**Attachment 2**

Vegetation, Soil and Site Stability Assessments

# **Outline**

Assessment Procedures

Appendix 1 – Vegetation Photograph and Topsoil Inventory Datasheet

Appendix 2 – Site Specific Assessment

Appendix 3 – Site Stability Rapid Assessment

Appendix 4 – Simple Revegetative Assessment

Appendix 5 – Simple Line-Point Transect Intersect

Appendix 6 – Alternative Wildlife Habitat Features

# **Assessment procedures**

Procedures for mine site pre-mining vegetative and soil inventories and site-specific, site stability and revegetation assessments will use standardized methodologies and efforts to allow for consistent data collection statewide.

1. Vegetative Photo Inventory: The miner and/or BLM staff will collect a minimum of 13 photos for every 5 (or fewer) acres to be disturbed. Four photos will be taken from the center of the site looking across the site in each cardinal direction, and one photo shooting straight down towards the ground at a height of four feet; a 3-foot scale or 1-meter box frame will be included in the ground shot. Four photos will be taken in each cardinal direction from four feet inside each edge and facing towards the center. A ground shot from each of these locations at a height of four feet with the scale or box frame is also required. Additional photos should be included to document site conditions not captured by the required photographs. A datasheet for recording photo information is provided in Appendix 1.
2. Topsoil Inventory: A standardized protocol to inventory the depth of topsoil in order to make volume estimates for the assessment area. Topsoil Assessments should be done in conjunction with vegetation assessments and should include a minimum of 3 soil pits per acre for projects disturbing 5 acres or less; for projects disturbing more than 5 acres, a minimum of 2 soil pits per acre must be recorded. Each soil pit should be 18” deep, if soil conditions allow. A photo must be taken of each soil pit, with a tape measure or some type of reference scale placed vertically along the pit wall. Include a close-up photo of soil removed from the pit. Use the datasheet in Appendix 1 for recording soil pit information.
3. Site-Specific Assessment: After completion of the Pre-Mining Photo and Topsoil Inventories, a Site-Specific Assessment (SSA) may be requested to assess soil available for reclamation. An SSA may lower a site’s foliar cover requirement for final revegetation. See Appendix 2.
4. Site Stability Rapid Assessment: A quick checklist to ensure all aspects of site stability are considered during a site visit. The checklist can be used during reclamation and upon completion of reclamation activities. Only minimal training is needed to apply this assessment. See Appendix 3.
5. Simple Revegetation Assessment: Entails either: 1) a boot transects and/or 2) photographed grids. A Revegetation Assessment should include a plot search and general plot photographs. Simple cover/no cover data can be collected with either method, and a plot search will attempt to identify non-native invasive weeds. This method is designed to be used by people with minimal training. See Appendix 4.
6. Simple Line-Point Intersect Transect: A more comprehensive protocol that should be used with the more problematic sites (compliance issues history, monocultures, weeds issues, etc.) or any other situation in which the Simple Revegetation Assessment is deemed insufficient. This protocol is to be performed by appropriate IDT staff. See Appendix 5.

All vegetation, soil, and site stability information should be summarized and presented to the AO to make a final determination on the successful completion of reclamation. Summary data should also be shared with the miner.

The following table illustrates when the protocols are to be implemented and by whom:

| Protocol | Initial Implementation | Subsequent Implementation | Who |
| --- | --- | --- | --- |
| Photo Inventory | Prior to Plan/Notice submittal | Reclamation inspections | Init: Miner and/or MC staff  Sub: MC staff |
| Topsoil Inventory | Prior to Plan/Notice submittal | Immediately after earthwork completed | Init: Miner and/or MC staff  Sub: MC staff |
| Site-Specific Assessment | After request and/or after Photo and Topsoil Inventories submitted |  | Interdisciplinary Team |
| Site Stability Rapid Assessment (SSRA) | As needed after mining operations have commenced | After reclamation activities have been completed | MC staff and/or Interdisciplinary Team |
| Simple Revegetation Assessment (SRA) | After one growing season; after two growing seasons; | After two growing seasons, each year if possible, else after miner requests | MC staff |
| Simple Line-Point Intersect Transect | After SRA or in lieu of SRA, as deemed appropriate | As needed | Interdisciplinary Team |

# **Pre-Disturbance Assessment Considerations**

After evaluating information collected by BLM staff or obtained from the miner, BLM staff are responsible to assess baseline conditions and determine if an SSA is warranted for all or portions of the area to be disturbed. Miners, contractors, partners or others may participate with the BLM in these processes.

Baseline Conditions

Maintaining as much of the natural or baseline site potential as possible is paramount in the reclamation process. It is beneficial to document what is present before the mining activity begins (the “baseline conditions”) in terms of soil and vegetation. The regulations require these resources be stockpiled for reshaping during reclamation, per 43 CFR 3809.420(3)(ii)(A). It is recognized that some mining is occurring on sites that have been previously mined where the current site potential is likely less than the potential of a site in natural conditions. In order to apply the *Site-Specific Assessment*, it is necessary to collect baseline information before mining begins.

A surrogate baseline may be obtained on sites that were not assessed prior to disturbance. In order to confidently select a surrogate baseline that is likely to be representative of the assessment area, find a nearby area within the same ecological site, a similar hydrologic setting, and with a similar disturbance history.

Topsoil Stockpiling, Spreading, and Erosion Control

Pre-disturbance topsoil is a key element of revegetation and must always be stockpiled or immediately re-used for reclamation. BLM staff shall assess topsoil prior to mining and at the completion of reclamation (use form in Appendix 1). Proper topsoil stockpiling techniques will be more likely to maintain the viability of seeds and other viable plant parts and maintain viable mycorrhizae. Mineral soil (in the overburden) is also valuable to reclamation and should be stockpiled separately from topsoil. Prior to stripping and stockpiling the soil, consider salvaging and storing plant materials from the site.

Minimizing erosion is critical to retaining soil. BLM staff shall ensure the operator minimizes erosion prior, during and after disturbance, while soil is stockpiled, and following respreading. In 43 CFR 3809.420.b, reshaping of the area and application of topsoil by the operator are required prior to revegetation of disturbed areas. Reshaping of the area should increase hydrologic stability and minimize erosion potential for the site prior to spreading the topsoil.

In addition to stockpiling all soil and organic matter prior to mining, BLM staff shall recommend fine sediments be removed from sediment ponds when mining is complete. BLM staff shall recommend the fine sediments, soil, and organics (in that order) should be spread across the disturbed area during the final grading process to act as a growth medium and facilitate the revegetation process. BLM staff shall recommend the operator not to respread top soil low in the floodplain, since it could be washed away.

If baseline topsoil is not stored properly and is lost, the operator will still be expected to meet revegetation criteria and achieve site stability. If there is little to no topsoil present when baseline conditions are assessed, the site-specific assessment process (Appendix 2) can be used to set reasonably practicable revegetation criterion to reclaim the site considering the amount of soil present and the potential to create more soil.

After soil is respread, utilization of gradual slopes, mulch, quick growing vegetation, and engineering techniques will minimize erosion. BLM staff should share BMPs for topsoil stockpiling, enhancement, creation, and spreading with the operator prior to mining to ensure techniques are applied to minimize erosion.

The site must be in stable condition in terms of contour and terrain, and water management. BLM staff should ensure the site is contoured or otherwise stabilized before initiating revegetation. The *Site Stability Rapid Assessment* is provided to compliance staff for expedient evaluation of a site’s stability (Appendix 3).

## Appendix 1. Vegetation Photograph and Topsoil Inventory Datasheet

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operator: |  | |  | Mine Site: | |  | |  | | Date: | |  | |
| Serial No: |  | |  | Inspector: | |  | |  | | Time: | |  | |
| Site Size: | |  |  | | Avg Soil Depth: | |  | |  | | Soil Volume: | |  | |

Take the initial photographs from the center of the site looking across the site in each cardinal direction, and one photo shooting straight down towards the ground at a height of 4 feet; a 3-foot scale or 1-meter box frame will be included in the ground shot. Take 4 photos in each cardinal direction from four feet inside each edge and facing towards the center. A ground shot from each of these locations at a height of 4 feet with the scale or box frame is also required. Additional photos should be included to document site conditions not captured by the required photographs. Take subsequent photographs from the approximate locations and in the directions of the original photograph points provided by the miner in the pre-mining submittal information.

**Vegetation Baseline Photographs**

| **Photo #** | **Direction** | **Notes** | **Photo #** | **Direction** | **Notes** |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
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**Topsoil Baseline Photographs and Depths**

| **Soil Pit/**  **Photo #** | **Depth (inches)** | **Notes** |
| --- | --- | --- |
|  |  |  |
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|  |  |  |
| **Total:** |  |  |
| **Average:** |  |  |

## Appendix 2. Site Specific Assessment

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  |  |  |  |  |  |  |  |  |  |  |
| **Site Specific Assessment Calculations** | | | | Length | Width | Height | Acres to cover | Cubic Yards | Coverage Inches |  | Adjustment | |
| 1. Soils Present | |  | |  |  |  |  |  |  |  |  | |
|  | a. Top Soil Quantities ‐ Min 1 inch desire 2 inches | | | |  |  |  |  |  |  |  | |
|  |  | i. Salvaged on site | |  |  |  |  | 0.0 | #DIV/0! |  | #DIV/0! | |
|  |  | ii. Mixed with overburden | |  |  |  |  | 0.0 | #DIV/0! |  | #DIV/0! | |
|  |  | iii. None available | |  |  |  |  | 0.0 | 0 |  |  | |
|  |  |  | |  | **TOTAL Top Soil / Mix Available** | | |  | #DIV/0! |  | #DIV/0! | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  | b. Overburden with fines | | |  |  |  |  |  |  |  |  | |
|  |  | i. Approximate Quantity | |  |  |  |  | 0.0 | #DIV/0! |  | Acre Inches | |
|  |  | ii. Rock Content % (0 to 40%) | |  |  |  |  |  |  |  | 1 | |
|  |  |  | |  | **Overburden Stockpile Available** | | |  | #DIV/0! |  | Acre Inches | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  | c. Fines In‐situ | | |  |  |  |  |  |  |  |  | |
|  |  | Percent of soil by weight from are to be mined | | | |  |  |  | IN‐SITU |  |  | |
|  |  | Actual percent fines by weight from multiple bucket samples | |  |  |  |  |  |  |  | Acre inch per acre mined | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  | d. Processing fines ‐ generated from mining | | | |  |  | IN‐SITU |  |  |  |  | |
|  |  | i. Currently on site | |  |  |  |  | 0 | 0 |  |  | |
|  |  | ii. Potentially generated | |  |  |  | **0%** | 0.0 | 0 |  | Acre inches | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  |  | **SOIL COMPONENT AVAILABLE ‐ All Sources** | | |  | 2 inches desired | |  | **#DIV/0!** |  | Acre inches | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  |  | **SOIL COMPONENT Factor** | |  | Between 0.5 and 1.0 | |  |  | **#DIV/0!** |  | **Soil Depth Factor** | |
|  |  |  | |  |  |  |  |  |  |  |  | |
| 2. Organic Material | | | | For each inch of overburden or process fines in top 2 inches | | | | | |  |  | |
|  | a. Current Sources | | | 5% Minimum 10% desired 30% Maximum | | | |  | Percent of need |  | OM Additions per inch soil | |
|  |  | Soil Organic content from Lab | |  |  |  |  |  | 0% |  | not > 300% | |
|  |  | i. Wood to chip | | 2500 lbs /cord | |  |  | cords | 0% |  | 0.29385836 | |
|  |  | ii. Peat to farm | |  |  |  |  | ton | 0% |  | 0.14692918 | |
|  |  | iii. Potential to farm | |  |  |  |  | ton | 0% |  | 0.14692918 | |
|  |  | iv. Import from offsite | |  |  |  |  | ton | 0% |  | 0.14692918 | |
|  | b. Potential | | | 5% to 10% desired 30% max | | |  |  |  |  |  | |
|  |  | i. Wood to chip | | 2500 lbs /cord | |  |  | cords | 0% |  | 0.29385836 | |
|  |  | ii. Peat to farm | |  |  |  |  | ton | 0% |  | 0.14692918 | |
|  |  | iii. Potential to farm | |  |  |  |  | ton | 0% |  | 0.14692918 | |
|  |  | iv. Import from offsite | |  |  |  |  | ton | 0% |  | 0.14692918 | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  | c. Additional Organic Material Desired | | |  |  |  |  | OM Add |  |  |  | |
|  |  |  | | Type | ton | Quantity |  | ####### | 0% |  |  | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  |  | Range 100% ‐ 600 % of Minimum | |  | **TOTAL ORGANIC Component** | | |  | **0%** |  |  | |
|  |  |  | |  |  |  |  |  |  |  |  | |
| 3. Soil Texture | |  | |  |  |  | **Texture** | **Factor** |  |  |  | |
|  |  | Loam to Silt Loam | |  |  |  |  | 1 |  |  | Best growth | |
|  |  | Sandy Loam | |  |  |  |  | 0.8 |  |  |  | |
|  |  | Silt | |  |  |  |  | 0.7 |  |  |  | |
|  |  | Clay | |  |  |  |  | 0.6 |  |  | Difficult | |
|  |  | Sand | |  |  |  |  | 0.5 |  |  | Drought prone | |
| **Site Specific Assessment Calculations** | | | | Length | Width | Height | Acres to cover | Cubic Yards | Coverage Inches |  | Adjustment | |
| 4. Vegetation | |  | |  |  |  |  |  |  |  |  | |
|  | a. Current Vegetation | | |  |  |  |  |  |  |  |  | |
|  |  | i. Coverage % | |  |  |  |  |  |  |  |  | |
|  |  | ii. Species Richness *#* | |  |  |  |  |  |  |  |  | |
|  |  | iii. Structural Elements # | |  |  |  |  |  |  |  |  | |
|  |  | iv. Age | |  |  |  |  |  |  |  |  | |
|  |  |  | |  |  |  |  |  |  |  |  | |
|  | b. Reference Site Vegetation | | |  |  | Target | **Soil Depth Factor** | **Texture Factor** | **Adjusted** |  |  | |
|  |  | i. Coverage % | |  |  | 70% |  |  | **0** |  | See #5 Below | |
|  |  | ii. Species Richness *#* | |  |  | 5 |  |  | **0** |  | Never < 5 | |
|  |  | iii. Structural Elements # | |  |  | 2 |  |  | **0** |  | Never < 2 | |
|  |  | iv. Age | |  |  | 2 |  |  | **2** |  |  | |
| Adjustments | |  |  |  |  |  |  |  |  |  |  |  |
| 1. Minimum of 1 " soil required therefore adjustment is never more than 0.5 (1.5" soil = 0.75 soil depth factor) | | | | | | | | | | |  |  |
| 2. Organic Content ‐10% minimum needed in top 2 inches ‐ Determine additions from soil tests ‐ Add as needed ‐ no adjustment factors | | | | | | | | | | | | |
| 3. Soil Texture will affect the amount of vegetation that will be targeted | | | | | | |  |  |  |  |  |  |
| 4. If reference site is not base line conditions (which already adjust for these factors) use soil depth factor and texture factor to create new targets | | | | | | | | | | | | |
| 5. Adjusted target should be at least 10% better than the Current Vegetation coverage and never less than 35% for interior or 15 for Arctic/ Alpine/ Tundra | | | | | | | | | | | | |
| 6. After adding organic material the soil should be lab tested for fertilizer recommendations to account for breakdown of fresh organic materials | | | | | | | | | | | | |
| Basis for Calculations | | |  |  |  |  |  |  |  |  |  |  |
| 7. Cubic Yard per inch per acre 8. Wood Chips | | | 134.44 CY/ac in CY/CD | Soil Wt per Ac/in = CD/ ac in Tons/ ac in | | | 272,250 lbs 5%= 13,612 lbs  lbs /cord | | | | |  |
|  | | | 134.44 4.740741 | 28.35938 70.89844 | | | 4000 | | | | |  |
| 9. Topsoil, mixed overburden, and overburden calculations are based on conical or triangular shaped piles | | | | | | | | | |  |  |  |
| To Measure linear piles measure full with and height and average length (bottom + top / 2) for inputs | | | | | | | | | |  |  |  |
| 10. Processing fines should be measured as a cubic function length x width x depth of proposed mine area | | | | | | | | | |  |  |  |
| 11. IN‐SITU and Overburden content of fines should be calculated by filling 3 to 6 five gallon buckets with material from the area to be mined | | | | | | | | | | | | |
| Fine particle content can be determined either by weight (recommended) or water displacement | | | | | | | | |  |  |  |  |
| **a)** weight ‐ weigh the full bucket of material then sieve material through a 1inch screen into another bucket and re‐weigh. | | | | | | | | | | | | |
| New weight/ total weight = IN‐SITU | | | |  |  |  |  |  |  |  |  |  |
| **b)** Displacement ‐ sieve the material through a 1inch screen and place the materials left on the screen back into the bucket when done | | | | | | | | | | | | |
| Fill the bucket of oversize with water then measure the water volume by pouring it into another bucket | | | | | | | | | | | |  |
| ( 1‐ (water volume/5)) X 100 = IN‐SITU | | | |  |  |  |  |  |  |  |  |  |
| **c)** If soil content is less than 60% the fines will need to be separated from overburden and/or IN‐SITU materials | | | | | | | | | | | |  |
| 12. If organic content is over 300% some of this soil may be mixed with fines or overburden to extend the quantity available over more area | | | | | | | | | | | | |

## Appendix 3. Site Stability Rapid Assessment

This rapid assessment provides BLM compliance staff with a quick and standardized way to assess site stability for mine reclamation. Use a separate sheet for distinctly different sites or assessment areas. Complete this assessment for every compliance site visit until the site is considered stable. Green items indicate good stability practices, Yellow items indicate neutral items that may require monitoring, and Red items indicate areas of potential concern for stability.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mine Site Name: |  | | Assessor: | | |  | | | Date: | |  | |
|  |  |  | | |  | | |  | |  | |
| Assessment Area: |  | | | Photo Numbers: | | |  | | | | | |

Site Status (check all that apply): Active Mining:  Active Reclamation:

Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ACTIVE MINING STAGE**

1. Has all topsoil been stockpiled properly?

Yes:\_\_\_\_ No:\_\_\_\_ N/A:\_\_\_\_ Estimated yd3:\_\_\_\_ Notes:

1. Has all mineral soil been stockpiled properly?

Yes:\_\_\_\_ No:\_\_\_\_ N/A:\_\_\_\_ Estimated yd3:\_\_\_\_ Notes:

1. Have plant materials been salvaged and stored properly?

Yes, transplants:\_\_\_\_ Yes, sod:\_\_\_\_ Yes, poles:\_\_\_\_ No:\_\_\_\_ N/A:\_\_\_\_ Notes:

**ACTIVE RECLAMATION STAGE**

1. Has the site been recontoured properly?

Yes:\_\_\_ No:\_\_\_\_ Notes:

1. Are slopes under 20% (1:5)?

Yes:\_\_\_ No:\_\_\_\_ Notes (justify if >20% but considered stable):

1. Is there evidence of rills?

Yes:\_\_\_ No:\_\_\_\_ Notes:

1. Is there evidence of or potential for concentrated water flows (gullies)?

Yes, evidence:\_\_\_\_ Yes, potential:\_\_\_\_ No:\_\_\_\_ Notes:

1. Have erosion control measures been implemented?

Yes:\_\_\_\_ If yes, describe:

No, but necessary:\_\_\_\_ No, but not necessary:\_\_\_\_ Describe:

1. Has rock or woody debris been spread to minimize erosion?

Yes, rock:\_\_\_\_ Yes, wood:\_\_\_\_ No:\_\_\_\_ Notes:

1. Has active (seeding, planting, mats, etc.) revegetation been implemented?

Yes:\_\_\_ No:\_\_\_\_ Describe if Active / Notes:

1. Is there evidence of new plant growth?

Yes:\_\_\_ No:\_\_\_\_ Describe if new growth is on transplants, cuttings, mats, or from seed:

1. Was a vegetation assessment completed in conjunction with this stability assessment?

Yes, Boot Transect:\_\_\_\_ Yes, Line-Point Intersect Transect:\_\_\_\_ No:\_\_\_\_

% Foliar Cover:\_\_\_\_ Notes:

1. Summarize site stability concerns:
2. Summarize site stability recommendation given to mine operator:

## Appendix 4. Simple Revegetative Assessment

It is expected that a Simple Revegetative Assessment will be used for initial and final reclamation at most sites. The SRA will consist of either a Boot Transect or the Grid Sampling technique or both.

**Boot Transect**

Boot transect(s) should be representative of the variety of conditions on the site, including openings and dense areas. The total points recorded for a site should be 150 points per acre, but no less than 300 points for a site. A boot transect may be conducted in the following manner:

1. Points are randomly placed in a systematic way on the site.  Decide how best to evenly space the points on the site.  This may require multiple lines with points equally spaced along each line.
2. Use a pin flag, laser pointer, fishing pole tip, or similar fine point to determine sample point.
3. Points are placed by walking across the site in a natural step spacing.  Points are placed 6 inches ahead of the toe of 1 foot (left or right) at a predetermined spacing (i.e. every third, fourth or fifth step) without regard as to where it lands in relation to the existing conditions.
4. At each point the only vegetation that touches the pin flag is counted.
5. To calculate coverage percentage divide the number of points with vegetation by he total number of sample points and multiply the result by 100.  Example: 210 points with vegetation out of 300 point sample   210 / 300 = 0.7.    0.7 \* 100= 70%

**Grid Sampling**

Conduct a ‘grid sampling’ using a PVC square (recommended 1m2). This rapid method may be useful if the vegetation specialist is not able to visit the site and retains an excellent photographic record.



1. Buffer samples from the edge of assessment area by 1m.
2. Lay the grid at 10 or more randomly selected locations per acre around the assessment area.
3. Take a clear, high-resolution photo of each square lying on the ground from the top center of the grid. Be sure there are no shadows originating from outside the grid occurring within the grid or that the entire grid is within a shadow.
4. Later in the office, overlay a 10-point-by-10-point grid over the square on the computer.
5. Determine if each point is a hit on a live plant or a miss. Use your hits to determine percent foliar cover.

Boot Transect Revegetation Assessment Field Form

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operator: | |  | | |  | Mine Site: | |  | | |  | Date: |  | |
| Serial No: | |  | | |  | Inspector: | |  | | |  | Time: |  | |
| Plot: |  | |  | Line No.: | | |  | |  | Aprrox. Interval: | | | |  |



## Appendix 5. Simple Line-Point Transect Intersect

1. Layout a transect following the [Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems Vol. 2](https://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,%20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20.II.pdf) (see page 30) protocol. The total transect length of 150 feet should be surveyed, usually in three 50 foot transects in a “spoke design” layout. Other layouts may be considered if the spoke design does not fit into the assessment area with a 5 feet buffer from the edges. Sampling points on each transect should occur on one foot intervals and start at 1ft and end at 50ft and be repeated three times.
2. At each sampling point, drop a pin or laser pointer straight down. If any portion of a live plant hits the pin, mark a “hit” on the datasheet. Count any overhead plants that would hit as a “hit”. Dead portions of live plants and previous year’s growth still attached to the plant count as a “hit”. Record anything else as a “miss”. Multiple hits still count as a “hit”.
3. Identify and record the type(s) of plant hit to the most detailed level possible, based on the surveyor’s existing knowledge. At minimum, record if it is a moss (>2in thick), lichen (foliose only), graminoid (grass, sedge, rush), forb, shrub, or tree. Record at least the first hit, but add additional hits if field time allows. If possible, note more information, such as “Willow 1” or the actual species “Bebb’s willow”.
4. If credit for cover is being taken for Alternative Wildlife Habitat Features, mark “AWHF” on the datasheet and name the feature (e.g. “brush pile”).
5. Tally all hits plus AWHFs and then divide by 150 to determine plant foliar cover.

**Simple Line-Point Intersect Transect Datasheet**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operator: | |  |  | | Mine Site: | |  | |  | | Date: | |  | |
| Serial No: | |  |  | | Inspector: | |  | |  | | Time: | |  | |
| Plot: |  | | |  | | Transect: | |  | |  | | Interval: | |  | |

| **Sample Point** | **1st Hit** | **2nd Hit** | **3rd Hit** | | **Sample Point** | **1st Hit** | **2nd Hit** | **3rd Hit** | **Sample Point** | **1st Hit** | | **2nd Hit** | **3rd Hit** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 |  |  |  | | 51 |  |  |  | 101 |  | |  |  |
| 2 |  |  |  | | 52 |  |  |  | 102 |  | |  |  |
| 3 |  |  |  | | 53 |  |  |  | 103 |  | |  |  |
| 4 |  |  |  | | 54 |  |  |  | 104 |  | |  |  |
| 5 |  |  |  | | 55 |  |  |  | 105 |  | |  |  |
| 6 |  |  |  | | 56 |  |  |  | 106 |  | |  |  |
| 7 |  |  |  | | 57 |  |  |  | 107 |  | |  |  |
| 8 |  |  |  | | 58 |  |  |  | 108 |  | |  |  |
| 9 |  |  |  | | 59 |  |  |  | 109 |  | |  |  |
| 10 |  |  |  | | 60 |  |  |  | 110 |  | |  |  |
| 11 |  |  |  | | 61 |  |  |  | 111 |  | |  |  |
| 12 |  |  |  | | 62 |  |  |  | 112 |  | |  |  |
| 13 |  |  |  | | 63 |  |  |  | 113 |  | |  |  |
| 14 |  |  |  | | 64 |  |  |  | 114 |  | |  |  |
| 15 |  |  |  | | 65 |  |  |  | 115 |  | |  |  |
| 16 |  |  |  | | 66 |  |  |  | 116 |  | |  |  |
| 17 |  |  |  | | 67 |  |  |  | 117 |  | |  |  |
| 18 |  |  |  | | 68 |  |  |  | 118 |  | |  |  |
| 19 |  |  |  | | 69 |  |  |  | 119 |  | |  |  |
| 20 |  |  |  | | 70 |  |  |  | 120 |  | |  |  |
| 21 |  |  |  | | 71 |  |  |  | 121 |  | |  |  |
| 22 |  |  |  | | 72 |  |  |  | 122 |  | |  |  |
| 23 |  |  |  | | 73 |  |  |  | 123 |  | |  |  |
| 24 |  |  |  | | 74 |  |  |  | 124 |  | |  |  |
| 25 |  |  |  | | 75 |  |  |  | 125 |  | |  |  |
| 26 |  |  |  | | 76 |  |  |  | 126 |  | |  |  |
| 27 |  |  |  | | 77 |  |  |  | 127 |  | |  |  |
| 28 |  |  |  | | 78 |  |  |  | 128 |  | |  |  |
| 29 |  |  |  | | 79 |  |  |  | 129 |  | |  |  |
| 30 |  |  |  | | 80 |  |  |  | 130 |  | |  |  |
| 31 |  |  |  | | 81 |  |  |  | 131 |  | |  |  |
| 32 |  |  |  | | 82 |  |  |  | 132 |  | |  |  |
| 33 |  |  |  | | 83 |  |  |  | 133 |  | |  |  |
| 34 |  |  |  | | 84 |  |  |  | 134 |  | |  |  |
| 35 |  |  |  | | 85 |  |  |  | 135 |  | |  |  |
| 36 |  |  |  | | 86 |  |  |  | 136 |  | |  |  |
| 37 |  |  |  | | 87 |  |  |  | 137 |  | |  |  |
| 38 |  |  |  | | 88 |  |  |  | 138 |  | |  |  |
| 39 |  |  |  | | 89 |  |  |  | 139 |  | |  |  |
| 40 |  |  |  | | 90 |  |  |  | 140 |  | |  |  |
| 41 |  |  |  | | 91 |  |  |  | 141 |  | |  |  |
| 42 |  |  |  | | 92 |  |  |  | 142 |  | |  |  |
| 43 |  |  |  | | 93 |  |  |  | 143 |  | |  |  |
| 44 |  |  |  | | 94 |  |  |  | 144 |  | |  |  |
| 45 |  |  |  | | 95 |  |  |  | 145 |  | |  |  |
| 46 |  |  |  | | 96 |  |  |  | 146 |  | |  |  |
| 47 |  |  |  | | 97 |  |  |  | 147 |  | |  |  |
| 48 |  |  |  | | 98 |  |  |  | 148 |  | |  |  |
| 49 |  |  |  | | 99 |  |  |  | 149 |  | |  |  |
| 50 |  |  |  | | 100 |  |  |  | 150 |  | |  |  |
| Subtotal: |  |  |  | | Subtotal: |  |  |  | Subtotal: |  | |  |  |
|  |  | |  | |  | |  | | |  | |
|  | Sample Point Hit | | AWHF Hit | | Sample Point Hit + AWHF Hit | | Divide by 150 (or total points sampled) | | | Foliar Cover | |
| Totals: |  | |  | |  | |  | | |  | |

## Appendix 6. ALTERNATIVE WILDLIFE HABITAT FEATURES

Vegetative composition and structure is the primary component of habitat for most wildlife species. As part of the Site-Specific Assessment, vegetation-based criteria can be lowered. However, rehabilitation of wildlife habitat still must be considered. When lowering vegetative criteria, or simply to provide even better habitat when reclaiming a site, alternative (non-vegetative) wildlife habitat features should be suggested by BLM staff to the operator. BLM staff assessing vegetation should calculate wildlife habitat features as “non-vegetative cover” and not bare ground. These alternative wildlife habitat features should not account for more than 25% of the required foliar cover in an assessment area.

Most features will serve to create additional vegetative cover by capturing windblown sediment and seed and creating microclimates conducive to growth. BLM staff should recommend the operator consider planting or seeding in conjunction with the features to take advantage of the microclimates created.

| **Alternative Wildlife Habitat Feature** | **What Is It?** | **What Benefits?** | **How Is It Built?** | **Recommended Min & Maxs / Other Notes** |
| --- | --- | --- | --- | --- |
| **Brush Pile** | A pile of small to medium sized sticks, branches, and brush from salvaged dead vegetation. | Cover habitat for birds, small mammals, and inverebrates, which provide food sources for larger mammals and raptors. Also creates microclimates and captures wind blown seed and sediment. | Larger wood should be placed on the bottom to provide structure and crevices, then smaller sticks and brush should be placed on top to provide cover.  Consider planting appropriate species in the microclimate surrounding the pile. | 10ft/5ft width max/min.  6ft/3ft height max/min.  Maintain approx. 5:3 width:height ratio.  50ft on center max density.  Place out of active flood zone. |
| **Vertical Mulch** | Single dead salvaged shrubs placed in the ground.  Useful to minimize access or unplanned disturbance to reclamation. | Cover habitat for birds, small mammals, and inverebrates, which provide food sources for larger mammals and raptors. Also creates microclimates and captures wind blown seed and sediment. | The pieces of a single shrub (or pieces of multiple shrubs) are “planted“ to look like a dead plant. Be sure to install deep enough to provide stability. Works well with medium sized, multi-stemmed shrubs, such as alder or willow. | 4ft/7ft width max/min.  4ft/10ft height max/min.  Density dependant on need to reduce disturbance.  Place out of active flood zone. |
| **Rock Pile** | A pile of cobble to boulder-sized rocks from materials disturbed by mining activity. | Cover habitat for birds, small mammals, and inverebrates, which provide food sources for larger mammals and raptors. Also creates microclimates and captures wind blown seed and wind and water bound sediment. | Larger rocks should be placed on the bottom in the center and smaller rocks can be placed around and on top. Angular rocks will stack better than rounded rocks.  Consider planting appropriate species in the microclimate surrounding the pile. | 4ft/3ft width max/min.  3ft/2ft height max/min.  Maintain approx. 3:2 width:height ratio.  50ft on center max density.  Can be placed in active flood zone. |
| **Woody Debris** | Downed wood of all sizes spread on the ground. | Cover habitat for inverebrates, which provide food sources for larger animals. Creates microclimates and captures wind blown seed and wind and water bound sediment. Inputs organic matter into soil. | Scatter available woody debris around site.  Consider planting appropriate species in the microclimate surrounding larger debris. | Max 25% of ground covered with debris.  Cannot be counted toward vegetation cover totals.  Avoid scattering below the ordinary high water mark. |
| **Installed Snag** | A large dead tree or branch set upright in the ground to mimic a natural dead tree. | Perch site for hunting raptors and smaller songbirds. Woodpeckers may make cavity nests, which are used by a variety of birds and mammals. Attacts perching birds that may deposit seeds onsite. | Ensure the snag is installed at a depth to provide stability for many years. Approximately 1/3 of the length should be underground.  Can be further stabilized with a rock pile around the base. | 20ft/10ft above ground max/min.  4inch diamter base min / no max.  Max 2 per acre.  Can be placed in conjunction with a brush or rock pile. |
| **Moist Soil Area** | A gradual depression designed to create moister soil conditions than the surrounding area.  Not designed to hold water more than 1 month per year. | The moister soil will grow different species of plants and will likely grow deser vegetation, which will provide food and cover for invertebrates, small mammals, and nesting birds. | Use heavy equipment to excavate an area that has already been disturbed by mining activities. Do not disturb vegetation to install. Settling ponds may be used.  Consider planting appropriate species in the moist soil area.  Consider using excavated material for rock piles. | Max diameter 20ft .  Max sideslope steepness 10:1.  Max depth 2ft below surrounding grade.  Max 1 per acre.  Only use groundwater or local surface flow, not channel water from a stream. |
| **Pool / Pond** | A gradual depression designed to create a small pool of water.  Designed to hold water for more than 1 month per year. | In addition to the benefits of the moister soil (see above), the standing water may provide habitat for invertebrates and birds, as well as off channel drinking water. | Use heavy equipment to excavate an area that has already been disturbed by mining activities. Do not disturb vegetation to install. Settling ponds may be used.  Consider planting appropriate species on the slopes.  Consider using excavated material for rock piles. | Max diameter 30ft .  Max sideslope steepness 10:1.  Max depth 3ft below surrounding grade.  Max 1 per acre.  Should only use groundwater or local surface flow, not channel water from a stream.  Should not be placed in steep drainages where ponding and oxbows are not a natural feature. |