7.0. Constituent concentrations are generally low with a number of parameters near or below analytical detection limits, and all constituent concentrations less than applicable groundwater quality standards. Additional information on the project area hydrologic conditions is provided in Appendix A-2.

Table 2.2-6
June/July 2014 Groundwater Monitoring Results – Montana Limestone Resources

SITE CODE	MW-1	MW-2	MW-3S	MW-3D	MW-4	MW-5	MW-5 DUP	DI BLANK	RINSATE BLANK
SAMPLE CODE	MLR-1406-200	MLR-1406-208	MLR-1406-201	MLR-1406-207	MLR-1406-202	MLR-1406-203	MLR-1406-204	MLR-1406-205	MLR-1406-206
COLLECTION DATE	6/26/14	7/2/14	6/26/14	7/2/14	6/26/14	6/26/14	6/26/14	6/27/14	6/27/14
FIELD PARAMTERS									
Depth to Water Level (SWL)	24.16	495.5	23.72	37.1	8.21	8.55	--	—	—
Dissolved Oxygen	5.17	0.83	2.33	1.11	2.51	0.46	--	—	—
pH	7.26	7.32	7.02	7.94	7.4	7.1	—	—	—
Conductivity	511	896	506	589	425	515	—	—	—
Water Temperature	10.8	15.9	8.5	10.1	9.9	8.7	—	—	—
PHYSICAL PROPERTIES									
Solids, Total Suspended TSS @ 105 C	518	<10	<10	294	<10	<20	<10	<10	<10
Solids, Total Dissolved TDS @ 180 C	336	638	323	333	273	344	335	<20	<20
Alkalinity, Total as CaCO3	160	170	190	97	150	180	180	<4	<4
Chloride	3	7	6	2	7	6	6	<1	<1
Sulfate	82	300	53	150	43	70	69	<1	<1
Fluoride	1.4	1.4	0.4	1.9	0.4	0.5	0.5	<0.1	<0.1
NUTRIENTS									
Nitrogen, Total	0.8	0.7	0.3	0.2	0.4	0.2	0.2	<0.1	<0.1
Phosphorus, Total as P	0.31	0.05	0.04	1.08	0.03	0.04	0.04	<0.01	<0.01
DISSOLVED METALS									
Aluminum	1.46	<0.009	<0.009	0.029	<0.009	<0.009	<0.009	<0.009	<0.009
Antimony	<0.0005	0.0015	0.0008	<0.0005	0.0007	0.0007	0.0007	<0.0005	<0.0005
Arsenic	0.005	0.006	0.007	0.004	0.006	0.007	0.007	<0.001	<0.001
Barium	0.055	0.027	0.081	0.036	0.056	0.067	0.068	<0.003	<0.003
Beryllium	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Cadmium	<0.00003	<0.00003	<0.00003	0.00006	<0.00003	0.00004	0.00004	<0.00003	<0.00003
Calcium	62	115	69	69	54	65	64	<1	<1
Chromium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	<0.002	<0.002
Iron	0.54	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead	0.0003	0.0007	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Magnesium	14	36	13	13	11	13	13	<1	<1
Manganese	0.046	0.097	0.003	0.033	<0.001	0.002	0.002	<0.001	<0.001
Mercury	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	0.005	0.009	0.003	0.021	0.003	0.005	0.004	<0.001	<0.001
Nickel	0.002	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	15	4	4	4	3	4	4	<1	<1
Selenium	0.002	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sodium	24	29	14	8	13	18	18	<1	<1
Strontium	2	0.91	0.31	0.8	0.25	0.34	0.34	<0.01	<0.01
Thallium	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Uranium	0.0022	0.0022	0.0047	0.0019	0.0054	0.0044	0.0044	<0.0002	<0.0002
Zinc	<0.008	0.031	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008

2.3 TERRESTRIAL WILDLIFE

Terrestrial wildlife resources of the MLR Project vicinity were inventoried for four seasons in 2013 (Appendix A-3). A study area of about 3540 acres ranged from the Clark Fork River south through the adjacent uplands, and encompassed the permit area and associated facilities. Incidental observations outside the study area were also recorded.

A total of 114 species (0 amphibians, 1 reptile, 20 mammals and 93 birds) were recorded in the study area. None of the species recorded during the study were unexpected, based on habitat availability.

No amphibians were recorded during the study. Appropriate breeding habitat in the study area was limited to several ponds along the Clark Fork River bottom, and was not available in the permit area; however, no adults, egg masses or larvae were observed at any of these sites.

The only reptile observed was the prairie rattlesnake. They were considered common in the study area.

Big game species recorded in 2013 were white-tailed deer, mule deer, elk, moose and black bear. White-tailed deer were common in the study area in all seasons, particularly along the Clark Fork River bottom, and in the adjacent uplands in or near the permit area in spring. Mule deer were present in low numbers in the study area year-round, but were most common in the permit area in winter. The study area is a small part of a much larger elk winter range. Elk were most common in winter but were occasionally present in low numbers in other seasons. They ranged throughout the study area, including the permit area. Moose were present in low numbers in the Clark Fork River valley year-round. Black bear were occasional transients through the study area, primarily in spring.

The only upland game species observed during the study were dusky grouse and ruffed grouse. Both were considered uncommon.

Ten species of raptors (vultures, eagles, hawks, falcons and owls) were recorded in the study area vicinity in 2013: turkey vulture, osprey, bald eagle, golden eagle, rough-legged hawk, red-tailed hawk, Cooper's hawk, prairie falcon, American kestrel and great horned owl. Bald eagles and ospreys nested within two miles of the study area. Red-tailed hawks nested along the Clark Fork River bottom in the study area. Although no nests were observed, American kestrels were suspected to have nested in the study area. The remaining species were not believed to have nested in the study area.

Nesting in the study area was verified for five species of waterfowl and shorebirds (Canada goose, wood duck, common merganser, hooded merganser and great blue heron; all nested in the Clark Fork River bottom) and suspected for two others (killdeer and Wilson's snipe).

The USFWS (2014) identified three terrestrial wildlife species that are listed, proposed or candidates for listing under the Endangered Species Act: Canada lynx, grizzly bear and wolverine. The probability of any of these species occurring in the study area is considered very low, and any such occurrences would likely be transient individuals. No endangered or threatened species were recorded by sightings or evidence during the 2013 study.

Montana has established lists of vertebrate animal Species of Concern (MTNHP and MFWP 2014). These lists comprise three categories: Species of Concern are "…considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution." Potential Species of Concern are "…animals for which current, often limited, information suggests potential vulnerability or for which additional data are needed before an accurate status assessment can be made." Special Status Species "…have some legal protections in place, but are otherwise not recognized as federally listed under the Endangered Species Act and are not Montana Species of Concern."

Eight such species (all birds) were recorded in 2013 field work:

- Special Status Species: bald eagles nested within two miles of the study area.
- Potential Species of Concern: hooded mergansers nested in the Clark Fork River bottom. Rufous hummingbirds were observed along the river in August but not during nesting season, and it was suspected that the birds observed in the study area were immigrants/transients from more preferred, cooler mountainous habitats.
- Species of Concern: great blue herons nested within 0.25 mile of the study area but were only observed along the Clark Fork River bottom. There was a single sighting of a transient golden eagle. No pileated woodpeckers were observed in 2013 but several of the species' characteristic excavations were found in cottonwood trees along the Clark Fork River, indicating that this species is at least occasionally present in the study area. Clark's nutcrackers were regularly seen in the study area, always in Douglas-fir habitats. Brewer's sparrows were observed in big sagebrush habitat.

2.4 VEGETATION

The MLR vegetation classification was based on published classifications of vegetation types that have been developed statewide for Montana. Table 2.4-1 lists habitat types and community types for each physiognomic type sampled in the MLR baseline study area in 2013. Vegetation types in the intensive and extensive study areas are mapped on Plate 1 in Appendix A-4.

There were four Grassland types identified in three series including the *Agropyron spicatum* (bluebunch wheatgrass), *Festuca idahoensis* (Idaho fescue) and *Festuca campestris* (rough fescue) series (Table 2.4-1). A Tame Pasture type was also identified, dominated by seeded, non-native perennial grasses.

Six upland Shrub/Grassland types were sampled in two series, dominated by *Artemisia tridentata* (big sagebrush) or *Symphoricarpos occidentalis* (western snowberry). Understories were dominated or distinguished variously by *Poa secunda* (Sandberg bluegrass), *Agropyron smithii* (western wheatgrass), *Agropyron spicatum, Festuca idahoensis, Festuca campestris,* and *Poa pratensis* (Kentucky bluegrass).

Of five Conifer Forest and Woodland types identified, three were in the *Pseudotsuga menziesii* (Douglas-fir) series, and one each in the *Pinus ponderosa* (ponderosa pine) and *Juniperus scopulorum* (Rocky Mountain juniper) series. Understories were distinguished by *Agropyron spicatum, Festuca campestris* or *Physocarpus malvaceus* (mallow ninebark).

Three primary Riparian-Wetland (RW) types were classified according to physiognomic type, including Herbaceous, Shrub and Conifer-Deciduous Tree. The Herbaceous RW type was sampled in seven mesophytic/hydrophytic habitat or community types dominated by various associations of *Poa pratensis, Agrostis stolonifera* (redtop), *Bromus inermis* (smooth brome), *Typha latifolia* (common cattail), *Carex nebrascensis* (Nebraska sedge), *Carex pellita* (woolly sedge) and *Carex utriculata* (southern beaked sedge). The Shrub RW type includes a mesophytic low shrub community type in the *Symphoricarpos occidentalis* series, and a hydrophytic tall shrub community type codominated by *Salix exigua* (sandbar willow) and *Cornus sericea* (red-osier dogwood). The Conifer-Deciduous Tree Riparian type was comprised of three mesophytic series, including two *Populus balsamifera* (black cottonwood) community types and one habitat type each in the *Juniperus scopulorum* and *Populus tremuloides* (quaking aspen) series. Understory dominants in Riparian Tree types reflected the main constituents of the Shrub RW community types, *Symphoricarpos occidentalis, Rosa woodsii* (Wood's rose), *Cornus sericea,* and their most common associates including *Poa pratensis, Agrostis stolonifera, Ribes setosum* (bristly gooseberry) and *Salix bebbiana* (Bebb willow).

The diversity of community types in the inventory area is largely representative of other, lower elevation study areas in west-central and southwestern Montana, as listed in the literature review table in Appendix A-4. All vegetation types identified in this study have been documented in previous studies in the region under the same or similar type names, as reviewed and summarized from published literature and unpublished technical reports. Following is a summary of the relative abundance of habitat and community types identified for the MLR intensive and extensive baseline study areas.

Table 2.4-1
Vegetation Acreage of the Montana Limestone Resources Baseline Study Area, Granite County, Montana, 2013 (see Plate 1 in Appendix A-4).

MAP UNIT	VEGETATION TYPE	n	INTENSIVE STUDY AREA		EXTENSIVE STUDY AREA	
			ACRES	PERCENT	ACRES	PERCENT
10	**GRASSLAND**	**29**	**735.56**	**55.06**	**765.64**	**35.04**
10D	Disturbed Grassland		1.02	0.08	34.16	1.56
11	*Agropyron spicatum/Poa secunda* h.t.	*9*	201.51	15.08		
12	*Agropyron spicatum/Agropyron smithii* h.t.	*14*	370.17	27.71		
13	*Festuca idahoensis/Agropyron spicatum* h.t.	*1*	20.84	1.56		
14	*Festuca campestris/Agropyron spicatum* h.t.	*5*	142.02	10.63		
20	**TAME PASTURE**	**8**	**67.81**	**5.08**	**286.36**	**13.10**
20	Tame Pasture – Grass	8	67.81	5.08	220.05	10.07
20A	Tame Pasture – Grass/Alfalfa				66.31	3.03
30	**SHRUBLAND**	**20**	**289.96**	**21.70**	**440.71**	**20.17**
31	*Artemisia tridentata/Poa secunda* c.t.	*3*	35.55	2.66		
32	*Artemisia tridentata /Agropyron smithii* c.t.	*2*	8.26	0.62		
33	*Artemisia tridentata/Agropyron spicatum* h.t.	*4*	93.51	7.00		
34	*Artemisia tridentata/Festuca idahoensis* h.t.	*3*	43.14	3.23		
35	*Artemisia tridentata/Festuca campestris* h.t.	*7*	100.36	7.51		
36	*Symphoricarpos occidentalis/Poa pratensis* c.t.	*1*	8.08	0.60		
37	*Prunus virginiana/Agropyron spicatum* c.t.		1.06	0.08		
40	**CONIFER FOREST AND WOODLAND**	**24**	**235.89**	**17.66**	**258.84**	**11.84**
41	*Juniperus scopulorum/Agropyron spicatum* c.t.	*5*	57.89	4.33		
42	*Pinus ponderosa/Agropyron spicatum* h.t.	*2*	3.59	0.27		
43	*Pseudotsuga menziesii/Agropyron spicatum* h.t.	*2*	30.54	2.29		
44	*Pseudotsuga menziesii/Festuca campestris* h.t.	*3*	50.57	3.79		
45	*Pseudotsuga menziesii/Physocarpus malvaceus* h.t.	*12*	93.30	6.98		
50	**HERBACEOUS RIPARIAN AND WETLAND**	**14**	**0.25**	**0.02**	**142.27**	**6.51**
51	*Poa pratensis* c.t.	*1*				
52	*Agrostis stolonifera* c.t.	*2*	0.11	0.01		
53	*Bromus inermis* c.t.	*1*				
54	*Typha latifolia* c.t.	*2*				
55	*Carex nebraskensis* c.t.	*3*	0.14	0.01		
56	*Carex pellita* h.t.	*2*				
57	*Carex utriculata* h.t.	*3*				
60	**WOODY RIPARIAN AND WETLAND**	**9**	**0.00**	**0.00**	**197.37**	**9.03**
61	*Symphoricarpos occidentalis* c.t.	*1*				
62	*Salix exigua-Cornus sericea* c.t.	*2*				
63	*Juniperus scopulorum/Cornus sericea* h.t.	*1*				
64	*Populus balsamifera/Symphoricarpos occidentalis* c.t.	*2*				
65	*Populus balsamifera/Cornus sericea* c.t.	*1*				
66	*Populus tremuloides/Cornus sericea* h.t.	*2*				
70	**MISCELLANEOUS**		**6.52**	**0.49**	**94.13**	**4.31**
71	Roads, Railroads				38.49	1.76
72	Residential and Related		0.16	0.01	12.94	0.59
73	Water				34.08	1.56
74	Gravel Bar				7.23	0.33
75	Rock Outcrop, Scree		6.36	0.48	1.39	0.06
	TOTAL	**104**	**1335.99**	**100.00**	**2185.28**	**100.00**

n = sample size (number of 0.01-acre canopy cover plots)
c.t. = community type
h.t. = habitat type

2.4.1 Community Type Descriptions

Grassland

Upland herbaceous communities or "grasslands" were identified according to two principal categories:

- Native Grassland (736 acres, or 55 percent of the intensive study area) that is completely dominated by native grass (and forb) species, with adventitious occurrences of introduced (exotic) species and relatively minor amounts of woody plants.
- Tame Pasture (68 acres, or 5 percent of the intensive study area) is land that has been seeded with introduced (exotic) species, primarily *Elymus junceus* (Russian wildrye) in the intensive study area. Tame Pasture definitions are explained below.

There were four Native Grassland habitat types and communities identified in three series during the 2013 inventory, comprising 736 acres or 55 percent of total intensive study area acreage. The three Grassland series were dominated or distinguished by *Agropyron spicatum* (78 percent of Grassland acreage), *Festuca idahoensis* (3 percent), or *Festuca campestris* (19 percent). Grassland types accounted for 766 acres or 35 percent of the extensive study area, thus totaling 1500 acres or 43 percent of the entire MLR inventory area.

Tame Pasture

As explained above, upland herbaceous communities ("grasslands") were identified according to two principal categories, Native Grassland and Tame Pasture. The Tame Pasture type is based on considerations of land use (management-related activities), and refers to land that has been seeded or interseeded to introduced forage species of limited diversity that provides special or seasonal use for livestock, often on a more intensively managed basis than that which would occur if the land were native grazing land.

In the MLR extensive study area, tame pasture areas on the Clark Fork floodplain are regularly mowed and baled for hay production for livestock feed. These lowland pastures are predominantly various mixtures of *Bromus inermis, Dactylis glomerata* (orchardgrass) and *Poa compressa* (Canada bluegrass) in drier pastures, and *Schedonorus arundinaceus* (tall fescue)*, Poa pratensis* and *Alopecurus pratensis* (meadow foxtail) in moist pastures. Upland Tame Pasture in the intensive study area comprises areas apparently seeded decades ago but not reseeded since then, and currently dominated by introduced grasses (mostly *Elymus junceus)* but with a fair representation of reestablished native grass (mostly *Poa secunda*). In the MLR intensive study area, Tame Pasture occurred on 68 acres (5 percent of the study area), while Tame Pasture occupied 286 acres or 13 percent of the extensive study area thus totaling 354 acres or 10 percent of the entire MLR inventory area.

Shrubland

There were seven Shrubland habitat types and communities identified in three series, comprising 290 acres or 22 percent of total intensive study area acreage. The five types in the *Artemisia tridentata* series were dominated or distinguished in the understory by *Poa secunda* (13 percent of acreage in the *Artemisia tridentata* series), *Agropyron smithii* (3 percent), *Agropyron spicatum* (33 percent), *Festuca idahoensis* (15 percent), or *Festuca campestris* (36 percent). In the other two series, *Symphoricarpos* *occidentalis/Poa pratensis* comprised 3 percent of Shrubland acreage in the intensive study area, and *Prunus virginiana/Agropyron spicatum* comprised 0.4 percent. Upland Shrubland types accounted for 441 acres or 20 percent of the extensive study area, thus totaling 731 acres or 21 percent of the entire MLR inventory area.

Conifer Forest and Woodland

Five upland Conifer Forest and Woodland habitat types and communities were identified in three series, comprising 236 acres or 18 percent of total intensive study area acreage. The three Conifer series were dominated or distinguished by *Juniperus scopulorum* (24 percent of Conifer acreage), *Pinus ponderosa* (2 percent), or *Pseudotsuga menziesii* (74 percent). Each habitat or community type was named for the characteristic understory union, *i.e., Agropyron spicatum, Festuca campestris* or *Physocarpus malvaceus.* Conifer Forest and Woodland types accounted for about 260 acres or 12 percent of the extensive study area, thus totaling 495 acres or 14 percent of the entire MLR inventory area.

Riparian and Wetland (RW) Vegetation Types

Three primary Riparian and Wetland vegetation types were identified in the MLR inventory area, and classified according to physiognomic type, including Herbaceous, Shrub, and Conifer-Deciduous Forest. Riparian and Wetland (RW) types collectively comprised 340 acres (10 percent) of the inventory area, almost entirely in the extensive study area, with only 0.25 acre (0.02 percent) of RW types located within the intensive study area. These communities are restricted to the Clark Fork floodplain, drainage bottoms and adjacent toeslopes, swales and sidehill seeps, sites which receive supplemental water from snow catchment, overflow, subirrigation or seepage. The following type descriptions are arranged with regard to the stratification of plant physiognomy.

The Herbaceous RW type was comprised of seven mesophytic/hydrophytic habitat and community types representing seven series dominated by various associations of *Poa pratensis, Agrostis stolonifera, Bromus inermis, Typha latifolia, Carex nebrascensis, Carex pellita* and *Carex utriculata.* Due to the mosaic distribution of these often small-scale communities, it would be impractical to map these sites on a species-dominance basis, therefore they are mapped according to physiognomic type (see Plate 1 in Appendix A-4). Herbaceous RW types totaled 143 acres, or 42 percent of total Riparian and Wetland vegetation type acreage, and 4 percent of the inventory area.

Woody RW types totaled 197 acres, or 58 percent of total Riparian and Wetland vegetation type acreage, and 6 percent of the inventory area. The Shrub RW type included two mesophytic/hydrophytic shrub community types in two series dominated by *Symphoricarpos occidentalis,* or codominated by *Salix exigua* and *Cornus sericea.* The Conifer-Deciduous Forest RW type was comprised of three mesophytic series, including the *Juniperus scopulorum/Cornus sericea* habitat type, two *Populus balsamifera* community types, and the *Populus tremuloides/Cornus sericea* habitat type.

2.4.2 Productivity and Utility

The primary land uses in the MLR study area are livestock grazing (rangeland) and hay production (tame pasture). NRCS (2003) presents recommended stocking rates for the applicable soils in Granite County, relative to good-excellent condition (HCPC). Additionally, NRCS (2003) gives long-term irrigated and nonirrigated hay yields by soils mapping unit that can be expected under a high level of management. Information pertinent to the MLR study area is summarized below.

Rangeland

Productivity varies considerably among vegetation types in the study area, depending on current condition and the ecological sites involved. Hypothetical grazing capacity calculated for HCPC (not current condition) rangeland was estimated at 1228 animal unit months (annually) for the inventory area as a whole.

In recent management of the study area, 300 yearling calves are brought each year to the ranch to graze. The yearlings' average weight gain over a five-month grazing season (early May to late September) is 600 pounds. The yearlings are sold when they reach 800 to 900 pounds. Additionally, the ranch has a 160-acre state lease in the southwestern quarter of Section 36. The grazing permit on the state lease allows for 14 head of cattle per month (14 AUM). The ranch inventory area is divided into eight pastures on which the cattle are rotated over the course of a year.

Cropland

Hay is the only crop grown in the inventory area. In the MLR extensive study area, tame pasture areas on the Clark Fork floodplain are regularly mowed and baled for hay production for livestock feed.

Based on compilation of long-term annual production data (NRCS 2003), Tame Pasture in the intensive study area can be expected to produce 27.5 non-irrigated AUM's per acre. The total predicted yield of grass hay in the extensive study area is expected (NRCS 2003) to average 1.0 ton per acre in non-irrigated pastures, and 3.5 tons per acre in irrigated pastures. Grass-legume hay in the extensive study area can be expected to yield 4.3 irrigated tons per acre based on NRCS (2003) productivity guidelines. In recent practice, grass hay and grass-alfalfa hay on the Clark Fork River floodplain is harvested twice a year within the study area, producing 1.5 tons per acre each harvest, thus averaging approximately 3 tons per acre annually.

Timber Productivity

Timbered areas in the inventory area do not generally constitute a commercial timber resource. Much of forest and savannah tree density in the study area is composed of non-commercial Rocky Mountain juniper, or mid-size Douglas-fir and limited ponderosa pine. Merchantable trees are present only as relatively small stands, often associated with steep and very steep terrain.

2.4.3 Species List/MTNHP-Listed Species

A total of 367 vascular plant taxa were identified during the 2013 inventory of the MLR vegetation baseline study area, with forbs (255 species) comprising the majority (69 percent). Forbs included 180 perennial taxa (156 native, 19 introduced and 5 fern allies), and 75 annual/biennial taxa (47 native and 28 introduced). Of 68 grasses and grass-like plants identified (19 percent of the total), there were 62 perennial taxa (49 native and 13 introduced), and 6 annual taxa (3 native and 3 introduced). The 44 woody plant taxa (12 percent of the total) recorded in the study area included 37 shrubs and vines, and 7 tree species.

No federally listed or proposed endangered or threatened plant species are known to occur in the vicinity of the MLR study area, and none were recorded during the 2013 baseline vegetation inventory. A search of the Montana Natural Heritage Program (2013) website for "plant species of concern or SOC" in Granite, Powell and Missoula Counties found 62 plant species of concern, including 20 taxa listed for Granite County, of which five are in common with Missoula and/or Powell County. The remaining 42 plant taxa of concern are listed for Missoula and/or Powell Counties, but are not currently listed for Granite County. None of the SOC taxa listed for Granite County were identified in the MLR study area during the 2013 vegetation inventory, in which 367 vascular plant species were identified.

2.4.4 Weeds

State-listed noxious weeds are given on the "Montana Noxious Weed List, Effective December, 2013" (Montana Department of Agriculture 2014). Ten state-listed weed species (one Priority 2A and nine Priority 2B), and one Priority 3 regulated plant species were encountered on the study area during the 2013 MLR baseline inventory, as detailed in Appendix A-4.

The three most common noxious weeds in the MLR study area, particularly in uplands, were *Centaurea maculosa* (spotted knapweed), *Linaria dalmatica* (Dalmatian toadflax) and *Euphorbia esula* (leafy spurge). On more mesic sites in drainage bottoms and on the Clark Fork floodplain, the most common weed species were *Cirsium arvense* (Canada thistle), *Cynoglossum officinale* (common houndstongue) and, again, *Euphorbia esula*. Two noxious weed species, *Lepidium latifolium* (perennial or broad-leaved pepperweed) and *Tanacetum vulgare* (common tansy), were recorded with minor cover values at limited sites in riparian community types. Three noxious weed species, *Acroptilon repens* (Russian knapweed), *Convolvulus arvensis* (field bindweed) and *Lepidium appelianum* (globe-podded hoarycress or whitetop), were noted as sporadic occurrences in tame pasture and disturbed roadside locations.

Of the three potentially problematic weed species recorded, *Carduus nutans* (musk thistle) was by far the most common, occurring in every vegetation physiognomic type present in the study area.

2.5 WETLANDS AND WATERBODIES

Wetlands and waterbodies were identified and delineated using the routine on-site approach described in the 1987 USACE Wetland Delineation Manual (Environmental Laboratory 1987) and the final Regional Supplement to the Manual: Western Mountains, Valleys and Coast Region (WMVC) (USACE 2010). Wetlands were classified using a combination of hydrogeomorphic classes (Smith et al. 1995, Brinson 1995) and vegetation types (Cowardin et al. 1979). Standard data forms (from the regional supplement) were completed to assess wetland hydrology, hydric soils and hydrophytic vegetation at potentially jurisdictional sites along drainages, floodplains, subirrigated areas, at springs or seeps, and around ponds.

The traditional navigable water (TNW) nearest the Project area is the Clark Fork River about 265 river miles downstream of the Project at the Montana/Idaho border. WUS, as defined in 33 CFR Part 328, encompass all major streams and their tributary streams, ponds and wetlands within the Project area. Wetlands are a regulatory subset of WUS that require additional investigation, delineation and avoidance/mitigation measures to comply with Section 404(b)(1) of the Clean Water Act. Wetlands and waterbodies within the Project area are shown on Plate 1 in Appendix A-5 along with each segment's Cowardin classification (Cowardin *et al.* 1979). Non-wetland stream segments are displayed in a different color on Plate 1 to differentiate them from wetland polygons.

2.5.1 Results by Wetland Component

Wetland Hydrology

Wetland hydrology indicators within the Project area occur primarily within streamside riparian and floodplain zones, on low terraces adjacent to main stream channels, downslope from seeps and springs, and in some swales and depressions. Areas of artificial wetland hydrology occur along irrigation ditches, irrigated agricultural fields and old channels that receive irrigation return flow. Many of the areas exhibiting wetland hydrology are not flooded or saturated year-round but retain water from snowmelt runoff, seasonal stream channel overflow, and/or rainfall events.

Hydric Soils

Hydric soils are typically found along the Clark Fork River floodplain in overflow channels and irrigated fields. Other areas with hydric soils include spring/seep areas in narrow drainages and low terraces along the perennial creek on the east side of the Project area. In most of these locations the soils are finely textured loams. Soil horizons are often difficult to identify due to mixing from cattle trampling when soils are muddy. Redox features are the most common hydric soil indicator, as well as saturated soils often with groundwater within 18 inches of the surface.

Hydrophytic Vegetation

Vegetation community types in the Project area, including wetland and riparian types, are described in the baseline vegetation inventory (Appendix A-4). Herbaceous types are the most prevalent in the Project area with sedge types most common. Nebraska sedge, woolly sedge and southern beaked sedge dominate various sites. Common cattail-dominated wetlands represent the wettest sites but are uncommon. Redtop is common on more disturbed sites. Two herbaceous riparian types dominated by

Kentucky bluegrass and smooth brome do not support a prevalence of hydrophytic vegetation, and are riparian but not wetland on the Clark Fork River floodplain.

Two shrub-dominated types were sampled: the sandbar willow/red-osier dogwood community type supports hydrophytic vegetation while the western snowberry community type is dominated by upland species. Riparian forest types dominated by black cottonwood, Rocky Mountain juniper or quaking aspen typically are non-wetland, although facultative species often dominate.

2.5.2 Results by Drainage

Each wetland and waterbody inventoried and delineated in the field, or identified from aerial photography interpretation and MTNHP mapping, was digitally mapped as presented in Plate 1 of Appendix A-5. Mapped wetlands and waterbodies were assigned unique labels based on the drainage basins in which they occurred, named for streams and tributaries as shown below:

Label (Plate 1)	Drainage	Number of Wetland/ Waterbody Labels
CF	Clark Fork River and floodplain	120 / 7
CFT	Clark Fork tributaries	2 / 4
M	Unnamed Perennial Creek	9 / 2
MD	Unnamed Perennial Creek ditches and seepage areas	9 / -
FCT	Flint Creek tributary	1 / -
T	Tigh Creek	- / 2

The Wetland Baseline Report (Appendix A-5) presents a line item list of selected features for each wetland/waterbody label, including Cowardin code, HGM code, acreage or linear measurement, waters type, lat/long location and local waterway drainage. A summary of wetland and waterbody measurements is given by drainage below. Field forms and digital photographs of inventory sites are also included in Appendix A-5.

WUS Drainage Designation	Wetland Area (Acres)	Non-wetland Pond Area (Acres)	Non-wetland Stream Length (Feet)
CF	148.44	0.79	13, 319
CFT	0.25	---	11, 665
M	17.80	---	15, 230
MD	4.94	---	---
FCT	3.92	---	---
T	---	0.11	10, 210
PROJECT TOTAL	**175.35**	**0.90**	**50,424**

Clark Fork River and Floodplain (CF)

Wetlands on the Clark Fork River floodplain occur on low terraces and within high flow channels. Hydrology is typically provided by spring flows, although flood irrigation and irrigation return water provide longer-term hydrology. Vegetation communities are variable and diverse, ranging from hydric common cattail sites to the high-mesic sandbar willow community type. Riparian forest dominated by black cottonwood is generally non-wetland. A relatively large farmed wetland supported by flood irrigation is also present on the floodplain, although most hay meadows and pastures on the floodplain are non-wetland. Several irrigation ditches are present in support of agricultural activities.

Clark Fork Tributaries (CFT)

Two ephemeral flow drainages tributary to the Clark Fork River support narrow wetlands below seepy areas. Occasional flow in these drainages (which come together within the Project area) is captured in irrigation ditches prior to reaching the river and no defined stream channel connects to the Clark Fork. Both areas were once developed for livestock watering with stock tanks and piping but have not been maintained. Livestock trampling when the sites are wet has mixed soil profiles and created a hummocky surface. Species common to disturbed wet sites are dominant, including redtop, foxtail barley, and Nebraska sedge.

Unnamed Perennial Stream (M)

An unnamed perennial stream crosses the eastern side of the Project area, running generally from southwest to northeast connecting to the Clark Fork River near the east edge of the Project area. Wetlands are intermittent occurring as a narrow fringe, or more extensive on low terraces and slope seepage areas. Nebraska sedge typically dominates these heavily grazed wetland sites, with common cattail sporadically dominant in wetter areas.

Miscellaneous Ditches and Ditch Seepage Areas (MD)

An irrigation diversion from the unnamed drainage discussed above feeds water seasonally to ditches irrigating hay meadows on the Clark Fork River floodplain. These ditches support a narrow fringe of hydrophytic species in some areas. Localized wet areas are present where leakage from the ditch has resulted in seasonal flooding and saturation.

Flint Creek Tributary (FCT)

The Montana Natural Heritage Program delineated a temporarily-flooded palustrine emergent wetland near the south-central margin of the Project area. This broad swale is fed by upslope irrigation water that eventually enters an irrigation ditch at the Project boundary. Irrigation ditches carry water east towards Flint Creek.

Tigh Creek (T)

Tigh Creek is an ephemeral flow drainage in the northwestern portion of the Project area. Flow is present only for short durations during snowmelt and heavy rain events. No defined channel is present connecting to the Clark Fork River where the creek enters the Clark Fork floodplain. Upstream of the floodplain, the drainage channel is intermittently composed of incised channel segments and broad swales, both supporting upland vegetation.

2.6 GEOLOGY

The permit area lies within the Montana Fold and Thrust Belt, along a zone called the Lewis and Clark Line, a lineament that bisects the Montana Thrust Belt, with thrust sheets experiencing different rotational movements north of the line than the thrust sheets to the south. The Lewis and Clark Line is characterized by folded strata, with Mississippian Madison limestones uplifted and exposed at the surface in many areas. The permit area is located on one of these broad anticlines west of Drummond. The limestone pit will be located in the gently dipping limb of an asymmetrical anticline of Paleozoic strata. The folding exposed the Madison Limestone which is dipping 10-25° to the southwest.

The strata found in the permit area range in age from Cambrian to Quaternary. The limestone to be quarried and the overlying strata are primarily Quaternary alluvium and colluvium, Tertiary Renova and Sixmile Creek Formations, Pennsylvanian Quadrant and Amsden Formations, and Mississippian Madison Limestone.

The Quaternary sediments are dominated by modern floodplain alluvium deposits along the Clark Fork River. They contain well-sorted to moderately well-sorted gravels and sands. Older Quaternary alluvium can be found within abandoned river channels and on terraces along the edge of the Clark Fork River basin.

The late Tertiary Sixmile Creek Formation is composed of several units of coarse debris flow, fine sand and silt, and basalt flow. The basal member is coarse gravel which sits unconformably over the early Tertiary Renova Formation. A thin veneer (1-2 feet thick) of the Sixmile Creek Formation can be found over most of the property. The formation can be up to 30 feet thick.

A major Miocene unconformity is marked in the upper Renova Formation by a thin but distinct laterite layer. The normally white to orange stained arkosic sandstone changed to dark red sandy clay. The Cabbage Patch member is the most common member of the Renova Formation on the property and is characterized by white to light grey silt, ash layers, and arkosic sandstone with orange-stained root traces interbedded with thin seams of lignite. The base of the Renova Formation is a distinctive, white rhyolitic tuff with euhedral sanidine and smoky quartz crystals. The formation can be up to 150 feet thick.

Tertiary andesite and basalt flows thought to be associated with the Garnet Volcanics are the oldest Tertiary rocks found on the property. The Cretaceous Kootenai Formation, Jurassic Swift Sandstone, Rierdon Formation, and Sawtooth Formation, and Permian Phosphoria Formation are found on the property, but not within the mining area.

The Pennsylvanian Quadrant Formation is a resistant, light orange to pink, well-sorted, silica-cemented sandstone which forms prominent hogbacks and ridges. It is up to 150 feet thick, occurring on the outer edge on both sides of the anticline.

The Pennsylvanian Amsden Formation is a dark-reddish purple calcareous siltstone, mudstone shale and sandstone. It sits atop the Madison limestone on the lower slopes of the anticline on both sides of the fold. It contains a middle marker bed of gray limestone. It is about 200 feet thick.

The Madison Group is a set of three Mississippian carbonate formations: the McKenzie Canyon, Mission Canyon, and Lodgepole Formations. The resistant carbonate group is a prominent cliff-former in the area.

The McKenzie Canyon Formation is characterized by brecciated limestone and dolomite resulting from cave formation and collapse. Secondary iron-stained calcite fills fractures and voids. While not the target formation, the McKenzie Canyon Formation that needs to be stripped off may have some economic value as neutralizing aggregate. The formation is up to 220 feet thick.

The Mission Canyon Formation is easily divided into an upper dolomite layer and a lower, high-calcium limestone layer. The upper unit is fine-grained, light grey, massive dolomite. Several beds contain nodules and thin, wispy beds of black chert. The upper unit is approximately 170 feet thick. The lower, high-calcium unit is the primary target of the Project and is characterized by dark grey, massively bedded, crystalline limestone. Crinoids and brachiopod fossils are common. It is 220 feet thick.

The Lodgepole Formation underlies the high-calcium limestone. Although it won't be mined, it will have a stockpile located on it. It is a thin-bedded, fine-grained, light grey limestone with thin beds of black chert and yellow-orange shale. When weathered, soluble calcite veins found within the formation weather away, resulting in a distinctive cliff of pillars.

2.7 SOILS

A baseline soils study was conducted to characterize soils in the Project area, identify reclamation limitations of native soils, and develop recommendations for soil salvage. The study area comprises most of the Project area west of the Clark Fork floodplain and includes the areas where mine operations, waste dumps, and material stockpiling are proposed.

Prior to on-site soil investigations, the most current soil survey data from the Natural Resources Conservation Service (NRCS) were reviewed to identify common soil series in the Project area and evaluate their diagnostic characteristics. Soil profiles and soil parameters, including horizon depth, thickness, and dominant physical and chemical characteristics, were sampled at locations deemed representative of the various soil and landscape types in the Project area. Samples were taken of major horizons at each location and submitted for laboratory analysis. The analyses included a standard suite of parameters, as well as concentrations of arsenic, cadmium, copper, lead, and zinc (per MDEQ request). The extent of soils types within the study area was mapped on an aerial photo base and is included as Plate 1 in the soil baseline report (Appendix A-7). Acreages of soil map units are presented in Table 1 of the soil baseline report, field observations are in Table 2, and laboratory analytical data are presented in Tables 3 and 4 (Appendix A-7).

Soils in the study area are typically developed in colluvium and alluvium derived from a variety of parent materials, including Tertiary sedimentary clays along the southern portion of the study area, Tertiary volcanics near the western boundary, and Mesozoic and Paleozoic sedimentary rocks, including Mississippean-age Madison Limestone, in the central portion of the study area. The variable parent materials on the study site result in soils with diverse physical and chemical characteristics.

Soils in the study area vary with respect to their salvage and reclamation potential. Relevant soil properties and salvage/reclamation potential are summarized in Table 2.7-1 and discussed below.

Twenty percent of the study area is covered by the Braziel-Tolbert complex of loams and silt loams. Both soils have predominantly loamy textures and sufficient organic matter content to make them suitable for soil salvage and reclamation. In some areas within this map unit, soil salvage could be impeded by the presence of stone- to boulder-sized coarse fragments.

Martinsdale gravelly loams, Quigley silt loams, and Windham skeletal loams are three soil mapping units that collectively cover 17 percent of the study area and are generally suitable for soil salvage and reclamation. The primary possible limitation for reclamation use of these soils is locally high coarse fragment content and/or shallow bedrock.

Winspect skeletal loams constitute 4 percent of the study area and occur on mostly steep, southwest-facing slopes in the south-central portion of the study area. These soils are derived from sandstones and quartzites, with coarser textures and lower organic matter content than many soils in the study area. Winspect soils are suitable for most reclamation purposes wherever steep slopes do not preclude soil salvage.

Table 2.7-1
Summary Of Soil Map Unit Properties Relevant To Soil Salvage Potential On The MLR Project Soils Baseline Study Area

Map Unit Symbol	Map Unit Name	Percent of Study Area[1]	Dominant Soil Textures	Coarse Fragment (CF) Content	Slope	Soil Depths[2]	Potential Salvage Limitations
BrTo	Braziel-Tolbert loams	20	Loam, Silt loam	Variable	Low to moderate	Variable	Localized high CF
Co	Coben clay loam	6	Silty clay loam, Clay	Low	Low	Deep to very deep	Clay content
Da	Danvers silty clay loam	7	Silty clay loam, Clay	Low	Low to moderate	Deep	Clay content
Lp	Lap gravelly loam	9	Loam, Silt loam	Moderate to high	Low to steep	Shallow	Shallow soils, high CF; localized steep slopes
Ma	Martinsdale gravelly loam	9	Silt loam, Silty clay loam	Low to moderate	Low	Moderately deep to deep	Localized high CF
Qg	Quigley silt loam	3	Loam, Silt loam	Low	Low	Moderately deep	Localized high CF
Sh	Shawmut gravelly loam	12	Silt loam, Silty clay loam, Clay	Moderate to high	Low	Shallow	Shallow soils, high CF
Wc-RO	Whitecow - Rock Outcrop	25	Silty clay loam	Moderate to high	Moderate to steep	Shallow to moderately deep	Steep slopes, rock outcrops; localized high CF
Wd	Windham skeletal loam	5	Silt loam, Clay loam, Clay	Moderate to high	Low	Moderately deep to deep	Localized high CF
Ws	Winspect skeletal loam	4	Loam, Silt loam	Moderate	Low to steep	Moderately deep	Localized steep slopes

[1] Based on soils map in Soils Baseline Study (Plate 1 in Appendix A-7)

[2] Categorized by NRCS soil depth classifications (depth to lithic or paralithic contact):

Shallow = 0-20 in.
Moderately deep = 20-40 in.
Deep = 40-60 in.
Very deep = 60+ in.

Two mapping units, Coben clay loam and Danvers silty clay loam, generally exhibit suitable soil chemical properties for reclamation purposes and have minimal coarse fragment content, but their clayey textures limit their soil salvage and handling potential. These two soil map units total 13 percent of the study area.

Lap gravelly loams and Shawmut gravelly loams collectively cover 21 percent of the study area and have minimal reclamation potential due to steep slopes, high coarse fragment content, and/or shallow depth to bedrock. Lap soils are shallow and are typically found on ridgetops and terraces, often near limestone outcrops; their chemical characteristics are suitable for reclamation but salvage of these soils will be restricted by large and abundant coarse fragments and proximity to outcrops. Shawmut soils formed in colluvium and alluvium on terraces and swales; they are also shallow (typically less than 15 inches) and have high coarse fragment content.

Twenty-five percent of the study area is comprised of the Whitecow-Rock Outcrop complex, including the steep limestone cliffs and outcrops exposed along the west edge of the Clark Fork floodplain, along Tigh Creek, and near the north boundary of the study area. Soils within this complex are predominantly silt loams with a moderate to high percentage of coarse fragments, which along with steep slopes precludes safe and effective soil salvage.

Laboratory analysis of selected metals content found no samples with concentrations in excess of Environmental Protection Agency (EPA) Regional Screening Levels, with the exception of arsenic. Because arsenic in excess of recommended EPA screening levels is common in Montana soils, MDEQ established a statewide action threshold of 40 milligrams per kilogram (mg/kg) for residential areas. Arsenic concentrations in samples from the study area ranged from 3 to 121 mg/kg. Only two samples exceeded MDEQ's 40 mg/kg threshold for residential areas; both were from the C-horizon at two sample locations.

No prime farmlands were identified in the study area, although Danvers, Martinsdale, Quigley, and Winspect soils are classified by NRCS as farmland of statewide importance.

2.8 LAND USE

Lands within the MLR study area were assigned a land use category based on aerial photography interpretation and field investigations. Land use categories are generally based on the USGS primary classifications (cited in Appendix A-8). A summary of existing land use categories within the study area is presented below and mapped on Figure 2 in Appendix A-8.

Summary of Existing Land Uses within the MLR Project Study Area

Land Use Classification	Acres	Percent of Acreage
Grazing Land (Cattle)	2374.4	67.4
Woodland/Grazeable Woodland	692.1	19.6
Irrigated Hay Land	66.3	1.9
Non-Irrigated Hay Land	287.9	8.2
Transportation Corridor	38.5	1.1
Miscellaneous[1]	62.1	1.8
Study Area Total	3521.3	100.0

[1] Residential, water and gravel bar, rock outcrops and scree

2.8.1 Ownership and Jurisdiction

The study area is comprised of private land and a quarter-section of State land in Section 36, T11N, R13W. Lands within Granite County that are used for agricultural, grazing, horticultural or timber production are not subject to the County planning and zoning district regulations. The study area is within the Montana Department of Fish, Wildlife and Parks (MTFWP) Commission District 1 and Administrative Region 2.

Private land, comprised of neighboring ranches, surrounds the study area except for Section 22, T11N, R13W at the northern boundary of the area which is managed by the Bureau of Land Management (BLM). Two residences are located within the study area including one house inhabited by the Ranch Manager and one uninhabited, smaller house, both with outbuildings. Land ownership within the study area is summarized below.

Land Ownership within the MLR Project Study Area

Ownership	Acres	Percent of Acreage
Private	3,361	95.5
State of Montana	160	4.5
Study Area Total	3,521	100.0

2.8.2 Land Use Discussion

The study area has been used for cattle grazing and hay production since the late 1800’s. Limited mining activity occurred in the 1930’s prior to the Great Depression.

Grazing

The majority of the study area is an active cattle ranch. Each year, 300 yearling calves are brought to the ranch to graze from early May until they are sold in late September. The yearlings’ average weight gain over the five-month period is 600 pounds. The yearlings are sold when they reach 800 to 900 pounds. It is estimated that the stocking capacity of the ranch is approximately 1200-1500 total animal unit months (AUM). The ranch has a 160-acre lease on the State quarter-section described previously. The grazing permit on the State lease allows for 14 head of cattle per month (14 AUM). The ranch (study area) is divided into 8 pastures on which the cattle are rotated over the course of a year.

Irrigated Lands

Approximately 150 acres in the northeastern portion of the study area on the Clark Fork River floodplain are irrigated lands. This area is irrigated grass hay which is harvested to feed to cattle. The hay is harvested twice a year, producing 1.5 tons per acre each harvest for a total production of 3 tons per acre each year.

Timber

Conifer Forest and Woodland habitat types and communities were identified in the study area including series dominated by Rocky Mountain juniper, ponderosa pine, or Douglas-fir. The majority of the study area is not suitable for timber harvest. No forestry activities or timber harvesting is known to have occurred within the study area within the last 20 to 40 years.

Recreation and Management Areas

Because the majority of the study area is privately owned, recreational uses of the lands are limited to the family members of the former owners of the ranch. Hunting for big game on a limited basis is the only recreational use cited by the Ranch Manager. The ranch has not participated in MTFWP's Block Management Program. No MTFWP Wildlife Management Areas or U.S. Forest Service lands are located within a six-mile radius of the study area.

Fishing and rafting on the Clark Fork River are popular recreational activities. The Montana Stream Access Law allows anglers, floaters and other recreationists in Montana to have full use of most natural waterways between the high-water marks for fishing and floating, along with swimming and other river or stream-related activities.

2.9 ENERGY

The detailed Energy baseline report is presented in Appendix A-9. This Energy summary provides publically available information on existing electrical, petroleum, and natural gas utilities within a four-mile radius of the center of the study area. The pipeline utilities provided location information for oil and gas transmission lines, but not for smaller gathering or distribution lines. Electrical transmission line information is presented for lines greater than 100 kilovolts (kV) capacity.

2.9.1 Pipelines

Two pipelines are located south of the Project area and one to the east, as shown in Figure 1 of Appendix A-9. One of the pipelines south of the study area is a natural gas pipeline operated and maintained by NorthWestern Energy and the second is the Yellowstone Pipeline, a non-highly volatile liquid* (non-HVL) petroleum pipeline owned by Phillips66 Pipeline LLC. Both pipelines follow an east-west route. A third NorthWestern Energy natural gas pipeline is located east of the Project area, and predominantly parallels MT Highway 1 south from Drummond, Montana to Phillipsburg, Montana.

The Yellowstone Pipeline is an interstate pipeline that transports liquid fuels from Billings, Montana to Spokane, Washington. There are multiple diameters listed for the pipeline in the NPMS database, but none larger than 10 inches. Both NorthWestern Energy pipelines are intrastate natural gas lines; diameters for these pipelines are not listed in the NPMS database. The NorthWestern Energy natural gas line south of the study area is part of a larger transmission network spanning neighboring counties. There are no reported liquid natural gas (LNG) plants or breakout tanks listed for Granite County. Although the locations of smaller gathering and/or distribution lines are not reported in the NPMS database, it is likely there are distribution lines providing natural gas to the residences on the east side of the study area. The product type, owner, and distance of each pipeline from the study area boundary are summarized below.

Pipelines within Four Miles of the MLR Study Area Center

Pipeline Product	Name/Ownership	Distance & Direction from Study Area Boundary[1]
Non-HVL petroleum (gasoline, diesel fuel, Jet A fuel)	Yellowstone Pipeline/ Phillips 66 Pipeline LLC	0.14 miles, South
Natural gas	Unnamed/ NorthWestern Energy	0.39 miles, South
Natural gas	Unnamed/ NorthWestern Energy	<0.1 miles, East

[1]Approximate distance as measured from the study area boundary (see Figure 1 in Appendix A-9).

* Highly volatile liquids (HVL) are gaseous at atmospheric temperature and pressure, but are transported in a liquid state, under pressure. Examples of HVL are liquefied petroleum gases such as propane, butane, and natural gas liquids. Conversely, non-HVL liquids remain in a liquid state under atmospheric temperature and pressure.Non-HVL refers to hundreds of possible liquids from acetic acid to xylene, including gasoline & diesel fuel (American Petroleum Institute 2005).

2.9.2 Electrical Transmission Lines

Four electrical transmission lines with a capacity of 100kV or greater are present within a four-mile center of the study area. NorthWestern Energy owns and operates three of the four: a 100kV line north of the study area and two 161kV lines north and south of the study area. All three of these lines are in service. The study area overlaps approximately one-half mile of the 100kV line. The Bonneville Power Administration operates the fourth, a 230kV transmission line south of the study area. Smaller distribution lines in the range of 25kV to 4160kVa provide service to businesses and residences in the Drummond area. The transmission lines and the distance of each line from the study area are listed below.

Electrical Transmission Lines within Four Miles of the MLR Study Area Center

Transmission Line Capacity	Ownership	Distance & Direction from Study Area Boundary[1]
100 kilovolts	NorthWestern Energy	<0.1 miles, North/Northeast
161 kilovolts	NorthWestern Energy	0.52 miles, North 1.02 miles, South
230 kilovolts	Bonneville Power Administration	1.02 miles, South

[1]Approximate distance as measured from the study area boundary (see Figure 1 in Appendix A-9).

2.10 TRANSPORTATION

The baseline transportation study (Appendix A-10) reviewed all forms of transportation within a four-mile radius of the center of the study area. Road information was collected from various MDT resources. Roadways are described according to their functional classification and assigned highway system. Functional classes are used to define routes by characteristics related to the level of access and mobility they provide (see Appendix A-10). Railroad information for the transportation investigation was obtained from the Montana State Rail Plan and the MRL website and route map. Airport information was acquired from FAA records and from AirNav, LLC, a private enterprise providing airport and navigation information to pilots via the internet.

2.10.1 Roads

Access to the study area is provided by Montana Highway 1 (MT Highway 1) and local roads approximately one mile south of Drummond. The study area is bounded on the north by I-90/U.S. Highway 12, the interstate frontage road, and the railroad. To the east of the study area is MT Highway 1, a remnant portion of the old state highway route, a railroad spur line, and local roads connecting residential property to the highway. A discussion of the railroad lines is provided below. U.S. Highway 12 joins I-90 in Missoula and overlaps with the Interstate until Garrison, Montana, where it heads east. The West Mullan Trail Road borders the study area to the south. It consists of an unpaved county road connecting MT Highway 1 to an I-90 frontage road about 10 miles to the west. To the east of MT Highway 1, the East Mullan Trail Road is paved and terminates at a ranch property near the Clark Fork River.

Within Granite County, I-90/US-12 is comprised of two east bound lanes and two west bound lanes. Drummond has two interstate exits, Exit 153 and Exit 154. The MDT collects traffic count data on road networks within the state. The 2013 annual average daily traffic (AADT) for the section of I-90 within Granite County ranged between 8,710 and 9,430 vehicles per day. Approximately 20 percent of the traffic along I-90 within Granite County was commercial truck traffic.

MT Highway 1 is a two-lane, paved, primary state route connecting Drummond and Opportunity, Montana. A portion of Montana Highway 1 serves as a main route through downtown Drummond before turning south to Phillipsburg, Montana. An average AADT of 1,555 vehicles per day traveled Montana Highway 1 through Drummond in 2013. The AADT for MT Highway 1 between Drummond and Phillipsburg in 2013 ranged between 1,010 and 1,440 vehicles per day.

Within the Project area boundary, there are approximately 18 miles of unpaved roads traversing the property. The roads are a mix of established gravel roads and less-frequented dirt or grass two-track roads. The established gravel roads are primarily located on the east side of the study area.

Functional classes, highway system designations, and length of roads within a four-mile radius of the study area center are summarized below.

Road Networks within Four Miles of the MLR Study Area Center

Highway Functional Classification	Montana Highway System Designation	Road Type	Approximate Length (miles)
Arterial	National Highway System (NHS) Interstate, Primary Highway	I-90/US-12, MT Highway 1	14
Collector	Secondary Highway	Montana Route 271	1
Local	None	City/County Roads, Alleys	48
Other	None	Private driveway	4

2.10.2 Railroads

Two railroad lines are present in the vicinity of the study area. One located to the east, north and west of the study area parallels I-90, and a second spur line located east of the study area follows MT Highway 1. Both rail routes are controlled by Montana Rail Link (MRL), a Class II regional railroad who operates 875 miles of track within Montana.

The railroad north of the study area consists of 119.3 miles of main line track connecting Helena (MP 0.0) and Missoula (MP 119.3). Drummond is one of the fourteen stations along the route at MP 70.7. The speed limit on the main track is between 20 and 45 miles per hour. The northern study area boundary overlaps with approximately 0.75 miles of the railroad.

The rail line east of the study area is a 26-mile long railroad spur line between Drummond and Phillipsburg. The line is currently out of service. As of 2010, there are no plans to reopen the Drummond-Phillipsburg line, but also no plans to formally abandon the track.

2.10.3 Airports

The Drummond public airport is located three miles southwest of Drummond, and approximately two miles south of the study area, on the west side of MT Highway 1.The airport is owned by Granite County and managed locally out of Drummond.Facilities at the airport consist of a grass airstrip measuring 2,400 feet long, a single airport hangar, tie-downs, and a lighted wind indicator.There are no fuel services at the airport or other structures.Airport operations were reported in 2013 to be 175 airplanes, with fifty-seven percent of the traffic comprised of general aviation and forty-three percent comprised of local air traffic.

2.11 NOISE LEVELS

Baseline noise level measurements were conducted for the MLR Project on April 1 and 2, 2014. Ambient daytime and nighttime noise level measurements were completed at six locations (see Figure A of Appendix A-11) to document existing background noise levels. A 24-hour noise level measurement was completed at Location 1. One 20-minute daytime (7 a.m. to 10 p.m.) and one 20-minute nighttime (10 p.m. to 7 a.m.) noise level measurement was completed at each of Locations 2 through 6. Results are summarized in Table 2.11-1; the entire baseline noise level report is presented in Appendix A-11, including methodology.

Noise levels are typically described using A-weighted equivalent noise levels, L_{eq}, during a certain time period. The L_{eq} metric uses a single number, similar to an average, to describe the constantly fluctuating instantaneous ambient noise levels at a receptor location during a period of time. The 90th percentile-exceeded noise level, L_{90}, is a metric that indicates the single noise level that is exceeded during 90 percent of a measurement period, although the actual instantaneous noise levels fluctuate continuously. The L_{max} metric denotes the maximum instantaneous noise level recorded during a measurement period. The day-night average noise level, L_{dn}, is a single number descriptor that represents the constantly varying sound level during a continuous 24-hour period.

Table 2.11-1
Noise Level Measurement Results at Locations 2 through 6, MLR Project Area, 2014

Location	Time	Measured L_{eq}	Measured L_{90}	Calculated L_{dn}	Noise Sources
2	Daytime	27	23	34	Noise sources included traffic on I-90 (faint) and cows mooing.
	Nighttime	30	22		Noise sources included traffic on I-90 (faint), airplane in distance and electrical noise from overhead wires.
3	Daytime	43	37	46	The dominant noise source was traffic on Old Route 1. Other noise sources included birds, I-90 traffic (faint), a back-up alarm and a distant tractor.
	Nighttime	41	37		The dominant noise source was I-90 traffic. Other noise sources included breeze in the tree tops, distant dog barking and a faint buzz from the substation located north of the river.
4	Daytime	59	49	58	The dominant noise sources were I-90 and Front Street traffic, and a heavy truck idling to the east.
	Nighttime	52	27		The dominant noise source was I-90 traffic.
5	Daytime	52	42	56	The dominant noise sources were I-90 and Frontage Road traffic and birds.
	Nighttime	51	32		The dominant noise sources were I-90 traffic and a helicopter.
6	Daytime	62	49	62	The dominant noise source was I-90 traffic. Another noise source was a loader working at the pole yard.
	Nighttime	56	29		The dominant noise source was I-90 traffic. Other noise sources included an idling car in driveway and a train horn in the distance.

Location 1 – Drummond Community Church

The 24-hour Measurement Location 1 was located along the west fence at the Drummond Community Church along Route 1, less than a mile southwest of downtown Drummond. The dominant L_{max} noise sources included vehicles on Route 1, train horns, helicopters and birds. The L_{eq} ranged from 35 to 50 dBA and L_{90} ranged from 26 to 39 dBA. Based on the measured noise levels, the L_{dn} at Location 1 is 52 dBA. The results indicated typical noise levels for sparsely-populated rural areas, as depicted in Graph 1 in Appendix A-11.

Location 2 – Mullan Road

Measurement Location 2 was approximately 1.8 miles south of the project site adjacent to the Project's southern property line along Mullan Road, a possible site access and haul road. The measured noise levels are listed in Table 2.11-1 and were typical for rural areas.

Location 3 – Drummond City Park

Measurement Location 3 was approximately 0.5 miles southwest of downtown Drummond along Old Route 1. The measured noise levels are listed in Table 2.11-1 and were typical for sparsely-populated rural areas.

Location 4 – East End of Drummond – Front Street

Measurement Location 4 was at the east end of Drummond, adjacent to Front Street at the mobile home lot prior to the I-90 on-ramp. Front Street is a potential haul route for the project trucks. The measured noise levels are listed in Table 2.11-1 and were typical for suburban, not rural, areas.

Location 5 – Campground/I-90 Frontage Road

Measurement Location 5 was approximately 2.5 miles northwest of Drummond, north of I-90 along the Frontage Road at the Project's northern property line. Scattered rural residences and a campground are located adjacent to the Frontage Road. The measured noise levels are listed in Table 2.11-1 and were typical for suburban, not rural, areas.

Location 6 – North of Pole Yard

Measurement Location 6 was approximately 0.5 miles southeast of Drummond, and north of I-90 and the Frontage Road. Scattered rural residences are located adjacent to the Frontage Road, and Location 6 is north of the east end of the pole facility south of I-90, which is a potential location for project rail load out facilities. The measured noise levels were typical for suburban, not rural, areas (Table 2.11-1).

2.12 SOCIOECONOMICS

This summary is extracted from the baseline socioeconomics report presented in Appendix A-12. Drummond and Granite County are identified as the region of influence (ROI) for socioeconomic resources including population, employment and income, housing, schools, and government and community services. Today, Drummond, Hall, and Phillipsburg are the only urban centers in Granite County. Phillipsburg is the county seat of Granite County. Granite County occupies approximately 1,733 square miles and has a population of about 3,079. The population of Drummond is 309.

Today, ranching, as well as some mining and forest industries, supports the economy of the ROI. Manganese, silver, lead, and zinc are mined and milled near Phillipsburg. Three stud mills, one at Hall and two at Drummond, harvest and process lodgepole pine, Douglas-fir, and ponderosa pine for the commercial market. Three post-and-pole operations, one at Phillipsburg and two at Drummond, process lodgepole pine for posts, poles, and grape-stakes.

2.12.1 Population Characteristics

The Drummond median household income in 2012 was 42 percent of the United States median and 49 percent of the overall Montana value. Granite County median household income in 2012 was 76 percent of the United State median and 86 percent of the overall Montana value. With 32.7 percent of its population below the poverty level, Drummond has higher rates of poverty than Granite County (13.6), Montana (14.8) and the United States (14.9). Income characteristics for the ROI are summarized below.

Income Characteristics for Drummond, Granite County, State of Montana and the United States, 2012

2012 Income Data	Drummond	Granite County	Montana	U.S.
Median household income, 2008-2012	$22,200	$40,511	$45,456	$53,046
Household income as percent of Montana	49	89	100	---
Household income as percent of U.S.	42	76	86	100
Per capita annual income, 2008-2012 (2012 dollars)	$17,146	$26,018	$25,002	$28,051
Per capita annual income as percent of Montana	69	104	100	---
Per capita annual income as percent of U.S.	61	93	89	100
Persons below poverty level (percent) 2008-2012	32.7	13.6	14.8	14.9

2.12.2 Economic Characteristics

Granite County comprises 2,632 people 16 years of age and over, 1,389 of which are employed in the civilian sector. As of December, 2013, the unemployment rate in Granite County was 9.6 percent, ranking 51 out of 56 counties in Montana, in order of low to high. Raising livestock, growing forage crops and hardy varieties of small grains, and producing timber are the principal industries in the Drummond and greater Granite County Area. Mining of precious metals is also of importance. The main categories of jobs in Granite County are summarized below.

Categories of Primary Employment in Granite County

Primary Work Categories	Number Employed	Percent of Total
Agriculture and Forestry	204	14.7
Mining, Quarrying, and Oil & Gas Extraction	56	4.0
Construction	150	10.8
Manufacturing	72	5.2
Wholesale Trade	37	2.7
Retail Trade	116	8.4
Transportation, Warehousing, and Utilities	45	3.2
Information	42	3.0
Finance, Insurance, Real Estate, and Rental Leasing	40	2.9
Professional, Scientific, Management, Administrative, and Waste Management Services	60	4.3
Educational Services, Health Care and Social Assistance	315	22.7
Arts, Entertainment, Recreation, and Accommodation and Food Services	173	12.5
Other Services, Except Public	34	2.4
Public Administration	45	3.2
Total	1389	100.0

2.12.3 Housing

The average house cost for a single family, owner- occupied house in 2008-2012 was $183,600. Granite County has a total of 2,822 housing units of which about 50 percent are occupied. The town of Drummond has a total of 911 housing units of which about 60 percent are occupied.

2.12.4 Schools

The four schools in Granite County are all public schools, as summarized below.

Schools in Granite County

School	Public	Private	Grades	Number of Students Attending
Drummond High School	X		9^{th} -12^{th}	N/A
Drummond Elementary	X		Kindergarten – 8^{th}	N/A
Hall Elementary	X		Kindergarten – 8^{th}	N/A
Granite High School	X		Kindergarten – 12^{th}	N/A

2.12.5 Health Care

The ROI is served by the Margo Bowers Community Clinic in Drummond, the Granite County Medical Center located in Phillipsburg, and St. Patrick Hospital located in Missoula. Missoula is approximately 49 miles west of Drummond, a 45-minute drive on Interstate-90.

2.12.6 Government And Community

The town of Drummond is governed by one mayor and four town council members each of whom directs parks, sewer, public works and roads, and flood plains. Granite County is governed by three Commissioners. Granite County has five law enforcement personnel including the sheriff and under-sheriff.

2.13 CULTURAL RESOURCES

In accordance with State and Federal guidelines relating to the identification and protection of cultural resources, MLR sponsored the completion of a full cultural resources inventory of the project area (refer to Appendix A-13) as part of the permit development process. The boundaries of this inventory correspond to the full permit area, including the mine/mill site itself and all designated access corridors. This inventory was designed to evaluate the impacts any ground-disturbing activities in the permit area may pose to historic or prehistoric cultural properties. This inventory was completed under contract by Renewable Technologies, Inc. (RTI) a Montana-based cultural resources consulting firm.

2.13.1 Methodology and Fieldwork

RTI began its study project by initiating a records search with the Montana State Historic Preservation Office (SHPO), to determine whether any previous cultural investigations had been conducted within the permit area, and whether any historic or archeological sites had previously been located in the area. The records search identified several previous cultural research studies in the vicinity, but only one which included lands in the MLR permit area: a 2004 study of a proposed (but never built) airport site in Sections 1 and 2, Township 10 North, Range 13 West. This location is outside the MLR mine site, but is traversed by the proposed natural gas line corridor.

In addition to the above report, the records search identified a total of five historic and prehistoric sites located in proximity to the permit area. One of these previously-recorded sites intersects a portion of the permit area, and is briefly discussed below under “Inventory Results”.

This records search was followed by the completion of a Class III cultural inventory of the entire permit area, including archaeological investigations designed to identify cultural resources exposed on the ground surface or in natural or man-made subsurface exposures. RTI professional staff completed the inventory in two extended field sessions, the first completed in October 2013 and the second in October 2014 (see Appendix A-13). The entire permit area was surveyed using parallel pedestrian transects spaced no more than 30 meters apart. In areas of poor ground surface exposure, particular attention was given to areas where mineral soil is open and exposed. Rodent burrows, livestock trails, roads, and cutbanks were closely inspected, since they can often provide unobscured exposures in localized areas. No subsurface investigations were undertaken as part of this inventory. Weather and ground visibility were generally favorable for all field inventory sessions.

2.13.2 Inventory Results

The RTI pedestrian inventory confirmed the existence and status of one previously recorded historic site within the permit area, and identified the locations of two additional sites, one prehistoric in origin and one historic. These three sites are briefly described below:

Site 24GN1031 is the former Malone Homestead, located along the permit gas line corridor in Section 2, T10N, R13W. This site consists of an abandoned 1910s-era farm complex, including two small wooden houses and the ruins of several other former buildings and structures. This site was recorded by Patrick Renne in 2004 and determined not to be eligible for the National Register of Historic Places. RTI revisited the site in 2014 and confirmed that it was largely unchanged from 2004. The planned MLR gas line installation will avoid the standing structures remaining at the site.

Site 24GN1173 is a small, dispersed prehistoric lithic scatter, located on a prominent ridge in the southern half of the mine/mill area. A total of eleven lithics were noted at the site, though they were not sufficiently formed to provide significant diagnostic information. Due to the relatively small number of lithics observed, their limited diagnostic potential, and the ubiquity of the site type, the site was determined not to be eligible for the National Register of Historic Places.

Site 24GN1174 is a former historic farmstead, located near the center of the mine/mill area. The location was apparently developed in the 1910s and occupied through the 1940s. All of the major buildings at the site have been removed in the years since, and today the location retains only two small outbuilding structures, along with the foundations of three other buildings and the scattered implement parts and other debris. Because of the lack of historic integrity caused by the removal of the major buildings at the site, this resource was also determined to be ineligible for the National Register of Historic Places.

Following the completion of fieldwork, RTI prepared Montana cultural site forms for the newly identified resources, and submitted them to the SHPO along with a full project report.

2.13.3 Conclusion

Since the cultural resources located within the permit area were determined not to be independently eligible for the National Register, MLR need not consider potential impacts to these sites that may be caused by its proposed undertaking. With the completion of the Class III inventory of the permit area, MRL may proceed with its undertaking without further cultural resource study in the area, and without mitigative action.

3.0 MINE PLAN

3.1 OVERVIEW

3.1.1 Facilities

The facilities at the MLR project will consist of:

- An open pit mine from which 7,000 tons of limestone per week will be extracted. The extraction process consists of drilling and blasting along benches and the loading of the blasted rock with a wheel loader into 40-ton capacity mine haul trucks
- A crushing and screening plant to reduce the size of the blasted rock to a desired size range for the processing operation
- The pyro processing of the limestone in a preheater rotary kiln to produce calcium oxide (lime)
- Storage bins and tractor-trailer loading and shipping facilities to transport the lime

These unit processes are discussed in detail in the subsequent sections of this permit application. A Mine Plan Map is presented as Exhibit 3-1.

Limestone (calcium carbonate) will be extracted and processed to produce lime (calcium oxide). The principal use of the lime that this facility will produce is for: 1) pH control of the water in flotation cells of the Montana Resources concentrator and potentially for other ore processing plants; and 2) in the neutralization of acidic mine water of the Montana Resources Butte operation and potentially other mines.

3.1.2 Permit Boundary

The permit boundary for the MLR Project is located primarily within properties owned by WLR. The main entrance to the site is located 1 mile south of Drummond, Montana on State Highway 1. The main access road crosses a small private tract at Highway 1, a State of Montana parcel, and WLR property before entering the mine site (Exhibit 3-1).

The permit boundary encloses an area of 546 acres. The boundary closely follows the hydraulic crest on the western side, and the 4380-foot elevation and watershed on the east. The north and south sides of the boundary are as near to the deposit as possible while allowing control of runoff and watershed.

3.1.3 Disturbances and Acreage

Minimizing the footprint and environmental impact of construction and mining activities has been one of the important priorities incorporated into the design of the MLR Project. Design considerations to minimize project impacts include:

- Maintaining a small footprint
- Avoiding the Clark Fork River floodplain
- Avoiding disturbances in wetlands
- Planning for ongoing pit backfill as mining progress
- Scheduling concurrent reclamation where possible

- Siting off-loading facilities for solid fuels away from Drummond

Total acreage within the permit boundary is approximately 546 acres (Table 3.1-1); ultimately, approximately 200 acres will be disturbed (Table 3.1-2 and Exhibit 3-2).

Table 3.1-1
Total Operating Permit Acreage

Area	Permit (acres)
Mine & Plant	505.8
Access Road	40.6
Total	**546.3**

Construction will begin once the project is permitted. Pre-mining civil construction (plant site, roads) will occur prior to the commencement of mining. At the end of Year 1 of actual mining activity, 104 acres will have been disturbed within the permit area. Cut and fill slopes for the access road will be reclaimed immediately, and it is anticipated these will be fully revegetated by Year 5. Backfilling and reclamation of the pit is planned to occur as feasible as mining progresses, but the disturbance shown in Table 3.1-2 only reflects credit for access road reclamation. Exhibits 3-3 and 3-4 show Mining Disturbance at End of Year 1 and Year 5, respectively.

Table 3.1-2
Anticipated Disturbed Acres Over the Project Life

Area	Civil Work Plant Site and Roads	Mine EOY			Comments
		Year 1 (acres)	Year 5 (acres)	Year 50 (acres)	
Access Road	25.3	25.3	15.6	15.6	Access Road cuts & fills reclaimed by EOY 5 (9.7 acres)
Haul Roads	8.0	11.0	11.0	13.2	
Plant Site	24.4	24.4	24.4	24.4	
Pit	0	10.2	15.1	83.0	Does not show progressive backfilling/reclamation of pit
Main Waste Dump	1.7	1.7	4.4	16.8	
Soil Stockpiles	8.6	20.8	12.3	0	Access Road cuts & fills and associated topsoil stockpiles reclaimed EOY 5 (8.5 acres)
Rejects Pile	0	4.6	7.5	14.6	
N & S Sediment Pond Embankments	0.9	0.9	0.9	0.9	
Miscellaneous	5.5	5.5	5.5	5.5	
Total	**74.4**	**104.4**	**96.7**	**174.0**	

3.1.4 Employment

This project is expected to provide full-time employment of 4 salaried and 26 hourly persons for a total of 30 persons to mine and process the limestone rock into lime. Additionally, this project will result in employment by contractors for certain functions such as:

- Transporting the lime produced to the mine and concentrator at Butte and other locations;
- Delivering solid fuels to the plant, which will be used to fire the rotary kiln to produce lime.

This facility will operate 24 hours a day, 365 days a year. The open pit mine section will require 4 persons to extract and primary crush the rock on a schedule of 4 shifts per week. The shifts will be 8 hours and occur during daytime. Additionally, drilling, blasting, and maintenance activity will take place 1 shift each week with the same 4 persons. The number of shifts required to drill and blast may be increased when effective operational drilling rates and the blast hole pattern is established.

The lime plant section of this facility will operate 24 hours a day, 365 days a year. During the day shift Monday through Friday, 10 persons will be employed to manage, operate, and maintain the limestone crushing and lime production and shipping systems. During the evening and night shifts, and all three shifts on weekends, 4 persons per shift will operate the lime production systems, which requires a total of 16 persons.

Production at the lime plant will be interrupted periodically for maintenance reasons. It is anticipated that there will be one or two periods a year that production will stop for a cumulative total of 10 to 15 days to replace worn-out refractory linings in the rotary kiln, the preheater, and the lime cooler and to repair machinery and electrical systems. During such periods of interruption, operating personnel will be employed in maintenance activities.

Operation of lime plants and their related sources of limestone (open pit mines or “quarries”), require flexibility in assigning persons to the work, and considerable cross-training of employees to perform the many and varied tasks at the plant and mine. Training of employees is an ongoing activity to enhance safety, increase skills, permit advancement and maintain high operating rates of the equipment. This lime plant will be a highly automated, computer-controlled plant with a central control room.

3.2 MINING

3.2.1 Mining Operations and Schedule

3.2.1.1 Introduction

The MLR deposit consists of a high calcium limestone ore seam that ranges from 100 to 150 feet thick. This seam strikes to the northwest and dips to the southwest. Dips vary from 19 to 34 degrees and the seam extends below lower quality limestone and dolomite beds.

Mining at MLR will follow traditional open pit and quarrying methods. Both ore and waste will be mined with 20-foot benches and all mined material will be drilled and blasted with roughly 14x14-foot blast patterns. The blasted material will be excavated with an 8.5 cu. yd. loader, and loaded onto a 40-ton haul truck. High calcium limestone will be sorted and sent to the primary crusher, while all overburden and unsuitable limestone will be sent to waste dumps. Early mine phases will require waste to be dumped outside of the pit boundary; however, once the early phases are finished, MLR will backfill the finished phases with the remaining mine waste from the rest of the phases as operationally feasible.

Plant site progress is shown for End-of-Year 1 in Exhibit 3-3 and End-of-Year 5 in Exhibit 3-4.

3.2.1.2 Mine Phases

MLR mining will be sequenced into phases so the waste haulage will be spread over the life of the mine. The ultimate MLR pit shell is presented in Figure 3.2-1. The first two phases will begin mining the northernmost exposed boundary of the limestone seam (Figures 3.2-2 and 3.2-3). All waste from these phases will be stored in one main waste dump, which lies west of the first two phases (Figure 3.2-3). Remaining wastes will be dumped as operations allow into the previously finished phases (Figures 3.2-4–3.2-7).

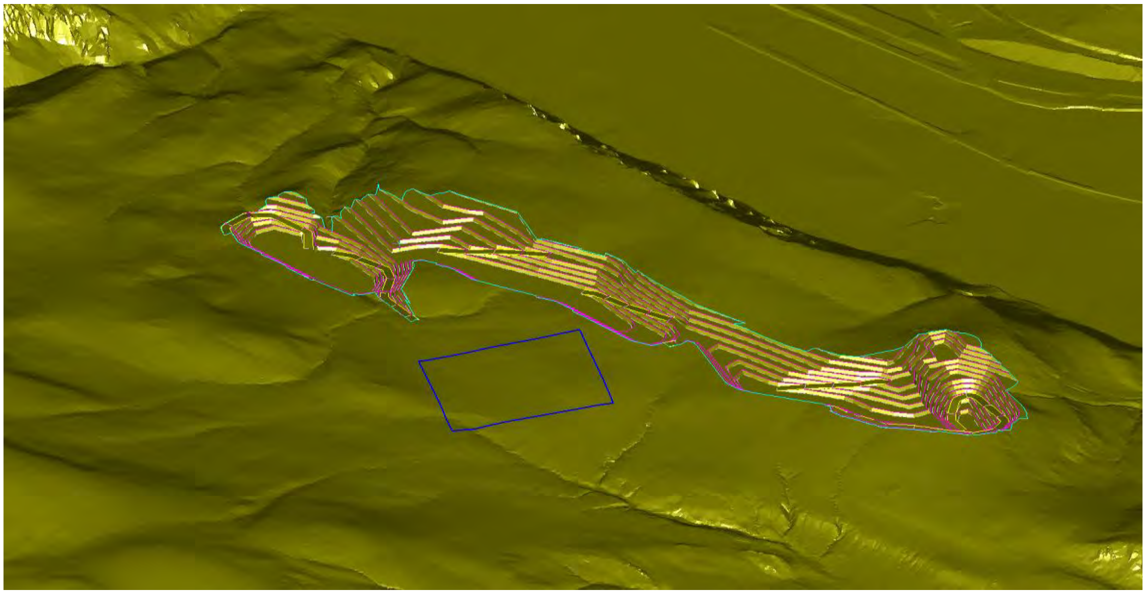


Figure 3.2-1 Ultimate MLR Pit Shell

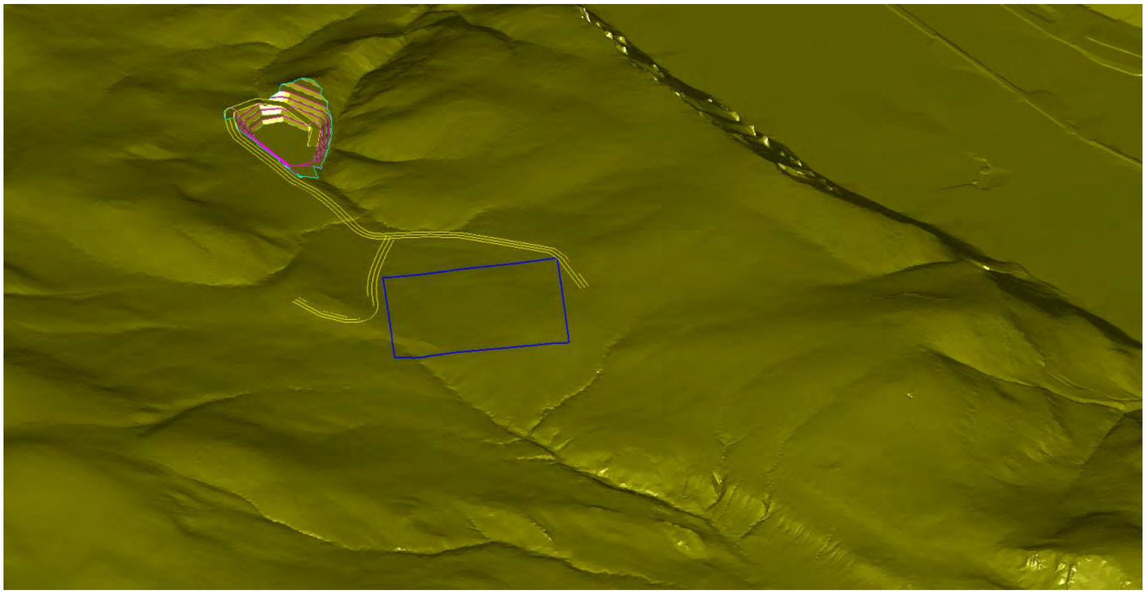


Figure 3.2-2 MLR Phase 1 with Plant Site (blue)

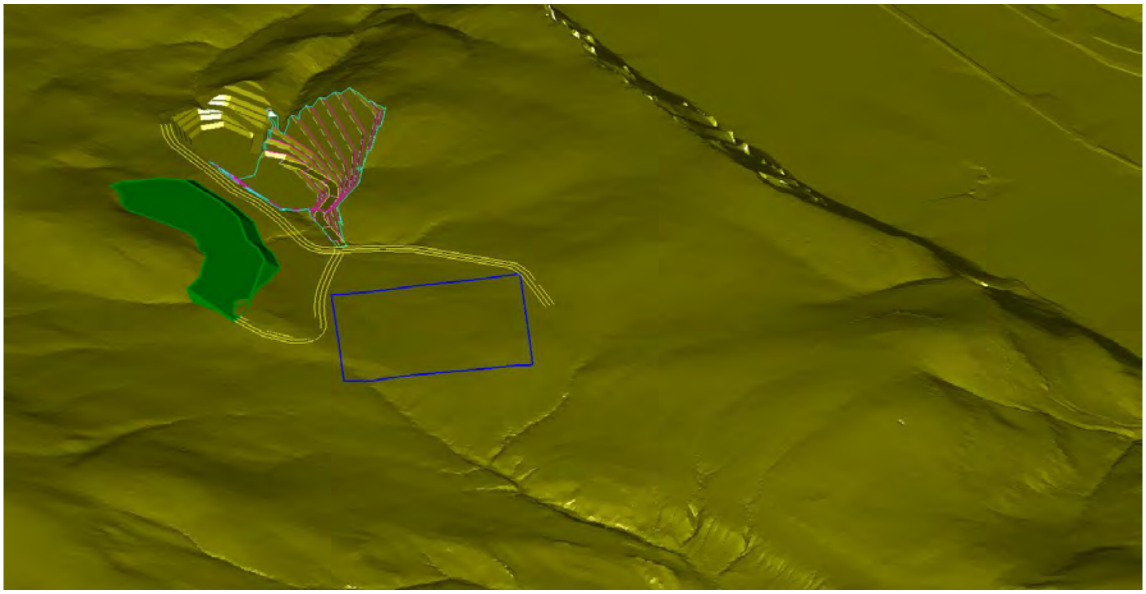


Figure 3.2-3 MLR Phase 2 with Main Waste Dump (green) and Plant Site (blue)

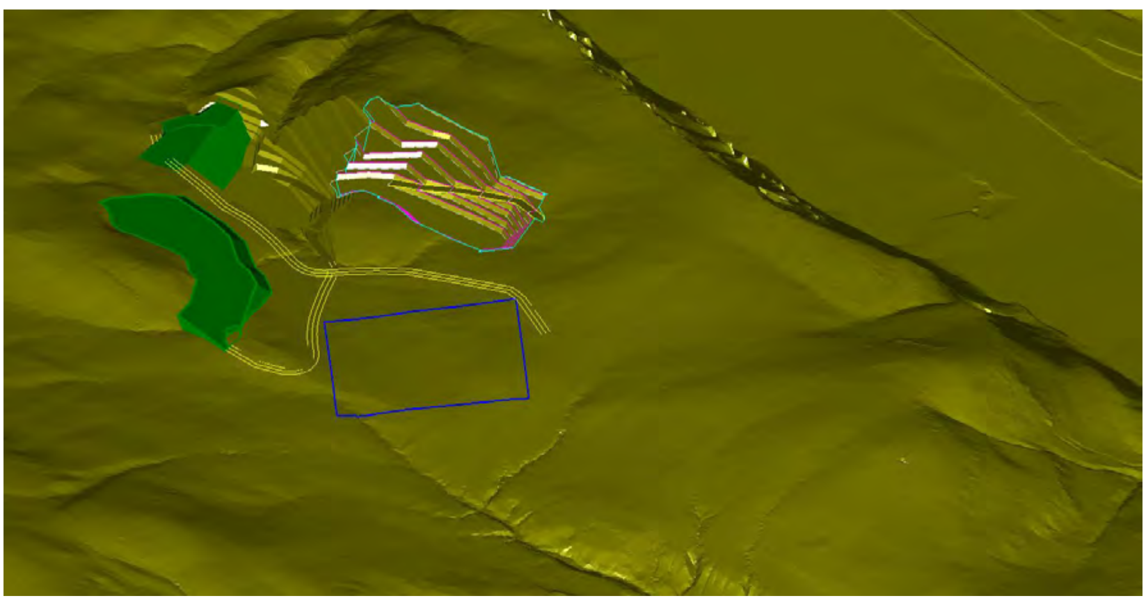


Figure 3.2-4 MLR Phase 3 with Waste Dumps (green) and Plant Site (blue)

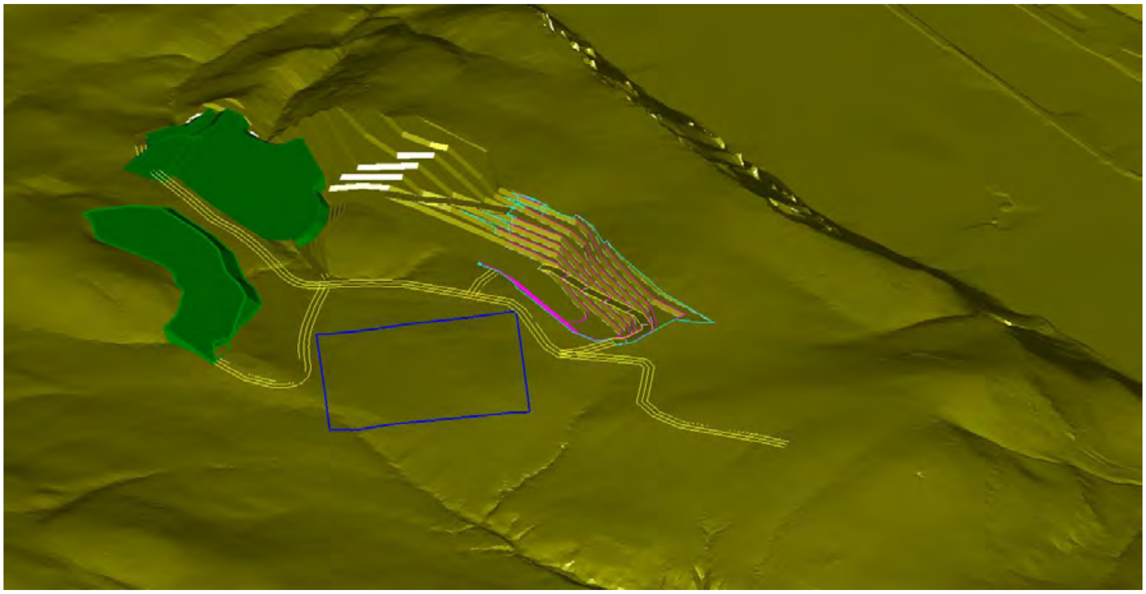


Figure 3.2-5 MLR Phase 4 with Waste Dumps (green) and Plant Site (blue)

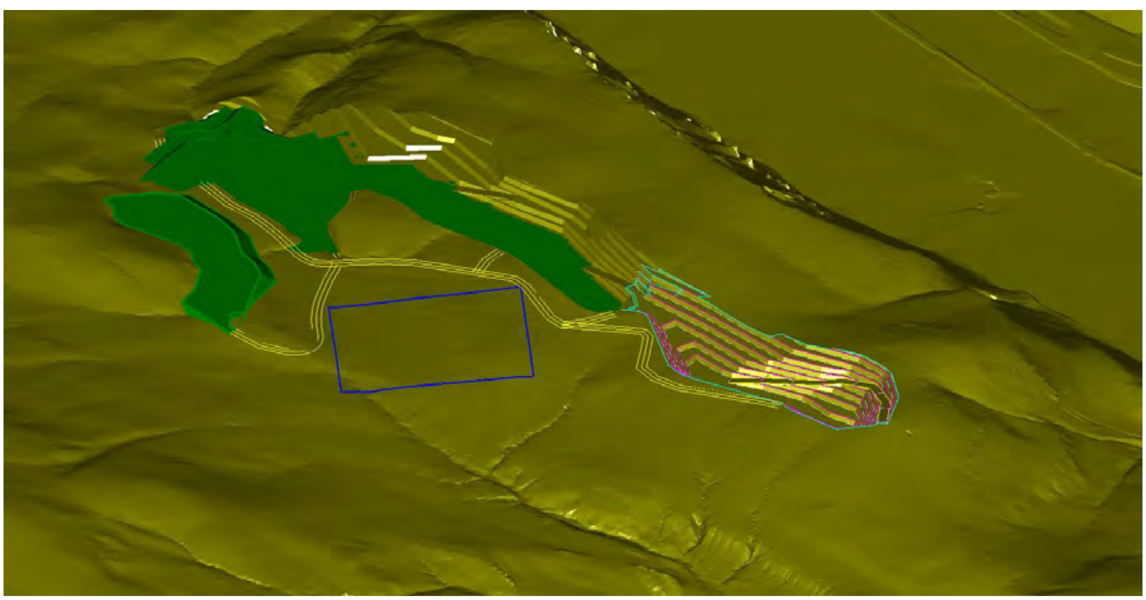


Figure 3.2-6 MLR Phase 5 with Waste Dumps (green) and Plant Site (blue)

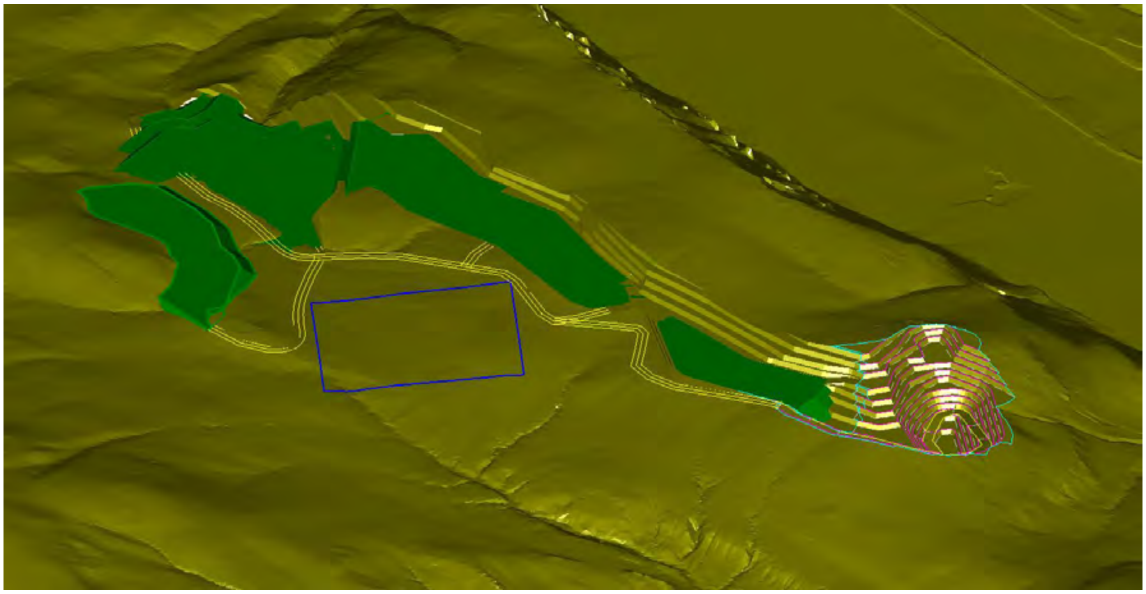


Figure 3.2-7 MLR Phase 6 with Waste Dumps (green) and Plant Site (blue)

3.2.1.3 Mine Schedule

Mine production will occur 5 days a week with a single crew working 8 hours each day. Mine ore production will be set to meet the needs of the plant. Currently this is projected at around 7,000 tons per week for a 350-ton per day lime output. Ore will be delivered directly to the primary crusher with 40-ton trucks, and the primary will be capable of over-supplying the nominal plant capacity and feed into a 10,000-ton coarse ore stockpile. Once the ore stockpile has been filled for the week, the remaining shift hours will be scheduled to move waste and plant rejects.

During the first few years of production, waste rock stripping should remain relatively low with a waste-to-ore strip ratio of around 0.15. However, as the phases progress to the southeast, the strip ratio will reach 0.55, and total daily mine production will top out at 2,100 tons per mine day.

The projected first through fifth year mine progress is illustrated in Figures 3.2-8 and 3.2-9.

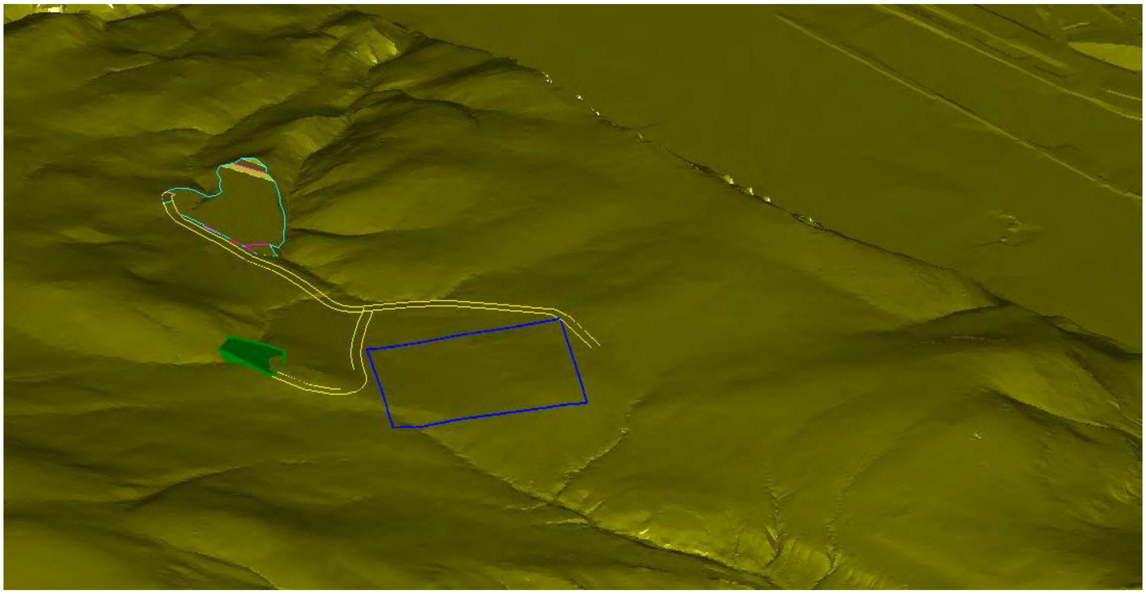


Figure 3.2-8 1 Year Mine Projection

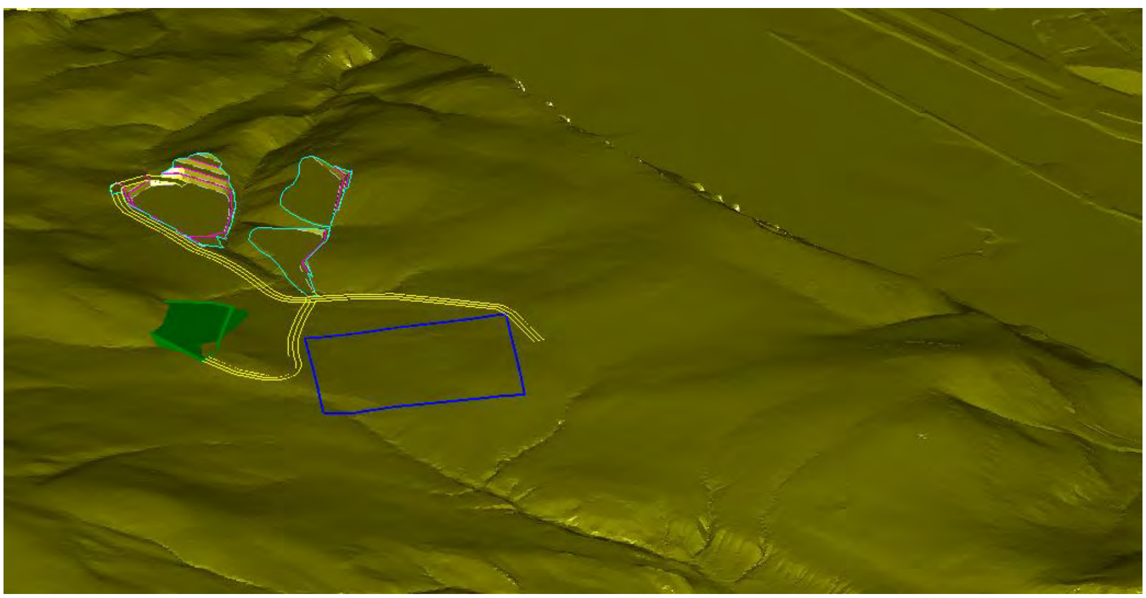


Figure 3.2-9 5 Year Mine Projection

3.2.2 Project Equipment

The following equipment will be installed and operated on the Project:

- Mining Equipment consisting of:
  - One 8.5 cu. yd. wheel loader
  - Three 40-ton mine haul trucks
  - One DTH track-mounted blasthole drill (60,000 lbs GVW) for blasting
  - One track dozer for maintaining dumps and prep work

- One motorgrader for road maintenance
- One water truck

- A crushing plant to reduce the size of the limestone to a range that is suitable for processing
- A rotary lime kiln with preheater to process the limestone (calcium carbonate) into lime (calcium oxide)
- Conveying systems to transfer the raw materials and lime
- Storage and shipping facilities to dispatch the product to customers

Chemicals used in the process will consist of:

- Explosives to allow extraction of the limestone
- Antifreeze to protect the cooling systems of internal combustion engines from freezing
- Antifreeze to protect the closed circuit bearing cooling system from freezing
- Dust suppression additives to the water sprayed on roads for dust control
- Fuels (natural gas, coal and petroleum coke) to fire the rotary kiln to produce lime from limestone
- Fuels (diesel fuel and gasoline) to power internal combustion engines of plant mobile equipment

Explosives will be stored in a small locked building designed to NFPA and MSHA requirements.

Solid fuels will be stored in a shed-type building to protect them from rain and snow. Natural gas will not be stored on site.

All other chemicals will be stored in containers; in the case of transportation fuels, the containers will be set in concrete containment vaults or stored in dual-wall, fire-resistant, environmentally-approved containment tanks.

3.2.3 Ore Characterization and Volume

MLR will mine the high quality limestone found in the gently dipping limb of an asymmetrical anticline. Specifics about the geology of the deposit are discussed in Section 2.6. The quarried limestone has many uses as an aggregate and is an important component of capping recipes for the neutralization of Acid Mine Drainage in metal mine remediation. Quick lime is used in many industrial applications including sulfur dioxide scrubbers in coal burning power plants, as an additive in pulp paper making, as a cleansing agent in the sugar making process, and as important reagent in milling and concentrating of copper ores.

ICP analysis was performed on samples to determine the trace metal content of the ore. The limestone ore is very pure and no anomalous trace metal values were detected.

3.2.4 Blasting Plan

Blasting of overburden and ore will be performed by conventional drill/load/blast procedures utilizing ANFO and non-electric initiation. Ore and waste shots will be scheduled biweekly, or as needed to sustain ore and waste production. Table 3.2-1 details blasting parameters for the project. A nominal

60,000 lb. (GVW) Down The Hole (DTH), track-mounted blasthole drill will be utilized to complete patterns incorporating holes up to 6¾ inches in diameter.

Unit operations for blasting will be contracted to a qualified service company. A 50-ton capacity, Ammonium Nitrate (AN) bin will be situated south of the plant along with two Type II Magazines for product storage. Permits for onsite storage of explosives will be the responsibility of the contractor. In lieu of accessory storage on site, the contractor may opt to transport detonators and delays to the project site for production blasting on a shot-by-shot basis.

A typical accessory inventory will include the following initiation products or equivalents:

1. 500-Foot Starters (Lead-in-Line) / 8 per case (1 case)
2. 350-gram Cast Boosters / 49 per case (9 cases)
3. 30-Foot EZTL (Surface Delays) / 60 per case (7 cases)
4. 30-Foot MS Nonel (Downhole Delays) / 150 per case (3 cases)

All explosive products on site will be owned and controlled by the contractor until detonated in a production blast. A bulk AN and Fuel Oil (ANFO) truck will be utilized to transport unsensitized blasting agents to an active bench in the mine and load nominal 40- to 50-hole patterns with ANFO. Production blasts will be timed to avoid disruption to the operation.

3.2.5 Waste Rock Management

3.2.5.1 Waste Rock Characterization

The limestone deposit has no overburden for a significant percentage of the area. Where overburden is evident, it is shallow and principally consists of sediments.

Core drilling has established two or three strata, not exceeding 10 feet in thickness, of lower grade rock in the 200-foot thick limestone bed. This lower grade material will either be blended with high grade limestone and processed into lime, or transferred to the waste rock piles shown on the MLR Mine Plot Plan, Exhibit 3-1.

Waste rock will include limestone, dolomite, chert, calcite, and minor siltstone and claystone. All waste rock material will be non-acid generating material, much of which could be sold as aggregate for use by other industries. The limestone and dolomite waste rock could be used for environmental remediation in hard rock mining and other types of industrial remediation and reclamation. The oversized limestone and waste carbonates could be sized and sold as riprap for use in stream remediation and slope stabilization. Waste rock that has no other commercial use will be used to backfill the previously quarried pit.

ICP analysis was performed on samples to determine the trace metals content of the waste rock. No anomalous trace metal values were detected.

Part of the processing of the limestone rock extracted from the deposit consists of crushing and screening. The fraction of rock produced by the crushing process that is less than 3/8-inch in size is not suitable for producing lime because it causes plugging of the preheater. Therefore, this fraction, which is anticipated to be 2,000 tons per week, will be segregated by screening and transported by truck to the waste rock piles shown on the MLR Mine Plot Plan, Exhibit 3-1. Some may be sold as a valuable product in construction and road building and for fill, chicken feed, or other uses.

In the processing of limestone in the rotary kiln and preheater, some dust will be produced. This dust, which is anticipated to be 70 tons per day, will be captured in a fabric filter ("baghouse") and conveyed to a bin. The bin will be emptied daily into trucks and disposed of in the waste rock piles.

Table 3.2-1
Blasting Parameters

MONTANA LIMESTONE RESOURCES BLASTING

PARAMETERS	**ORE**	**WASTE**
Rock Type	**Limestone**	**Dolomite**
SPG	**2.67**	**2.67**
	ANFO	**ANFO**
Bench Data		
Bench Height (ft)	20	20
Burden (ft)	14	14
Spacing (ft)	14	14
Tons / Hole	388	388
Hole Data		
Hole Depth (ft)	24	24
Sub Drill (ft)	4	4
Stemming (ft)	11	11
Column Height (ft)	13	13
Hole Size (in)	6.50	6.50
Powder Data		
Blend	ANFO	ANFO
Density	0.83	0.83
Lbs / Foot	11.94	11.94
Lbs / Hole	155	155
Powder Factor / Ton	0.400	0.400
Powder Factor / Foot Loaded	0.616	0.616
Drill Data		
Drill Penetration (ft/hr)	90.0	80.0
Drilling Time / Shift	5.5	5.5
Feet / Shift	495	440
Holes / Shift	20	18
Nominal Tons / Shift	7753	6978
Nominal Shots	Bi-weekly	Bi-weekly
Holes / Pattern	40-50	40-50
Shot Timing (Delays)		
Burden (ms)	17	17
Spacing (ms)	42	42
Down Hole (ms)	350	350
Perimeter Holes (ms)	400	400
Max Lbs / 8 ms Delay	310	310

3.2.5.2 Waste Rock Volume and Storage

The total waste rock and dust volume is expected to be 2,000 cubic yards per week (2,500 tons, based on a bulk density of 90 lbs per cu ft). This waste will be placed in the waste rock pile, less the quantity for which a market is found.

Storage of waste rock is planned in two locations (Main Waste Dump and Rejects Pile) as shown on the MLR Mine Plot Plan, Exhibit 3-1. These piles are sized to hold 620,000 cubic yards and 860,000 cubic yards, respectively. Before this storage space is filled, waste rock will be backfilled in areas of the pit that have been exhausted of extractable limestone. The total tonnage of waste rock is expected to be 35% of the mined rock. Even though the bulk density of the in-bank rock is 1.67 times the density of the mined waste rock, the volume of waste rock placed in the mined-out pit will not exceed 60% of the volume of extracted rock. Any waste rock sold commercially will reduce the amount to be placed in the waste rock piles.

3.2.6 Mine Water Management

Mine water management at the MLR project site will be limited in scope due to the strong negative water balance. Active treatment and control of process waters produced on site are limited as well. No process waters requiring treatment are expected to be generated on site other than sanitary wastewater disposed of by drain field (Section 3.6). Non-contact cooling waters will be closed loop and will be recycled; no treatment of these waters is anticipated (Section 3.3.2). Air pollution control equipment are proposed to be dry processes; no wet scrubbers will be used in the process (Section 3.17). It is not anticipated that dewatering of the pit ahead of mining will become necessary (Section 3.11.1). Storm water runoff from the site will be captured and routed to detention structures for reuse (Sections 3.9 and 3.10). Some storm water may be collected within the pit proper; these waters will be collected in sumps and reused as needed. Figure 3.2-10 presents the water balance for the project as currently defined.

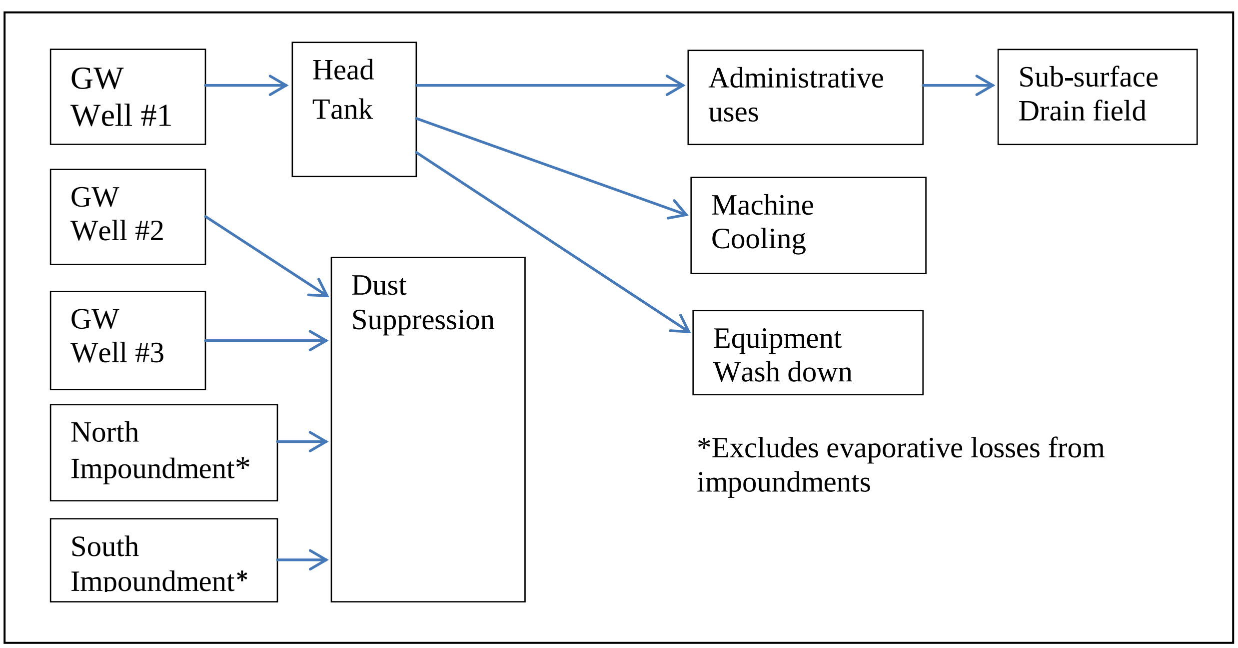


Figure 3.2-10 Water Balance Block Flow Diagram

3.2.6.1 Mine Water Sources

Groundwater and storm water are the primary sources of water to be utilized by the project. Groundwater will be provided by up to three wells (Exhibit 3-1); completed in either the Madison limestone or other bedrock aquifer, or unconsolidated alluvial/colluvial aquifer. Based on baseline groundwater monitoring completed to date, groundwater quality from these source aquifers is of good quality suitable for the proposed uses (Section 2.2). One well will be located near the main processing area proximal to the proposed 150,000-gallon storage tank. The process area storage tank will supply potable water to the office and main facilities site/, provide makeup water to the equipment cooling water circuit, and fire protection water (Section 3.15). The remaining wells will pump to local storage tanks to be used for dust suppression activities. The well and tank locations are shown on Exhibit 3-1.

Storm water runoff from the site will be controlled by runon/runoff ditches and collected in two sediment basins; the North and South sediment basins. Besides serving as storm water BMPs, the basins will provide additional water for use in dust suppression on a seasonal basis. The sediment basin locations are shown on Exhibit 3-1.

The north sediment basin is sited below the main waste dump and is designed to contain 1.8 ac-ft of storm water runoff and 0.6 ac-ft of sediment. The basin will control runoff from 356.3 acres of the site and is located in an ephemeral drainage. Location for the north basin is provided in Exhibit 3-1.

The south sediment basin is sited in the far southeast corner of the permit boundary (Exhibit 3-1) below the main access road. The south basin is designed to contain 32.1 ac-ft of storm water runoff from the main processing area as well as 13.2 ac-ft of sediment. The pond collects storm water runoff from 221.9 acres and is also located in an ephemeral drainage. Location for the south basin is provided in Exhibit 3-1.

3.2.6.2 Mine Water Consumption

Primary ongoing water demands include potable water use, equipment cooling circuit makeup water, and road dust suppression. Fire protection water is also identified on an “as needed” basis. The total water demand will be approximately 54 ac-ft/year (35 gpm annual average), with dust suppression being the largest demand. Of this, approximately 2,750 gpd (1.9 gpm) will be required at the plant site, primarily for potable use.

Sanitary/gray waters will be produced from the operations staff and office employees. The total number of staff manning the facility is expected to be 30 full time employees (FTE). EPA projects this number of employees to produce approximately 2,100 gallons of sanitary wastewater on a daily basis. Sanitary/gray water will be handled through an onsite septic treatment system and discharged to a subsurface drain field.

No water consumption is anticipated for cooling machinery (e.g. bearings). Water may be required to cool the kiln gases in conjunction with sulfur dioxide capture to meet ambient air quality standards.

Ambient dust suppression is the primary consumptive use of water generated on site. Access roads, haul roads and active mining areas will be watered as needed to prevent ambient dust generation (Section

3.10), using a 4000-gallon water truck for application. Dust suppression water will be derived primarily from storm water contained in the two sediment ponds; secondary sources will be groundwater pumped from wells. It is anticipated that 50.9 ac-ft/yr or 31.6 gpm on an annualized basis will be needed for dust suppression.

3.2.6.3 Mine Water Treatment and Discharge

Two types of waters generated on site will require treatment prior to discharge: sanitary/gray water and storm water runoff. No other regulated process waters are produced or expected to be discharged from the project.

Sanitary/gray waters will require the appropriate level of subsurface wastewater treatment for a non-community sewage system. Sanitary sewage treatment and disposal requires adherence to Department of Environmental Quality Design Circular MDEQ-4, and approval by the county sanitarian. A drain field is proposed for disposal of sanitary wastes at this time.

Storm water runoff treatment and discharge has a phased implementation. During the initial construction phase of the project, runoff from disturbed areas (greater than one acre) will require coverage under the General Permit for Storm Water Discharges from Construction Activities. Treatment of runoff entails control of sediment transport from disturbed areas by the use of Best Management Practices (BMPs). BMPs are selected and implemented based on site conditions until one of the two following conditions are met: 1) Stabilization of the disturbed surfaces has occurred, or 2) The facility is permitted under the General Permit for Storm Water Discharges from Industrial Activities.

The Industrial general permit implements long term control and management of storm water that would discharge from areas impacted by industrial activities. Overflow structures on the sedimentation ponds would qualify as outfalls under the storm water rules. Based on the current regulatory requirement, storm water collected and pumped from the pit can be discharged under the industrial storm water general permit.

Mine runoff will be neutral or slightly alkaline as the limestone deposit is at the surface. Water in contact with limestone usually is very slightly alkaline. There are no sources of sulfur or halogen bearing rock or minerals in this deposit that might create acid drainage. The principal concern with the mine runoff will be suspended solids. The retention ponds are designed to allow the solids to settle without the addition of flocculants.

A monthly sampling program is planned to monitor turbidity and pH. In the event turbidity is found, flocculants may be added if there is concern that overflow will occur. If the periodic pH check determines that the run-off is acidic, lime will be added to bring the pH up into the alkaline range.

3.2.6.4 Pit Dewatering

Based on current hydrologic information, dewatering of the pit in advance of mining will not be necessary (Section 2.2, Appendix A-2). Based on exploration drill holes and five monitoring wells at the site, groundwater is not expected to occur at depths less than the ultimate pit depth, except for potential seepage from limited perched zones that may occur within the limestone (although no such zones have been detected to date).

Subsurface water (local water table) at the MLR site is approximately 3850 feet above MSL on average. The deepest planned excavation of the pit is 4100 feet above MSL. The only anticipated pit dewatering will occur during spring thaw or storm events. Storm water runoff from within the pit may have to be routed to sumps and pumped to other storm water ponds or used for dust suppression activities.

3.2.6.5 Impoundments, Diversions and Drainages

The MLR project will use a number of runon/runoff controls to route storm water away from critical infrastructure. A number of diversion ditches are planned to collect runon from sheet flow areas and route them to drainages leading to the sedimentation ponds (See Plot Plan Exhibit3-1). The North Inceptor Ditch (570’ long, 2% slope), diverts runoff into the North Sediment pond. The North ditch is sized to transport runoff from above the rejects pile. The West Inceptor Ditch (2,856’ long, 1% slope) and South Inceptor Ditch (2,469’ long with slopes between 2-10%) route sheet flow into the South Sediment pond for storage. The ditches will maintain a trapezoidal geometry along their length.

There are two sediment detention structures designed to capture runoff. Both ponds are placed in naturally existing drainages as earthen embankments with emergency spillways. Both ponds have been designed with primary outlets engineered for sediment retention. The north pond is constrained by topography, while possible runoff will be diverted to the south pond for long-term storage and treatment.

The north sediment pond will capture any runoff from the plant site, the north side of the pit, and the primary waste dump. This pond will be contained by an earthen embankment 20 feet high with the capacity to store 60,000 cubic feet (1.8 acre-feet) for reuse. There is 25,000 cubic feet of sediment storage capacity included in this design. Watershed drainage boundaries providing runoff to this impoundment are found in Exhibit 3-1.

The south sediment pond will capture any runoff from the south side of the pit, topsoil stockpiles, fines and rejects piles, and the primary access road within the permit boundary. This pond will be contained by an earthen embankment 26 feet high and will have the capacity to store and treat 1,080,000 or 32.1 acre-feet of storm water. There are 13.2 acre-feet of sediment storage capacity built into this design. Watershed drainage boundaries providing runoff to this impoundment are found in Exhibit 3-1.

Other storm water controls will be used along the length of the access road (Section 3.9). Borrow ditches and culverts will be used to control storm water flows and route runoff from the roadway. Culverts will be sized to pass the peak flow from a ten year-24 hour storm event. Inlet and outlet protection will be used as needed to control scour and erosion.

3.3 PLANT FACILITY

3.3.1 General Facility Description

The lime plant will be located on property owned by WLR. The Lime Plant Site Map (Exhibit 3-5) shows that the plant is situated at an elevation of approximately 4300 feet and occupies approximately 22 acres.

Access to the plant is from State Highway 1, which is accessible from Interstate 90 at exits 153 and 154. Traffic will enter the plant from State Highway 1 via the Access Road.

An on-site pit (described in section 3.2) will provide limestone to the plant facility.

3.3.1.1 Building and Machinery

The facility will include a maintenance and operating control building, electrical and air compressor building, storage bins, conveying systems, and machinery used in the production of lime (CaO).

The processing facilities will include:

- Modular primary crusher and stacking conveyor system for primary crushed rock
- Primary crushed rock open storage pile
- Feeders and modular secondary crusher system
- Screening/transfer tower for separation of primary and secondary crushed and waste rock
- Stacking conveyor system and covered storage for secondary crushed rock
- Reclaim feeders and conveyor system to the kiln feed stone box
- Preheater and rotary lime kiln
- Lime cooler and conveying system
- Storage/shipping bins
- Tractor-trailer loading facilities
- Solid fuel storage building
- Solid fuel feed bins
- Vertical coal/pet coke grinding mill
- Control room/workshop/ spare parts warehouse facilities
- Sewage treatment
- Water supply system and storage tank with ring main and hydrants for firefighting and plant services
- Electrical substation and motor control centers
- Employee and visitor parking
- Containment/settling pond for storm water run off from the plant area

3.3.2 Process Description

3.3.2.1 Process Flow and Plot Plan

A plot plan (Exhibit 3-5), and flow sheets (Exhibit 3-6), of the lime plant are included. Stockpile and storage bin capacities and expected process materials flow rates are tabulated in tables 3.3-1 and 3.3-2, respectively.

Table 3.3-1
Material Storage

Material	Storage Capacity	Used/produced per week	Expected Fill time and Frequency
Primary Crushed Limestone	10000 tons	7000 tons	8 hrs/ day, 4 days/week, as required
Secondary Crushed Limestone (kiln feed)	10000 tons	5000 tons	8 hours per day as required
Limestone fines from Secondary to waste	2000 tons	2000 tons	8 hours per day with secondary operation
Fabric Filter Dust to Waste	100 tons	500 tons	Continuous at Approx 3 tph
Coal /Coke (as received)	1200 tons	400 to 600 tons	Receive coal by truck as required.
Coal/Coke Bins	2 x 80 tons	525 tons	Refill bins for 30 minutes every 8 hours
Lime	350 tons	2450 tons	Continuous

Table 3.3-2
Process Materials Flow Rates

Material	Hourly Rate (Design) tph	Hourly rate (Nominal) tph	Daily Rate (Typical) Tons	Weekly rate (Average) Tons	Annual rate tons
Primary crusher (Limestone to Stockpile)	315	254	1750	7,000	350,000
Feed to Screen	315	295	1,750	7,000	320,000
Secondary crushed rock to stock pile	245	204	1,250	5,000	228,600
Limestone fines from Screen to waste	102	87	500	2,000	91,440
Kiln Feed Limestone	108	90 (intermittent) or 30 (continuous)	715	5,000	228,600
Fabric Filter Dust to Waste	3.5	2.9	70	525	22,400
Coal and/ or coke to pulverizer	4.6	3.4	82	575	28,000
Lime (Product)	18	15	350	2,450	120,000
Lime Shipping	150	100	350	2,450	120,000

3.3.2.2 Primary Crusher

Surface mine trucks will be loaded with blasted rock at the active face of the limestone deposit; the limestone will be transported to a dump hopper at the primary crusher. A grizzly feeder in the dump hopper will move the oversize rock (+6 inch) to the primary crusher, a Jaw Crusher. The fine rock (-6 inch) from the grizzly feeder and the jaw crusher will discharge to a rougher belt conveyor which feeds a 24-inch wide belt conveyor, which conveys the limestone to a stockpile.

3.3.2.3 Primary Crushed Rock Stockpile and Reclaim

A stockpile of primary crushed rock will provide raw materials for the secondary crushing system. The primary crushed rocks will be withdrawn from the stockpile through vibrating feeders located in a reclaim tunnel under the stockpile to a belt conveyor. A separate feeder that is not under the stockpile will be used to feed rock using a loader or dozer when required due to live storage reclaim limitations such as blockage, frozen rock, feeder maintenance and other factors.

The reclaiming system from the primary crushed rock pile will operate on an as-required basis, expected to be 24 to 30 hours per week, to supply the secondary crushed limestone storage pile. All conveyors will have covers for dust control except those conveyors in a reclaim tunnels.

3.3.2.4 Screening System

The reclaim conveyor from the primary crushed rock and stockpile will carry the rock to a multi-deck screen for sizing the material. The screen has two decks sized at 1½ inch and ⅜ inch.

Material less than ⅜-inch is too small for use in the lime kiln and will be directed to a fines pile. This stockpile of minus ⅜-inch rock will either be sold as aggregate, road bed material, or for other uses or be disposed of on the property.

Oversize material (plus 1½-inch) will be directed to the secondary crushing system which is a 48-inch modular cone crusher. This rock will be discharged from the cone crusher to a belt conveyor and returned to the screen for classification. This closed-circuit screen circuit will ensure a consistent feed size for the kiln.

After screening, material in the size range > ⅜-inch to < 1½-inch will be conveyed to kiln feed storage.

3.3.2.5 Kiln Feed Storage, Reclaim, and Kiln Feed

Kiln feed rock will be stored in a 100x200-foot pre-engineered building.

Kiln feed rock will be stored in one continuous pile. The stockpile will be filled using a tripper conveyor which will also provide basic blending of the rock as the pile is filled.

Reclaim from the kiln feed stockpile will be through 4 feeders in a reclaim tunnel. Reclaimed stone will then be conveyed to the preheater in a sequential manner or continuously from multiple feeders to provide blending. Rock will be fed to the kiln at approximately 90 tph to refill the kiln feed “stone box” every twenty minutes. The conveying system will operate for approximately 6 minutes, three times per hour. Rock will be screened again before conveying to the kiln feed stone box. This screen rejects material will be less than ⅜-inch. Since the feed will already have been screened to this size, only small quantities of fines are expected.

3.3.2.6 Preheater and Rotary Kiln

Limestone will be conveyed to the top of the preheater by belt conveyor and discharged into a stone box (referenced above). This stone box is a rectangular bin that holds about 250 tons of limestone. The bin will provide feed to the preheater.

The preheater has been designed to recover energy from the rotary kiln exhaust gases by passing the gases through the kiln feed. Rotary kiln exit gases will be cooled from 1800 °F to approximately 590 °F as the kiln feed is heated from ambient temperature to 1500 °F. Preheated rock will be fed to the rotary kiln from the preheater by 6 hydraulic rams that cycle at a controlled rate.

The final calcination process will take place in the rotary kiln ("lime kiln") which has been designed to contain, convey, and heat the feed material. The lime kiln will be fired using a blend of natural gas, coal, and petroleum coke fuels to raise the material temperature in order to break down calcium carbonate ($CaCO_3$) to calcium oxide (CaO) and carbon dioxide (CO_2) ("calcination"). Limestone from the preheater will pass through the rotary kiln countercurrent to the gas flow. This system will provide the temperature and residence time required to calcine the feed and produce CaO.

Hot lime will discharge from the rotary kiln to the lime cooler. The discharge system will be provided with a means to reject oversize lumps (greater than 6 inches) by grizzly bars and a semi-automated discharge door into a tote bin.

The kiln processes (including heating up the kiln, variations in production and in fuel feed rates, and miscellaneous losses) will require up to 5,500,000 BTU per ton of lime. The firing system is described separately below.

An induced draft fan will provide the draft to draw the gases produced in the kiln (products of combustion, excess air, and CO_2 from calcination) through the preheater and then through a fabric filter before exhausting to atmosphere.

3.3.2.7 Lime Cooler

Lime will be discharged from the kiln through the kiln hood at a temperature of about 2,100 °F into a lime cooler ("Niems Cooler"). Air will be blown into this cooler by a fan under a pressure of 14 inches WC (0.5 psig) to cool the lime to a discharge temperature of 160 °F. The air will be heated as it permeates through the bed of lime in the cooler and enters the kiln as heated secondary combustion air at about 960 °F. Lime will be discharged from the lime cooler via 4 vibrating feeders to a belt conveyor.

3.3.2.8 Kiln Air Pollution Control System

A fabric filter will be provided for cleaning the gases coming from the preheater. The filter media are fiberglass bags with PTFE coating. The cleaned gases will be ducted to the kiln ID Fan and then to a stack. Dust collected in the baghouse filter will be conveyed by screw conveyors to a bucket elevator and to a dust bin. Approximately 70 tons of dust per day will be collected by the filter. The dust bin will be emptied once every 24-hour period, 7 days per week. The dust, which is a mixture of calcium carbonate and calcium oxide, will be used for pH control, marketed for agricultural use, or be disposed of on site.

3.3.2.9 Fuel Firing System

Petroleum coke and/or coal will be used along with natural gas to provide heat for the kiln system. Energy consumption will be 5.0 to 5.5 million BTU/ton of product. Coal and/or petroleum coke ("petcoke") will be received into the plant by highway truck and stored in covered storage. The stockpiled coal and petcoke will be reclaimed by front loader through a hopper to fill the separate coal and coke bins. Each bin will discharge through a weigh feeder which allows accurate proportioning of pet coke and coal to the grinding mill. The fuel mix will be adjusted to control sulfur input to the kiln system. The solid fuel blend will be pulverized in a roller-type grinding mill in which the solid fuel is removed from the mill by air sweep and blown directly to the kiln. Hot air drawn from the kiln hood will provide energy for drying the solid fuel in the grinding mill. There will be no storage of pulverized fuel.

3.3.2.10 Lime Conveying and Storage

The lime discharged from the Niems cooler will be conveyed to a small roll crusher to break up any lumps that may have formed in the kiln. The roll crusher will discharge the lime to a belt conveyor which transfers the lime to the top of 2 lime storage bins. This conveyor will discharge the lime onto a small screen which separates "fines" from "lump lime". The "lump lime" will be discharged from the screen into one of the bins. The "fines" will be discharged to the other bin. The plant will have two, 350-ton capacity storage bins. The bins will be supported on a structural steel frame so as to allow tractor trailer bulk carriers to pull under and load from either bin.

3.3.2.11 Shipping

Lime will be loaded into enclosed trailers equipped with a pneumatic conveying discharge system, directly from the storage bins. Retractable spouts with integral dust collectors will direct the lime into the trailer and vent the displaced air to capture escaping lime dust. Approximately 5 to 20 tractor-trailer loads of lime (average of 14 loads) will be dispatched each day over a typical 12 hour period, 6:00 A.M. – 6:00 P.M. Shipping operations will be on an as-required basis, and are expected to continue 7 days per week.

3.3.3 Solid Fuels Transportation

The lime plant process design incorporates a solid fuel grinding and firing system. The kiln will be fired using natural gas and solid fuels (coal and/or petroleum (pet) coke). The capability to fire the kiln with coal or any proportion of coal and pet coke with or without natural gas will depend on fuel costs, process and operating considerations. Consequently, both coal and pet coke will be transported to the plant from their respective sources on a regular basis. Pet coke will come from a refinery in Billings and coal could come from any of several sources such as mines in Montana, Kemmerer, Wyoming, or southern Utah. Natural gas transmission is discussed in Section 3.4.2.

It is anticipated that both coal and pet coke will be transported by rail and off-loaded by the supplier to trucks at a convenient location. Highway dump trucks will deliver the coal and pet coke to the lime plant from the off-loading site.

An enclosed building with truck drive-through doors is included in the lime plant site to receive and store solid fuels. Trucks will travel from State Highway 1 and proceed along the project access road to the storage building where the load will be dumped. An operator will use a front-end wheel loader to stack the coal and pet coke in their respective piles, keeping the drive-through path clear for trucks entering and leaving.

The amount of coal and pet coke required by the plant will depend on the amount of natural gas that is co-fired with either or both solid fuels. It is anticipated that up to 500 to 550 tons of coal or pet coke will be delivered per week. When the kiln is fired by a combination of natural gas and solid fuel at the expected ratio of 25% natural gas and 75% solid fuel, the weekly shipment will be 400 to 415 tons.

It is expected that 27 to 30 truck loads will be required to deliver these fuels to the storage building. When the fuel mix to the kiln is 25% natural gas and 75% solid fuel, 20 to 23 truck loads will be necessary. Since the delivery of solid fuel to the plant is to be contracted out, the number and size of trucks to deliver the solid fuels to the plant may vary. On the assumption that a 20-ton truck can make 4 round trips per shift, and the Contractor desires to complete the unloading in 2 shifts, 3 or 4 trucks will be required.

3.4 POWER CONSUMPTION AND SOURCES

3.4.1 Electrical

MLR will require an estimated 1.5 Megawatts (MW) of electrical supply. The vast majority of the electrical power will be used to power induction motors with a total estimated connected horsepower of 2100hp, the largest single motor being 600hp. Crushing and conveying will be the major electrical load, followed closely by the blowers and equipment to run the kiln. The remainder of the load will be for lighting and ancillary equipment (i.e. welders, compressors, and office equipment).

NorthWestern Energy (“NWE”) has completed a System Impact Study for the MLR project. This study explored two options for supplying power to the site. The first option was to construct a new substation on the property near 100 kV Transmission lines that skirt the north side of the property; the second option was to utilize existing equipment in the Drummond Clark Fork Substation in downtown Drummond, Montana, and construct a new distribution feeder to the property. NWE determined that building a new substation on the property was not feasible due to higher construction costs and it would require breaker and relaying upgrades at another nearby substation. NWE did, however, find the second option feasible. By installing an express circuit distribution feeder from Drummond Clark Fork Substation to MLR’s primary metering point at the plant site, no concerns were identified in serving this load. By constructing this new distribution feeder, NWE determined that MLR would not be subject to voltage fluctuations and power disturbances caused by existing customer load. Likewise, existing customers would not be subject to voltage fluctuations and power disturbances caused by MLR’s load. The study also found that adding 1.5 MW of load to the system would not result in any adverse impact to the transmission system.

The new distribution feeder will require additions to the Drummond Clark Fork Substation, an additional 24.97 kV overhead distribution feeder, 24.97 kV feeder re-closer, steel breaker bay structure, foundation work, bus work, and relaying; also, a feeder get-a-way will need to be constructed. The 24.97 kV distribution feeder that will need to be constructed from the Drummond Clark Fork Substation to the MLR primary metering point will require building a new 9000-foot single circuit pole line and rebuilding a 4400-foot single circuit line to a double circuit. In order to serve the customer at the requested voltage, a step-down transformer must be installed. The step-down transformer from 25 kV to 4.16 kV at the MLR premise will be fed from a 1/0ACSR-25 kV-rated conductor, three phase 24.97 kV overhead feeder. MLR will take the 4.16 kV service delivery at NWE's premise transformer's secondary bus. From the secondary bus, MLR would install 4.16 kV Breakers and 4.16 kv/480 V Transformers with 480 V Breakers to distribute power to the other areas.

3.4.1.1 Power Line Route

The distribution feeder would originate in the existing Drummond Clark Fork Substation. The existing single circuit power line parallels (to the west and north) Drummond Main Street/Old US Highway 10 before crossing State Highway 1 to Lorensen Lane. This existing power line would be upgraded to include an additional 24.97 kV circuit. From the end of the existing power line a new power line would be constructed to MLR property. The power line would terminate at the plant site substation.

3.4.1.2 Power Line Design

All power poles will be designed to be avian safe, either with insulated conductor coverings at crossarms, or designed with sufficient spacing to prevent birds from line-line or line-ground contact. All power lines will be designed in accordance to NESC regulations.

3.4.2 Gas Transmission and Storage

NorthWestern Energy (NWE) will supply natural gas for the project from a tap on their Missoula Transmission Line south of the Mullen Road (Figure 3.4-1). The operating pressure of this nominal 12-inch line is 350 psi. A pressure reduction station will be constructed to feed the 2.78-mile distribution line to the MLR plant site. A 100-foot easement (on center, 50 feet per side) will be required for the pipeline. The distribution line will be a 6-inch, black, HDPE, SDR 11 pipe with a nominal operating pressure of 100 psi. The pipeline will comply with federal regulations applicable for pipelines at or above 100 psi. A pressure reduction station at the plant site will supply the kiln burner building with natural gas at the designed operating pressure of 50 psi. Gas for heating ancillary buildings including the office, shop, and warehouse will be provided at a nominal pressure of 3 - 10 psi. There will be no gas storage on site.

3.4.2.1 Gas Line Route and Alternatives

Various routes to the proposed plant site were evaluated (Figure 3.4-1). The preferred and most direct route is Option 1, traversing uplands from the Missoula Transmission Line to the plant site. The available supply capacity is marginal from the Drummond Station along Old US Highway 10 and this option requires a longer pipeline, so Option 2 is a secondary choice. Option 3 crossing the Allendale Ditch poses construction challenges, but is a viable alternative.

3.4.2.2 Gas Demand

The gas supply capacity of the line will be 103,000 cubic feet of natural gas per hour. Nominal gas consumption will be in the range of 43,000 to 83,000 cubic feet per hour.

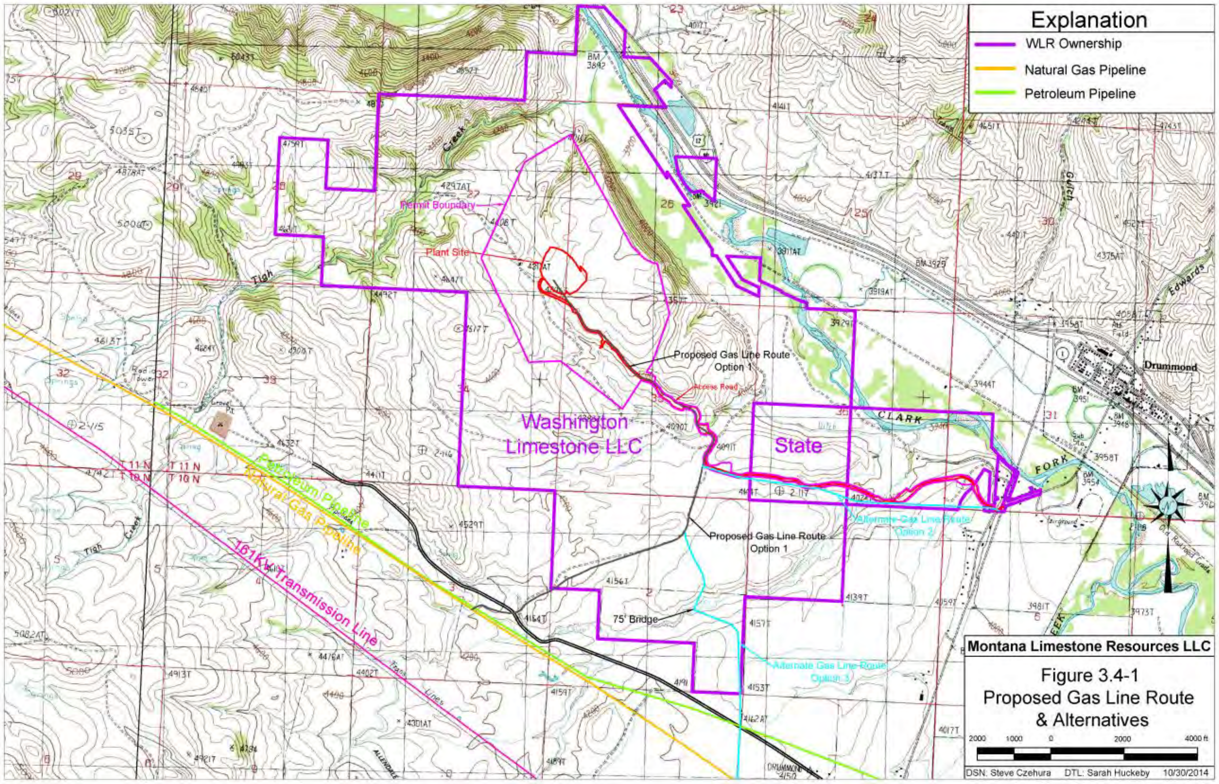


Figure 3.4-1 Proposed Gas Line Route (Option 1) and Alternatives

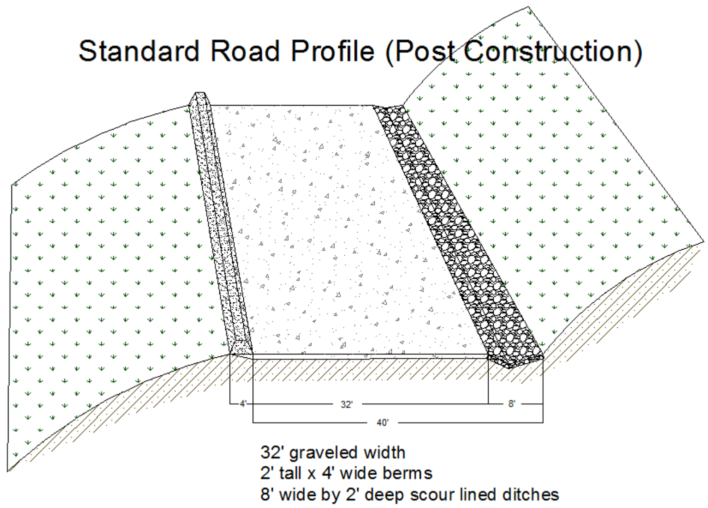
3.5 ROADS AND TRAFFIC

3.5.1 Access Roads

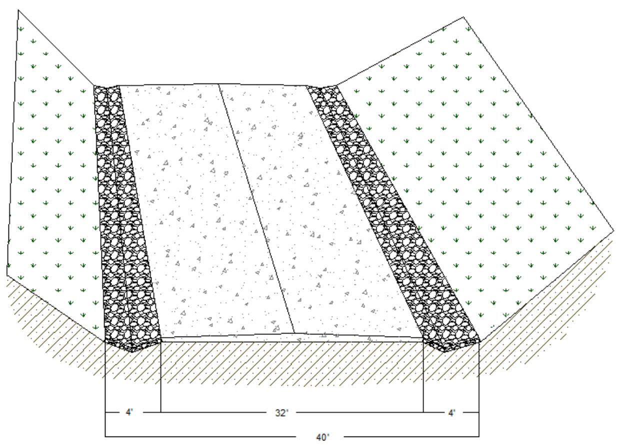
The access road for the MLR pit and plant site traverses upland hills southwest of Drummond (Figure 1.0-1). It connects the mine and plant complex to Montana State Highway 1, which accesses Highway 10A to US Interstate 90, immediately east and west of the community. The access road will be constructed with a gravel surface, providing sufficient stability to convey all traffic to the project site.

As designed, the road is 3.22 miles long. It originates at the junction of Old Highway 10 and Lorensen Lane along Montana State Highway 1, and crosses both Washington Limestone Resources (WLR) and State of Montana properties. The termination of the primary access is at the plant site. The maximum incidental grade is 8% with an overall average grade of 2%.

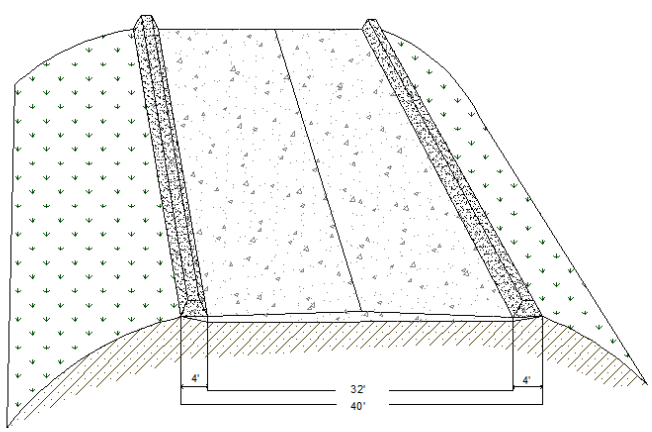
The road will be gravel with a compacted subgrade and crushed gravel top-grade with drainage control structures including scour-lined ditches, culverts, and sediment pool (Figure 3.5-1). It has the following design specifications:



a. Cut and Fill Section.



b. Full Cut Section.



c. Fill Section.

Figure 3.5-1 Typical Road Sections

- Thirty-two foot running surface
- Eight-foot wide by 2-foot deep riprap-lined scour ditch on the uphill slopes
- Negative 2-degree slope to drain to the ditch where constructed
- Berms one-half the axle height or greater to accommodate the largest vehicle using the road or, where deemed necessary, W-beam guardrail to promote drainage
- Cut slopes will be at 2.5:1 and fill slopes will be at 3:1 where practical to enhance revegetation establishment

On a routine basis the road will be watered to reduce airborne dust. Other controls for dust control may include speed and traffic controls, hygroscopic treatment (magnesium/calcium chloride), periodic grading, and/or other engineering controls deemed appropriate by operating experience (see Appendix C).

There will be two waterbody crossings. The first, described as the “Allendale Ditch Crossing,” will be a bridge spanning the existing ditch, approximately one mile from the access point along Montana State Highway 1 (see Exhibit 3-1). The second crossing spans an ephemeral drainage located approximately 1.8 miles from the entrance at Montana State Highway 1. At this site, rock fill will be used to bury a culvert appropriately sized to accommodate anticipated runoff from storm events or spring thaw.

A secondary road will follow the high-pressure gas line corridor utilizing an existing unimproved ranch road that could be used for emergencies or when the primary access road is otherwise unavailable. The road enters the WLR property from an access point on the Mullen Road and crosses rolling hills to join the main access road west of the pit before turning west and terminating at the plant site (Exhibit 3-1).

Another road descends from the intersection of the unimproved Mullen Road access and the primary access road to traverse the Clark Fork River floodplain, and is an existing unimproved ranch road. This tertiary access could also be used for emergencies or when the primary and secondary access roads are unavailable. The road exists in its entirety on WLR property.

3.5.2 Access Operational Traffic

Predicted traffic will consist of:

- Tractor with trailer and pup trailer for movement of finished product from the plant site
- Double-axel dump truck for solid fuel delivery to the plant site
- Pit operational traffic for survey, engineering, maintenance and warehouse delivery
- Pit employees
- Site visitors including contractors and agencies

Tractor and trailer with pup assemblies will move finished product (lime) from the plant site to customers. The predicted GVW for a loaded assembly is 80 tons. At maximum output, no fewer than 14 trucks will be needed per day. To ensure that transportation needs are met, calculations were based on 20 haulage assemblies per day.

Dump trucks or comparable equipment will haul solid fuel to the plant site from an offsite loadout facility. At maximum output, no fewer than 5.5 trucks will be needed per day. To allow for weekends and holidays, 7 trucks per day were used in calculations.

Light vehicle traffic will include mine employees traveling to/from work, travel for pit duties as performed by maintenance, surveyors, engineers, geologists and others, site deliveries, and non-MLR visitors.

Table 3.5-1
Access Road Traffic

Vehicle Type	Axels (count)	Tires (count)	Distance (ft)	Distance (miles)	Average Weight (tons)	Daily Trips (count)	VMT (miles)	Speed (mph)	Route (traveled)	Fuel Type (type)	Fuel (gph)	Opr (hrs)
Truck, Trailer, & Pup	9	26	17,000	3.22	60.0	8	51	35	Plant to MT 1	Diesel	5	20
Truck (LKD)	9	26	17,000	3.22	50.0	8	13	35	Plant to MT 1	Diesel	5	10
Truck (Delivery)	5	18	17,000	3.22	22.5	2	13	35	MT 1 to Plant	Diesel	5	10
Truck (Solid Fuel)	3	10	17,000	3.22	30.0	8	49	35	MT 1 to Plant	Diesel	5	10
Passenger Car	2	4	17,000	3.22	2.1	30	193	35	MT 1 to Plant	Gasoline	3	1
Light Vehicle	2	4	17,000	3.22	3.2	8	52	35	MT 1 to Plant	Gasoline	4	20
Truck (Delivery)	3	10	17,000	3.22	21.3	1	6	35	Mine to MT 1	Diesel	5	10
Daily					14.6	58	376	35				
Monthly							11,455					
Yearly							150,466					
Days of Measurable Precipitation							100					
Annual Adjusted VMT							109,346					

3.5.3 Access Traffic Controls

A traffic impact study will be completed to assess any traffic control and geometric intersection improvements where the main access road will tie into the existing public road system at Grace Road, Lorensen Lane, Old Highway 10, MT Highway 1, and any other impacted intersections. It is anticipated the posted speed limit for the primary gravel access road will be 45 mph.

3.5.4 Pit Haul Road Traffic

In-pit operational traffic will adhere to the rules stated in Federal Metal and Nonmetallic Mine Safety and Health Standards 30 CFR 57.9100 and 57.9101. Road surfaces and traffic designations will comply with 30 CFR 57.9300, which requires adequate berms or guardrails. Current haul road designs are set to match the requirements and operating capabilities of 40-ton articulated trucks. Haul road widths are 50 feet (roughly 4 times the width of a 40-ton articulated truck), with haul grades at a nominal 12%.

Design haul speed limits are as follows:

Truck Speeds

Loaded	mph
Uphill	7.4
Downhill	10
Flat	30

Empty	mph
Uphill	16
Downhill	23
Flat	30

Haul truck traffic will be limited to 5 days per week, Monday thru Friday. During these 5 days, typical haul routes will include: ore hauls to the crusher, waste hauls to designated waste dumps, and reject loads hauled to designated rejects pile/waste dump. Hauls will vary depending on phase and dump positions. The average haul lengths and total vehicle miles per year are presented for Year 1 of pit operation, Years 2-5, and for the remaining Life of Mine (LOM) in Table 3.5-2.

Table 3.5-2
Average Haulage Distances and Total Annual Miles Traveled

Annual Hauls	Year 1	Years 2-5	LOM
Ore Average Haul (miles)*	0.78	0.78	0.57
Ore VMT per Year	13,536	13,502	10,224
Waste Average Haul (miles)*	0.76	0.72	0.96
Waste VMT per Year	2,101	1,605	7,324
Reject Average Haul (miles)*	0.45	0.45	0.45
Waste VMT per Year	2,559	2,560	2,647
Total VMT	18,196	17,668	20,195

*Distances based on one-way haulage.

3.5.5 Pit Traffic Controls

On a routine basis, the pit haul roads will be watered to reduce airborne dust. The pit speed limit will be 30 mph and a speed limit of 15 mph will be set for the plant area.

3.6 SEWAGE TREATMENT

The maximum number of personnel on any shift is expected to be 14 persons, including the pit personnel, lime plant operations and maintenance, and managerial personnel. These personnel will be working on the day shift, Monday through Friday. During the remaining 16 weekly shifts, the lime plant staffing will be 4 persons per shift, supplemented when necessary with an electrician and maintenance personnel on overtime as needed. The pit does not operate during these 16 shifts and therefore will not require personnel.

Sewage treatment facilities will be a septic tank system with a drain field that is sized for the anticipated peak load of 14 persons, which is expected to occur at the end of day shift. Pit personnel will normally avail themselves of the main washroom/change room; however, a portable toilet will be located adjacent to the primary crusher for the benefit of the pit personnel.

3.7 SOLID WASTE DISPOSAL

The major solid waste is waste rock, addressed in Section 3.2.5.

Other waste generated on site will consist of general waste (paper, bottles, cans, food waste) and maintenance shop waste.

General waste will be collected daily in plastic bags and placed in a dumpster. Once a week, a contract service will pick up this waste and dispose of it in a licensed municipal solid waste facility.

Maintenance shop waste consisting of rags, paper, metal, cardboard, and wood boxes (in which spare parts are received) will be disposed of in a specific dumpster identified for this purpose. Once a week (or more often if required), a contract service will pick up this waste and dispose of it in various types of facilities: a metal recycling facility, a wood waste disposal facility, and/or a licensed municipal solid waste facility.

Waste lubricating oil, hydraulic fluid, antifreeze, and other similar waste will be placed in tanks labeled for their specific fluid. Once a week (or more often if required), a contract service specializing in handling and recycling, or other licensed means of disposal of these types of waste, will pick up these fluids and transport them to their sorting and recycling facility.

3.8 SOIL SALVAGE AND PROTECTION

3.8.1 Soil Salvage

Soils within the proposed disturbance areas associated with mine development or operation will be salvaged and stockpiled or directly hauled and replaced on approved reclamation areas. Soil salvage depths were derived from soils data collected as part of the Soil Baseline Report (Appendix A-7) and from existing NRCS data. Recommended soil salvage depths were determined by averaging the depths of horizons with organic matter in excess of 1.5 percent, coarse fragment content less than 50 percent by volume and depth to bedrock. Other considerations included soil texture, avoiding salvage on slopes greater than 2:1 ratio and geographical grouping of soils to facilitate effective soil salvage.

Topsoil will be salvaged following vegetation removal and prior to major surface disturbing activities such as grading or excavating. Topsoil will not be salvaged from topsoil storage areas or from small disturbances such as powerline construction or small pipeline installations. Topsoil will be salvaged using a multiple-lift approach of various depths to gather mineral soils and non-woody vegetation materials. Soil resources will be protected to the extent practicable using salvage techniques and timing that minimizes erosion, contamination, degradation and compaction.

Recommended topsoil salvage depths range from 0 inches in soils on steep slopes and ridges dominated by bedrock outcrops to 24 inches in depositional areas such as alluvial plains and broad swales. Salvaged soil volumes were calculated for each disturbance and soil type and are shown on the Soil Salvage Map (Exhibit 3-7). Soil salvage volumes are summarized by soil map unit and disturbance type in Table 3.8-1.

Actual salvage volumes will vary due to the presence of large coarse fragments and intermittent rock outcrops within many salvage areas. Limitations imposed by coarse fragments and bedrock will be most evident in shallow to moderately deep soils on ridge, slopes and incised drainages. These sites contain Lap, Quigley, Shawmut, Windham, Winspect and Whitecow soils. Other considerations include the salvage of finely-textured soils such as Coben, Danvers and Martinsdale, which could be inhibited by the presence of dense clays at various depths.

Table 3.8-1
Acres of Disturbance and Estimated Soil Salvage Volumes

Soils Map Unit Symbol (MUSYM)	Roads			Mine Operations					Soil / Sediment			Inches of Soil Salvage			Soil Volume in Cubic Yards		
	Haul Roads	Main Access Road	Other Roads	Mine Plant	Rejects Pile	Main Waste Dump	Ultimate Mine Pit	Misc Disturbances	Sediment Control	Soil Storage[1]	Total per Map Unit	1st Lift	2nd Lift	Total Salvage	1st Lift Volume	2nd Lift Volume	Total Soil Volume
Intensive Study Area																	
BrTo			0.5		5.5			0.3	0.8		**7.1**	12	12	**24**	11455	11455	**22910**
Co		0.7									**0.7**	12	12	**24**	1129	1129	**2258**
Da						8.1	0.1				**8.2**	12	12	**24**	13229	13229	**26458**
Lp	0.5	0.1				0.3	27.4			4.4	**32.7**	12	0	**12**	45657	0	**45657**
Ma	7.7	3.2		14.1	9.1	7.6	3.7	4.9		1.8	**52.1**	12	12	**24**	81151	81151	**162302**
Qg	2.4			3.4			13.1			5.7	**24.6**	12	0	**12**	30492	0	**30492**
Sh			0.2				0.1	0.3	3.6		**4.2**	12	0	**12**	6776	0	**6776**
WC-RO		1.2	0.2			0.8	18.7		0.5		**21.4**	0	0	**0**	0	0	**0**
Wd	2.6			6.9			19.9			1.3	**30.7**	12	0	**12**	47432	0	**47432**
Ws		7.1								0.2	**7.3**	12	0	**12**	11455	0	**11455**
Extensive Study Area - NRCS Soils																	
24B		1.0									**1.0**	12	12	**24**	1613	1613	**3226**
24C		2.1									**2.1**	12	12	**24**	3388	3388	**6776**
33B		0.9								2.2	**3.1**	12	12	**24**	1452	1452	**2904**
34B											**0.0**	12	12	**24**	0	0	**0**
36D		0.6									**0.6**	12	12	**24**	968	968	**1936**
49C		3.3								3.1	**6.4**	12	12	**24**	5324	5324	**10648**
65D		1.0								2.1	**3.1**	12	12	**24**	1613	1613	**3226**
69D		3.3									**3.3**	12	12	**24**	5324	5324	**10648**
351E		0.8									**0.8**	12	12	**24**	1291	1291	**2582**
TOTALS	**13.2**	**25.3**	**0.9**	**24.4**	**14.6**	**16.8**	**83.0**	**5.5**	**4.9**	**20.8**	**109.4**				**269749**	**127937**	**397686**

[1]Soil will not be salvaged in soil storage areas and thus are not included in soil volume calculations.

3.8.2 Soil Storage and Protection

Salvaged soils will be either directly replaced on regraded spoils or transported to one of the soil stockpile areas designated on the Soil Salvage Map (Exhibit 3-7). Soils that will be stockpiled for one year or longer will be seeded with an interim revegetation mixture during the first available seeding period, in accordance with the Reclamation Plan (Section 4.5.4). During mine development and operation, sediment control measures will be installed and maintained downslope of soil stockpiles to mitigate soil loss and sediment transport.

3.9 OPERATIONAL EROSION AND SEDIMENT CONTROL

Sediment control structures, including diversion ditches and ponds, are shown on Exhibit 3-1. No infringement of other landowner's rights will occur as sediment control structures will be constructed in uplands or ephemeral drainages on MLR-controlled property within the permit area. Sediment control structures are located to prevent siltation to natural flowing streams, including the Clark Fork River, and off of the Mine Permit area.

Sediment control structures will be constructed simultaneously with the operation and will be initiated promptly after completion or abandonment on those portions of the operation not subject to additional disturbance.

Operation erosion and sediment control will also include revegetation of soil stockpiles, access road cut and fill slopes, and other areas where vegetation can be established to minimize erosion. Silt fence, rolled erosion control products, sediment logs or other erosion control products will be installed where necessary to prevent off-site sedimentation. Sites where these products will be used include drainage crossings along the access road and downslope of disturbances such as soil stockpiles, where sediment may enter waters of the State or leave the permit area.

3.10 DUST CONTROL

The Administrative Rules of Montana (ARM) 17.24.116(3)(c) require the application for a mine operating permit to contain provisions for the prevention of wind erosion of all disturbed areas. MLR submits the Dust Control Plan for Fugitive Particulate Matter (Appendix C) to comply with this requirement.

3.11 OPERATIONAL WATER MONITORING

MLR currently monitors surface water and groundwater in the project area under their baseline water resources monitoring program (Section 2.2). The rationale and methodology for the baseline monitoring program is outlined in the water resources monitoring plan (Appendix A-2), and is also applicable to the operational water resources monitoring program as described below.

3.11.1 Groundwater

Operational groundwater monitoring will include the same monitoring locations as the baseline program, with modifications as warranted by mine development. Operation groundwater monitoring sites are listed in Table 3.11-1. Additional groundwater monitoring sites will be added if warranted by modifications in the mine facilities or operational plans, or if existing monitoring wells require abandonment as part of mine development. Initially, operational groundwater monitoring will occur on a quarterly basis, with the schedule modified as appropriate based on the baseline and initial operational monitoring results.

The operational monitoring program will follow the same sampling protocol and methodologies detailed in the baseline monitoring plan (Appendix A-2), unless project developments warrant changes to the protocol. Prior to mine development, a separate operational water resources sampling and analysis plan will be developed for agency review. As currently proposed, the operational groundwater monitoring program will utilize the same analytical schedule as the baseline program (Table 3.11-2).

Table 3.11-1
Operational Groundwater Monitoring Stations – MLR Project

Well	Northing	Easting	MP Elevation (ft)	Screen Interval Depth (ft)	Lithology
MW-1	46.66667474	-113.1852836	3960.7	95-125	Cretaceous
MW-2	46.67511534	-113.2127801	4328.3	480-600	Madison Limestone
MW-3D	46.68683221	-113.2059492	3908.1	58-98	Cretaceous
MW-3S	46.68676711	-113.2059843	3906.9	20.5-30.5	Alluvium/Colluvium
MW-4	46.68161756	-113.1966936	3910.1	8-18	Alluvium
MW-5	46.6881815	-113.2039311	3902.1	7.5-17.5	Alluvium

Monitoring well locations shown on Figure 2.2-2.

3.11.2 Surface Water

Similar to the groundwater monitoring program, the operational surface water monitoring program as currently proposed will follow the baseline monitoring program (Section 2.2). Operational surface water monitoring sites are shown in Figure 2.2-2 and described in Table 3.11-2. Additional surface water monitoring sites will be added if warranted by modifications in the mine facilities or operational plans. Initially, operational surface water monitoring will occur on a quarterly basis, with the schedule modified as appropriate based on the baseline and initial operational monitoring results.

The operational monitoring program will follow the same sampling protocol and methodologies detailed in the baseline monitoring plan (Appendix A-2), unless project developments warrant changes to the protocol. Prior to mine development, a separate operational water resources sampling and analysis plan will be developed for agency review. As currently proposed, the operational surface water monitoring program will utilize the same analytical schedule as currently utilized for the baseline program (Table 3.11-2).

3.11.3 Additional Monitoring

The operational monitoring program will include annual streambed sediment sampling for comparison to baseline sediment metals concentrations. As currently proposed, stream sediment sampling will occur in the fall during the first two years of mine operations, with the monitoring schedule modified to bi-annually, or some other less frequent basis, depending on the initial results. Since the MLR project is a limestone mining operation, trace metal contaminants are not expected to be a significant concern for the project.

The operational monitoring program will also include seasonal spring and seep monitoring. The spring and seep monitoring program will include monitoring sites included in the baseline program (Appendix A-2), pending site access following mine development. As currently proposed, operational spring/seep sampling will occur semi-annually (spring/fall), and will include flow measurements and sample collection for analyses per the Table 3.11-2 parameter list.

Table 3.11-2
Analytical Methods and Detection Limits for Surface Water and Groundwater Samples

Parameter	Analytical Method[1]	Project-Required Detection Limit (mg/L)
Physical Parameters		
TDS	SM 2540C	10
TSS	SM 2540C	10
Common Ions		
Alkalinity	SM 2320B	4
Sulfate	300.0	1
Chloride	300.0/SM 4500CL-B	1
Fluoride	A4500-F C	0.1
Calcium	215.1/200.7	1
Magnesium	242.1/200.7	1
Sodium	273.1/200.7	1
Potassium	258.1/200.7	1
Nutrients		
Total Nitrogen (Persulfate)	A4500N-C	0.04
Total Phosphorus	365.1	0.003

Table 3.11-2
Analytical Methods and Detection Limits for Surface Water and Groundwater Samples

Trace Constituents (SW - Total Recoverable except Aluminum [Dissolved], GW - Dissolved)(2)		
Aluminum (Al)	200.7/200.8	0.009
Antimony (Sb)	200.7/200.8	0.0005
Arsenic (As)	200.8/SM 3114B	0.001
Barium (Ba)	200.7/200.8	0.003
Beryllium (Be)	200.7/200.8	0.0008
Cadmium (Cd)	200.7/200.8	0.00003
Chromium (Cr)	200.7/200.8	0.01
Cobalt (Co)	200.7/200.8	0.005
Copper (Cu)	200.7/200.8	0.002
Iron (Fe)	200.7/200.8	0.02
Lead (Pb)	200.7/200.8	0.0003
Manganese (Mn)	200.7/200.8	0.005
Mercury (Hg)	245.2/245.1/200.8/SM 3112B	0.000005
Molybdenum (Mo)	200.7/200.8	0.001
Nickel (Ni)	200.7/200.8	0.002
Selenium (Se)	200.7/200.8/SM 3114B	0.001
Silver (Ag)	200.7/200.8	0.0002
Strontium (Sr)	200.7/200.8	0.02
Thallium (Tl)	200.7/200.8	0.0002
Uranium	200.7/200.8	0.0002
Zinc (Zn)	200.7/200.8	0.008
Field Parameters		
Stream Flow/Water Level	HF-SOP-37/-44/-46	NA
Water Temperature	HF-SOP-20	0.1 °C
Dissolved Oxygen (DO)	HF-SOP-22	0.1 mg/L
pH	HF-SOP-20	0.1 s.u.
Specific Conductance (SC)	HF-SOP-79	1 µmhos/cm

(1) Analytical methods are from *Standard Methods for the Examination of Water and Wastewa*ter (SM) or EPA's *Methods for Chemical Analysis of Water and Waste* (1983).

(2) Samples to be analyzed for dissolved constituents will be field-filtered through a 0.45 µm filter.

3.12 SPILL CONTINGENCY PLAN

Appendix D presents MLR's Spill Contingency Plan. The state fire marshal and Granite County Fire Warden have been notified that the Spill Contingency Plan has been filed with the MDEQ.

3.13 PROTECTION OF ARCHAEOLOGICAL AND HISTORICAL VALUES

As described in Section 2.13, the entire MLR project area was subjected to an intensive-level, Class III cultural resources inventory in conjunction with the development of this operating permit. This inventory identified the locations of two historic sites and one prehistoric site within the project boundaries, which were found not to be eligible for the National Register of Historic Places.

During construction, and throughout the operating life of the project, MLR will ensure that that any cultural resources later discovered in the project area in the future will be professionally recorded and evaluated, and that any such sites that are found to be National Register-eligible will be protected and/or mitigated in accordance with state and federal guidelines.

3.13.1 Previously Identified Sites

The proposed natural gas pipeline corridor passes through the center of the former Malone Homestead, site 24GN1031. Although the site as a whole was found to be ineligible for the National Register in 2004, two standing buildings and a number of other cultural features remain at the site (the buildings are outside the pipeline corridor). During construction, MLR will not disturb the standing buildings at the site and will flag the boundaries of the pipeline corridor through the site, limiting project-related activity to the corridor.

3.13.2 Potential Sites Identified During Project Operation

During construction, and throughout the operational life of the project, all personnel involved in ground-disturbing activities in the project area will be instructed to immediately notify on-site managers if possible historic or prehistoric resources are noted. If any potential sites are noted, all ground-disturbing activity in the area will be halted immediately, and the area will be flagged and/or fenced. No objects will be collected from the area, and no further activity will take place at the identified site until it has been evaluated by a qualified cultural resource professional. Applicable staff at the Montana State Historic Preservation Office will be notified, and appropriate recordation/mitigation steps coordinated with them.

3.13.3 Potential Human Remains

MLR will treat the inadvertent discovery of human remains or potential human remains with the utmost care and respect. If MLR construction or operations activities reveal a possible gravesite, identifiable human remains, or skeletal items of possible human origin, all work within 100 feet of the location will immediately cease, the location will be secured, and MLR will notify both the Granite County Coroner and the Montana State Historic Preservation Office of the discovery. Subsequent investigative and disposition activities will fully adhere to the applicable procedures outlined in the Montana Human Skeletal Remains and Burial Protection Act.

3.14 PROTECTION OF OFF-SITE FLORA AND FAUNA

Substantial wind erosion that becomes a public nuisance or detriment to the flora and fauna of the area is not anticipated. Particle size of spoils materials will generally be too large to pose a substantial wind erosion hazard. Exposed cuts and fills for access roads or other facilities, and topsoil stockpiles will be seeded with a site-appropriate vegetation mixture as described in the reclamation plan.

Mine-related activities that result in substantial effects to flora and/or fauna (e.g., surface disturbance, habitat loss) will be restricted to the mine permit area, and recontoured and revegetated at the end of mine operations as detailed in Section 4.0 “Reclamation Plan”. Noxious weeds will be monitored and controlled during operational and reclamation phases to minimize negative effects to desirable vegetation, both on-site and off-site, as detailed in Section 4.12 “Weed Management Plan”.

Sites containing potentially toxic materials will be fenced and/or access to such materials by livestock or wildlife will be otherwise blocked. Garbage or other waste materials that may attract wildlife will be stored in appropriate containers. Feeding or attracting wildlife in such a manner that poses undue risk to either human or wildlife safety will be prohibited. If necessary, livestock will be excluded from the permit area by fencing or other appropriate measures. Fugitive dust on roads will be minimized, as necessary, with water or surfactants applied to the road surface. Speed limits for vehicles on access or haul roads will be established at safe levels that will avoid or minimize impacts to wildlife. Firearms will be prohibited in mine vehicles. Warning signs will be posted, and/or employees and visitors will otherwise be notified, of any persistent livestock- or wildlife-related hazards in the permit area.

3.15 FIRE PROTECTION AND SAFETY

Fire hazards at the project site are very low. The principle potential zones of fire include:

- Brush fires in the shrub-covered terrain southwest and northwest of the project site
- Fire at the lime plant. Although the rotary kiln used to produce lime from the limestone mined at the site requires the burning of fuel, this combustion will be contained within the rotary kiln and is not considered a fire hazard. The cause of a fire in the lime plant will more likely be due to spilled diesel fuel and gasoline, a ruptured natural gas line, or oily waste rags from maintenance activities
- Forested area is very limited in the vicinity of the project area

Within the active mine area, there is no vegetation that presents a fire hazard. All mobile equipment will have installed fire extinguishers for Class A, B, and C fires.

Fire protection in the lime plant will be an NFPA-compliant ring main system with dry fire hydrants spaced about 200 feet apart. Water will be supplied to each fire hydrant from the ring main line. A fire pump at the plant at elevation 4,300 feet will supply 500 gpm of water to the ring main. The fire pump in turn will be supplied from a 50,000 or 150,000-gallon water tank located 1600 feet northwest of the lime kiln at elevation 4,400 feet. This tank will be supplied from a well at up to 35 gpm.

The lime plant electrical rooms will be protected to NFPA requirements and will be MSHA-compliant.

In the event of a brush fire, fire protection will be with water from the water truck, augmented by the Drummond Fire Department and U.S. Forest Service. Fire protection of the forested areas to the north of the mine would be by U.S. Forest Service. In addition, MLR will cooperate with Granite County and other stakeholders on fire reduction mitigation activities presented in Granite County's "Community Wildfire Protection Plan" (FoxLogic 2005).

3.16 VISUAL RESOURCES ASSESSMENT

3.16.1 Visual Analysis

The objectives of the visual resource investigation were to identify and describe important visual resources that could be affected by the proposed activities. Visual resources include landscapes that may be seen during activities such as travel and recreation. The visual resources evaluation references

Landscape Aesthetics using *the Scenery Management System (SMS) (USDA, 1995).* The study area for visual resources is located in the northeastern part of the Sapphire Range of the Northern Rocky Mountains. This location is west of the continental divide in Granite County near the town of Drummond, Montana.

Landscape Character

Landscape character embodies distinct landscape attributes that exist throughout an area. Existing character may range from predominately natural landscapes to those that are culturally influenced. The MLR study area landscape consists of barren rolling hills with forested edges rising several hundred feet above the Clark Fork River valley at elevations up to 4400 feet. Pastureland and roadways influence the views.

Scenic Integrity

Scenic integrity indicates how a visual landscape is perceived as whole or intact. A high degree of integrity would be near perfect natural landscape with little or no deviation from its aesthetic character. A lower degree of integrity would exhibit a landscape of unnatural human alterations. Public roads and private ranch roads, poles, fence lines, as well as a few private residences penetrate the study area. A classification of moderate scenic integrity includes the Clark Fork River to the north of the proposed project. The project area itself would be considered an area of low to moderate scenic integrity, having no outstanding visual features.

Landscape Visibility

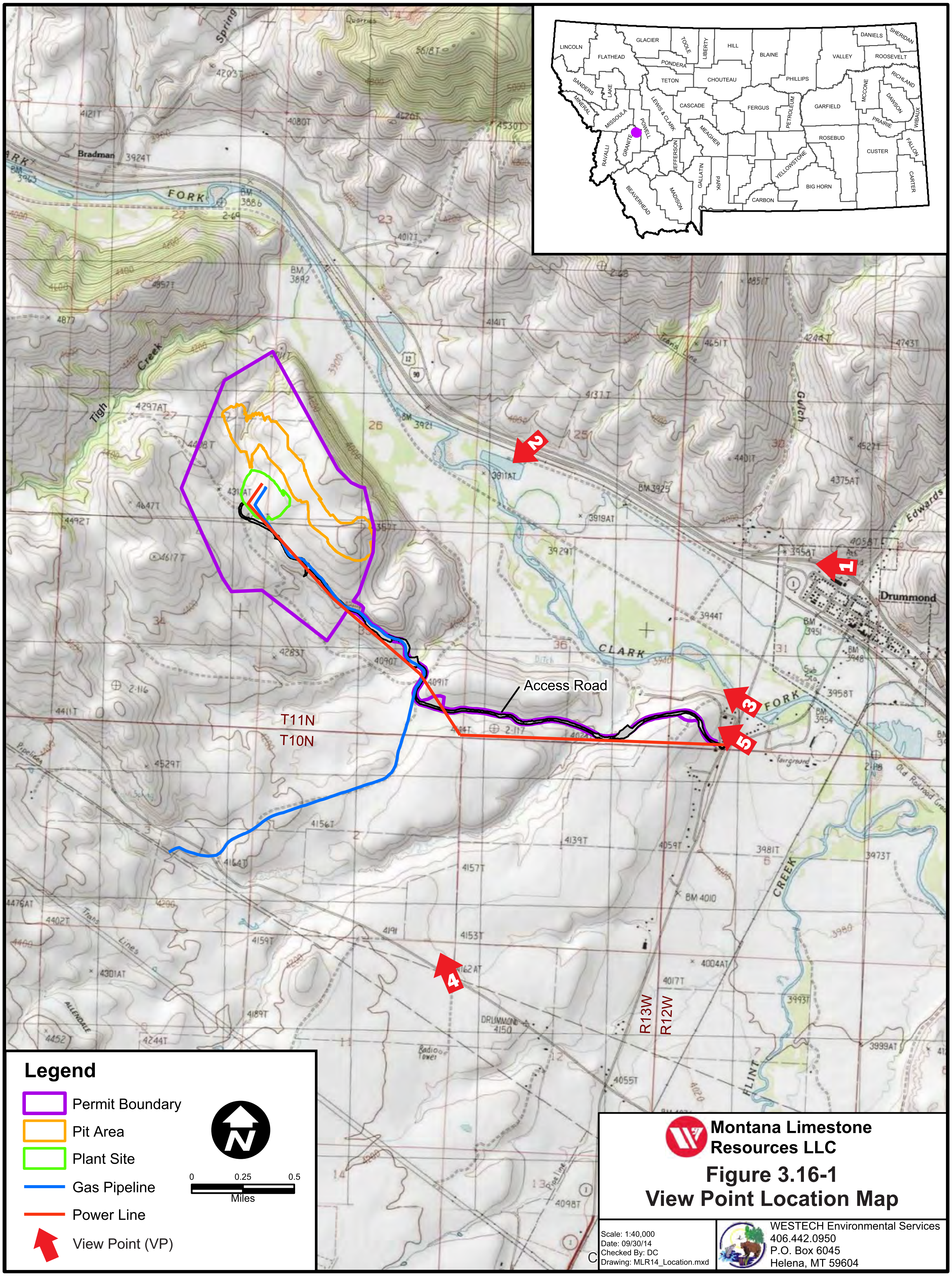
Landscape visibility addresses the relative importance and sensitivity of what is seen and perceived in the landscape. Landscape viewing can be divided into distance zones to simplify classification and analysis. Foreground viewing reaches up to one-half mile, middle ground from one-half to four miles, and background views extend beyond four miles to the horizon. Near foreground views when travelling can be more graphic to the viewer, but are of shorter duration. Middle ground views offer a better picture for visual evaluations giving the viewer more time to absorb the scenery. Background views are more constant and distant impacts are less discernible. Viewing distances for this study range from 1000 feet to 2.5 miles, mostly falling in the middle ground classification. Background horizon elevations rise to over 5000 feet.

Viewpoints

Viewpoints (VP) were established for evaluating visual impacts in a natural setting. Factors considered into selecting these viewpoints include number of potential viewers, duration of view, angle of observation, and seasonal variations. Figure 3.16-1 shows the location of five selected viewpoints.

3.16.2 Visual Impacts

Visual simulations of five viewpoints are presented in Figures 3.16-2 through 3.16-6.



Legend
Permit Boundary
Pit Area
Plant Site
Gas Pipeline
Power Line
View Point (VP)
0 0.25 0.5
Miles
Access Road
T11N
T10N
R13W
R12W
Drummond
Bradman
CLARK FORK
Montana Limestone Resources LLC
Figure 3.16-1
View Point Location Map
Scale: 1:40,000
Date: 09/30/14
Checked By: DC
Drawing: MLR14_Location.mxd
WESTECH Environmental Services
406.442.0950
P.O. Box 6045
Helena, MT 59604

Figure 3.16-2 VP 1 is located near Drummond on I-90. Located on the roadway at an elevation of 4000', westbound viewers will have a sustained view of the proposed activity while traveling at a distance of 3 miles down to 1 mile. This viewpoint is important due to the relative high number of viewers traveling on the interstate highway and its proximity to Drummond.

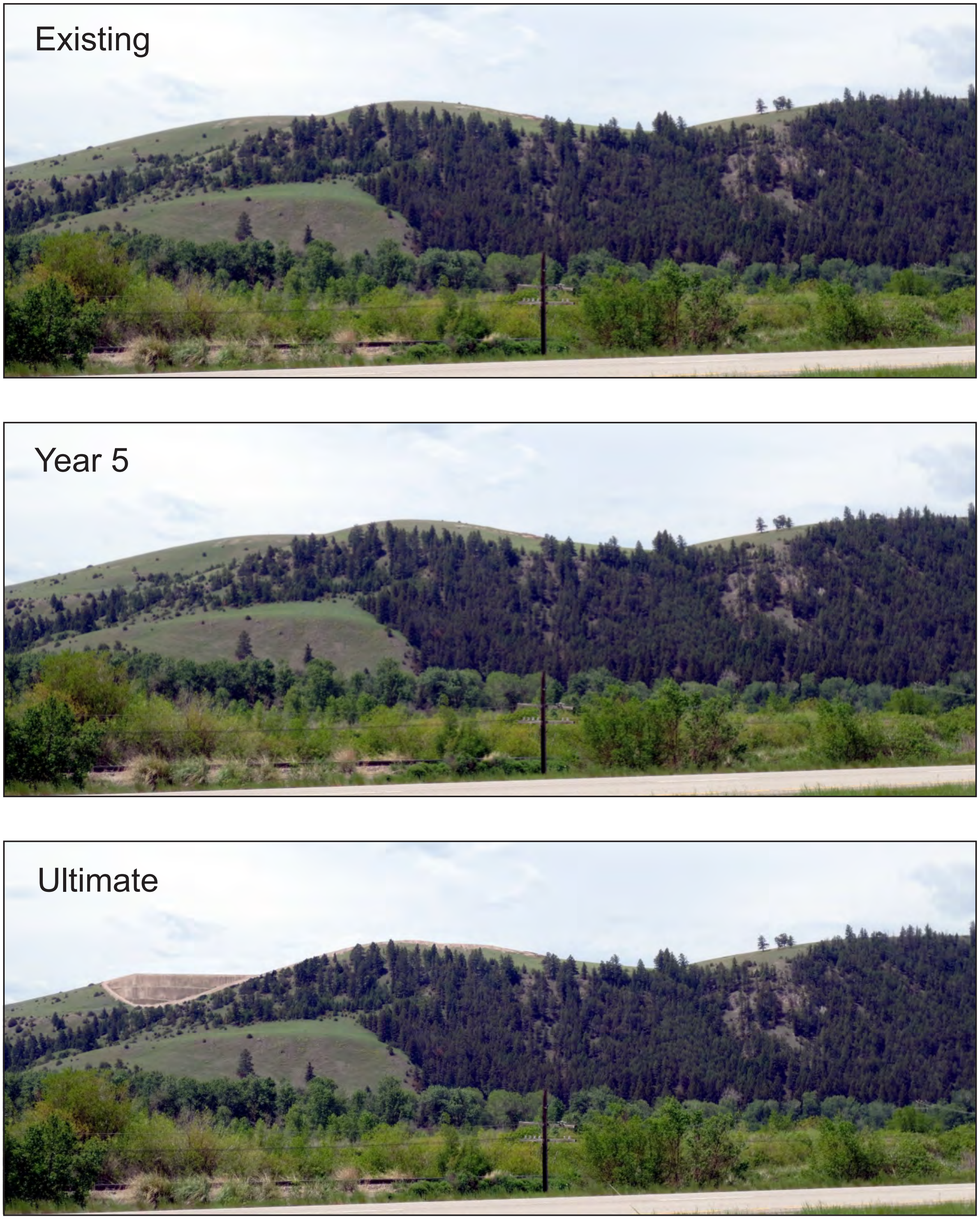


Figure 3.16-3 VP 2 is located at MM 152 on I-90. Located on the roadway at an elevation of 3925', this viewpoint is the closest distance to the proposed activity at less than one mile. The view is of short duration given the speed of traveling vehicles and at this point it also becomes an angular view.

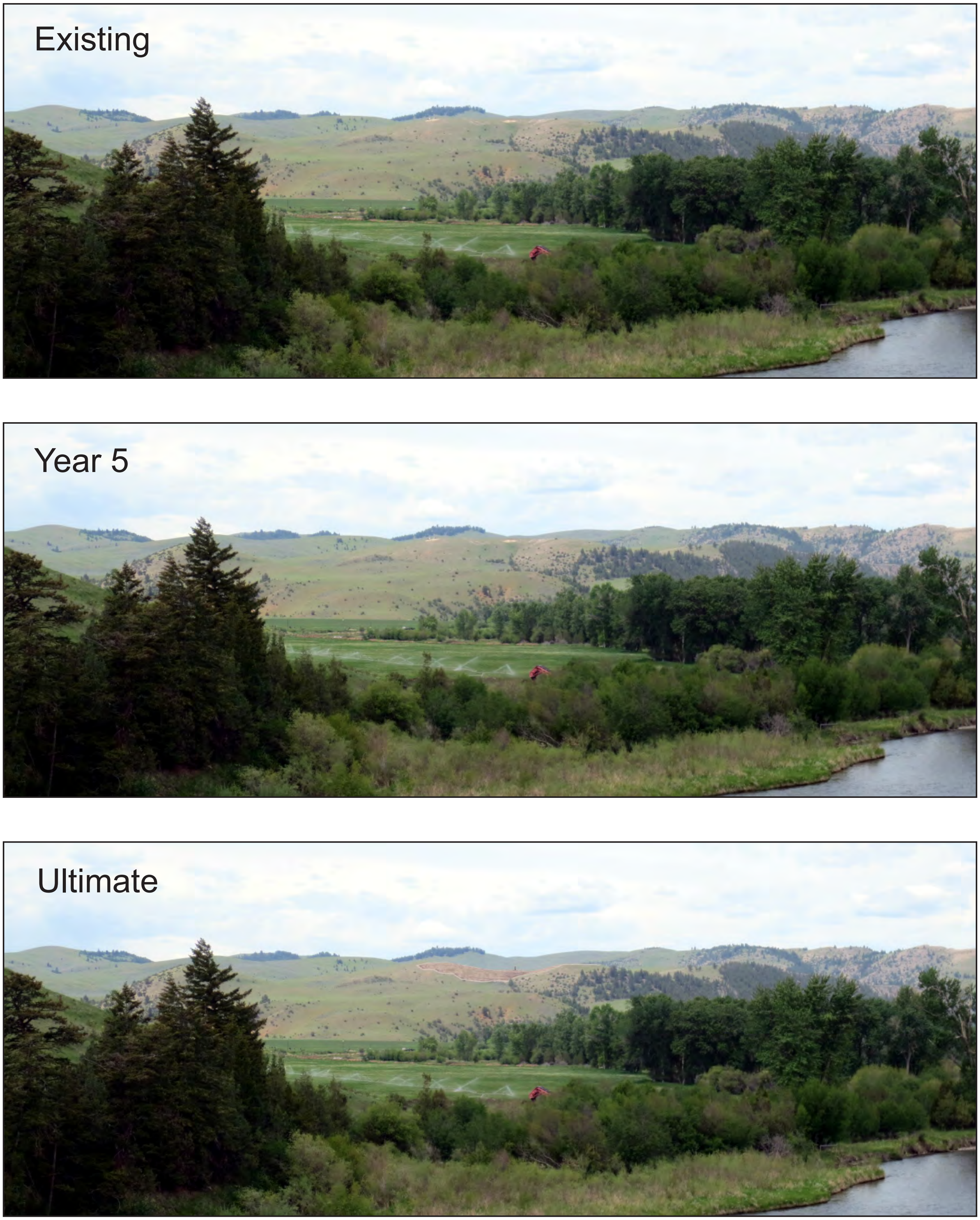


Figure 3.16-4 VP 3 is located at the elevated bridge over the Clark Fork River on State Highway 1. This view from 10,000’ away, at an elevation of 3975’ is short in duration due to traffic movement and angular view.

Figure 3.16-5 VP 4 is located on Mullan Road. At an elevation of 4200', this northern view becomes the highest vantage point of the proposed activity. The low number of viewers will be local residents and the occasional recreationist. This distant view of over 10,000' away, offers the most expansive view of the proposed activities.

Figure 3.16-6 VP 5 is located on Main Street (Old Hwy 10A) near the intersection of State Highway 1. This foreground view (1000') is of the new MLR Access Road intersection with State Highway 1.

3.16.2.1 Plant Site and Mine Pit

The proposed plant facility is located on a 22-acre site adjacent to, and southwest of, the pit. The plant site footprint is approximately 400 feet x 1200 feet with the stack 150 feet tall at an approximate top elevation of 4450'. The pit is approximately 5200 feet long and ranges from 300 to 1000 feet wide. Various stockpiles are also proposed in the area.

Manmade influences in the area consist of a major interstate highway, frontage road, county road, ranch road, abandoned railroad bed, and nearby private residences. These influences combine to create foreground and middle ground landscape character compromise. Low measures of scenic integrity include areas that are often heavily altered by human activities and begin to dominate the landscape character.

The disturbance viewed from VP 1 (Figure 3.16-2) would alter the landscape contour, color, and texture of the existing conditions. The degree of scenic integrity of this view would be low. At a distance of almost three miles the proposed activity will appear somewhat blended into the existing landscape. As the distance is reduced, the viewer will observe more detail of the proposed activity. Changes in line, form, color, and texture will be more apparent to the viewer.

VP 2 (Figure 3.16-3) offers a relatively close view of the east end of the pit, although not the best view due to the extreme elevation change and a screen of trees between viewer and proposed activity.

Moderate scenic integrity refers to landscapes where the character appears only slightly altered. Deviations should remain visually subordinate to the character of the existing landscape. At two miles away from VP 3 (Figure 3.16-4), the east end of the pit is visible as a deviation in landscape due mostly to the color change of exposed rock. The stack would eventually be visible from this location as the mine pit is excavated to proposed depth.

VP 4 (Figure 3.16-5) offers the most complete view of the proposed activities, including the plant site. At a distance of almost two miles, details remain subordinate as the naked eye can only pick up changes in shape, form, and color of the viewed landscape. Scenic integrity would remain low to moderate.

3.16.2.2 Access Road

The proposed Access Road from State Highway 1 to the mine site lies perpendicular to the existing roadway to the west. The new haul road design construction will be 40 feet wide with 32 feet usable with berms and ditches. County roads, fence lines, and private residences influence the landscape character of the proposed haul road. Figure 3.16-6 is a computer-simulated view of the Access Road looking west from VP 5 as it approaches State Highway 1.

3.17 OPERATIONAL NOISE

The Operational Noise Assessment presented in Appendix E predicts the noise generated by the project equipment and operations, and compares the project noise to the existing ambient noise levels measured in 2014 (Appendix A-11).

3.17.1 Noise Guideline

Granite County and the State of Montana do not have noise ordinances or regulations to limit the noise levels of the pit or processing operations. However, excessive noise can be considered a public nuisance according to Montana Code (MCA 2011).

As a result of the Noise Control Act of 1972, the EPA developed acceptable noise levels to protect public health and welfare. The EPA identified outdoor L_{dn} noise levels less than or equal to 55 dBA as sufficient to protect public health and welfare in residential areas and other places where quiet is a basis for use (EPA 1979).

No regulations limit blasting noise, however, the U.S. Army determined that L_{pk} 115 dBP at a listener location represents the threshold of annoyance for people, and below this level there is a low risk of noise complaints (USACHPPM 2005).

The Montana Department of Transportation (MDT) determines traffic noise impacts based on noise levels generated by peak-hour traffic. Noise impacts occur if predicted one-hour L_{eq} traffic noise levels, L_{eq}(h), are 66 dBA or higher at a residential property or 13 dBA above existing noise levels (MDT 2011).

In addition to the absolute impact limits defined by EPA, U.S. Army, and the MDT, changes in noise levels are used to determine noise impacts and gauge community response (Egan 1998). Since a person's response to noise is subjective, the perception of noise can vary from person to person. Table 3.17-1 indicates the relationship between a change in noise levels and a person's typical perception of the change.

Table 3.17-1
Change in Noise Levels vs. Apparent Change in Loudness

Change in Noise Level (dBA)	Apparent Change in Loudness to a Person
±1	Imperceptible
±3	Barely audible (*i.e.,* barely noticeable reduction or increase)
±5	Clearly audible (*i.e.,* clearly noticeable reduction or increase)
±10	Half as loud or twice as loud as the original noise (significant change)
±20	One quarter as loud or four times as loud as the original (very significant change)

3.17.2 Plant Site

The lime plant will include a pit with mobile diesel-powered equipment, haul trucks, a crushing circuit and a lime kiln. Table 3.17-2 indicates the reference noise levels used for the plant equipment.

Table 3.17-2
Plant Site Equipment Reference Noise Levels

Noise Source	Noise Level at Distance from Source	Duration and Frequency	Reference
Crusher circuit (vibrating screens, jaw and cone crushers, and conveyor systems)	L_{eq} 66 dBA at 1,050 ft	12 hrs/day 4 days/wk	BSA 2008
Haul truck (40-ton)	L_1 88 dBA at 50 ft		FTA 2006
Mobile diesel-powered equipment	L_1 85 dBA at 50 ft		FTA 2006
Rock drill	L_1 98 dBA at 50 ft	8 hrs/day 1-2 days/wk	FTA 2006
Kiln ID fan	L_1 115 dBA at fan	24 hrs/day 7 days/wk	Phoenix 2014a

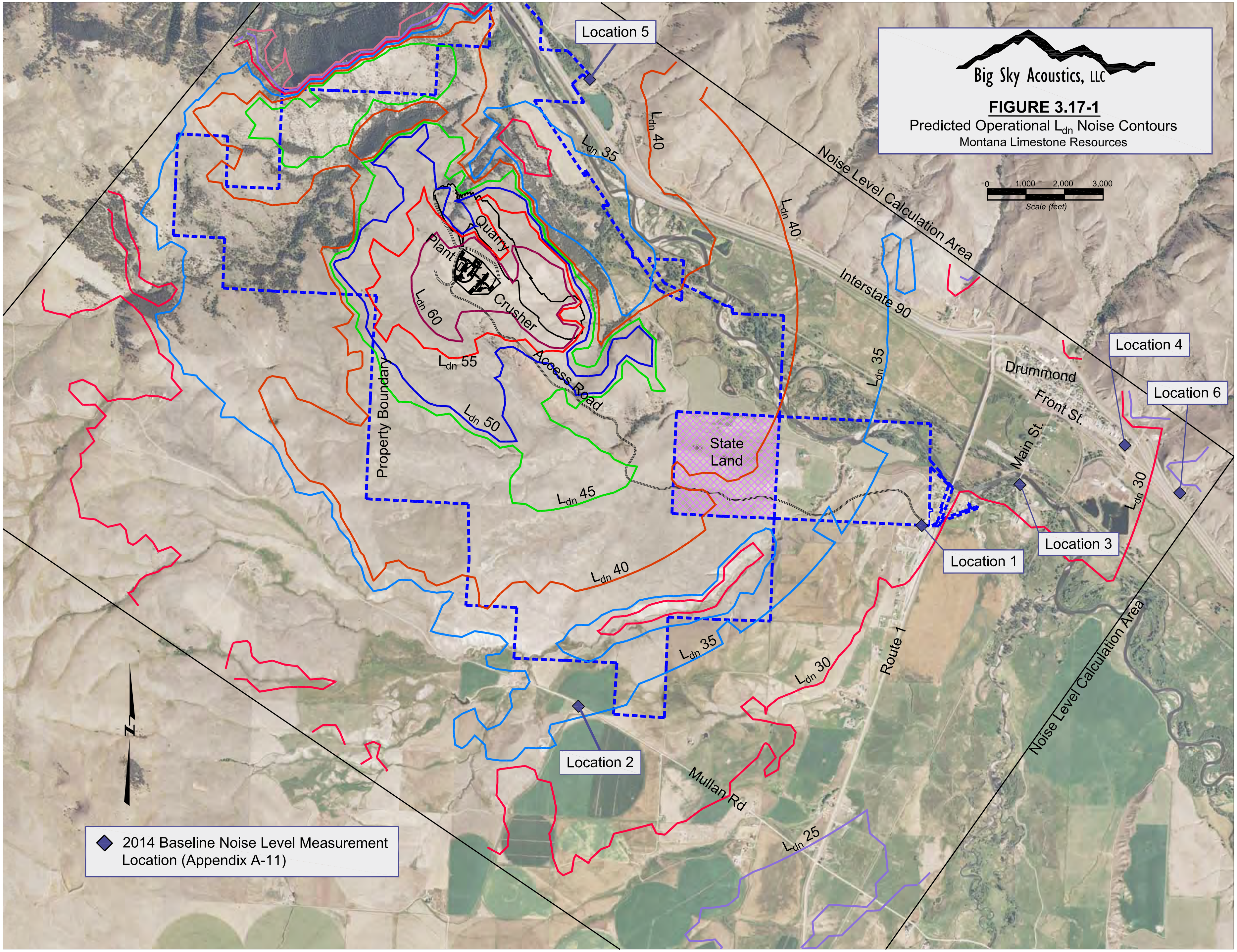
Table 3.17-3 indicates the predicted L_{dn} noise levels at the 2014 baseline noise level measurement locations (Figure 3.17-1) due to the equipment and operations at the lime plant site. The predicted operational noise levels are L_{dn} 31 to 41 dBA, which are less than the EPA guideline L_{dn} 55 dBA (EPA 1979), and the L_{dn} 55 dBA noise contour is predicted to be predominantly on the MLR property (Figure 3.17-1). However, the plant may still be audible at times due to changing atmospheric conditions or operations at the site.

Table 3.17-3
Plant Site Predicted Noise Levels

Measurement Location (Figure 3.17-1)	Existing Baseline L_{dn} (dBA)	Predicted Plant Noise L_{dn} (dBA)	Difference (dBA)	Perception (Table 3.17-1)
1	52	31	-21	Imperceptible
2	34	39	+5	Clearly audible increase
3	46	36	-10	Imperceptible
4	58	33	-15	Imperceptible
5	56	41	-15	Imperceptible
6	62	31	-31	Imperceptible

3.17.3 Blasting Noise

MLR will utilize blasting to develop the pit. Blast noise is calculated based on the weight of explosive used for each delay (Fidel 1983). For the exploration activities, the maximum charge per delay is expected to be approximately 310 pounds (Montana Resources 2014). At the closest residence located approximately 4,600 feet northeast of the pit (Figure 3.17-1), the blast noise level is predicted to be approximately L_{pk} 111 dBP. Although blasting will be clearly audible in the area, the predicted blast noise level at the nearest residence is less than the U.S. Army L_{pk} 115 dBP threshold for annoyance (USACHPPM 2005).


Big Sky Acoustics, LLC
FIGURE 3.17-1
Predicted Operational Ldn Noise Contours
Montana Limestone Resources
0 1,000 2,000 3,000
Scale (feet)
Location 5
Location 4
Location 6
Location 3
Location 1
Location 2
Noise Level Calculation Area
Interstate 90
Drummond
Front St.
Main St.
Route 1
Mullan Rd
Quarry
Plant
Crusher
Access Road
Property Boundary
State Land
Ldn 60
Ldn 55
Ldn 50
Ldn 45
Ldn 40
Ldn 35
Ldn 30
Ldn 25
N
2014 Baseline Noise Level Measurement Location (Appendix A-11)

3.17.4 Back-Up Alarms

Manufacturer-published back-up alarm sound levels vary between maximum noise levels of 90 and 110 dBA at 4 feet away (MSHA 2011). Back-up alarm noise levels will vary widely in the area around the plant site as mobile equipment move around, and may be clearly audible at times yet inaudible at others. To reduce the possibility of annoyance due to back-up alarms, traditional "beep-beep-beep" alarms on all mobile equipment should be replaced with manually adjustable, self-adjusting, or broadband sound alarms.

3.17.5 Off-Site Haul Trucks

Tractor-trailer trucks will haul lime off the site, and bring coal onto the site for the kiln. Lime loaded into tractor-trailer trucks will be shipped off-site at an average rate of 14 trucks during a 12 hour period per day (ranging from 5 to 20 truck loads per day). Coal will be transferred from railcars and trucked onto the site at a rate of approximately 50 truckloads during an 8 to 12 hour period one day per week (Phoenix 2014b).

Although a specific route for the haul trucks has not been finalized, possible truck travel routes include State Highway 1 (between the intersection of Main Street/Old Highway 10A and I-90), Front Street through Drummond, and along Main Street/Old Highway 10A (between State Highway 1 and Front Street) (Figure 3.17-1) (Phoenix 2014b). The posted speed limits are 55 mph on State Highway 1, 30 mph on Front Street, and 25 and 35 mph on Main Street/Old Highway 10A.

Table 3.17-4 summarizes the predicted ranges of traffic noise levels at residences along the possible truck routes. The predicted traffic noise levels including those associated with the lime and coal haul trucks, are not expected to exceed the MDT traffic noise impact criterion of L_{eq}(h) 66 dBA. However, the increase in traffic noise levels along Main Street/Old Highway 10A due to lime haul trucks is predicted to be +3 to +5 dBA (a barely to clearly audible increase) since no heavy trucks are currently using the road (MDT 2014). The increase in traffic noise levels due to coal haul trucks is predicted to be +5 to +9 dBA along Main Street/Old Highway 10A, which would be a clearly audible increase to twice as loud as the existing traffic noise (Table 3.17-1). Therefore, the haul trucks should not use the Main Street/Old Highway 10A route.

Table 3.17-4
Predicted Traffic Noise Levels

Haul Route Option:	State Highway 1	Front Street	Main Street/Old Highway 10A (25 mph)	Main Street/Old Highway 10A (35 mph)
Distance Between Residences and Road Centerline (Figure 3.17-1):	85 to 180 feet	40 to 75 feet	90 to 210 feet	40 to 185 feet
Existing Traffic Noise L_{eq}(h) WITHOUT Haul Trucks:	55 to 60 dBA	55 to 58 dBA	39 to 44 dBA	44 to 52 dBA
Lime Hauling				
Traffic Noise L_{eq}(h) WITH Lime Haul trucks:	56 to 60 dBA	56 to 59 dBA	44 to 49 dBA	47 to 55 dBA
Difference vs. Existing Traffic Noise:	0 to +1 dBA	+1 dBA	+5 dBA	+3 dBA
Perception (Table 3.17-1):	Imperceptible	Imperceptible	Clearly audible	Barely audible

Table 3.17-4
Predicted Traffic Noise Levels

Haul Route Option:	State Highway 1	Front Street	Main Street/Old Highway 10A (25 mph)	Main Street/Old Highway 10A (35 mph)
Coal Hauling				
Traffic Noise L_{eq}(h) WITH Coal Haul trucks:	57 to 61 dBA	57 to 60 dBA	48 to 52 dBA	50 to 57 dBA
Difference vs. Existing Traffic Noise:	0 to +1 dBA	+2 dBA	+8 to +9 dBA	+5 to +6 dBA
Perception (Table 3.17-1):	Imperceptible	Imperceptible to barely audible	Clearly audible increase to twice as loud	Clearly audible increase to twice as loud

3.18 AIR QUALITY

The Administrative Rules of Montana (ARM) 17.24.115(h) requires that a reclamation plan ensure that precautions are taken to ensure that airborne fugitive dust generated from cuts, tailings or disposal areas do not become a public nuisance or detriment to flora or fauna of the area. Further, air quality rules under ARM 17.8.308 require reasonable precautions are taken to prevent emissions of airborne particulate matter. The dust control plan contained in Appendix C describes the specific actions that will be taken at the MLR lime plant to control fugitive particulate matter emissions. The plan is summarized below.

3.18.1 Fugitive Dust Control

Fugitive dust may consist of soil particles mobilized by wind from exposed soil surfaces, soil and spoil handling, and traffic on unpaved access and haul roads. It may also consist of stone and lime particles arising from stone loading in the pit, dumping, crushing, conveyance and truck loading. Major components of the dust control plan are:

- Minimizing to the extent possible exposed soil areas
- Prompt revegetation of reclaimed areas
- Establishing temporary vegetation on inactive soil and spoil stockpiles that will be in place for one year or more
- Use of chemical dust control products to stabilize access and haul road surfaces
- Application of water to access roads and active haul roads during dry periods
- Enclosure of screens, crushers and transfer points
- Covering of conveyor belts
- Use of fabric filter dust collectors at stone dumping, crushing, screening, transfer and loading points
- Use of fabric filter dust collectors at lime processing, transfer and loading points

3.18.2 Air Quality Permit

The MLR lime plant will require a Montana Air Quality Permit and a Title V Operating Permit under the Montana Clean Air Act, with requirements specified in applicable federal and state air quality standards. The permits will specify dust control, monitoring and reporting requirements in detail. The air quality permit application will demonstrate compliance with all applicable state and federal regulations and ambient air quality standards.

3.18.3 Monitoring

Monitoring of ambient air quality will be conducted to the extent required under the terms of the air quality permits.

4.0 RECLAMATION PLAN

4.1 INTRODUCTION

The short-term objectives of reclamation are to:

- stabilize disturbed areas through erosion and sedimentation control
- control noxious weeds
- prevent air and water pollution

This will be achieved through a combination of operational practices, sediment and erosion control measures, interim revegetation, and implementation of a weed management plan.

The long-term objectives of reclamation are similar, but also include the creation of post-mine topography, distribution of soils, and establishment of an effective and permanent vegetative cover that collectively meet the approved post-mining land use of livestock grazing and that are compatible with adjacent areas. The portion of the pit that is not backfilled will have bluffs and exposed outcrops that will have utility for wildlife. Public safety will be ensured through the removal of facilities, fencing of the pit, and limited access onto private property.

Except in the event of emergency or catastrophe, MLR will not depart from the approved reclamation plan without previously obtaining written permission from MDEQ for the proposed change.

4.2 POST-OPERATION LAND USE

Pre-mining land uses are discussed in the Baseline Vegetation Report (Appendix A-4, Section 3.3). The primary land uses in the MLR study area are livestock grazing (rangeland) and hay production (tame pasture). NRCS long-term data provide recommended stocking rates for the applicable soils in Granite County, relative to good-excellent condition (HCPC). Additionally, NRCS gives long-term irrigated and nonirrigated hay yields by soils mapping unit that can be expected under a high level of management. Information pertinent to the MLR study area is summarized below.

Productivity varies considerably among vegetation types in the study area, depending on current condition and the ecological sites involved. Estimated grazing capacity in the intensive study area (encompassing the affected area) calculated for HCPC (not current condition) rangeland was estimated at 345 animal unit months (annually) for the intensive study area as a whole. Hay is the only crop grown in the inventory area. Upland Tame Pasture in the intensive study area comprises areas apparently seeded decades ago but not reseeded since then, and currently dominated by introduced grasses (mostly Russian wildrye) but with a fair representation of reestablished native grass (mostly Sandberg bluegrass). In the MLR intensive study area, Tame Pasture occurred on 68 acres (5 percent of the study area). Upland Tame Pasture in the intensive study area can be expected to produce 27.5 non-irrigated AUM's per acre.

Timbered areas in the inventory area do not generally constitute a commercial timber resource. Much of forest and savannah tree density in the study area is composed of non-commercial Rocky Mountain juniper, or mid-size Douglas-fir and limited ponderosa pine. Merchantable trees are present only as relatively small stands, often associated with steep and very steep terrain.

The post-mine land use will be grazing land for livestock. No alternative post-mine land uses are proposed. Post-Mining Land Use/Seed Mixtures developed for reclaiming mine areas for livestock grazing are presented in Section 4.5. Reestablished vegetation will be appropriate to the post-mine land use, in that:

- grazing land will provide post-mine livestock stocking rates equal to pre-mine rates
- fish and wildlife habitat, forestry and recreation are not post-mine land uses; however, wildlife enhancement features will be incorporated to benefit wildlife habitat (such as shrub seedings, slash piles, rock piles, bluffs, etc.).

4.3 POST-OPERATION TOPOGRAPHY AND GRADING

Mine disturbances will be graded to stable configurations under partial or complete saturated conditions. This will be accomplished by phased pit backfilling, construction of benches, backsloping the tops of waste rock and reject piles and slope reduction as discussed by mine component in the following sections. All final grading will be made with non-noxious, nonflammable, noncombustible solids. Post-mine topography is presented in Exhibit 4-1.

Surface gradient restoration will be suitable for the post-operation use of rangeland. Grading will minimize the amount of precipitation and run-on that infiltrates into disturbed areas.

4.3.1 Pit

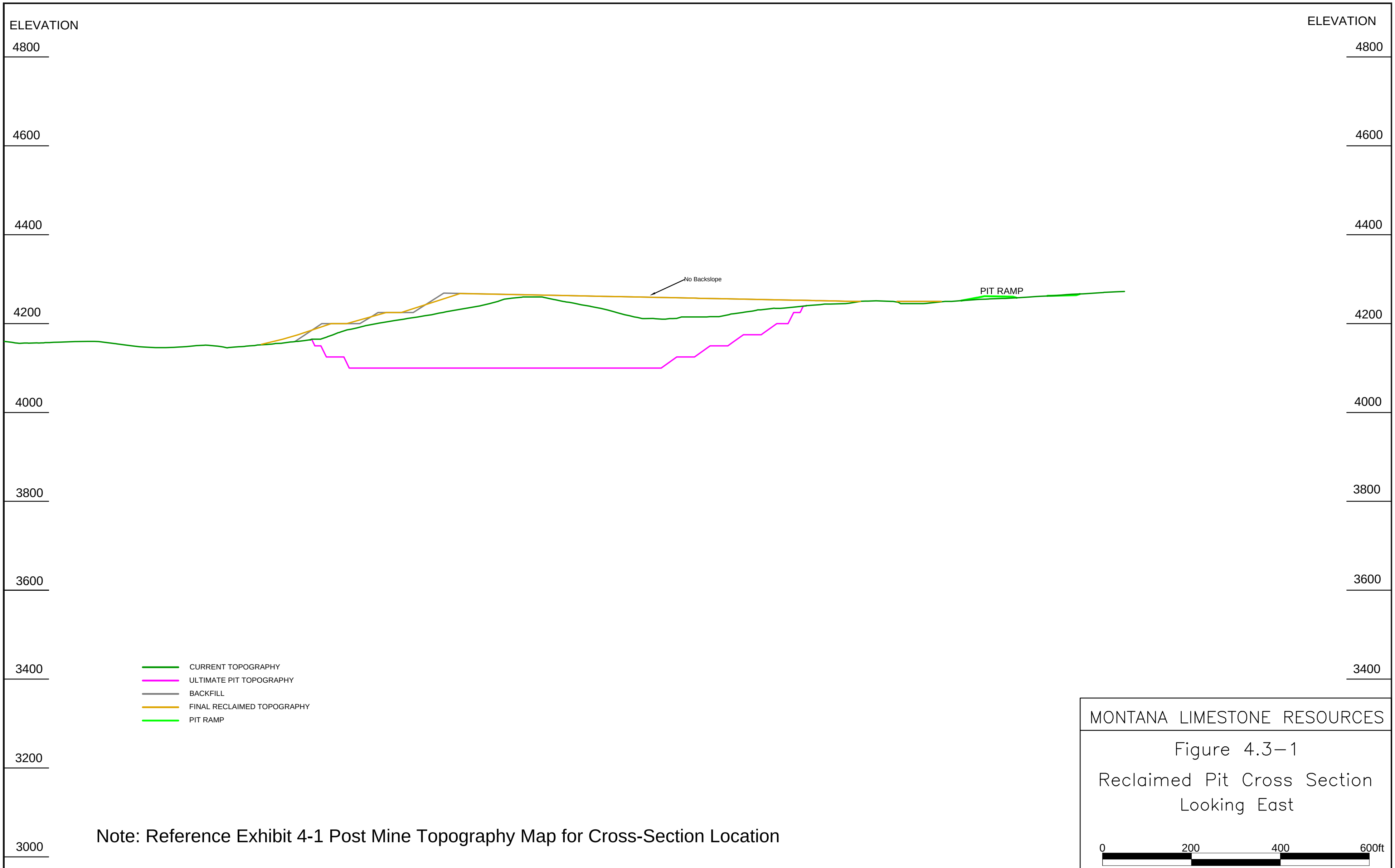
The mine plan is designed to provide phased pit backfilling. Figures 3.2-1 through 3.2-9 show the backfilling sequence. The initial pit area will be backfilled with waste rock generated from the second phase of mining with sequential backfilling such that only the final pit area remains unbackfilled. Figures 4.3-1 through 4.3-6 show cross-sections of pit backfilling; final pit configuration is shown on Figure 4.3-7.

4.3.2 Waste Rock Dump

The size of the waste rock dump has been minimized by designing the pit to allow for phased pit backfilling with waste rock. Only waste rock that cannot be direct-hauled into the pit, used for plant site or access road construction, or utilized commercially will be placed in the waste rock dump. Figure 4.3-8 shows a typical cross-section of the post-operation waste rock dump configuration. The top of the dump will be backsloped to reduce run-on. The dump face will be graded to a 1.5h:1v slope.

4.3.3 Rejects Pile

The rejects pile will be constructed and graded similarly to the waste rock dump; however, since the pile will contain smaller rock and more fines, the overall slope on the face will be reduced to 1.5h:1v. Figure 4.3-9 shows a typical cross-section of the regraded rejects pile.



Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location

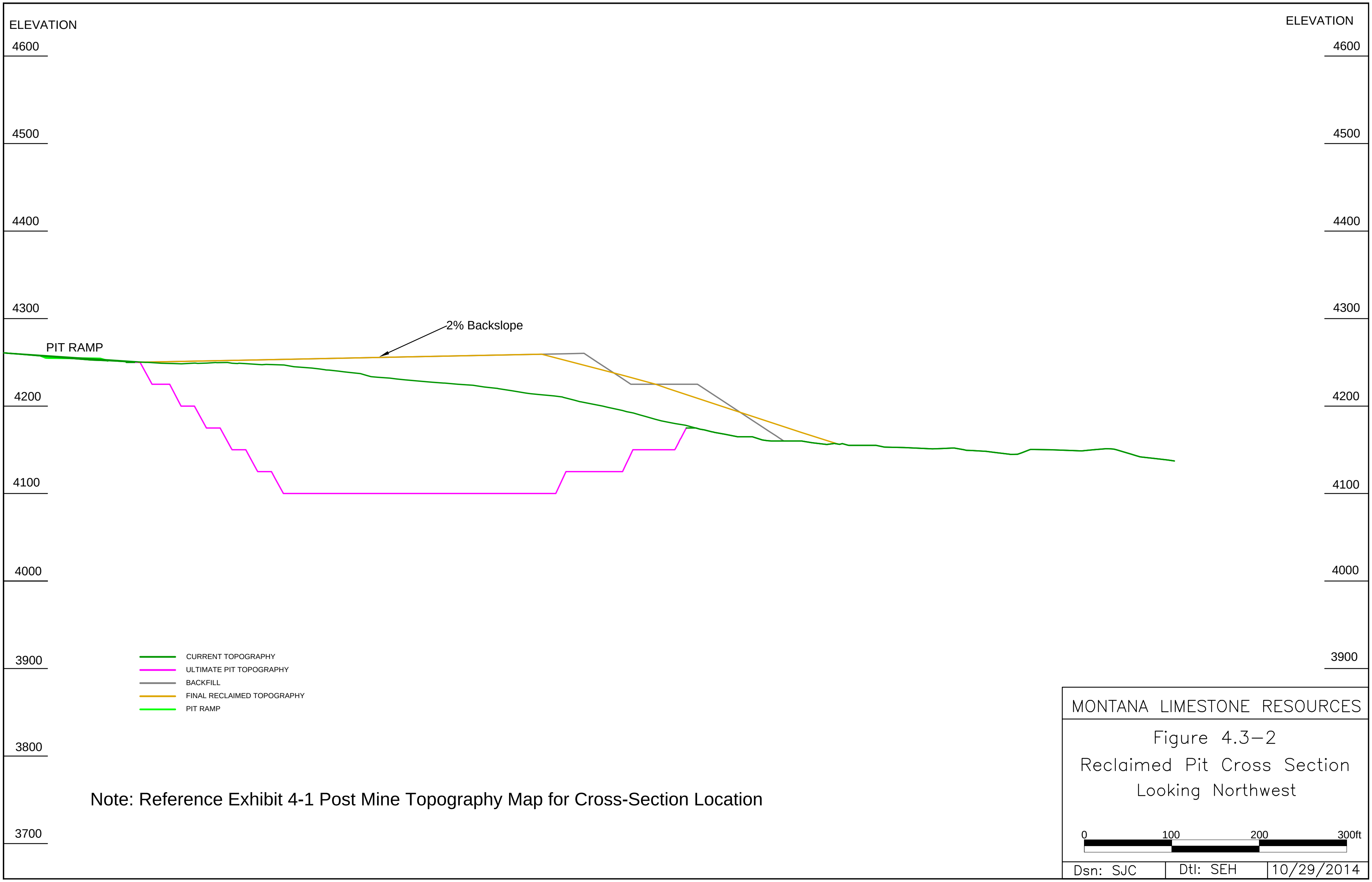
MONTANA LIMESTONE RESOURCES

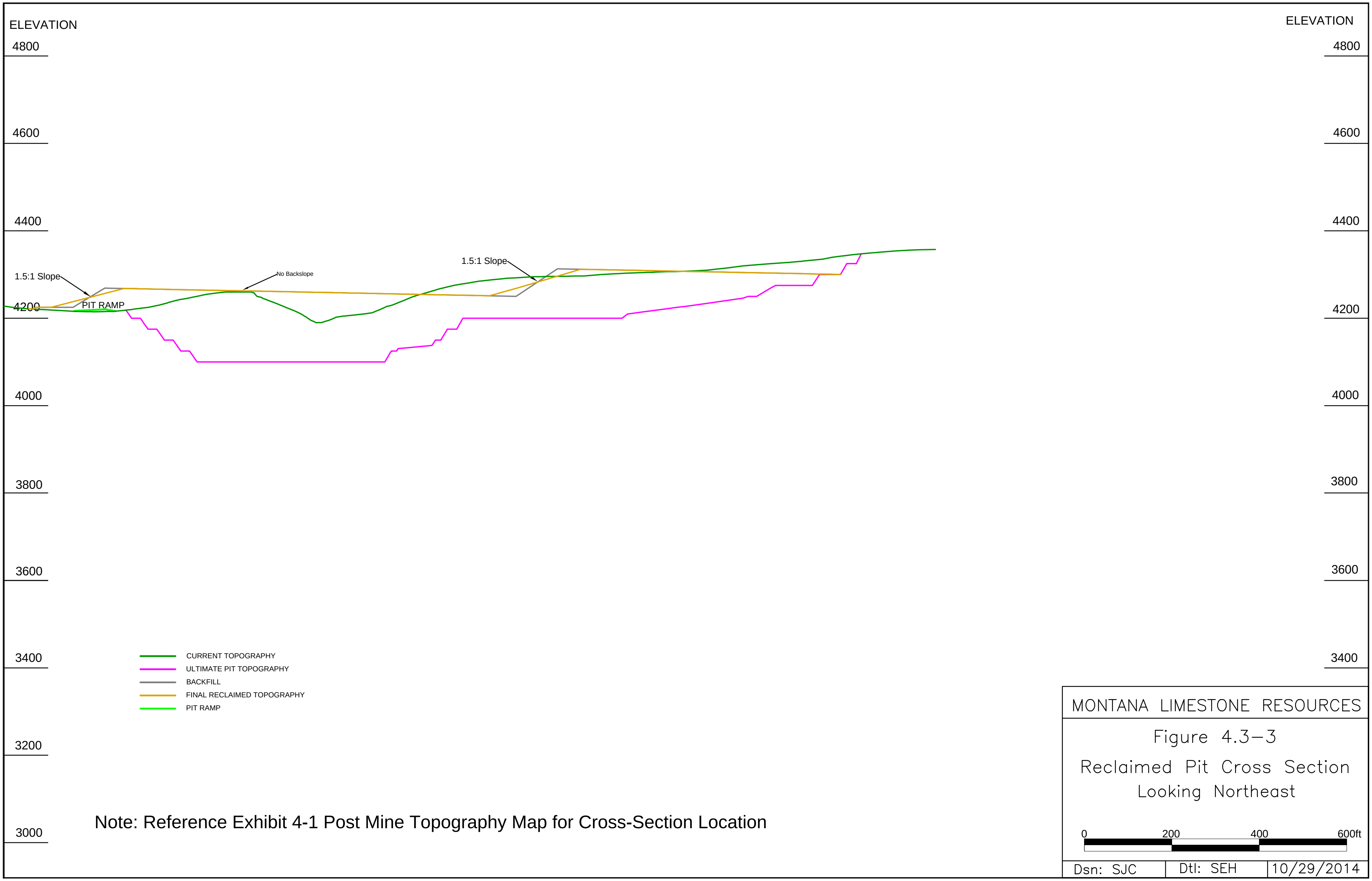
Figure 4.3–1

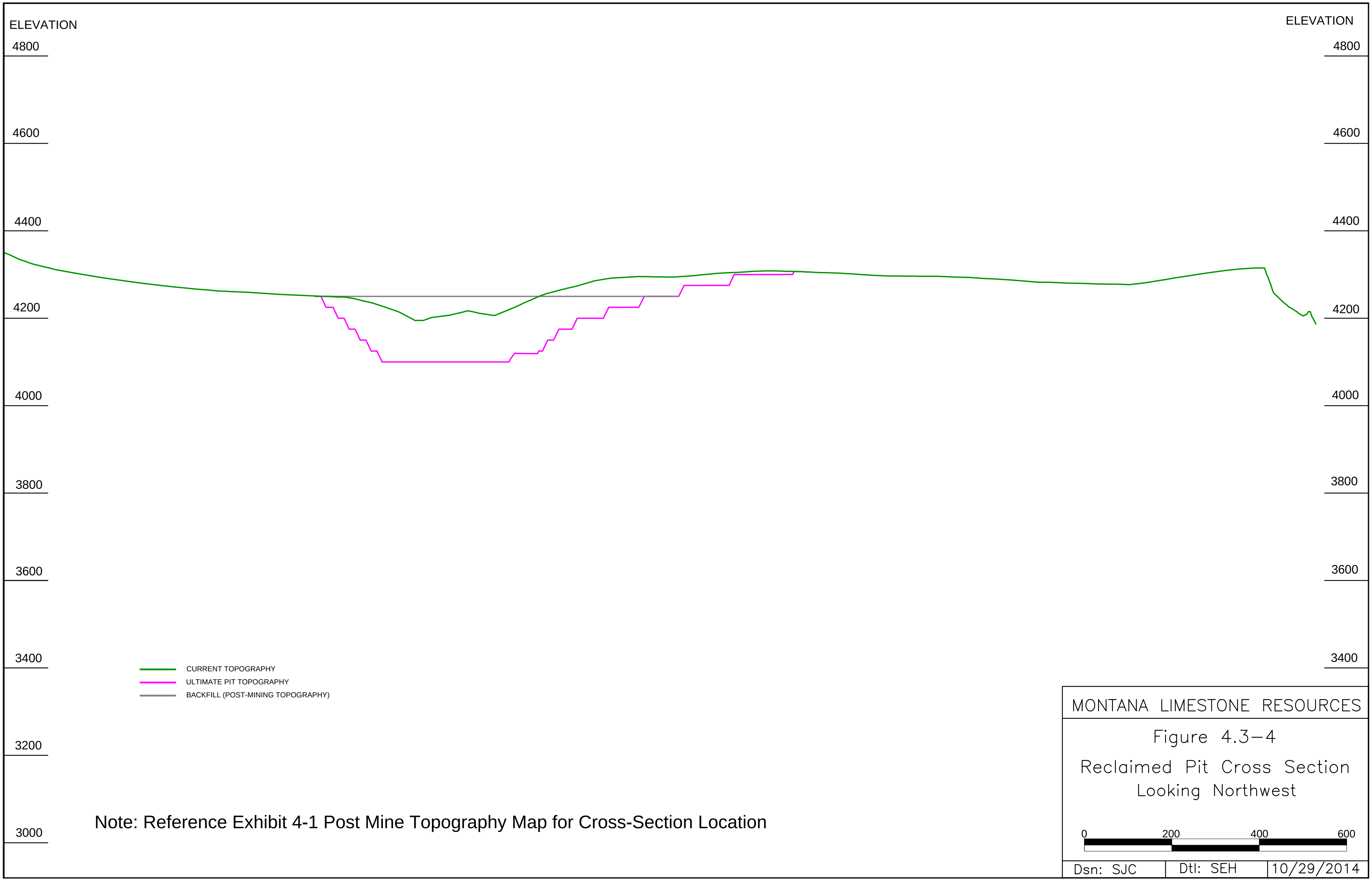
Reclaimed Pit Cross Section
Looking East

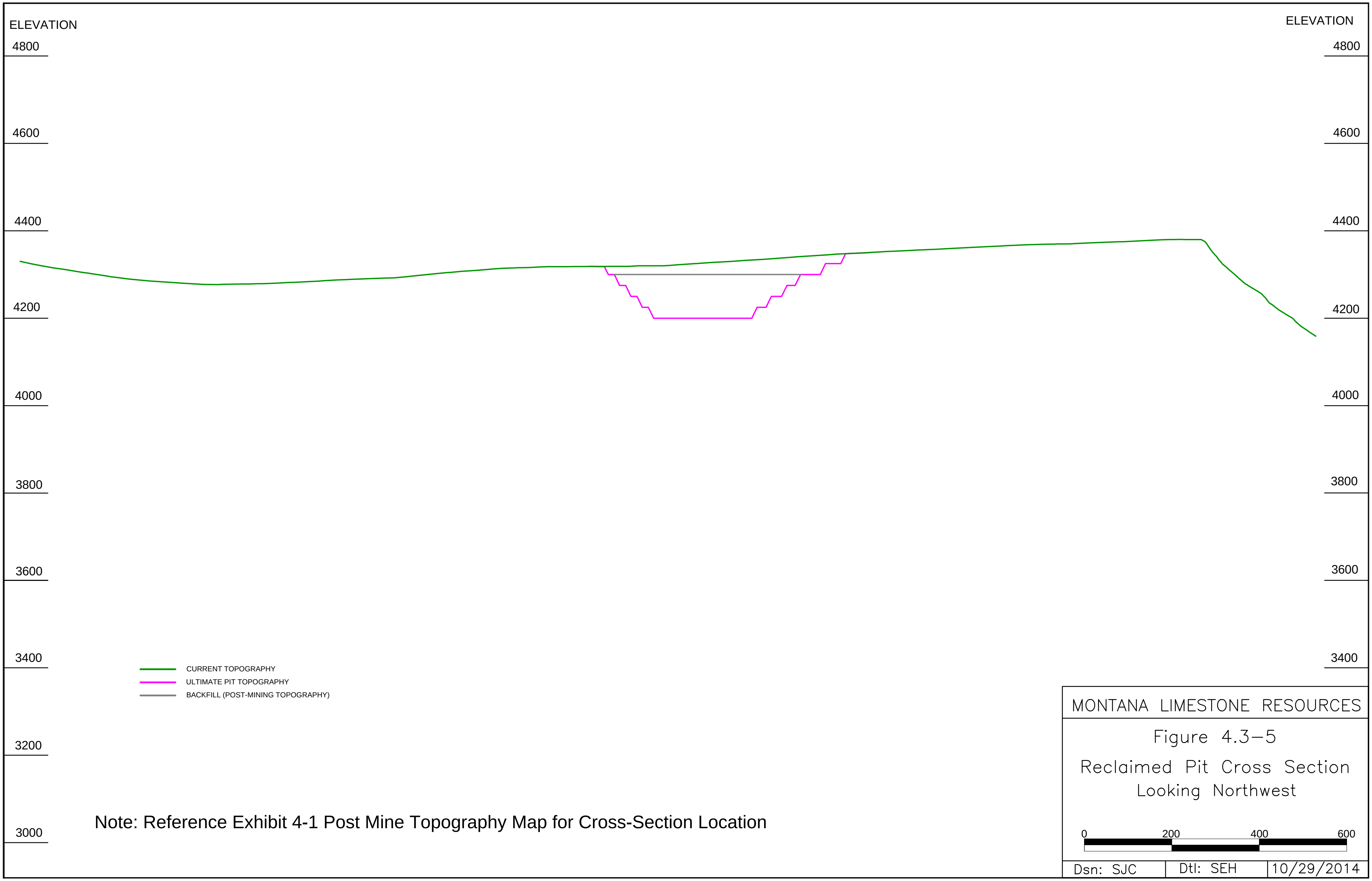
0 200 400 600ft

Dsn: SJC | Dtl: SEH | 10/29/2014


ELEVATION
4600
4500
4400
4300
4200
4100
4000
3900
3800
3700
ELEVATION
4600
4500
4400
4300
4200
4100
4000
3900
PIT RAMP
2% Backslope
CURRENT TOPOGRAPHY
ULTIMATE PIT TOPOGRAPHY
BACKFILL
FINAL RECLAIMED TOPOGRAPHY
PIT RAMP
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location
MONTANA LIMESTONE RESOURCES
Figure 4.3–2
Reclaimed Pit Cross Section
Looking Northwest
0
100
200
300ft
Dsn: SJC
Dtl: SEH
10/29/2014


ELEVATION
ELEVATION
4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
1.5:1 Slope
PIT RAMP
No Backslope
1.5:1 Slope
CURRENT TOPOGRAPHY
ULTIMATE PIT TOPOGRAPHY
BACKFILL
FINAL RECLAIMED TOPOGRAPHY
PIT RAMP
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location
MONTANA LIMESTONE RESOURCES
Figure 4.3–3
Reclaimed Pit Cross Section
Looking Northeast
0
200
400
600ft
Dsn: SJC
Dtl: SEH
10/29/2014

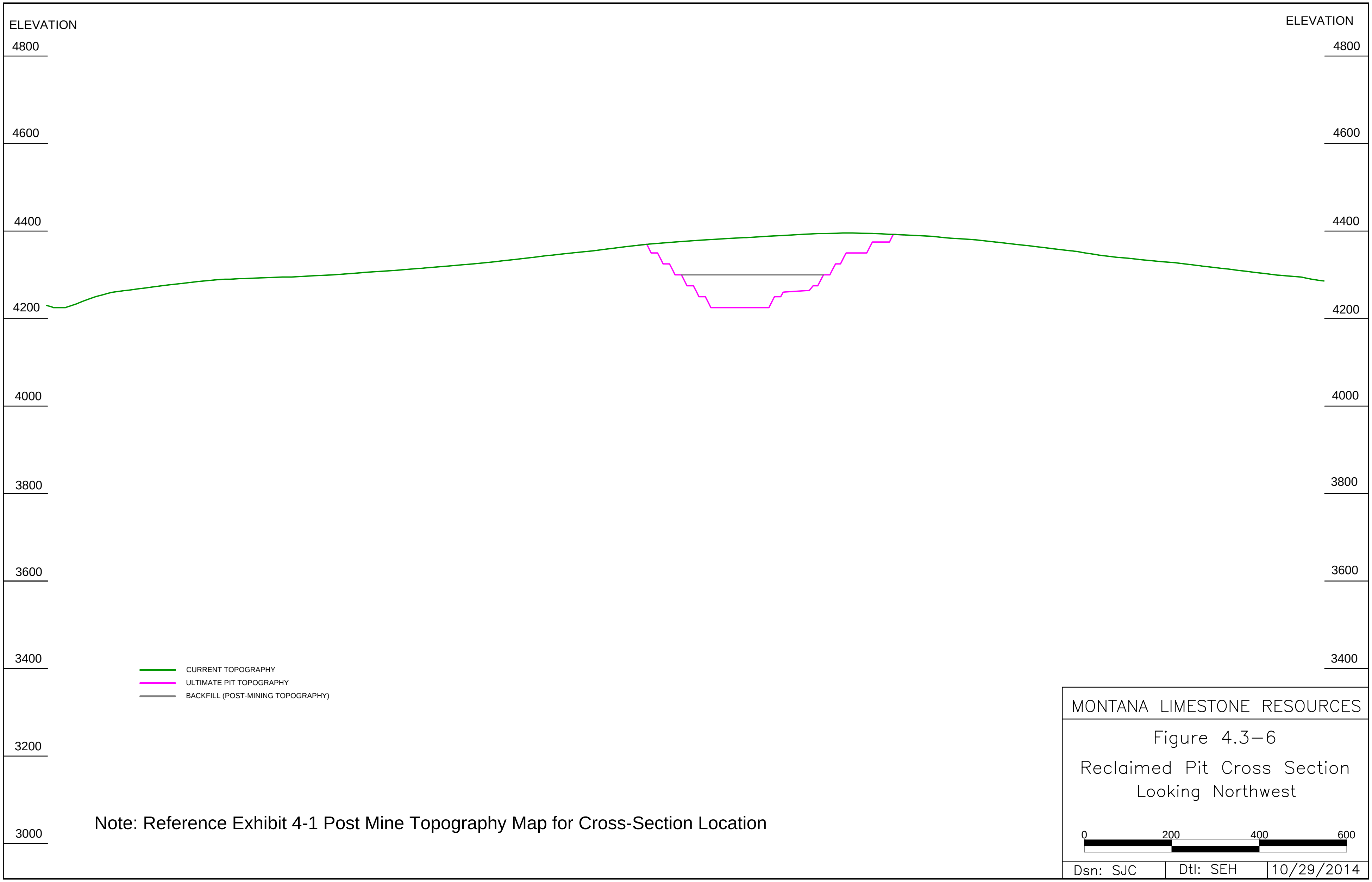

ELEVATION
4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
ELEVATION
CURRENT TOPOGRAPHY
ULTIMATE PIT TOPOGRAPHY
BACKFILL (POST-MINING TOPOGRAPHY)
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location
MONTANA LIMESTONE RESOURCES
Figure 4.3-4
Reclaimed Pit Cross Section
Looking Northwest
0
200
400
600
Dsn: SJC
Dtl: SEH
10/29/2014



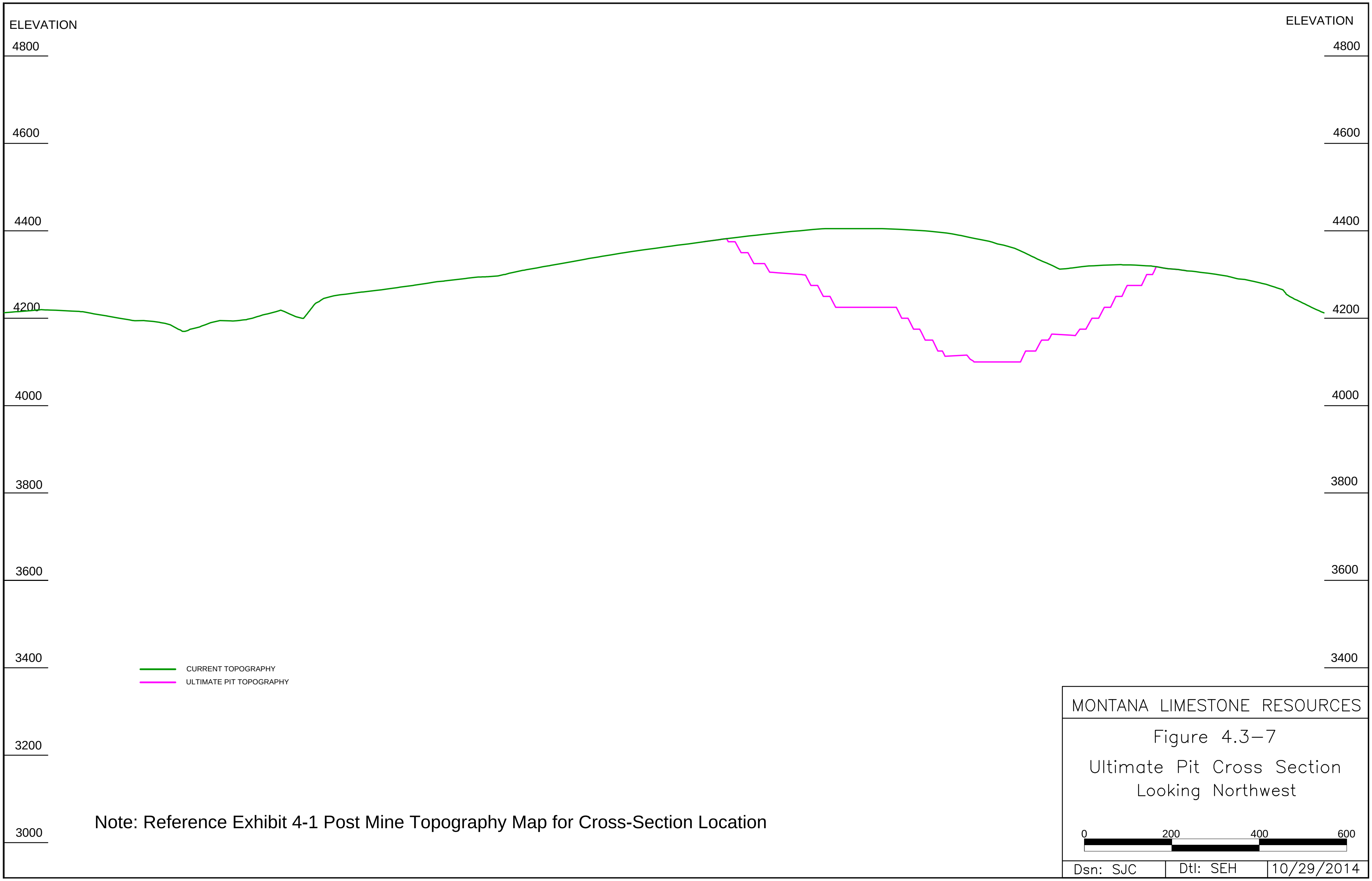
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location

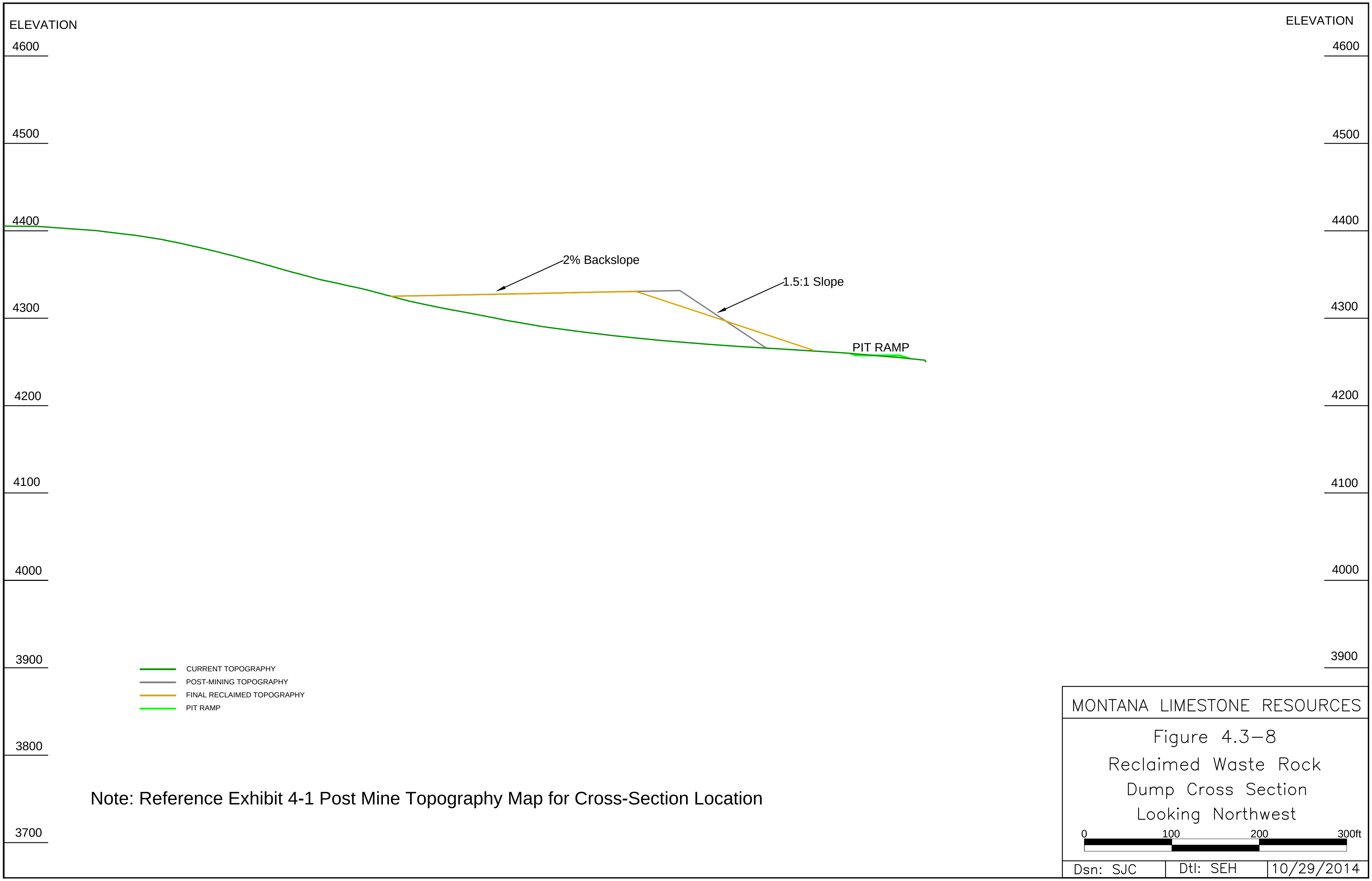
Figure 4.3–5

Reclaimed Pit Cross Section
Looking Northwest



Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location


ELEVATION
4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
ELEVATION
4800
4600
4400
4200
4000
3800
3600
3400
CURRENT TOPOGRAPHY
ULTIMATE PIT TOPOGRAPHY
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location
MONTANA LIMESTONE RESOURCES
Figure 4.3-7
Ultimate Pit Cross Section
Looking Northwest
0
200
400
600
Dsn: SJC
Dtl: SEH
10/29/2014

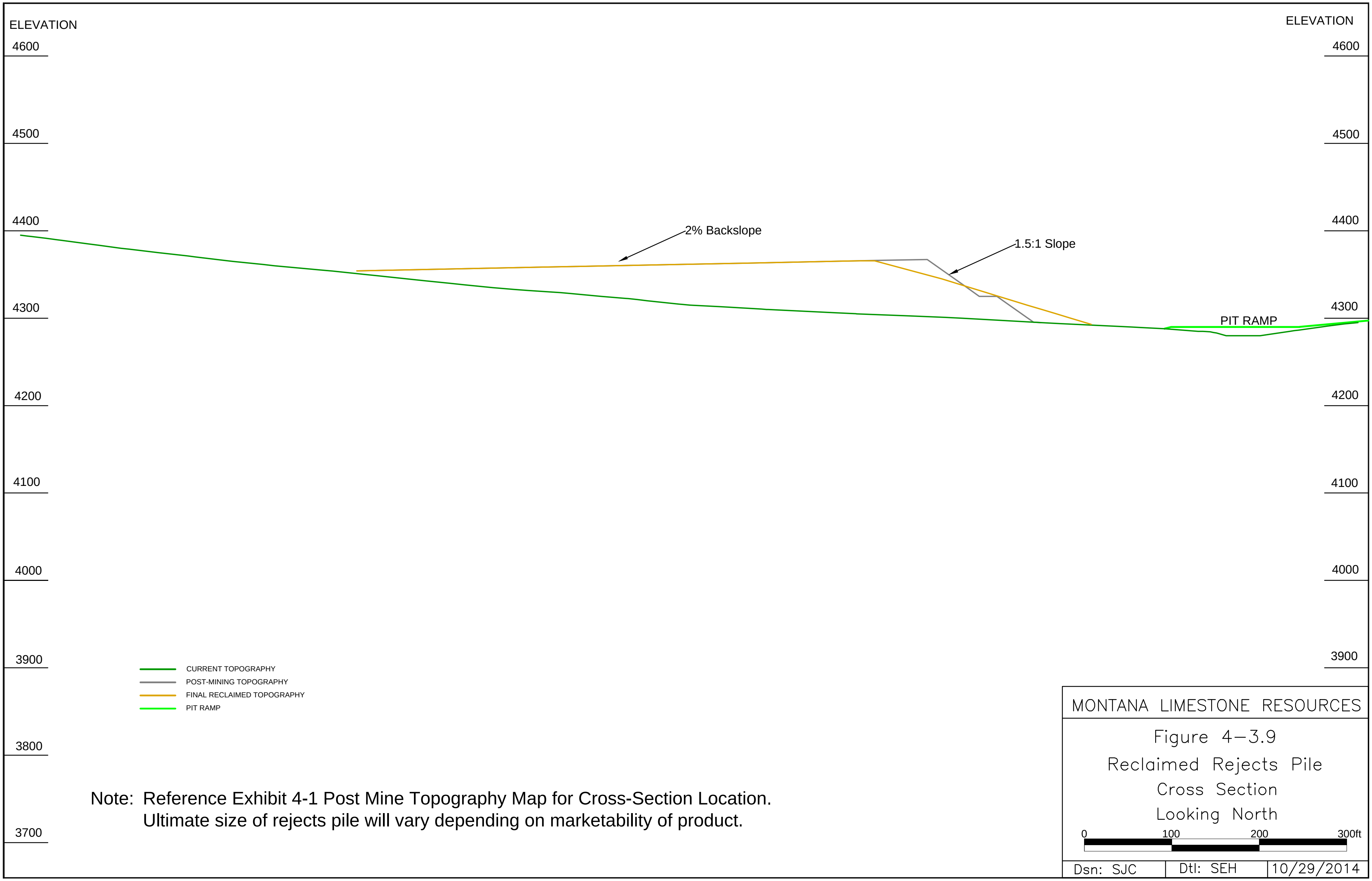


Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location

MONTANA LIMESTONE RESOURCES

Figure 4.3–8
Reclaimed Waste Rock
Dump Cross Section
Looking Northwest

Dsn: SJC	Dtl: SEH	10/29/2014



Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location.
Ultimate size of rejects pile will vary depending on marketability of product.

4.3.4 Plant Site

The plant site will be constructed to a configuration suitable for post-operation use in ranch operations, which may include, but is not limited to, equipment/material storage, hay storage or corrals. No regrading is proposed. Cut slopes will be constructed and remain at not steeper than 2.5h:1v. Fill slopes will be constructed and remain at not steeper than 3h:1v.

4.3.5 Access Road

The mine access road will be constructed to final (end-of-operation) configuration since it will remain for the post-operation use. Cut slopes will be not steeper than 2.5h:1v and fill slopes will be not steeper than 3h:1v.

4.3.6 Sediment Pond Embankments

The north and south sediment pond embankments will remain after operations. Figures 4.3-10 (north sediment pond embankment) and 4.3-11 (south sediment pond embankment) show post-mining cross-sections.

4.4 SOIL HANDLING

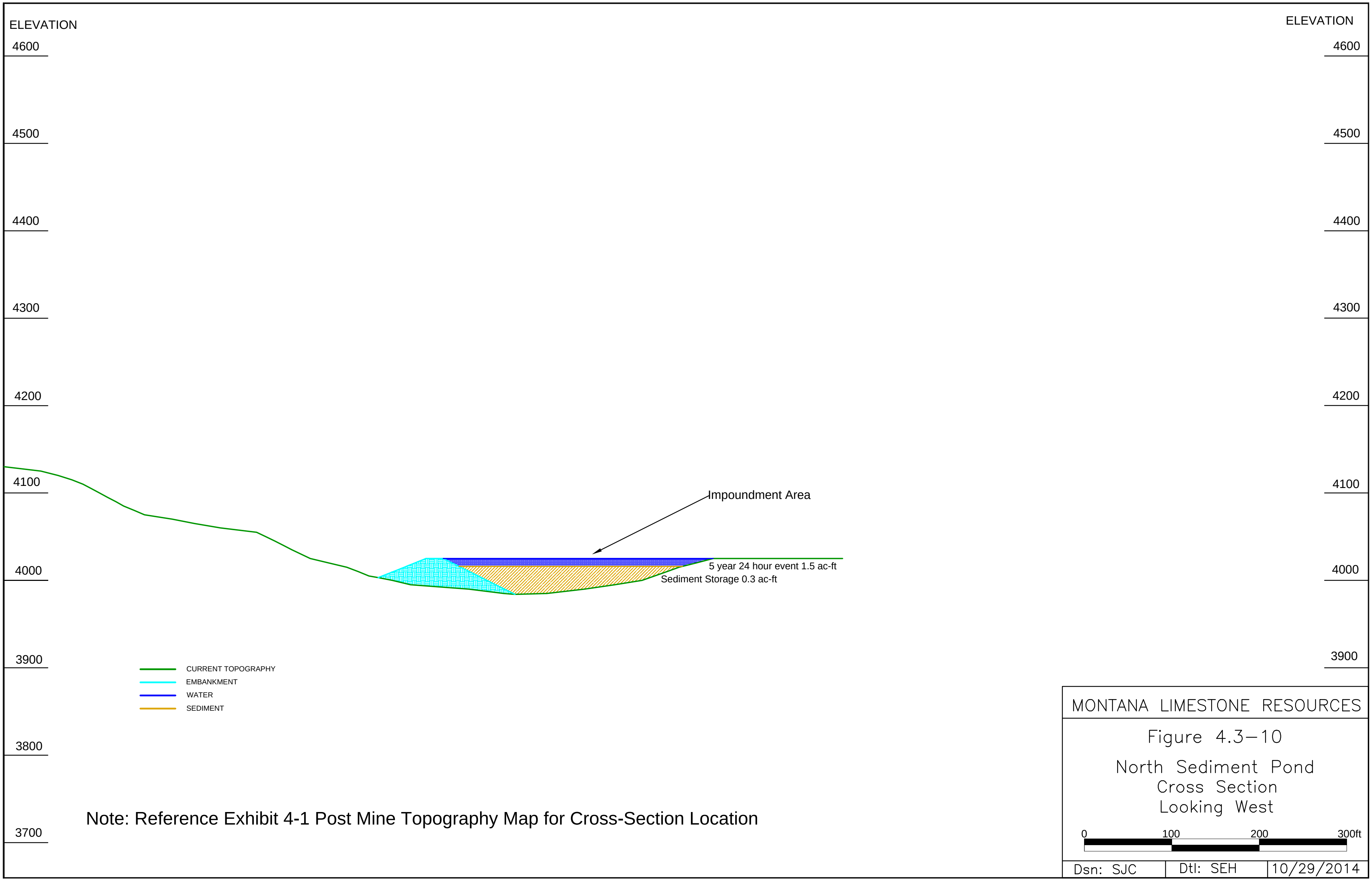
Soils will be salvaged and stored in accordance with methods described in the Soil Salvage and Protection Plan (Section 3.8). Typically salvaged topsoil will be transported to a designated soil storage area and stored until required for site reclamation. In some cases, soil redistribution will be accomplished using direct-haul handling if areas of regraded spoils have been approved for application of topsoil. The average respread thickness of topsoil on mine disturbance sites is 14 inches, which approximates the soil depth of pre-mine soils.

To minimize soil compaction and contamination, topsoil handling will be timed to avoid periods of wet weather and/or saturated soils, when practicable. In general, soils will be stockpiled and replaced in the general areas from which they were salvaged. Most of the soils salvaged during the construction of mine roads will be immediately replaced and reseeded on roadside cut/fill slopes, reducing the storage time of these soils. Soils associated with the development of mine facilities and the mine pit will be stockpiled and replaced onto the backfilled and reclaimed areas of the pit on a rotating basis. These approaches will preserve soil fertility through reduced storage time and mitigate erosion from fewer and/or smaller soil stockpiles.

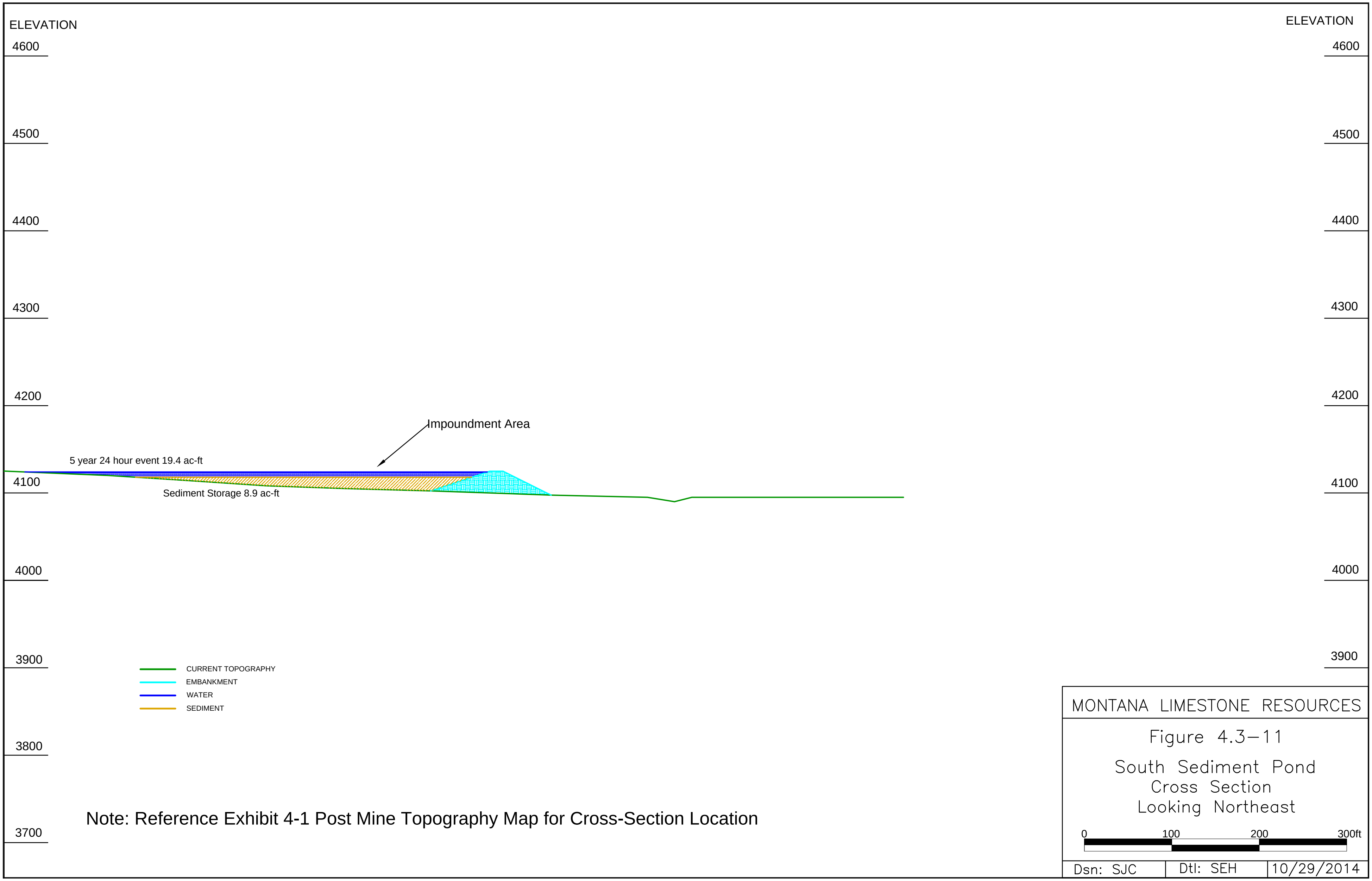
4.5 REVEGETATION

4.5.1 Permanent Revegetation Mixtures

Quantitative vegetation sampling was conducted in 2013 in or near areas potentially affected by proposed mining operations. Baseline vegetation data are presented in Appendix A-4 of this application. Over half (approximately 55 percent) of the intensive vegetation baseline study area was comprised of native grassland types dominated by bluebunch wheatgrass, Idaho fescue, and rough fescue. Upland shrub/grassland types (nearly 22 percent of the study area) were primarily dominated by big sagebrush



ELEVATION
4600
4500
4400
4300
4200
4100
4000
3900
3800
3700
ELEVATION
4600
4500
4400
4300
4200
4100
4000
3900
Impoundment Area
5 year 24 hour event 1.5 ac-ft
Sediment Storage 0.3 ac-ft
CURRENT TOPOGRAPHY
EMBANKMENT
WATER
SEDIMENT
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location
MONTANA LIMESTONE RESOURCES
Figure 4.3–10
North Sediment Pond
Cross Section
Looking West
0
100
200
300ft
Dsn: SJC
Dtl: SEH
10/29/2014


ELEVATION
4600
4500
4400
4300
4200
4100
4000
3900
3800
3700
ELEVATION
Impoundment Area
5 year 24 hour event 19.4 ac-ft
Sediment Storage 8.9 ac-ft
CURRENT TOPOGRAPHY
EMBANKMENT
WATER
SEDIMENT
Note: Reference Exhibit 4-1 Post Mine Topography Map for Cross-Section Location
MONTANA LIMESTONE RESOURCES
Figure 4.3-11
South Sediment Pond
Cross Section
Looking Northeast
0
100
200
300ft
Dsn: SJC
Dtl: SEH
10/29/2014

with understories distinguished by Sandberg's bluegrass, western wheatgrass, bluebunch wheatgrass, Idaho fescue, rough fescue, and Kentucky bluegrass. Tame pasture, dominated by seeded, non-native perennial grasses, constituted 5 percent of the study area. Conifer forest and woodland totaled nearly 18 percent of the intensive study area, and was characterized by Douglas-fir, Ponderosa pine, and juniper types having understories dominated by bluebunch wheatgrass, rough fescue, and mallow ninebark. Remaining miscellaneous categories comprised 0.5 percent of the intensive study area.

MLR proposes to seed permanent Grassland and Shrubland revegetation mixtures (see Table 4.5-1). A correlation of these two pre-mining vegetation types with the permanent post-mining revegetation mixtures and acreages is presented in Table 4.5-2. The location of the permanent post-mining revegetation mixtures is shown on Exhibit 4-1 (Post-Mine Topography Map). The access road surface and a portion of the pit will remain unvegetated.

The Grassland and Shrubland permanent revegetation mixtures are most compatible with the post-mining land use (livestock grazing) and anticipated site conditions (topography, aspect, slope, soils); have similar species composition as pre-mining vegetation communities; are capable of self-regeneration and succession; are compatible with plant and animal species in the area; and meet requirements of applicable seed and noxious weed regulations.

Permanent seed mixtures are exclusively native. The mixtures can be expected to provide a diverse, effective, and permanent vegetative cover that is capable of stabilizing the post-mining soil surface.

Seed that is genotypically and phenotypically adapted to the project area and from within the Northern Rocky Mountains or Great Plains will be used when commercially available in sufficient quantity and acceptable quality. Seeding rates have been calculated on a Pure Live Seed (PLS) basis. Purity and germination rates will be documented. All seed will be noxious weed-free.

4.5.2 Seeding and Planting Rates

Grasses, forbs, and shrubs will be seeded. In the Shrubland mixture, the grass and forb seeding rates will be reduced by 50 percent; grasses, forbs and shrubs may be seeded together using a broadcast drop seeder. Where grasses are drill-seeded, they will be applied separately from shrubs to alleviate herbaceous competition and promote the establishment of shrubs. Shrubs will generally be broadcast-seeded.

4.5.3 Seeding Methods

Seedbed Preparation

Soils will be prepared for seeding by subsoil or chisel plowing to relieve compaction, and disking or culti-packing to prepare a firm seedbed.

Seeding

Both broadcast and drill-seeding will be used. Drill-seeding will be used wherever equipment can safely negotiate the terrain, and will be conducted on the contour wherever possible. Seeding depth will generally be ¼ to ½-inch. A rangeland drill, broadcast drop seeder or comparable equipment will be used.

Table 4.5-1
Permanent Revegetation Mixtures, Montana Limestone Resources

SPECIES	COMMON NAME	PREFERRED VARIETY[1]	Grassland		Shrubland	
			Drill Seeding Rate (Pure Live Seed – PLS)[2]			
			# PLS/Acre	PLS/sq. ft.	# PLS/Acre	PLS/sq. ft.
GRASSES:						
Agropyron dasystachyum	Thickspike wheatgrass	Critana	2.00	7	1.00	4
Agropyron smithii	Western wheatgrass	Rosana	3.00	8	1.50	4
Agropyron spicatum	Bluebunch wheatgrass	Goldar	4.00	13	2.00	6
Agropyron trachycaulum	Slender wheatgrass	Pryor	1.00	4	0.50	2
Festuca campestris	Rough fescue	Site adapted	1.00	5	0.50	2
Festuca idahoensis	Idaho fescue	Winchester	0.50	5	0.25	3
Koeleria cristata	Prairie junegrass	Site adapted	0.10	5	0.05	3
Poa secunda	Sandberg's bluegrass	High Plains	0.25	6	0.10	2
Stipa comata	Needle-and-thread	Site adapted	1.00	3	0.60	2
Stipa viridula	Green needlegrass	Lodorm	1.00	4	0.50	2
		SUBTOTAL	13.85	60	7.00	30
SHRUB:						
Artemisia tridentata	Big sagebrush	Vaseyana	-	-	2.00	115
		SUBTOTAL	-	-	2.00	115
		TOTAL	**13.85**	**60**	**9.00**	**145**

[1]"Site adapted" seed originates from within the Northern Rocky Mountain and Great Plains regions.
[2]Drill Seeding Rates are given in pounds Pure Live Seed (PLS) per acre and PLS per sq. ft. Rates will be doubled if broadcast-seeded.

NOTE 1: Species or rates may be revised based on commercial availability or site-specific conditions.
NOTE 2: Forbs are not recommended because of their susceptibility to mortality from herbicides used to control numerous noxi ous weeds that are present in area.

Table 4.5-2
Correlation of Pre-Mining Vegetation Types in the MLR Intensive Baseline Study Area With Revegetation Mixtures and Post-Mining Acreages

PRE-MINING VEGETATION TYPE	POST-CONSTRUCTION REVEGETATION ACREAGE
GRASSLAND	
Disturbed Grassland	153.01
Bluebunch wheatgrass/Sandberg's bluegrass h.t.	
Bluebunch wheatgrass/Western wheatgrass h.t.	
Idaho fescue/Bluebunch wheatgrass h.t.	
Rough fescue/Bluebunch wheatgrass h.t.	
SHRUBLAND	
Big sagebrush/Sandberg's bluegrass c.t.	27.31
Big sagebrush/Western wheatgrass c.t.	
Big sagebrush/Bluebunch wheatgrass h.t.	
Big sagebrush/Idaho fescue h.t.	
Big sagebrush/Rough fescue h.t.	
Western snowberry/Kentucky bluegrass c.t.	
Common chokecherry/Bluebunch wheatgrass c.t.	
TOTAL	**180.32**

Broadcast seeding will be conducted for shrubs; for slopes exceeding 33 percent; and on areas with high coarse fragment content. Seed will be broadcast using manually or mechanically-operated cyclone-type bucket spreaders or a drop-seeder. On small or hard-to-access sites, hand raking will be used to cover seed. Hydroseeding may be utilized on a limited basis. If hydroseeding is used, seed, mulch and tackifier will be applied using the manufacturer's recommended rates and procedures.

4.5.4 Interim Revegetation

Operational disturbances such as soil stockpiles and roadsides within the Plant Site during mining will be stabilized using the following native Interim revegetation mixture:

			Broadcast Seeding Rate[1]	
Species	**Common Name**	**Variety**	**Pounds PLS/Acre**	**PLS/sq.ft.**
GRASSES:				
Agropyron smithii	Western wheatgrass	Rosana	10	25
Agropyron trachycaulum	Slender wheatgrass	Pryor	4	14
Stipa viridula	Green needlegrass	Lodorm	10	40
		TOTAL	**24**	**79**

[1]If drill-seeding is used, the rate will be halved.

The Interim revegetation mixture may be broadcast, drilled, or hydroseeded, depending on site condition, as detailed previously.

4.5.5 Seeding Periods

Seeding will be coordinated with other reclamation activities to occur as soon after seedbed preparation as possible. Fall seeding (mid-September to late November) is preferred, based on climatic considerations, local soil moisture patterns, and germination requirements of selected species. When soil moisture conditions are suitable, late summer/ early fall seeding (mid-August to mid-October) may be employed. Spring seeding (early April up to mid-June) will be practiced if areas are ready for revegetation, climatic conditions are acceptable, and access is possible. Interim revegetation will be implemented to stabilize sites prior to permanent revegetation (e.g., sediment control structures or topsoil stockpiles) as soon after their construction as possible.

4.5.6 Cultural Practices

Nurse crops (companion crops) will generally not be included as they tend to provide unwanted competition and will typically reduce stand establishment and forage yield of desired species. However, cover crops, which may include cereal grains, annual ryegrass, or sterile hybrids of cereal grains, may be seeded as necessary for erosion control when seeding of perennial mixtures will be delayed until the next appropriate season.

Straw mulch may be applied as necessary to steeper slopes (generally slopes ≥33 percent where rock cover does not provide adequate erosion control), longer slopes with erosive soils, and other locations where necessary to reduce soil loss and prevent off-site sedimentation. Hydromulch may be used in lieu of straw mulch on some sites such as cut-fill slopes, steeper slopes that are not safely negotiable by surface equipment, and areas too small for equipment to operate. As discussed above, mulching is also an option where interim erosion control is necessary.

Where utilized, mulch will be certified noxious weed seed-free cereal grain straw. Straw will be crimped on the contour, or will be dozer-tracked with tracked grousers perpendicular to the slope.

Hydromulch and tackifier will be applied at a rate to produce a uniform mat on the ground at rates recommended by the manufacturer. Fibers will be dyed to facilitate visual metering.

Fertilization of revegetated areas is not planned; however, fertilization may be used as a management measure in the event vegetation monitoring indicates a soil nutrient deficiency, and the deficiency is confirmed by soil testing.

4.6 PERMANENT EROSION AND SEDIMENT CONTROL

As described in Section 4.3, the post-mining topography has been designed to be erosionally stable. Grading will minimize the amount of precipitation and run-on that infiltrates into disturbed areas by phasing pit backfilling, constructing benches, backsloping tops of the waste rock dump and rejects pile, and reducing slopes.

Sediment control structures, including runon/runoff ditches and two sediment ponds will either be: removed, graded, and revegetated (most ditches); retained and revegetated in place (ditch associated with rejects pile); or potentially retained in place for use by the landowner (sediment ponds) for stock watering.

The prompt establishment of permanent vegetation constitutes the principal measure used to prevent erosion and sedimentation. Final grading, soil replacement, and seeding will be conducted along the contour to minimize rills or gullies that disrupt approved post-mining land use and the establishment of vegetation, or potentially cause or contribute to a violation of water quality standards outside of the permit area. Minor erosional features and small eroded areas will constitute normal conservation practices; a plan will be prepared in consultation with MDEQ to mitigate areas of extensive rill and gully formation.

4.7 POST-OPERATION SOLID WASTE DISPOSAL

One waste rock dump and one rejects pile will be reclaimed in place at the end of operations. Waste rock management and storage is discussed in Section 3.2.5; final grading of the waste rock dump and rejects pile is described in Section 4.3; and soil redistribution and revegetation of the waste rock dump and rejects pile is discussed in Sections 4.4 and 4.5, respectively.

All facilities (buildings, infrastructure, equipment, etc) will be dismantled, salvaged if possible, and removed. Following removal of facilities, remaining solid waste will be disposed of in accordance with laws and regulations of the MDEQ Solid Waste Management Section and Granite County.

Inert waste such as concrete, plastic, steel, or wood may be sold to scrap dealers for recycling or buried on-site. Some waste may be transported to an approved waste transfer station as authorized by the county solid waste district. Any exposed rebar in concrete would be cut flush with the concrete surface prior to burial.

4.8 RECLAMATION OF SURFACE SUPPORT FACILITIES

All disturbed areas will be regraded as described in Section 4.3, re-soiled as discussed in Section 4.4, and seeded/planted as described in Section 4.5. The pit will be partially backfilled and reclaimed as discussed in Section 4.9. The waste rock dump and rejects pile will be graded, soiled, and revegetated in place (Sections 4.3-4.7).

The cut and fill slopes of the access road up to the mine area and the embankments of the north and south sediment ponds will be permanently reclaimed with the Grassland mixture during initial construction, and will remain in place for landowner use following mining. The plant facilities area will be minimally graded, ripped, soiled, and seeded in place to provide level areas for landowner use following mining. The sediment pond embankments will also remain in place following mining and be managed by the landowner for use as potential stockwater ponds.

4.9 PIT RECLAMATION

As described in Sections 3.2.1 and 4.3.1, the pit will be backfilled as mining progresses, leaving only the final pit open. Figure 3.2-1 shows the final pit configuration; Figures 4.3-1 through 4.3-7 show pit backfilling cross-sections.

The floor and walls of the pit will be limestone and will not cause formation of acidic, toxic, or otherwise pollutive solutions (objectionable effluents) on exposure to moisture. No insulation of pit walls, faces or the bottom will be necessary and no water treatment will be necessary.

The remaining pit walls will be composed of remnant limestone of the Madison formation with a massive structure not prone to instability from geologic or climatic perturbations. No pit wall failures are anticipated and, in the remote possibility a failure did occur, the pit is on private land not accessible to the public.

The portion of the pit that is backfilled (comprising the majority of the pit area) will be reclaimed as rangeland, providing utility for the ranching operation. Fencing will be installed around the perimeter of remaining pit walls to prevent livestock from falling into the pit.

The final pit area that is not backfilled will provide potential nesting habitat for birds that typically nest in cliffs. This would include raptors that construct stick nests on rock faces (such as red-tailed hawk or golden eagle), or those who use ledges or cavities (such as American kestrel or great horned owl), as well as several passerines (such as common raven, rock dove or swallows). Bats may also roost in fissures in the high wall face.

Phased pit backfilling will mitigate visual contrasts between reclaimed areas and adjacent lands.

No undesirable off-site environmental impacts are anticipated given proposed reclamation.

4.10 REVEGETATION MONITORING

Qualitative observations of vegetation establishment and erosion will be made by pedestrian reconnaissance of seeded areas for three years following seeding. Data recorded in early years will include observations of seedling success and vigor. Later observations will include plant vigor, composition, and relative density, as well as evidence of erosion.

4.11 REVEGETATION MANAGEMENT

Post-operation land use management will provide for reestablishment of pre-mine land use of livestock grazing. Upon cessation of mining operations, cattle will be excluded from grazing on revegetated areas (through appropriate fencing) until vegetation is well-established and hardy enough to withstand moderate grazing. Noxious weeds will be monitored and treated with herbicide on reclaimed and adjacent areas.

4.12 WEED MANAGEMENT PLAN SUMMARY

4.12.1 Purpose and Objectives

This section summarizes the weed management plan presented in Appendix F. The plan outlines strategies to prevent and/or control the spread of noxious weeds during operations and reclamation of the MLR Project. Noxious weed management requirements and commitments are outlined in Montana's Weed Laws and the Granite County Noxious Weed Management Plan (Granite County Weed District 2012), and detailed in Appendix F.

State-owned land within the Project area is managed by the Montana DNRC Trust Land Management Division. Under the Project's right-of-way easement agreement with the State of Montana, the Project will be required to control noxious weeds for the life of the Project within the Project boundary/right-of-way easement and prevent the spread of noxious weeds onto land adjoining the right-of-way easement land regardless of the presence or absence of weeds on lands adjacent to the Project area.

Additionally, the Granite County Noxious Weed Management Plan (Granite County Weed District 2012) outlines specific requirements for mining operations as outlined in Appendix F.

Noxious weed distribution is presented by vegetation community type in the Baseline Vegetation Inventory Report (Appendix A-4). Ten state-listed weed species (one Priority 2A and nine Priority 2B) and one Priority 3 regulated plant species were encountered on the study area during the 2013 MLR baseline inventory. The species recorded in the Project area are discussed in Appendix A-4.

4.12.2 Monitoring and Management of Noxious Weeds

The focus of MLR's weed management program is to protect weed-free vegetation communities by monitoring and treating new or expanding weed populations within the Project area during operations and reclamation phases. During operations, the distribution and density of noxious weeds will be monitored on topsoil stockpiles and all project-related infrastructure as detailed in Appendix F.

Weeds are spread by a variety of means that may include construction and mining equipment, construction and reclamation materials, livestock, wildlife, and wind. The risk of establishing weeds increases with ground-disturbing activities. The Plan presented in Appendix F presents strategies to manage noxious weeds during pre-operations, operations and reclamation phases of the Project, focused on 1) preventative measures, 2) management methods, and 3) education.

4.12.3 Herbicide Application and Reporting

Herbicides will be utilized on a limited basis during the pre-operations phase and as the primary control method during the operations and reclamation phases. Herbicides used on the Project will first be approved by the Granite County Weed Supervisor. All persons applying herbicides will have current Montana certification.

Weed control activities will be documented. A report will be prepared describing occurrence, distribution, and abundance of noxious weeds and weed control activities. Reports will be presented to the Granite County Weed Supervisor and other relevant agencies.

4.13 POST-OPERATION WATER MONITORING

Following cessation of mining operations, a post-operational water monitoring program will be implemented. During the final phases of mine operations, a post-operational monitoring plan will be developed in consultation with MDEQ that is based on the final mine facilities layout and operational phase monitoring results. The post-operational water monitoring program will be used in conjunction with other reclamation and revegetation monitoring to document post-reclamation conditions at the former mine site and surrounding water resources. Post-operational monitoring will occur until such time as the mine is certified as fully reclaimed and all bonding release milestones are met, or as determined in the post-operational monitoring program to be developed in conjunction with MDEQ.

4.14 RECLAMATION SCHEDULE

Reclamation activities will be completed not more than 2 years after completion or abandonment of the operation on that portion of the complex.

Most disturbances will be in active use throughout the life of the operation and will be reclaimed at the conclusion of operations. As discussed in Section 4.3.1, the pit will be backfilled in phases so reclamation can be conducted on those portions of the pit where backfill is complete.

Final reclamation of areas that will not be regraded at the end of operations, including plant site cut and fill slopes and access road cut and fill slopes, will occur as these areas are constructed.

Interim reclamation of soil stockpiles, ditch cuts and fills, and other disturbances not inherently stable, will occur during the first appropriate seeding season following construction.

4.15 CESSATION OF OPERATIONS

4.15.1 Temporary

If circumstances beyond the control of MLR cause a short-term stoppage of operations, adequate evidence of intent not to abandon operations and evidence to show intent to resume operations will be submitted, as discussed in ARM 17.24.150.

Measures that would be undertaken if a temporary cessation occurs include:

1. Clearing and repairing site drainage facilities to insure proper runoff over a sustained period of time. Areas susceptible to erosion will be contoured and seeded or otherwise stabilized.
2. Securing monitoring wells, pumps, and intake structures to prevent equipment damage.
3. Maintaining roads to insure project access.
4. Inspecting signs and fencing around the property, including the pit; repairing or replacing, as necessary.
5. Developing and implementing a program for facility inspection.

No actions would be taken that would preclude a resumption of operations.

4.15.2 Permanent Cessation

A permanent cessation of operations would occur in the unlikely event that mining ceased prior to the end of the scheduled operations. In this circumstance, surface disturbances would be smaller than originally designed (primarily the pit, waste rock dump, and rejects pile). However, reclamation objectives and methods would be the same as presented in this plan. If operations were to end prematurely, MLR would prepare, in consultation with MDEQ, a reclamation plan to address conditions as of the cessation.

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