CENWO-ODG-A 13 December 2023

MEMORANDUM FOR: All Garrison Project Employees

SUBJECT: USACE Garrison Project Office SOP #14 – Vegetation Mitigation

Overview: Goals and Objectives

Reclamation is a process that ensures the impacts on the land and other resources are not permanent. It starts with planning before any disturbance takes place. For all surface disturbing activities on USACE property, a Reclamation and Monitoring Plan must be developed. The level of detail for the plan should be proportional to the project's complexity, the environmental concerns unique to the location or activity, and the reclamation potential for the site.

The primary goal of reclamation is to restore the ecosystem, to include bringing back the natural vegetation community, hydrology, and wildlife habitat. The objective is to establish a self-sustaining, diverse native plant community with a density capable of controlling erosion and preventing non-native plant invasion. Successful reclamation helps to re-establish wildlife habitat or forage production. Coordination with the Garrison Project Office staff early in the process is recommended to identify the current practices required for successful reclamation. Reclamation planning should consider all activities necessary to reclaim the disturbed areas within a project, and applicants should plan to perform reclamation actions throughout their operation.

1. Purpose: To control and regulate the indiscriminate or excessive removal, large-scale, clear-cutting, and destruction of trees/vegetation and to prevent conditions such as degradation of sensitive areas or wanton destruction that cause an increase in stormwater runoff, sedimentation, soil erosion, loss of wildlife habitat, air or noise pollution or inhibit aquifer recharge while impairing the ambiance or physical appearance of the property. The guidance contained in this SOP is designed to limit such adverse impact while not interfering with the right of an entity to appropriately remove trees/vegetation per the guidance set forth below.

2. Policy: All lands impacted will be restored to native conditions. If affected lands cannot be restored, USACE will seek mitigation for any vegetation removed, destroyed, or damaged on USACE lands managed by the Garrison Project Office.

3. Applicability:
    a. The terms and provisions of this SOP shall apply to all soil, ground or vegetation disturbances or activities causing environmental degradation to real property on Garrison Project lands.
    b. It shall be prohibited for any person to remove/damage or cause any soil or vegetation to be removed/ damaged under any circumstances without obtaining documented project permission. The definition of vegetation includes but is not limited to crops, grasses, forbs, shrubs, and trees.

4. Vegetation Mitigation Plan: To obtain documented project permission, a vegetation mitigation plan shall be submitted by the applicant and consist of the following:
    a. Site plan showing the location of existing vegetation, proposed disturbance, and clearly marked property boundaries by legal land survey description, GPS coordinates, and GIS shapefiles.

b. Vegetation inventory identifying the quantity, extent, and species of trees/shrubs, grasses, and forbs affected. Trees shall be inventoried using diameter breast height (DBH) measurement, which is the tree's diameter, measured approximately 54 inches from ground level. Trees with a DBH of two (2) inches or larger shall be individually counted, and trees with a DBH smaller than two (2) inches and all shrubs shall be clump calculated by square foot. Clump count by square foot is defined as measuring the footprint of a cluster of trees/shrubs to determine the overall square footage of the cluster of shrubs. (Example: A 20ft x 20ft cluster of shrubs with DBH smaller than 2 inches is calculated at 400 square feet in total.) To obtain the measurement for a multi-stem tree, each stem must be tallied separately with its own DBH measurement as long as the measurement is 2 inches or greater.
    i. Inventory of the total number of existing trees/shrubs, by size and species, with a DBH of two (2) inches or greater, which are to be mitigated.
    ii. Inventory of the total number of existing trees listed by species with a DBH smaller than two (2) inches, which are to be mitigated, clump counted by square foot.
    iii. Inventory of the total number of existing shrubs listed by species with a DBH smaller than two (2) inches to be mitigated, clump counted by square foot.
    iv. Inventory of the total square footage of affected grass/forb vegetation
    v. Inventory of the total square footage of permanently affected grass/forb vegetation, (ex. square footage of a new road or new building being constructed on government property)
c. A planting detail and description for replacement of vegetation.All specific plans for mitigation of affected vegetation shall be based on the following requirements:
    i. The replacement vegetation shall be planted on the property where the vegetation was removed, damaged, or planted in a location designated by the USACE.
    ii. All inventories/informational documents must be provided to the USACE, and approval must be obtained prior to the commencement of work.
    iii. Should a road or other permanent structure be built, a specific seed mix must be applied to the ditches.
    iv. The use of erosion control methods will be required as needed.
    v. Replacement vegetation must be planted within one year after the applicant's project has been completed.

5. <u>Replacement Tree/Shrub Value Calculations:</u>
    a. Pre-existing dead and diseased trees/shrubs, as determined by the USACE, shall not be included in the mitigation plan.
    b. Tree/shrub vegetation affected by an environmental spill/contamination or likewise injured shall be assessed after one growing season after completion of cleanup procedures. If a tree/shrub displays approximately 50% or more crown decline after one growing season, each tree/shrub shall be inventoried and mitigated according to this SOP. All other ground vegetation shall be inventoried and restored according to this SOP.
    c. The Garrison project will not be accepting payment in the form of mitigation, all mitigation measures will either need to be done so in the form of a tree/shrub planting or in the form of a prairie restoration/pollinator planting (See Section 6 for more details).
    d. The replacement value of all trees and shrubs removed or damaged will be as follows:

Ratio Value of Replacement Trees

Size of Tree/Shrub Removed (Inches DBH)	Replacement Ratio	Replacement Value
Two, but not more than four (2"-4")	2:1	$200.00
More than five, but less than eight (5"-8")	3:1	$400.00
More than nine, but less than twelve (9"-12")	4:1	$800.00
More than thirteen, but less than eighteen (13"-18")	5:1	$1000.00
More than nineteen, less than twenty-three (19"-23")	6:1	$1600.00
More than twenty-four (24" +)	7:1	$2000.00
Trees with a DBH smaller than 2" clump counted by square ft.	4:1	$2.50
Shrubs with a DBH smaller than 2" clump counted by square ft.	4:1	$2.50

Note: The replacement ratio of a given tree size may be divided by (2) when the applicant plants large (6ft. or 1-inch DBH) trees in place of the more common conservation sized trees/shrubs (1-3ft.). The reduced ratio may never be less than a 1:1 ratio for replacement. (Example, there are 4 (9”-12”) trees being taken for a project, instead of planting 4 conservation grade trees, the applicant could choose to plant (2) 6ft or 1-inch DBH replacement trees instead.)

6. Tree/Shrub to Prairie Restoration Mitigation (Hybrid Option)
    a. This option enables the Garrison Project Office to choose between tree/shrub mitigation or prairie restoration mitigation depending on the specifics of the project presented.
    b. It will be up to the discretion of the USACE to determine if a tree/shrub planting or native prairie restoration project will be more beneficial in the affected area.
    c. After determination of the total restoration value of the trees/shrubs impacted by a project, the “replacement value” will then be used to determine an equivalent acreage for prairie restoration plantings.
    d. The ratio is: ($1500 replacement value of tree/shrubs = 1 acre of native prairie/pollinator plantings)
        i. Example: a project has $60,000 in tree/shrub impacts, instead of planting hundreds of tree/shrubs, the applicant is given the option to perform a prairie/pollinator planting instead, this applicant could then plant 40 acres of native prairie/pollinator habitat instead of the trees or shrubs.

7. Replacement of Ground Cover: Any disturbed ground cover (e.g., crop cover, forbs, grasses) is to be reclaimed to a state determined acceptable by the USACE. Reclamation requirements may include, but are not limited to, the following:
    a. Redistribute soil materials in a manner similar to the original vertical profile.
    b. Reduce compaction to an appropriate depth (generally below the root zone) prior to redistribution of topsoil to accommodate desired plant species.
    c. Provide suitable surface and subsurface physical, chemical, and biological properties to support the long-term establishment and viability of the desired plant community.
    d. Protect seed and seedling establishment (e.g., erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)
    e. Seed mixes will be selected using the parameters outlined in Section 12 & Appendix B.
    f. Ground cover that is permanently altered and unable to be reclaimed (i.e., Roads, buildings, etc.) will be reclaimed at a 4:1 ratio and performed at a location chosen by the Garrison Project Office.
    g. The establishment threshold of 90% cover of grass/forbs must be accomplished by the third year after planting within the restoration area. 50% or more of the planted species of grass and forb within the provided prairie seed mix must be present within the restoration by the third year of the restoration. If either one of these thresholds is not

being met, additional plantings will need to be performed. (It is recommended to have at least 70% cover by year one, 80% cover by year two to meet the 90% establishment threshold.)

h. Spot treatment of federal and state listed noxious weeds within the restoration area is the responsibility of the contractor until the USACE has informed the applicant that their restoration threshold has been met.

8. Species Requirements: The recommended and approved USACE Tree and Shrub list can be found in Appendix A and contains species acceptable for planting on USACE property. The chief objective of the replacement plantings is to restore native habitat for wildlife. Other native vegetative species or their varieties not listed may be planted on USACE-owned property at USACE discretion, but only desirable vegetation of good appearance, health, and suitability that are generally free from injurious insects, diseases, or other limitations. Where certain planting sites have been assigned a particular species or variety, only that designated species or variety shall be planted unless the USACE approves an alternative plan. Ecological Site Descriptions will be used to determine a suitable seed mix for ground cover reclamation as outlined in Section 11 and Appendix B.

9. Planting Requirements:
   a. Size - All small trees and their cultivars or varieties shall be in the minimum age classes of 1-2, 2-1, 3-0, or 2-2 with a top height of no less than (8) inches. (The number preceding the hyphen relates to the years the tree spent in a seedbed, and the number following the hyphen is the years the tree spent in a nursery field. As such, a 2-2 would be a 4-year-old tree.)
   b. Grade - Unless otherwise allowed for specific reasons, all trees shall have comparatively straight trunks, well-developed leaders, and tops, and the roots should be characteristic of the species. They shall have an acceptable balance between the top and root. When planting, all trees must be free of objectionable features that affect the plant's future health, growth, strength, form, and beauty, such as root bound, mechanical injuries, and crown decline. Replacement stock must be purchased for USDA Plant Hardiness zones 3b and 4a.
      i. Location and Spacing - No tree shall be planted within a utility easement or closer than thirty (30) feet from overhead utility lines to allow room for line maintenance. No shrubs shall be planted under utilities if their eventual height will interfere with said utility lines. The USACE will approve the selection of planting sites and species. The USACE shall determine the spacing of trees in accordance with local environmental conditions, the species, cultivars, or varieties used, and their mature height, spread, and form. At maturity, all large and medium-sized trees shall be spaced a minimum of twenty-five (25) to thirty (30) feet apart, center-to-center. Large and medium-sized trees are any tree that can exceed 20 feet in height when mature. All small trees shall be placed at least eight (8) to ten (10) feet apart, center-to-center. Small trees are any tree or shrub that does not regularly exceed 20 feet in height when mature.
   c. Methods of Planting and Support - Most small trees and shrubs may be moved bare-rooted unless otherwise indicated. Roots of bare-rooted trees and shrubs must be protected against drying out. All coniferous trees shall be moved, balled, and bur-lapped. Balled roots should be prevented from drying out at the ball's surface and protected against freezing. Pits for planting bare-root and balled-root plants shall be at least two to three times larger in diameter than the root system's diameter to accommodate the roots without crowding and provide room for proper backfill. Plantings are to be installed to replicate natural habitats and will not be planted in rows. Trees

shall be planted in clumps or in an irregular pattern. Trees shall be planted no deeper than previously grown, with due allowance for settling. When planting balled and burlapped trees or wire baskets, all non-degradable strings shall be removed completely. When the planting is completed, the entire root area shall be thoroughly saturated with water.

[1]

10. General Maintenance Requirements:
    a. A minimum of 80% of the replacement vegetation must be living at the end of 3 growing seasons to meet the mitigation requirements.
    b. The use of tree fabric may increase tree survivability and reduce the amount of moisture needed for survival. In some instances, USACE may recommend or require that fabric is utilized for large tree/shrub plantings; in this case, fabric will need to be removed before acceptance of reclamation.

11. Penalty for Non-notification:
    a. If vegetation is removed without prior approval, the following protocol will be followed:
        i. If the DBH can be calculated, use the chart above for mitigation or restitution purposes.
    b. If cut tree or shrub stumps are only visible, each stump will be marked, tallied, and measured at ground level. Ratio in the table above will be increased by 2 from the stump measurement.
        i. If it is unknown how many trees/shrubs were removed, the number of trees requiring replacement shall be computed by assuming ten (10) trees having twelve (12) - eighteen (18) inches DBH and twenty-five (25) shrubs per half acre of disturbed area were removed.
        ii. Crop cover, grasses, and forbs will be reclaimed to prior condition at USACE discretion.
    c. Any person who violates, fails or refuses to comply with this SOP shall be liable to a penalty outlined in the USACE Title 36 CFR 327.14(a) "Public Property".

12. Ecological Site Description: To understand the variations across the landscape, the Natural Resource Conservation Service (NRCS) has classified these different parts into units called ecological sites. Ecological sites are defined as “a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.” Any land inventory, analysis, and resulting management decisions require the knowledge of these individual sites and their interrelationships with one another on the landscape.

[1] Pardon P 2018, Silvoarable agroforestry systems in temperate regions : impact of tree rows on crops, soil and biodiversity, digital photograph, accessed 7 August 2020, <https://www.semanticscholar.org/paper/Silvoarable-agroforestry-systems-in-temperate-%3A-of-Pardon/4c3f4163c6818b3a67d600ca63854e2d2f0215a2#extracted>

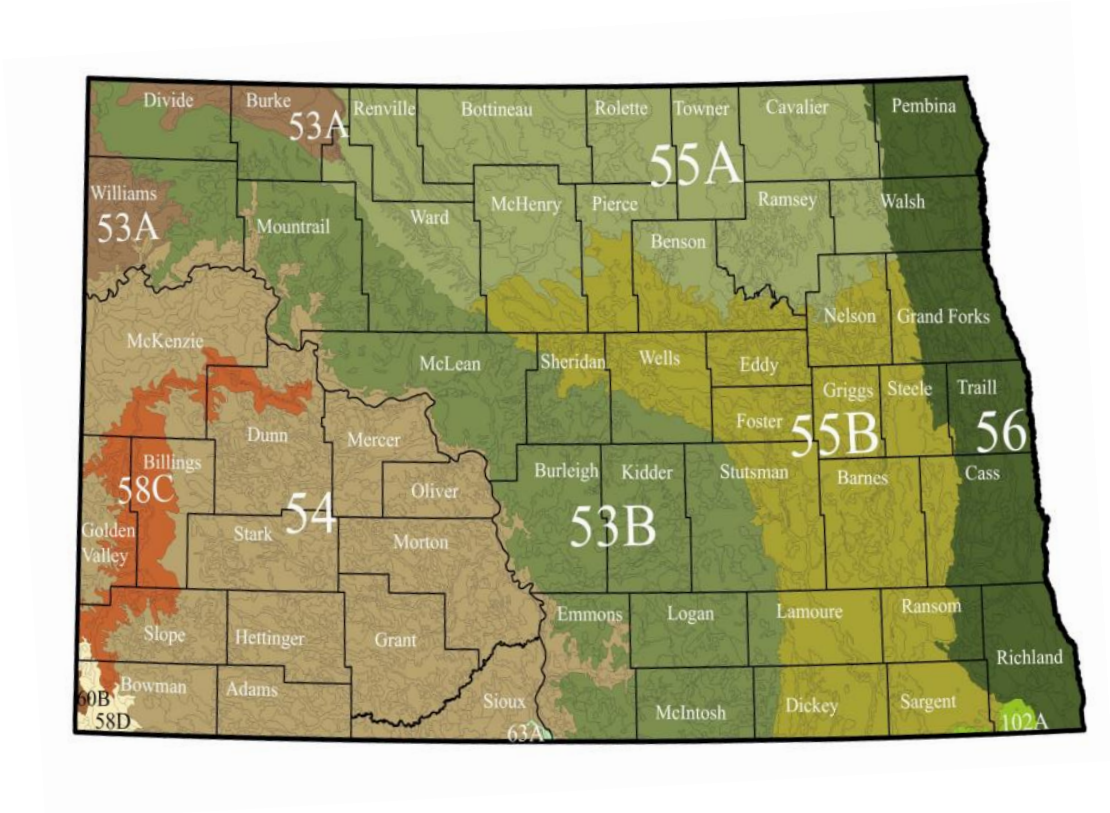
The data comprising an ESD is presented in four major categories:

- Site Characteristics – Identifies the site and describes the physiographic, climate, soil, and water features associated with the site.
- Plant Communities – Describes the ecological dynamics and the typical plant communities comprising the various vegetation states of the site. The disturbances that cause a shift from one state to another are also described.
- Site Interpretations – Interpretive information pertinent to using and managing the site and its related resources.
- Supporting Information – Provides information on sources of information and data utilized in developing the site description and the site's relationship to other ecological sites.

This information and the ESDs the NRCS has developed to date may be found at the following website:
http://esis.sc.egov.usda.gov/Welcome/pgECOLOGICALSITEDESCRIPTIONWelcome.aspx

a. Ecological Sites: The NRCS has developed Ecological Site Descriptions (ESD) that contain detailed information on the plant species naturally occurring in those soil mapping units. ESDs for the state are available at: https://esis.sc.egov.usda.gov/

b. MLRA Map of North Dakota:



13. Seed Mix Guide: Appendix B lists the approved native prairie mixes that should be used for any vegetation reclamation on USACE property. Each blend is formulated for each specific MLRA and soil type found around Lake Sakakawea. To choose the correct mix for the location of your reclamation, please refer to the ecological site description map, select the MLRA that covers your site, determine the soil type of your specific site, and choose the mix that matches both characteristics. Each mix has the grasses pre-selected. Each mix will need eight species of forb/wildflower selected before it is complete and can be provided to the seed house of your choice to purchase for the reclamation project. It is recommended that you ask the seed house to provide the seed mix in two portions. One portion will have all the grasses in their respective bags, with the forb/wildflower seed separated from the grasses in their own bags.

This will aid the planting process and make it easier to either broadcast or no-till drill into your reclamation site. Please consult the following guide for instructions on adequately planting the prairie seed mixes.
https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmcpu5933.pdf

14. Noxious Weed Act: The Federal Noxious Weeds Act of 1974 (PL 93-629, 7 U.S.C. §§ 2801-2814, January 3, 1975, as amended 1988 and 1994) provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture, commerce, wildlife resources, or public health.

    All projects on USACE property are required to control the establishment and spread of noxious weeds within their affected impact area. This may include returning the next year and treating the weeds established in the following growing season from when the work was performed. Undesirable plants include species classified as undesirable, noxious, harmful, exotic, injurious, or poisonous under State or federal law but do not include species listed as endangered under the Endangered Species Act.

North Dakota state-listed noxious/exotic weeds

Common Name	Scientific Name
Salt cedar	*Tamarix spp.*
Purple loosestrife	*Lythrum salicaria*
Leafy spurge	*Euphorbia esula*
Field bindweed	*Convolvulus arvensis*
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*
Russian knapweed	*Acroptilon repens*
Absinth wormwood	*Artemisia absinthium*
Spotted & Diffuse knapweed	*Centaurea stoebe ssp. diffusa*
Yellow starthistle	*Centaurea solstitialis*
Dalmatian toadflax	*Linaria dalmatica*
Yellow toadflax	*Linaria vulgaris*

15. Monitoring:
    https://www.uwyo.edu/wrrc/_files/docs/seeding_essentials_mealor.pdf
    https://www.fia.fs.fed.us/library/field-guides-methods-proc/docs/core_ver_4-0_10_2007_p2.pdf

    The project applicant is responsible for monitoring and treating all noxious weeds mentioned in the list above found at the reclamation site before any native species of tree, shrub, or vegetation is planted for the reclamation. All herbicides used on site must be used at the appropriate rates listed on the bottle; misuse of any herbicide violates federal law and EPA regulation.

16. Oil and Gas:
    a. Reclamation and Monitoring Plan - Reclamation helps ensure that the effects of oil and gas activities on the land and other resources and uses are not permanent, and

reclamation begins with planning before construction. A Reclamation and Monitoring Plan must be developed as part of the applicant's SUPO for all surface disturbing activities related to oil and gas activities on USACE outgrants. The ultimate objective of reclamation is ecosystem restoration, including restoration of the natural vegetation community, hydrology, and wildlife habitat. As an overarching goal, reclamation is successful when a self-sustaining, vigorous, diverse native plant community is established, with a density that will control erosion and non-native plant invasion and re-establish wildlife habitat or forage production. Applicants are encouraged to coordinate early with the Garrison Project Office staff to identify the current practices expected for interim and final reclamation. Reclamation planning should reflect that reclamation is required once disturbed areas are no longer used for their intended purpose, and applicants should plan to perform reclamation actions throughout their operation. For further information and guidance, please consult the Garrison Dam/Lake Sakakawea Project Oil and Gas Management Plan located at: https://www.nwo.usace.army.mil/Missions/Dam-and-Lake-Projects/Oil-and-Gas-Development/

b. Oil and Gas Reclamation on USACE - The primary objective of each reclamation project is to fulfill the requirements of the Corps outgrant by effectively restoring the site to its original condition. The oil and gas operator will ensure that no environmental liability remains on the property and comply with all applicable laws. A Reclamation Work Plan must be submitted to USACE before the reclamation. Further guidance on developing a reclamation work plan can be found in Appendix C.

Joshua P. Gormley

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US Army Corps of Engineers
Omaha District

Appendix A

US Army Corps of Engineers Approved Tree and Shrub Lists

Garrison Dam/Lake Sakakawea Project
North Dakota

May 2020

USACE TREE LIST: APPROVED SPECIES

Common Name	Scientific Name
Boxelder	*Acer negundo*
Paper Birch	*Betula papyrifera*
Common Hackberry	*Celtis occidentalis*
Siberian Larch	*Larix sibirica*
Black Hills Spruce	*Picea glauca*
Blue Spruce	*Picea piungens*
Ironwood	*Ostrya virginiana*
Limber Pine	*Pinus flexilis*
Ponderosa Pine	*Pinus ponderosa*
Balsam Poplar	*Populus balsamifera*
Cottonwood	*Populus deltoides*
Bigtooth Aspen	*Populus grandidentata*
Quaking Aspen	*Populus tremuloides*
Black Cottonwood	*Populus trichocarpa*
American Plum	*Prunus americana*
Chokecherry	*Prunus virginiana*
Bur Oak	*Quercus macrocarpa*
Northern Pin Oak	*Quercus ellipsoidalis*
Peachleaf Willow	*Salix amygdaloides*
American Linden	*Tilia americana*
Dolgo Crabapple	*Malus dolgo*
Midwest Crabapple	*Malus mandshurica*
Sugar Maple	*Acer saccharum*
Water Birch	*Betula occidentalis*

USACE SHRUB LIST: APPROVED SPECIES

Common Name	Scientific Name
Speckled Alder	*Alnus rugosa*
Fourwing Saltbrush	*Atriplex canescens*
Shadescale Saltbrush	*Atriplex confertifolia*
Juneberry	*Amelanchier alnifolia*
Big Sagebrush	*Artemesia tridenta*
False Indigo	*Amorpha fruticosa*
Redosier Dogwood	*Cornus sericea*
American Hazelnut	*Corylus americana*
Beaked Hazelnut	*Corylus cornuta*
Downy Hawthorn	*Crataegus mollis*
Winterfat	*Krascheninnikova lanata*
Ironwood	*Ostrya virginiana*
Woodbine	*Parthenocissus vitacea*
Wild Plum	*Prunus americana*
Pin Cherry	*Prunus pennsylvanica*
Western Sandcherry	*Prunus pumila*
Black Currant	*Ribes americanum*
Golden Currant	*Ribes aureum*
Wax Currant	*Ribes cereum*
Missouri Gooseberry	*Ribes missouriense*
Prairie Rose	*Rosa arkansana*
Woods Rose	*Rosa woodsii*
Sandbar Willow	*Salix interior*
Bebb Willow	*Salix bebbiana*
Pussy Willow	*Salix discolor*
Silver Buffaloberry	*Shepherdia argentea*
Western Snowberry / Wolfberry	*Symphoricarpos occidentalis*
Nannyberry	*Viburnum lentago*
American Cranberrybush	*Viburnum trilobum*

https://www.nd.gov/ndda/program/noxious-weeds

US Army Corps of Engineers
Omaha District

Appendix B

Seed Mixes

Garrison Dam/Lake Sakakawea Project
North Dakota

May 2020

The mix will comprise **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 54 & 58C

Loamy (Ly)

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	Big bluestem	10	6	X
	Switchgrass	15	3.5	X
	Sideoats grama	5	6	X
Cool Season	Western wheatgrass	15	8	X
	Green needlegrass	10	6	X
	Canada wildrye	5	6.5	X
Forbs (Select 8)	American vetch	5%	36	
	Blanketflower	5%	7	
	Blue aster	5%	1.5	
	Canada goldenrod	5%	0.2	
	Canada milkvetch	5%	4	
	Cudweed sagewort	5%	0.3	
	Dotted gayfeather	5%	8	
	Heath aster	5%	0.4	
	Hoary vervain	5%	2.4	
	Ironweed	5%	2.8	
	Lead plant	5%	5.4	
	Lewis blue flax	5%	3.8	
	Maximilian sunflower	5%	1	
	Missouri goldenrod	5%	0.5	
	Partridge pea	5%	10	
	Plains coreopsis	5%	0.7	
	Prairie onion	5%	6.2	
	Prairie rose	5%	24	
	Purple coneflower	5%	1	
	Purple prairie clover	5%	3.8	
	Scarlet globemallow	5%	2	
	Stiff sunflower	5%	2.5	
	Silvery lupine	5%	8	
	White prairie clover	5%	3.9	
	Wild bergamot	5%	0.9	

The mix will comprise **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 53 A&B

Loamy (Ly)

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	Big bluestem	10	6	X
	Switchgrass	15	3.5	X
	Sideoats grama	5	6	X
Cool Season	Western wheatgrass	15	8	X
	Green needlegrass	10	6	X
	Canada wildrye	5	6.5	X
Forbs (Select 8)	American vetch	5% max	36	
	Black-eyed Susan	5% max	0.8	
	Blanketflower	5% max	7	
	Blue aster	5% max	1.5	
	Canada goldenrod	5% max	0.2	
	Canada milkvetch	5% max	4	
	Cudweed sagewort	5% max	0.3	
	Dotted gayfeather	5% max	8	
	Fragrant giant hyssop	5% max	0.8	
	Heath aster	5% max	0.4	
	Hoary vervain	5% max	2.4	
	Illinois bundleflower	5% max	18	
	Ironweed	5% max	2.8	
	Maximilian sunflower	5% max	1	
	Lead plant	5% max	5.4	
	Lewis blue flax	5% max	3.8	
	Missouri goldenrod	5% max	0.5	
	Partridge pea	5% max	10	
	Plains coreopsis	5% max	0.7	
	Prairie onion	5% max	6.2	
	Prairie rose	5% max	24	
	Purple coneflower	5% max	1	
	Purple prairie clover	5% max	3.8	
	Scarlet globemallow	5% max	2	
	Shell-Leaf penstemon	5% max	4	
	Stiff sunflower	5% max	2.5	
	Silvery lupine	5% max	8	
	White prairie clover	5% max	3.9	
	Wild bergamot	5% max	0.9	

The mix will comprise **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 54 & 58C				
Sandy (Sy)				
	Species (Common Name)	**% of Mix**	**PLS/Acre**	**Selections**
Warm Season	Big bluestem	10	6	**X**
	Switchgrass	15	3.5	**X**
	Sideoats grama	5	6	**X**
Cool Season	Western wheatgrass	15	8	**X**
	Green needlegrass	10	6	**X**
	Canada wildrye	5	6.5	**X**
Forbs (Select 8)	American vetch	5%	36	X
	Black-eyed susan	5%	0.8	
	Blanketflower	5%	7	X
	Blue aster	5%	1.5	
	Butterfly milkweed	5%	16.2	
	Canada goldenrod	5%	0.2	
	Cudweed sagewort	5%	0.3	
	Dotted gayfeather	5%	8	
	Fragrant giant hyssop	5%	0.8	X
	Heath aster	5%	0.4	
	Hoary vervain	5%	2.4	
	Lead plant	5%	5.4	
	Lewis blue flax	5%	3.8	
	Maximilian sunflower	5%	1	
	Missouri goldenrod	5%	0.5	X
	Partridge pea	5%	10	
	Prairie onion	5%	6.2	
	Prairie rose	5%	24	
	Purple coneflower	5%	1	X
	Purple prairie clover	5%	3.8	X
	Shell-Leaf penstemon	5%	4	X
	Stiff sunflower	5%	2.5	X
	Silvery lupine	5%	8	
	White prairie clover	5%	3.9	

The mix will consist of **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 53A&B

Sandy (Sy)

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	Big bluestem	10	6	X
	Switchgrass	15	3.5	X
	Sideoats grama	5	6	X
Cool Season	Western wheatgrass	15	8	X
	Green needlegrass	10	6	X
	Canada wildrye	5	6.5	X
Forbs (Select 8)	American vetch	5%	36	
	Black-eyed susan	5%	0.8	
	Blanketflower	5%	7	
	Blue aster	5%	1.5	
	Butterfly milkweed	5%	16.2	
	Canada goldenrod	5%	0.2	
	Canada milkvetch	5%	4	
	Cudweed sagewort	5%	0.3	
	Dotted gayfeather	5%	8	
	Fragrant giant hyssop	5%	0.8	
	Heath aster	5%	0.4	
	Hoary vervain	5%	2.4	
	Illinois bundleflower	5%	18	
	Lead plant	5%	5.4	
	Lewis blue flax	5%	3.8	
	Maximilian sunflower	5%	1	
	Missouri goldenrod	5%	0.5	
	Partridge pea	5%	10	
	Plains coreopsis	5%	0.7	
	Prairie onion	5%	6.2	
	Prairie rose	5%	24	
	Purple coneflower	5%	1	
	Purple prairieclover	5%	3.8	
	Shell-Leaf penstemon	5%	4	
	Stiff sunflower	5%	2.5	
	Silvery lupine	5%	8	
	White prairie clover	5%	3.9	
	Wild bergamot	5%	0.9	

The mix will consist of **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 54 & 58C

Clayey (Cy)

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	Big bluestem	15	6	X
	Little bluestem	10	4	X
	Sideoats grama	5	6	X
Cool Season	Western wheatgrass	15	8	X
	Green needlegrass	10	6	X
	Canada wildrye	5	6.5	X
Forbs (Select 8)	American vetch	5%	36	
	Blanketflower	5%	7	
	Canada goldenrod	5%	0.2	
	Canada milkvetch	5%	4	
	Cudweed sagewort	5%	0.3	
	Dotted gayfeather	5%	8	
	Heath aster	5%	0.4	
	Lewis blue flax	5%	3.8	
	Maximilian sunflower	5%	1	
	Missouri goldenrod	5%	0.5	
	Prairie onion	5%	6.2	
	Prairie rose	5%	24	
	Purple coneflower	5%	1	
	Purple prairieclover	5%	3.8	
	Scarlet globemallow	5%	2	
	Silvery lupine	5%	8	
	Stiff sunflower	5%	2.5	
	White prairie clover	5%	3.9	

The mix will consist of **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 53 A&B

Clayey (Cy)

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	Big bluestem	10	6	X
	Switchgrass	15	3.5	X
	Sideoats grama	5	6	X
Cool Season	Western wheatgrass	15	8	X
	Green needlegrass	10	6	X
	Canada wildrye	5	6.5	X
Forbs (Select 8)	American vetch	5%	36	
	Black-eyed susan	5%	0.8	
	Blanketflower	5%	7	
	Canada goldenrod	5%	0.2	
	Canada milkvetch	5%	4	
	Cudweed sagewort	5%	0.3	
	Dotted gayfeather	5%	8	
	Fragrant giant hyssop	5%	0.8	
	Heath aster	5%	0.4	
	Illinois bundleflower	5%	18	
	Ironweed	5%	2.8	
	Maximilian sunflower	5%	1	
	Missouri goldenrod	5%	0.5	
	Lead plant	5%	5.4	
	Lewis blue flax	5%	3.8	
	Partridge pea	5%	10	
	Plains coreopsis	5%	0.7	
	Prairie onion	5%	6.2	
	Prairie rose	5%	24	
	Purple coneflower	5%	1	
	Purple prairieclover	5%	3.8	
	Scarlet globemallow	5%	2	
	Shell-Leaf penstemon	5%	4	
	Silvery lupine	5%	8	
	Stiff sunflower	5%	2.5	
	White prairie clover	5%	3.9	

The mix will consist of **60%** perennial grasses and **40%** perennial forbs. **Six grass species** and **eight forb species** must be selected. The grass species have been pre-selected. One of the eight forbs must be a culturally significant species (in orange).

Ecological Site MLRA 54 & 58C

Shallow Gravel & Very Shallow (SwG & VS)

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	Little bluestem	15	4	X
	Prairie sandreed	10	4	X
	Blue grama	5	2	X
Cool Season	Western wheatgrass	15	8	X
	Slender wheatgrass	10	5	X
	Canada wildrye	5	6.5	X
Forbs (Select 8)	Black-eyed susan	5%	0.8	
	Blanketflower	5%	7	
	Dotted gayfeather	5%	8	
	Lewis blue flax	5%	3.8	
	Missouri goldenrod	5%	0.5	
	Prairie rose	5%	24	
	Purple coneflower	5%	1	
	Purple prairieclover	5%	3.8	
	Scarlet globemallow	5%	2	
	Stiff sunflower	5%	2.5	

The mix will consist of **70%** perennial grasses and **30%** perennial forbs. **Six grass species** and **six forb species** must be selected. The grass species have been pre-selected. If the seed supplier does not have a species at the time of purchase, select an alternative species from the list below that was not selected.

Ecological Site MLRA 54 & 58C

Wet Meadow (WM) Site Description

	Species (Common Name)	% of Mix	PLS/Acre	Selections
Warm Season	American sloughgrass	10	0.9	X
	Prairie cordgrass	15	7	X
	Northern reedgrass	10	NR	X
	Switchgrass	10	3.5	X
Cool Season	Fowl bluegrass	10	1	X
	Slender wheatgrass	15	5	X
	Western wheatgrass	10	8	X
	Canada wildrye	10	6.5	X
Forbs (Select 6)	Black-eyed susan	5%	0.8	
	Blue vervain	5%	1	
	False boneset	5%	0.4	
	Golden alexander	5%	6.2	
	Ironweed	5%	2.8	
	Joe pye weed	5%	0.7	
	Maximilian sunflower	5%	1	
	Purple meadow rue	5%	6.2	
	Swamp milkweed	5%	15	

US Army Corps of Engineers
Omaha District

Appendix C

Oil and Gas Reclamation Guidelines

Garrison Dam/Lake Sakakawea Project
North Dakota

May 2020

OIL & GAS RECLAMATION GUIDELINES
U.S. ARMY CORPS OF ENGINEERS, GARRISON PROJECT

1. Introduction:

This Guideline is intended to provide a strategic framework for Oil and Gas Reclamation projects on U.S. Government-owned properties for which the US Army Corps of Engineers (Corps) has management and operational responsibilities. The primary objective of each reclamation project is to fulfill the Corps' outgrant or permit requirements by effectively restoring the site to its original or similar condition to the satisfaction of the Corps. The oil and gas operator will ensure that no environmental liability remains at the property and will comply with all applicable federal, tribal, state, or local laws. The Corps will provide written notification of appropriate closure to the operator after the site is successfully restored.

2. Regulatory Requirements:

- *Surface Standards and Guidelines for Oil and Gas Exploration and Development - The Gold Book* (BLM, 2007).
- *NDIC Administrative Rule 43-02-03-34.1. - Reclamation of Surface* (NDIC, 2014a)
- *Cleanup Action Levels for Gasoline and Other Petroleum Hydrocarbons, North Dakota Department of Health* (NDDoH, 2006).
- Guidelines for the Assessment and Cleanup of Saltwater Releases, North Dakota Department of Health, Environmental Health Section Division of Water Quality (NDDOH, 2016).
- Industry standard best management practices (BMPs)

3. Mineral Ownership:

Coordination will be required with the North Dakota Industrial Commission (NDIC) and/or the Bureau of Land Management (BLM). The NDIC has jurisdiction over state and private minerals, while the BLM has jurisdiction over federal minerals. Depending on mineral ownership, the Plug & Abandon (P&A) Report and Sundry Notices shall be filed with the appropriate agency.

Copies of the sundry notices and reports shall be provided to the Corps when they are provided to the NDIC and/or BLM. Approval of the Sundry Notices will be given by the agency with jurisdiction, with concurrence by the Corps.

4. Soil Sampling, Constituents of Concern, and Field Screening:

4.1. Sampling & Analysis Plan:

The operator shall perform no less than five (5) test pits per acre to a minimum depth of twelve inches below the original ground surface. Test locations will be submitted to the Corps for approval before completion. Composite samples will be collected based on biased sampling methods. Soil that is suspected to be impacted will be included in the composite sample based on visual and olfactory means. Composite samples should be taken from the following locations on the well pad that have shown to be historically impacted by crude oil and/or brine: well head, flare pit, heater treater, tank battery, pipeline corridors, stormwater catchment basins, and reserve/trash pits (if no record of approved interim reclamation and/or vegetation is not growing adequately on the surface). Results from the sampling analysis will be provided to the Corps and incorporated into the RWP.

4.2. Constituents of Concern (COCs):

Once operations are complete, the oil and gas system requires reclamation, including identifying, segregating, and removing contaminated soils from the site before regrading and revegetation. Soil sampling will be conducted to determine if soils in the overburden or subsurface are impacted. Impacted soils will be characterized per NDIC and NDDOH guidelines:

- Electrical Conductivity (EC): 2,000 micro-Siemens per centimeter (µS/cm) where soils are located in the root zone (upper 12 inches of the final grade) and 4,000 µS/cm where soils are not within the root zone; and
- Total Petroleum Hydrocarbons (TPH-DRO, GRO, & ORO): 100 ppm (mg/kg)

A list of COCs which are typically related to oil and gas production and are identified as important to the Corps for future environmental liabilities at the site include:

- Volatile Organic Compounds- Benzene, Toluene, Ethylbenzene, Xylene (BTEX
- Heavy Metals- Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver

Specific cleanup standards for these additional COCs are not available from the regulatory agencies. However, analytical results from soil sampling at the well pad will be compared to background levels as a baseline for determining potentially impacted soils. If analytical results indicate that there is significant variance between background levels and the well site samples (e.g. two times background), the operator will contact the Corps to discuss cleanup level scenarios specific to the site.

The following parameters will be analyzed to verify acceptability of the soil as vegetation medium: pH, alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate, sodium absorption ratio (SAR), and organic matter. Results from these COCs will also be reviewed against background levels to determine if additional remedial actions are needed for vegetation to successfully grow at the site.

4.3. Field & Confirmation Screening Methods:

Field screening methods will be used to delineate the extent of soils that were determined to be impacted based upon initial sampling analysis. Any soil that exhibits visual and olfactory signs of contamination will continue to be field screened until COC action levels are no longer exceeded. Observations and field screening data should be provided to the Corps in a final report.

Field screening for pH and EC will be conducted according to Section V of the NDIC's, *A Guide for Remediation of Salt/Hydrocarbon Impacted Soil* (NDIC Guide) (NDIC, 2014b). Common examples include using an EC meter or using field titrations for chloride according to the Hach Company Chloride QuanTab® Test Strips instructions.

TPH field screening should be conducted according to the EPA SW 486 analytical method. One example would be to use the Dexsil Corporation's *PetroFLAG® Hydrocarbon Analysis System User's Manual* (Dexsil, 1997). The PetroFLAG® System can be used to conduct TPH field screening because field trials demonstrated by the U.S. Environmental Protection Agency (EPA) for the PetroFLAG® System exhibited statistical correlations that compared well with EPA SW 486 analytical methods.

Additional field screening methods may be requested and used by the operator if approved by the Corps.

5. Removal Alternatives for Overburden/Fill Material

When well pads are constructed, borrow material such as overburden or fill is typically placed onto the site to construct a flat operational surface. A common condition of approval (COA) in Corps permits for oil & gas well pads is for the operator to remove all fill material from the site during reclamation and restore the site to original contours. The operator has two basic alternatives on how to remove the overburden from the site.

5.1. Transport all fill to a landfill:

The operator may choose to simply excavate and transport all fill material to a depth of one foot below original grade to a landfill. In this scenario, soil sampling of the fill material would not be required for Corps purposes but may be required for transportation and disposal purposes. Additionally, confirmation sampling of the COCs listed above would still be required 12 inches below original grade. Doing so is required to ensure that the site does not contain any residual contamination. If contamination is found, subsoil will be removed until COC action levels are no longer exceeded or to a depth of four feet below original grade. The operator would need to propose a soil removal alternative if COCs are still found to be exceed action levels at a depth of four feet or deeper. See Section 6.9 for more information.

5.2. Initial sampling and reuse of clean overburden:

The Corps would prefer to reuse 'clean' overburden as a road amendment on nearby Corps managed property. Doing so would reduce transportation costs to the operator and provide benefits to public access roads without cost to the Corps or taxpayer. 'Clean' overburden will be characterized using both initial sampling analysis and subsequent field screening methods during excavation. The criteria for 'clean' overburden for beneficial reuse will include: BELOW the regulatory limits for TPH at 100 ppm AND for salinity at 4,000 µS/cm AND not exhibiting 'red flags' when background is compared to any of the additional COCs identified in Section 4.2.

6. Reclamation Work Plan (RWP) Requirements

6.1. Site History: The operator shall consolidate applicable documentation for the history of the site. Examples will include but are not limited to: the Corps permit with COAs, photos/mapping of the site prior to disturbance, application for permit to drill (APD), surface use plan, spill reports from the site, interim reclamation documentation, sundry notices and reports, mapping of both owned and support facilities (i.e. service roads, electrical service, pipelines, etc), and cultural resource clearances. This information will be used by the operator to draft a site-specific reclamation work plan (RWP). Copies of this information will be referenced as appendices in the RWP.

6.2. Schedule:

The operator will submit a schedule that outlines when the necessary work is anticipated to be completed. The Corps will be notified and presented a RWP at least 30 days prior to initiating reclamation. A Sundry Notice will be filed with the BLM or NDIC to receive concurrence with the RWP. Corps personnel will be notified at least 48 hours prior to commencement and completion of key work items. All work shall be completed within 360 days of filing the Sundry Notice to P&A the well. A Sundry Notice will be filed with the NDIC within 30 days after the reclamation work is performed. Copies of all Sundry's will be provided to the Corps.

6.3. Coordination:

The operator will be required to coordinate and insure the RWP includes the contact information for the following entities: regulatory agency POC per mineral ownership (i.e. BLM or NDIC), Corps POC, Corps third party lessee POC (if applicable, e.g. ND Game & Fish), operator engineering firm/consultant POC, operator contractor POC, analytical laboratories POC, waste disposal facility POC, operator QC POC, operator safety POC, etc.

6.4. Quality Control & Safety Plan:

The operator will insure the RWP identifies specific quality control and safety objectives for each phase of the work and describes how they will be accomplished. The operator will also insure one-call notifications for utility marking are made prior to earthworks commencing and have a contingency plan for emergencies.

6.5. Archaeological Clearance:

Reclamation projects that occur within the footprint of the existing facilities are typically determined to be exempt from review under Section 2B(6)(b) of the Omaha Districts Operations Project Exemption List for the Missouri River Programmatic Agreement. However, the operator should insure that the RWP includes an archaeological clearance from the Corps. There are professional archaeologists on staff at the Garrison Project in Riverdale, ND to assist with this clearance.

6.6 Threatened & Endangered (T&E) Species:

The operator will immediately suspend all work and notify the Corps if any T&E species are discovered during the reclamation project. Examples of such species in Western North Dakota could include but are not limited to: black- footed ferret, gray wolf, Dakota skipper, Sprague's pipit, interior least tern, pallid sturgeon, piping plover, and/or whooping crane. Wildlife enclosures, if applicable, will be strictly adhered to. The Corps will provide site specific T&E requirements to the operator for inclusion in the RWP.

6.7. Decommissioning Facilities & Equipment:

The operator will remove all aboveground facilities and equipment on the site and properly dispose of at an approved facility. The operator will also remove and properly dispose of all underground facilities and equipment to a depth of four feet below original ground surface. Plug & abandonment procedures for pipelines located more than 4' below original ground surface will be approved by the Corps. Proper safety procedures such as lockout tagout will be used when decommissioning all electrical and mechanical equipment. A final abandonment marker will be placed on the site as specified by the NDIC and/or BLM. The Corps recommends that a steel plate dry hole marker be welded to the surface casing four or more feet below original ground surface. Reference *State of North Dakota Century Code NDCC 38-08-04 and Reclamation of Surface under Code 43-02-03-34.1* for more information.

6.8. Removing Impacted Soils:

Impacted soils identified by soil sampling and analysis and field screening methods will be excavated and properly disposed of at a licensed landfill facility. If soil confirmation sampling indicates that additional removal is necessary, these soils will be removed and disposed of at a licensed landfill facility, and additional confirmation sampling will continue until the area is deemed free of impacted soil or approval is received from the Corps to apply an alternative remediation measure. The operator will provide the name and location of the landfill facility prior to shipment. Shipping manifests will be maintained to track materials removed from the site. During excavation and removal of the overburden and subsurface materials of the operational pad, impacted soils will be identified, segregated, and removed based on sampling analysis, field observations (e.g., visual staining, odor, etc.), and field screening methods.

6.9. Soil Removal Alternative:

The operator may seek Corps approval to implement a soil removal alternative if the initial soil sampling analysis and/or confirmation screening indicate that the subsoil continues to exceed COC cleanup standards at depths greater than 4 feet below the original ground surface. There are many variables to consider when choosing a soil removal alternative. One example would be to consider Section VI.A of the *NDIC Guide (NDIC, 2014b)*. Once the alternative is approved by the Corps, the operator shall delineate the remedy area and provide GIS shapefile and time stamped digital photos to the Corps. Monitoring should be conducted on the remedy area for a period of 3 years to ensure contamination does not migrate to the remediated surface. Further remediation may be required by the operator if vegetation does not grow on the site or COC cleanup standards are exceeded at the site during the 3 year monitoring period.

6.10. General Earthworks:

The operator will provide the name and contact information for the contractor who will conduct earthworks at the site. Ideally, the contractor will be present at the initial on-site meeting. The operator or their contractor will obtain any proper NPDES and/or SWPPP from the ND Department of Health prior to commencing earthwork operations. Prior to accessing federal lands, the contractor must pressure wash or air blast all equipment to remove all existing soils and/or vegetation. Doing so will prevent the introduction of noxious weeds or other undesirable vegetation. The operator must provide proof of the cleaning to the Corps within three (3) days of the cleaning.

After the overburden and impacted subsoils are removed from the site, the existing well pad site and supporting access roads shall be reshaped to pre-existing topography. Natural drainages will be reestablished. All borrow material or topsoil that is brought onto the site will be certified weed free. Placement of clean fill will be compacted to a depth of one foot below original grade and will achieve 95% compaction via a performance standard identified in the RWP.

6.11. Topsoil:

The operator will place a minimum one foot of topsoil to finish grade and will first utilize stockpiled topsoil that was set aside during well pad construction. Established trees will be protected during the redistribution of stockpiled topsoil. Additional topsoil from a certified weed free source can be used to achieve the desired thickness of topsoil.

6.12. Seeding:

Native seed mixes will be certified weed free and approved by the Corps prior to application. Seed, fertilizer, and mulch will be distributed by appropriate methods as dictated by the topography on the site. Analysis from initial soil sampling will be used to determine fertilizer application rates.

6.13. Fencing:

In most cases, existing fencing around the well pad will be removed or relocated after vegetation is adequately established on the site. However, additional fencing, signage, and/or deterrents may be required to discourage travel and/or grazing on the reclaimed areas. The Corps will provide site specific fencing requirements to the operator for inclusion in the RWP.

6.14. Weed Management:

The operator will be responsible for weed management on the site until the reclamation project receives final approval by the Corps. Approved pesticides can be used for weed management purposes according to applicable Federal, State, Tribal, and local laws.

Management of Invasive and Noxious Weeds, as listed on the North Dakota Noxious and Invasive list, will be dealt with in a prompt and environmentally safe manner. Noxious or invasive weeds will be managed using pesticides appropriate for the type of weed and seed mixes used on the reclaimed areas. Records of pesticide application will be provided to the Corps for each day that treatment of weeds takes place.

7. Monitoring

The site will be monitored for erosion and vegetation management for a minimum period of 3 years. Reclamation will be considered accomplished by the Corps when there is the weed-free establishment of 90%+ vegetative cover, consisting of grasses and forbs, on the site.

8. Final Approval/Environmental Condition of Property (ECP)

The operator will make a formal request for approval to the Corps. In response, the Corps will formally concur in writing after all terms and conditions of outgrant and RWP are achieved. The Corps will complete an ECP at the termination of outgrants that have a potential for past or future Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) liability. ECPs are a means for the Corps to document CERCLA liability when outgrants are issued and terminated. The operator may request a copy of the completed ECP as part of the final approval from the Corps.