

Encana Oil and Gas (USA) Inc.

2016 Master Reclamation Plan

Piceance Basin

encana



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List of Appendices

Appendix A: Surface Management Guidelines, Expectations, and Specifications

Appendix B: Vegetation Monitoring Program Manual

This master reclamation plan is designed to identify regulatory expectations and detail the sequence of actions towards achieving successful reclamation in the Piceance Field (areas of primary operation within Garfield, Mesa, and Rio Blanco Counties). Through a wide range of tools and management practices, Encana works to establish a diverse, self-sustaining mosaic of vegetative cover that meets compliance requirements and provides a basis for visual resource, stormwater management, revegetation, and productive land use. This objective begins with pre-construction site analysis, design, earthwork, and topsoil conservation during initial construction, and continues with improved and tested practices and active management through the point of final land-owner/agency approvals and bond release. For more specific information on Encana's reclamation expectations, throughout the life-phases of disturbances, please refer to Appendix A, the Surface Management Guidelines, Expectations, and Specifications.

1.0 Pre-Disturbance Site Characterization

Site specific soil, vegetation and landscape data may be collected for each area of development. The data is summarized in a Biological Assessment Report (BAR), Mini BAR or Initial Site Assessment (ISA) (see Appendix A). The baseline information is used to establish the best methods for reclamation for the life of Oil and Gas operations. All or a portion of the following baseline conditions are evaluated and reported by a qualified third party:

- 1.1** *Project Area* – The project location and area to be disturbed will be described.
- 1.2** *Soils* – Baseline soils data collection requires that an Order 1 Soil Survey is completed by a competent Soil Scientist. Information from the soil survey including physical and chemical lab data are used to establish a topsoil management plan for the Oil and Gas disturbance.
- 1.3** *Vegetation* – A Vegetation Survey of each proposed pad, access road or ancillary facilities pad would consist of identifying individual species of grasses and forbs and a technical assessment of the current percent basal cover of those species present on the proposed development site. The species list would be used to pick those species which match with the BLM or Forest Service approved species list for reclamation.
- 1.4** *Federally and State Listed Candidate, Threatened and Endangered Plant Species* – A species survey will be conducted to identify potential suitable habitat and species of concern identified within the project area.
- 1.5** *Noxious Weeds* – The baseline noxious weed inventory would be utilized to identify areas requiring pre-disturbance weed control through application of proper herbicides. Also, the survey would provide documentation on the presence of noxious weeds on areas directly adjacent to Encana's proposed development site(s).
- 1.6** *Federally and State Listed Candidate, Threatened and Endangered Animal Species* – A species survey will be conducted to identify potential suitable habitat and species of concern identified within the project area.
- 1.7** *Wildlife* – A wildlife survey will be conducted on the project area. Species may include raptors, migratory, non-migratory and Birds of Conservation Concern, American elk and mule deer, black bear and mountain lion, small mammals, herpetiles, and other species of interest.

- 1.8** *Waters of the United States* – A description of the survey area will include vegetation communities, average climate, recent weather, etc.
- 1.9** *Wetland Delineation* – A description of the survey area, including wetlands, other waters, and uplands within survey area, average climate, recent weather, etc. Delineations results will include USACE Wetland Delineation Manual and appropriate Regional Supplement forms.
- 1.10** *Flood Plain Verification* – Description of the survey area, including wetlands, other waters, and uplands within survey area, average climate, recent weather, etc.
- 1.11** *Visual Resources* – A survey will be conducted to identify what Visual Resource Mitigation Class (as determined by BLM on federal surface) the project falls within. The report should include planning and design criteria to minimize the visual impacts of surface-disturbing activities and to maintain scenic values.
- 1.12** *Archeological Resources* – A survey will be conducted to identify and Archeological Resources in the project area. Archaeological Resources consist of the physical remains of past human activity. These resources may be of regional, national or international significance. These resources are often very susceptible to disturbance and are non-renewable and finite in number so planning and design mitigate impact to these resources. The report should include planning and design criteria for maintaining the resource or criteria for mitigating the impact.
- 1.13** *Paleontological Resources* – A survey will be conducted to identify and Paleontological Resources in the project area. Paleontological Resources are fragile and nonrenewable scientific records of the history of life on earth, and so represent an important and critical component of America's natural heritage. Planning and design with paleontological resources is important because once these resources are "damaged, destroyed or improperly collected, their scientific and educational value may be greatly reduced or lost forever.
- 1.14** *Photo Documentation* – Photo documentation of each vegetation transect and soil pit will be included in the final report.

2.0 Surface Disturbing Activities

This section outlines general reclamation requirements from Federal, State and Local Municipalities which operators are obligated to follow:

- Manage waste materials
- Implement Best Management Practices (BMPs)
- Conduct documented inspections per Permit requirements
- Ensure subsurface integrity (geology & hydro-geology)
- Re-establish slope stability and topographic diversity
- Re-establish stable water courses and drainage features
- Ensure biological, chemical, physical integrity of soil
- Prepare site to meet the needs for plant establishment
- Re-establish desired self-perpetuating native plant community

- Return visual composition to blend with surroundings
- Prevent introduction / establishment of invasive plants
- Implement a monitoring and management protocol

2.1 Manage of Waste Materials

Before reclamation earthwork is initiated, qualified environmental personnel will complete a records search and site-assessment for the purpose of identifying potential soil impacts resulting from current and historic activities on the pad. The site-assessment includes collection of field notes and a photographic record of site conditions. Soil samples will be collected from the footprint of removed production equipment, from any visibly stained soil, and wherever stormwater accumulations may concentrate contaminants. Collected soil samples will be analyzed for compliance with Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 (separate document) constituents of concern. If laboratory analysis identifies hydrocarbon contaminated soil, an evaluation of impacts and site-specific conditions will be undertaken to determine if onsite remediation or offsite disposal is appropriate. All remediation and disposal activities will be directed by qualified environmental personnel using field screening techniques, verified by laboratory analysis, and in compliance with COGCC 900 Series Rules. Removal of contaminated material will be reported to the landowner and the COGCC.

2.2 Pipeline Abandonment and Removal (Final Reclamation)

Final abandonment of pipelines and flowlines will include purging, proper disposal of fluids, then plugging at specific intervals. All surface lines and any lines that may be exposed in the foreseeable future due to water or wind erosion, soil movement, or anticipated subsequent use, will be removed. Exceptions for site-specific situations may be requested and include: Facilities, risers, meter housing, or other pipelines that must remain on location for current use related to other operations, or owned by a 3rd party. In these cases, re-assignment of responsibility may be needed, concerning final removal of any remaining equipment and pipeline right-of-way (ROW) final reclamation.

2.3 Dust Abatement

Fugitive dust will be prevented and abated as needed, whether created by vehicular traffic, equipment operations or wind events. The BLM may direct the operator to change the level and type of treatment if dust abatement is insufficient. BLM approval is required before application of surfactants, binding agents, or other dust-suppression chemicals on roadways within public lands. Speed control measures on all project-related unpaved roads will also be required. More stringent dust control may be required in areas adjacent to Federal or State listed threatened, endangered, or sensitive plant species.

2.4 Ground and Surface Water Integrity

The operator will ensure the integrity of sub-surface resources by plugging drilled holes and surface openings, and filling/capping any other openings to ensure that contamination of ground and surface water does not occur. The Colorado Oil and Gas Conservation Commission (COGCC) issues state-wide rules and regulations to govern the development of oil and gas in Colorado. Current COGCC rules can be accessed through the "Regulation" page on the COGCC's website (<http://cogcc.state.co.us/#/home>).

2.5 Soil Management

Soils will be managed in accordance with the findings summarized in BAR, Mini BAR or ISA document. In general, topsoil will be collected from the uppermost horizon and stored separately from the subsoil. Topsoil depth may vary across the well pad site, and will be stripped and salvaged accordingly. Contractors will reference the site-specific document to determine salvage strategies.

Precautions will be taken to protect soil from erosion, degradation and contamination, including covering piles with mulch, and diverting water run-on or run-off around piles. Soil that will be stored for more than one growing season will be seeded with short-lived species to compete against weeds and help maintain soil microbial activity. Soil should not be piled too high, as the resulting compaction and anaerobic conditions can result in soil degradation. Seed mix recommendations are included in BAR or ISA. Please reference Appendix A, the Surface Management Guidelines, Expectations, and Specifications for more detail on Soil Management, throughout the life-phases of disturbances.

2.6 Vegetation Promotion

With proper soil and subsoil handling and placement, natural drainage patterns can be restored promoting the germination and establishment of desirable vegetation species. For detailed specifications and procedures, please reference Appendix A, the Surface Management Guidelines, Expectations, and Specifications.

2.7 Slope Stability, Surface Stability and Topographic Diversity

Reclaimed topographic conditions should be similar to pre-disturbance conditions described in the site specific document and the surveyor plats. The reclaimed landscape should blend with the surrounding contours, and erosion prevention and maintenance of current hydrology will be necessary. Refer to Appendix A, the Surface Management Guidelines, Expectations, and Specifications.

2.8 Visual Composition

During the reclamation process, the operator will ensure that the well pad site blends in with the surrounding landscape, so that the scenic quality is not altered. Efforts will also be made to ensure visual quality during the construction/production phase. Primarily, long-term Visual Resource Management (VRM) is implemented during Interim Reclamation, through land-forming. Other components of VRM include properly matched paint for facilities (as directed by BLM or other surface owner criteria). Refer to Appendix A, the Surface Management Guidelines, Expectations, and Specifications.

2.9 Sheet and Rill Erosion

Best management practices (BMPs) will be utilized during all phases of construction and reclamation on all projects to minimize sheet and rill erosion. The implementations of BMPs are a requirement of the CDPS General Permit for Stormwater Discharges Associated with Construction Activity, managed by the

Colorado Department of Public Health and Environmental (CDPHE) - Water Quality Control Division (WQCD) and COGCC's Reclamation Regulations - 1000 Series Rules.

All erosion control methods will follow the standards outlined in Encana's BMP Manual (see Appendix A). Non-structural BMPs related to sheet and rill erosion will include construction techniques to minimize land disturbance by proper site construction planning, scheduling and preserving natural/native vegetation. Depending on site specific needs, water bars, wing ditches, drainage dips and culverts will be utilized to manage water along road/pipeline ROWs. Depending on site-specific conditions, stabilization measures may include the following types of structural BMPs: retention structures (i.e. sediment traps, straw bales, or other containment devices), infiltration structures (i.e. gravel and sand), and diversionary structures (i.e. culverts, wing ditches, water bars, berms and diversion ditches). Erosion on steep slopes may be controlled using standard methods such as mulching, tackifiers, hydromulch, and/or matting, depending on site-specific conditions.

All runoff and erosion control structures will be inspected periodically, cleaned out, and maintained in functional condition throughout the life of the BMP. The timing of inspection/monitoring will comply with CDPHE standards (i.e. every 14 calendar days *and* within 24 hours of any major precipitation and/or snow melt event). From completion of seeding and initial installation of BMPs, sites are then monitored every 30 days, to the point of reaching 70% relative cover to pre-existing or surrounding vegetation, per CDPHE rules for Final Stabilization. After the site is final stabilized under CDPHE standards, it is monitored under COGCC rules, through the point of 80% vegetative cover, again relative to pre-existing or surrounding areas. Corrective actions needed for repair of erosion issues, during any point of the monitoring processes, are documented and repairs are completed, as soon as possible.

2.10 Drainages and Riparian Areas:

Areas identified as Wetland or critical Riparian habitat areas are mitigated primarily by avoidance in the planning phase. Local, State, and Federal rules and guidelines are followed, when applicable, for any disturbance falling within Encana's nation-wide Army Corp 404 Wetlands permit or other site specific permitting as needed. If a project cannot be relocated to avoid impacts a site specific reclamation plan will be developed to address the riparian habitat. This plan is developed with the agencies and landowner in the planning phase.

3.0 Site Preparation and Seeding

This section outlines standards that will be adhered to during the reclamation period. All operators and contractors will be aware of and comply with the following standards outlined in Appendix A: the Surface Management Guidelines, Expectations, and Specifications.

- Compaction will be mitigated in areas with significant traffic or weight placed on them (i.e. parking areas) to approximately 18-24 inches, using standard ripping methods.
- Ripping will take place prior to application of topsoil.
- Soil will be redistributed with the subsoil spread first and then the topsoil on top.
- The topsoil should be spread to a depth of 4 to 6 inches across the disturbed areas.

- Seedling success will be encouraged by using the following practices as appropriate: erosion control matting, mulching, hydroseeding, surface roughening, fencing, targeted amendment of the soils, and geotextiles.
- A desired plant community will be established by using a seed mix appropriate for the site.
- Soil will be tested for pH, electrical conductivity (EC), and reactivity.
- Seed will be selected that is locally adapted and genetically appropriate.
- Non-native plants will not be seeded unless approved by the surface land owner.

3.1 Seeding Methods

The methods required to successfully seed reclamation areas differ substantially from standard methods used for agriculture. Terrain is rougher, soils are often shallow, and seeding methods vary from species to species. Methods must be adaptable to account for individual species requirements within the seed mix. Segregation of seed by size and planting depth is critical for optimal regrowth, as different plant species have different seed sizes and require different planting depths.

Seeding methods to be used on the site will be selected based on project conditions. Options include drill seeding, drill seeding with special handling of seed, hand or mechanical broadcasting, or hydro-seeding. Refer to Appendix A, the Surface Management Guidelines, Expectations, and Specifications.

3.2 Seed Mix Development

An important goal of a site-specific reclamation plan is to develop a seed mix which is representative of the pre-disturbance vegetation or long term management plan of the surface owner. Documentation of the Pure Live Seed (PLS) used in the seed mix is required. PLS is a measure describing the percentage of a quantity of seed that will germinate as a percentage of a given weight of seed. PLS is a way to standardize quality allowing the purchaser to compare the quality and value of different lots of seed. PLS is calculated by multiplying the percent purity of the seed mix and the percent germination together and dividing by 100. $PLS = \% \text{ purity} \times \% \text{ germination} / 100$.

Example of a PLS Calculation:

A recommended seed mixture requires that 5 lbs. (PLS) of intermediate wheatgrass be planted:

Intermediate wheatgrass germination = 80%

Intermediate wheatgrass purity = 90%

$80\% \times 90\% (PLS) = 0.72$

5 lbs. (PLS) to be planted = Approximately 7 lbs. of bagged

*0.72 (PLS factor) seed should be included in the
mixture so that 5 lbs. of PLS will be planted.*

Thus, a seed species PLS factor is based on germination multiplied by purity. In order to plant one PLS pound of a species you may end up planting 1.6 to 2.0 times more seed which is considered the bulk seed amount.

3.3 Site Specific Seed Mixes

Oil and Gas reclamation seed mixes for the Colorado River Valley and Grand Junction BLM Field Offices, include six menu driven seed mixtures that are based on common vegetation communities and associated general elevations and eco-system. Similarly, White River BLM Field Office has eight preferred seed mixes. Further requirements are a minimum of 60 pure live seeds per square foot drill seed rate and double this rate for hydro-seed and broadcast seed applications. The BLM leaves it up to individual landowners as to their desired seed mixture(s) for revegetation. The approved BLM seed mixtures are included in Appendix A.

If the BAR or ISA indicates that there are high densities of grasses or forbs on any given proposed facility, pad, or pipeline that is not in current seed mixtures, a variance may be requested for inclusion of the species.

3.4 Seedbed Preparation

Soil preparation is a critical first step to revegetation. The objective is to have the top 8 inches of surface soil loose enough to allow for root growth and firm enough on the surface for good seed to soil contact. The soil surface should also be relatively free of rocks, debris, and dirt clods greater than 3 inches in diameter. Too much debris, rock, and clods will prohibit proper seed placement.

There are several types of implements that can be pulled behind agricultural tractors or small dozers to till the soil. These consist of disks, chisel plows, subsoilers, and harrows. The working widths commercially available for soil preparation implements typically vary from 6 feet to over 20 feet. The working width of implements used by contractors is typically based on site access and size. Also, on slopes steeper than 2:1 or otherwise prohibitive to tractor work, soil seed bed preparation is accomplished with track hoe excavators. In these circumstances, final grade and topsoil is typically surface-roughened for erosion control and moisture retention and these areas are broadcast seeded (usually with Hydraulic application). To help prevent improper Sub-soil preparation and possible contamination of topsoil, final grade of Sub-soil must be approved by Encana's Reclamation and Construction Coordinator prior to topsoil placement. Refer to Appendix A, the Surface Management Guidelines, Expectations, and Specifications.

3.5 Site Protection

When appropriate, reclaim areas will be fenced for the exclusion of livestock grazing until seeded species are well established. Typically, a wildlife-friendly, four-strand fence is specified, with wood H-bracing on each corner, and a "Cowboy" style wire gate for maintenance access. BLM surface locations will be fenced according to the specifications listed below.

- In deer and elk habitat, fences for livestock exclusion will not exceed 40 inches. The four strand fence will have smooth top and bottom wires. Distance from the ground to the bottom smooth wire will be no less than 16 inches. Distance from the top wire to the second wire will be no less than 12 inches. Middle wires will be barbed, with 6 inch spacing.

Livestock fencing standards for BLM may be also be found on page 18 of the Gold Book, 4th Edition, in BLM Manual Handbook H-1741-1, p. 16, or electric fencing may be approved. Fencing will remain in place and properly maintained, for Encana reclamation sites, throughout vegetation establishment, until the site is approved by COGCC for Interim complete or Final Reclaim bond release. Or, in the case of BLM surfaces, fence will remain until Interim Reclaim Approval or Final Abandonment Notice (FAN) is conditionally approved (with order to remove fence) on final reclaims.

4.0 Invasive Species

Noxious weeds will be documented during the pre-disturbance survey, and site-specific management will be addressed. A general stand-alone Weed Management Plan is included in Appendix A. This plan outlines management goals, methods, and monitoring of weeds. Weed surveys will be completed annually for the life of the project, following these protocols. Herbicide use must be approved prior to spraying on BLM surface, and the following standards will be followed:

- A Pesticide Use Proposal (PUP) will be submitted and approved prior to the use of herbicides on Public Lands.
- A Weed Management Plan (Appendix A) will be submitted and approved prior to the use of herbicides.
- Pesticide Application Records (PARs) will be submitted to the BLM office.
- A Pesticide Use Report will be submitted at the end of the treatment season.

5.0 Monitoring and Success Criteria

The purpose of Encana's Vegetation Monitoring Program (Program) is to verify compliance with Federal and State reclamation success requirements to establish early seral stage development for desirable vegetation. The Program utilizes the Stormwater and Inspection Programs as means to identify when a disturbance requires a quantitative vegetation measurement, in addition to other regulatory required monitoring cycles. Encana utilizes the Assessment, Inventory and Monitoring (AIM) Strategy which is recorded within the Database for Inventory, Monitoring and Assessment (DIMA), see Appendix B: Vegetation Monitoring Manual. For Colorado River Valley, Grand Junction, and White River Field offices, annual Reclamation Status Reports are completed on a three-year rotation for Interim and Final Reclaim locations after the 2nd season of establishment.

Another purpose of the Program is to verify when reclamation success criteria are met and all required Regulatory notifications have been made. Criteria, currently in the WRFO BLM Resource Management Plan (Aug. 2015), will serve as the basis for Encana's overall reclamation success goals. Those criteria are listed below.

- At a minimum, the established plant community will consist of species included in the seed mix and/or desirable species which occur in the surrounding natural vegetation.
 - Permanent vegetative cover will be determined successful when the basal cover of desirable perennial species is at least 80 percent of the basal cover of the undisturbed

site or, of a reference area, or, if available, of the potential basal cover as defined in the National Resource Conservation Service (NRCS) Range/Ecological Site(s) for the area.

- The resulting plant community (in a healthy early seral state) must contain at least 80 percent desirable plant species, preferably one of which is a forb or shrub. Plants must be resilient, as demonstrated by vigor, well-developed root systems and flowers. Shrubs must be well established and at least in a “young” age class, rather than comprised mainly of seedlings that might not survive.
- No one species may exceed 70 percent basal cover in the resulting plant community, to achieve species diversity on the site. Desirable species include those defined by those in the BLM-approved seed mix, other desired species found in the reference area, or potential species in the NRCS range/ecological site.

Reference areas may be identified when areas near the disturbance do not reflect the appropriate plant community. Prior to BLM approval for use as a reference area, an operator may provide quantitative site measurements of vegetation cover, vegetation composition, woody plant density, and percent bare ground.

Encana utilizes the vegetation monitoring data to determine and document if the success criteria have been met for the BLM and COGCC for a FAN or bond release, as stated above. The data is also used to assess and potentially modify the reclamation strategy on each location. Modifications could include, but are not limited to, implementing more aggressive weed treatments, reseeding with a modified seed mix, grazing, irrigating, and fertilizing.

Again Encana’s objective, through a wide range of tools and management practices, is to establish a diverse, self-sustaining mosaic of vegetative cover that meets compliance requirements and provides a basis for visual resource, stormwater management, revegetation, and productive land use.

Appendix A: Surface Management Guidelines, Expectations, and Specifications

Appendix B: Vegetation Monitoring Program Manual