3.13. VEGETATION

This section describes the affected environment and addresses potential impacts of the proposed Project and the AMA on vegetation and federally listed threatened and endangered (T&E) plant species as well as Montana Species of Concern (SOC).

3.13.1. Analysis Methods

3.13.1.1. Analysis Area

The vegetation analysis area for the vegetation baseline data surveys encompasses 3,317 acres within Sections 24 through 26, 35 and 36 in T12N, R6E, and Sections 19 and 29 through 32 in T12N, R7E (WESTECH 2015). The vegetation analysis area is included on **Figure 3.13-1**.

3.13.1.2. Information Sources for Vegetation and Ecological Communities

The baseline vegetation surveys were conducted by WESTECH in May, June, and July 2015.Vegetation data from the 2014 baseline wetlands inventory was also used, in part, for the "2015 Baseline Vegetation Inventory" (WESTECH 2015), which is included as Appendix H of the MOP Application (Tintina 2017). These data were used for evaluating the potential impacts on vegetation.

3.13.1.3. Information Sources for T&E and Species of Concern

T&E and SOC information is provided in the "2015 Baseline Vegetation Inventory" report (WESTECH 2015) as well as the updated lists of SOC plant species provided by the Montana Natural Heritage Program (MTNHP) (MTNHP 2016).

3.13.1.4. Methods of Analysis

The vegetation resources impact analysis was conducted by reviewing the MOP Application, which includes the "2015 Baseline Vegetation Inventory" report (WESTECH 2015). WESTECH preliminarily mapped the vegetation resources using desktop methods and color orthophotos. Field surveys (i.e., pedestrian and vehicular surveys) then verified the mapping and identified T&E, SOC, and noxious weeds present within the vegetation analysis area.

3.13.2. Affected Environment

This section describes the existing habitat and plant communities; rangeland and cropland classifications; T&E and SOC; and noxious weeds in the vegetation analysis area.

3.13.2.1. Vegetation and Plant Communities

The "2015 Baseline Vegetation Inventory" report summarizes the results of vegetation sampling for 185 sample plots surveyed throughout the vegetation analysis area. The results of the surveys indicated there are five habitat and community types within the vegetation analysis area:

- Upland grassland
- Upland shrubland
- Conifer forest and woodland
- Lowland altered grassland
- Riparian and wetland (RW)

These habitat and community types are divided into sub-categories defined by the dominant vegetation noted within each habitat and community type, as summarized in **Table 3.13-1**. The vegetation community types are mapped on **Figure 3.13-1**.

Table 3.13-1
Habitat and Sub-Community Type Noted in the Analysis Area

Habitat Type	Sub-Community Type	Area within Analysis Area (acres)	Percent of Analysis Area (%)
Upland Grassland	Upland native grassland	607	18
	Upland altered grassland	172	5
Upland Shrubland	*Artemisia tridentata/Poa pratensis*	1,372	41
	Artemisia tridentata/Festuca idahoensis		
	Artemisia tridentata/Festuca campestris		
	Artemisia tridentata-Dasiphora fruticosa/ Poa pratensis		
	Dasiphora fruticosa-Artemisia tridentata/ Festuca campestris		
	Mixed Shrub-Shale Outcrop		
Conifer Forest and Woodland	Mature conifer stands	502	15
	Immature conifer stands	235	7
Lowland Altered Grassland	Noxious weed tailings	7	0
	Lowland altered grassland – hay meadow	118	4
Riparian and Wetland (RW)	Herbaceous RW	75	2
	Shrub-dominated RW	216	7
	Deciduous forest RW	13	0
	Total	**3,317**	**99**

Note: Total percentage does not add to 100% due to rounding.

3.13.2.2. Rangeland

Rangeland is included in the upland altered grassland sub-community type. Rangeland or animal grazing capacity is based on the ecological site and soil mapping unit classifications (**Figure 3.13-1** and **Figure 3.13-2**). The information presented in the "2015 Baseline Vegetation Inventory," which was derived from Natural Resources Conservation Service data, indicates that the rangeland productivity varies considerably by soil type. The actual animal grazing capacity is likely much less than the literature values, which were based on the historic climax plant community values. Due to the current and historic land use as cattle pasture for the majority of the vegetation analysis area, the actual animal grazing capacity is likely considerably less than literature values (WESTECH 2015).

3.13.2.3. Cropland

In addition to cattle rangeland, the vegetation analysis area is utilized for cropland, which is included in the upland altered grassland sub-community type. Hay is grown in the meadow areas located within the Sheep Creek floodplain, accounting for approximately 2 percent of the vegetation analysis area.

3.13.2.4. T&E and Species of Concern

There are no federally listed T&E plant species in Montana; however, Montana does maintain a list of SOC, which are species that are rare, threatened, and/or have declining populations and as a result are at risk or potentially at risk of extirpation in Montana (MTNHP 2016). Designation as an SOC is not a statutory or regulatory classification in Montana (FWP 2015).

The "2015 Baseline Vegetation Inventory" reported eight SOC species within the Meagher County element data. Of these eight species, one was identified within the analysis area: long-styled thistle *(Cirsium longistylum)*. No federal species were reported within the vegetation analysis area.

Since the results of "2015 Baseline Vegetation Inventory" were made available, a subsequent list of the Meagher County MTNHP data was updated to include 16 additional SOC plant species. None of the additional SOC species was documented within the vegetation analysis area during the field surveys. The Meagher County MTNHP SOC plant list is summarized in **Table 3.13-2**.

3.13.2.5. Noxious Weeds

Twelve state, county, and problematic listed noxious weed species were noted within the vegetation analysis area during the 2014 to 2015 baseline vegetation surveys. Of these 12 species, the 3 most common noxious weeds were Canada thistle (*Cirsium arvense*), common houndstongue (*Cynoglossum officinale*), and musk thistle (*Carduus nutans*). The Canada thistle and houndstongue were primarily encountered in the lowland areas, while musk thistle was common in nearly all community types present in the vegetation analysis area.

A list of all noxious and problematic weeds encountered during the baseline vegetation inventories is provided in **Table 3.13-3**.

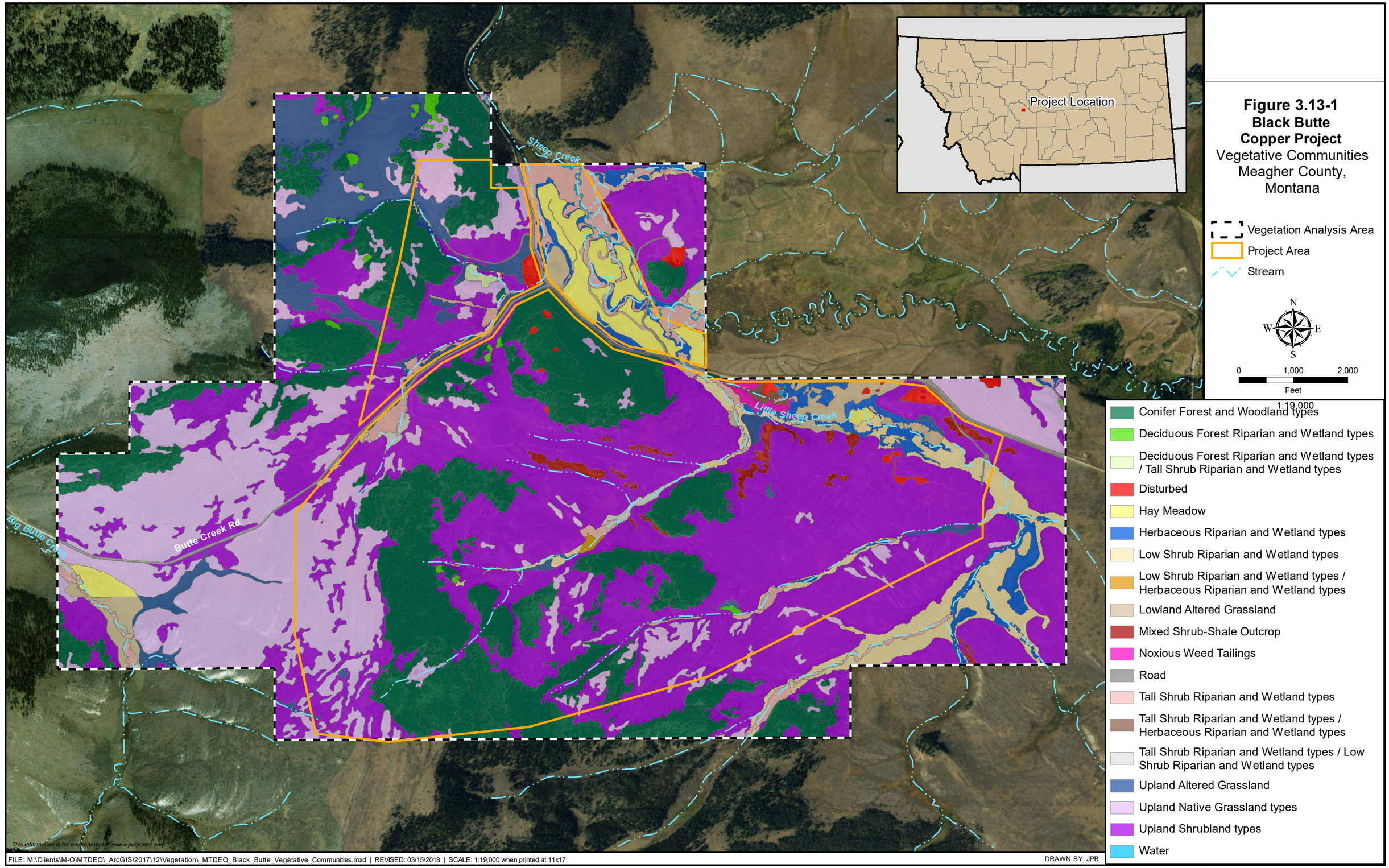

Figure 3.13-1
Black Butte Copper Project
Vegetative Communities
Meagher County, Montana

Vegetation Analysis Area
Project Area
Stream

N
W E
S

0 1,000 2,000
Feet
1:19,000

- Conifer Forest and Woodland types
- Deciduous Forest Riparian and Wetland types
- Deciduous Forest Riparian and Wetland types / Tall Shrub Riparian and Wetland types
- Disturbed
- Hay Meadow
- Herbaceous Riparian and Wetland types
- Low Shrub Riparian and Wetland types
- Low Shrub Riparian and Wetland types / Herbaceous Riparian and Wetland types
- Lowland Altered Grassland
- Mixed Shrub-Shale Outcrop
- Noxious Weed Tailings
- Road
- Tall Shrub Riparian and Wetland types
- Tall Shrub Riparian and Wetland types / Herbaceous Riparian and Wetland types
- Tall Shrub Riparian and Wetland types / Low Shrub Riparian and Wetland types
- Upland Altered Grassland
- Upland Native Grassland types
- Upland Shrubland types
- Water

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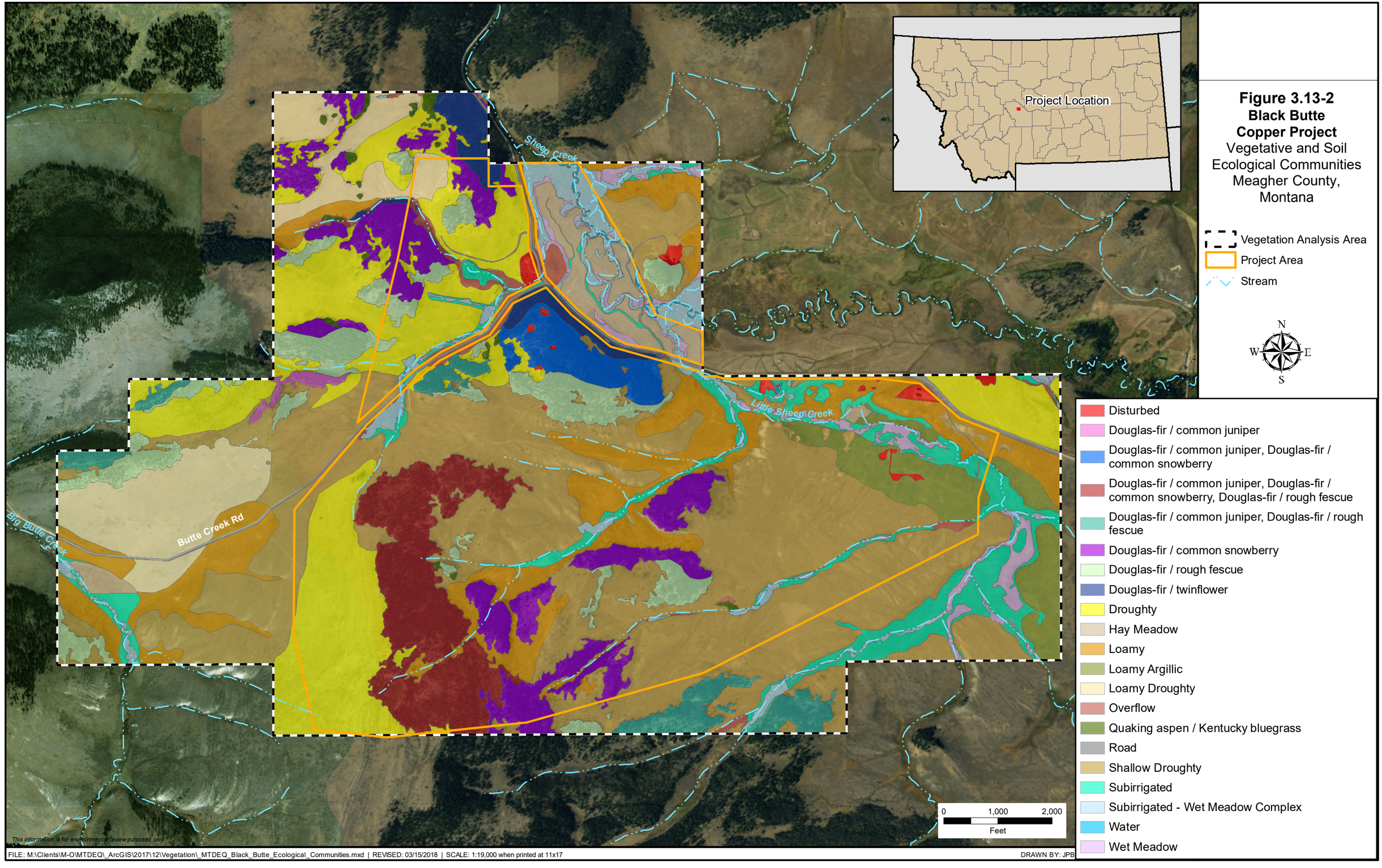

Figure 3.13-2
Black Butte Copper Project
Vegetative and Soil Ecological Communities
Meagher County, Montana

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Table 3.13-2
Plant Species of Concern Known to Occur in Meagher County, Montana

Scientific Name	Common Name	Habitat	Occurs within Analysis Area
Adoxa moschatellina	Musk-root	Rock/talus	
Allium geyeri var. *geyeri*	Geyer's onion	Moist, open slopes, meadows, or stream banks in mountains	
Asplenium trichomanesramosum	Limestone maidenhair spleenwort	Montane to alpine shaded rocks	
Bolboschoenus fluviatilis	River bulrush	Freshwater shores, marshes and riparian communities; tolerates alkaline conditions	
Castilleja gracillima	Slender Indian paintbrush	Riparian wetlands	
Cirsium longistylum	Long-styled thistle	Montane-subalpine meadows	X
Delphinium glaucum	Pale larkspur	Upper montane and lower subalpine to alpine; open evergreen woods and wet tall-herb meadows and thickets	
Delphinium depauperatum	Slim larkspur	Moist sagebrush basins to subalpine meadows; moist meadows, often along streams; montane	
Descurainia torulosa	Wyoming tansymustard	Subalpine talus slopes	
Downingia laeta	Great Basin downingia	Shallow water ponds and lakes	
Eleocharis rostellata	Beaked spikerush	Alkaline wetlands	
Equisetum palustre	Marsh horsetail	Valleys to montane shallow water wetlands, often in forests	
Equisetum pratense	Horsetails	Riparian wetlands	
Goodyera repens	Northern rattlesnake plantain	Mesic forests	
Noccaea parviflora	Small-flowered pennycress	Montane to alpine moist meadows	
Phlox kelseyi var. *missoulensis*	Missoula phlox	Open foothills to subalpine slopes and ridges	
Physaria klausii	Divide bladderpod	Open, montane to subalpine slopes	
Piperia elegans	Hillside rein orchid	Dry, coniferous forests; valleys, montane, dry or briefly moist meadows and ditches in lowlands	
Piperia elongata	Dense-flower rein orchid	Moist to wet meadows; valleys; dry, exposed habitats, forest chaparral, shrubby areas, woods and woods edges, from lowland to montane elevations	

Scientific Name	Common Name	Habitat	Occurs within Analysis Area
Primula incana	Mealy primrose	Riparian wetlands	
Salix serissima	Autumn willow	Riparian wetlands	
Pinus albicaulis	Whitebark pine	Timberline of subalpine forests	
Trifolium cyathiferum	Cup clover	Valleys to montane wet meadows, sandy streambanks, and roadsides	
Trifolium microcephalum	Woolly clover	Moist meadows and sandy banks along rivers to dry hillsides	

Source: MTNHP 2016 and 2017; WESTECH 2015

Table 3.13-3
Noxious and Problematic Weeds within the Analysis Area

Weed List	Common Name	Scientific Name
State of Montana	Spotted knapweed	*Centaurea maculosa*
	Canada thistle	*Cirsium arvense*
	Common houndstongue	*Cynoglossum officinale*
	Leafy spurge	*Euphorbia esula*
	Oxeye daisy	*Leucanthemum vulgare*
Meagher County	Common wormwood	*Artemisia absinthium*
	Musk thistle	*Carduus nutans*
	Bull thistle	*Cirsium vulgare*
	Field scabious	*Knautia arvensis*
	Field sow-thistle	*Sonchus arvensis*
Problematic [a]	Caraway	*Carum carvi*
	Yellow rattle	*Rhinanthus crista-galli*

Notes:
[a] Categorized as problematic weeds by WESTECH, meaning that these weeds are not listed as noxious weeds by state of Montana or Meagher County, but are generally accepted as noxious or problematic by other counties (WESTECH 2015).

3.13.3. Environmental Consequences

3.13.3.1. No Action Alternative

The No Action Alternative would not change the existing landscape and, therefore, would not disturb or affect vegetation.

3.13.3.2. Proposed Action

This section describes the potential environmental consequences of the Proposed Action to vegetation resources, including impacts to state, federal, and SOC listed species and introduction of noxious weeds. The potential environmental consequences are described in terms of direct, secondary, and residual impacts. Actions taken to avoid or mitigate for vegetation impacts are

considered in the discussions below. These actions would be implemented during the pre-construction, operations, and closure phases of the Project.

Direct Impacts

Direct impacts to vegetation communities, listed species, and ecological communities occur through clearing, filling, and other construction activities. A direct impact to a listed threatened species, endangered species, or SOC occurs when the action results in the removal or loss of an individual plant or entire plant population.

Surface Grading and Construction

The Proposed Action would disturb a total of approximately 311 acres within the Project area (i.e., the MOP Application Boundary encompassing approximately 1,888 acres), which is within the vegetation analysis area, as a result of the above ground infrastructure. This disturbance from Project infrastructure includes new access roads, stockpiles, the mill and plant site, and other associated mine facilities occurring during the mining operations, as well as a 10 percent construction buffer. These disturbances would directly affect the existing vegetation by surface grading and development of the above ground infrastructure in the Project area during the operations phase of the mine. **Table 3.13-4** lists the vegetation community types affected by the Proposed Action.

Among the earliest Project activities would be the clearing of vegetation to allow for the construction of Project surface facilities and infrastructure. Pre-construction treatments may include mechanical means (e.g., mowing, brush clearing, tree harvesting) and are proposed for Years 0 through 2. The vegetation would be displaced within the majority of the approximately 311-acre disturbed area during the operations phase in Years 3 through 15, as the Project infrastructure would replace the vegetation. During the closure phase (Years 16 through 19), all previously vegetated areas would be reclaimed as described in Section 7.3.5 of the MOP Application. The exception to this would be the main Project access road, where the proposed plan would be to downsize but not totally reclaim this access road during closure (Tintina 2017).

To keep the integrity of the topsoil organic content and natural seedbank until the closure phase, the topsoil stockpile would be revegetated using an appropriate seed mix (native grass seed mixture of Western wheatgrass, bluebunch wheatgrass, and slender wheatgrass) and surrounded by silt fence to minimize erosion and retain soil moisture and stripping of organic matter until the topsoil would be needed for the reclamation phase (Tintina 2017).

The resulting impacts to vegetation communities would be expected to have low severity in the long-term, as they would only be realized during the pre-construction and operations phase. The closure phase would include various stages of revegetation to ultimately bring the vegetated communities back to the comparable pre-existing conditions. The reclamation and closure plan would be implemented during the closure phase, and all affected areas except the Project access road noted above would be regraded and revegetated to a vegetation community with comparable stability and utility as the original conditions. Though it is likely that short-term impacts would occur from the Project infrastructure disturbances, long-term impacts would be

minimal due to revegetation efforts, since the site would be revegetated using native seed and tubelings and noxious weeds would be controlled. The revegetation measures would include soil replacement using the stockpiled topsoil and subsoil, seedbed preparation, and seeding with the Project approved seed mixes detailed in the MOP Application; the reclamation and closure plan is structured to meet the requirements of the § 82-4-301, MCA (Tintina 2017). Based upon these factors, the impacts on vegetation communities from surface grading and construction would be minimized with the use of appropriate revegetation measures.

A summary of the revegetation plan, as detailed in the MOP Application includes:

- Protect and stored topsoil and subsoil during stockpiling by revegetation and soil erosion controls;
- Decompact soils prior to revegetation and properly prepare seed bed;
- Revegetate with appropriate native seed mixes for grasses and shrubs, and tubelings for trees;
- Initiate revegetation within 1 year of reaching a decision to permanently discontinue mining in Project area, unless otherwise permitted by DEQ;
- Monitor revegetated areas for noxious weeds and control if noted;
- Long-term closure of site is expected to take two to three years.

Table 3.13-4
Mine Site Vegetation Community Impacts

Vegetative Community	**Acres of Disturbance**
Upland Grassland	85.0
Upland Shrubland	110.7
Conifer Forest and Woodland	84.4
Lowland Altered Grassland	0.1
Riparian and Wetland	1.5
Previously Disturbed	0.4
Existing Roads	0.5
Sub-total	**282.6**
Construction Buffer (10%)	28.3
Total	**310.9**

Direct impacts to the ecological community would affect the suitability of the Project area for use as wildlife habitat, rangeland, or cropland during the life of the mine during the operations phase. **Table 3.13-5** lists the ecological community types affected by the Proposed Action. Like the vegetation impacts, the ecological community impacts would occur during the pre-construction and operations phase during Years 0 through 15, since the pre-construction ecological communities could not be used for wildlife habitat, rangeland, or cropland. During the reclamation phase (Years 16 through 19), there would be little availability of these ecological communities until the site is fully reclaimed and the pre-existing conditions are reclaimed to comparable stability and utility.

Also like the vegetation community impacts, the ecological community impacts would be considered short term, which would occur from the Project infrastructure disturbances; long-term impacts would be minimal due to revegetation efforts. The impact on vegetation in the long term would be realized during the operations phase, as the reclamation and closure plan would be implemented during the closure phase and all affected areas would be regraded and revegetated to a vegetation community, and therefore ecological community, with comparable stability and utility as the original conditions. As described above, the revegetation measures generally would include soil replacement using the stockpiled topsoil and subsoil, seedbed preparation, and seeding with the Project-approved seed mixes detailed in the MOP Application and noxious weed control detailed in the "Noxious Weed Management Plan" (WESTECH 2016), which is included as Appendix O of the MOP Application (Tintina 2017).

These measures would return the areas affected from the operations phase of the mine to the hay meadows and rangeland that currently occur in the Project area. Based upon these factors, the impacts to ecological communities from surface grading and construction would be negligible with the use of appropriate proposed revegetation measures, as described above in the vegetation community impacts discussion.

Table 3.13-5
Mine Site Ecological Community Impacts

Ecological Community	**Acres of Disturbance**
Disturbed	0.4
Douglas fir/common juniper, Douglas fir/common snowberry, Douglas fir/rough fescue	60.7
Douglas fir/common juniper, Douglas fir/rough fescue	1.6
Douglas fir/common snowberry	6.8
Douglas fir/rough fescue	12.5
Droughty	32.9
Hay Meadow	0.1
Loamy	25.6
Loamy Argillic	2.5
Overflow	0.6
Quaking aspen/Kentucky bluegrass	0.7
Road	0.6
Shallow Droughty	135.2
Subirrigated	1.7
Subirrigated - Wet Meadow Complex	0.6
Wet Meadow	0.2
Sub-total	**282.7** [a]
Construction Buffer (10%)	28.3
Total	**311** [a]

[a] Acreage total is less than reported due to rounding.

No impacts to state or federally listed plant species would occur due to the Proposed Action since none were noted during the field surveys. One SOC species, long-styled thistle, was noted primarily within upland altered grassland communities; however, a review of the planned mining above ground facilities indicates this species would not be impacted within its known locations as determined by the vegetative field surveys.

Secondary Impacts

A secondary impact occurs when a cover type, plant community, or ecological habitat type experiences a change in vegetative composition, occurs over time, or after the action is complete, and can occur on or off site. Secondary impacts to vegetation may include changes in hydrology, deposition of particulate matter (dust), changes in successional stage, a decline in species structure, and/or invasion of non-native species.

The MOP Application indicates plans would be in place to control changes from hydrology and deposition of particulate matter. Specifically, the mine closure and reclamation plans would assure surface and groundwater hydrology would be brought back to comparable conditions as the pre-Project conditions. During operations, some springs and seeps located within the mine drawdown cone might experience decreased flow, and some might dry up. Many of the springs and seeps appear to be connected to perched groundwater bodies and may only flow seasonally; these would not likely be directly affected by mine dewatering. Vegetation may be affected at the springs or seeps depleted by dewatering, which might include stress to existing species and increased growth of successional species. Spring flow would be anticipated to reestablish when shallow groundwater recovers to baseline conditions, within two years after the cessation of dewatering. See further discussion in Section 3.5, Surface Water Hydrology.

Likewise, deposition of particulate matter would be controlled through the fugitive dust collection system (Tintina 2017). As a result, the severity and likelihood of the secondary impacts described above to vegetation, ecological communities, and listed species would be low. In addition, the likelihood and severity of succession of noxious weeds would be low because noxious weeds would be monitored and controlled during all phases of the Project, as summarized in the “Noxious Weed Management Plan” (WESTECH 2016), which is included as Appendix O of the MOP Application (Tintina 2017). This plan states that preventative measures would be used during the pre-construction phase to treat for known populations of noxious weeds prior to soil stripping, and would then monitor vegetation during the operations and closure phases, and would reactively treat mechanically or with herbicide if new populations were noted.

Based upon these factors, the secondary impacts to vegetation, ecological communities, and T&E species from changes in hydrology, deposition of particulate matter (dust), changes in successional stage, and/or invasion of non-native species would not be adverse.

Residual Impacts

Residual impacts are those direct or secondary impacts to vegetation, ecological communities, or listed species that are not eliminated by mitigation procedures. The severity and likelihood of

having residual impacts from the direct or secondary impacts would be low since reclamation and closure plan would be implemented during the closure phase and all affected areas would be regraded and revegetated to vegetated communities with comparable stability and utility as the original conditions. Specific measures would be implemented to monitor the effectiveness of the revegetation effort and introduction of new populations of noxious weeds, as described in the MOP Application Section 7.3.5, Revegetation, and the "Noxious Weed Management Plan" (WESTECH 2016), which is included as Appendix O of the MOP Application (Tintina 2017). The effectiveness of the revegetation effort would be insured in the form of a performance bond, where the monetary amount would be determined by DEQ. Per the MOP Application, if revegetation does not respond appropriately due to overlying factors, appropriate remedial actions would be taken to correct any significant problem identified by DEQ (Tintina 2017). Likewise, if new or reoccurring populations of noxious weeds were noted during monitoring efforts, appropriate and agency-approved methods would be utilized to control these populations of noxious weeds. Monitoring and management would continue until revegetation success criteria have been met and the performance bond is released.

Smith River Assessment

The Smith River is located approximately 12 miles directly west of the Project area, and approximately 19 river miles (along Sheep Creek) from the Project area. The potential impacts from the Proposed Action are expected to be localized to the immediate Project area and would not affect the riparian vegetation along the Smith River.

The goal of the monitoring program described in the MOP Application Weed Management Program is to protect weed-free vegetation communities by monitoring and treating new or expanding weed populations in the Project area. As a result of weed management within the Project area, the severity and likelihood of spreading invasive species or noxious weeds to the Smith River banks via Sheep Creek, wind transport, or bird transport is expected to be low. Based upon this, the impacts to vegetation communities on the Smith River from the Proposed Action would be negligible with the use of weed management within the Project area.

3.13.3.3. Agency Modified Alternative

The impacts of the AMA on vegetation, ecological communities, or listed species would be the same as described for the Proposed Action. The additional backfill component of the AMA would not affect any additional vegetation because the surface disturbance footprint would not change. As a result, the impacts to vegetation or listed species would be the same as the Proposed Action.

Smith River Assessment

The impacts of the AMA modifications on vegetation would be the same as described for the Proposed Action because there would be no additional surface disturbances that could affect vegetation. The Weed Management Program in the Proposed Action would still be implemented to protect weed-free vegetation communities by monitoring and treating any new or expanding weed populations in the Project area. As a result of weed management within the Project area,

the severity and likelihood of spreading invasive species or noxious weeds to the Smith River banks via the Smith River tributary routes, wind transport or bird transport is expected to be low.