3.7 – REVEGETATION PLAN

A. REVEGETATION PROCEDURES

It is the intent of Westmoreland Beulah Mining (WBM) to establish post-mining vegetation consistent with applicable laws in effect. The procedures that follow are directed toward achievement of applicable revegetation success standards in a timely manner.

1. Erosion Control Measures

The generally gentle postmining slopes of the Beulah Mine area are an asset in limiting the potential for water erosion. Erosion control practices elucidated here are therefore directed primarily at the control of wind erosion, although specifications for steeper slopes have been addressed.

Either of two soil stabilizing methods will be used during the growing season. If topsoil respreading is completed during periods of the year when favorable vegetation establishment conditions are likely to occur, WBM will plant the appropriate postmining land use seed mix which, when established, will act as the soil stabilizing agent. The second method involves planting of an annual species as a temporary cover crop. If necessary, a late fall (dormant) planting of any type will be protected by crimped mulch (1 ton/acre), as explained in the following paragraph.

During periods of the year outside of the growing season, one of two soil stabilizing methods will be used. The first method involves application of a hay or straw mulch at the approximate rate of 1 ton per mulched acre. The mulch may be applied to the entire SPGM redistribution tract or in strips oriented perpendicular to prevailing winds as is practical. The mulch strips will simulate oft used barrier strips or stubble strips in wind strip cropping systems by trapping soil particles, preventing particle saltation, and acting as a wind barrier. The mulch strips will typically be 20-30 feet wide, using present equipment, and non-mulched strips will be in the neighborhood of 50-60 feet wide. Mulch will be crimped whenever possible. Mulching will be performed within 3 weeks of topsoil respreading completion.

The second method involves tillage designed to produce a rough soil surface characterized by clods and ridges up to 4 inches high. This has proven to be an effective means of con-

trolling wind erosion and is a logical technique to employ when conditions such as extreme cold can make mulching and crimping impractical or impossible. Tillage shall be accomplished by a chisel plow or motor grader scarifier, and shall not be executed until field approval is given by PSC staff.

Slopes exceeding 10 percent will be homogeneously mulched at the rate of 1 ton/acre to inhibit water erosion. The mulch will be crimped into the soil after application.

Wood fiber or other materials applied as erosion control blankets may be used in place of the preceding soil stabilizing practices from time to time.

With respect to the spoil laydown area in the SW¼ of Section 17, silt fences will be placed above the drainage to reduce downstream erosion and will remain until vegetation can provide adequate protection. Curlex and/or geosynthetic materials with equal or better protective capabilities will be employed in the bottom of the drainage and on adjoining highly erodible slopes to protect seeded areas.

If employment of any of the described soil stabilizing procedures is impractical, or if use of alternative procedures is proposed, WBM will seek the counsel and approval of the PSC on a case by case basis in order to satisfy the requirements of NDAC 69-05.2-22-05.

2. Soil Analysis

Sampling of soils related to revegetation shall be performed prior to the implementation of seedbed tillage, if necessary to determine chemical and nutrient status. Generally, topsoil and subsoil will be sampled and analyzed for parameters which will probably include the following: pH, EC, SAR, Na, Mg, Ca, Texture, and N-P-K status. A fertilizer application recommendation may be sought from the testing laboratory for the appropriate land use vegetation.

During the liability period, sampling and analysis will be carried out to ascertain the soil welfare and possible treatments warranted. Fertilizer application recommendations will be requested when necessary to determine the needs of the crop and amounts needed to maintain good soil fertility or increase soil fertility when available N, P, or K are below desirable levels.

3. Fertilization

The anticipated soil fertilization program preceding seedbed preparation will involve broadcasting of a granular fertilizer mix at a rate governed by recommendations of the soil testing laboratory, soil properties, seed mix components, and practical experience. All broadcast fertilizer will be incorporated whenever possible. Alternate fertilizers and application methods such as anhydrous ammonia injection may be employed if their use is determined to be justifiable.

4. Seedbed Preparation

All respread area seedbeds will be tilled by means of a chisel plow and/or disc, as well as any other techniques necessary to provide a suitable seedbed and adequate seed germination potential. Any particular treatment is designed on a site specific basis, e.g. clayey soils may need to be tilled a number of times to pulverize clods to a sufficiently small size.

5. Seeding/Planting

Seeding will generally be conducted by implantation of seed to a maximum depth of 1.5 inches with a grain or grass drill. Seeding of native seed shall be at the shallower depths of this spectrum. All seeding operations will be performed on the contour whenever necessary to conserve moisture and minimize erosion.

Seed implantation will be conducted during the first favorable planting period. Typically, favorable planting dates for the Beulah Mine seed mixtures would be April 15 through June 1, August 10 through September 15 (provided soil moisture is sufficient) and after October 20 until frozen conditions prevail. Annual temporary cover crops, due to their vigorous germination potential, may be planted on dates other than these if the potential for establishment is good. Likewise, seeding of perennial species may be executed outside of the aforementioned time frames if, after analysis of climatic forecasts or other information, the likelihood of establishment is considered acceptable. The following seed mixtures and rates, Table 3.7.1, are given on a Pure Live Seed (PLS) basis and are based on the availability of the best genotypically adapted species of sufficient quality and quantity for planting with present seeding equipment and may be adjusted slightly due to these considerations. Endemic forb species will be added to or substi-

tuted for species in the native grassland seed mix in appropriate quantity. A record of seed mix revisions through the years appears in Exhibit 3.7.10.

Table 3.7.1
Seed Mixes

Hayland – Industrial and Commercial – Pre-Cropland – Tame Pastureland Mixture	PLS Lb/Acre	Seeds/Lb (1,000)	Seeds/Sq Ft
Intermediate wheatgrass (Thinopyrum intermedium ssp. intermedium) or Pubescent wheatgrass (Thinopyrum intermedium ssp. barbulatum)	4.0	88	8.1
Tall wheatgrass (Agropyron elongatum)	2.0	79	3.6
Western wheatgrass (Agropyron smithii)	2.0	110	5.1
Purple alfalfa (Medicago sativa)	7.0[1]	200	32.1
			48.9

[1]For tame pastureland, alfalfa will be seeded at 2 PLS lb/ac.
Meadow bromegrass (Bromus biebersteinii) may be added to the mix or replace a portion of the wheatgrass components in some seedings.

Native Grassland Mixture	PLS Lb/Acre	Seeds/Lb (1,000)	Seeds/Sq Ft
Western wheatgrass (Agropyron smithii)	2.0	110	5.1
Slender wheatgrass (Agropyron trachycaulum)	1.2	135	3.7
Green needlegrass (Stipa viridula)	2.0	181	8.3
Sideoats grama (Bouteloua curtipendula)	2.5	191	11.0
Switchgrass (Panicum virgatum)	1.2	389	10.7
Prairie sandreed (Calamovilfa longifolia)	1.0	275	6.3
Blue grama (Bouteloua gracilis)	1.2	725	20.0
Little bluestem (Andropogon scoparius)	1.0	260	6.0
Big bluestem (Andropogon gerardii)	1.5	130	4.5
			75.6

Seeding of haul road ditches, temporary pond embankments, and stockpiles where a perennial cover is desired will utilize perennial species such as those in the first seed mix in Table 3.7.1. Introduced species will not be seeded on structures such as pond embankments and soil stockpiles that are adjacent to native grassland or on those designated for areas where native species will be seeded. Permanent pond embankments will be seeded with the seed mix particular to the postmining land use. As specified in the SPGM Handling Plan, active stockpiles will be seeded with a small grain cover crop at 1-2 bu/acre, or other appropriate annual species such as sudangrass at similar rates. A historical record of native grassland seed mixes

planted is presented in Exhibit 3.7.13. Planting years can be discovered on the annual map. Information concerning areas where seeding was delayed or reseeding was required is given in the narrative of this exhibit as well.

Our commitment to seed mixes free of smooth bromegrass notwithstanding, smooth brome and, to a lesser degree other introduced species, have invaded most undisturbed grassland in the permit area. Through the 1990's and into the new millennium we have noted smooth brome making inroads on undisturbed acreage, forming patches scattered throughout the undisturbed grassland in Sections 15 and 16. The invasions have favored more mesic environments, but topoedaphic influences seemingly have not excluded brome from any range site. If WBM's mining operations have resulted in the invasion of smooth bromegrass into undisturbed areas of the permit, WBM shall address resultant landowner complaints to the satisfaction of the landowner.

With respect to the haul road corridor in Sections 14 and 15, portions of the grassland in the vicinity of the former gravel pit and eastward have populations of introduced species such as crested wheatgrass. The ditches, slopes, uplands, and soil stockpiles comprising the remainder of the corridor are also dominated by introduced species, especially smooth brome and alfalfa. Some sites dominated by introduced species were intentionally seeded with these species in compliance with the approved reclamation plan at the time of haul road construction. Other contaminated sites are the result of invasion from degraded native grassland. Infested soil stockpiles were likely initially contaminated by latent brome and other species represented in the soil seed bank at the time of removal and stockpiling.

When seeding native species into soils significantly contaminated with smooth brome, we will implement a deferred seeding procedure. The significance of contamination will be subjectively evaluated on the basis of factors such as the percentage of the soil surface occupied by the brome, potential seed bank composition, and the associated soil removal volume. Seeding deferment is more likely when surface area contamination is high and the soil removal volume is small. Deferment will be decided on a case by case basis and the Reclamation Division will be notified annually, for approval, whenever deferment is elected. These procedures will

help to provide the favorable planting conditions addressed in NDAC 69-05.2-22-04 and ultimately a greater opportunity for revegetation success. Initial brome suppression management prior to seeding of the native species will involve a combination of tillage and herbicide application aimed at cleansing the respread soil of smooth brome and other pests. When monitoring of establishing vegetation during this period indicates satisfactory control of smooth brome has been achieved, native species will be planted at the appropriate time, with the goal of seeding by the spring of the third year following completion of respreading. This approach may also be applied to soils similarly impacted by other tame species.

Recruitment of hydrophytic vegetation in constructed wetlands will generally occur naturally in a relatively short span of time if water ponding is adequate. If hydrophytic vegetation establishment does not occur in a reasonable time period, seeding will be performed. Seeding methods may include depositing slough hay and/or wetland topsoil prior to the growing season as well as more conventional methods. With respect to the water supply for reclaimed wetlands in drainage bottoms, (i.e., riparian wetlands), much of the premining supply originates upstream of the revision No. 22 boundary and will not be affected by mining. However, groundwater supplies may be inadequate to sustain reclaimed wetlands constructed in drainage bottoms, particularly if mining advances beyond current permit boundaries. Therefore, since reclaimed riparian wetlands in Sections 20 and 22 may depend on surface water for long-term viability, they will incorporate basins to capture surface water runoff. Design plans for these wetlands will be submitted for approval prior to construction.

The permittee will establish a four row reclaimed shelterbelt in Section 20-143-88 (see Exhibit 2.7.1) to replace premining shelterbelts. A distinct single row conservation shelterbelt will be planted to the north of the reclaimed shelterbelt for wildlife habitat enhancement, separated by a hayland strip 30-50 feet wide. Planting details such as plant spacing, as listed in the following table, may be subject to slight modification after consideration of recommendations by authorities including the local Soil Conservation District and regulatory approval.

Reclaimed Shelterbelts	Row	Species	Row Width (ft.)	Length (ft.)	Plant Spacing (ft.)
Replacement 20-1	1	Chokecherry	16	2440	8
	2	Ponderosa pine	16	2440	12
	3	Green ash	16	2440	12
	4	Rocky Mountain juniper	16	2440	12
Conservation 20-1	1	Cotoneaster	16	2440	8

Shelterbelt plantings will likely be installed by soil conservation district personnel. Management techniques to conserve moisture and protect plants are discussed in the woody planting narrative that follows. Replantings will be performed to enable the permittee to meet applicable standards or other objectives.

Planting of woody vegetation in woodland plantings may be accomplished by hand and/or machine. Planting of trees and shrubs will likely be done with woody species planting equipment such as that utilized by local soil conservation districts. However, plantings may be conducted by hand in locations where equipment access is hindered or where greater control of composition and/ or location is desired. Hand planting will allow selection of preferred niches to enhance survival rates. It will also present opportunities to improve the compositional and structural heterogeneity of the planting. Woodland species will be planted at approximate 4-foot intervals in rows about 4 feet apart (if equipment allows), equating to a potential planting density of about 2,700 plants per acre. Planting locations, as currently depicted, may be relocated if evaluation of slopes, aspects, and other considerations during final reclamation reveals a more advantageous site in the vicinity.

Management techniques designed to conserve moisture, inhibit weed growth, and protect plants will be considered. These techniques may include application of an organic mulch, placement of weed barrier fabric, installation of protective tubes, and use of predator repellents. If necessary, plantings will be fenced to protect them from damage from livestock and/or wildlife. The welfare of planted specimens will be reviewed periodically during the early stages of stand establishment. Management inputs and decisions on replacement of dead stock will be based in part on these evaluations.

Approximate planting rates for a composite woodland planting are presented in the table that follows. Although no low shrub communities will be established, a low shrub species has been added to the species mix to further diversify reclaimed woodland stands. The composite woodland planting will represent both mixed deciduous woodland and tall shrub patches that are projected to be removed by mining activities in the area added by revision 19 and subsequent revisions. From time to time, species availability can be limited or nonexistent and substitution of a species by one or more of the other species within the community group may be necessary. Woods' rose may be substituted for wolfberry as well. Installation of some rows or the entire planting will be postponed if inadequate numbers of green ash or buffaloberry are available. Replacement acreage will equal or exceed the acreage removed by mining activities.

Table 3.7.2
Composite Woodland Planting Mix

Species	Relative Percentage	Approximate Number Per Acre
Trees		
Green ash	50	200
American elm	30	120
Box elder	20	80
	100	400
Tall Shrubs		
Buffaloberry	45	810
Chokecherry	25	450
Juneberry	20	360
Round-leaved hawthorn	10	180
	100	1,800
Low Shrubs		
Wolfberry (Snowberry)	80	500
Planting Total		2,700

In addition to the planting of mitigation woodlands to replace woodlands removed during mining activities, we intend to plant two small areas of non-mitigative, conservation woodlands in Section 20. These conservation woodland plantings will be planted at a similar density with the techniques used for the composite plantings. Composition will be heavily weighted with tall shrubs. The primary tall shrub species will be buffaloberry, with a minor

tall shrub component of chokecherry comprising approximately 10 percent of tall shrubs. Wolfberry (snowberry) will be planted in one or both outside rows. Availability restrictions in planting years may require substitution of Juneberry and/or round-leaved hawthorn for chokecherry and Woods' rose for wolfberry. Only tall shrubs may be planted if neither of the low shrub species is available. As with composite plantings, installation may have to be postponed if an insufficient number of buffaloberry are available. After initial planting, hand planting of individuals and/or small groupings of the aforementioned species may be conducted to supplement composition. Replanting will be performed to insure a viable tall shrub community.

Table 3.7.3 presents the identification and acreage of planned conservation and mitigation shelterbelts, wetlands, and woodlands as identified on Exhibit 2.7.1. Actual planted acreage may vary slightly from planned acreage.

Table 3.7.3
Conservation and Mitigation Shelterbelts, Wetlands, and Woodlands

Land Use	Identification	Acreage
Conservation Shelterbelt	NW20-1	0.90
Mitigation Shelterbelt	NW20-1	4.48
Conservation Wetland	SE17-1	0.44
Mitigation Wetland	SE17-1W	0.66
	SE20-1W	0.63
	SE20-2W	0.29
	SE20-3W	0.10
	SW20-1W	0.42
	NW22-1W	1.81
	SW22-1W	0.23
	SW22-2W	0.05
Conservation Woodland	NW20-1	0.13
	SW20-1	0.17
Mitigation Woodland	SE15-1	0.39
	SE17-1*	0.59
	SE17-2	0.22
	SE20-1	0.63
	NW22-1	0.35
	NE22-1	0.35
	NE22-2	1.28
	SE22-1	0.85
	SW22-1	1.03
	SW22-2	0.06
~~*Established~~		

6. Stand Management

The following management techniques are not intended to comprise the gamut of possibilities, but rather to portray a general approach.

a. Weed Control

Normally, weed control may be warranted in the year of establishment and only infrequently thereafter in perennial stands. Either mechanical or chemical agents will be utilized depending on the nature of the problem and other mine site factors. Mechanical destruction of the weed population will be carried out by a rotary mower before maturation of the weed seed population as a whole. Herbicide application will be conducted by a certified applicator, if necessary, and will occur during recommended periods for the major target weeds, including state listed noxious weeds. Weed control in the annually cropped areas will assume either of two forms; 1) tillage (cultivation), or 2) herbicide application as normally practiced in the region.

b. Insect Control

Insect infestations shall be mediated by pesticide application by a certified applicator, if necessary.

c. Erosion Control

Localized erosion problems shall be rectified via several alternative measures including, but not limited to: dikes consisting of bales, sandbags, or earth; repetition of tillage and seeding operations; creation of small diversion ditches to redirect runoff; and application of wood fiber blankets and other materials to control erosion.

d. Fertilization

Fertilizer application may be instituted to maintain or improve soil nutrient content to desirable levels and/or achieve acceptable stand productivity or composition. The application rate will be guided by soil testing laboratory recommendations for the land use, stand components, soil properties, and other factors. Other aspects of the fertilization program, such as time of application, may be determined by the desired objectives for the stand.

e. Mechanical Manipulation

Although this type of stand management operation is not anticipated to be a common type of stand manipulation, it may be necessary at times to remove forage, lightly scarify the soil surface, or conduct other operations to prevent stand deterioration or improve stand characteristics. In addition, the landowner or lessee may conduct periodic forage removal (e.g., haying or annual cropping) after establishment of vegetation on the reclaimed tract. Such operations would be given careful consideration before implementation.

f. Grazing

If management of the revegetated tracts involves grazing, in accordance with rule 69-05.2-22-06, grazing will not be initiated until WBM, the landowner or lessee, and the Public Service Commission reclamation staff agree that the vegetation is well established and capable of withstanding grazing without suffering long term setbacks.

The general grazing plan for such areas would probably involve a continuous grazing system aimed at providing a moderate (20-40 percent) utilization of the forage base. At this utilization level, most of the plot will show grazing effects with little or no use of poor foliage. A full grazing season, approximately 6 months long, would be another objective. However, specific aspects of a grazing plan would depend on the grazing plans of the landowner (the native grassland reference area is presently grazed annually), availability of ruminants, site conditions, and other factors during the liability period.

g. Management of Reclaimed Native Grassland

The management of reclaimed native grassland will be focused on achieving the revegetation success standards through application of normal conservation practices. These are practices that are often routinely employed on unmined lands as part of long term management or practices that, if discontinued, will not reduce the probability of permanent revegetation success. Many such practices involve periodic forage removal. This may be accomplished via grazing if tract size, water supply access, and other factors are supportive. Other forage removal management may include burning, haying, and mowing. These types of operations will most often result in moderate removal levels, which approximates the light to moderate grazing

utilization rates that the native grassland reference areas are subjected to in most years and allows them to maintain acceptable ecological condition. In some cases, it may be necessary to employ more specialized management techniques such as interseeding or fertilizer or herbicide applications in order to attempt to nudge the reclaimed native grassland in a particular compositional direction. They could also be considered equivalent to practices on unmined reference areas in the sense that they are often intended to improve stand characteristics such as diversity or seasonality and achieve the effect of more closely approximating unmined grassland.

Concerning the reclaimed native grassland in the S½ of Section 17, switchgrass has developed a luxuriant growth after the first few years of growth on significant acreage in the earliest plantings. In order to reduce the overgrowth and promote the establishment and/or growth of other species, we intend to institute forage removal. Either haying or mowing of the stand will be performed as the initial management effort on these tracts.

B. EVALUATION OF REVEGETATION SUCCESS

The standards and methods characterized herein have been derived from the latest edition of the Public Service Commission's publication titled "Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Postmining Vegetation Assessments". This document is hereafter referred to as the "vegetation document".

For all land uses, the premining soil mapping units subjected to SPGM removal or disturbance within contiguous quarter sections under the same ownership will serve as the basis for development of standards. In cases where surface ownership of the bond release tract is divided among two or more entities, a separate standard will be generated for each ownership. Exhibit 3.7.3 contains the technical standards based on the premining map units for the land uses (including non-prime and prime cropland) within each surface ownership. The success standards for the applicable land uses are as follows.

1. Cropland

a. Annual Cropland

The Natural Resources Conservation Service (NRCS) cropland technical standard will be adjusted using correction method No. 1 (annual county yield to long-term county average yield ratio). Statistical data related to county yields may be employed in yield comparisons. If prime farmland is disturbed, separate standards will be developed for the prime and ordinary (non-prime) cropland acreage that is disturbed within each ownership. The yield standards for the full acreage of prime and non-prime cropland in each ownership are presented in Exhibit 3.7.4.

b. Hayland

The NRCS based technical standard for tame pastureland (production estimates) will be adjusted using correction method No. 2 (North Dakota Agricultural Statistics Service, (NDASS) productivity/precipitation regression) to develop the productivity standard. In the event that the aforementioned regression is unavailable, correction method No. 1 (annual county yield to long-term county average yield ratio) will be used. The yield of the reclaimed tract will likely be determined from hand harvested samples.

2. Native Grassland

Success of revegetation on native grassland will be assessed as follows.

a. Production – The NRCS technical standard will be used in conjunction with direct yield data from Sandy and Silty range site reference areas located in the N½ of Section 16, T.143N., R.88W. The reference areas are depicted on Exhibit 2.6.9.

b. Cover – ARS data (Hofmann et al., 1983) will be used in conjunction with cover data from the aforementioned Sandy and Silty reference areas.

c. Diversity and Seasonality – We shall use the standard specified in Section II-D of the vegetation document.

d. Permanence – This standard shall be satisfied by having met the standards for ground cover, productivity, diversity and seasonality.

e. Reference Area Suitability

Production data collected through the years on the Silty and Sandy reference areas reflects the variability of the climate in central North Dakota. Production was depressed by the poorer growing conditions experienced in the 1980's, profited from the growth-friendly climate of the subsequent decade, and has returned to generally poorer production levels in the new millenium. Long-term average production since establishment is approximately 1,700 #/acre for both sites, or about 90 percent of the estimated climax production. Cover data has been consistently good through the years. Range condition is assessed occasionally. Recent range condition determined from production data reveals a classification for both sites in the vicinity of the fair/good boundary. This is characteristic of range condition on undisturbed land assessed as part of base-line investigations performed for recent permit revisions. Reference area range condition sample data gathered in recent years, as well as sample data for production and cover, is presented in Exhibit 2.6.14. Long-term data and that from recent years supports the use of these reference areas to represent the permit area native grassland that has not been disturbed by mining activities. It is also important to note that both reference areas are located within a quarter-mile of the permit area and generally undergo slight to moderate grazing annually – a range of use common to most of the premining native grassland in the permit area and neighboring lands. With the abundance of sandy and silty premining range sites in the permit area, and the similarity of sandy and sands range sites, the sandy and/or silty reference areas are representative of not only most premining native grassland acres in the permit area, but can also be used to represent one or more of the range sites expected in most bond release tracts in calculation of standards.

With revision No. 27, DWC took another look at the range site and ecological site composition of native grassland that had been and was projected to be disturbed in the permit area. The analysis confirmed that Sandy (including the highly similar Sands site) and Silty range sites, and their ecological site equivalents in the revision 27 area, comprise 50 percent or more of the native grassland acreage in all ownerships except the E½ of the SW¼ of Section

22, where they are a minor component of the minor acreage that will be disturbed. Accordingly, we intend to use the Sandy and/or Silty range site reference areas to represent disturbed native grassland. Productivity and composition remain at or near historical levels.

Disturbance in all areas except Section 20 was essentially complete when revision 30 was submitted. Analysis of actual disturbance acres concluded that the Sandy (including Sands) and/or Silty range sites and their ecological site equivalents were the predominant range/ecological sites disturbed in all ownerships within the permit area except the E½ of the SW¼ and the SE¼ of Section 22, where the Shallow range site (Shallow clayey ecological site) was the predominant affected site. Even here, the Sandy and/or Silty range sites run a close second. Looking at the entire permit area, the Sandy and Silty range sites heavily dominate and will serve well in representing the disturbed native grassland acreage in all ownerships.

Within the revision 31 area native grassland in Section 29, the Thin Loamy ecological site dominates. However, we anticipate that disturbance will generally avoid the steeper slopes and valleys associated with this type and the majority of disturbance acres may well be located within the Sandy and/or Loamy sites. The Thin Loamy type is also within the same Loamy Group of ecological sites as the Loamy ecological site, indicating similarity in productive capacity and composition. Given this similarity and the significant contribution by the Sandy and Loamy ecological sites to total disturbance acres, we intend to use the existing reference areas to represent the revision 31 area.

As explained in the narrative for Section 2.6, Shallow and Thin Upland range site reference areas were established concurrently with the Sandy and Silty sites. However, in late 2015 the Shallow and Thin Upland sites experienced significant disturbance as a result of construction of a haul road for a neighboring coal mine and consequently were removed from service.

3. Shelterbelts

Replacement shelterbelts will be evaluated using the criteria set forth in the vegetation document. Conservation plantings will not be subject to standards, but management and replanting will be performed when needed to meet the primary objective of habitat enhancement.

4. Tame Pastureland

The NRCS based technical standard for tame pastureland (production estimates) will be adjusted using correction method No. 2 (NDASS productivity/precipitation regression) to develop the productivity standard. In the event that the aforementioned regression is unavailable, correction method No. 1 (annual county yield to long-term county average yield ratio) will be used. In addition, the cover standard presented in the vegetation document will be applied.

5. Wetlands and Streams

An on-site inspection by representatives of the Public Service Commission and other parties will be conducted as part of final bond release procedures. The wetland will be evaluated to ascertain if it exhibits the degree of permanence it was intended to achieve. An assessment of vegetation zonation and characteristics will be performed to determine similarity to descriptions by Stewart and Kantrud (1971). Ground cover on the periphery immediately contiguous to the high water line will be evaluated and deemed adequate if erosion in this area cannot be discerned. These and other standards in the vegetation document will be used to judge wetland reclamation success. In addition to the establishment of mitigation wetlands to replace wetlands removed by mining activities, a non-mitigative conservation wetland will be established in the SE¼ of Section 17. This wetland is intended to enhance landscape values such as fish and wildlife habitat and will be constructed in a fashion similar to upland mitigation wetlands. No standards are applied to the conservation wetland.

Stream channels that are affected by mining will be replaced by a topography designed to integrate surface water and groundwater drainage on the reclaimed landscape with undisturbed drainage networks on the disturbance periphery. Generally speaking, the location, profile, and other characteristics of many low order ephemeral and intermittent streams can be expected to change when reclamation that involves a reconstructed topography occurs, but the hydrologic balance and the utility of postmining land uses are expected to be maintained. Reclaimed intermittent streams will be located in the vicinity of premining intermittent streams and will be constructed to minimize adverse effects upon the hydrologic balance and postmining land use. The structures and revegetation techniques that may be employed in intermittent

stream reclamation are designed for resource protection and enhancement of stream values and may include revetments, rock vanes, step pools, boulder clusters, erosion control fabrics, and live stakes.

6. Woodlands

Disturbance planned for woodlands in the revision 19 area is limited to up to 0.7 acres of mixed deciduous woodland almost exclusively dominated by green ash trees and a few tall shrub patches covering about 0.4 acres. Within the boundaries of revision 22, approximately 2.0 acres of mixed deciduous woodland and 0.5 acres of tall shrubs will be disturbed based on current mining plans. If mixed deciduous woodlands or tall shrub patches are disturbed, the target density will be based on local and regional stocking recommendations that recognize the premining densities. A planting density of 2,700 plants per acre will be utilized in the composite woodland plantings addressed previously in this section. The following are the target per-acre densities for the tree and shrub types comprising the composite woodland plantings. The total density standard figure assumes a 30 percent mortality rate for trees and tripling of the number of shrubs planted through regenerative processes. Standards that will be applied to each mitigative woodland planting, based on the actual tree and shrub planting densities, are presented in Exhibit 3.7.11 and layouts appear in Exhibit 3.7.12.

Table 3.7.3
Composite Woodland Standards

Woody Type	Number Planted	Density Standard
Trees	400	280
Tall Shrubs	1,800	5,400
Low Shrubs	500	1,500
Total		7,180

Revegetation success will have been demonstrated when these standards and requirements for species diversity and seasonality, time in place, and ground cover, as stipulated in the vegetation document, have been achieved.

The conservation woodlands are being planted to enhance the wildlife habitat and other values of this area and will consist of some of the species identified in the woodland planting

mix at similar planting densities, although composition may be limited to tall shrubs. No standards are applied to these plantings.

C. RECLAMATION OF SUPPORT FACILITIES

1. Temporary Water Management Structures

Unless otherwise stated, all temporary sediment ponds and diversion ditches shall be reclaimed after their use is no longer necessary to manage the surface water flow of the permit area. Grading and revegetation of these areas will complement the surrounding areas postmining land uses. Embankments or parts thereof shall be removed unless otherwise specified in the Water Management Plan and utilized for fill within the impoundment area or other areas designated at the time of removal. Upon completion of grading and redistribution of SPGM, revegetation measures described in this section shall be employed to return the support facility site to a productive postmining land use.

2. Permanent Water Management Structures

WBM intends to retain certain water management structures as permanent facilities which will enhance the postmining land use utility. These permanent structures are addressed in Section 3.2, Water Management Plan. Landowner preference statements are located in Exhibit 2.7.2.

The vegetative cover on structures which were constructed and vegetated as temporary structures and have undergone reclassification to permanent status will be evaluated to determine if cover is adequate or if measures such as topsoil respreading are necessary. The evaluation will be jointly conducted by the PSC and WBM.

3. Stockpiles

After completion of the removal of stockpiled SPGM from SPGM stockpiles, site reclamation will begin. Respreading of topsoil (if necessary) will be followed by the revegetation steps appropriate for the postmining land use.

Stockpiles of other types - e.g. scoria stockpiles - will be reclaimed by respreading SPGM, if necessary, and the appropriate subsequent revegetation operations.

4. Electrical Substations

When electrical substations are no longer needed to support mine facilities or operations, the site shall be reclaimed. Reclamation shall begin with removal of the structures and aggregate base, followed by respreading of topsoil and/or subsoil (if necessary) and the appropriate revegetation operations.

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