CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and alternatives considered for the National Environmental Policy Act (NEPA) environmental impact assessment and details the differences among alternatives, providing a clear basis for choice among options by the decision-makers and the public. Comparison of the alternatives is based on the design of the alternatives and the environmental, social, and economic effects of implementing each alternative. **Section 2.7** presents the Agency-Preferred Alternative and the rationale used to select it. Alternatives or alternative elements considered but eliminated from detailed study are also discussed in **Section 2.8**.

As specified in 40 Code of Federal Regulations (CFR) 1502.14(a), only reasonable alternatives need be considered in detail. Reasonable alternatives must be feasible, and such feasibility must focus on the accomplishment of the underlying purpose and need that would be satisfied by the proposed federal action. This Final Environmental Impact Statement (Final EIS) considers three alternatives in depth:

- The Proposed Action
- A group of alternatives packaged together as the Rasmussen Collaborative Alternative (RCA)
- The No Action Alternative

After the discussion of the alternative elements considered in detail, alternative elements considered but eliminated from detailed analysis are discussed briefly.

2.1 BACKGROUND

The Rasmussen Valley phosphate deposit addressed in this Final EIS is located in Caribou County, Idaho, 18 miles northeast of Soda Springs, Idaho (**Figure 1.2-1**). It is a portion of the phosphate-rich Meade Peak Member of the Permian-age Phosphoria Formation. In the Study Area, the Phosphoria Formation consists of chert, phosphatic mudstone, phosphorite, carbonaceous and cherty mudstones, and carbonate rock. In general, the thickness of the formation ranges from 250 to 450 feet at the Study Area location. The mineable phosphate rock occurs in two ore zones within the Meade Peak Member. About 60 to 100 feet of non-economic phosphatic shales separate the upper ore zone and the lower ore zone.

A federal phosphate lease that included the Rasmussen Valley deposit was originally issued to J.A. Terteling & Sons in 1955. Subsequently, the Lease was transferred to the Stauffer Chemical Company, then to the FMC Corporation in 1968, to Astaris Production LLC in 2000, and (most recently) to Agrium in 2004.

The Bureau of Land Management (BLM) and U.S. Forest Service (USFS) have prepared this Final EIS to consider approval of Agrium's Proposed Action for mining on the Lease and the construction and operation of mine-related facilities outside the Lease. Agrium has submitted a Mine and Reclamation Plan (Agrium 2011) to the BLM for the development of this Lease that includes both on-lease and off-lease activities. This Final EIS evaluates the impacts of the Proposed Action and alternatives to the Proposed Action to the human environment and impacts on area natural resources.

2.2 DISTURBANCE FROM PAST EXPLORATION

Exploration in the Rasmussen Valley deposit began in 1912, when the U.S. Geological Survey (USGS) excavated two exploratory trenches. Additional exploratory trenching occurred in 1948 as part of a study of the Western Phosphate Field. Exploratory drilling in the deposit has been conducted intermittently since 1969.

In 2008, Agrium began systematic exploration drilling and conducted geotechnical boring and water monitoring as part of the planning and development for the Proposed Action. From 1969 through 2015, 203 documented exploration drill holes were completed in the Rasmussen Valley deposit. Precise locations and extent of exploration are not available for all of the early exploration; however, all of the exploration activity over the years has disturbed 28 acres of the Study Area.

2.3 PROPOSED ACTION

This description of the Proposed Action is a summary of Agrium's 2011 Mine and Reclamation Plan (Agrium 2011). The following sections describe proposed mining operations, environmental protection measures and best management practices (BMP's) including management of water, the reclamation plan, environmental monitoring, and conceptual mitigation approach. They also discuss modifications to the lease boundaries proposed by Agrium. The 2011 Mine and Reclamation Plan provides additional details.

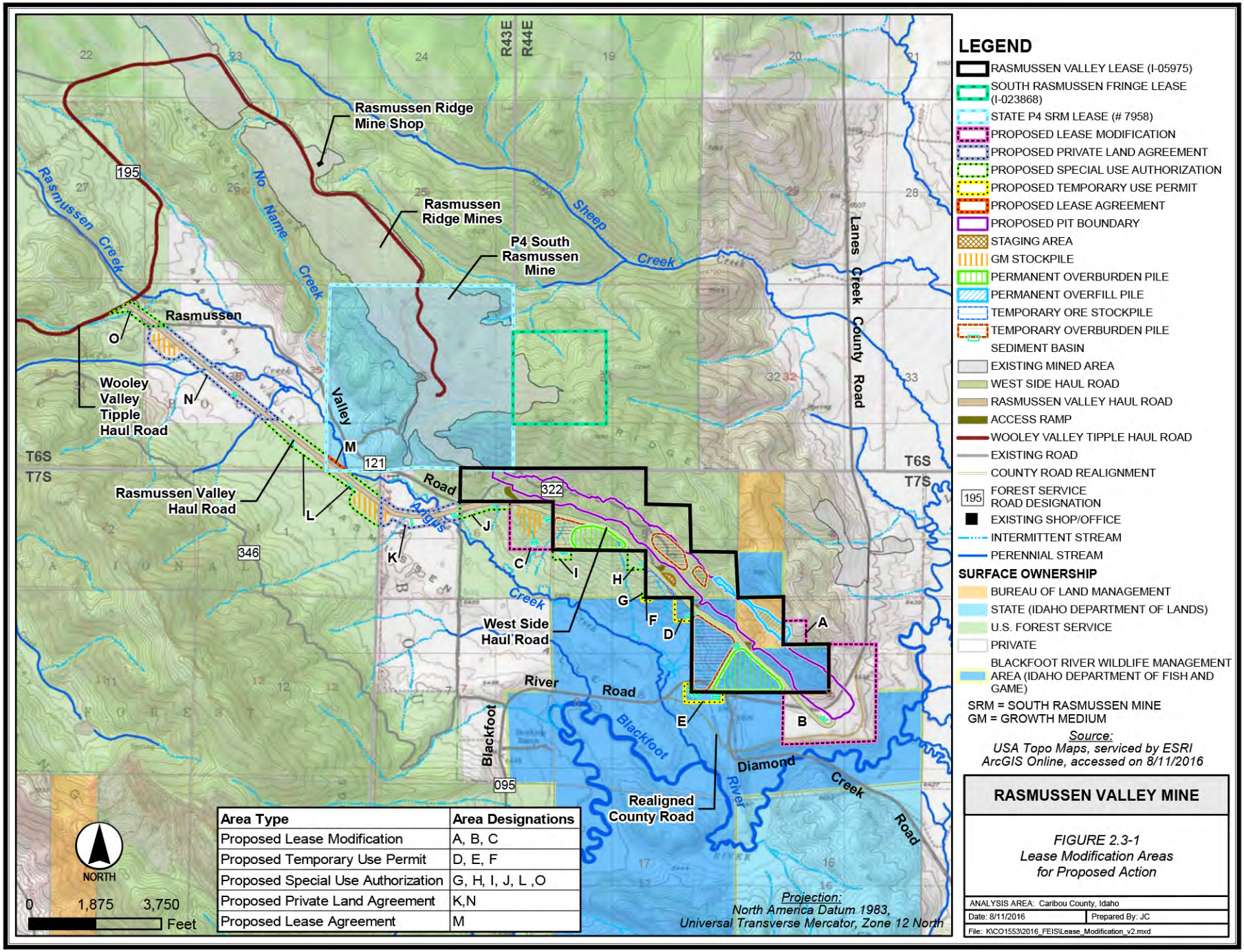
2.3.1 Lease Modifications

Mine disturbances outside the BLM lease boundary are sometimes proposed to allow the recovery of additional phosphate ore outside the Lease or the expansion of pit backfill and external overburden piles onto National Forest Lands. The following describes specific areas in which Agrium has requested lease modifications for activities outside of the lease boundary on National Forest System land, and discusses how those activities could be authorized in accordance with 43 CFR 3503.20 (**Table 2.3-1**). The lease modifications have been proposed by Agrium to extend the current lease boundary in two locations (Areas B and C, **Figure 2.3-1**), specifically in portions of T7S R44E, Sections 6 and 9, totaling 166.3 acres. An additional lease modification was proposed on private land (see next paragraph).

A portion of the pit wall and ultimately backfill, backfill cover, a runon diversion ditch, and access road would extend outside the Lease on private property with no federal minerals. Agrium proposed a lease modification (Area A [10.0 acres], **Figure 2.3-1**). This disturbance on private land would need to be authorized by an agreement between Agrium and the private landowner, and could not be authorized by a lease modification because it has no federal mineral estate.

Exploratory drilling indicates that the federal phosphate deposit continues southeast beyond the currently defined lease boundaries. To mine this area and maximize economic recovery, Agrium proposes to expand the lease boundary (Area B [128.3 acres], **Figure 2.3-1**) to include this area. This expansion would require a lease modification to recover the federal phosphate under the private land.

A portion of the southwestern pit wall and associated backfill would extend outside of the Lease on National Forest Land (Area C [38.0 acres], **Figure 2.3-1**). This activity would need to be authorized with a lease modification to allow waste to be stored on National Forest Land.



RASMUSSEN VALLEY MINE

FIGURE 2.3-1
Lease Modification Areas for Proposed Action

ANALYSIS AREA: Caribou County, Idaho
Date: 8/11/2016 | Prepared By: JC
File: K\CO1553\2016_FEIS\Lease_Modification_v2.mxd

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Table 2.3-1 Proposed Lease Modifications and Use Permits for the Proposed Action

Map ID*	Type	Acreage
A	Modification (BLM; Private Land Agreement)**	10.0
B	Modification (BLM)	128.3
C	Modification (BLM)	38.0
D	Temporary Use (State - IDFG)	7.3
E	Temporary Use (State - IDFG)	8.2
F	Temporary Use (State - IDFG)	0.5
G	Special Use (USFS)	0.3
H	Special Use Authorization (USFS)	6.3
I	Special Use Authorization (USFS)	3.4
J	Special Use Authorization (USFS)	10.1
K	Private Land Agreement	23.8
L	Special Use Authorization (USFS)	39.3
M	Lease Agreement (State - IDL)	3.0
N	Private Land Agreement	41.2
O	Special Use Authorization (USFS)	8.3
	Total	**328.2**

Notes:

* ID number from **Figure 2.3-1**

** The Mine Plan refers to this as a BLM Lease Modification. However, it is on private land and does not involve federal minerals. Therefore, a private land agreement must be developed.

2.3.2 Other Permits and Agreements

In addition to the BLM lease modifications, other agreements would be needed with the landowners for activities outside the Lease. Three areas south of the Lease located on the WMA (Areas D, E, and F) would be needed for sediment basins and a portion of the West Side Haul Road. These areas would require temporary use permits from IDFG. To the west, in Rasmussen Valley, the Rasmussen Valley Haul Road crosses a small area of state land (Area M) and would require a lease agreement from IDL.

The Rasmussen Valley Haul Road would also cross two areas of private land (Areas K and N) and three areas of USFS land (Areas J, L, and O). The use of private land would require agreements with the private land owners. The haul road across USFS land would require special use authorizations (SUAs). Additional USFS SUAs would be required for small areas of USFS land for a portion of the West Side Haul Road and water control features including sediment basins (Areas G, H, and I).

2.3.3 Proposed Rasmussen Valley Mine

The Proposed Action consists of:

- Developing the Rasmussen Valley Mine in six sequential pit phases
- Once the mining in each phase is completed, that phase would be backfilled using material from subsequent phases being mined or from temporary overburden piles.

Once a phase has been backfilled and shaped, it would be covered and reclaimed (the concurrent backfilling and reclamation are referred to jointly as concurrent reclamation).

Initial stages of mine development include salvaging topsoil and other suitable surface material to be used as reclamation growth medium (GM) and then removing overburden to reach the ore.

Overburden is non-economic geologic materials that must be removed or segregated from the ore to obtain an adequate ore grade and quality for processing at Agrium's Conda fertilizer plant. The overburden that has been removed can be backfilled to a previously mined area or stored temporarily or permanently outside the mine pit.

Several identifiable geologic layers or strata comprise the overburden that would be excavated from the mine pits. At various phosphate mines in Southeast Idaho, some of these strata express a potential for releasing higher concentrations of selenium and other constituents of potential concern (COPCs). The selenium and other COPCs released from overburden need to be limited to a level that will prevent contamination of surface water and groundwater (at concentrations above regulatory standards), and maintain beneficial uses and concentrations in soils as determined by concentrations in vegetation that are maintained below action levels. Historically, in the Southeast Idaho Phosphate District, strata within the Rex Chert Member geological formations have contained higher levels of selenium. Conversely, other strata express a lower potential for releasing selenium and other COPCs. Each mine also has its own unique profile of how much selenium and other COPCs are released based on the presence and ratios of the various strata. Consequently, the overburden material for each mine proposal must be evaluated independently.

Agrium's 2011 Mine and Reclamation Plan (Agrium 2011) uses the terms "seleniferous" material and "non-seleniferous" material to describe how Agrium proposes to segregate overburden for different disposal locations to lessen the potential for exceeding water quality standards and vegetation standards for COPCs. In subsequent documents, Agrium replaced the term "non-seleniferous" with "low-seleniferous" to be more accurate because some of the materials slated to be placed in "non-seleniferous" overburden piles may contain some selenium or other COPCs that could be released.

During their review, the Agencies (BLM, USFS, and Idaho Department of Environmental Quality [IDEQ]) determined that the terms "seleniferous" and "low-seleniferous" do not provide enough information to prepare an appropriately informative affects analysis and disclosure. In addition, the site-specific samples Agrium provided for each of the strata cannot be differentiated in accordance with this terminology, thus requiring the site-specific leachability tests performed for this impacts analysis. Consequently, the Agencies have taken a more descriptive approach to defining the overburden materials that would be segregated and placed in the different overburden piles and backfill. Overburden that does not include Meade Peak strata or specific Rex Chert strata is referred to by Agrium as "low-seleniferous." In the EIS, these materials are referred to more descriptively as "non-Meade Peak-containing material" or "non-Meade Peak overburden". Overburden that may contain Meade Peak or specific Rex Chert material, which is referred to by Agrium as "seleniferous" or "SeW", is designated in this EIS as "Meade Peak-containing material" or "Meade Peak overburden."

Agrium proposed to avoid placing Meade Peak overburden in certain permanent external overburden piles. This would reduce, but not eliminate, the potential risk of selenium and other COPCs being released from these locations and exceeding surface water and groundwater quality standards. Again, the impacts were analyzed by performing material-specific leach tests to determine the expected release of COPCs from this material.

The proposed mine pit would be on the southwest slope of Rasmussen Ridge. Available areas for overburden storage near the pit are upslope around the crest of Rasmussen Ridge or downslope on the steep slopes below the mine pit. Runoff from overburden piles upslope of the mine pit would drain into the mine pit or be diverted to water management features such as sediment basins. Runoff from overburden piles downslope of the mine pit would be managed by

collection ditches and sediment basins, but would still carry the potential to drain to nearby surface water (such as Angus Creek) or reach groundwater. In addition, portions of the steep slopes downslope of the mine pit are potentially unstable, and storage of overburden on these slopes could result in slope failure.

The Proposed Action would include the following features:

- Two permanent external piles containing non-Meade Peak overburden would be developed and reclaimed downslope from the pit area and haul road and designated the North Overburden Pile and South-South Overburden Pile.
- Two permanent external piles containing Meade Peak overburden would be developed contiguous with and uphill from the pit and designated as the North External Overfill Pile and the South External Overfill Pile.
- Two temporary external piles containing Meade Peak and non-Meade Peak overburden would be developed downslope from the pit area and haul road, including the South Main Temporary Overburden Pile and a portion of the North Main Overburden Pile.
- Two temporary piles containing Meade Peak overburden would be developed within the pit boundary, designated as the North and South Temporary Overburden Piles.
- A stockpile area could be optionally developed and reclaimed downslope from the pit area and haul road for temporary storage of ore or Meade Peak-overburden as operational demands dictate and designated as the Ore Stockpile Area.
- Three GM stockpiles for use in reclamation activities would be developed and reclaimed.
- Access and haul roads would be constructed, operated, and reclaimed.
- Portions of the Blackfoot River, Lanes Creek, and Diamond Creek County Roads would be permanently realigned and the abandoned road reclaimed.
- Temporary power lines would be constructed, operated, and reclaimed.
- A staging area would be constructed, operated, and reclaimed.
- Dust suppression supply, water quality monitoring, and water supply wells would be constructed, operated, and reclaimed.
- Surface water sediment controls would be constructed, operated, and reclaimed.
- A fuel storage area would be constructed, operated, and reclaimed.

Figure 2.3-2 shows the distribution of these facilities within the Proposed Action. **Table 2.3-2** lists the surface disturbances estimated for these activities. Agrium currently has approval to perform additional exploratory drilling within the Study Area. Based on the results of this additional exploratory drilling and potential changed conditions that might be encountered during mining, the areas to be disturbed and the quantities of material to be handled could minimally increase or decrease relative to what is shown in the table.

Agrium proposes to mine phosphate ore from the open pit and haul it by truck to their Wooley Valley Tipple. The pit would be mined in six phases starting at the south end of the Proposed Action and progressing north. Ore would be mined using methods and equipment similar to those used at Agrium's Rasmussen Ridge Mines. From the tipple, ore would be hauled by rail on existing track to the Agrium Conda Phosphate Operations (CPO) fertilizer plant for processing. Agrium's Rasmussen Ridge Mine currently uses the tipple, railroad, and CPO, and their use would continue for the Rasmussen Valley Mine without change or modification.

Table 2.3-2 Total Project-related New Surface Disturbance from Proposed Action by Surface Ownership, including Areas Outside the Lease

Facility or Activity	Maximum Disturbance (acres)					
	Private	USFS	BLM	IDFG	IDL	Total[1]
Open Pit and Backfill[2]	22.6	102.2	27.4	43.2	0	195.4
Overburden and Overfill Piles	1.5	29.2	8.2	70.7	0	109.6
Optional Ore Stockpile	0	8.5	0	0	0	8.5
Haul Roads	23.0	38.3	1.3	14.9	0.4	77.9
Groundwater Monitoring Wells and Access Roads	2.6	3.5	1.0	1.4	0	8.5
Facilities	0	1.4	0	0	0	1.4
Water and Sediment Control Structures	1.2	2.9	0	3.1	0	7.2
Realigned Portions of County Roads	3.1	0	0	3.0	0	6.1
GM Stockpiles	8.0	17.2	0	0	0	25.2
Total[1]	62	203.2	37.9	136.3	0.4	439.8
POC Monitoring Well and Access Roads[3]						8.0
Potential Pit Layback Areas[4]						20.0
Grand Total[1,5]						**467.8**

Notes:

1 Totals are based on more precise numbers (more decimal places) than are shown in the table, and because of rounding conventions, the totals may appear to be lower than the sum of the numbers in a row or column.

2 Total acreage includes temporary access ramps and also includes 11.2 acres of pit wall that would not be reclaimed.

3 The monitoring well network has not been finalized by the IDEQ. Therefore, the locations of these wells and the associated access road network cannot be represented on the figures. The Point of Compliance (POC) was not included in the original Mine and Reclamation Plan (Agrium 2011), but would be needed if the Proposed Action were approved.

4 The potential pit layback areas have not been determined. This category was not included in the original Mine and Reclamation Plan (Agrium 2011), but would be needed if the Proposed Action were approved.

5 Up to 28 acres of additional disturbance in the Study Area are being considered for POC monitoring wells and access roads (8 acres) and potential pit layback areas (20 acres). However, the locations have not been determined and are not included in the impact assessment for specific resources. Baseline conditions are known so that the impacts can be assessed when locations are determined. These locations will be finalized after the approval of the Final EIS.

IDFG = Idaho Department of Fish and Game

IDL = Idaho Department of Lands (Does not include already disturbed area at P4's South Rasmussen Mine)

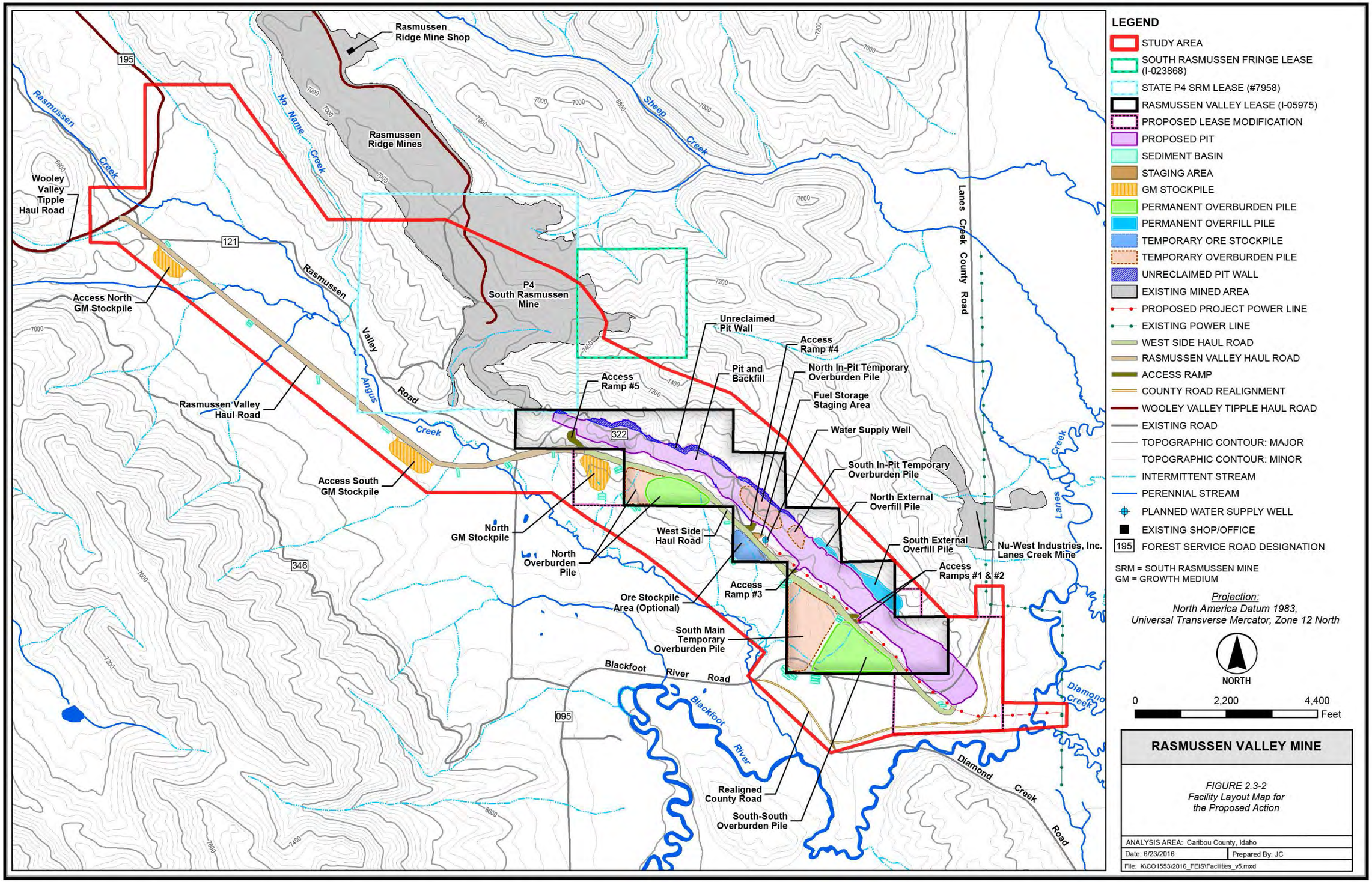
Mining involves the removal of the available ore down to an economically feasible limit. This economic limit is based on mining capabilities, processing capabilities, costs, and ore value. It generally coincides with a pit depth that is at or below the "alteration floor." The alteration floor is the depth at which less weathered or unaltered ore is encountered. Below the depth of the alteration floor, the unaltered ore typically is more difficult or prohibitively costly to retrieve and process.

2.3.4 Mining Operations

2.3.4.1 Mine Design

2.3.4.1.1 Mine Phasing and Reclamation

Under the Proposed Action, the deposit would be mined as an open pit in six phases (**Figure 2.3-3**) from south to north, a distance of approximately 2.4 miles. The phases would range from 1,500 to 3,500 feet long, and the pit crest would average 600 feet wide. The ore recovery would take 3.9 years, and the overall life-of-mine project duration (from stripping and infrastructure development through initial reclamation) would be 5.8 years. Constraints on the pit's design include economic strip ratios; access requirements; slope stability assumptions and requirements; design restrictions, such as slope angles, roads, and pit benches that may affect the pit's cross-sectional geometry for the ultimate pit design; and balancing phase volumes with available storage and backfill volumes.


Rasmussen Ridge Mine Shop
Rasmussen Ridge Mines
195
Rasmussen Creek
No. Name Creek
Sheep Creek
Wooley Valley Tipple Haul Road
121
Rasmussen Valley Road
Access North GM Stockpile
P4 South Rasmussen Mine
Lanes Creek County Road
Unreclaimed Pit Wall
Access Ramp #4
Pit and Backfill
North In-Pit Temporary Overburden Pile
Access Ramp #5
Fuel Storage Staging Area
Water Supply Well
322
Angus Creek
Rasmussen Valley Haul Road
South In-Pit Temporary Overburden Pile
North External Overfill Pile
Access South GM Stockpile
North GM Stockpile
West Side Haul Road
South External Overfill Pile
Nu-West Industries, Inc. Lanes Creek Mine
346
North Overburden Pile
Access Ramps #1 & #2
Access Ramp #3
Ore Stockpile Area (Optional)
South Main Temporary Overburden Pile
Blackfoot River Road
095
Blackfoot River
Diamond Creek
Realigned County Road
South-South Overburden Pile
Diamond Creek Road
Lanes Creek
LEGEND
STUDY AREA
SOUTH RASMUSSEN FRINGE LEASE (I-023868)
STATE P4 SRM LEASE (#7958)
RASMUSSEN VALLEY LEASE (I-05975)
PROPOSED LEASE MODIFICATION
PROPOSED PIT
SEDIMENT BASIN
STAGING AREA
GM STOCKPILE
PERMANENT OVERBURDEN PILE
PERMANENT OVERFILL PILE
TEMPORARY ORE STOCKPILE
TEMPORARY OVERBURDEN PILE
UNRECLAIMED PIT WALL
EXISTING MINED AREA
PROPOSED PROJECT POWER LINE
EXISTING POWER LINE
WEST SIDE HAUL ROAD
RASMUSSEN VALLEY HAUL ROAD
ACCESS RAMP
COUNTY ROAD REALIGNMENT
WOOLEY VALLEY TIPPLE HAUL ROAD
EXISTING ROAD
TOPOGRAPHIC CONTOUR: MAJOR
TOPOGRAPHIC CONTOUR: MINOR
INTERMITTENT STREAM
PERENNIAL STREAM
PLANNED WATER SUPPLY WELL
EXISTING SHOP/OFFICE
195 FOREST SERVICE ROAD DESIGNATION
SRM = SOUTH RASMUSSEN MINE
GM = GROWTH MEDIUM
Projection:
North America Datum 1983,
Universal Transverse Mercator, Zone 12 North
NORTH
0
2,200
4,400
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.3-2
Facility Layout Map for
the Proposed Action
ANALYSIS AREA: Caribou County, Idaho
Date: 6/23/2016
Prepared By: JC
File: K\CO1553\2016_FEIS\Facilities_v5.mxd

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The economic strip ratio and quality of the ore ultimately control the designed pit depth. Factors that control the economic strip ratio are cost to remove the overburden and estimated value of the phosphate ore. Costs to remove overburden are controlled by equipment costs, access, haul distances, slope stability safety, and water management considerations. Although the proposed pit design is based on site-specific geotechnical data and experience with similar phosphate mines in southeast Idaho, pit wall stability is not a certainty; thus, the potential exists for minor pit wall laybacks beyond the proposed pit boundary that may require up to 20 acres of additional disturbance.

The pit and backfill footprint of the six phases would disturb a total of 195.4 acres. As mining progresses, concurrent reclamation would start on the mined out areas using overburden material and GM from the newly mined area. Through progressive open pit backfilling, shaping, and concurrent reclamation, the unreclaimed pit disturbance at any one time would be minimized. The backfill will be covered with a minimum of 3 feet of non-Meade Peak-containing material and overlain with 2 feet of GM from the pit area. The backfill and cover would be sloped to direct surface water off the reclaimed pit and onto native ground. No backfill would be left exposed. Upon completion of backfilling, pit wall exposures would remain in place above some portions of the backfilled pit.

During mining, a small road would be constructed along the crest of the pit to provide access to lighting stations and for pit wall inspections. This road would be 20 feet wide to accommodate light vehicles, a bulldozer, or other equipment. Trees, boulders, or other potential hazards that may fall into the pit would be removed during construction of this road.

2.3.4.1.2 Haul Roads

The ore haul road from the mine would be constructed 2.3 miles along the southwest side of the pit (the West Side Haul Road) and 2.4 miles across Rasmussen Valley (the Rasmussen Valley Haul Road) to the existing Wooley Valley Tipple Haul Road (**Figure 2.3-4**). The design of the Rasmussen Valley Haul Road minimizes curves and follows the most direct route between the mine pit and the Wooley Valley Tipple Haul Road. The proposed Rasmussen Valley Haul Road (identified in the alternatives as HR-1) would cross Rasmussen Valley County Road at two locations, cross Angus Creek at two locations, and cross three minor tributary drainages. This route would disturb 12.6 acres of wetlands.

The Wooley Valley Tipple Haul Road would provide access to the shop and maintenance facilities currently in use at the Rasmussen Ridge Mines. These facilities would remain operational for the duration of the Proposed Action. The West Side and Rasmussen Valley Haul Roads would connect mining operations in the pit with the staging area, GM stockpiles, overburden piles, and other mine facilities (**Figure 2.3-4**). Five access ramps (Access Ramps 1 through 5) would provide access to the active mining and backfilling areas from the West Side Haul Road. These ramps would be required throughout the life-of-mine to haul overburden, GM, and ore. Access ramps would be reclaimed concurrently with their associated pits, and new roads would be built as the sequence of mining progresses.

Widths of the haul roads would vary depending on location and localized physical constraints. Proposed Action haul roads not within the mine pit are designed with an 80-foot running width and a 10-foot safety berm on each side for a total top width of 100 feet. This contrasts with the pit ramps, which have safety berms on only one side. The 80-foot running width allows for a safe running surface for two-way haul truck traffic 3.5 times the width of the haul trucks. On average, haul road disturbance widths adjacent to the mine pit (principally the West Side Haul Road) would be 140 feet. All of these roads would be constructed of non-Meade Peak-containing materials

with fill side berms where necessary for safety. Culverts would be used to convey natural drainage ways under the haul road as described in the Surface Water Control Design Plan (Agrium 2011, Appendix F).

Access ramps to the open pit would accommodate 150-ton-capacity haul trucks. Initial ramp widths have been designed with 90-foot overall widths, allowing for a running surface and a safety berm. Ramps in the lower portions of the pit have been designed to be narrower where it is deemed reasonable to operate using one-way traffic. All ramps were designed at a maximum 10 percent gradient with the exception of areas close to the pit floor.

All roads located outside of the pit boundary have been designed to minimize surface impacts and ensure maximum efficiency and safety. Design features include:

- GM would be salvaged from the proposed road areas before construction and placed in stockpiles along the length of the road for use in reclamation.
- Road surfaces would be graded and sloped to minimize standing water.
- BMPs, such as silt fencing, straw wattles, and erosion mats, would be used to minimize impacts to surface water.
- If necessary, large fill or cut slopes may be stabilized by hydro-mulching, seeding, or use of other BMPs to prevent excessive erosion from runoff.

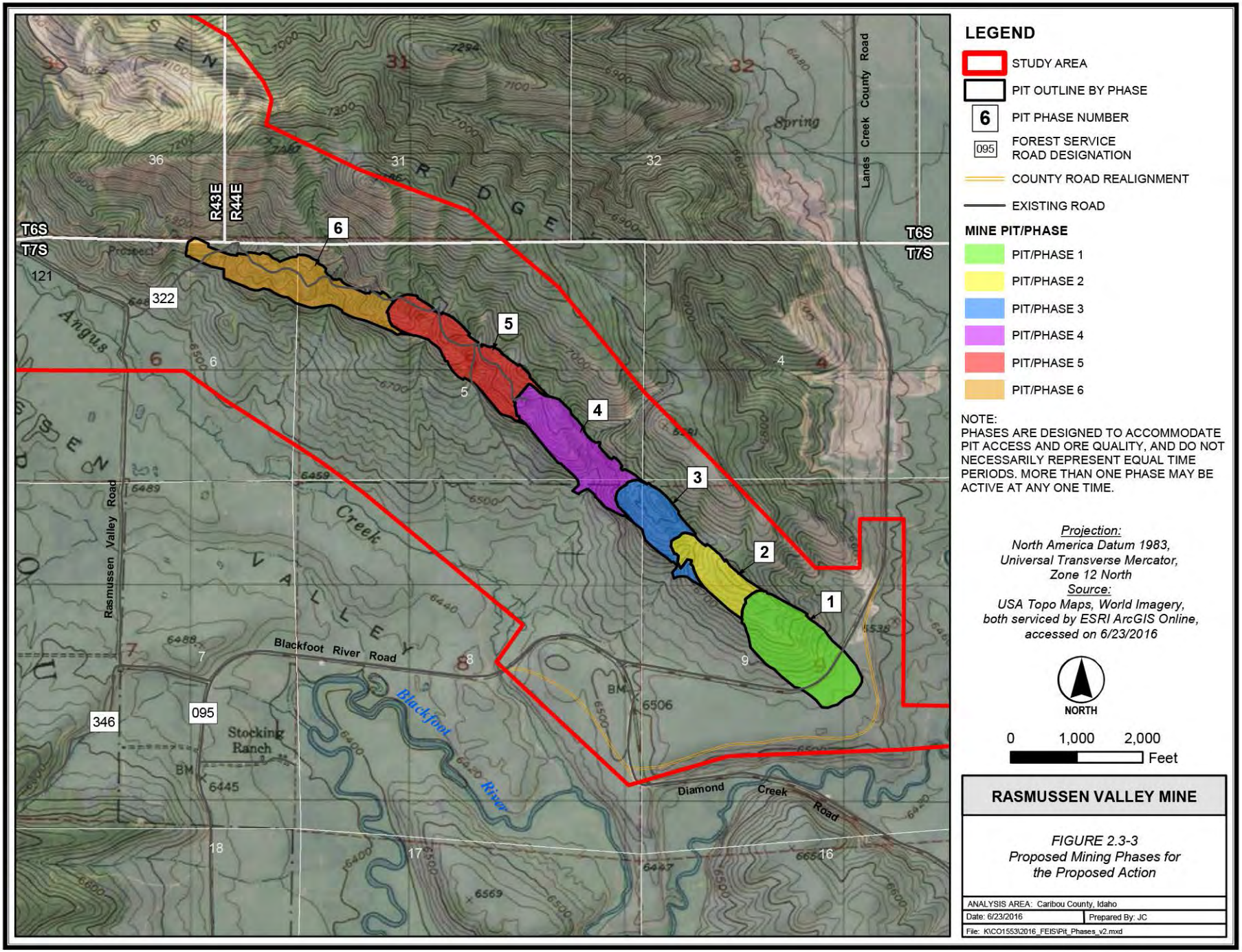
Surface water runoff reaching the haul roads and the relocated county roads from areas uphill would be conveyed along the toe slope of the road to culverts or pipes that cross under the roads. Culverts and pipes would be designed to pass a 50-year storm event in accordance with the Federal Lands Highway Project Development and Design Manual (FHWA 2014).

Agrium would use BMPs to control surface water runoff, sediment, and erosion from roads. These could include straw wattles, silt fencing, erosion matting, straw bales, brush barriers, diversion ditches, berms, and sediment basins. Specific measures would be identified in a site-specific Stormwater Pollution Prevention Plan (SWPPP).

2.3.4.1.3 Overburden and GM Management

Overburden mined from the Rasmussen Valley deposit would be placed directly in the pit as backfill, temporarily stored in external overburden piles for later use as backfill, or permanently stored in external overburden piles. Most of the overburden mined from the pits would be transported directly from the active phase of mining and placed as backfill in the previous mined out phases, but some limited temporary storage may be necessary. Backfill would be placed in mined out areas by dumping at the pit crest and using a bulldozer to push it into the pit or by dumping in lifts and spreading by bulldozer. Several factors would influence the decision on which method would be used for placing backfill in specific areas. They include the need for backfill ramps, the stability of the material as it is placed, availability of equipment to maintain truck-dumping areas, haul distance, haul grade, and stage of the backfilling process.

Seven external overburden piles would be used throughout the life-of-mine; three would be temporary and four would be permanent. The North Temporary and South Temporary Overburden Piles would be located inside the yet to be mined Phase 5 pit area (**Figure 2.3-2**) and used to store overburden from Phase 1 until it could be used as backfill in other phases before mining Phase 5. The North and South Main Temporary Overburden Piles would be located on the pediments downslope of the pit area and haul road (**Figure 2.3-2**) and would contain Meade Peak overburden. All Meade Peak overburden from these piles would be re-handled into Phases 5 and 6 backfill areas.


LEGEND
STUDY AREA
PIT OUTLINE BY PHASE
6 PIT PHASE NUMBER
095 FOREST SERVICE ROAD DESIGNATION
COUNTY ROAD REALIGNMENT
EXISTING ROAD
MINE PIT/PHASE
PIT/PHASE 1
PIT/PHASE 2
PIT/PHASE 3
PIT/PHASE 4
PIT/PHASE 5
PIT/PHASE 6
NOTE:
PHASES ARE DESIGNED TO ACCOMMODATE PIT ACCESS AND ORE QUALITY, AND DO NOT NECESSARILY REPRESENT EQUAL TIME PERIODS. MORE THAN ONE PHASE MAY BE ACTIVE AT ANY ONE TIME.
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps, World Imagery,
both serviced by ESRI ArcGIS Online,
accessed on 6/23/2016
NORTH
0 1,000 2,000
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.3-3
Proposed Mining Phases for
the Proposed Action
ANALYSIS AREA: Caribou County, Idaho
Date: 6/23/2016
Prepared By: JC
File: K\CO1553\2016_FEIS\Pit_Phases_v2.mxd
T6S T7S
R43E R44E
Rasmussen Valley Road
Blackfoot River Road
Diamond Creek Road
Lanes Creek County Road
Stocking Ranch
Blackfoot River
Angus Creek
Spring
095
322
346

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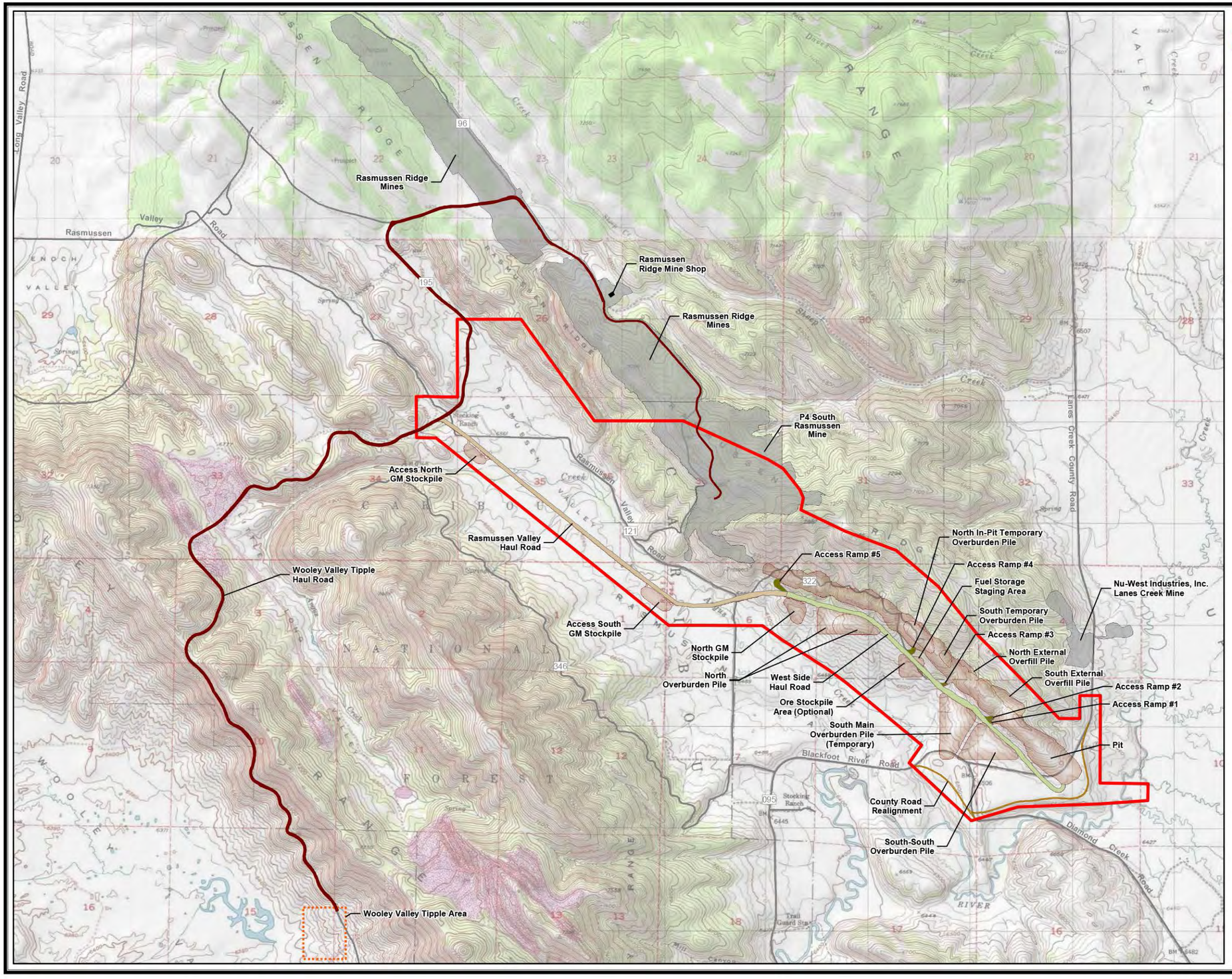

LEGEND

- STUDY AREA
- 195 FOREST SERVICE ROAD DESIGNATION

EXISTING INFRASTRUCTURE

- EXISTING MINED AREA
- WOOLEY VALLEY TIPPLE AREA
- WOOLEY VALLEY TIPPLE HAUL ROAD
- EXISTING ROAD
- EXISTING SHOP/OFFICE

PROPOSED INFRASTRUCTURE

- PROPOSED MINE FOOTPRINT
- WEST SIDE HAUL ROAD
- RASMUSSEN VALLEY HAUL ROAD
- ACCESS RAMP
- COUNTY ROAD REALIGNMENT

Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps,
serviced by ESRI ArcGIS Online,
accessed on 6/23/2016

NORTH

0 3,250 6,500 Feet

RASMUSSEN VALLEY MINE

FIGURE 2.3-4
Existing and Proposed Infrastructure

ANALYSIS AREA: Caribou County, Idaho	
Date: 6/23/2016	Prepared By: JC
File: K\CO1553\2016_FEIS\Existing_n_Proposed_Infrastructure.mxd	

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The North and South-South External Overburden piles would be composed of non-Meade Peak-containing material. Two permanent external overburden piles (the North and South External Overfill Piles) are located uphill of and contiguous with the pit backfill, outside the pit crest. The overfill piles contain Meade Peak overburden and will be reclaimed with the adjacent backfill. The overfill piles provide added disposal space and reduce the risk that percolating water would express as seeps at the toe of the backfill, or impact shallow groundwater. Estimated external overburden pile volumes, excluding stockpiled GM, are listed in **Table 2.3-3**.

Table 2.3-3 Estimated Volume Balances of External Overburden Piles and Backfill Locations

Overburden Pile	Capacity (loose yd^3)	Added (loose yd^3)	Removed to Backfill (loose yd^3)	Balance (loose yd^3)
North (Temporary)	1,589,000	1,443,000	1,443,000	0
North* (Permanent)	758,000	689,000	0	689,000
South Main	4,112,000	4,052,000	4,052,000	0
South-South	2,842,000	2,842,000	0	2,842,000
North Temporary	490,000	490,000	490,000	0
South Temporary	66,000	66,000	66,000	0
North External Overfill	61,000	61,000	0	61,000
South External Overfill	1,085,000	1,085,000	0	1,085,000
Total	11,003,000	10,728,000	6,051,000	4,677,000

Notes:

* On **Figure 2.3-2**, the permanent portion of the North Overburden Pile has a larger footprint than the temporary portion, but the capacity of the temporary pile is much greater than the permanent pile. This is because the temporary footprint partially overlies the permanent pile.

In addition to the overburden piles, Agrium has designated an optional ore stockpile area for temporary storage of ore or Meade Peak-containing material, if necessary. This optional stockpile would be located between the North and South Main Overburden Piles immediately southwest of the staging area (**Figure 2.3-2**). This location would require a base of non-Meade Peak-containing material that does not release selenium or other COPCs at concentrations higher than acceptable levels. The base would have a level surface and 3H:1V side slopes. Approximately 160,000 loose cubic yards of non-Meade Peak-containing material would be required to build the base for this stockpile area, should it be required. This stockpile would provide 177,000 loose cubic yards of temporary storage capacity.

During mining, Agrium would strip approximately 1,719,000 loose cubic yards of soils suitable for use as GM for reclamation. Three locations adjacent to the West Side and Rasmussen Valley Haul Roads would be used for stockpiling GM. They are the Access North GM Stockpile, Access South GM Stockpile, and North GM Stockpile (**Figure 2.3-2**). Stormwater would be diverted around the GM stockpiles where needed to prevent erosion, and runoff from the stockpiles would be diverted through temporary sediment basins.

GM removed during construction of the haul road and other infrastructure would be temporarily stored in the Access North and Access South GM Stockpiles. The Access North GM Stockpile would store approximately 331,000 loose cubic yards and occupy 8.0 acres. The Access South GM Stockpile would store approximately 347,000 loose cubic yards and occupy 8.6 acres. GM removed from the Haul Road, Phase 1, external overburden pile areas, and ancillary areas would be temporarily stored in the North GM Stockpile. The North GM Stockpile would contain varying amounts of GM over time and would occupy 8.6 acres. GM removed during construction of the

subsequent pit phases, in order of preference, would be either directly placed for concurrent reclamation or temporarily stored for later use in reclamation.

Mining operations would dictate the timing of the use of salvaged GM for reclamation. The preferred method is direct placement. If operational constraints do not permit direct placement, the salvaged GM would be temporarily stored before placement. The salvaging and placing of GM is a dynamic process; therefore, the stockpile volumes would constantly change. Over the life-of-mine, a cumulative total of approximately 1,103,000 loose cubic yards may be temporarily stored and removed from the stockpiles.

2.3.4.2 Ancillary Facilities

Ancillary facilities include an area to stage personnel and equipment, an area to store fuel, power lines or generators to provide electricity, and a well to supply water. The staging area is where miners would meet, receive operational instruction, and discuss safety items. A temporary structure at the staging area would contain restrooms and at least one emergency shower. The staging area also would provide storage and parking for emergency response and rescue equipment and vehicles. Finally, the staging area would have a “ready-line” for parking equipment that is not in use.

Fuel storage would be located near the staging area. Fuel would be dispensed at this facility directly or by fuel trucks dispatched from it. Fuel would be stored in multiple aboveground tanks.

The Proposed Action would require electrical power. This power would be supplied to the various facilities through power lines or generators. The ultimate source of electrical power would depend on the cost-effectiveness of the options available.

A well would be drilled to supply water for operations. Water from the well would be applied to haul roads and other areas to suppress dust from operations. In addition, water from the well would be used for emergency showers and restrooms at the staging area. The showers and restrooms would also require a septic system.

The Rasmussen Ridge Mines would be completing operations while operations at the Rasmussen Valley Mine were starting up, but the shop and maintenance facilities at Rasmussen Ridge Mines would remain open and would be used for the Proposed Action. The shop and maintenance facilities would be accessed by way of the Wooley Valley Tipple Haul Road (**Figure 2.3-4**).

2.3.4.3 Mining Sequence

Factors affecting the economic recovery of the phosphate resource include strip ratio, ore quality and cutoff grades, and the safe slope angle of the pit walls. Mining would begin at the south end of the Rasmussen Valley deposit and move north. This sequence was developed with the following strategies to address issues and concerns:

- Backfilling to prevent ponding of water in the pit to reduce potential environmental impacts to surface and groundwater and, with the exception of some exposed pit wall, to limit visual impacts
- Maintaining close proximity between areas being mined and areas being backfilled to minimize backfill and reclamation material haul distance
- Minimizing the extents and heights of remaining pit walls.

Mining is divided into Phases 1 through 6 (**Figure 2.3-3**). Each phase was designed to allow construction of pit ramps for safe ingress and egress and provide available volume in previous

phases to accommodate short haul distances for overburden disposal as backfill. Each phase would be from 1,500 to 3,500 feet long and average 600 feet wide. Because no previous phase would be available for the disposal of overburden from Phase 1, most of the overburden from this phase would be placed in external permanent or temporary overburden piles. Overburden of subsequent phases would be placed directly into previously mined phases. Mining would typically occur in concurrent multiple phases to allow blending of ores to maintain an overall consistent quality of ore for processing, maintain the appropriate stripping ratio to ensure available space to dispose of overburden, and allow continuous operation of large excavation equipment in the wider upper portions of the pit while smaller equipment is mining the narrower, deeper portions of the pit.

New roads would be constructed or existing roads relocated as they are needed. The Rasmussen Valley Haul Road, connecting with the existing Wooley Valley Tipple Haul Road at the northwest end of the Study Area, and the West Side Haul Road, along the west side of the Rasmussen Valley deposit, would be constructed at the beginning of mining. Portions of Lanes Creek and Diamond Creek County Roads and Blackfoot River Road would be relocated permanently at the beginning of mining to make room for the Phase 1 Pit and for the South-South and South Main Overburden Piles. Lanes Creek County Road, Diamond Creek County Road, and Blackfoot River Road would not be returned to their original alignments after final reclamation because the post-mining topography of the pit backfill would require steep grades or side hill cuts in the backfill material that would be unacceptable for a county road.

A power line may be constructed from the existing power line southeast of the Proposed Action to the staging area unless generators are found to be more cost-effective. It may be constructed before mining begins or during the first stages of mining. If the power line is not constructed before mining begins, generators may be used until the power line is in place.

Non-Meade Peak overburden from mining Phase 1 would be used to construct haul roads. If necessary, it also would be used to build the base for the Optional Ore Stockpile Area. Ore would be stored on this area until the haul road is completed, and ore could be hauled to the Wooley Valley Tipple directly. The remaining non-Meade Peak-containing material not used for constructing facilities would be placed either in the North or South-South Overburden Piles.

Meade Peak-containing material would not be used for constructing facilities. It would be placed temporarily in the South Main Temporary, North Temporary, or South Temporary Overburden Piles. Operational demands may at times require that Meade Peak overburden be stored temporarily in the Optional Ore Stockpile Area.

As mining proceeds into Phases 2 through 6, overburden from the current phase would be directly backfilled into previously mined phases. Non-Meade Peak overburden that would not fit into a previous phase would be permanently placed into an external overburden pile.

Agrium would generally salvage GM in the summer and fall, avoiding working in wet soil conditions. Wherever practicable, Agrium would use freshly salvaged GM for direct placement on areas being reclaimed. GM would be salvaged from a mining phase or area before mining. A minimum of 24 inches of GM would be used over backfilled areas. A minimum of 12 inches of GM would be placed over all other disturbed areas. The GM would be shaped to final configuration with bulldozers, graders, or other equipment before revegetation.

2.3.4.4 Mining Operations

The mine may be operated up to 24 hours per day, year-round, with overlapping shifts. Mining would occur using a series of 40-foot cuts with 30-foot-wide catch benches on the pit walls at every 80 feet of depth. Overburden would be either ripped or blasted to aid excavation depending

on the hardness of the material. Blasting would be performed with ammonium nitrate-fuel oil (ANFO), blasting emulsions, or other standard blasting agents placed in drilled blast holes. Excavated material would be loaded into haul trucks and transported to the Wooley Valley Tipple, the Optional Ore Stockpile Area, previous phase pit, or external overburden piles depending on the type of material and available space.

2.3.5 Natural Resource Protection and BMPs

The following paragraphs briefly address Agrium's proposals to protect natural resources, including surface water and groundwater, livestock and wildlife, cultural resources, wetlands, soils, vegetation, air, and fisheries and aquatic resources as part of the Proposed Action. Subsequent sections present discussions that are more detailed on overburden handling and management, water management, and reclamation.

2.3.5.1 Surface Water

The mining activities described in the 2011 Mine and Reclamation Plan (Agrium 2011) have the potential to impact surface waters by introducing pollutants, such as sediment, selenium, and other COPCs, via precipitation runoff, snowmelt and spills, and by surface runoff contacting exposed overburden. Surface waters may also be impacted by changes in natural canopy cover (vegetation removal) or a change in surface soil characteristics (such as compaction) that may alter natural streamflow quantities and character. These impacts are collectively termed "hydrologic disturbance" and are specifically regulated in portions of watersheds that occur within USFS land.

Agrium would design and implement BMPs to control erosion, sediment, and the release of COPCs to protect surface waters in and around the mine. In addition, Agrium would limit the surface area of Meade Peak-containing material that would be exposed at any given time through direct backfilling and the Proposed Action backfill cover consisting of a minimum of 3 feet of non-Meade Peak overlain by a minimum of 2 feet of GM.

Water control structures may be constructed before initiating each mining phase to intercept and divert surface water runon before it reaches the pit crest. Otherwise, runon water would enter the pit. The operator would decide between these two options based on safety and operational concerns. Control structures would include several types of designs to reduce or eliminate the risk of surface water contamination. Sediment basins for runoff water and silt would be constructed at strategic locations before mining activities occur in the associated area to collect and contain water exposed to mining disturbances or overburden materials. Collection ditches constructed along the outer perimeters of the overburden pile and stockpile sites would convey surface water runoff from these sites to runoff sediment basins.

2.3.5.2 Stormwater Pollution Prevention Plan

Agrium would implement a SWPPP in accordance with the National Pollutant Discharge Prevention and Elimination System (NPDES) program. The SWPPP would identify all potential sources of pollutants that precipitation could mobilize and transport to surface waters in or near the Proposed Action via runoff. The SWPPP would also outline the control measures and BMPs that Agrium would implement to prevent or reduce the discharge of pollutants in stormwater. As part of the SWPPP, Agrium would comply with U.S. Environmental Protection Agency (USEPA) and IDEQ requirements for monitoring storm-event-related surface water. The SWPPP would remain a living document throughout the life-of-mine and would accommodate changing mining operations through each mining phase.

2.3.5.3 Spill Prevention Control and Countermeasures Plan

Agrium would also implement a Spill Prevention Control and Countermeasure (SPCC) Plan to meet the requirements in Title 40 CFR 112. The SPCC Plan would be implemented before placement of any petroleum products on site and would be reviewed by Agrium's Spill Prevention Coordinator or other qualified personnel every 3 years. As required by regulation, the SPCC Plan and all subsequent amendments would be reviewed and certified by a Professional Engineer (PE).

2.3.5.4 Groundwater

Groundwater quality impacts from selenium and other COPCs are a documented concern at phosphate mines in southeast Idaho. Constituents mobilized by water from precipitation events, snowmelt, and other surface runoff events percolating through overburden storage piles carry the potential to introduce selenium and other COPCs to groundwater at concentrations above regulatory standards. The backfill and overfill overburden would be covered with a minimum of 3 feet of non-Meade Peak-containing material overlain by 2 feet of GM. The cover is intended to limit infiltration of precipitation and snowmelt and reduce pore-space water in the GM by transpiration from the reclamation vegetation. Subsequent modeling of the Proposed Action cover found that the percolation rate, and thus the leached COPC impact to groundwater, could be reduced with an improved cover design. The residence time of any temporarily stockpiled overburden would be minimized to limit potential surface water infiltration and subsequent percolation to groundwater. Runon diversion ditches would divert surface runoff originating from uphill areas so that it would not infiltrate into overburden. The permanent external overburden piles were considered by Agrium to not have the potential to release COPCs into vegetation, groundwater, or surface waters because they would only contain non-Meade Peak overburden. Thus, they were not designed with a soil cover that purposely restricts infiltration and percolation.

2.3.5.5 Protection of Livestock

Livestock grazing would be restricted in areas of mining and related activities. The areas would be fenced, but fencing may not be entirely effective. Agrium personnel would periodically visually survey the mine areas for livestock during mining and related activities. Livestock would be immediately removed from any areas of risk. Wildlife movement into or out of the Proposed Action would not be controlled. To minimize impacts to wildlife, any fencing constructed would be designed to be wildlife-friendly. This would include the use of smooth wire (non-barbed wire) and ensuring spacing of the wires that allows wild ungulates to cross over or under.

2.3.5.6 Cultural and Paleontological Resources

Any cultural or significant paleontological resources identified at the Proposed Action by baseline surveys and during operation would be avoided and protected. If vertebrate fossils are exposed during mining, the locations would be recorded and, if possible, the fossil(s) may be provisionally classified. The BLM, State Historic Preservation Office (SHPO), landowner, or USFS would be notified depending on the location of the find. Any previously unknown cultural resource sites discovered during mining would be cordoned off and left as found until an appropriate agency or qualified representative can examine, document, and evaluate the find.

2.3.5.7 Wetlands and Riparian Areas

The development and mining of the Lease could disturb wetlands. Agrium would implement all necessary BMPs to minimize impacts to wetlands and riparian areas outside of the proposed disturbed areas.

2.3.5.8 Soil Erosion

Soil erosion would be controlled through the implementation of BMPs. BMPs may include, but are not limited to, straw wattles and silt fencing to control water and soil movement from mining disturbances. Where appropriate, erosion matting would be used on haul road fill slopes to control soil movement into drainages. Brush barriers would be used to control runoff from overburden piles and GM stockpiles. Regular monitoring would be conducted to evaluate the effectiveness of the BMPs. If any BMPs are found to be inadequate, erosion control techniques would be adjusted to correct the inadequacy.

2.3.5.9 Existing and Reclaimed Vegetation

Existing vegetation would be protected to the extent practicable by limiting surface disturbance to those areas needed for operations. Concurrent reclamation would be employed. As soon as GM is removed from its original location, it would be placed directly atop reclamation areas if they are available. The immediate use of GM in reclamation promotes regrowth of vegetative matter and preserves existing seeds in the GM. Some GM would need to be stockpiled because reclamation areas would not always be available at the time that GM must be removed.

Agency-approved seed mixes that include native seeds would be applied. Two seed mixes would be used: one for drier sites and one for moister sites (**Table 2.3-4**). The reclaimed areas would be managed to control invasive and noxious species and prevent their introduction.

Table 2.3-4 Revegetation Seed Mixes

Southwest Aspects (drier sites)	Pounds per Acre	% of Seed Type	Northeast Aspects (moister sites)	Pounds per Acre	Percentage of Seed Type
[1]					
Wheatgrass	6.75	15	Mountain Brome	9.00	20
Western Wheatgrass	2.25	5	Bluejoint Grass	6.75	15
Great Basin Wildrye	4.50	10	Redtop Bentgrass	2.25	5
Idaho Fescue	4.50	10	Timothy	2.25	5
Mountain Brome	6.75	15	Pine Reedgrass	4.50	10
Big Bluegrass	4.50	10	Bluebunch Wheatgrass	6.75	15
Green Needlegrass	5.40	12	Slender Wheatgrass	4.50	10
Slender Wheatgrass	4.50	10	June Grass	4.50	10
Sterile Annual Rye (Quick Guard)	2.25	5			
Forbs			**Forbs**		
	0.90	2		0.90	2
Lewis Blue Flax	0.90	2	Lewis Blue Flax	0.90	2
Brush			**Brush**		
	0.90	2	Mountain Snowberry	0.90	2
	0.90	2	Cinquefoil	0.90	2
				0.90	2
Total	**45.0**	**100**	**Total**	**45.0**	**100**

Notes:
1 Highlighted species are native species in Rasmussen Valley that are listed on the Shoshone-Bannock Tribes' 2016 Culturally Sensitive Plants list (Shoshone-Bannock Tribes 2016). The 2016 list includes grasses, but does not list individual species. Therefore, the heading for grasses is highlighted.

2.3.5.10 Air Emissions and Noise

Project-related air emissions would predominantly consist of fugitive dust and combustion emissions from mining operations. Major sources of fugitive dust may include mining, drilling, blasting, material hauling, and traffic on the access and ore haul roads. Dust would be mitigated or minimized by the application of water or supplementary dust suppressants, such as magnesium chloride or calcium chloride, as necessary to seal roads chemically. Liquid dust suppressants would be used on all blast hole drilling operations.

Control of dust on haul roads is a safety concern as well as an environmental concern, especially during the dry season. If necessary, Agrium would install a water production well to ensure an adequate supply of water for dust suppression.

The layout of haul roads was designed to maximize haulage efficiencies and reduce combustion emissions. Steep grades and greater haul distances decrease haulage efficiency and increase combustion emissions.

2.3.5.11 Hazardous Materials and Wastes

Hazardous materials and wastes associated with the Proposed Action would be stored in the fuel storage area at the staging area and at the existing Rasmussen Ridge Mines shop area. The hazardous materials anticipated to be used and stored on-site for the Proposed Action are listed in **Table 2.3-5**.

The Proposed Action would comply with applicable federal hazardous materials laws and regulations. They include the Resource Conservation and Recovery Act of 1976 (RCRA); the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or "Superfund"); the Superfund Amendments and Reauthorization Act of 1986 (SARA); the Clean Air, Clean Water, and Clean Drinking Water Acts; and other applicable federal and state laws and regulations.

Table 2.3-5 Hazardous Materials Inventory

Material	Purpose for Use	Storage Location	Quantity Used/Day	On-Site Storage Quantity/Week	Waste Management
Diesel	Fueling heavy equipment	Staging Area and Rasmussen Ridge Mines Shop Area	10,000 gallons	37,120 gallons	Not Applicable
Gasoline	Fueling pickups and mechanics trucks	Staging Area and Rasmussen Ridge Mines Shop Area	100 gallons	3,000 gallons	Not Applicable
Solvents	Parts cleaning	Rasmussen Ridge Mines Shop Area	5 gallons	50 gallons	Spent Solvents Recycled Off Site
Used Oil	Used motor oil	Rasmussen Ridge Mines Shop Area	Varies	5,000 gallons	Used Oil Recycled Off Site
Antifreeze	Cooling for mining equipment	Rasmussen Ridge Mines Shop Area	100 gallons	8,000 gallons	Not Applicable

Table 2.3-5 Hazardous Materials Inventory

Material	Purpose for Use	Storage Location	Quantity Used/Day	On-Site Storage Quantity/Week	Waste Management
Used Antifreeze	Used antifreeze	Rasmussen Ridge Mines Shop area	Varies	2,000 gallons	Used Antifreeze Recycled Off Site
Mining Overburden	Phosphate ore recovery	Mine area	20,000 tons	120,000 tons	Not Applicable
Explosives-Emulsion	Overburden removal	Rasmussen Ridge Mines Shop Area	Varies	20 tons	Not Applicable
Kerosene	Fueling portable heaters	Rasmussen Ridge Mines Shop Area	Varies	2,500 gallons	Not Applicable
Methanol	Keeps air systems on heavy equipment from freezing	Rasmussen Ridge Mines Shop Area	Varies	110 gallons	Not Applicable

All hazardous materials and wastes would be stored and shipped in appropriate containers and labeled according to the U.S. Department of Transportation regulations for hazardous materials as provided in 40 CFR Parts 171 through 180. Hazardous materials would be transported via regulated transporters. The primary route for transporting hazardous materials from Soda Springs to and from the mine would be via State Highway 34, Blackfoot River Road, and the existing haul road to the new West Side Haul Road to the mine site. Transportation of hazardous materials and wastes associated with the Proposed Action would comply with federal regulations.

The term “hazardous wastes” designates materials defined in 40 CFR Part 261.3 and regulated under RCRA. Hazardous wastes are regulated from the point of generation to the point of disposal. The Proposed Action is anticipated to be a conditionally exempt small-quantity generator because Agrium would generate less than 100 kilograms (220 pounds) of hazardous waste per month.

2.3.5.12 Aquatic Habitats

Stream crossings would be constructed to maintain water flows at adequate depths to allow fish passage consistent with adjacent portions of the stream to mitigate potential impacts to existing fisheries and aquatic habitats. Sediment control BMPs would also be implemented to prevent sediment from entering the streams at crossings and other project areas with sediment release potential to streams.

2.3.6 Water Management

The goal of the surface water management system is to prevent exceedances of water quality standards. The methods proposed to obtain that goal for the Proposed Action are summarized in the following sections and set forth in detail in Appendix F of the 2011 Mine and Reclamation Plan (Agrium 2011), Surface Water Control Design for the Rasmussen Valley Mine. Groundwater and surface water management in the pit is described below and summarized in the 2011 Mine and Reclamation Plan.

Small amounts of water that accumulate in the pits from snowmelt, rain, or groundwater seepage and interfere with mining or create a workplace hazard would be disposed on backfill areas that have yet to be covered and reclaimed. Water removed from open pits would not be discharged

into surface waters or allowed to percolate into groundwater that connects to nearby surface waters. If any sediment basin is found to be holding water for an extended period, the design and operation of the basin would be adapted to minimize use by wildlife.

If water accumulation in the operational pit areas needs to be remove for operational or safety concerns, it would be transferred from the pit to unreclaimed backfill areas located within the pit crest such that no surface runoff or sediment would leave the backfill area.

Snow that needs to be removed from Proposed Action roads and facilities areas would generally be plowed and stored along roadside berms or within reclaimed areas of the mine that feed runoff into the various installed BMPs (such as silt fences) and appropriate sediment retention structures. This would ensure that surface runoff is kept within acceptable standards for sediments in surface waters. Hauling and handling of snow in areas identified as sensitive (e.g., near wetlands or stream channels) may be subject to other practices to avoid impacts to these areas.

Water from well PW-1W or the well at the Rasmussen Ridge Mine shop may be used for dust suppression. Runoff from the areas where dust suppression water is applied would be contained in stormwater sediment basins and only released if testing found that the water met surface water quality standards.

2.3.6.1 Surface Water Control Design

The goal of the Surface Water Control Design in the 2011 Mine and Reclamation Plan is to prevent exceedances of water quality standards. The following strategies would be employed to achieve that goal:

- Intercept and manage surface runoff from disturbed and undisturbed areas that could affect activities or impact resource to include:
    - Manage runoff from the haul roads.
    - Collect and manage runoff from unreclaimed and reclaimed overburden storage piles and GM stockpiles.
    - Manage drainage at road crossings of natural drainages and streams.
    - Re-establish pre-mining drainages after mining.

These objectives would be accomplished by constructing diversion structures, culverts, or ditches to collect water and divert it to mine pits or sediment basins, or by constructing features such as culverts to convey natural drainages or streams under potential linear obstructions, such as haul roads or the county road.

2.3.6.2 Surface Water Control Structures

Agrium has designed surface water control structures to divert and handle surface runoff in the mine operations area. The structure design strategy, criteria, and results are included in the following sections.

2.3.6.2.1 Surface Runon

As shown in **Figure 2.3-5**, there are 12 drainage areas upslope (north and northeast) of the mine pit, numbered sequentially from southeast to northwest. Surface water runoff from these areas (referred to as runon because it would potentially run onto the mine pit and backfill) drains to the

mine pit and backfill areas. Surface runon in the Proposed Action occurs primarily from snowmelt. Runon diversion ditches would be sized to accommodate this snowmelt. Surface water runon would be allowed to flow into the pits, and would be controlled as part of the mine dewatering plan included in the 2011 Mine and Reclamation Plan. Water removed from open pits would not be discharged into surface drainages. Diversion ditches would be used for drainage areas 1 through 4 to reduce potential runon into mining Phases 2, 3, and 4 (**Figure 2.3-5**).

2.3.6.2.2 Runoff from Haul Roads

Culverts and ditches would be used to collect water from haul road surfaces and route the water to sediment basins. The culverts, ditches, and sediment basins would be constructed to convey and hold runoff and prevent discharge of runoff that does not exceed the design storm rainfall event (100-year, 24-hour storm event). Agrium's Multi-Sector General Permit (MSGP) allows for release of stormwater that meets water quality standards or exceeds the approved design storm event.

Runoff sediment basins would be located at Runoff Basin Locations A through L (**Figure 2.3-5**). They would be positioned downgradient of the West Side and Rasmussen Valley Haul Roads to collect the runoff from these roads. Each location may comprise a group of individual basins. **Table 2.3-6** lists the number of individual sediment basins and basin sizes at each location and the resulting excess capacity as a percentage of the total volume. The design volume for some locations may include portions of runoff from adjacent stockpiles.

Table 2.3-6 Haul Road Runoff Sediment Basins

Runoff Basin Locations	Size	Road Length (ft.)	Runoff Volume (cu. ft.)*	Number of Sediment Basins	Basin Volume (cu. ft.)	Excess Capacity (%)
A	50'x140'x10'	1,410	38,129	1	40,833	7
B	50'x135'x10'	2,784	75,284	2	78,417	4
C	50'x190'x10'	1,999	54,056	1	57,083	5
D	50'x190'x10'	1,995	53,948	1	57,083	5
E	50'x190'x10'	2,020	54,624	1	57,083	4
F	50'x120'x10'	2,393	64,711	2	68,667	6
G	50'x130'x10'	1,297	35,073	1	37,583	7
H	50'x180'x10'	2,082	102,650	2	107,667	5
I	50'x135'x10'	1,381	37,345	1	39,208	5
J	50'x180'x10'	3,486	152,578	3	161,500	6
K	50'x150'x10'	1,334	83,520	2	88,167	5
L	50'x115'x10'	1,991	61,515	2	65,417	6

Notes:

* Based on a 100-year, 24-hour storm event

2.3.6.2.3 Overburden Storage Piles and GM Stockpiles

Stockpile sediment basins and diversion structures are part of the water management plan (**Section 2.3.5**) and are designed to prevent or mitigate impacts to surface water resources. Runoff from overburden and GM stockpiles would be collected by ditches at the toe of each stockpile and routed to sediment basins. The collection ditches and runoff sediment basins would be constructed to hold and prevent discharge of runoff that does not exceed the design. Agrium's MSGP would allow for release of stormwater that meets water quality standards or a stormwater event that exceeds approved design volume.

Six external overburden piles and three GM stockpiles are planned (**Figure 2.3-2**). Sediment basins are proposed for four of the six proposed external overburden piles and one of the three GM stockpiles. All of the GM stockpiles would be stabilized with vegetation, straw wattles, and silt fences, and two of the three would not have associated sediment basins. The North and South External Overfill Piles are contiguous with and uphill from the pit backfill. Runoff from the North and South External Overfill Piles would be handled in the same manner as runoff from the pit backfill.

The runoff sediment basins for stockpiles are designed to hold 100 percent of the 100-year, 24-hour storm event. **Table 2.3-7** lists the specifications of the overburden piles and GM stockpile sediment basins to meet the design parameters.

Table 2.3-7 External Stockpile and Overburden Pile Sediment Basins

Basin #	Basin Name	Size	Runoff Volume (cu. ft.)	Number of Basins	Basin Volume (cu. ft.)	Excess Capacity (%)
3	North GM Stockpile	50'x180'x10'	81,581	2	82,292	1
4	North External Overburden Pile	50'x170'x10'	152,914	4	155,083	1
5	Rasmussen Valley Ore Stockpile (Optional)	50'x145'x10'	65,191	2	65,667	1
6	Main South External Overburden Pile	50'x205'x10'	231,931	5	235,417	1
7	South-South External Overburden Pile	50'x215'x10'	196,299	4	197,833	1

2.3.6.2.4 Drainage Control

Surface water from undisturbed areas would be conveyed under the Rasmussen Valley Haul Road, the West Side Haul Road, and the County Road realignment through culverts at 18 locations (**Figure 2.3-5**). Culverts 1 through 8 along the Rasmussen Valley Haul Road would direct water under the Rasmussen Valley Haul Road. Culverts 9 through 14 and 16, along the West Side Haul Road, would drain areas between the mine pit and the haul road. Culverts 15, 17, and 18 would direct drainages under the county roads. The runoff routed through these culverts would be from undisturbed drainages and would not be retained. Culverts under the haul roads and the county roads would follow the requirements of the Federal Lands Highway Project Development and Design Manual for high-standard roads on federal lands (FHWA 2014). **Table 2.3-8** lists proposed surface water drainage structures to be used during mining and reclamation. During reclamation, pre-mining drainage across the mine pit would be re-established along Drainage Channels 4, 6, 7, 8, 10, and 12 (**Section 2.3.6.5**).

Table 2.3-8 Surface Water Drainage Structures

Structure #	Project Stage	Location	Drainage	Design Basis
Culvert 1	Mining	Rasmussen Valley Haul Road	Angus Creek	100-year, 24-hour
Culvert 2	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 3	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 4	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 5	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 6	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 7	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 8	Mining	Rasmussen Valley Haul Road	Angus Creek	100-year, 24-hour
Culvert 9	Mining	West Side Haul Road	Drainage 13	50-year, 24-hour
Culvert 10	Mining	West Side Haul Road	Drainage 14	50-year, 24-hour
Culvert 11	Mining	West Side Haul Road	Drainage 15	50-year, 24-hour
Culvert 12	Mining	West Side Haul Road	Drainage 16	50-year, 24-hour
Culvert 13	Mining	West Side Haul Road	Drainage 17	50-year, 24-hour

Table 2.3-8 Surface Water Drainage Structures

Structure #	Project Stage	Location	Drainage	Design Basis
Culvert 14	Mining	West Side Haul Road	Drainage 18	50-year, 24-hour
Culvert 15	Mining	County Road realignment	Drainage 18	50-year, 24-hour
Culvert 16	Mining	West Side Haul Road	Drainage 19	50-year, 24-hour
Culvert 17	Mining	County Road realignment	Drainage 19	50-year, 24-hour
Culvert 18	Mining	County Road realignment	Drainage 20	50-year, 24-hour
Drainage Channel	Mining	Drainage 18	Culvert 14 to 15	100-year, 24-hour
Channel* 4	Reclamation	Pit 4	Drainage 4 to 17	100-year, 24-hour
Channel* 6	Reclamation	Pit 5	Drainage 6 to 15	100-year, 24-hour
Channel* 7	Reclamation	Pit 5	Drainage 7 to 15	100-year, 24-hour
Channel* 8	Reclamation	Pit 5	Drainages 8 to 15	100-year, 24-hour
Channel* 10	Reclamation	Pit 6	Drainage 10 to 14	100-year, 24-hour
Channel* 12	Reclamation	Pit 6	Drainage12 to 13	100-year, 24-hour

Notes:

* Final re-established channels

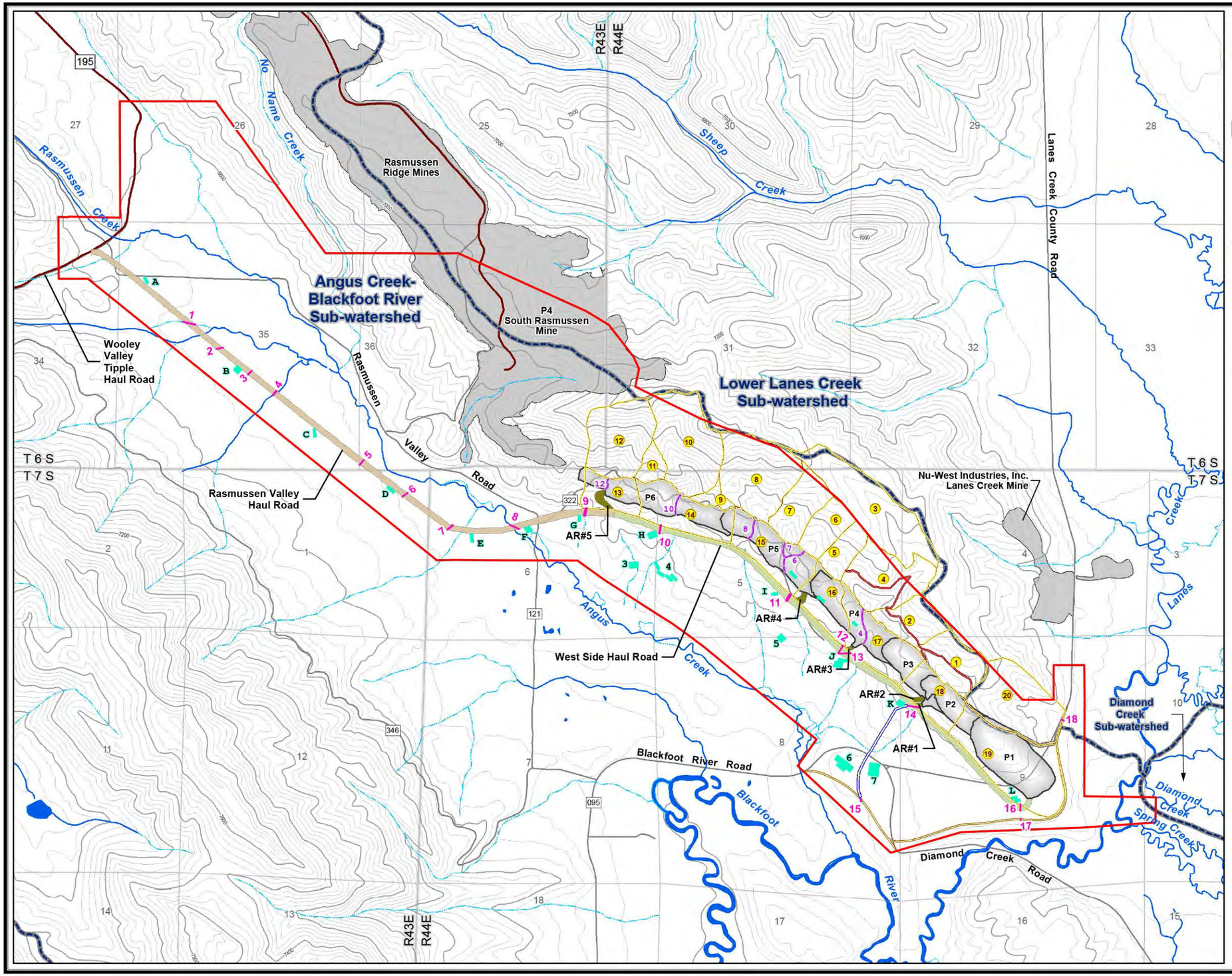
2.3.7 Reclamation Plan

The objectives of reclamation are to provide vegetative cover suitable to stabilize the surface; to re-establish the pre-mining multiple land uses of recreation, wildlife habitat, and livestock grazing where authorized; and to limit the risk of post-mining environmental impacts. Reclamation would consist of backfilling open pits, grading backfill and overburden piles and haul roads, placing a cover on backfill and overburden piles, handling GM, re-establishing drainage patterns, removing project-related facilities including power lines, and planting vegetation for reclamation of disturbed areas. Approximately 96 percent of the total disturbance would be reclaimed and revegetated. The remaining 4 percent would comprise exposed unrevegetated limestone pit walls and portions of the realigned county roads.

2.3.7.1 Backfill and Overfill

Approximately 89 percent of overburden excavated would be either returned to the open pits as backfill or permanently placed in the two external overfill piles, which are contiguous with the pit backfill. The remaining excavated overburden would remain permanently in two external overburden piles. All Meade Peak-containing material would be backfilled directly into the previous phase open pits or external overfill piles. When backfill space is not available, material would be stored temporarily in external piles until it can be placed in appropriate backfill locations.

All pit backfill would be shaped, covered, and reclaimed so that runoff could drain off the reclaimed backfill onto undisturbed ground. A small area of unreclaimed pit wall (11.2 acres) would be left exposed. No Meade Peak strata in the pit walls would be left exposed. Meade Peak overburden from the initial mining of Phase 1 would be transported to the temporary external overburden piles and to the two temporary overburden piles located within the pit footprint (**Table 2.3-2**). Non-Meade Peak overburden from Phase 1 would be transported for storage in the permanent external overburden piles. As mining progresses, open pits would become available to receive excavated overburden from the subsequent mining phase as backfill.



LEGEND

- STUDY AREA
- PIT OUTLINE BY PHASE
- EXISTING MINED AREA
- DRAINAGE AREA BOUNDARY AND LABEL
- PRE-MINING SUB-WATERSHED BOUNDARY
- INTERMITTENT STREAM
- PERENNIAL STREAM
- POND
- RUNON DIVERSION DITCH
- CULVERT
- DRAINAGE DITCH
- RE-ESTABLISHED CHANNEL
- SEDIMENT BASIN
- WEST SIDE HAUL ROAD
- RASMUSSEN VALLEY HAUL ROAD
- ACCESS RAMP
- COUNTY ROAD REALIGNMENT
- WOOLEY VALLEY TIPPLE HAUL ROAD
- EXISTING ROAD
- FOREST SERVICE ROAD DESIGNATION
- TOPOGRAPHIC CONTOUR: MAJOR
- TOPOGRAPHIC CONTOUR: MINOR

AR = ACCESS RAMP

Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Contour Interval = 40 Feet

NORTH

0 2,100 4,200 Feet

RASMUSSEN VALLEY MINE

FIGURE 2.3-5
Water Management for Proposed Action

ANALYSIS AREA: Caribou County, Idaho	
Date: 6/23/2016	Prepared By: JC
File: K\CO1553\2016_FEIS\Chapter2\Water_Management_v2.mxd	

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Phases 1 through 5 and a portion of Phase 6 would be backfilled to a final reclaimed surface slope of no more than 3H:1V. The remainder of Phase 6, the last phase to be mined, would be backfilled to a final reclaimed surface sloping northeast-to-southwest at a 2 percent gradient. Runoff would flow off the reclaimed backfill and onto undisturbed ground or toward re-established drainages. The backfill would be shaped to prevent standing water or formation of a pit lake.

The Proposed Action would cover the backfill and overfill with a store-and-release earthen cover consisting of a minimum of 3 feet of non-Meade Peak-containing material overlain by 2 feet of GM salvaged from within the pit area. The Proposed Action cover is a store-and-release design to reduce the percolation rate in the root zone until a portion of the water can be transpired to the atmosphere. The non-Meade Peak-containing material layer separates the underlying Meade Peak-containing material from the GM, while the GM supports vegetation.

2.3.7.2 Overburden Piles

The final slopes of external overburden piles would be graded or re-contoured to have maximum 3H:1V slopes and to prevent ponding of meteoric waters on the pile surface, thus reducing infiltration. The final height of the permanent overburden piles would range from 180 feet to 260 feet high from toe to top. The South Main Temporary Overburden Pile and a portion of the North Overburden Pile would not be reclaimed because they would be placed back into the pit as backfill at the end of mining. Once removed, the area occupied by the temporary piles would be reclaimed. The permanent external overburden piles would not include Meade Peak-containing material to reduce the potential for leaching COPCs. When the permanent external overburden piles are final graded, they would be covered with a minimum of 12 inches of GM and revegetated.

2.3.7.3 GM Direct Placement and GM Storage Management

GM would be salvaged, placed on available areas, or stored in GM stockpiles for use as soon as areas are available for reclamation, thereby reducing long-term GM storage. GM would generally be salvaged and used during the summer and fall when wet or frozen soil conditions do not restrict soil salvage or use operations.

2.3.7.4 Re-establishment of Drainages

All of the drainage areas would be re-established after mining, including those on backfill, overfill, and permanent overburden piles. Six of these drainages (4, 6, 7, 8, 10, and 12; **Table 2.3-8**) would be re-established with channels lined with compacted GM or alluvium and riprap. The remaining six drainages are small and would be re-established as swales during final grading.

The six re-established channels would be designed to accommodate the peak discharge from the 100-year, 24-hour storm event with a minimum of 6 inches of freeboard (**Table 2.3-8**). The channels would be constructed as flat-bottomed, trapezoid-shaped channels with a bottom width of 8 feet and 3H:1V side slopes. Channel depths would vary depending on the design peak flow. The channels would be lined with a layer of compacted alluvium or GM to reduce infiltration into backfill, then lined with riprap as needed to protect against erosion. The slopes of the channels would follow the ground slopes of the backfill, and thus would be not greater than 3H:1V.

2.3.7.5 Haul Roads

The West Side Haul Road, the Rasmussen Valley Haul Road, and smaller connecting roads in the Proposed Action would be reclaimed when no longer needed. The existing Wooley Valley Tipple Haul Road would be reclaimed under the Rasmussen Ridge Mines Reclamation Plan when no longer needed.

All reclamation would be designed to meet the vegetation COPC concentrations established in the BLM Pocatello Field Office (PFO) Approved Resource Management Plan (ARMP; BLM 2012a). For all haul roads, the first stage of road reclamation would be to remove safety berms as necessary, particularly in areas where selenium contamination from transported material may have occurred. Removed haul road material would be placed as backfill within the mine. Road material would be removed beginning with the outside edges and working inward to the centerline. Maximum practical effort would be made to not increase the road footprint during reclamation. Reshaping of the road would leave a reclaimed surface that has maximum slopes of 3H:1V, with the edges blending into the natural topography and having no ledge where the reclaimed edge meets the original grade. Reshaping would be achieved by removal of material to the specified dimensions and contours, not by spreading material out beyond the original road footprint. Once shaped, all reclaimed surfaces would be covered with a minimum of 12 inches of GM and revegetated.

Haul road culverts and all road fill materials overlying the culverts would be removed. A minimum of 8 feet of fill on either side of the original drainage would be removed. GM would be placed in areas where it had been removed for haul road construction. BMPs would be implemented to address erosion until vegetation is re-established. Any associated nearby water management structures, such as sediment ponds, would also be reclaimed as part of haul road reclamation. Water management structures would be cleaned of any materials found to contain selenium or other COPCs before the originally excavated materials are used to fill in the structures. Any Meade Peak-containing material from haul roads, berms, or water management structures would be disposed of as backfill within the mine.

2.3.7.6 Facilities

After mining, all equipment and facilities would be removed from the site. The drinking water system and septic system would be abandoned in accordance with applicable state laws. The staging area fill would be analyzed for total petroleum hydrocarbons (TPHs) that may have resulted from petroleum releases. If unacceptable levels of TPH concentrations are detected, the materials would be treated or removed in accordance with the current applicable regulations (Idaho Administrative Procedures Act [IDAPA] 58.01.24). The staging area would then be ripped and regraded to approximate the natural topography. GM would be placed over the area as needed to a minimum depth of 12 inches, seeded, and fertilized.

Fuel tanks would be emptied, cleaned, and hauled off site. Any products removed from the tanks during decommission or resulting from cleaning would be recycled or hauled off to an agency-approved disposal area. Secondary containment structures would be cleaned and demolished. Resulting rubble would be tested for petroleum. Contaminated rubble would be transported off site to a licensed landfill for disposal in accordance with current applicable regulations. Uncontaminated rubble would be hauled off site. The area underneath the secondary containment and surrounding disturbance would be tested for petroleum. If unacceptable levels of contamination are detected, the extent of the contamination would be delineated, and impacted soils would be treated or removed based on current applicable regulations (IDAPA 58.01.24). The areas would then be ripped, regraded in a manner that blends with the natural topography, capped with GM as needed, and seeded.

Power lines at the Proposed Action and all fencing and warning signs would be removed when no longer needed and all materials would be taken off site.

Existing office and maintenance facilities located at Agrium's Rasmussen Ridge Mines would be used for mine administration, operation personnel, and equipment storage and maintenance.

When no longer needed, the office, shop, and maintenance facilities would be demolished and reclaimed under the agency-approved reclamation plan for the Rasmussen Ridge Mines.

2.3.7.7 Revegetation

The objective of revegetation is to provide a self-regenerating cover that controls erosion, is easily established, and meets the vegetation COPC concentration action levels documented in the PFO ARMP (BLM 2012a). In addition, Agrium proposes to establish a plant cover suitable for post-mining land uses of grazing and wildlife habitat and to enhance the evapotranspiration function of the backfill and overfill cover system. Revegetation would be of two types: interim revegetation on areas that would be subject to future re-disturbance and final revegetation. Proposed seed mixes are presented in **Table 2.3-4**.

Interim revegetation would be conducted as needed on cuts and fills, road fills, and other areas that would be re-disturbed as part of final reclamation using the same seed mix as that used for permanent reclamation or a mixture of grasses and forbs selected solely to stabilize the surface against erosion. Agrium would use agency-approved seed mixes for species and application rates for interim revegetation. Interim seeding would typically occur in the fall.

Final revegetation, like interim revegetation, would be to stabilize the ground surface as well as to establish a plant cover suitable for post-mining land uses of grazing and wildlife habitat and to enhance the evapotranspiration function of the cover system. A mixture of grasses, forbs, and shrubs is proposed. All reclamation would be designed to meet the vegetation COPC concentrations established in the PFO ARMP.

The areas to be revegetated would be prepared to receive seeds through placement, grading, and smoothing of GM. Seeds would be drilled or broadcast onto the area. GM would be augmented with fertilizer based on soil analysis of the area. Revegetation would take place typically in the fall. Appropriate BMPs to control invasive and noxious species would be implemented throughout the life-of-mine and for a period post-mining. As reclamation techniques and philosophies change, Agrium would work with appropriate agencies to revise the seed mix and revegetation objectives.

2.3.7.8 Wetlands Mitigation or Replacement

Disclosing potential impacts to wetlands is a key issue for the EIS. Addressing potential wetland impacts and associated mitigation is the responsibility of the U.S. Army Corps of Engineers (USACE) through the Clean Water Act (CWA) Section 404 permitting process. Because of the wetlands existing within the Study Area, the USACE is a cooperating agency. The USACE would use data and analysis from this EIS to process any Section 404 permit application Agrium may need to submit for the project. The USACE's Final Decision on Agrium's Section 404 permit application, should a permit be required, would incorporate Compensatory Mitigation for Losses of Aquatic Resources in compliance with 33 CFR Parts 523 and 332 and 40 CFR Part 230.

2.3.7.9 Wildlife Habitat Mitigation Approach and Habitat Equivalency Analysis

The residual impacts to wildlife habitat for the Rasmussen Valley Mine were quantified using a Habitat Equivalency Analysis (HEA) model. The HEA uses habitat baseline information to evaluate the different wildlife habitats impacted in the Study Area and determines a value for the wildlife services lost as a result of ground disturbance and a value for the wildlife services gained

through reclamation and on-site mitigation. The acres and services lost or gained as a result of mining activities, reclamation, and mitigation are expressed quantitatively as Discounted Service Acre Years (DSAYs).

The HEA addresses impacts to upland wildlife habitats. Jurisdictional wetlands that occur in the Study Area are addressed in the USACE 404 permitting process, not through the HEA. The USACE has determined that all wetlands in the Study Area are jurisdictional (USACE 2014); therefore, no wetlands are included in the assessment of habitat service loss in the HEA.

The analysis process and results of the HEA are documented in several reports. The Wildlife Habitat Equivalency Analysis Baseline Metrics Report (Arcadis 2014a) describes baseline (pre-mining) conditions for the habitats on the mine site. The conditions are expressed in terms of two values called metrics: (1) richness cover wetness (RICHCOVWET) and (2) within aspen overstory (WAO). The RICHCOVWET metric quantifies wildlife service habitat losses and gains for areas containing shrubs, forbs, and grasses; and the WAO metric quantifies losses and gains for habitat with an aspen forest type overstory (Arcadis 2014a).

A second report, the Wildlife Habitat Equivalency Analysis Predictive Metrics Report (Arcadis 2015a) describes how on-site baseline conditions for the Proposed Action are expected to change as a result of reclamation that is expected to restore wildlife habitat services. The report then identifies two hypothetical mitigation projects (a Stream Project and an Aspen Project) to illustrate how the methods and results of the HEA can be used to quantify mitigation projects that offset lost wildlife habitat services. A third report, the Wildlife Habitat Equivalency Analysis Predictive Metrics Report Addendum (Arcadis 2015b), describes how conditions are expected to change following reclamation under the Preferred Alternative, the RCA.

The HEA Report (Arcadis 2015c) combines the information from the Baseline Metrics and Predictive Metrics Reports (Arcadis 2014a, 2015a, 2015b) and presents the quantified impacts to habitat services under the Proposed Action and alternatives using DSAYs as the measure. The HEA and the calculated DSAYs, take into account not only the wildlife services lost and gained as a result of impacts and reclamation, but also the timing of when the services are lost and when they return to maturity. The HEA Report also explains how mitigation projects would offset the on-site services lost.

Agrium has proposed to use the quantitative results of the HEA to determine the funding of a third party to implement wildlife habitat mitigation projects in the regional watersheds in lieu of Agrium implementing an actual project. To do this, Agrium would use four hypothetical mitigation projects to calculate and arrive at a cost of mitigating the lost (residual) wildlife habitat services (in terms of DSAYs) from the selected alternative. Because the selected alternative would not be known until after publication of the Final EIS, the project and cost estimate would be described in a Wildlife Habitat Mitigation Plan prepared by Agrium before the Record of Decision (ROD) is signed. This document would include five components: (1) details of the hypothetical mitigation project(s); (2) the gain in DSAY values from the hypothetical project and the assumptions used in the calculations; (3) a calculation of the total cost to offset the lost DSAYs of the Proposed Action and selected alternative using hypothetical mitigation projects as a basis; (4) description of the provisions of the corresponding in-lieu fee to a third party; and (5) fulfillment of the mitigation. The selection of the hypothetical mitigation projects and the cost of the projects would be calculated in coordination with the Agencies. The BLM, Agrium, and other stakeholders would identify a third-party recipient of the in-lieu fee and confirm that the fee would be spent in accordance with the wildlife habitat mitigation objectives. The calculation of the in-lieu fee amount and the disposition of the money will be documented as a requirement in the ROD. After the ROD is signed, Agrium would provide the in-lieu fee to the third party.

2.3.8 Environmental Monitoring Plan

The Environmental Monitoring Plan (EMP; **Appendix B**) identifies the environmental monitoring activities that would be undertaken at the mine to ensure compliance with environmental standards, regulations, and land use plans and the effectiveness of BMPs and mitigation measures. The EMP identifies which resources will be monitored and describes monitoring and sampling locations, approved monitoring and sampling methods, duration and frequency of sampling, and data reporting requirements. Some of the environmental monitoring, such as groundwater monitoring, began during baseline data collection to establish baseline conditions. The EMP will include monitoring water quality, reclamation success, overburden cover construction and presence of noxious weeds. A final EMP will be prepared and approved after the ROD has selected an alternative and before activities that impact resources begin.

2.4 ALTERNATIVES DEVELOPMENT PROCESS

The primary goal of alternatives development is to identify and describe acceptable ways to address unresolved conflicts with the Proposed Action identified during scoping while meeting the purpose of and need for the Proposed Action. The NEPA process requires that alternatives evaluated in detail be reasonable, as discussed in the regulations implementing NEPA (40 CFR 1500.1[e] and 1502.14). In addition, the Council on Environmental Quality's (CEQ's) 40 Most Asked Questions about NEPA (Question 2a) states, in part, "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense…" (CEQ 1981).

Alternatives development began with the compilation of a list of issues and indicators identified in public and agency scoping (**Table 1.6-1**). The Agencies and Arcadis evaluated these issues to identify modifications to project features, facilities, or operations that would eliminate or reduce anticipated environmental effects to acceptable levels while fulfilling the purpose of and need for the Proposed Action. A suggested list of these elements was provided to Agrium in a letter (BLM 2012b) requesting that they assist the Agencies by considering the feasibility of these elements for the development and operation of the Proposed Action. Agrium developed a technical memorandum (Brown and Caldwell [BC] 2015c) discussing the feasibility of alternative elements. In the technical memorandum, alternative elements were organized into the following seven categories:

- Overburden storage and management
- Infrastructure elements
- Ore transport and access routes
- Cover systems
- Wetlands mitigation
- Mine sequencing and material handling
- GM management and seed mix

Overburden storage and management during and after mining operations were identified as potential sources of COPCs that could contaminate surface water and groundwater. Runoff and drainage from in and around the overburden piles could also increase the potential release of COPCs. In addition, some of the locations for overburden piles in the Proposed Action carried a

potential for geotechnical instability which could lead to slope failure and exacerbate the release of COPCs. The release of COPCs could affect surface water and groundwater quality and in turn could affect wetlands and riparian areas; vegetation; wildlife; fisheries and aquatic species; and threatened, endangered, or sensitive species. Overburden piles on the ridge slopes would also affect the visual character of the landscape. Alternative elements that would contain and manage runoff and leaching were considered. These included alternative locations for temporary or permanent overburden piles, including the use of previously disturbed areas, and backfilling directly to mined out areas to minimize storage. Several different locations for overburden piles near the lease and several previously mined areas were considered for the disposal or storage of overburden. As discussed in **Section 2.8**, some of these alternative elements did not reduce adverse effects in comparison to the Proposed Action. Some may have reduced one adverse effect at the cost of increasing others.

Aspects of mine infrastructure, such as the locations of facilities and the construction and maintenance of power lines, were evaluated for environmental issues. As with overburden storage and management, a key issue for location and construction of infrastructure was potential effects to groundwater, surface water, and wetlands. Power lines identified in the Proposed Action were identified as a potential source of issues. One issue was the disturbance of natural drainages and indirect effects to wetlands in Rasmussen Valley. Another issue for overhead power lines was the potential for electrocution or collisions for birds.

The primary elements of ore transport and access are the ore haul roads. The existing Wooley Valley Tipple was identified as the preferred loading point for transport of the ore to the CPO fertilizer plant, and all haul road alternatives were designed to link to the existing Wooley Valley Tipple Haul Road. The Rasmussen Valley segment of the Proposed Action Haul Road was identified as having several issues. This haul road would cross the floor of Rasmussen Valley, would cross Rasmussen Valley County Road, would disturb 10.3 acres of wetlands and other waters of the U.S. (WOUS), would impair public access and recreation, and would disturb public and private grazing land. Alternative haul road routes were considered for their potential to reduce these potential impacts, particularly the impacts to wetlands and riparian areas. An alternative to avoid a new crossing of Rasmussen Valley and connect with existing haul roads at the Rasmussen Ridge Mines, originally identified as HR-4, depended on reaching an agreement with P4, LLC (P4) to cross through their South Rasmussen Mine. HR-5 in the RCA is a variation of this alternative.

As with overburden storage and management during mining, overburden and backfill after mining were identified as potential sources of COPCs that could contaminate surface water and groundwater. Many of the potential effects of the long-term management of overburden and backfill are the same as those for overburden storage and management during mining. A key element for the long-term management of overburden and backfill is the cover design. Objectives of the cover design are to establish a healthy vegetative ground cover to stabilize the ground surface from erosion and mass failure, limit deep percolation (thus limiting the leaching and transport of COPCs into groundwater), and provide a diverse vegetative cover for wildlife forage and cattle grazing.

Mine sequencing and material handling affect the extent of surface disturbance at any given time, the amount of Meade Peak overburden that must be managed, and the potential for mine pit water or the contamination of groundwater and surface water. This includes the sequencing of backfilling and overlaps to some extent with overburden storage and management. Aspects of mine sequencing and material handling may also reduce or eliminate the need for mining below the water table.

The combined alternatives feasibility analysis (BC 2013a) does not directly address alternative elements for wetlands mitigation. Other alternative elements, such as alternative haul roads and alternative overburden pile and GM stockpile locations that would avoid impacts to wetlands were considered.

Alternative elements for GM management and seed mixes are addressed in the alternatives analysis. Alternatives that included GM storage in Rasmussen Valley for haul road reclamation were eliminated with the haul road alternatives in the valley. Alternative GM stockpile locations included locations for overburden piles that were considered and eliminated, and locations that were incorporated into the RCA. The chosen alternative elements for GM storage eliminate potential impacts to wetlands. The alternative seed mixes emphasize diversity and reclamation of wildlife habitats.

Favorable alternative elements were combined into the RCA. Some elements that had initially been considered problematic (such as disposal of overburden in the partially reclaimed South Rasmussen Mine and a haul road route through the South Rasmussen Mine to link to the existing Rasmussen Ridge Mine haul road) became feasible with the cooperation of P4.

Agrium was requested to consider recovering the ore reserves located at the north end of the Lease to satisfy the BLMs CFR directive of “ultimate maximum recovery” of resources on leasable lands. This led to a variation in the alternative elements including an additional lease modification and revised pit footprint.

2.5 ALTERNATIVES CONSIDERED

The process described above resulted in the development of several alternatives that specifically responded to one or more of the issues. Although a number of alternatives were developed, they were not all analyzed in detail. Some were deemed unreasonable early in the process. Others were eliminated after initial analysis indicated that they were not reasonable.

The alternatives developed for this NEPA analysis are described in two overall groups. The alternatives analyzed in detail are described first. The alternatives considered but eliminated from detailed analysis are described subsequently (**Section 2.8**).

2.5.1 Rasmussen Collaborative Alternative and BMPs

Alternatives to several features of the Proposed Action were considered to be significantly more effective than the Proposed Action and are considered BMPs. These alternative components were combined together in a single alternative referred to as the RCA. The RCA is so called because it was developed by Agrium in collaboration with P4, the operator of the South Rasmussen Mine operating on State Lease #7958 and Federal Phosphate Lease IDI-23658 (Fringe Lease). The RCA alternative includes the following components considered BMPs:

- Placement of Rasmussen Valley Mine overburden into the P4’s partially backfilled South Rasmussen Mine pit on the State Lease and extending into the federal Fringe Lease to the east (**Figure 2.5-1**). The use of P4’s South Rasmussen Mine would eliminate the need for external overburden piles on the pediments downslope of the Rasmussen Valley Mine pit. It would also cover and reclaim portions of the South Rasmussen Pit that had not previously been identified for reclamation, and provide additional stability for backfill in the pit. Eliminating the external overburden piles down slope of the Rasmussen Valley Mine pit eliminates the source of potential COPC impacts to Angus Creek and Blackfoot River.
- Placement of an enhanced cover on the Rasmussen Valley Mine overburden piles and backfill and on the South Rasmussen Mine RCA backfill to reduce the predicted

percolation of meteoric water through the overburden, thus reducing the COPC loading to the groundwater to protect beneficial uses.

- Reducing the amount of water requiring management by avoiding mining below the regional water table, thus reducing the amount of water percolating through overburden and leaching COPCs into the groundwater, or the need for a water treatment alternative.
- Rerouting the haul road up the southeast slope of Rasmussen Ridge and onto P4's South Rasmussen Mine. The haul road would extend through the South Rasmussen Mine and onto Agrium's existing Rasmussen Ridge Mine haul road and next to their shop area. This route, designated HR-5, avoids all wetland impacts; allows the transport of overburden to the South Rasmussen Mine pit; eliminates the need for a new fuel facility at the staging area near the Rasmussen Valley Mine pit, and routes mine traffic past existing fuel facilities at the Rasmussen Ridge Mines shop area. Ore would also be hauled to the Wooley Valley Tipple by this route.
- Selection of a seed mix for reclamation that provides more native species for enhanced wildlife habitat vegetation.
- Avoidance of all wetlands impacts by repositioning several mine facilities.

The RCA addresses concerns and issues raised in public and agency scoping. In the following sections, the RCA will be compared to the Proposed Action, followed by a discussion of other alternative elements considered but not carried forward for full analysis. The comparison begins with a description of proposed mining operations in relation to **Section 2.3.3**.

In response to public comments, to concerns about activities on the IDFG Blackfoot River Wildlife Management Area (WMA), and to small remaining areas of wetland impacts, the following modifications have been made to the RCA as presented in the Draft EIS (**Figure 2.5-1**).

- The North-North and North Main GM, alluvium and colluvium borrow and storage areas, for obtaining material for backfill cover construction have been combined and enlarged on NFS land both on and off lease to potentially reduce the area on the WMA that might need to be disturbed for borrow material. The RCA North-North and North Main GM, alluvium, and colluvium storage areas coincidentally overlap the locations of the eliminated Proposed Action North GM Stockpile and North Overburden Pile. The similar names should not be confused.
- The area between the mine pit and the West Side Haul Road on NFS land would be used to store GM and alluvium in GM stockpiles for use in reclamation and backfill cover construction, again to minimize the need to disturb the WMA.
- The footprints of the West Side Haul Road and the access ramp at the west end of Phase 7 (Access Ramp 5) have been modified to avoid impacts to wetlands.
- The realignments of the county roads have been adjusted to avoid wetlands.
- Additional surface water management features have been added, including runon diversion ditches and an access road upslope of the mine pit, and sediment basins to reduce the amount of water potentially contacting overburden and pit walls.
- P4 will use mineral materials borrow from the Rasmussen Valley Mine external borrow areas to improve the cover placed on the overburden stored in the South Rasmussen Mine pit to protect beneficial uses of groundwater in the Wells Regional Aquifer.
- The avoidance of all wetlands by the RCA means that a Section 404 CWA permit may not be needed and will be evaluated and processed if needed.

These changes to the RCA have identified expanded borrow and storage areas off the WMA, have avoided all impacts to wetlands, and allowed flexibility so that less of the South Main Borrow and Storage Area on the WMA may need to be used. All of these changes together increase the overall potential surface disturbance by almost 141 acres for the RCA as described in the Draft EIS or 73 acres more than the Proposed Action. However, it is unlikely that all of these borrow areas will be needed.

The RCA also enlarges the extent of the mine pit to the northwest to recover additional ore thus delaying when additional mines may need to be brought into operation to continue supplying phosphate ore to the CPO fertilizer plant in Soda Springs.

2.5.1.1 Lease Modifications

Mine disturbances outside the BLM lease boundary are often proposed to allow activities such as additional phosphate ore recovery, pit wall lay back for safety, establishment of overburden backfill and external piles, and construction of ancillary facilities such as roads and stockpiles. The following describes specific areas in which Agrium has requested activities outside of the lease boundary, and how those activities could be authorized (**Table 2.5-1**).

The RCA expands the pit and associated backfill to the northwest and adds external overburden disposal north of the Lease on the north end of the pit (**Figure 2.5-2**, **Table 2.5-1**). The pit wall, pit backfill, and a smaller portion of external overburden would extend onto state land (**Figure 2.5-2**) and would need to be approved by IDL. The remainder of the external overburden outside the Lease (permanent overfill pile) would be placed on National Forest Land and would require a BLM lease modification (**Figure 2.5-2**, Area D; **Table 2.5-1**).

Table 2.5-1 Proposed Lease Modifications and Use Permits for the RCA

Map ID[1]	Type	Acreage
A	Private Land Agreement	10.2
B	Modification (BLM/Private)	55.9
C	Modification (BLM/USFS)	20.7
D	Modification (BLM)	19.6
E	Temporary Use (State - IDFG)	3.4
F	Temporary Use (State - IDFG)	10.0
G	Special Use (USFS)	0.6
H	Special Use (USFS)	1.0
I	Special Use (USFS)	0.6
J	Special Use (USFS)	0.6
K	Special Use (USFS)	0.6
L	Special Use (USFS)	0.6
M	Special Use (USFS)	0.1
N	Special Use (USFS)	0.3
O	Special Use (USFS)	0.2
P	Special Use (USFS)	0.3
R	Minerals Material (USFS)	104.4
T	Temporary Use (State - IDFG)	49.6
U	Lease Agreement (State - IDL)	18.4
V	Mine and Reclamation Modification (State - IDL)	52.5
W	Mine and Reclamation Modification (BLM)	5.5
	Total	**355.1**

Notes:
1 ID number from **Figure 2.5-2**

In the Proposed Action, Agrium requested a lease modification on the southeast end of the Lease to allow the recovery of additional ore in the area. The RCA has reduced the area of this lease modification (**Figure 2.5-2, Table 2.5-1**, Area B) to more closely conform to the location of the ore and pit informed by more recent exploration data.

A portion of the pit wall, backfill, haul road, and a section of monitoring well access road are proposed on the WMA (**Figure 2.5-2**, Areas E and F; **Table 2.5-1**). Authorization for these activities would be via an agreement between Agrium and the IDFG. The optional South Main External Borrow and Storage Area in Area T, if needed, would also be authorized via a use agreement between Agrium and the IDFG.

The lease modification identified in the Proposed Action and RCA (Area A in **Figure 2.3-1** and **Figure 2.5-2; Table 2.5-1**) on privately owned land is not an option because there is no federal phosphate mineral on the land. For this activity, Agrium would arrange an agreement with the private landowner (Bear Lake Grazing).

The Proposed Action lease modification to place backfill in the portion of the pit on National Forest Land outside the phosphate lease boundary (**Figure 2.3-1**, Area C) has been reduced from 40 acres in the Proposed Action to 20 acres in the RCA (**Figure 2.5-2**, Area C).The external borrow and storage areas in Area R would require a USFS minerals materials permit.

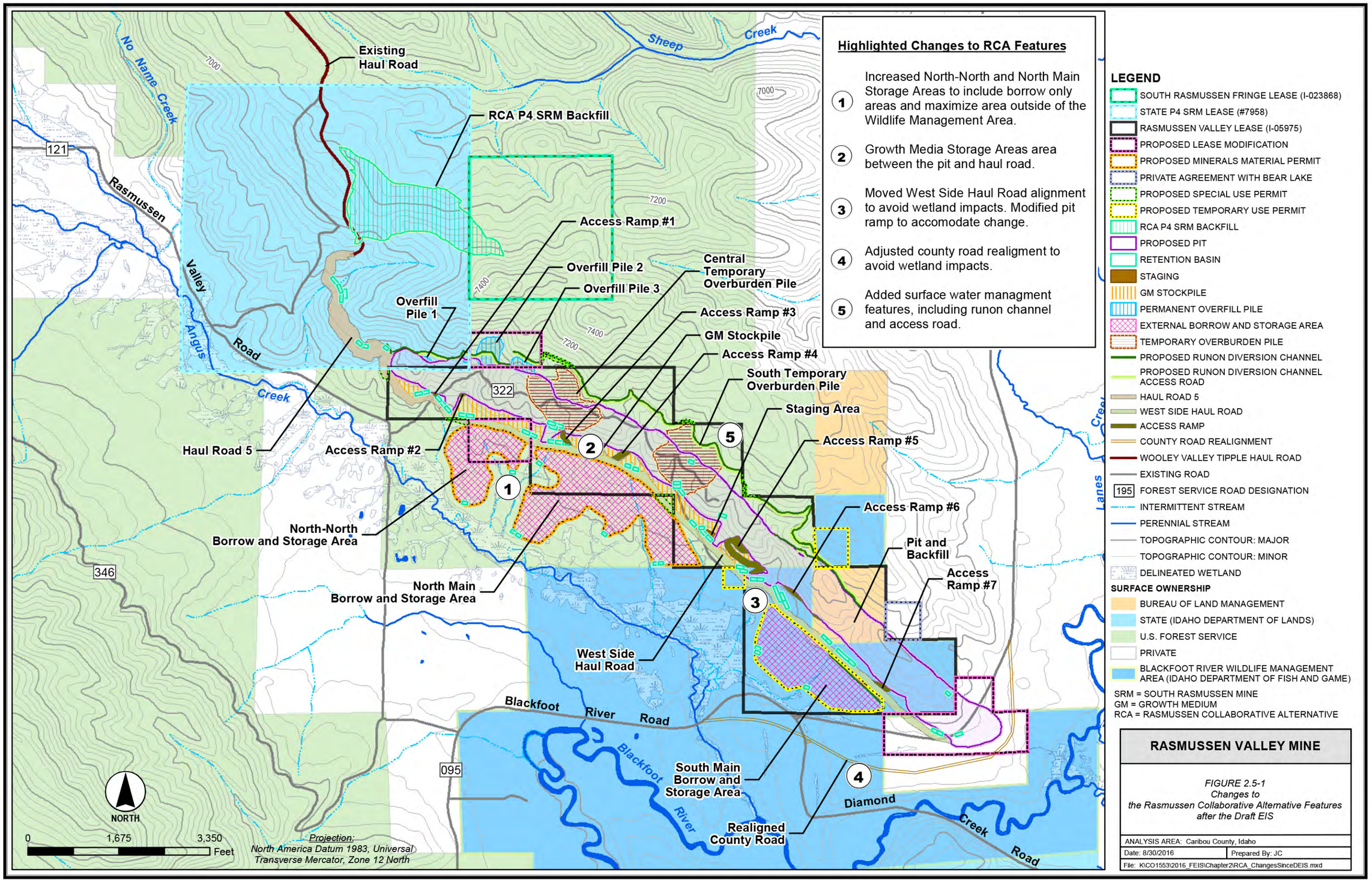
Several other areas on public land administered by the USFS would require SUAs. Areas G, H, I, and J would be required for the West Side and HR-5 Haul Roads and associated features, and Areas K through P would be required for the runon diversion ditch and associated access road.

Without the authorization of these areas, ore would be left behind at the boundary between the Lease and the lease managed by the IDL in Section 36 of T6S, R44E, and on the southeast end of the deposit.

2.5.1.2 Other Use Authorizations

Additional use authorizations have been proposed in the RCA (**Figure 2.5-2**, Areas G through P). They consist of SUAs on National Forest Lands, agreements with landowners on the WMA, and agreements with private landowners (**Table 2.5-1**). Proposed activities include a portion of a GM stockpile (Area G), portions of the ore haul road (Areas H through J), and segments of the runon diversion ditch and associated access road (Areas K through P).

There would also be changes on the P4 South Rasmussen Mine leases. The RCA would use haul road HR-5 on state land through the South Rasmussen Mine state lease, requiring a lease agreement between Agrium and IDL (Area U). Proposed Agrium POC and indicator wells on state land will also need to be authorized through a lease agreement with IDL. The RCA would add backfill from the Rasmussen Valley Mine to the P4 South Rasmussen Mine backfill on the P4 state lease (Area V) and on the BLM Fringe lease (Area W). The additional backfill on the South Rasmussen Mine state lease (Area V) would need to be authorized by an approved mine and reclamation plan modification with IDL. Similarly, the placement of additional backfill on the federal Fringe lease portion of the South Rasmussen Mine (Area W) would need to be authorized by and approved mine and reclamation plan modification with the BLM.


Existing Haul Road
RCA P4 SRM Backfill
Access Ramp #1
Overfill Pile 2
Overfill Pile 3
Central Temporary Overburden Pile
Overfill Pile 1
Access Ramp #3
GM Stockpile
Access Ramp #4
South Temporary Overburden Pile
Staging Area
Access Ramp #5
Haul Road 5
Access Ramp #2
Access Ramp #6
Pit and Backfill
Access Ramp #7
North-North Borrow and Storage Area
North Main Borrow and Storage Area
West Side Haul Road
South Main Borrow and Storage Area
Realigned County Road
No Name Creek
Sheep Creek
Rasmussen Valley Road
Angus Creek
Blackfoot River Road
Blackfoot River
Diamond Creek Road
121
322
346
095
7000
7200
7400
NORTH
0
1,675
3,350
Feet
Projection:
North America Datum 1983, Universal Transverse Mercator, Zone 12 North
Highlighted Changes to RCA Features
1 Increased North-North and North Main Storage Areas to include borrow only areas and maximize area outside of the Wildlife Management Area.
2 Growth Media Storage Areas area between the pit and haul road.
3 Moved West Side Haul Road alignment to avoid wetland impacts. Modified pit ramp to accomodate change.
4 Adjusted county road realigment to avoid wetland impacts.
5 Added surface water managment features, including runon channel and access road.
LEGEND
SOUTH RASMUSSEN FRINGE LEASE (I-023868)
STATE P4 SRM LEASE (#7958)
RASMUSSEN VALLEY LEASE (I-05975)
PROPOSED LEASE MODIFICATION
PROPOSED MINERALS MATERIAL PERMIT
PRIVATE AGREEMENT WITH BEAR LAKE
PROPOSED SPECIAL USE PERMIT
PROPOSED TEMPORARY USE PERMIT
RCA P4 SRM BACKFILL
PROPOSED PIT
RETENTION BASIN
STAGING
GM STOCKPILE
PERMANENT OVERFILL PILE
EXTERNAL BORROW AND STORAGE AREA
TEMPORARY OVERBURDEN PILE
PROPOSED RUNON DIVERSION CHANNEL
PROPOSED RUNON DIVERSION CHANNEL ACCESS ROAD
HAUL ROAD 5
WEST SIDE HAUL ROAD
ACCESS RAMP
COUNTY ROAD REALIGNMENT
WOOLEY VALLEY TIPPLE HAUL ROAD
EXISTING ROAD
195 FOREST SERVICE ROAD DESIGNATION
INTERMITTENT STREAM
PERENNIAL STREAM
TOPOGRAPHIC CONTOUR: MAJOR
TOPOGRAPHIC CONTOUR: MINOR
DELINEATED WETLAND
SURFACE OWNERSHIP
BUREAU OF LAND MANAGEMENT
STATE (IDAHO DEPARTMENT OF LANDS)
U.S. FOREST SERVICE
PRIVATE
BLACKFOOT RIVER WILDLIFE MANAGEMENT AREA (IDAHO DEPARTMENT OF FISH AND GAME)
SRM = SOUTH RASMUSSEN MINE
GM = GROWTH MEDIUM
RCA = RASMUSSEN COLLABORATIVE ALTERNATIVE
RASMUSSEN VALLEY MINE
FIGURE 2.5-1
Changes to the Rasmussen Collaborative Alternative Features after the Draft EIS
ANALYSIS AREA: Caribou County, Idaho
Date: 8/30/2016
Prepared By: JC
File: K\CO1553\2016_FEIS\Chapter2\RCA_ChangesSinceDEIS.mxd

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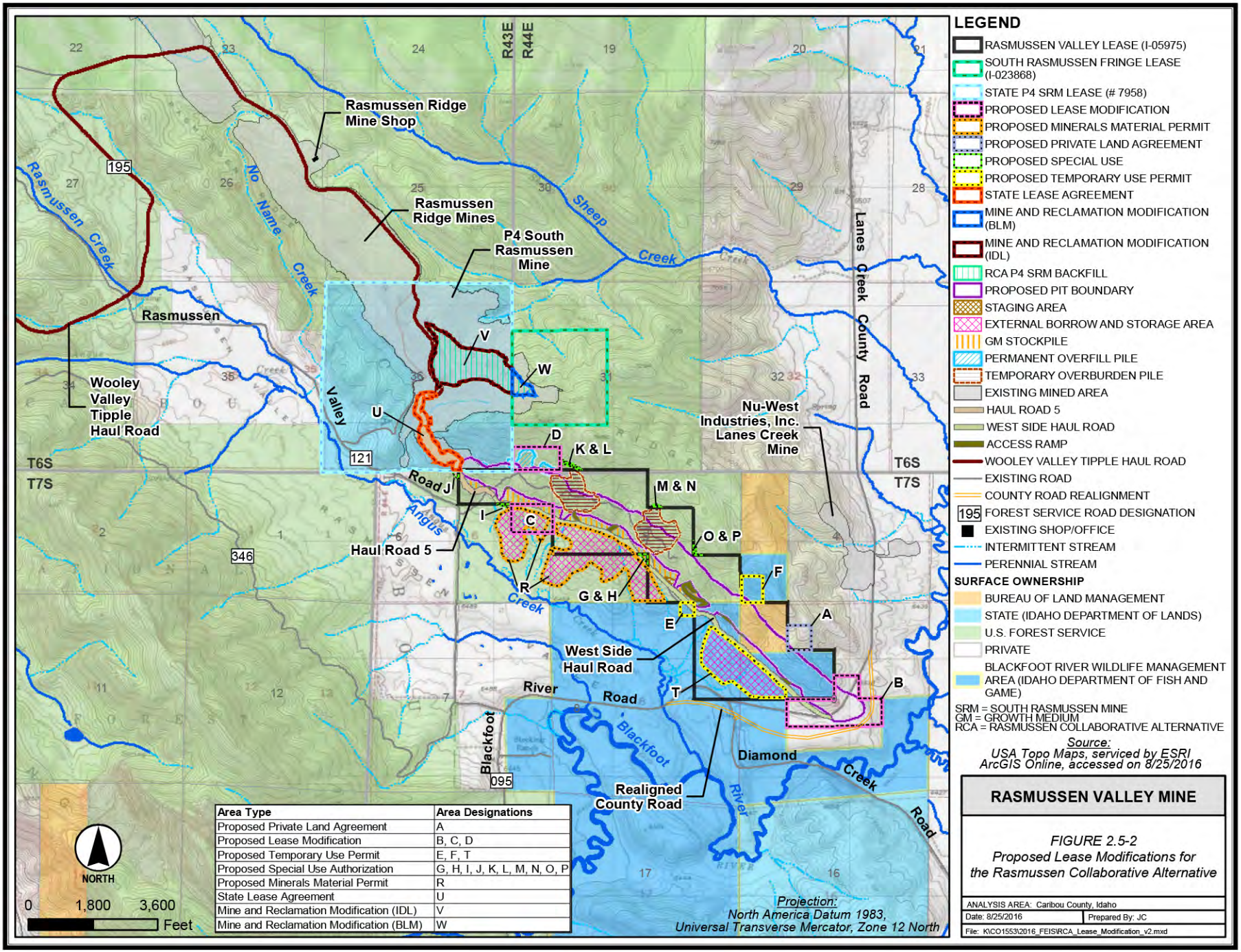

Area Type	Area Designations
Proposed Private Land Agreement	A
Proposed Lease Modification	B, C, D
Proposed Temporary Use Permit	E, F, T
Proposed Special Use Authorization	G, H, I, J, K, L, M, N, O, P
Proposed Minerals Material Permit	R
State Lease Agreement	U
Mine and Reclamation Modification (IDL)	V
Mine and Reclamation Modification (BLM)	W

RASMUSSEN VALLEY MINE

FIGURE 2.5-2
Proposed Lease Modifications for the Rasmussen Collaborative Alternative

ANALYSIS AREA: Caribou County, Idaho
Date: 8/25/2016 | Prepared By: JC
File: K\CO1553\2016_FEIS\RCA_Lease_Modification_v2.mxd

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2.5.1.3 Mining Operations

The RCA reflects Agrium's objectives to maximize the recovery of the economic phosphate resource and reduce environmental impacts compared to the Proposed Action. Some of the factors that influence these objectives include the economic strip ratio, ore quality and cutoff grades, and the safe angle of pit wall slopes. The considerations for long-term impacts to the environment include potential groundwater or surface water impacts, wetland impacts, visual impacts, and final reclamation objectives. Final reclamation objectives are to ensure a return to multiple uses of the public lands, protect any used resources, and continued productive use of private lands. These objectives and factors determined the ultimate design of the open pit, external storage facilities, haul road design, and the mining sequence.

The RCA includes the following:

- Development of a larger open pit in nine phases beginning at the northwest and generally progressing southeast. The ore recovery would take 4.8 years, and the total life-of-mine project duration including reclamation would be 7.1 years (**Figure 2.5-3**). As was the case with the Proposed Action, the potential exists for minor pit wall laybacks beyond those proposed that may require up to 20 acres of additional disturbance.

Overburden from the initial phases of the Rasmussen Valley Mine would be placed into P4's partially backfilled South Rasmussen Mine pit, thus avoiding the need for three external overburden piles.

- The reclamation of the Rasmussen Valley Mine backfill at the South Rasmussen Mine would increase the reclaimed area at the South Rasmussen Mine pit beyond that originally planned by P4.
- A haul road would be constructed from the north end of the West Side Haul Road up the side of Rasmussen Ridge onto P4's South Rasmussen Mine in order to haul overburden to the South Rasmussen Mine and to haul ore to the Wooley Valley Tipple.
- Up to four areas between the mine pit and the West Side Haul Road would be used to store GM for reclamation.
- The mined out Rasmussen Valley Mine pit would be backfilled to allow precipitation to run off onto undisturbed ground rather than ponding within the pit.
- The depth of mining would be reduced in the southern portion of the pit to avoid the need for active dewatering.
- A staging area similar to that of Proposed Action, but without fueling facilities would be constructed and reclaimed.
- Electrical generators would be used to power mine facilities such as the staging area.
- Portions of the Blackfoot River, Lanes Creek, and Diamond Creek County Roads would be realigned similar to the Proposed Action, but avoiding all wetlands.
- A pit ramp location would be revised to avoid wetlands.
- Sediment control structures similar in design to those of the Proposed Action would be constructed and reclaimed.
- Two areas within the mine footprint would be used for temporary storage of overburden until space becomes available in a mined out phase.

- Mining would be extended to the northern lease boundary to maximize ore recovery.
- Northern pit wall would be laid back onto state land in order to recover ore within federal lease.
- Three areas would be established down slope of the West Side Haul Road where GM, alluvium, and colluvium can be borrowed and stored.
- Overfill piles would be constructed at the north end of the pit.
- GM, alluvium, and colluvium from the borrow areas would be used for construction of a cover over the backfill.
- Reclamation would be accomplished with a larger variety of revegetation species.

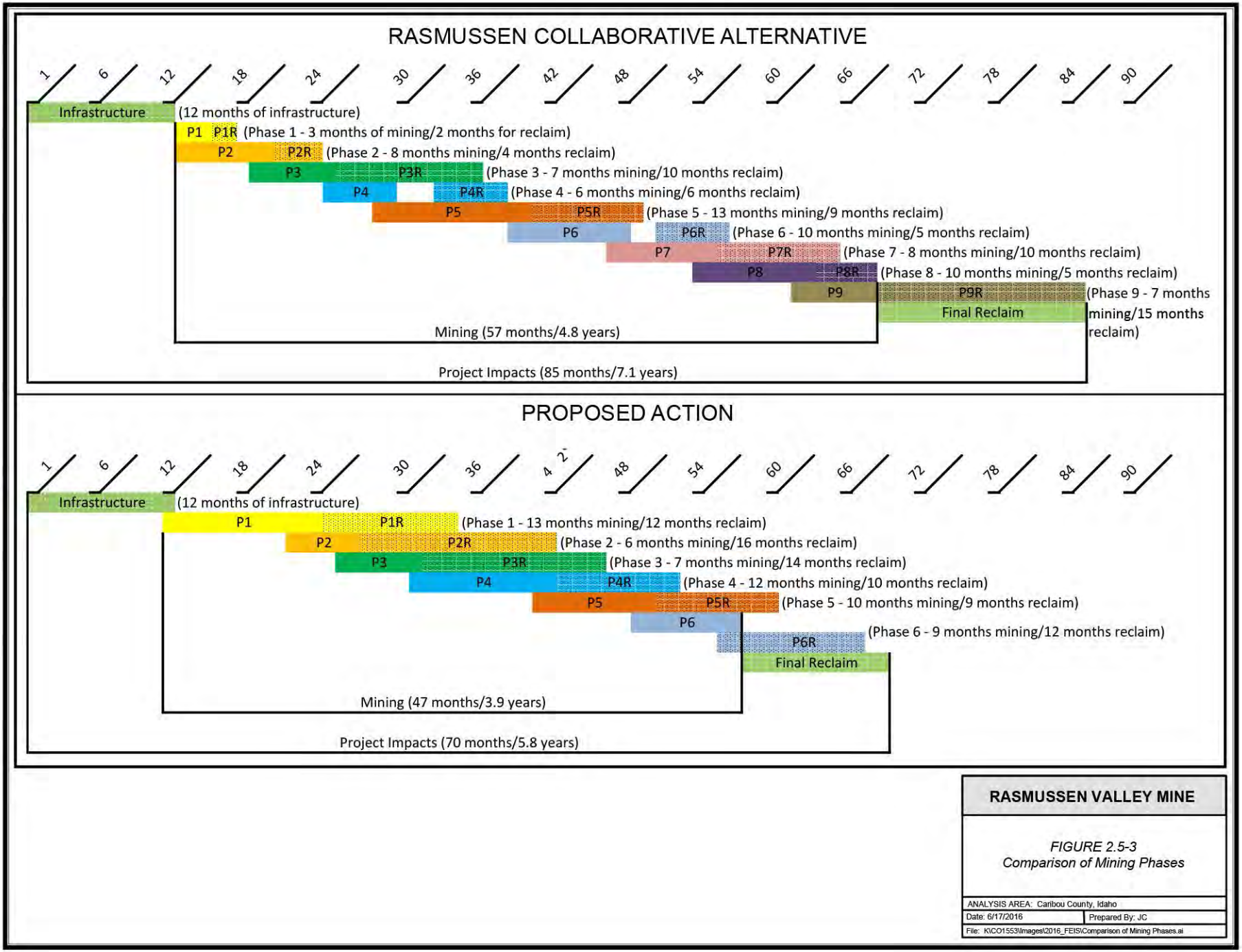
The RCA eliminates the following from the Proposed Action:

- All external overburden storage piles on potentially unstable areas or areas overlying shallow aquifers connected to surface waters
- Fueling at the staging area
- The power line to the staging area
- Mining below the water table
- Eight stream crossings
- The haul road across the floor of Rasmussen Valley and the associated crossings at Rasmussen Valley Road and Angus Creek
- Disturbance to any wetlands and WOUS
- Impacts to 70 acres of aquatic influence zones (AIZs)

If all potential borrow and storage areas for the RCA were used, the RCA would result in 73 acres more overall disturbance than the Proposed Action. However, none of that disturbance would be to sensitive areas such as wetlands. The expanded mine pit, developed in nine phases, would require a longer life-of-mine (**Figure 2.5-3**) to facilitate maximum ore recovery.

Natural resource protection measures, water management measures, and reclamation for the RCA would be similar to those for the Proposed Action with the exception that surface water runon from areas upslope of the pit would be intercepted and conveyed by ditches to sediment basins and around the mine pit and reclamation areas rather than being allowed to enter the pit, as was proposed under the Proposed Action.

Figure 2.5-4 shows the distribution of the RCA's facilities. **Table 2.5-2** lists the surface disturbances estimated for these activities.



RASMUSSEN VALLEY MINE

FIGURE 2.5-3
Comparison of Mining Phases

ANALYSIS AREA: Caribou County, Idaho
Date: 6/17/2016 | Prepared By: JC
File: K\CO1553\Images\2016_FEIS\Comparison of Mining Phases.ai

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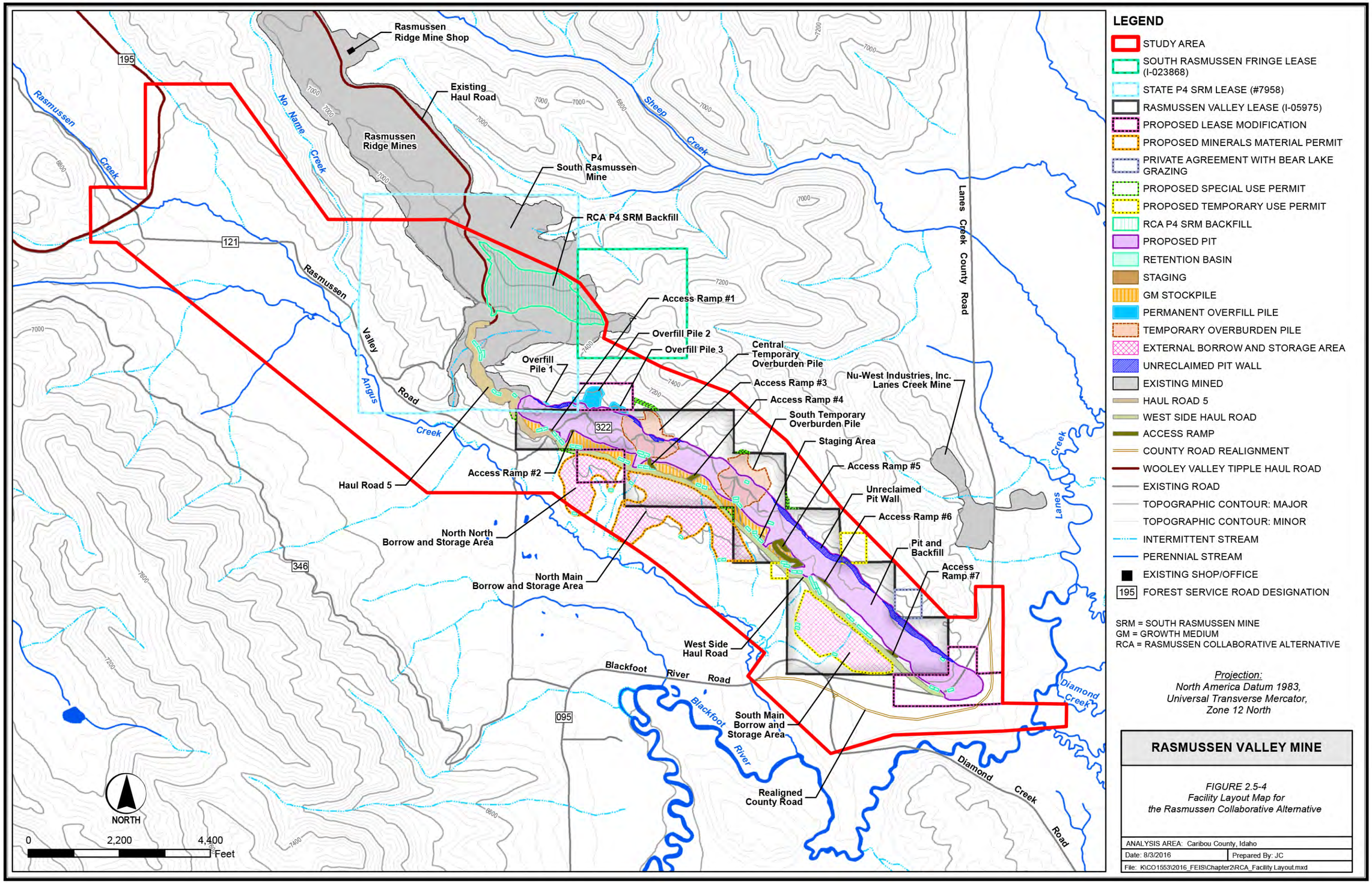

LEGEND

- STUDY AREA
- SOUTH RASMUSSEN FRINGE LEASE (I-023868)
- STATE P4 SRM LEASE (#7958)
- RASMUSSEN VALLEY LEASE (I-05975)
- PROPOSED LEASE MODIFICATION
- PROPOSED MINERALS MATERIAL PERMIT
- PRIVATE AGREEMENT WITH BEAR LAKE GRAZING
- PROPOSED SPECIAL USE PERMIT
- PROPOSED TEMPORARY USE PERMIT
- RCA P4 SRM BACKFILL
- PROPOSED PIT
- RETENTION BASIN
- STAGING
- GM STOCKPILE
- PERMANENT OVERFILL PILE
- TEMPORARY OVERBURDEN PILE
- EXTERNAL BORROW AND STORAGE AREA
- UNRECLAIMED PIT WALL
- EXISTING MINED
- HAUL ROAD 5
- WEST SIDE HAUL ROAD
- ACCESS RAMP
- COUNTY ROAD REALIGNMENT
- WOOLEY VALLEY TIPPLE HAUL ROAD
- EXISTING ROAD
- TOPOGRAPHIC CONTOUR: MAJOR
- TOPOGRAPHIC CONTOUR: MINOR
- INTERMITTENT STREAM
- PERENNIAL STREAM
- EXISTING SHOP/OFFICE
- 195 FOREST SERVICE ROAD DESIGNATION

SRM = SOUTH RASMUSSEN MINE
GM = GROWTH MEDIUM
RCA = RASMUSSEN COLLABORATIVE ALTERNATIVE

Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North

RASMUSSEN VALLEY MINE

FIGURE 2.5-4
Facility Layout Map for
the Rasmussen Collaborative Alternative

ANALYSIS AREA: Caribou County, Idaho	
Date: 8/3/2016	Prepared By: JC
File: K\CO1553\2016_FEIS\Chapter2\RCA_Facility Layout.mxd	

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Table 2.5-2 Total Project-Related New Surface Disturbance from the RCA Alternative, including Areas Outside of the Lease

Facility/Activity	Maximum Disturbance (acres)[1]					
	Private	USFS	BLM	IDFG	IDL	Total[4]
Open Pit and Backfill[2]	18.5	120.8	23.3	43.5	7.6	213.6
Permanent External Overfill Piles	0	6.8	0	0	0.7	7.4
External GM and Alluvium Borrow and Storage Areas[3]	0	120.1	0.1	49.6	0	169.8
Haul Roads	2.6	29.2	1.0	13.7	2.4	48.7
Groundwater Monitoring Wells and Access Roads	0.9	2.2	0.2	1.2	3.4	8.0
Facilities	0	0.9	0	0	0	0.9
Water and Sediment Control Structures (est.)	0.6	15.0	1.3	3.5	2.9	23.2
Realigned Portions of the County Roads	5.4	0	0	4.5	0	9.9
GM Stockpiles	0	31.2	0	0	0	31.2
Total[4]	**27.9**	**326.3**	**25.8**	**115.9**	**16.9**	**512.9**
POC Monitoring Well and Access Roads[5]	0.9	2.2	0.2	1.2	3.4	8.0
Potential Pit Layback Areas[6]						20.0
Grand Total[4,7]						**540.9**

Notes:

1 Disturbance acres are for comparison with the disturbance acreages listed for the Proposed Action (**Table 2.3-2**). Some elements described in the RCA may be combined to be comparable with elements of the Proposed Action.

2 Includes temporary pit access ramps and 13.2 acres of unreclaimed pit wall.

3 This includes borrow areas, storage piles, temporary overburden piles, and those portions of the Central and South Temporary Overburden Piles outside of the mine pit. This is a maximum area of disturbance if all identified areas are used. In practice, the extent of borrow areas and storage areas will be limited to only those areas needed, and may be much less than the area listed.

4 Row and column totals are based on more precise numbers (more decimal places) than those shown in the table, and because of rounding conventions, the totals may appear to be lower than the sum of the numbers in a row or column.

5 The monitoring well network has not been finalized by the IDEQ. Therefore, the locations of these wells and the associated access road network cannot be represented on the figures.

6 The potential pit layback areas have not been determined.

7 Up to 28 acres of additional disturbance in the Study Area are being considered for POC monitoring wells and access roads (8 acres) and potential pit layback areas (20 acres). However, the locations have not been determined and are not included in the impact assessment for specific resources. Baseline conditions are known so that the impacts can be assessed when locations are determined. These locations will be finalized after the approval of the Final EIS.

2.5.1.3.1 Mine Design

The larger pit footprint of the RCA would be mined from north to south in nine smaller phases in contrast to south to north in six larger phases for the Proposed Action. Pit design would be subject to the same constraints as those for the Proposed Action. The nine phases together would form a pit 2.4 miles long, averaging 600 feet wide. The phases would range in length from 1,000 to 2,600 feet. However, each phase may be operated in multiple locations within and between phases at the same time. Ultimate pit depth would be controlled by the same factors as the Proposed Action, except in the southern portion of the pit, the pit floor would be kept high enough to not intersect the regional groundwater, thus avoiding the need for active dewatering.

The open pit and backfill would disturb a total of 221 acres. Pit backfill would cover 207.8 acres, which would be reclaimed, leaving 13.2 acres of exposed limestone pit wall. Use of the South Rasmussen Mine for permanent overburden placement, in combination with temporary overburden storage within and upslope of the active mine footprint, would eliminate the need for the Proposed Action external North, South-Main Temporary, and South-South Overburden Piles and the Ore Stockpile downslope of the mine footprint (compare **Figure 2.3-2** and **Figure 2.5-4**). The enlarged GM, alluvium, and colluvium borrow and storage areas for the RCA would be temporary features in roughly the same areas. As in the Proposed Action, as mining progresses, the mined out areas would be backfilled, covered, and reclaimed. Through progressive open pit backfilling and concurrent reclamation, the unreclaimed pit disturbance at any one time would be minimized. Upon completion of mining operations, 13.2 acres of pit wall (limestone) exposures would remain unreclaimed, and the pits would

be backfilled to cover the exposure of all Meade Peak strata in the pit walls. The pit backfill and overfill areas would be capped with the RCA cover system.

A small road would be constructed near the crests of the pit to provide access to lighting stations and to conduct pit wall inspections. This road would be 20 feet wide to accommodate a bulldozer or equivalent and light vehicles. The Mine Safety and Health Administration (MSHA) requires the removal of potential fall hazards from around the pit crest. While establishing this proposed road, trees, tree roots, boulders, or other potential fall hazards would be removed from the pit crest area.

2.5.1.3.2 Haul Roads

As in the Proposed Action, the West Side Haul Road would extend for 2.3 miles along the southwest side of the mine pit. Unlike the Proposed Action, which would begin mining at the south end and require building the entire West Side Haul Road at the beginning of mining, in the RCA, the West Side Haul Road would be constructed piecemeal from north to south, concurrent with the mine phases as they progress south.

HR-5 would be constructed between the terminus of the West Side Haul Road at the north extent of the Lease and the existing joint Agrium-P4 haul road north of South Rasmussen Mine, extending through the reclaimed West Limb Pit of the South Rasmussen Mine and across the mine's backfilled main pit. The existing joint Agrium-P4 haul road continues northwest, passing by the Rasmussen Ridge Mines shop area, connecting to the Wooley Valley Tipple Haul Road. The haul road would be completed before the start of mining Phase 1 at Rasmussen Valley Mine. HR-5 would not cross Rasmussen Valley and would avoid any wetlands. Agrium would implement all necessary BMPs to protect any adjacent wetlands.

In addition to providing a route for hauling ore, the West Side Haul Road would connect mining operations in the pit with the staging area and GM stockpiles. HR-5 would connect the mine, borrow area, and staging area with the South Rasmussen Mine, existing shop facilities at the Rasmussen Ridge Mines, and Wooley Valley Tipple. Design parameters for the haul roads would be the same as those for the Proposed Action.

2.5.1.3.3 Material Management

Material management includes the storage and handling of backfill, GM, unconsolidated alluvium and colluvium, overburden, and non-Meade Peak-containing material. All overburden volumes have been designed based on a net 15 percent swell factor. This accounts for swelling of overburden during the mining process and incidental equipment and natural compaction during and after the placement of the overburden. This swell factor is assumed to be conservative based on current Agrium operations. All soil, alluvium, and colluvium volumes assume a 10 percent swell factor.

Backfill and Overburden

Approximately 42.4 million bank cubic yards (MBCY; 48.7 million loose cubic yards [MLCY]) of overburden would be excavated during the life-of-mine. Overburden would be placed as backfill in the South Rasmussen Mine pit or in previously mined phases of the Rasmussen Valley Mine pit. Some overburden would be stored in temporary overburden piles on and upslope of the pit area until there was space in the pit to backfill. Some overburden would be placed in permanent external overburden overfill piles located upslope and contiguous with the Rasmussen Valley Mine backfill at the northern end of the Lease. Some limestone material removed from the pits would be used in the construction of the West Side Haul Road.

Mining was completed at the South Rasmussen Mine in 2013. At the completion of mining, a partially backfilled open pit remained at the southern end of the mine. Topographic data and analysis indicate that the remaining pit could accommodate up to 12.7 MBCY of material, leaving enough space to place the 6.6 MBCY (7.6 MLCY) of the overburden mined from Phases 1 and 2 and a portion from Phases 3 and 4 (or 15.6 percent of the total overburden) to be excavated from Rasmussen Valley Mine. The overburden would be placed over previously disturbed and mined areas and would not create any new area of disturbance. The Rasmussen Valley overburden would be directly placed at the South Rasmussen Mine. The overburden would be covered and reclaimed in accordance with the South Rasmussen Mine Reclamation Plan Modification (P4 2014), except that the cover would consist of 3 feet of limestone; overlain by 2 feet of combined GM, alluvium, and colluvium from the Rasmussen Valley Mine borrow area; overlain by 1.5 feet of GM from the South Rasmussen Mine area to further reduce infiltrated water percolating through the overburden.

At the Rasmussen Valley Mine, the remaining 35.8 MBCY (41.1 MLCY; 84.4 percent) of overburden would be placed as backfill in the pit or in external overburden overfill piles located up slope from and contiguous with pit backfill at the northern end of the pit in three locations. The external overfill piles would total 7.4 acres and are designated Overfill Piles 1, 2, and 3 (**Figure 2.5-4**). The overall backfill and overfill piles would cover 214.5 acres. In addition, 13.2 acres of limestone pit wall would be left exposed.

Three methods would be used to place backfill in mined out areas (pits). Overburden may be dumped or pushed from the pit crest, placed in lifts, and plug or butt dumped. Placement from the pit crest may be used in backfill areas that do not require the construction of in-pit backfill ramps for access and where material slope stability characteristics are suitable to support the long repose slopes of dumped backfill. Alternatively, backfill lifts might be used in areas where the backfill slope stability characteristics do not allow long repose slopes without crest failures or toe mounding into active mining areas. Backfill lifts may also be used during wet weather conditions, which allow the mining operation multiple backfill dumping locations to use if a particular backfill area becomes muddy and difficult to maintain. Lift heights would be determined based on safety considerations and the overburden material repose slope stability characteristics. The backfill placement method would be determined for specific areas based on factors including the need for backfill ramps, stability of the material as it is placed, availability of equipment to maintain truck working areas, and the stage of the backfilling process.

On occasion, plug or butt dumping may be used if equipment failure causes the loss of support equipment to maintain the area. Plug or butt dumping may also be used in areas needing more control for final contouring, areas receiving final cover materials, or to place material on a backfill lift.

All backfill and overfill areas would be final graded to not exceed a 3H:1V slope. The minimum slope allowed in the backfill areas would be 2 percent in order to promote runoff and not allow standing water. No areas that could pond water on the cover would be allowed. The Rasmussen Valley Mine backfill would slope up from the western pit crest to the eastern pit wall. Portions of exposed limestone pit wall would remain along the eastern pit crest. All temporary overburden piles and reclaimed haul road materials would be placed in the Phases 8 and 9 backfill. Total re-handle of material from temporary overburden piles and haul roads would be 4.68 MBCY (5.38 MLCY).

Temporary Overburden Storage

Two temporary overburden piles are incorporated into the design. They are identified as the Central Temporary Overburden Pile and South Temporary Overburden Pile. These temporary piles would be used when operations produce more overburden than space is currently available for permanent disposal.

The Central Temporary Overburden Pile would be an overfill pile within and upslope of Phases 3 and 4. The available storage volume would be 2.19 MBCY (2.52 MCLY). There would be 6.3 acres of new disturbance outside of the pit crest associated with this pile. This overburden pile would consist predominantly of material from Phases 5 and 6. Operational constraints may require some flexibility in these estimates as mining occurs.

The South Temporary Overburden Pile would be an overfill pile within and upslope of Phase 4 and 5. The available storage volume would be 1.53 MBCY (1.76 MCLY). There would be 8.5 acres of new disturbance outside of the pit crest associated with this pile. This overburden pile would consist predominantly of material from Phase 7. Operational constraints may require some flexibility in these estimates as mining occurs.

GM Storage and Alluvium Borrow

Throughout the life-of-mine, GM would be salvaged from disturbed areas for reclamation activities. The GM would either be used for reclamation elsewhere on the project immediately after salvage or temporarily stored in stockpiles for later use. Volumes of available and required GM, alluvium, and colluvium are based on soil depths identified in the baseline soils surveys (AECOM 2012, 2015), suitability for use as GM (Arcadis 2015d), and volumetric calculations (Arcadis 2015e, BC 2015a, Guedes 2016). It is anticipated that 1.15 MBCY (1.27 MLCY) of topsoil would be removed from the disturbed areas for use as GM, and an additional 0.84 MBCY (0.92 MLCY) of topsoil would be available from the borrow areas. This is based on the soil depths identified in the baseline soils surveys (AECOM 2012, 2015) and suitability for use as GM (Arcadis 2015d, 2015e). Reclamation of all project disturbances, including the borrow areas, and reclamation of the South Rasmussen Mine backfill would require approximately 0.90 MBCY (0.99 MLCY) of topsoil for use as GM.

GM and unconsolidated alluvium and colluvium would be used in the construction of the cover over the pit backfill. Three areas have been proposed for the borrowing of GM, alluvium, and colluvium for the construction of the cover over the pit backfill, and for GM storage for use throughout the life-of-mine. These areas are designated as the North-North Borrow and Storage Area, North Main Borrow and Storage Area, and South Main Borrow and Storage Area (**Figure 2.5-4**). These areas were identified as the maximum area needed for borrowing GM, alluvium, and colluvium for use in constructing the backfill cover and as areas where there would be minimal disturbance to sensitive resources. These borrow and storage areas include locations identified for external overburden piles in the Proposed Action, but the external overburden piles are eliminated in the RCA. GM, alluvium, and colluvium would be borrowed from or stored at the three storage areas throughout the mine operations as needed. The area would also be used for temporary storage of GM from the pit area that would be used for reclamation. The maximum potential disturbance of the North-North Borrow and Storage Area and the North Main Borrow and Storage Area would be 104.4 acres, and for the South Main Borrow and Storage Area would be 49.6 acres. None of the borrow and storage areas would impact wetlands.

If all of the identified borrow areas were used, and material was removed to a depth of 10 feet, they could yield 2.5 MBCY of GM of GM, alluvium, and colluvium. Approximately 0.88 MBCY would be needed for backfill cover, including 0.19 MBCY for the South Rasmussen Mine backfill. Approximately 0.39 MBCY of GM would be required for final reclamation of the borrow areas (0.25 MBCY, if the maximum extent of the borrow areas are used) and South Rasmussen Mine backfill area (0.14 MBCY). Up to 0.84 MCBY of GM would be available within the borrow areas for these purposes. Therefore, there is flexibility in the choice of borrow areas to be used, allowing the disturbance in the WMA to be minimized. Disturbance from these borrow and storage areas would be graded to drain naturally without any ponding and fully reclaimed with a minimum of 12 inches of GM and revegetation after they are no longer needed.

Most of the GM and unconsolidated alluvium and colluvium from Phases 1 through 4 would be temporarily stored and used for reclamation. Alluvium from the footprints of Phases 5 through 9 would be used as needed. It is anticipated that 3.70 MBCY (4.07 MLCY) of unconsolidated alluvium and colluvium would be removed from all disturbed areas both within the pit boundary and from the borrow and storage areas.

2.5.1.4 Ancillary Facilities

Proposed RCA facilities include a staging area, an existing off-site fuel storage area, diesel generators, and dust suppression and water supply tanks.

2.5.1.4.1 Staging Area

As in the Proposed Action, a staging area would be constructed as a place for miners to meet, receive operational instructions, and discuss safety items as needed. A temporary structure would be constructed or transported to the staging area, fitted with showers for emergency needs, and would have portable restrooms as required by applicable regulations. In addition, the staging area would support emergency response and rescue equipment and vehicles. A wastewater holding tank would be needed to accommodate the emergency showers. The staging area would also have a "ready-line" or place to temporarily keep equipment when not in operation. The ready-line may be used for minor maintenance. Electrical power would be required for each component of the staging area. The staging area would be constructed during the mining of Phase 4 while the West Side Haul Road is developed to this location.

2.5.1.4.2 Fuel Storage

Rather than maintaining fuel storage at the staging area, fuel would be distributed from existing tankage at the Rasmussen Ridge Mines Shop Area or through the use of fuel trucks that comply with relevant federal and state regulations. The total fuel storage capacity at the Rasmussen Ridge Mines Shop facility is 40,000 gallons. This quantity is deemed sufficient to maintain project-related operations for 96 hours. Fuel is stored in multiple aboveground tanks to reduce the risk of spillage and containment requirements. Barriers exist under and around fuel tanks that meet applicable requirements for secondary containment of petroleum products.

2.5.1.4.3 Diesel Generators

Agrium anticipates that diesel generators would provide electrical power to RCA facilities. Supplying on-site diesel power generation would eliminate the disturbance associated with constructing a power line from the existing transmission line located in Upper Valley to the proposed facility location. The necessary number of generators and horsepower of those generators may change through the life-of-mine. For the purpose of the RCA, it is assumed that the generator array currently in use at the Rasmussen Ridge Mines would be sufficient to accommodate operations at the mine. Operation of the generators would continue through the life-of-mine. The current array includes:

- One - 1,093-horsepower (hp) diesel generator (main generator)
- One - 67 hp diesel generator (mine shovel)
- One - 388 hp diesel generator (support generator)
- One - 100 hp diesel generator (dust suppression well pump)
- Three - 126 to 315 hp diesel generators (seasonal runoff control)
- Fifteen - 67 hp diesel-fired light plants (night shift lighting)

- One - 98 hp diesel generator (dust suppression well pump)
- One - 90 hp diesel generator (contractor building)
- One - 52 hp diesel generator (mine pit equipment)

2.5.1.4.4 Dust Suppression and Water Supply Tanks

Water for operations, principally dust suppression, would be supplied from both the existing well at the Rasmussen Ridge Mines Shop and the existing well designated PW-1W, located near the south end of the lease. The tanks, if constructed, may be filled by tanker trucks or by pumping from either the Rasmussen Ridge Mines Shop well or PW-1W. Water stored in the tanks would be used for operations.

Options for obtaining the dust suppression water could include:

- Construction of a small road between the existing PW-1W well and active portions of mining operations to facilitate transport of the water by water truck to the active mine phases. This road would be built along the alignment of the West Side Haul Road.
- Installation of a pump/pipe system to move water from the PW-1W well to the active mine phases along the upslope runon diversion ditch.
- Installation and use of a pipeline to transport water from well PW-1W along the West Side Haul Road alignment. This alignment has better access than the diversion ditch alignment and could include a service road running the length of the pipeline.

All of these options would be located within disturbance footprints that have already been proposed and analyzed for impacts.

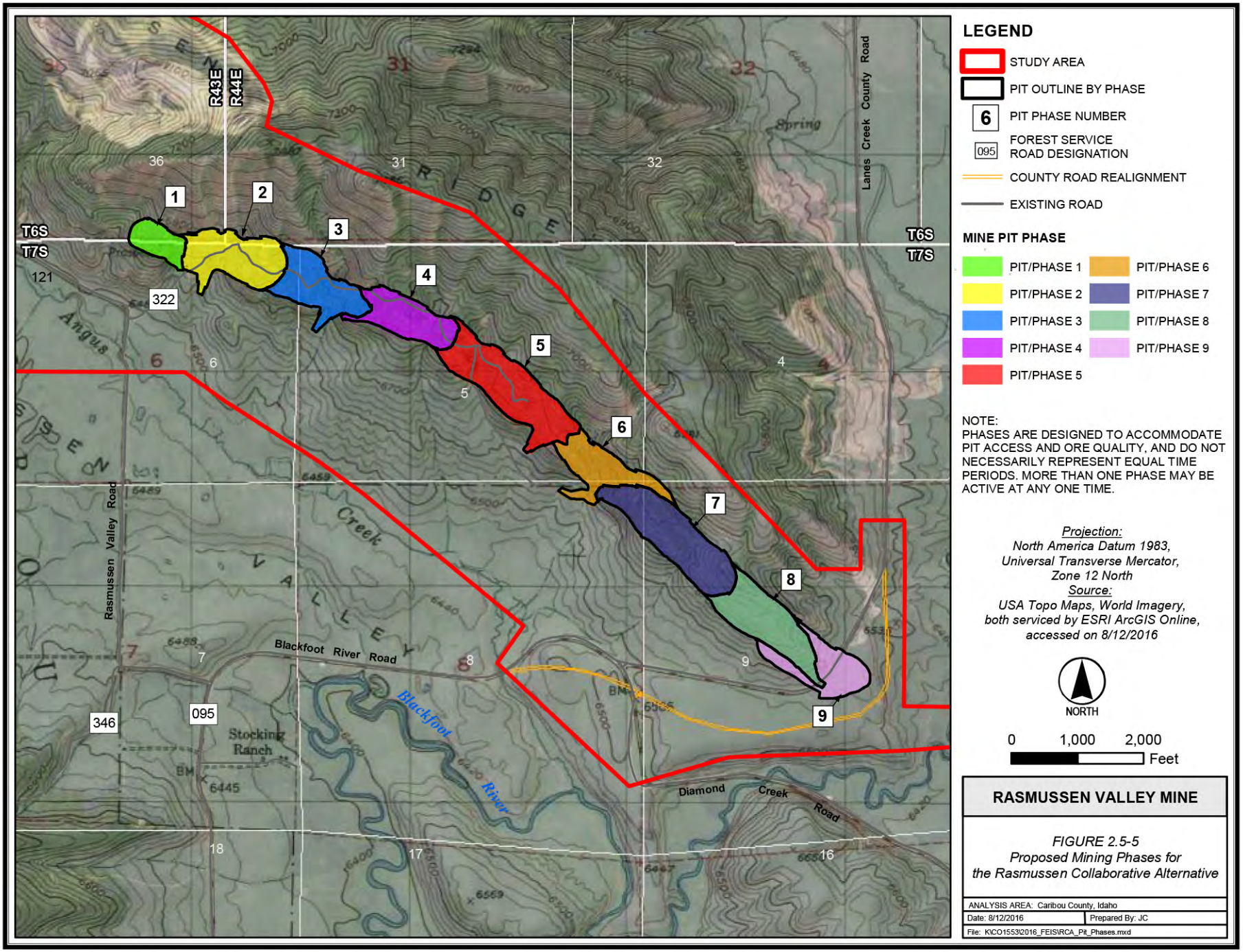
It is estimated that Agrium would use from 30,000 to 80,000 gallons of water per day for dust suppression through the months of April to November. The quantity of water required would depend on the haul road length required to transport ore for a given phase of mining.

2.5.1.5 Mining Sequence

The development of the open pit has been designed in a phased manner to achieve complete mining of the ultimate pit. A total of nine mining phases were designed. Phases are identified as RCA Phase 1 through Phase 9 (**Figure 2.5-5**).

The mining sequence was developed based on several assumptions and concerns including maintaining a transportation connection between areas being mined and areas being backfilled, and permanent disposal of overburden as backfill in South Rasmussen Mine and mined out phases of the RCA. Individual phases have been designed to maintain access for equipment, personnel, and supplies and to facilitate stormwater control.

Mining would begin from the north end (RCA Phase 1) and proceed generally southward. Phase 6 would be mined out of spatial order to facilitate minimizing the disturbance time in the deep draw that crosses the phase. This drainage is within sub-watershed 4 and is also the drainage for sub-watersheds 2 and 3. The total sub-watershed acreage collected through the drainage in Phase 7 is 129.9 acres. It is an important geomorphic feature that should be disturbed for the shortest duration operationally possible.


LEGEND
STUDY AREA
PIT OUTLINE BY PHASE
6 PIT PHASE NUMBER
095 FOREST SERVICE ROAD DESIGNATION
COUNTY ROAD REALIGNMENT
EXISTING ROAD
MINE PIT PHASE
PIT/PHASE 1
PIT/PHASE 2
PIT/PHASE 3
PIT/PHASE 4
PIT/PHASE 5
PIT/PHASE 6
PIT/PHASE 7
PIT/PHASE 8
PIT/PHASE 9
NOTE:
PHASES ARE DESIGNED TO ACCOMMODATE PIT ACCESS AND ORE QUALITY, AND DO NOT NECESSARILY REPRESENT EQUAL TIME PERIODS. MORE THAN ONE PHASE MAY BE ACTIVE AT ANY ONE TIME.
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps, World Imagery,
both serviced by ESRI ArcGIS Online,
accessed on 8/12/2016
NORTH
0 1,000 2,000
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.5-5
Proposed Mining Phases for
the Rasmussen Collaborative Alternative
ANALYSIS AREA: Caribou County, Idaho
Date: 8/12/2016
Prepared By: JC
File: KICO1553\2016_FEIS\RCA_Pit_Phases.mxd
R43E
R44E
T6S
T7S
Lanes Creek County Road
Rasmussen Valley Road
Blackfoot River Road
Diamond Creek Road
Stocking Ranch
Blackfoot River
Spring Creek
Angus
RIDGE
VALLEY
1
2
3
4
5
6
7
8
9

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In an effort to balance pit materials with available backfill volume, each phase was designed to be between 1,000 and 2,600 feet long and 600 feet wide. Most of a phase would be mined before commencing mining in the next phase. However, there would be some concurrent mining of multiple mine phases to maintain a constant grade of ore for processing purposes, to maintain the appropriate stripping ratio for waste management purposes, and to allow large excavation equipment to continue to operate while the narrow lower elevations of another phase are mined with smaller equipment.

2.5.1.6 Natural Resources Protection and BMPs

Natural resources protection issues and measures for the RCA would be the same as those discussed for the Proposed Action. Largely because of the HR-5, no areas of wetlands and riparian areas would be affected, and there would be less potential for effects to surface water, requiring fewer or less extensive measures to protect surface water, wetlands and riparian areas, and aquatic habitat.

2.5.1.7 Water Management

Water management features for the RCA would be similar to those for the Proposed Action, but there would be fewer culverts, and all surface water runon from upslope areas would be diverted around the mine pit and reclamation areas using ditches to prevent it from entering the pit. Construction of the upslope diversion ditches would begin at the start of mining and proceed from north to south concurrent with the development of mining phases (**Appendix C**). Water intercepted by the ditches would be routed to sediment basins. Non-contact water would be routed around active mining and reclamation areas to culverts under the West Side or HR-5 Haul Roads. In addition, overburden piles would be less extensive compared to the Proposed Action.

The HR-5 alternative would be much shorter than the HR-1 alternative, and would not cross drainages and wetlands in Rasmussen Valley. The Proposed Action included nine culverts for the Rasmussen Valley Haul Road (HR-1; Culverts 1 through 9) and six culverts for the West Side Haul Road (Culverts 10 through 14 and 16). In contrast, the RCA includes only four culverts for the HR-5 (Culverts 1 through 4) and seven culverts for the West Side Haul Road (Culverts 5 through 11). Therefore, HR-5 has five fewer culverts than the HR-1 Haul Road. The culverts for the West Side Haul Road for the RCA drain the same drainage areas as the Proposed Action culverts for the West Side Haul Road (**Table 2.5-3**, **Figure 2.5-6**). While there would be active mining upslope of haul road culverts, those culverts would receive water from only a small area between the mine pit and the haul road, which would contain GM stockpiles.

Table 2.5-3 RCA Surface Water Drainage Structures

Structure #	Project Stage	Location	Drainage[1]	Design Basis
Culvert 1	Mining	HR-5	Drainage 23	50-year, 24-hour
Culvert 2	Mining	HR-5	Drainage 23	50-year, 24-hour
Culvert 3	Mining	HR-5	Drainage 22 (21)	50-year, 24-hour
Culvert 4	Mining	HR-5	Drainage 22 (21)	50-year, 24-hour
Culvert 5	Mining	West Side Haul Road	Drainage 13 (12)	50-year, 24-hour
Culvert 6	Mining	West Side Haul Road	Drainage 9, 10, 11 (14)	50-year, 24-hour
Culvert 7	Mining	West Side Haul Road	Drainage 6, 7, 8 (15)	50-year, 24-hour
Culvert 8	Mining	West Side Haul Road	Drainage 5 (16)	50-year, 24-hour
Culvert 9	Mining	West Side Haul Road	Drainage 2, 3, 4 (17)	50-year, 24-hour
Culvert 10	Mining	West Side Haul Road	Drainage 1 (18)	50-year, 24-hour
Culvert 11	Mining	West Side Haul Road	Drainage 19	50-year, 24-hour

Notes:

1 The drainage areas in parentheses are re-established drainage areas across the reclaimed mine pit.

2.5.1.8 Reclamation

2.5.1.8.1 Backfill Sequence

Mining and initial construction of the West Side Haul Road would begin with Phase 1. The portion of HR-5 that would be on the P4 state lease would be constructed from material taken from the P4 state lease. Mixing of road-building materials between the Rasmussen Valley Mine and the South Rasmussen Mine is not anticipated. Final determination of HR-5 material needs would be controlled by material availability, material properties, and operational constraints. All overburden would be placed either in the Rasmussen Valley Mine pit or in South Rasmussen Mine pit.

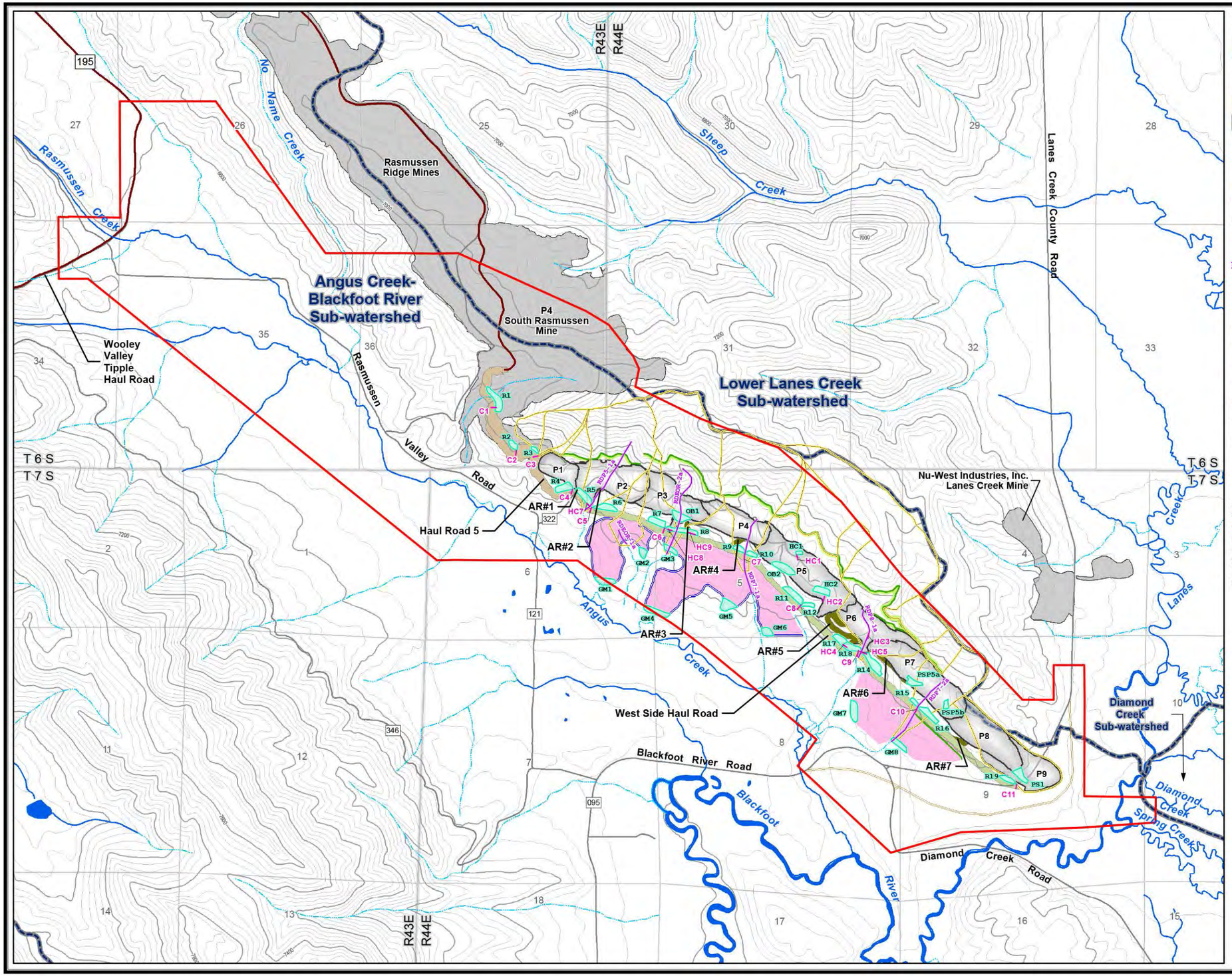
Most of the overburden from Phases 1, 2, and 3 would be directly placed in South Rasmussen Mine. Material from these three phases would be transported by haul truck along the West Side Haul Road and HR-5 and placed by end dumping or butt dumping in the open pit at the south end of South Rasmussen Mine. Under the RCA, after completion of backfill operations, the backfill at South Rasmussen Mine would be reclaimed following P4's state-approved Reclamation Plan Modification (P4 2014), except with the revised cover as outlined in the RCA. The final slopes for the South Rasmussen Mine reclaimed backfill would not exceed 3H:1V. The additional backfill and expanded reclamation under the RCA would require IDL approval.

After mining is complete in Phases 1, 2, and 3, direct placement of overburden as pit backfill from phase to phase would be conducted to the extent possible, reducing the need for additional storage piles. Backfilling with overburden would continue in this fashion for the remainder of mining activities in the open pit. When mining is completed, no portion of the mine pit would remain open. Small portions of the limestone pit wall would remain exposed along the eastern crest of the mine. Final overburden surfaces would have a maximum slope of 3H:1V and a minimum slope of 2 percent to promote runoff. No depressions that could result in ponding would remain, and the cover system would be placed over all overburden surfaces.

2.5.1.8.2 Haul Road Reclamation

Haul road reclamation would follow a procedure similar to that described for the Proposed Action. Any material removed during the reclamation of haul roads would be treated as Meade Peak overburden and re-handled to the pit as backfill.

All reclamation has been designed to meet the acceptable vegetation COPC concentrations documented in the PFO ARMP. For all haul roads, the first stage of road reclamation would be to remove safety berms as necessary, particularly in areas of potential selenium contamination. Removed haul road material would be placed as backfill within the mine. Road material would be removed beginning with the outside edges and working inward to the centerline. Maximum practical effort would be made to not increase the footprint of the road during reclamation. The haul road would be reclaimed to the original ground slope or 3H:1V, whichever is less, with the edges blending into the natural topography and having no ledge where the reclaimed edge meets the original grade. Reshaping would be achieved by removal of material to the specified dimensions and contours, not by spreading material out beyond the original disturbance area. There may be areas where the haul road is built through terrain steeper than 3H:1V. In these areas, the road prism would be reconstructed to a 3H:1V slope because steeper slopes would encourage more erosion. Once shaped, all surfaces would be reclaimed with a minimum of 12 inches of GM and revegetated.



LEGEND

- STUDY AREA
- PIT OUTLINE BY PHASE
- EXISTING MINED AREA
- DRAINAGE AREA BOUNDARY
- PRE-MINING SUB-WATERSHED BOUNDARY
- INTERMITTENT STREAM
- PERENNIAL STREAM
- POND
- C1 CULVERT
- RUNOFF COLLECTION DITCH
- RUNON DIVERSION DITCH
- DIVERSION DITCH ACCESS ROAD
- RDP7-1a RE-ESTABLISHED CHANNEL
- R1 SEDIMENT BASIN
- ACCESS RAMP
- HAUL ROAD 5
- WEST SIDE HAUL ROAD
- EXTERNAL BORROW AREA
- COUNTY ROAD REALIGNMENT
- WOOLEY VALLEY TIPPLE HAUL ROAD
- EXISTING ROAD
- 195 FOREST SERVICE ROAD DESIGNATION
- TOPOGRAPHIC CONTOUR: MAJOR
- TOPOGRAPHIC CONTOUR: MINOR

AR = ACCESS RAMP
C = HAUL ROAD CULVERT
GM = GROWTH MEDIUM STOCKPILE SEDIMENT BASIN
HC =TEMPORARY ACCESS RAMP CULVERT
OB = TEMPORARY OVERBURDEN PILE SEDIMENT BASIN
P = MINE PIT PHASE
PS = PRESTRIPPING AREA SEDIMENT BASIN
R = HAUL ROAD SEDIMENT BASIN

Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Contour Interval = 40 Feet

NORTH

0 2,100 4,200 Feet

RASMUSSEN VALLEY MINE

FIGURE 2.5-6
Water Management Features for the Rasmussen Collaborative Alternative

ANALYSIS AREA: Caribou County, Idaho	
Date: 6/23/2016	Prepared By: JC
File: K\CO1553\2016_FEIS\Chapter2\RCA_Water_Management_v3.mxd	

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Haul road culverts and all road fill materials overlying the culverts would be removed when the road is reclaimed. A minimum of 8 feet of fill on either side of the original drainage would be removed. GM would be placed in areas where it had been removed for haul road construction. BMPs would be implemented to address erosion until vegetation is re-established. Any associated nearby water management structures, such as sediment ponds, would also be reclaimed as part of haul road reclamation. Water management structures would be cleaned of any materials potentially containing selenium or other COPCs before the originally excavated materials are used to fill the structures. Any Meade Peak-containing material from haul roads, berms, or water management structures would be disposed of in the mine pit as backfill.

Reclamation at the South Rasmussen Mine would differ from that at the Rasmussen Valley Mine. The portions of HR-5 crossing the South Rasmussen Mine State Lease would be reclaimed according to the current state-approved South Rasmussen Mine Reclamation Plan Modification. Most of HR-5 on the South Rasmussen Mine State Lease crosses existing overburden backfill or overburden piles. Where the road crosses overburden, it would be reclaimed by filling in the road prism to original contours including a minimum of 5 feet of limestone followed by 18 inches of GM and the approved seed mix in accordance with the current South Rasmussen Mine Reclamation Plan Modification. A short section of the road disturbs natural ground. Where the haul road is built through terrain steeper than 3H;1V, the road prism would be backfilled to the extent practical, but slopes greater than 3H:1V may remain. Once shaped, all reclaimed surfaces would be covered with a minimum of 12 inches of GM and revegetated.

2.5.1.8.3 RCA Store-and-Release Cover C

The RCA proposes an alternative store-and-release cover for all overburden at the Rasmussen Valley Mine to provide additional protection of water quality resulting from any deep percolation of precipitation into and through the overburden. The store-and-release cover, called Cover C, would consist of three layers. The bottom layer would consist of 3 feet of alluvium salvaged from within the mine footprint (pit alluvium). The middle layer would consist of 2 feet of combined GM alluvium and colluvium salvaged from the external borrow sites (external GM). The top layer would consist of 1 foot of GM salvaged within the mine footprint (pit GM). **Table 2.5-4** compares the materials that would be used in each layer of the Proposed Action and RCA Cover C. **Figure 2.5-7** shows schematic profiles of each of the RCA and South Rasmussen Mine Backfill covers.

2.5.1.8.4 South Rasmussen Mine Covers

The South Rasmussen Mine is currently approved to cover backfill with a minimum of 5 feet of limestone and 18 inches of GM followed by revegetation with an IDL approved seed mix. P4 has proposed using the same external GM, alluvium, and colluvium material obtained from the Rasmussen Valley Mine external borrow areas to augment the cover on the RCA backfill at South Rasmussen Mine. The RCA South Rasmussen backfill cover would consist of 3 feet of South Rasmussen Mine limestone; overlain by 2 feet of RCA external combined GM, alluvium, and colluvium; overlain by 1.5 feet of GM obtained from the South Rasmussen Mine area. **Table 2.5-4** shows the materials that would be used in each layer of the Proposed Action cover, RCA cover, the currently approved P4 South Rasmussen Mine backfill cover, and the RCA South Rasmussen backfill cover, along with the saturated permeability of each layer used in the model simulation of each cover and the resultant average net annual percolation rate predicted out of the bottom of the cover and into the backfill or overburden. **Figure 2.5-7** shows schematic profiles of each of the RCA and South Rasmussen Mine Backfill Covers.

Table 2.5-4 Comparison of Cover Alternatives

Cover	Layer Description[a]			Net Percolation (in/yr)[b]
	Thickness (feet)	Material Type	Ksat (cm/sec)	
Proposed Action Cover	2	Pit Growth Medium	3.59 E-05	2.40
	3	Non-Meade Peak	7.00 E-04	
RCA Cover C	1	Pit Growth Medium	3.59 E-05	0.21
	2	External Area Combined Growth Medium and Alluvium/Colluvium	2.51 E-06	
	3	Pit Alluvium/Colluvium	9.96 E-05	
P4 South Rasmussen Mine Approved Backfill Cover	1.5	SRM Growth Medium	6.90 E-06	0.87
	5	Limestone Fill	1.00 E-04	
RCA South Rasmussen Mine Backfill Cover	1.5	SRM Growth Medium	6.9 E-06	0.21[c]
	2	External Area Combined Growth Medium and Alluvium/Colluvium	2.51 E-06	
	3	SRM Limestone Fill	1.00 E-04	

Notes:
a From the top down.
b With mature roots.
c Based on performance of similar RCA Cover C
cm/sec = centimeter per second.
in/yr = inch per year.
Ksat = saturated hydraulic conductivity.
SRM = South Rasmussen Mine

A variety of alternative covers were analyzed for performance along with Cover C. Among all the covers, Cover C has the second lowest net percolation rate (0.21 in/yr) after the geosynthetic clay laminated liner (GCLL; 0.04 in/yr) and a much lower net percolation rate than the Proposed Action cover (2.4 in/yr). Much of the improved performance for Cover C is a result of having the highest transpiration rate (6.41 in/yr) of the alternatives considered and a higher runoff (3.5 in/yr) compared to the Proposed Action (1.4 in/yr). Cover C has the second lowest need for external borrow material, greater than that for the Proposed Action but lower than that for most other alternatives. Like the Proposed Action, all of the required materials are available on or near the site. The GM top layer for Cover C would exhibit lower erodibility because of its coarser grain size.

2.5.1.8.5 GM Salvage and Placement

GM would be salvaged from any areas that are disturbed. Because GM is most efficiently handled in dry conditions, it would generally be salvaged during the typically drier summer and fall. Areas not containing backfill and overburden would have 12 inches of GM cover placed once these areas have been shaped. After placement of the GM, the areas would be revegetated.

Cover C would require 0.33 MBCY (0.36 MLCY) of GM from the pit area for the top 12 inches in accordance with the cover design (BC 2015a).

Approximately 2.00 MBCY (2.20 MLCY) of GM would be available from the disturbed and borrow areas for all reclamation (Arcadis 2015d). Any excess salvaged GM would be used to supplement cover over other disturbances.

Additional GM, alluvium, and colluvium could be recovered from the borrow and storage areas if needed. The ultimate goal would be to maximize the soil recovery to return reclaimed areas to

multiple use. The GM would be graded and prepared with bulldozers, graders, or other equipment suitable to this purpose before revegetation.

GM salvaged on the South Rasmussen Mine would remain segregated from GM salvaged on the Rasmussen Valley Mine and would be used for reclamation on their respective mines. Commingling of GM materials between mines is not anticipated other than the use of Rasmussen Valley Mine external GM, alluvium, and colluvium for the South Rasmussen Mine RCA Cover component. Final determination of cover material needs would be controlled by material availability, material properties, and operational constraints.

2.5.1.8.6 Revegetation

Public scoping in March 2011 identified a possible alternative seed mix to be considered instead of or in addition to the seed mix specified in the Proposed Action. Public comments pointed out that there were reasons to consider several different seed mixes for different settings within the Study Area to re-establish vegetative diversity and post-mining multiple land use goals. The seed mix identified in the Proposed Action (**Table 2.3-4**) considers differences in aspect and the associated differences in moisture regime. Subsequent vegetation baseline studies conducted in the Study Area further evaluated elevation, soil characteristics, and slope as controlling factors in existing plant communities (BC 2012a). The alternative seed mix proposed for the RCA is shown in **Table 2.5-5**. This seed mix includes species that are suited to several aspects and elevations, and would be used on the Rasmussen Valley Mine portion of the RCA. The South Rasmussen Mine would be reclaimed in accordance with the IDL-approved seed mix.

Table 2.5-5 Alternative Seed Mixes (Rasmussen Valley Mine)

Scientific Name**	Common Name	Recommended lbs/acre	% of Seed Mix
Bromus marginatus	Mountain Brome	2.00	5.3
Elymus elymoides	Bottlebrush Squirrel Tail	2.00	5.3
Elymus lanceolatus ssp *lanceolatus*	Thickspike Wheatgrass	1.00	2.6
Elymus lanceolatus ssp *psammophilus*	Streambank Wheatgrass	1.00	2.6
Elymus trachycaulus	Slender Wheatgrass	2.00	5.3
Festuca *I*dahoensis	Idaho Fescue	1.00	2.6
Festuca ovina	Sheep Fescue	1.00	2.6
Koeleria macrantha	Prairie Junegrass	0.25	0.7
Leymus cinereus	Great Basin Wildrye	2.00	5.3
Pascopyrum smithii	Western Wheatgrass	1.50	4.0
Poa secunda ssp ampla	Big Bluegrass	0.75	2.0
Pseudoroegneria spicata	Bluebunch Wheatgrass	2.00	5.3
Triticum aestivum x Secale cereale	Quickguard	3.00	7.9
	Grass Totals	**19.50**	**51.7**
Forbs			
	Western Yarrow	0.50	1.3
Heliomeris multiflora	Showy Goldeneye	0.50	1.3
Linum lewisii	Lewis Blue Flax	1.00	2.6
Lupinus argenteus	Silver Lupine	4.00	10.6
Penstemon palmeri	Palmer Penstemon	1.00	2.6
Penstemon strictus	Rocky Mountain Penstemon	1.00	2.6
	Forb Totals	**8.00**	**21.2**

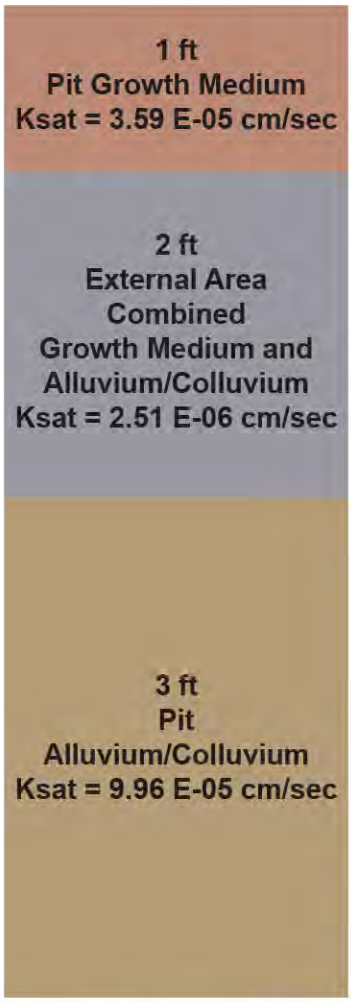
Table 2.5-5 Alternative Seed Mixes (Rasmussen Valley Mine)

Scientific Name**	Common Name	Recommended lbs/acre	% of Seed Mix
Shrubs			
Artemisia cana	Silver Sagebrush	0.15	0.4
	Mountain Big Sagebrush	0.10	0.3
Ceanothus velutinus	Snowbrush Ceanothus	1.00	2.6
Krascheninnikovia lanata	Winterfat	0.50	1.3
	Bitterbrush	4.50	11.9
	Wood's Rose	1.00	2.6
Symphoricarpos oreophilus	Mountain Snowberry	3.00	7.9
	Shrub Totals	**10.25**	**27.2**
	Overall Totals	**37.75**	**100.0**
Alternate Species for Rasmussen Valley Mine Project Seed Mix*			
Bouteloua curtipendula	Sideoats Grama		
Nassella viridula	Green Needlegrass		
Forbs			
Artemisia frigida	Fringed Sagewort		
	Arrowleaf Balsamroot		
Gaillardia aristata	Blanket Flower		
Hedysarum boreale	Northern Sweetvetch		
Sphaeralcea coccinea	Scarlet Globemallow		
Penstemon cyaneus	Blue Penstemon		
Penstemon eatonii	Firecracker Penstemon		
Shrubs			
	Saskatoon Serviceberry		
Potentilla fruticosa	Cinquefoil		
Rubus idaeus	American Red Raspberry		
Ribes cereum	Wax Current		
Ribes aureum	Golden Current		

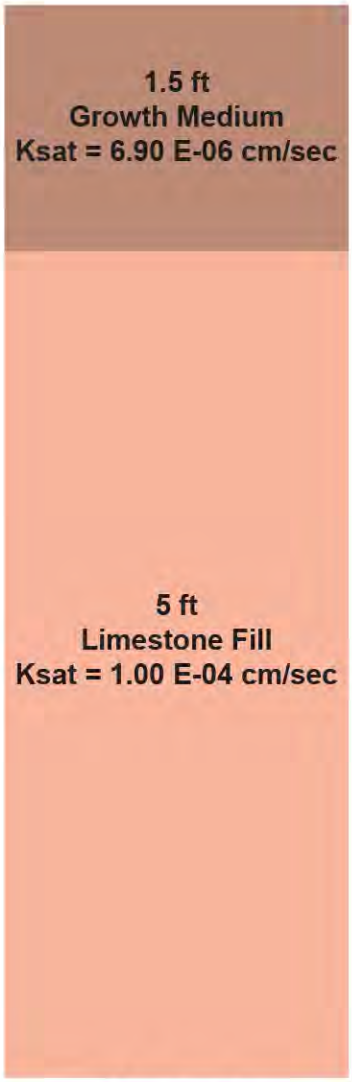
Notes:

* If alternate species are selected to replace species on the approved list, the species would be replaced at an equal percentage of the overall mix as the removed species. Recommended seeding rate would be calculated accordingly. Changes to the seed mix would consider culturally sensitive plant species.

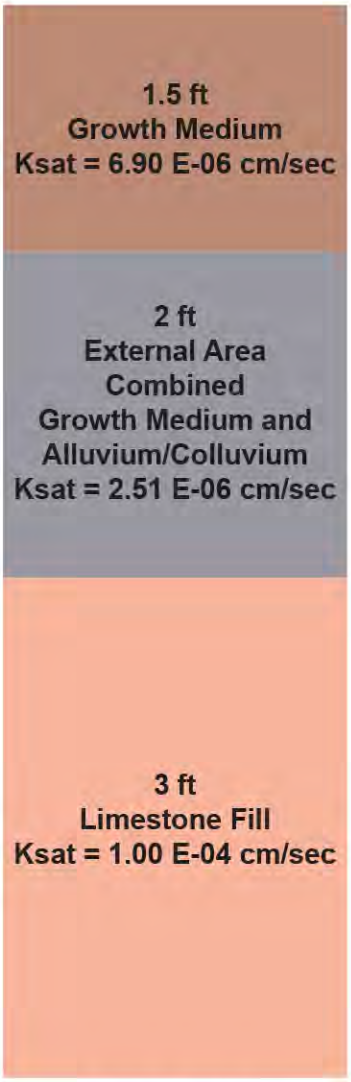
** Highlighted species are native species in Rasmussen Valley that are listed on the Shoshone-Bannock Tribes' 2016 Culturally Sensitive Plants list (Shoshone-Bannock Tribes 2016). The 2016 list includes grasses, but does not list individual species. Therefore, the heading for grasses is highlighted.



RCA Cover C
Net Percolation:
= 0.21 in/yr
(Adjusted SVFlux)



P4 South
Rasmussen Mine
Approved Backfill
Cover
Net Percolation:
= 0.87 in/yr



RCA South
Rasmussen Mine
Backfill Cover
Net Percolation:
= 0.21 in/yr
(Based on Similar
RCA Cover C)

cm/sec = centimeters per second
in/yr = inches per year
Ksat = saturated hydraulic conductivity
RCA = Rasmussen Collaborative Alternative
SVFlux = A software package used to calculate saturated flow

RASMUSSEN VALLEY MINE

FIGURE 2.5-7
Comparison of Profiles of RCA Cover C, P4 South Rasmussen Mine Approved Backfill Cover, and RCA South Rasmussen Mine Backfill Cover

ANALYSIS AREA: Caribou County, Idaho
Date: 4/12/2016 | Prepared By: JC
File: K:\CO1553\Image\2016_FEIS\EIS_Comparison_of_Covers.ai

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2.6 NO ACTION ALTERNATIVE

CEQ regulations require that an EIS include a No Action Alternative. The phosphate Lease grants the lessee the exclusive right and privilege to explore for and mine the phosphate deposit on the leased land, subject to the conditions provided in the Lease. It also gives the lessee the right to use such surface of the leased land as may be necessary for the development of the phosphate resource. Phosphate leases are not cancellable by the U.S., except by due process where the lessee does not meet the terms and conditions of the Lease. Thus, the No Action Alternative does not imply that the Lease would never be developed, only that it would not be developed under the 2011 Mine and Reclamation Plan (Agrium 2011) or alternatives evaluated in this Final EIS.

Under this alternative, the project would not be approved for mining on the existing Lease or any associated development. Similarly, the lease modification request would not be approved. Under the No Action Alternative, the Agency-Preferred Alternative and the RCA would not be approved, and no overburden from the Rasmussen Valley Mine lease would be backfilled to the South Rasmussen Mine. P4 would continue with the currently approved reclamation plan for the South Rasmussen Mine (P4 2014). The southern portion of the South Rasmussen Mine pit would be been partially backfilled with limestone to cover the exposed ore section. The backfill would be covered with 5 feet of run-of-mine limestone from the West Dump area of the South Rasmussen Mine overlain with 1.5 feet (18 inches) of topsoil, then seeded with the approved seed mix. There would be no additional backfill from the Rasmussen Valley Mine, and the RCA South Rasmussen Mine backfill cover would not be constructed (**Section 2.5.1.8**).

As a result, the No Action Alternative would not provide ore for the CPO and could result in reduced output or closure of the plant and loss of lease production royalties until another mine plan is approved. Ore for the CPO would have to be obtained from other sources, and environmental effects might be greater or less than those associated with the Proposed Action. Because the rights to mine the leased phosphate deposits have been acquired, if the No Action Alternative were selected, another Mine and Reclamation Plan for this Lease could be submitted in the future.

2.7 AGENCY-PREFERRED ALTERNATIVE

The Agency-Preferred Alternative is the RCA because it employs measures to satisfy regulatory requirements and reduce potential environmental impacts, particularly addressing water quality and its beneficial uses. The RCA addresses concerns communicated by the public where practical. The RCA was selected because of:

- Reduced impacts from COPCs to groundwater to protect beneficial uses by constructing a more effective cover over backfill and overburden;
- Elimination of external overburden piles on the pediments of Rasmussen Ridge that have the potential for impacting shallow groundwater connected with nearby surface water that has been and is currently impacted by nearby historical mining. Portions of these overburden piles were also proposed to be located on potentially unstable slopes that could fail causing additional impacts to water, soils and vegetation;
- Elimination of wetland impacts across the entire project;
- Use of previously disturbed ground at P4's South Rasmussen Mine and existing infrastructure at the Rasmussen Ridge Mine shop area to the maximum extent

practicable including reclamation of 58 acres that would not otherwise have been reclaimed;

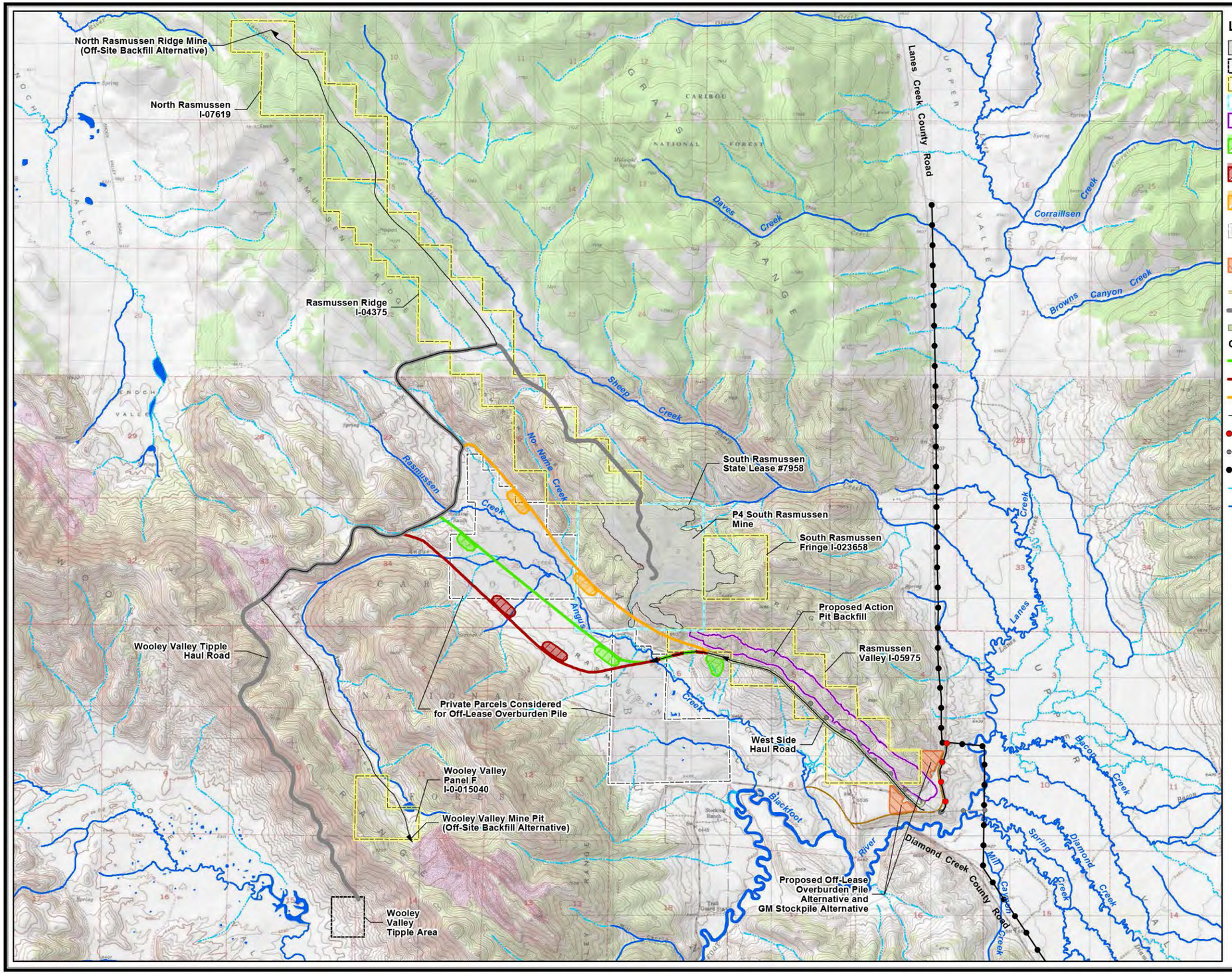
- Reduced water crossings and impacts to wetlands, AIZs, and aquatics;
- Elimination of a proposed power line segment; and
- Increased public safety on the county roads as a result of the elimination of new road crossings.

The RCA would reasonably accomplish the purpose and need for the federal action, while considering environmental, economic, and technical factors. The RCA would allow access to additional ore that would not be recovered by the Proposed Action. The RCA, with the lease modifications, would enable the extraction of 5.7 percent more ore, which would generate 5.7 percent additional royalties and extend the mine life, including initial reclamation by 7.1 percent. This would contribute to increased yield, increased royalty benefits to the economy and prolonged employment at the mine, at the CPO fertilizer plant and indirectly in the surrounding communities. The existing lease would not be economical to mine without these lease modifications. The Agencies identified the RCA as the Agency-Preferred Alternative for the Draft EIS. In response to public comments on the Draft EIS and review of the potential impacts, modifications to the RCA were incorporated into the Final EIS (**Figure 2.5-1**) and it continues to be the Agency-Preferred Alternative.

The USACE is a cooperating agency, but is neither an opponent nor a proponent of the applicant's Proposed Action or alternatives. The USACE uses the analysis in the EIS to inform their decision regarding issuing a Section 404 permit as applied for, issue the permit with modifications or conditions, or deny the permit. Because the RCA as revised in the Final EIS avoids all jurisdictional wetlands, the USACE may decide that a Section 404 permit for wetlands disturbance is not required. The intent of the USACE is to ensure that the analysis of alternatives is thorough enough to use for the public interest review outlined in USACE regulations at 33 CFR 320 et seq. and the 404(b)(1) guidelines (40 CFR part 230).

2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Several potential alternatives were considered for this analysis but were eliminated from detailed study for various reasons. These alternatives are listed below, and the reasons they were excluded from further consideration are described. **Figure 2.8-1** illustrates those alternatives considered but dismissed that have footprints differing substantially from the Proposed Action or RCA, including external overburden piles, external overburden backfill locations, GM stockpiles, ore haul roads, and power line corridors. Differences in design of features, such as cover alternatives and underground vs. overhead power lines, are not shown on this figure. In addition, the ore conveyor system was evaluated as following the route of HR-1. No alternative corridor was considered because the HR-1 route was determined to have the least impact for a conveyor. Several alternative elements that were initially eliminated were subsequently incorporated into the design of the RCA and are therefore not listed in this section. These include off-site backfill of overburden in the South Rasmussen Mine, HR-4, and use of generators to supply power to the mine operations and facilities.



LEGEND

- P4 SOUTH RASMUSSEN MINE
- WOOLEY VALLEY TIPPLE AREA
- BLM PHOSPHATE LEASE
- SOUTH RASMUSSEN STATE LEASE (#7958)
- PROPOSED ACTION PIT AREA
- PROPOSED GM STOCKPILE FOR HAUL ROAD-1 (2011 MINE PLAN)
- PROPOSED GM STOCKPILE FOR HAUL ROAD-2 ALTERNATIVE
- PROPOSED GM STOCKPILE FOR HAUL ROAD-3 ALTERNATIVE
- PRIVATE PARCELS CONSIDERED FOR OFF-LEASE OVERBURDEN PILE
- PROPOSED OFF-LEASE OVERBURDEN PILE ALTERNATIVE AND GM STOCKPILE ALTERNATIVE
- COUNTY ROAD REALIGNMENT
- WOOLEY VALLEY TIPPLE HAUL ROAD
- WEST SIDE HAUL ROAD

ORE HAUL ROAD ALTERNATIVES

- HAUL ROAD-1 (2011 MINE PLAN)
- HAUL ROAD-2 ALTERNATIVE
- HAUL ROAD-3 ALTERNATIVE
- BACKFILL HAUL ROAD: COMMON SEGEMENT*
- PROPOSED POWER LINE ALTERNATIVE
- PROPOSED POWER LINE (2011 MINE PLAN)
- EXISTING POWER LINE
- INTERMITTENT STREAM
- PERENNIAL STREAM

* THE BACKFILL HAUL ROADS START ALONG THE ORE HAUL ROAD ALTERNATIVES, BUT THEN BRANCH OFF.

BLM = BUREAU OF LAND MANAGEMENT
GM = GROWTH MEDIUM

Projection:
North America Datum 1983,
Universal Transverse Mercator, Zone 12 North
Source:
USATopo Map, serviced by ESRI ArcGIS Online, accessed on 6/23/2016.

NORTH

0 0.8 1.6 Miles

RASMUSSEN VALLEY MINE

FIGURE 2.8-1
Proposed Action and Alternatives
Not Carried Forward

ANALYSIS AREA: Caribou County, Idaho	
Date: 6/23/2016	Prepared By: JC
File: K\CO1553\2016_FEIS\Alternatives_NotCarriedForward.mxd	

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2.8.1 Store Meade Peak-Containing Material in External Overburden Piles

Alternative Considered: Under this alternative, Meade Peak-containing material would be placed in permanent external overburden piles instead of directly into the pit as backfill or re-handling the material from temporary external overburden piles to the backfill areas. Placing this material in permanent external overburden piles directly as it is removed from the pits would reduce the number of times the material is handled and transported.

Reasons Considered: This alternative was considered in response to issues about potential release of selenium and other COPC loading to surface water and groundwater. Handling 4.6 million cubic yards of Meade Peak-containing material multiple times could increase the potential for releases of selenium and other COPCs into the environment.

Reasons Dropped: This alternative was eliminated from detailed consideration because it would also introduce unnecessary additional risks of selenium release into the surrounding environment and increase potential post-mining liabilities. The RCA provided an alternative location to store the overburden.

2.8.2 Alternate On-Lease External Overburden Storage

Alternative Considered: Under this alternative, alternate external overburden storage would be developed in other areas of Agrium's Lease. This development would relocate the external overburden storage to areas potentially less vulnerable to geotechnical issues or farther away from areas sensitive to release of COPCs.

Reasons Considered: This alternative was considered in response to issues about geotechnical pile stability, potential release of selenium, and other COPC loading to surface water and groundwater from overburden material stored in the external overburden piles in the Proposed Action.

Reasons Dropped: This alternative was eliminated from detailed consideration because no suitable alternative locations could be made available on the Lease without reducing or eliminating currently identified mine features. In addition, there are potential issues with geotechnical stability at the potential sites for the additional external overburden storage piles. The RCA provided an alternative location to store the overburden.

2.8.3 Off-Lease External Overburden Storage in Rasmussen Valley

Alternative Considered: Under this alternative, the permanent external overburden storage piles would be located lower in Rasmussen Valley near Angus Creek. Areas considered included Agrium's private land in the southeast portion of the mine area, which has also been identified as a lease modification, and two parcels of private land in Rasmussen Valley near the proposed haul road alignments. In addition, the two potential permanent external overburden storage sites on the lease modification were also considered for placement of temporary overburden piles.

Reasons Considered: This alternative was considered in response to concerns about the potential geotechnical stability of on-lease locations for the permanent external overburden piles and the potential water impacts.

Reasons Dropped: This alternative was eliminated from detailed consideration because the two private land parcels in Rasmussen Valley that are large enough to accommodate overburden piles and located near proposed haul road alignments include extensive areas of delineated wetlands, would require crossing Angus Creek to transport the overburden to the overburden piles, and would permanently alter the land use in Rasmussen Valley. These overburden locations would increase the area of disturbance, including disturbance to wetlands or AIZs, increase dust emissions and fuel consumption, and would provide no reduction in environmental effects. Overburden storage in any of these locations would alter the visual landscape, affect grazing, and affect recreation. This would be a long-term change to land use and could affect other nearby resources.

The two potential permanent external overburden storage sites on the lease modification that were considered for placement of the temporary overburden pile would affect 0.65 acre of wetlands. In addition, these locations would be on a basalt bench close to the Blackfoot River, would require additional water management and protective measures, and would introduce additional risks of selenium release into the environment.

The RCA provided a closer off-lease alternative location to store the overburden at the South Rasmussen Mine.

2.8.4 Relocate External Overburden to Off-site Backfill Locations

Alternative Considered: Under this alternative, the permanent external overburden storage piles would be eliminated. Instead, the overburden material would be placed in areas of previous mine disturbance outside of the areas of disturbance delineated in the Proposed Action. Areas considered for off-site storage of overburden included Rasmussen Ridge Mines and Wooley Valley Mine. These alternatives differ from the permanent external overburden piles in the Proposed Action because they would use previously disturbed (mined) areas for overburden storage and would involve longer haul cycles to transport the overburden off site.

Reasons Considered: This alternative was considered in response to concerns about the potential geotechnical stability of proposed locations for the permanent external overburden piles.

Reasons Dropped: This alternative was eliminated from detailed consideration because permanent storage of overburden at the North Rasmussen Ridge or Wooley Valley Mines is not reasonable.

At the Rasmussen Ridge Mines, an open pit would remain at the end of mining in 2016 that could accommodate all of the proposed external overburden from the project. Haul cycles, however, would be greater than for Wooley Valley Mine. The additional truck traffic, including traffic on shared segments of the haul road, would add to fuel consumption, air emissions, traffic hazards, and safety issues.

Mining at Wooley Valley occurred from 1974 to 1989, and an open pit remains in Panel F on BLM land. Haul Roads HR-1, HR-2, HR-3, and HR-4 all connect the proposed mine to the Wooley Valley Tipple Haul Road, which passes by the north entrance of the former Wooley Valley Mine. Like the other two mines, use of the Wooley Valley Mine would add haulage for overburden disposal. The additional truck traffic, including traffic on shared segments of the haul road, would add to fuel consumption, air emissions, traffic hazards, and safety issues.

The RCA provided a closer off-lease alternative location to store the overburden at the South Rasmussen Mine.

2.8.5 Store-and-Release Cover A

Alternative Considered: Store-and-Release Cover A would consist of 1 foot of external area GM over 2 feet of pit GM over 4 feet of pit alluvium and colluvium. The layers of pit and external area GM store water to enhance evapotranspiration and support vegetation. The thick layer of alluvium and colluvium would reduce the risk of plant uptake of harmful constituents from the overburden. Cover A would use the most accessible external borrow material. Construction would be somewhat more technical for Cover A than for the Proposed Action Cover because of the layered system. This cover would use fine-grained external area GM as the uppermost layer. This top layer would initially reduce infiltration into the soil profile, but would increase runoff and the risk of soil erosion. Therefore, the timely implementation of adequate erosion control measures and post-construction monitoring would be essential to establishing a healthy vegetative cover necessary for long-term effectiveness and durability of the cover.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: Cover A was dropped because it was determined that the initial low permeability of the top 12 inches would weather to a more permeable layer, allowing additional infiltration, which would not be able to be transpired by the revegetation. The result would be net percolation rates and subsequent groundwater impacts similar to those associated with the Proposed Action. The RCA Cover C provides a more protective and durable cover.

2.8.6 Store-and-Release Cover B

Alternative Considered: Store-and-Release Cover B would consist of 2 feet of pit GM over 4 feet of low hydraulic conductivity external area alluvium and colluvium. The pit GM at the surface would provide storage and support vegetation, while the external area alluvium and colluvium was intended to impede deep percolation and provide hydraulic storage and sequestration of the backfill. The use of coarse-grained pit GM at the surface would result in a less erodible surface than Cover A.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: Cover B would have a higher net percolation and a lower efficacy-to-cost ratio than Cover A. Constructability would be similar to that of Cover A; however, this cover would require the largest quantity of external borrow material (double to quadruple the amount associated with other alternatives) and would result in the largest borrow disturbance area (about double the area of the other alternatives) and haul volumes. Because this cover would use the coarser-grained pit GM as the uppermost layer, it would be less prone to erosion than Cover A. This alternative was eliminated from detailed evaluation because it was determined that the 2 feet of pit GM and 4 feet of external alluvium and colluvium would not retard the percolation in the root zone enough for the vegetation to transpire sufficient amounts of water before the water passed beyond the root zone and into the overburden. The result was a relatively high net percolation rate. The RCA Cover C provides a more protective cover.

2.8.7 Capillary Break Cover

Alternative Considered: The Capillary Break Cover is a store-and-release cover with the addition of a coarse-grained layer immediately below the root zone. The interface between the upper fine layer and the lower coarse layer increases the storage capacity of the upper layer by increasing the saturation level required for drainage. The greater moisture storage in the GM layer allows plants more time to transpire soil moisture, thus preventing it from continuing down as deep percolation. This alternative was initially included in the analysis as 2 feet of pit GM over 1 foot of non-Meade Peak-containing material over 4 feet of pit alluvium and colluvium.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: This alternative was not analyzed in initial percolation modeling because no on-site borrow material was found with the appropriate coarse particle size properties that would provide an effective capillary break. Consequently, this cover could not be constructed with on-site materials. This alternative also would have a lower efficacy-to-cost ratio than other covers considered if off site material needed to be imported or a substantial volume of onsite materials needed to be processed for the capillary break.

2.8.8 Compacted Alluvium Barrier Layer Cover

Alternative Considered: The Compacted Alluvium Barrier Layer Cover (Compacted Barrier Cover) would consist of 2 feet of pit GM over a filter fabric over 1 foot of non-Meade Peak-containing material over a 2-foot layer of compacted external area alluvium and colluvium. The compacted alluvium and colluvium layer would act as a low-permeability barrier. The compacted barrier layer would reduce percolation into the underlying overburden. The more permeable non-Meade Peak-containing material would serve as a drainage layer above the barrier layer and provide lateral drainage to prevent oversaturation of the GM. Without the drainage layer, oversaturation could result in increasing pore water pressures that could compromise the stability of the cover soil, causing it to slide. The layer of pit GM would provide water storage and support vegetation.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: Infiltration modeling of the Compacted Barrier Cover predicted it would have the highest net percolation rate of the alternative covers considered (2.48 inches per year). This alternative also would have the lowest efficacy-to-cost ratio and most complicated construction of the native material alternatives. This alternative also ranked poorly because of the large volume of external borrow material that would be needed, the necessary crushing and screening of non-Meade Peak-containing material from the pit for a drain layer, and the infeasibility of installing the cover system in phases consistent with the concurrent reclamation because of the use of internal stockpiles. The drainage layer and overlying filter fabric that would be needed to prevent plugging of the drainage layer would complicate the long-term durability of this cover. This alternative was eliminated from detailed evaluation because of its high net percolation rate and concerns about the long-term stability and performance of the filter fabric and drainage layer. The RCA Cover C provides a more protective cover.

2.8.9 Geosynthetic Clay Liner Laminate Synthetic Cover

Alternative Considered: The GCLL Cover would use a bentonite synthetic barrier to reduce percolation of water through the cover system into the underlying backfill. It would consist of 2 feet of pit GM over a filter fabric over a drainage layer of 1.5 feet of non-Meade Peak-containing material over a GCLL over a bedding layer of 1 foot of compacted external area alluvium and colluvium. The GCLL barrier layer consists of a layer of sodium bentonite contained between two geotextile fabrics with a high-density polyethylene (HDPE) flexible membrane adhered to the upper side. The HDPE layer ensures that desiccation and adverse cation exchange do not occur and provides for a substantial reduction in percolation rates beyond the simple bentonite alone. GCLLs are considered to provide enhanced resistance to penetration by plant roots or burrowing animals by providing an extra layer of protection in addition to its self-sealing qualities provided by the integrated bentonite clay layer. The non-Meade Peak-containing material would provide lateral drainage to prevent slab failure of the cover that can result from oversaturation of the GM. The compacted alluvium and colluvium would provide a bedding layer under the GCLL to prevent damage. The layer of pit GM would provide hydraulic storage and support vegetation.

Reasons Considered: This alternative was considered as an option to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater and to establish a reclaimed vegetative environment supporting healthy multiple land use.

Reasons Dropped: Although infiltration modeling predicted the GCLL Cover would have the lowest net percolation, it would have a very low efficacy-to-cost ratio and would be the most technically challenging to construct. This cover would require substantially more complex construction associated with the haulage and compaction of external borrow material for the bedding layer, installation of the GCLL on steep slopes, crushing and screening of non-Meade Peak-containing material from the pit for a drain layer or installation of a synthetic drainage layer, and installation of the cover system in phases consistent with the concurrent reclamation. The synthetic materials and potential plugging of the drainage layer could complicate the long-term performance and durability of this cover The ability to maintain a diverse vegetative cover, given the relatively thin root zone, is also a concern with this type of cover. This alternative was eliminated from detailed evaluation because of its technical challenges for construction, very high costs to construct, and maintain and impact on post-mining multiple uses. Also, IDEQ considered it, but felt that Cover C sufficiently met the need to protect future groundwater uses adjacent to the site with less long term maintenance and at a lower cost, thus dropping the GCLL from further consideration in the Final EIS.

2.8.10 Alternative Overhead Power Line

Alternative Considered: The alternative overhead power line would have connected with the existing power line east of the mine and west of Lanes Creek County Road. The alternative overhead power line would have been 1,183 feet longer than the Proposed Action power line, but would not cross the Blackfoot River or wetlands in the floodplain of the Blackfoot River. The west end of the power line would have paralleled the West Side Haul Road and would have been constructed at the same time.

Reasons Considered: This alternative was considered in response to concerns about effects of the Proposed Action power line to wetlands, riparian areas, and AIZs along the upper Blackfoot River.

Reasons Dropped: This alternative power line element would offer minimal benefit by itself and would not have the flexibility of relocation that would be provided by portable generators. The power line would also pose more extensive physical impacts than portable generators and would cross several small drainages. No other alternative elements are currently being proposed that would combine with the alternative overhead power line to make a reasonable alternative. This alternative was eliminated from detailed consideration because the reduction of effects to wetlands in the floodplain of Blackfoot River for this alternative in comparison to the Proposed Action power line was not sufficient to consider it a reasonable alternative for detailed evaluation.

2.8.11 Underground Power Line along the Proposed Corridor

Alternative Considered: Under this alternative, a temporary underground power line would be constructed instead of an overhead power line. It would follow the same corridor as the proposed overhead power line. The underground line would require a continuous corridor of disturbance for construction and an 80-foot-wide cleared and maintained corridor for maintenance.

Reasons Considered: This alternative was considered in response to concerns raised about the potential for the overhead power line to adversely affect terrestrial and avian wildlife.

Reasons Dropped: This alternative was eliminated from detailed consideration because installation of the underground power line would result in greater adverse effects than construction of the overhead power line or use of generators. Disturbance of the required 80-foot-wide corridor would adversely affect biological resources present in the corridor where an overhead line could span small sensitive areas, such as drainages and wetlands. Particular problem areas for an underground line would be crossing small drainages, crossing wetlands, crossing the Blackfoot River, and installation in areas where basalt flows are at or near the ground surface. Crossing the Blackfoot River would require either directional drilling under the river or spanning the river with a segment of overhead line. Installation of the underground line across the basalt flow would require drilling and blasting. Finally, underground lines are less reliable, more difficult and costly to construct and maintain, and potentially dangerous to public safety.

2.8.12 Underground Power Line along the Alternative Corridor

Alternative Considered: Under this alternative, a temporary underground power line would be constructed instead of an overhead power line. The underground line would require a continuous corridor of disturbance for construction and an 80-foot-wide cleared and maintained corridor for maintenance.

Reasons Considered: This alternative was considered in response to concerns raised about the potential for the overhead power line to affect terrestrial and avian wildlife adversely.

Reasons Dropped: This alternative was eliminated from detailed consideration because installation of the underground power line would result in greater adverse effects than construction of the overhead power line or use of generators. Disturbance of the 80-foot-wide corridor would adversely affect biological resources present in the corridor, where an overhead line could span small sensitive areas, such as drainages and wetlands. Although the line would not cross any substantial areas of wetlands, the Blackfoot River, or areas where basalt flows are at or near the ground surface, it would cross a number of small intermittent drainages. This alternative would avoid some of the potential effects of the buried line along the proposed alignment, but would still result in additional environmental effects in comparison to an overhead power line along the same corridor. Finally, underground lines are less reliable, more difficult and costly to construct and maintain, and potentially dangerous to public safety.

2.8.13 Generation of Renewable Energy

Alternative Considered: Under this alternative, geothermal and wind generation were considered as potential options for supplying power to the mine facilities. Use of geothermal and wind generation would eliminate the need for the power line to the mine.

Reasons Considered: This alternative was considered in response to concerns raised about the potential for the overhead power line to adversely affect terrestrial and avian wildlife.

Reasons Dropped: This alternative was eliminated from detailed consideration because operations would be conducted 24 hours per day and would require a constant source of power. No potential sources of renewal energy exist that could provide the required continuous power required for the project. Sufficiently sized geothermal power facilities are available, but they require natural geothermal resources. Although some evidence of water with elevated temperatures has been noted in groundwater monitoring wells near the south end of the Study Area, the temperature and extent is not sufficient to be considered for geothermal resources for a mine. In addition, wind generation would require the installation of at least one wind turbine generator. Climatological data for the Study Area suggest that the average velocities of wind may be adequate, but that winds are too intermittent to meet the project requirements for continuous power. Given the short life-of-mine, the life cycle energy costs to develop renewable energy at the site could require more energy than would be gained.

2.8.14 Ore Conveyor System

Alternative Considered: Under this alternative, a conveyor would be constructed to transport ore across Rasmussen Valley from the north end of the proposed mine pit to the existing ore haul road. The conveyor could be constructed along the alignment of HR-1. The alignment would be approximately 15,000 feet long, running from the north end of the proposed mine pit to the existing ore haul road. The conveyor system would consist of a maintenance road along the conveyor system; ore stockpile, staging, loading, and unloading areas at each end of the conveyor; and GM stockpiles and sediment basins along the area of disturbance. Haul trucks would still be necessary at both ends of the conveyor to move ore from the mine to the conveyor and from the conveyor to the Wooley Valley Tipple. Following the same corridor as HR-1, the conveyor would cross Rasmussen Valley Road, Angus Creek, and the same areas of wetlands. The corridor of disturbance would be approximately 40 feet wide.

Reasons Considered: This alternative was considered in response to concerns about adverse effects of the haul road on wetlands and on surface water at stream crossings and segmentation of grazing allotments along the proposed haul road.

Reasons Dropped: Construction of the conveyor would not eliminate the effects to wetlands because of the required maintenance road; it would disturb 10.3 acres (BC 2013a) of wetlands along HR-1 (compared to 20.5 acres for the haul road). The conveyor, however, would cross large areas of private land (4,400 feet along HR-1 and 6,600 feet along HR-2) and disrupt the landowners' use of these areas. In addition, the conveyor would be a constant source of noise and fugitive dust, would disrupt wildlife, fragment wildlife habitats, and be a barrier to the movement of wildlife and livestock. Finally, the conveyor system would be unduly expensive to construct and operate considering the short life-of-mine. The shorter new haul road (HR-5) in the RCA addresses the same issue as the conveyor would and avoids the impacts that would be incurred by the conveyor, the Proposed Action or other alternative haul roads.

2.8.15 Ore Haul Road HR-2

Alternative Considered: Under this alternative, the Rasmussen Valley Haul Road would be moved to the south edge of Rasmussen Valley. The alternative would cross the same two privately owned parcels as HR-1 (eastern [7S/44E] and western [6S/43E]), but for a shorter distance on the western parcel. This alternative haul road also would cross Rasmussen Valley Road at just one location, compared to the two locations where HR-1 crosses the road.

Reasons Considered: This alternative was considered in response to concerns about the extent of potential adverse effects to wetlands.

Reasons Dropped: This alternative was eliminated from detailed consideration because the reduction of impacts for this alternative in comparison to HR-1 was not sufficient to consider it a reasonable alternative. It does not provide sufficient additional environmental benefit compared to other alternative haul road routes. Although the impacts on wetlands would be less than those for HR-1, they would still be considered significant. The cycle time for hauling ore from the mine to the Wooley Valley Tipple would be nearly the same, which eliminates any operational benefits of reduced fuel consumption or associated air emissions for this haul road alignment. Crossing of a public road by a haul road would create public safety concerns. The shorter new haul road (HR-5) in the RCA avoids the impacts that would be incurred by HR-2, the Proposed Action, or other alternative haul roads.

2.8.16 Ore Haul Road HR-3

Alternative Considered: HR-3 would have followed the lower slopes of Rasmussen Ridge northwest to the Wooley Valley Tipple Haul Road. It would have avoided the wetlands along Angus Creek as well as avoiding crossing Rasmussen Valley Road. It would also cross less private land than the Proposed Action Haul Road, but would cross more state lands managed by the IDL.

Reasons Considered: This alternative haul road was considered in response to concerns about the extent of potential adverse effects to wetlands along Angus Creek.

Reasons Dropped: This alternative would not reduce the travel distance to the existing Agrium mine facilities at the Rasmussen Ridge Mines, and would increase the haul cycle to the Wooley Valley Tipple in comparison to the Proposed Action. This alternative would generate more dust emissions, and would result in higher fuel consumption and air emissions in comparison to HR-1. This alternative element does have fewer potential effects on wetlands in comparison with the Proposed Action, and does not cross Rasmussen Valley Road, reducing potential effect on public roads. However, it does not address other issues such as effects on air quality, water resources, soils, wildlife, and visual resources. This alternative was eliminated from detailed consideration because the reduction of impacts for this alternative in comparison to HR-1 and HR-5 was not sufficient to consider it a reasonable alternative for detailed evaluation. The shorter new haul road (HR-5) in the RCA avoids the impacts that would be incurred by HR-3, the Proposed Action, or other alternative haul roads.

2.9 ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Table 2.9-1 provides a summary and comparison of potential effects from the Proposed Action and alternatives by resource. Detailed descriptions of potential effects for specific resources are presented in **Chapter 4**.

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Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Geology, Minerals, and Paleontology			
Geotechnical Stability	The North and South Main Overburden Piles could be affected by slope instability. An indirect effect of slope failure would be exposure of Meade Peak overburden. In addition, 30.6 acres of haul roads constructed on soil map units HAX and PCM may be susceptible to minor cut slope failure. Overall potential effects of slope and pit wall instability under the Proposed Action were predicted to be short-term and minor.	Under the RCA, there would be no permanent external overburden piles on potentially unstable slopes downslope of the mine pit. Borrow and storage areas may be located on unstable slopes downslope of the mine pit and could be affected by slope instability. The West Side Haul Road and HR-5 would be constructed on 31 acres of soil map units HAX and PCM and may be susceptible to minor cut slope failure. Portions of HR-5 would carry a higher potential for minor failure than the Rasmussen Valley HR-1. Overall potential effects of slope and pit wall instability under the RCA would be negligible.	The mine would not be developed, and there would be no potential for geotechnical effects from this action.
Paleontology	Geological strata that would be mined are classified under the BLM Potential Fossil Yield Classification (PFYC) system (BLM 2007) as PFYC 5a and PFYC 3a. PFYC 5a deposits have a very high potential to contain scientifically significant fossils. PFYC 3a deposits have a moderate potential to contain scientifically significant fossils. However, the paleontological resources in these formations are mostly commonly occurring invertebrate fossils not generally considered to be important or	The RCA would disturb 67 acres of PFYC Class 5a deposits and 81 acres of PFYC Class 3a deposits. With required mitigation, effects to paleontological resources would be minor. The RCA could have a beneficial effect for paleontology through the discovery and documentation of previously undocumented paleontological resources. Overall, the effects to important paleontological resources would be long-term and minor.	The mine would not be developed, and there would be no potential for effects to paleontological resources from this action.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	restricted to the analysis area. The Proposed Action was predicted to disturb 60 acres of PFYC Class 5a deposits and 25 acres of PFYC Class 3a deposits. With required mitigation, effects to paleontological resources would be minor. Mitigation would be developed on a case-by-case basis and may include salvage of important specimens. The RCA could have a beneficial effect for paleontology through the discovery and documentation of previously undocumented paleontological resources. Overall effects to paleontology under the Proposed Action would be long-term and minor.		
Air Resources, Climate, and Noise			
Air Emissions	Activities at the Rasmussen Ridge Mine would gradually conclude as equipment is moved to develop the Rasmussen Valley Mine. The Proposed Action would replace comparable existing activities at the Rasmussen Ridge Mine. The majority of air emissions are from fugitive dust and equipment emissions. Similar levels to those currently occurring would occur during operation of the Proposed Action. The impacts from the Proposed Action to air resources would be negligible.	The RCA eliminates overburden piles downslope of the pit and reduces the frequency of overburden pile disturbance. The total potential surface disturbance of the RCA would be approximately 73 acres more than the Proposed Action. HR-5 would be approximately 3 miles longer than the Proposed Action HR-1, increasing vehicle emissions, but the overall potential air emissions would be lower than those for the Proposed Action.	Under the No Action Alternative, direct impacts to air emissions from the activities in the Proposed Action would not occur. Air emissions would be reduced from existing conditions as activities conclude at the Rasmussen Ridge Mine.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
		The impacts from the RCA to air resources would be negligible.	
Climate Change	Greenhouse gas (GHG) emission from the Rasmussen Valley Mine operations would be similar to those from the current operations at Rasmussen Ridge Mine. These emissions are lower than the current USEPA reporting threshold of 25,000 metric tons in combined GHG emissions per year. Effects of the Proposed Action on GHG emissions and climate change would continue after the mine is closed. As a result of the long residence time of GHG in the atmosphere, the effects of the Proposed Action on climate change would be long term and negligible. Trends in climate change may affect the rate of long-term reclamation success and succession, but the effects would be negligible over the 5.8-year life-of-mine of the Proposed Action.	Potential contribution to climate change from the RCA would be greater than those described for the Proposed Action as a result of the addition of additional GHGs because of the longer mine life. As with the Proposed Action, the effects of the RCA on climate change would be long term and negligible. Trends in climate change may affect the rate of long-term reclamation success and succession, but the effects would be negligible over the 7.1-year life-of-mine of the RCA.	Under the No Action Alternative, direct impacts to climate change from the activities in the Proposed Action would not occur. GHG emissions would be reduced from existing conditions as activities conclude at the Rasmussen Ridge Mine.
Noise	Noise from operation of the Proposed Action would be generated by site equipment, blasting, drilling, and traffic. The overall mine generation noise profile would be minimally changed from current activities at the Rasmussen Ridge Mine. The noise profile would be unchanged from existing conditions, and changes in the locations of noise generating	Potential impacts of noise under the RCA would be the same as those for the Proposed Action. The noise impacts from the RCA are expected to be negligible or minor at the closest residence as a result of the distance from the mine.	Under the No Action Alternative, direct impacts to noise from the activities in the Proposed Action would not occur. Mining-related noise would be reduced from existing conditions as activities conclude at the Rasmussen Ridge Mine.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	activities would be negligible at all off-site receptors. The noise effects from the Proposed Action would be negligible or minor at the closest residence as a result of the distance from the mine.		
Water Resources			
Groundwater Quantity	Pit dewatering under the Proposed Action to facilitate mining below the regional groundwater table near the southern end of the excavation would be expected to result in moderate but localized impacts to water levels in the Wells Regional Aquifer for 10 to 11 months starting during Phase 1 mining. The projected maximum drawdown in the Wells Regional Aquifer would be approximately 60 feet. Capping of the permanent overburden piles and pit backfill would permanently reduce the amount of recharge reporting to groundwater by approximately 8 percent from a pre-mining 2.6 inches per year to a predicted permanent 2.4 inches per year. Long-term decreases in shallow groundwater levels by reduced infiltration through reclaimed areas would be minor and localized, and in the Wells Regional Aquifer would be negligible.	The RCA would result in reduced effects to groundwater quantity in comparison to the Proposed Action. The RCA would eliminate mining below the water table, reduce the pumping of pit water through unreclaimed backfill, and would eliminate external overburden piles downslope of the pit, thus eliminating the reduced infiltration to shallow groundwater. The RCA would also use a cover system over the backfill and overfill that has lower infiltration characteristics. Numerical infiltration and seepage modelling of the RCA cover calculated a net percolation of 0.21 inch per year. Because of the elimination of mining below the water table, the elimination of the overburden piles downslope of the mine pit, the effects of the RCA to groundwater quantity would be negligible and less than the Proposed Action and would protect groundwater beneficial	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to water resources beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
		uses.	
Surface Runoff and Flow	The Proposed Action may affect surface waters by changing the volume and timing of surface runoff and flow patterns. The Proposed Action was predicted to increase hydrologic disturbance in the Angus Creek-Blackfoot River sub-watersheds by 1.59 percent. This would temporarily raise the total hydrologic disturbance in the Angus Creek-Blackfoot sub-watershed to 25.18, which is below the USFS guideline of 30 percent. There would be no disturbance on USFS lands in the Lower Lanes Creek or Diamond Creek sub-watersheds. Impacts to watershed area disturbance would be minor, local, and long-term, lasting until vegetation has fully re-established and trees have reached the sapling/pole size class. Reduction of runoff resulting from the Proposed Action was predicted to be 4.14 percent in the Angus Creek-Blackfoot River and 0.03 percent in the Lower Lanes Creek sub-watersheds. There would be no change in the Diamond Creek sub-watershed. Total runoff reduction to Blackfoot River would be less than 1 percent. Impacts to runoff reduction would be considered minor to negligible, local, and limited to the duration of mining. Haul roads carry	The RCA would temporarily increase hydrologic disturbance in the Angus Creek-Blackfoot River sub-watershed by 1.65 percent during mining. The total new hydrologic disturbance would be 0.06 percent higher than that under the Proposed Action in the Angus Creek-Blackfoot River sub-watershed, and would be the same as for the Proposed Action for the Lower Lanes Creek and Diamond Creek sub-watersheds. The total hydrologically disturbed area would meet the USFS guideline of less than 30 percent in all three sub-watersheds. Runoff reduction under the RCA would be 4.06 percent in the Angus Creek-Blackfoot sub-watershed; 2 percent lower than under the Proposed Action. Differences in runoff reduction to Blackfoot River between RCA and the Proposed Action would be negligible. Total runoff area reduction compared to the Proposed Action would be 4.06 percent of the Angus Creek-Blackfoot River sub-watershed. Potential impacts to alterations in peak flow under the RCA would be the same as those for the	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to water resources beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	the potential to affect peak flows through the diversion of flow through in-slope ditches and cross-drains, and through potential constrictions of flow at stream crossings or culverts. Potential alterations to peak flow would be minor, local, and short-term. Long-term effects to streamflow from haul roads would be negligible. The permanently realigned county roads would have minor, localized impacts that would be long-term. Construction of four overburden piles downslope of the pit would alter the natural flow patterns by diverting flow away from the natural channels. Although the intermittent drainages affected by two of the piles would be re-established after reclamation, the drainages affected by the North and South-South Overburden Piles would be permanently diverted. Pit dewatering under the Proposed Action to facilitate mining below the regional groundwater table near the southern end of the excavation is expected to result in moderate but localized impacts to water levels in the Wells Regional Aquifer for 10 to 11 months starting during Phase 1 mining. The projected maximum drawdown in the Wells Regional Aquifer would be approximately 60 feet. Temporary drawdown of shallow groundwater levels west of the pit near Angus Creek is predicted to be	Proposed Action. While there would be up to four external GM stockpiles constructed within intermittent drainages downslope of the mine pit, these would all be reclaimed after the cessation of the mining activities, and there would be no permanent diversions from original stream channels under the RCA. There would be no impacts from dewatering under the RCA because there would be no mining below the water table. Consequently, there would be no drawdown in the aquifer, and there would be no indirect effects to streamflows.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	negligible. Dewatering is not predicted to measurably affect Angus Creek and Blackfoot River streamflows. However, some minor, localized, temporary stream depletions may occur at lower reach of Spring Creek.		
Groundwater Quality	The Proposed Action was predicted to affect groundwater quality by leaching pollutants, including selenium and other COPCs, from pit backfill, external overburden piles, and the optional ore stockpile into the Wells Regional Aquifer and shallow groundwater flow system. Leachate generated by the percolation of infiltrated through the North, South Main Temporary, and South-South Overburden Piles and the optional ore stockpile would be the primary source of chemical loading to shallow groundwater in alluvium. COPCs leaching into shallow groundwater would be transported southwest toward Angus Creek and Blackfoot River, and may discharge into surface water. Percolation of infiltrated meteoric water through backfilled overburden in the mined out pit would be the primary source of chemical loading to the Wells Regional Aquifer. COPCs released into the Wells Regional Aquifer would be transported northwest, but would not discharge to surface water near the Proposed Action.	The RCA would eliminate downslope external overburden piles and the optional ore stockpile, which would remove sources of chemical loading to the shallow aquifer system and reduce impacts to shallow groundwater quality to negligible levels. Under the RCA, no impacts to the chemistry of surface water would occur by the transport and discharge of COPCs in groundwater to Blackfoot River and Angus Creek. The RCA would result in the permanent disposal of all overburden in either the existing South Rasmussen Mine pit or in the Rasmussen Valley Mine pit and overfill piles. It would also result in the construction of protective covers over the backfill at both locations, which would reduce the percolation of meteoric water through the backfill from 0.87 in/yr at the South Rasmussen Mine pit and 2.4 in/yr at the Rasmussen Valley Mine pit to 0.21 in/yr at both locations. The	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to water resources beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	The Proposed Action was predicted to result in impacts to groundwater quality in the shallow and regional aquifers that would exceed numerical groundwater standards. Seepage from the mine facilities would form contaminant plumes with higher concentrations than in unaffected groundwater. The impacts to groundwater quality under the Proposed Action would be long-term and moderate.	reduction of percolation through the backfill would reduce chemical loading to the Wells Regional Aquifer at the Rasmussen Valley Mine compared to the Proposed Action. Seepage out of the backfill under the RCA would result in the formation of groundwater contaminant plumes from the Rasmussen Valley Mine and South Rasmussen Mine in the Wells Regional Aquifer that have higher concentrations than in unaffected or existing groundwater. The concentration of contaminant plumes from the Rasmussen Valley Mine would be lower than those that would occur under the Proposed Action. The concentrations of contaminant plumes from the South Rasmussen Mine would be lower and higher than concentrations that would occur under the Proposed Action depending on the constituent considered. The Rasmussen Valley Mine groundwater plumes would have smaller extents than those predicted under the Proposed Action, and would be transported to the northwest, where they would merge with the South Rasmussen Mine plume. COPCs transported in the Wells Regional	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
		Aquifer would not discharge at the surface. Impacts to shallow groundwater quality under the RCA would be negligible. Impacts to groundwater in the Wells Regional Aquifer would be long-term and moderate but meet beneficial uses.	
Surface Water Quality	Short-term effects to surface water quality could occur from increased sediment yield from disturbances related to construction, resulting in increased suspended sediment and turbidity. These sources of sediment would be controlled by the use of BMPs, sediment control structures, and slope stabilization. There would be no long-term effects. Cover systems on the backfill and overburden piles would prevent contact of runoff with overburden, preventing direct contamination of surface water by selenium and other COPCs. The Proposed Action would result in negligible, local, and short-term impacts to surface water quality. Numerical infiltration and seepage modeling of the Proposed Action cover calculated a net percolation of 2.4 inches per year. Although substantially mitigated by the cover system, meteoric water that infiltrates the pit backfill and overburden piles may result in moderate COPC loading	Potential impacts to water quality from sedimentation and runoff under the RCA would be the same as those for the Proposed Action.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to water resources beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	to the alluvial aquifer, where the COPCs would be transported west in groundwater toward Angus Creek. However, gain-loss studies and surface water monitoring data indicate that the lower sections of Angus Creek lose flow to groundwater under most flow conditions. The COPCs transported in groundwater from the facility may be attenuated by dilution, precipitation, or adsorption. The Proposed Action was predicted to result in the release of COPCs into the Wells Regional Aquifer at concentrations that exceed Idaho groundwater quality standards. Impacts to surface water quality would be considered minor to moderate and long-term.		
Soils			
	Direct impacts to soils from mining and construction include increased erosion; soil compaction; decreased soil productivity; and potential contamination of soils from chemical spills during transport, storage, or use. Indirect impacts to soils are not expected. Except for contamination by spills, these impacts would decrease soil productivity by impacting soil structure, increasing runoff and soil loss, decreasing permeability and infiltration, and damaging soil microorganisms. Overall direct impacts from construction of the Proposed Action would be moderate,	Impacts to soils under the RCA would be similar to those described for the Proposed Action. The intensity of effects would be slightly different than the Proposed Action in response to differences in location and extent of disturbances. The total area of surface disturbance under the RCA would be up to 540.9 acres, 73 acres more than the Proposed Action. In all, 517.8 acres of this disturbance would be reclaimed. As in the Proposed Action, unreclaimed areas would include unreclaimed pit walls and	Under the No Action Alternative, existing soil resource trends would continue, and there would be no new impacts to soil resources.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	local, and long-term. The Proposed Action would create 467.8 acres of surface disturbance. Approximately 450.5 acres would be reclaimed. The remaining 17.3 acres would include unreclaimed pit walls and permanently realigned county roads. Reclamation would reduce the long-term impacts to minor. The majority of undisturbed soils that would be disturbed by the Proposed Action are soil types with low erosion hazards, but disruption of vegetative cover and soil aggregates would result in a short-term increase in soil erosion and sediment transport. Disturbances would occur on 62 acres of soils with high erosion hazard and 230 acres of soils with moderate erosion hazard. Overall erosion rates are expected to decrease as portions of the Proposed Action are reclaimed and vegetation cover is established. Based on lab analysis, COPCs are not expected to be released from soils used for reclamation. Use of salvaged soils for GM is not expected to cause adverse impacts on plant selenium concentrations or downstream water quality. Estimated volumes of available GM indicate that sufficient soils are present within the area to be disturbed to meet cover requirements. No soils from outside disturbed areas	permanently realigned county roads. . The RCA would create less disturbance on soils with moderate (120 acres) or high (31 acres) erosion hazards. Specific areas outside the mine pit, overburden stockpiles, and roads would be used as borrow areas for GM and alluvium to construct the RCA Cover C. Overall adverse effects to soils under the RCA would be greater than under the Proposed Action and would be long-term and minor to moderate. As under the Proposed Action, much of the impact would reduce over time with the success of reclamation.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	would be needed for use as GM. Salvaged GM would be stored in stockpiles. During reclamation, any surplus GM beyond that required for minimum thickness of reclamation would either be placed to a thicker depth or placed in stockpiles for later use. Overall effects to soils under the Proposed Action would be long-term and moderate, but much of the impact would reduce over time with the success of reclamation.		
Vegetation, Riparian Areas, and Wetlands			
Upland Vegetation and Pollinators	Over the life-of-mine, the Proposed Action would remove up to 447 acres of upland vegetation. This would include the effectively permanent loss of 83 acres of aspen forest. Reclamation would eventually re-establish vegetation cover, but the species composition and community structure would be different. Proposed seed mixes are pollinator-friendly, and no threatened, endangered, or USFS sensitive pollinator species are known to occur in the Caribou-Targhee National Forest (CTNF). Overall impacts to vegetation and pollinators would be minor and long-term.	Impacts to vegetation from the RCA would be similar to the Proposed Action. The RCA would remove up to 540.9 acres of upland vegetation. Reclamation would eventually re-establish vegetation cover, but the species composition and community structure would be different. No threatened, endangered, or USFS sensitive pollinator species are expected to be impacted under the RCA, and proposed seed mixes are pollinator-friendly. Overall impacts to vegetation and pollinators would be minor and long-term.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed, and there would be no new impacts to vegetation.
Wetlands and Riparian Areas	The Proposed Action would remove 20.5 acres of wetlands and non-wetland WOUS. Most wetland	The RCA would have no impact on wetlands or riparian areas. Under the RCA, there would be no measureable loading of	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed, and

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	impacts (17.5 acres) would occur in Category III wetlands. As a result of project design, use of BMPs, acreage, and similar functionality of wetlands not impacted in the assessment areas, the wetland impacts would be local, long-term, and moderate. Reclamation and establishment of new wetlands would eventually compensate for much of this loss. Potential impacts from COPCs in shallow alluvial aquifers may occur and would be long-term and moderate.	selenium or other COPCs to wetlands and riparian areas.	there would be no new impacts to wetlands.
Noxious Weeds	There is a low occurrence of noxious weeds in the analysis area, and BMPs would be implemented to minimize their potential spread. The effects of noxious weeds from the Proposed Action would be short-term and minor.	Noxious weed control methods for the RCA are unchanged from those presented in the Proposed Action. The RCA would disturb approximately 73 more acres of vegetation than the Proposed Action. The effects of noxious weeds from the RCA are expected to extend several years past the end of mining, but are considered short-term and minor because reclamation species and native vegetation will ultimately predominate. Should any weed issues arise post-mining, control methods would be adapted to alleviate such issues.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed, and there would be no new impacts from noxious weeds as a result of the undertaking.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Terrestrial Wildlife			
	The Proposed Action would have immediate direct effects to wildlife mortality, disturbance, and displacement and changes in wildlife behavior and composition associated with long-term changes in land cover. Overall, depending on the season and species, disturbance and displacement impacts to terrestrial wildlife would be long-term and negligible to minor. Wildlife may also be affected by exposure to selenium and other COPCs in vegetation and water in wetlands and riparian areas. Effects of selenium exposure from the Proposed Action would be long-term and negligible to minor. Indirect effects from habitat alteration would be localized and long-term. The Proposed Action would result in the loss of up to 447 acres of forested and shrubland habitat and 20.5 acres of wetland and riparian habitat. This would include the effectively permanent loss of 83 acres of aspen forest habitat. This would be a long-term and major effect on the habitats of many terrestrial wildlife species.	The RCA would have impacts to terrestrial wildlife similar to the Proposed Action. The maximum total acreage of upland wildlife habitat affected would be 540.9 acres, or 73 acres more than the Proposed Action. The RCA would not disturb any wetland areas, which translates to 20.5 acres less wetland disturbance than the Proposed Action. The use of an existing haul road and backfill of overburden in a previously disturbed area would also consolidate new disturbance and result in less habitat fragmentation than the Proposed Action. Depending on the season and species, overall disturbance and displacement impacts would be long-term and range from negligible to minor.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed, and there would be no new impacts to wildlife from the proposed mining.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Fisheries and Aquatic Resources			
Aquatic Habitat	The Proposed Action would result in direct impact to 20.5 acres of wetland habitat and would also impact stream channels in the Study Area. There would also be indirect impact to aquatic habitats within and adjacent to the Study Area. Clearing of vegetation in the Study Area could contribute to increased soil erosion and sediment loading in local drainages if not controlled with BMPs. This could result in altered stream morphology, choking out of aquatic plants, and changes in fish and aquatic invertebrate communities. BMPs for sedimentation and capturing of surface runoff during mining would decrease the severity of or eliminate these potential impacts. However, the reduced quantity of water resulting from capture of runoff could also result in the drying of some aquatic habitats downstream of the Proposed Action. The Proposed Action would impact 80 acres of AIZ, which could result in increased water temperatures, decreases in natural sediment filtration, changes in channel morphology, loss of instream wood recruitment, and decrease in inputs of organic matter as energy. Overall effects of the Proposed Action to aquatic habitat would be long-term and moderate.	The RCA was developed to avoid most impacts to aquatic resources. The RCA would have no impact on wetlands, and therefore would impact 20.5 fewer acres of wetland habitat than the Proposed Action. The majority of RCA disturbance would occur in upland habitats. The RCA would also impact 70 fewer acres of AIZ than the Proposed Action. Overall impacts to aquatic resources would be negligible and long-term under the RCA.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to aquatic habitat beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Macroinvertebrates	Macroinvertebrates would be impacted by changes in sedimentation and changes to AIZs resulting from the Proposed Action. These impacts would change the physical characteristics of the aquatic environment. Changes in the macroinvertebrate community may include temporary increases in the abundance of some species and decreases in the abundance of other species less tolerant of changes in turbidity. Macroinvertebrate community composition is also impacted by removal of vegetation in the AIZ. Macroinvertebrates could bioaccumulate selenium in reaches of Angus Creek where impacted shallow alluvial water discharges to the creek. Overall impacts of the Proposed Action to macroinvertebrates would be long-term and minor.	Impacts to macroinvertebrates under the RCA would be less than the Proposed Action. Macroinvertebrates may be affected by sedimentation and changes to the AIZ. There would be only 10 acres of direct impact to the AIZ under the RCA compared to 80 under the Proposed Action. The RCA would also have a lower potential to contribute selenium and other COPCs to surface water. Overall, the impacts of the RCA on macroinvertebrates would be negligible in wetlands and waters downstream of the RCA.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to macroinvertebrates beyond the existing conditions.
Fish	Culverts would be designed so that the minimum depth of water for fish passage is always available. BMPs and design features would be implemented to minimize sedimentation. The Proposed Action is unlikely to contribute to population level effects of selenium and other COPCs on fish downstream of the Study Area. Overall impacts of the Proposed Action to fish would be long-term and moderate.	The RCA does not include any crossings of fish-bearing streams. The RCA would comply with BLM and USFS guidelines for the maintenance of instream flows and would not fragment fish habitat. The potential for the bioaccumulation of selenium and other COPCs in the aquatic food chain would be lower under the RCA. Overall, the RCA would have a negligible impact on fish populations in wetlands and	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to fish habitat beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
		waters downstream of the Study Area.	
Amphibians and Reptiles	Direct mortality of amphibians and reptiles may occur in wetland, riparian, and stream habitats disturbed by the Proposed Action, including 20.5 acres of wetland and riparian areas. In addition, direct mortalities may occur on haul roads when individuals move between wetland habitats. Amphibians are also susceptible to selenium toxicity and to the effects of other COPCs. Overall impacts of the Proposed Action to amphibians and reptiles would be long-term and moderate.	All wetlands would be avoided under the RCA. Only 10 acres of AIZ would be impacted under the RCA, 70 fewer acres than under the Proposed Action. Consequently, impacts on amphibians and reptiles from the RCA would be negligible.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined, and there would be no effects to amphibians and reptiles beyond the existing conditions.
Threatened, Endangered, and Special Status Species			
	Threatened, endangered, or sensitive species include threatened, endangered, and proposed candidate species; Caribou National Forest (CNF) sensitive species and management indicator species and BLM sensitive species; and special status plants. Threatened, endangered, and proposed candidate species that may occur in the analysis area are Canada lynx and North American wolverine. Sensitive species and management indicator species that may occur in the analysis area are gray wolf, greater sage-grouse, Townsend's big-eared bat, special status raptor species,	Under the RCA, there would be a loss of 132 acres of marginal aspen forest foraging habitat, 49 acres more than under the Proposed Action. This would make these marginal areas less attractive to Canada lynx, gray wolf and North American wolverine, but would not result in mortality or loss of important habitat. A greater loss of sagebrush shrubland under the RCA would result in displacement of individuals, marginal habitat loss, and habitat fragmentation, making	Under the No Action Alternative, the federal phosphate leases would not be developed. The No Action Alternative would result in no new impacts in the Study Area.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Columbian sharp-tailed grouse, small birds, special status migratory and water birds, special status reptiles and amphibians, and special status fish. There are no identified threatened, endangered, and proposed candidate plant species, CNF sensitive plant species, CNF Forest Watch rare plant species, or BLM sensitive plant species in the analysis area. Canada lynx, gray wolf, wolverine, greater sage-grouse, and Columbian sharp-tailed grouse may range into the analysis area or may occur in limited numbers. In general, the habitat in the analysis area is marginal for these species. There is no sage grouse habitat formally designated in the federal land use plans within the Study Area. Wide-ranging species like the Canada lynx, gray wolf, and wolverine would avoid these marginal habitats. The greatest effects to these species would be from the loss of 83 acres of marginal aspen forest foraging habitat under the Proposed Action. Given the marginal and patchy nature of habitat and the large foraging range of these species, adverse impacts would be negligible. Greater sage-grouse and Columbian sharp-tailed grouse have been observed sporadically in the analysis area. The existing sagebrush	the Study Area unattractive for greater sage-grouse and Columbian sharp-tailed grouse although the area is not in designated sage-grouse habitat. The RCA would not impact any wetlands which is foraging habitat for the Townsend's big-eared bat. Other impacts to the species would be similar to the Proposed Action. In general, impacts of the RCA to special status raptor species and small birds would be similar to the Proposed Action. The RCA would result in long-term loss of 132 acres of aspen forest, 49 acres more than the Proposed Action. On the other hand, the RCA would result in no disturbance to wetland and riparian habitat. Overall impacts would be negligible and long-term. The RCA would have the same types of impacts to special status fish, reptiles and amphibians, and migratory and water birds as the Proposed Action, but they would be reduced because of the reduced impacts to wetland habitats and improved protection of downstream water quality. Overall impacts to special status	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	communities do not provide optimum habitat for either grouse species. Townsend's big-eared bats may occupy a variety of the habitats in the Study Area. The Proposed Action would result in long-term alteration of up to 468 acres of upland, woodland, and wetland foraging habitat. Overall impacts would be minor and long-term. Special status raptors and small birds would be affected principally by disturbance to upland woodlands and shrubland habitat. These habitats are important for both nesting and foraging. These species also use wetland habitat for foraging. There would be long-term loss of foraging and nesting habitat for special status raptor species and small birds. Noise and human disturbance would temporarily displace the raptors. The Proposed Action would result in permanent loss of 83 acres of aspen habitat and 20.5 acres of wetland and riparian habitat. On a landscape scale, these impacts would be minor. Special status fish, reptiles and amphibians, and migratory and water birds are more heavily dependent on wetlands and riparian areas. These species would be directly affected by the loss or degradation of wetland habitat and are also more susceptible to potential exposure to selenium and	water birds would be negligible and long-term. Overall impacts of the RCA on threatened, endangered, and special status species would be less than the Proposed Action, but similar in nature. The overall impact of the RCA on threatened, endangered, and special status species would be long-term and negligible to minor.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	other COPCs. The Proposed Action would result in the loss of 20.5 acres of wetland and riparian habitat. Impacts to these species under the Proposed Action would be moderate and long-term. Overall impacts to threatened and special status species from the Proposed Action would be negligible to long-term and moderate.		
Special Status Plant Species	There are no identified threatened, endangered, proposed, or candidate plant species; CNF sensitive plant species; CNF Forest Watch rare plant species; or BLM sensitive plant species in the Study Area.	There are no special status plant species in the Study Area.	There are no special status plant species in the Study Area.
Visual Resources			
	Under the Proposed Action, impacts to visual resources would include alterations of the existing visual landscape by project components. These components would contrast with the existing visual landscape character, and would remain with somewhat less contrast after reclamation. However, views of the Study Area are limited by the surrounding terrain. The area is viewed by comparatively few people for limited periods of time. The modifications would meet both the USFS Visual Quality Objectives (VQOs) of modification and the BLM Visual Resource Management (VRM) objectives for the area.	Under the RCA, there would be no overburden piles on the downslope side of the mine pit and the GM stockpiles in that area would be transient. Although the overall mine pit of the RCA would be slightly larger than in the Proposed Action, the individual pit phases, and associated stockpiles would be less noticeable than those of the Proposed Action. As in the Proposed Action, the landscape modifications would meet both the USFS VQO of modification and the BLM VRM management objectives for the area.	Under the No Action Alternative, the mine would not be developed, and there would be no new impacts to visual resources

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Overall, the impacts of the Proposed Action to scenic attractiveness would be long-term and minor.	The overall impacts of the RCA to scenic attractiveness would be negligible.	
Land Use, Access, and Transportation			
Grazing	The Proposed Action would result in a loss of 200 head months (HMs) for the Rasmussen Valley Cattle Allotment (RVCA), including almost all of Unit 3A in the Study Area. Although impacts to some grazing units would be major, impacts to the RVCA as a whole would be minor, because the grazing lands would not be displaced all at once, but progressively as mining activities progress, and thus portions of the grazing lands within the Study Area may remain accessible during mining activities. In contrast, only 9 acres of the Henry Olsen Sheep and Goat Allotment (HOSGA; 0.08 percent) would be unusable. The impact to the HOSGA would be negligible. When areas are reclaimed, the vegetation in the early stages of reclamation may be more favorable for forage production than the pre-mine vegetation, although the species diversity would be limited. Overall impacts of the Proposed Action to grazing would be negligible to long-term and minor.	Impacts to grazing under the RCA would be equivalent to those under the Proposed Action. The additional acreage to be mined and the slight changes in access would not alter the effects of the RCA in comparison to the Proposed Action. The changes to acreage to be mined and sequence of mining would have little if any additional effect on land available for grazing in comparison to the Proposed Action. The overall impacts of the RCA on grazing would be long-term and minor.	Under the No Action Alternative, the mine would not be developed. There would be no impact to the availability or quality of grazing.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Traffic	Under the Proposed Action, workforce and equipment currently being used at the Rasmussen Ridge Mines would transition to the Proposed Action. This continuation of activities, equivalent to existing activities, would result in little or no change to workforce or traffic. No impacts to traffic or motorist safety are anticipated under the Proposed Action. Consequently, the impacts on traffic from the Proposed Action would be negligible.	Effects to traffic under the RCA would be would be equivalent to those under the Proposed Action Overall impacts on traffic from the RCA would be in slightly different locations than the Proposed Action, but would also be negligible.	Under the No Action Alternative, the mine would not be developed, and there would be a reduction of traffic on public roadways.
Recreation	The Study Area includes 1,008 acres of public lands and 833 acres of state lands that are open for recreation. Of that, approximately 410 acres are located in the Blackfoot River WMA. The Proposed Action would directly impact 38 acres of BLM land, 203 acres of USFS land, and 137 acres of state land. Given the industrial nature of the Proposed Action, access for recreation would be restricted or prohibited on the disturbed lands and on additional nearby areas that would not be directly impacted for the duration of the Proposed Action. In addition, it is likely that recreationists would choose not to use nearby areas that would be accessible. The acreage of lands available for recreation that would be reduced under the Proposed Action is negligible at the local and regional scales given the large acreage that would remain available.	The RCA would have similar effects to wildlife as those described under the Proposed Acton. Consequently, impacts to hunting and other upland wildlife-related recreation would be the same. The effects of the RCA to wetlands would be eliminated, and would thus be less than the Proposed Action and would have less effect on aquatic species including game fish. Overall the impacts of the RCA to recreation, like those of the Proposed Action would be long-term, moderate and site-specific, but negligible at the local and regional scales.	Under the No Action Alternative, the mine would not be developed. There would be no new impacts to recreation or recreationists.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	The Proposed Action does not include any developed recreational facilities in the Study Area. There are sections of some designated trails that would be lost from use. Overall, the impacts of the Proposed Action to recreation would be long-term, moderate, and site-specific, but negligible at the local and regional scales.		
Cultural Resources			
	Class III cultural resource inventories have been performed for the entire area of potential effects (APE) of the Proposed Action. No historic properties were identified in the APE of the Proposed Action. The Proposed Action would have no effect on known historic properties. If cultural resources are discovered during mine operation, they would be avoided and evaluated and, if necessary, a treatment plan would be developed and implemented. Effects of the Proposed Action to cultural resources would be negligible.	Class III cultural resource inventories have been performed for the entire APE of the RCA. No historic properties were identified in the APE of the RCA. The RCA would have no effect on known historic properties. If cultural resources are discovered during mine operation, they would be avoided and evaluated and, if necessary, a treatment plan would be developed and implemented. Effects of the RCA to cultural resources would be negligible.	Under the No Action Alternative, the mine would not be developed. There would be no effect to historic properties as a result of the No Action Alternative.
Tribal Treaty Rights and Interests			
	Agency consultation with the Shoshone-Bannock Tribes has been ongoing. The Tribes have identified the loss of access to public lands as an issue of concern, but have not identified any locations having traditional concern such as sacred sites. The Tribes have provided a list of culturally sensitive plant species that would be affected and have	Effects of the RCA on tribal treaty rights and interest would be the same as for the Proposed Action. Similar to the Proposed Action, the Tribes have identified the loss of access to public lands as an issue of concern for the RCA, but have not identified any locations having traditional concern such as	The No Action Alternative would have no effect on tribal treaty rights and interests.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	asked that revegetation take these plants into consideration. Effects of the Proposed Action to known treaty rights and interests would be negligible. Overall impacts to traditional resources would be long-term and minor.	sacred sites. The Tribes have provided a list of culturally sensitive plant species that would be affected and have asked that revegetation take these plants into consideration. Overall impacts to traditional resources would be long-term and minor.	
Social and Economic Conditions			
	The Proposed Action would take effect during the shutdown of the Rasmussen Ridge Mines. The existing work force and associated services would transfer to the new mine. Effects to population, housing, community services, employment, income to local and regional businesses, taxes and other revenues, and property values would be negligible. Effects to tourism and recreation from restricted access to mine property during operations would also be negligible. Over the 3.9-year life-of-mine, the Proposed Action would support 1,700 direct, indirect, and induced jobs, generate $724 million in personal income throughout Idaho ($260 million in personal income in Caribou County), $6.5 million in Caribou County property taxes, $20 million in federal mineral royalty payments, and other payments/tax receipts.	Effects of the RCA on social and economic conditions would be similar to those for the Proposed Action. The additional 10 months of mining and related increased production royalties and the 15 months of additional project life would increase the positive impact to the economy compared to the Proposed Action. Over the 4.8-year life-of-mine, the RCA would support 1,700 direct, indirect, and induced jobs, generate $876 million in personal income throughout Idaho ($315 million in personal income in Caribou County), $7.9 million in Caribou County property taxes, $24 million in federal mineral royalty payments, and other payments/tax receipts. Overall favorable impacts of the RCA on social and economic conditions would be short-term and major.	Under the No Action Alternative, the mine would not be developed. There would be major effects to employment, income to local and regional businesses, taxes and other revenues, and property values in Caribou County and lesser effects in neighboring counties. There would also be moderate effects to population and housing resulting from unemployment. Overall impacts of the No Action Alternative to social and economic conditions would be adverse, long-term, and major.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Overall favorable impacts of the Proposed Action to social and economic conditions would be short-term and major.		
Environmental Justice			
	There are no communities in the vicinity of the Proposed Action that are minority as a whole, and none would be exposed to high and adverse environmental effects. Because The Shoshone-Bannock Tribes of the Fort Hall Reservation, approximately 30 miles from the Study Area, have treaty rights and interests in public lands in the region, the Proposed Action could have disproportionate impacts on the population at the Reservation. These potential effects are addressed in Tribal Treaty Rights and Interests. Impacts of the Proposed Action to the Shoshone-Bannock Tribe would be long-term and minor. Impacts to remaining populations using the analysis area would be negligible.	The environmental justice effects of the RCA would be the same as with the Proposed Action. Like the Proposed Action, impacts of the RCA to the Shoshone-Bannock Tribe would be long-term and minor. Impacts to remaining populations using the Study Area would be negligible.	Under the No Action Alternative, the mine would not be developed, and there would be no new environmental justice effects.
Hazardous Materials and Solid Waste			
	Appropriate BMPs, storage, and secondary containment would be used for all hazardous materials and wastes, similar to those used at the Rasmussen Ridge Mines. In the event of any inadvertent spills or releases, Agrium would implement its SPCC Program. Effects of the Proposed	The RCA storage area for fuels and hazardous materials would be at the existing Rasmussen Ridge Mine Shop. Management practices for fuels, hazardous materials, and wastes would continue in the same manner as that currently implemented at the Rasmussen Ridge Mines. As in	Under the No Action Alternative, the proposed mine would not be developed and there would be no new effects associated with fuels, hazardous materials, and wastes.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Action on hazardous materials and wastes would be negligible. Under the Proposed Action, there would be little or no net increase in the quantities of materials used or wastes generated relative to what is currently managed at the Rasmussen Ridge Mines.	the Proposed Action, effects associated with fuels, hazardous materials, and wastes would be negligible. Overall impacts of the RCA would be negligible. Under the RCA, there would be little or no net increase in the quantities of materials used or wastes generated relative to what is currently managed at the Rasmussen Ridge Mines.	
Public Health and Safety			
	The Proposed Action has the potential to impact surface waters by introducing pollutants, such as sediment, selenium, and other COPCs, and restricting access by the public, livestock, and wildlife. However, no adverse effects to public health and safety are anticipated to occur from implementation of the Proposed Action. The impacts of the Proposed Action to public health would be negligible.	Under the RCA, potential impacts to public health and safety would be similar to those described for the Proposed Action; however, this alternative would have less potential for selenium and other COPCs to be released to surface water or to bioaccumulate in the aquatic food chain. No adverse effects to public health and safety are anticipated to occur from implementation of the RCA. The impacts of the RCA to public health and safety would be negligible.	Under the No Action Alternative, the facilities would not be constructed or operated; therefore, there would be no project-related impacts to public health and safety.