

Volume 1
Master Stormwater Management Plan
South Parachute Unit
COR-038210

Prepared by:
Encana Oil & Gas (USA) Inc.
Parachute, Colorado
Revised June 2009

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Prepared By Monroe Stocking

Reviewed By Bryan Whiteley

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1.0 Introduction

This Master Stormwater Management Plan (Master SWMP) satisfies the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD) General Permit No. COR-030000 issued on May 31, 2007 for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit). Encana Oil & Gas (USA) Inc. (Encana) has submitted a General Permit Application to WQCD, a copy of which is provided as Appendix A.

This Master SWMP has been prepared in compliance with CDPHE WQCD, the Federal Clean Water Act (CWA), and the National Pollutant Discharge Elimination Permit (NPDES) regulations found in 40 CFR, Part 122.26 for stormwater discharges.

The objectives of this Master SWMP are to:

1. Identify all potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges associated with construction activity within this Master SWMP permit area at each project site;
2. Describe the practices to be used to reduce the pollutants in stormwater discharges associated with construction activity within this Master SWMP permit area at each project site (also known as Best Management Practices (BMPs)); and ensure the practices are selected and described in accordance with good engineering practices, including the installation, implementation and maintenance requirements;
3. Be properly prepared and updated to ensure compliance with the terms and conditions of the Stormwater Construction Permit;
4. Work hand in hand with the Site Specific Records, as described in the following section; and
5. Serve as an education tool and comprehensive reference/guide to stormwater management for inspectors, surveyors, engineers, and Encana employees and contractors.

Encana construction activities fall under one of two types. Exploration and Production (E&P) sites involve the construction of well pads, roads, and other facilities. Midstream Services (also referred to as Gas Gathering) sites involve the construction of pipelines and compressor, treatment, and other facilities. This Master SWMP is intended to address stormwater management for any and all of these sites within this Master SWMP's Permit Coverage Area.

1.1 Site Specific Records

While Volume 1 of the Master SWMP contains all of the general permit area information, Volume 2 of the Master SWMP contains all of the Site Specific Records including all Individual Stormwater Site Plans (Site Plans), as discussed in Section 2.8, and all Inspection and Maintenance Reports (discussed in Section 5.4). These Site Specific Records contain information specific to each site (each well pad, compressor station, section of road/pipeline, etc.), including information on areas of disturbance, ecosystems and vegetation, soil types, percent pre-disturbance vegetation, etc. Any changes to the design of individual sites or the BMPs used at those sites will be noted on the Site Plans as those changes occur, and kept with the Site Specific Records.

The Site Specific Records (Volume 2 of the Master SWMP) are bound separately from the body of this Master SWMP; however, both are readily available during any inspection. Both the body of this SWMP (Volume 1) and the Site Specific Records (Volume 2) comprise the entire SWMP, and go hand in hand in keeping Encana in compliance with stormwater regulations. The Site Specific Records will be kept at the Encana field office in Parachute during active construction and site inspections to ensure accurate implementation, inspections, and maintenance of BMPs, as well as timely revisions to the Site Specific Records.

1.2 SWMP Administrator

The SWMP Administrator is responsible for the process of developing, implementing, maintaining, and revising this SWMP as well as serving as the comprehensive point of contact for all aspects of the facility's SWMP.

SWMP Administrators:

- Local Contact: Kathy Vertiz, Surface Management Lead
2717 County Road 215, Suite 100, Parachute, CO 81635
(970) 285-2626
- Legal Contact: Cindy Allen, Environmental Lead EH&S South Rockies
370 17th St. Suite 1700, Denver, CO 80202
(720) 876-5474

encana

2.0 Narrative Description of Master SWMP Permit Coverage Area

Name of Permit Coverage Area: South Parachute Unit

Permit Number: COR-038210

Location of the Permit Coverage Area:

- County: Portions of Garfield County.
- City: Located in Colorado approximately 1.5 miles Southeast of Parachute and East of the Colorado River within the southern portion of the Piceance Basin.
- Township/Section/Range: Township 7 and 8 S, Range 95 and 96 W, Sixth Principal Meridian.

Activities at the Permit Coverage Area will likely involve the construction of:

- Well pads
- Access roads
- Pipelines
- Compressor stations
- Water Treatment

The above construction activities are only typical and may vary once construction begins. Up-to-date information on the construction of well pads, roads, pipelines, etc. will be kept with the Site Specific Records (Volume 2 of the Master SWMP).

2.1 Sequence of Major Activities

Site specific, scheduling, surface use agreements, and/or other constraints can and/or may dictate changes in construction sequences. Significant sequence changes are addressed in the Site Specific Records (Volume 2 of the Master SWMP). Specific details on the construction and maintenance of BMPs mentioned below are provided in the Stormwater Manual of Best Management Practices (BMP Manual) as discussed in Section 3.3.

2.1.1 Well Pads and Roads

Construction activities for well pads and roads are generally completed in the following sequence:

Preconstruction:

1. **Surveys.** Topographic, vegetation, wildlife and archeology, as dictated.
2. **Temporary BMP's.** Where physical access is available, installation of terminal perimeter and temporary sediment controls, such as wattles, silt fence and/or other as necessary. Actual BMPs used for each site are shown on the Site Plans (discussed in Section 2.8) and kept with the Site Specific Records (Volume 2 of the Master SWMP).

Construction:

3. **Vegetation Clearing.** Vegetation will be cleared/grubbed and placed along the perimeter at the terminal discharge edges/points in a windrow and/or dam beyond the edge of excavation and at any run-on-protection discharge points, and/or chipped or other depending on landowner requirements.

4. **Diversions and Retention Reservoirs.** After vegetation clearing and prior to topsoil stockpiling, diversions are to be placed for run-on-protection (ROP) to prevent the greater landscape from discharging onto the planned disturbance. Temporary sediment control BMPs shall be placed at the discharge points of the ROP until permanent erosion controls can be installed along the entire length of the ROP. Diversions are to be installed along the terminal discharge edge inside of the vegetation windrows to convey site water/sediment to terminal discharge points where rough retention reservoirs are to be installed. The retention reservoir outlets are to receive temporary sediment control BMPs until permanent retention reservoirs and erosion, drainage, and sediment BMPs can be installed.
5. **Topsoil Stripping/Conservation.** All ACCESSIBLE TOPSOIL is to be removed from areas that are to be excavated, covered in subsoils, or turned into stabilized unpaved surfaces. If initial topsoil stockpile areas are insufficient to accommodate the quantities of topsoil being generated, the excess is to be placed at either end of the subsoil stockpile and segregated as much as possible. After major earthwork, grading, and erosion/drainage/sediment controls are complete, any areas that can be identified for immediate interim reclamation shall receive topsoil.
6. **General Rough Grading.** The site location will be graded to provide suitable surfaces for vehicle traffic and/or building sites, and may be graded to establish surface drainage patterns, such as berms or roadside ditches as necessary.
7. **Facility Specific Grading.** Individual facilities may require additional excavation to allow for construction of foundations. Excess soil will typically be used in general site grading.
8. **Foundation Construction.** To support facilities (such as tanks, processing equipment, etc), foundations will be constructed. Foundations may consist of select backfill, concrete spread footings, or piles. Finished support elevations are to be installed twelve to eighteen inches (12-18") above finished grade or the lowest point of the facility.
9. **Facility Construction.** Tanks, processing equipment, etc. will be constructed.

Interim Reclamation:

10. **Gravel Surfacing.** Areas used for access, parking, or materials staging will typically be gravel surfaced.
11. **Reclamation of Unused Areas.** Areas not needed for facilities, roads, parking, or materials staging will generally be reclaimed. Salvaged topsoil will be spread and the vegetative seed mix will be applied.
12. **Application of Erosion Stabilization.** Depending on terrain (e.g. steep slopes and drainage crossings) additional measures may be applied to increase stability of the reclaimed area.

Final Reclamation:

13. **Reclamation of Post-Operation Areas.** When operation of well pad or road is no longer necessary, the area will be decommissioned and all newly disturbed areas will be reclaimed. Any remaining topsoil will be spread and the vegetative seed mix will be applied. This may occur after termination of this permit and under the coverage of a new construction permit.

2.1.2 Pipelines

Construction activities for pipelines are generally completed in the following sequence:

Preconstruction:

1. **Surveys.** Topographic, vegetation, wildlife and archeology, as dictated.
2. **Mark Right-Of-Way.** The construction right-of-way (ROW) will be marked prior to construction with laths and/or flagging. Laths/flagging will be maintained throughout construction and will not be removed until after reclamation activities have been completed.

3. **Temporary BMPs.** Encana's stormwater inspectors will determine locations to install preconstruction temporary erosion control devices, per site specific BMP installation plans and as necessary. Encana's contractor will maintain the erosion control structures as directed by the stormwater inspectors throughout all phases of construction, or until permanent erosion control measures are installed. Actual BMPs used for each site are shown on the Site Plans, which are kept with the Site Specific Records (Volume 2 of the Master SWMP).

Construction:

4. **Vegetation Clearing.** If necessary, vegetation will be cleared and placed in a windrow at the edge of the work area to be used later in reclamation activities, removed from the construction site, or burned/chipped depending on landowner requirements. Details for windrows are provided within the Stockpiling BMP of the BMP Manual (discussed in Section 3.3).
5. **Topsoil Stripping.** All ACCESSIBLE TOPSOIL (from the entire width of the right-of-way) will be removed and temporarily stockpiled along the up-hill side of the right-of-way (if terrain grades will allow) for later use in reclamation activities.
6. **General Grading.** For pipeline segments that occur in relatively rough terrain, general grading will be conducted to create a safe and workable ground surface. This is generally done to form a relatively level work surface on steep cross slopes and to reduce slopes in undulating terrain (arroyo and wash crossings). The site location will be graded to provide suitable surfaces for vehicle traffic and/or building sites, and may be graded to establish surface drainage patterns, such as berms or roadside ditches as necessary.
7. **Trench Excavation.** The trench needed for pipeline installation is almost always off-set in the ROW. The surveyors may indicate the location of the trench on their pipeline lateral. Generally, the trench will be located in the first third of the ROW. The remaining two thirds of the ROW will be used for working space. The trench depth and width will vary with the number of pipes to be installed and the pipe diameter. Generally, a 4-foot deep trench will be excavated by track-mounted excavators. The ditch will be excavated and sloped in accordance with OSHA specifications. The cover from top of pipe to ground level will be a minimum of 36 inches. Where rock is encountered, tractor-mounted mechanical rippers or rock trenching equipment may be used to facilitate excavation. The trench will be excavated and subsoil material stockpiled within the confines of the approved right-of-way limits. Trench spoil will be stored in a separate location from the previously segregated topsoil.
8. **Pipe Installation.** Pipe installation will include stringing, bending for horizontal or vertical angles in the alignment, welding the pipe segments together, coating the joint areas to prevent corrosion, and then lowering-in and padding.
9. **Stringing.** Pipe will be hauled by truck to the pipeline ROW. Each joint of pipe will be unloaded and placed parallel to the ditch.
10. **Bending.** After the joints of pipe are strung along the ditch, individual joints of pipe may need to be bent to accommodate horizontal and vertical changes in direction. Field bends will be made utilizing a hydraulically operated bending machine. Where the deflection of a bend exceeds the allowable limits for a field-bent pipe, factory (induction) bends will be installed.
11. **Welding.** After the pipe joints are bent, the pipe is lined up end-to-end and clamped into position. The pipe is then welded in conformance with 49 CFR Part 192, Subpart E. "Welding of Steel Pipelines" and API 1104, "Standard for Welding Pipelines and Related Facilities".
12. **Welding Inspection.** Welds will be visually inspected by a qualified inspector. Any defects will be repaired or cut out as required under the specified regulations and standards.
13. **Coating.** To prevent corrosion, the pipe will be externally coated with fusion bonded epoxy coating prior to delivery. After welding, field joints will be coated with fusion bond epoxy coating, tape and primer, or shrink sleeves. Before the pipe is lowered into the ditch, the pipeline coating will be visually inspected and tested with an electronic detector, and any faults or scratches will be repaired.
14. **Lowering-In and Padding.** Once the pipe coating operation has been completed, a section of the pipe will be lowered into the ditch. Side-boom tractors may be used to simultaneously lift the pipe, position it over the ditch, and lower it in place. Inspection will be conducted to verify: that minimum

cover is provided; the trench bottom is free of rocks, debris, etc.; external pipe coating is not damaged; and the pipe is properly fitted and installed into the ditch. Specialized padding machines will be used to sift soil fines from the excavated subsoil to provide rock-free pipeline padding and bedding. In rocky areas, padding material or a rock shield will be used to protect the pipe. Topsoil will not be used to pad the pipe. At the completion of lowering-in and padding activities the contractor may install trench breakers around the pipelines to minimize subsurface water flow. Details for trench breakers are provided within the BMP Manual (discussed in Section 3.3).

15. **Backfilling.** Backfilling will begin after a section of the pipe has been successfully placed in the ditch and final inspection has been completed. Backfilling will be conducted using a bulldozer, rotary auger backfill, padding machine or other suitable equipment. Backfilling the trench will use the subsoil previously excavated from the trench. Backfill will be graded and compacted, where necessary for ground stability, by being tamped or walked in with a wheeled or track vehicle. Compaction will be performed to the extent that there are no voids in the trench. Any excavated materials or materials unfit for backfill will be utilized or properly disposed of in conformance with applicable laws or regulations.
16. **General Grading.** If general grading was conducted to facilitate pipeline construction, these materials will be replaced and graded to recreate the preconstruction topography.

Final Reclamation:

17. **Cleanup.** Cleanup activities will be initiated as soon as practicable after backfilling activities have been completed. All construction-related debris will be removed and disposed of at an approved disposal facility.
18. **Subsoil and Topsoil Placement.** Subsoil will be evenly re-contoured across the right-of-way to pre-construction conditions. After the subsoil has been re-spread the contractor will spread the previously segregated topsoil back across the right-of-way. The topsoil will be evenly spread to original contours.
19. **Vegetation.** After any remaining topsoil is spread, the vegetative seed mix will be applied. The area will be revegetated according to private landowner Surface Use Agreements and/or according to the BLM/Forest Service reclamation requirements. Details for revegetation are provided within the BMP Manual (discussed in Section 3.3) and the Revegetation Manual (provided as Appendix B).
20. **Application of Erosion Stabilization.** Depending on terrain (e.g. steep slopes and drainage crossings) additional measures may be applied to increase stability of the reclaimed area. Possible erosion stabilization methods are provided within the BMP Manual (discussed in Section 3.3). Actual locations and measures used are shown on the Site Plans, which are kept with the Site Specific Records (Volume 2 of the Master SWMP).

2.1.3 Compressor Stations, Treatment Facilities, or Other Facilities.

Construction activities for compressor stations, treatment facilities, and other facilities are generally completed in the following sequence:

Preconstruction:

1. **Surveys.** Topographic, vegetation, wildlife and archeology, as dictated.
2. **Temporary BMP's.** Where physical access is available, installation of terminal perimeter and temporary sediment controls, such as wattles, silt fence and/or other as necessary. Actual BMPs used for each site are shown on the Site Plans, which are kept with the Site Specific Records (Volume 2 of the Master SWMP).

Construction:

3. **Vegetation Clearing.** Vegetation will be cleared/grubbed and placed along the perimeter at the terminal discharge edges/points in a windrow and/or dam beyond the edge of excavation and at any run-on-protection discharge points, and/or chipped or other depending on landowner requirements.
4. **Diversions and Retention Reservoirs.** After vegetation clearing and prior to topsoil stockpiling, diversion are to be placed for ROP to prevent the greater landscape from discharging onto the planned disturbance. Temporary sediment control BMP's shall be placed at the discharge points of the ROP until permanent erosion controls can be installed along the entire length of the ROP. Diversions are to be installed along the terminal discharge edge inside of the vegetation windrows to convey site water/sediment to terminal discharge points where rough retention reservoirs are to be installed. The retention reservoir outlets are to receive temporary sediment control BMP's until permanent retention reservoirs and erosion, drainage, and sediment BMP's can be installed.
5. **Topsoil Stripping/Conservation.** All ACCESSIBLE TOPSOIL is to be removed from areas that are to be excavated, covered in subsoils, or turned into stabilized unpaved surfaces. If initial topsoil stockpile areas are insufficient to accommodate the quantities of topsoil being generated, the excess is to be placed at either end of the subsoil stockpile and segregated as much as possible. After major earthwork, grading, and erosion/drainage/sediment controls are complete, any areas that can be identified for immediate interim reclamation shall receive topsoil.
6. **General Rough Grading.** The site location will be graded to provide suitable surfaces for building sites and vehicle traffic, and may be graded to establish surface drainage patterns, such as berms or roadside ditches as necessary.
7. **Excavation.** Soil will be excavated to allow for the construction of foundations. Trenches will be excavated for all underground piping and conduit. Excess soil will typically be used in general site grading.
8. **Foundation Construction.** Foundations will be constructed to support facility buildings. Foundations may consist of select backfill, concrete spread footings, piles, etc. Finished support elevations are to be installed twelve to eighteen inches (12-18") above finished grade or the lowest point of the facility.
9. **Facility Construction.** Buildings, tanks, processing equipment, etc. will be constructed. Utilities will be installed.

Interim Reclamation:

10. **Landscaping.** If necessary, certain areas will be spread with topsoil and landscaped.
11. **Gravel Surfacing.** Areas used for access, parking, or materials staging will typically be gravel surfaced.
12. **Reclamation of Unused Areas.** Areas not needed for facilities, roads, parking, or materials staging will generally be reclaimed. Salvaged topsoil will be spread and the vegetative seed mix will be applied.
13. **Application of Erosion Stabilization.** Depending on terrain (e.g. steep slopes and drainage crossings) additional measures may be applied to increase stability of the reclaimed area. Possible erosion stabilization methods are provided within the BMP Manual (discussed in Section 3.3). Actual locations and measures used are shown on the Site Plans, which are kept with the Site Specific Records (Volume 2 of the Master SWMP).

Final Reclamation:

14. **Reclamation of Closed Facilities.** When facilities are no longer necessary, the buildings may be demolished, according to approved procedures. All construction materials will be removed and the newly disturbed areas will be reclaimed. Any remaining topsoil will be spread and the vegetative seed mix will be applied. This may occur after termination of this permit and under the coverage of a new construction permit.

2.2 Area Estimates

The Permit Coverage Area encompasses portions or all of 12 sections of surface land (approximately 11,000 acres) in Township 7 and 8 South, Range 95 and 96 West. Development of the natural gas resource and related facilities within the area is estimated to result in a total disturbance area of 400+ acres. Because the area will vary over time, these are only approximate estimates. This information is used to help determine the extent of control measures (BMPs) needed.

2.3 Description of Existing Topography and Soils

The Permit Coverage Area consists of relatively flat mesas and ridge crests, mountainsides and steep canyons with areas of rock outcrop, and valley bottoms.

Elevations within the Permit Coverage Area range from approximately 5,600 feet above mean sea level (amsl) above the Colorado River to 7,300 feet near the Southeast area of the South Parachute area. Soils surrounding the Permit Coverage Area are distributed according to the major soil forming factors including climate (effective moisture and temperature), parent material, topographic position, and slope. The soils table within Appendix C provides a summary of the soil types found within the Permit Coverage Area (including permeability, available water capacity, surface runoff, erosion hazard, and others). Most of these soil types are considered to possess moderate to very severe potential for water erosion.

2.4 Description of Existing Vegetation

The existing percent vegetative ground cover for each well pad, section of roadway/pipeline, etc. within the Permit Coverage Area is estimated on each inspection and maintenance report form (discussed in Section 5.4), which are kept with the Site Specific Records (Volume 2 of the Master SWMP). A map indicating the existing ecosystem types within the Permit Coverage Area is provided in Appendix C.

A description of the existing vegetation within each ecosystem (Mutel, 1992) is as follows:

1. Grasslands

- a. **Plains Grasslands.** Plains grasslands are dominated by a mixture of blue grama (*Chondrosium gracile*) and buffalograss (*Buchloe dactyloides*). Interspersed are occasional shrubs and bright flowered forbs, most of which are members of the pea and sunflower families. Taller grass species cover 10 to 25 percent of the ground of little-grazed, moist sites. Most are perennial bunch-grasses up to three feet tall. Needle-and-thread (*Stipa comata*), sand dropseed (*Sporobolus cryptandrus*), side-oats grama (*Bouteloua curtipendula*), western wheatgrass (*Pascopyrum smithii*), Junegrass (*Koeleria macrantha*), and red three-awn (*Aristida purpurea*) are other common species. Common forbs consist of prickly pear (*Opuntia polyacantha*), pasture sage (*Artemisia frigida*), and yucca (*Yucca glauca*).
- b. **Mountain Grasslands and Meadows.** Natural wet meadows and fens are dominated by moisture-loving species, primarily members of the sedge and rush families. Spike-rush (*Eleocharis palustris*), sedges, Canadian reedgrass (*Calamagrostis canadensis*), and tufted hairgrass (*Deschampsia cespitosa*) are common. Natural dry meadows are filled with members of the grass family. Bunchgrasses dominate at low elevations. Needle-and-thread, mountain muhly (*Muhlenbergia montana*), Junegrass, blue grama, and species of wheatgrass and bluegrass are common. Successional meadows contain a combination of weedy, introduced plants and plants typical of dry, rocky slopes, such as common dandelion (*Taraxacum officinale*), golden banner (*Thermopsis divaricarpa*), Colorado locoweed (*Oxytropis sericea*), mountain pussytoes (*Antennaria parvifolia*), showy daisies (*Erigeron speciosus*), stonecrop (*Sedum lanceolatum*), and some sedges (*Carex* spp.). Mountain grasslands, where Thurber fescue (*Festuca thurberi*) and mountain muhly were once the dominant grasses, are now largely dominated by blue grama, Canada bluegrass (*Poa compressa*), foxtail barley (*Critesion jubatum*), and other species as a result of grazing.

2. Riparian Ecosystems

- a. **Lowland Riparian Ecosystems.** The lowland riparian ecosystem is dominated by the plains cottonwood (*Populus deltoidea* ssp. *occidentalis*), the valley cottonwood (*Populus deltoidea* ssp. *wislizenii*) and the peach-leaved willow (*Salix amygdaloides*). Common shrubs and herbaceous plants include snowberry (*Symphoricarpos occidentalis*), sandbar willow (*Salix exigua*), bulrush (*Schoenoplectus lacustris*), broad-leaved cat-tail (*Typha latifolia*), prairie cord-grass (*Spartina pectinata*), and western wheatgrass.
 - b. **Mountain Riparian Ecosystems.** The mountain riparian ecosystem is dominated by quaking aspen (*Populus tremuloides*), lanceleaf cottonwood (*Populus X acuminata*), narrowleaf cottonwood (*Populus angustifolia*), and Colorado blue spruce (*Picea pungens*). Common shrubs include alder (*Alnus incana*), river birch (*Betula fontinalis*), chokecherry (*Padus virginiana*), common gooseberry (*Ribes inerme*), bush honeysuckle (*Distegia involucrata*), and mountain maple (*Acer glabrum*). The lush riparian herbaceous understory includes forbs, grasses, sedges, rushes, climbing vines, mosses, lichens, and liverworts. Weedy invaders are also common.
3. **Shrublands.** Shrub communities include semidesert shrublands found in dry lowlands, sagebrush shrublands that occupy a wide range of elevation from the Colorado Plateau to high mountain valleys, and montane shrublands other than sagebrush, characteristic of foothills and mountain regions.
 - a. **Semidesert Shrublands.** Common shrubs include Great Basin big sagebrush (*Seriphidium tridentatum*), greasewood (*Sarcobatus vermiculatus*), rabbitbrush (*Chrysothamnus*), four-winged saltbush (*Atriplex canescens*), and shadscale (*Atriplex confertifolia*). Common grasses and forbs include galletagrass (*Hilaria jamesii*), blue grama, alkali sacaton (*Sporobolus airoides*), nodding eriogonum (*Eriogonum cernuum*), copper mallow (*Sphaeralcea coccinea*), and prince's plume (*Stanleya pinnata*).
 - b. **Sagebrush Shrublands.** Common shrubs include Great Basin big sagebrush, mountain big sagebrush (*Seriphidium vaseyanum*), rabbitbrush, and serviceberry (*Amelanchier alnifolia*). Common grasses and forbs include nodding eriogonum, copper mallow, and Indian Paintbrush (*Castilleja* spp.).
 - c. **Montane Shrublands.** Common shrubs include mountain mahogany (*Cercocarpus*), Gamble oak (*Quercus gambelii*), rabbitbrush, serviceberry, and skunkbrush (*Rhus aromatica*). Common grasses and forbs include needle-and-thread, western wheatgrass, copper mallow, and Indian Paintbrush.
 4. **Pinyon-Juniper Woodlands.** Pinyon-juniper woodlands consist of scattered Utah juniper interspersed with big sagebrush. Pinyon pine is a minor component. Several other shrub species also occur in this community, including snowberry, bitterbrush (*Purshia tridentata*), snakeweed (*Gutierrezia sarothrae*), and serviceberry. In general, the sparse herbaceous layer consists of graminoids such as cheatgrass (*Anisantha tectorum*), Kentucky bluegrass (*Poa pratensis*), western wheatgrass, Indian ricegrass (*Oryzopsis hymenoides*), and squirreltail (*Elymus elymoides*). Forbs include Tracy's thistle (*Cirsium tracyi*), mariposa lily (*Calochortus nuttallii*), western wallflower (*Erysimum capitatum*), tapertip onion (*Allium acuminatum*), yarrow (*Achillea lanulosa*), stemless four-nerve daisy (*Tetranneuris acaulis*), and sharpleaf twinpod (*Physaria acutifolia*). All of these are native species, except for cheatgrass (an invasive, non-native annual species) and Kentucky bluegrass (a widely naturalized non-native perennial species).
5. **Montane Forests**
 - a. **Ponderosa Pine Forests.** These forests are dominated by the ponderosa pine (*Pinus ponderosa*) and the Rocky Mountain juniper (*Savina scopulorum*). Common shrubs and herbaceous plants include the wax currant (*Ribes cereum*), blue grama, side-oats grama, Junegrass, needle-and-thread, spike fescue (*Leucopoa kingii*), and sulphur flower (*Eriogonum umbellatum*).
 - b. **Douglas Fir Forests.** These forests are dominated by the Douglas fir (*Pseudotsuga menziesii*). Common shrubs and herbaceous plants include common juniper (*Juniperus communis*), kinnikinnik (*Arctostaphylos*), mountain maple (*Acer glabrum*), mountain lover (*Paxistima myrsinites*), heart-leaved arnica (*Arnica cordifolia*), and false Solomon's seal (*Maianthemum* spp.)

- c. **Aspen forests.** Quaking aspen generally occur on north-facing slopes, and along drainage swales. The aspen forest generally has an understory of Wood's rose (*Rosa woodsii*), Colorado blue columbine (*Aquilegia caerulea*), showy daisy, Thurber fescue, white geranium (*Geranium richardsonii*), common lupine (*Lupinus argenteus*), Fendler meadowrue (*Thalictrum fendleri*), and American vetch (*Vicia americana*).
 - d. **Lodgepole Pine Forests.** These forests are dominated by the lodgepole pine (*Pinus contorta*). Common shrubs and herbaceous plants include broom huckleberry (*Vaccinium scoparium*), common juniper, kinnikinnik, sticky-laurel (*Ceanothus velutinus*), and heart-leaved arnica.
6. **Subalpine Forests**
- a. **Engelmann Spruce and Subalpine Fir.** Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies bifolia*) trees are the dominant species in this type of forest, however lodgepole pine, aspen, and sedge-bluegrass have been known to invade in areas which have been severely burned. Understory growth is patchy and consists primarily of dense, low-growing blueberry (*Vaccinium myrtillus*) and broom huckleberry bushes. Moisture-loving shrubs and herbs such as broad-leaved arnica (*Arnica latifolia*) and heart-leaved arnica, Jacob's ladder (*Polemonium pulcherrimum*), curled lousewort (*Pedicularis racemosa*), elk sedge (*Carex geyeri*), and lesser wintergreen (*Pyrola minor*) are interspersed among the huckleberry.
 - b. **Limber and Bristlecone Pine Woodlands.** Limber pine (*Pinus flexilis*) and bristlecone pine (*Pinus aristata*) trees are the only tree species that can invade this harsh ecosystem. Common species among the sparse understory consist of common juniper, kinnikinnik, sticky-laurel, Junegrass, stonecrop, Colorado locoweed, and whitlow-wort (*Draba* spp.). Lichens cover exposed rock surfaces.
7. **Alpine Tundra.** Tundra vegetation consists of a low growth of shrubs, cushion plants, and small forbs with brilliantly colored flowers, and of lush meadows of narrow-leaved sedges and grasses. These plants cover gentle slopes and rock crevices filled with soil. Rock surfaces are partially covered with more primitive plants – lichens and mosses. Shrubs consist of arctic willow (*Salix arctica*), bareground (*Salix brachycarpa*), planeleaf (*Salix planifolia*), and snow (*Salix reticulata* ssp. *nivalis*). Common grasses are alpine bluegrass (*Poa arctica*), tufted hairgrass (*Deschampsia cespitosa*), and kobresia (*Kobresia myosuroides*). The most common forbs are alpine avens (*Acomastylis rossii*), American bistort (*Bistorta bistortoides*), marsh marigold (*Psychrophila leptosepala*), old-man-on-the-mountain (*Rydbergia grandiflora*), moss pink (*Silene acaulis*), rock selaginella (*Selaginella densa*), and alpine sandwort (*Lidia obtusiloba*). All plant species are slow-growing perennials except for the rare annual koenigia, a tiny member of the buckwheat family.
8. **Urban Areas.** Urban areas contain an increased density of human-created structures in comparison to the areas surrounding it. Depending on the area, vegetation may account for anywhere between 20 and 70 percent of the total land cover, with the remaining portion being constructed materials. Types of vegetation within urban areas may be any combination of the above ecosystems, and may include areas of blue grass yards and parks.
9. **Cropland.** Cropland vegetation may consist of wheat, corn, soybeans, or a variety of many other crops. Cropland may either lie fallow (bare of any crops) or contain crops at any stage of growth from seedlings to mature plants.

Detailed Description of Existing Vegetation

The existing percent vegetative ground cover for each well pad, section of roadway/pipeline, etc. within the Permit Coverage Area is estimated on each inspection and maintenance report form (discussed in Section 5.4), which are kept with the Site Specific Records (Volume 2 of the Master SWMP). The majority of the South Parachute Unit consists of pinyon-juniper woodlands. However, there is also a large area of big sagebrush and a smaller area of greasewood fans/flats.

The vegetation within the South Parachute Unit consists of woodland hillsides dominated by Utah Juniper (*Juniperus osteosperma*), with a few scattered pinyon pine (*Pinus edulis*) at higher elevations or north-facing slopes. Drainages and ridge tops/mesas in the Unit (High Mesa) were dominated by Basin and Wyoming big sagebrush (*Artemisia* spp.), greasewood (*Sarcobatus vermiculatus*) and shadscale (*Atriplex confertifolia*). Drainages in the southeast portion of the project area, as well as high-elevation hillsides, had dense groves of scrub oak (*Quercus gambelii*) with understory species such as creeping hollygrape (*Mahonia repens*), mountain pussytoes (*Antennaria parvifolia*), yarrow (*Achillea millefolium*), northern sweetvetch (*Hedysarum boreale*), and sego lily (*Calochortus nuttallii*). Some patches of serviceberry (*Amelanchier alnifolia*) and mountain-mahogany (*Cercocarpus montanus*) were also found along drainage hillsides. The most common understory species found within the sagebrush/greasewood flats included orange globemallow (*Sphaeralcea munroana*), yellow and red prickly pear cactus (*Opuntia polyacantha*), cryptantha (*Cryptantha glomerata*), and yucca (*Yucca glauca*).

The entire South Parachute Unit has, to some extent, been affected by cheatgrass (downy brome) (*Bromus tectorum*) (see Invasive, Non-Native Species). It is often associated with sagebrush communities and disturbed areas, especially two-track roads. In the pinyon/juniper woodlands, this species may be found as the understory.

Stressed by the recent drought, many pinyon pine trees in the Colorado Plateau have succumbed to an engraver beetle (*Ips confusus*) infestation. However, in the South Parachute Unit, the scattered pinyon pine trees have shown few signs of infestation.

2.5 Identification of Potential Pollution Sources

Potential sources of pollution are associated with all phases of the project from the start of construction through interim reclamation and up until final stabilization has occurred. Final stabilization occurs when construction activities have been completed and all disturbed areas have been either built on, paved, or a uniform vegetative cover has been established with a density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.

The most common source of pollution during construction is sediment resulting from the erosion of recently cleared and/or graded areas, such as cut/fill slopes and soil stockpiles. However, there may be many potential pollution sources at any given site. The following types of conditions that might affect the potential for a pollutant source to contribute pollutants to stormwater (CDPHE, 2007B) shall be evaluated:

- The frequency of the activity (i.e., does it occur every day or just once a month? can it be scheduled to occur only during dry weather?);
- Characteristics of the area where the activity takes place (i.e., surface type (pavement, gravel, vegetation, etc.), physical characteristics [site gradients, slope lengths, etc.]);
- Ability of primary and secondary containment (fuel tanks, drum storage, etc.) at product storage and loading/unloading facilities to prevent and contain spills and leaks;
- Proximity of product storage and loading/unloading facilities to waterways or drainage facilities;
- Concentration and toxicity of materials which may be found in the site's stormwater runoff; and
- Contamination of storage facilities/containment with stored materials (i.e., used oil drums or tanks coated with spilled oil).

The following items are potential sources of pollutants at the South Parachute Unit. Each of the potential sources of pollutants will be controlled using one or more of the following types of BMPs: Erosion Controls, Drainage Controls, Sediment Controls or Non-Stormwater Controls. Descriptions and details for each of these types of BMPs are provided in the BMP Manual (discussed in Section 3.3). Actual BMPs used at each site are shown on the Site Plans (discussed in Section 5.4).

Construction:

- All Disturbed and Stored Soils: Erosion Controls, Drainage Controls, Sediment Controls.
- Vehicle Tracking of Sediments: Sediment Controls, Non-Stormwater Controls.
- Management of Contaminated Soils: Non-Stormwater Controls.
- Loading and Unloading Operations: Non-Stormwater Controls.
- Outdoor Storage Activities (Building Materials, Fertilizers, Chemicals, etc.): Non-Stormwater Controls.
- Vehicle and Equipment Maintenance and Fueling: Non-Stormwater Controls.
- Significant Dust or Particulate Generating Processes: Non-Stormwater Controls.
- Routine Maintenance Activities Involving Fertilizers, Pesticides, Detergents, Fuels, Solvents, Oils, etc.: Non-Stormwater Controls.
- On-Site Waste Management Practices (Waste Piles, Liquid Wastes, Dumpsters, etc.): Non-Stormwater Controls.
- Concrete Truck/Equipment Washing, Including the Concrete Truck Chute and Associated Fixtures and Equipment: Non-Stormwater Controls.
- Dedicated Asphalt and Concrete Batch Plants: There will be no asphalt or concrete batch plants located within the Permit Coverage Area of this SWMP.
- Non-Industrial Waste Sources Such as Worker Trash and Portable Toilets: Non-Stormwater Controls.

Interim/Final Reclamation:

- All Disturbed and Stored Soils: Erosion Controls, Drainage Controls, Sediment Controls.
- Vehicle Tracking of Sediments: Sediment Controls, Non-Stormwater Controls.
- Vehicle and Equipment Maintenance and Fueling: Non-Stormwater Controls.
- Significant Dust or Particulate Generating Processes: Non-Stormwater Controls.
- Non-Industrial Waste Sources such as Worker Trash and Portable Toilets: Non-Stormwater Controls.

2.6 Allowable Sources of Non-Stormwater Discharge

Allowable sources of non-stormwater discharge within the Permit Coverage Area include the following:

- **Uncontaminated Springs.** Although there are several springs within the Permit Coverage Areas, none of these springs are currently located in areas where soil disturbance will occur. If this changes in the future, the controls used at any such location will be noted with the Site Specific Records.
- **Landscape Irrigation Return Flow.** There are several locations where pipelines cross through irrigated fields. These locations will be treated similarly to any water crossing with the use of an appropriate control which will be noted in the Site Specific Records.
- **Construction Dewatering.** Construction dewatering is described and discussed in Section 3.2.5.
- **Concrete Washout.** Concrete washout is described and discussed in Section 3.2.4.
- **Emergency Fire Fighting Water.** Water used to put out any type of fire is considered an allowable source of non-stormwater discharge.

No other non-stormwater discharges are allowed under the Stormwater Construction Permit. Other types of non-stormwater discharges must be addressed in a separate permit issued for that discharge.

2.7 Receiving Water

Runoff from disturbed areas during construction will be controlled and/or routed through the use of one or more BMPs, as described later in this plan, prior to being discharged to receiving waters. However, it may be

expected that runoff from certain areas will infiltrate into the earth and is not expected to contribute to receiving waters.

Runoff from the Permit Coverage Area will flow to the Colorado River directly or through one of the following tributaries: Battlement Creek, Monument Gulch, Stone Quarry Gulch, Dry Creek, Pete and Bill Creek, or other unnamed tributaries. All other drainages are ephemeral. No wetland habitats have been documented along any drainages.

2.8 Master SWMP Permit Area Map and Individual Stormwater Site Plans

An overall Master SWMP Permit Area Map is provided as Appendix D. This map is likely to change constantly and will be updated at least annually. The Master SWMP Permit Area Map includes:

- Contours and elevations (topography) with existing drainage patterns;
- Locations and names of major surface waters such as streams, wetlands, irrigation ditches, canals, etc...;
- Master SWMP permit area boundaries; and
- Construction area locations including roads, pipelines, well pads, compressor station facilities, treatment facilities, water parks, and all other facilities.

Individual Stormwater Site Plans (Site Plans) of each site (well pad, access road, section of pipeline, etc.) are provided with the Site Specific Records (Volume 2 of the Master SWMP). Separate Site Plans will be developed for each phase of construction: preconstruction, construction, interim reclamation (if applicable), final stabilization (if applicable) and final reclamation (if applicable). These Site Plans include:

- Construction site boundaries (this is the area expected to be disturbed by clearing, excavating, grading, or other construction activities);
- Contours and elevations (topography) with existing and proposed drainage patterns;
- Limits of well pads and locations of reserve pits and well heads (if applicable);
- All areas of ground surface disturbance, including areas of cut and fill;
- Locations of all potential pollutant sources listed in Section 2.5 (including areas used for vehicle fueling, the storage of materials, equipment, soil, or waste, etc...);
- Locations of all minor surface waters and all anticipated allowable sources of non-stormwater discharge (including springs, dewatering, concrete washout, etc...);
- Locations of all existing and planned BMPs (including erosion, drainage, and sediment controls);
- Locations, names, and distances to streams, wetlands, irrigation ditches, canals, and other surface waters; and
- The size, type and location of any outfall(s). If the stormwater discharge is to a municipal separate stormwater system, name that system, the location of the storm sewer discharge, and the ultimate receiving water(s).

Figures showing typical BMP locations along roadways and pipelines are provided as part of the BMP Manual (discussed in Section 3.3).

3.0 Best Management Practices (BMPs)

A key component of this Master SWMP is employing BMPs to improve stormwater quality. Local factors will be evaluated to determine what BMPs are suitable and practical at different locations. BMPs will be employed in different combinations during construction activities and phases as conditions warrant. Due to the fact that this Master SWMP is likely to cover more than one ecosystem (as described in Section 2.4), the selection of BMPs (including type, quantity, sequence/combination, etc.) will vary at each site within the Master SWMP Permit Area. Specific BMPs to be employed at each well pad, road, pipeline, or other facility are identified on the Site Plans, which are kept with the Site Specific Records (Volume 2 of the Master SWMP).

3.1 Erosion, Drainage, and Sediment Control BMPs

The primary method for controlling erosion, drainage, and sediment transport consists of minimizing initial disturbance of the soil and ground cover. However, many other methods can also be used. All stormwater-related BMPs will fall under at least one of the following three types of controls:

- **Erosion Control.** Any source control practice that protects the soil surface and/or strengthens the subsurface in order to prevent soil particles from being detached by rain or wind, thus controlling raindrop, sheet, and/or rill erosion.
- **Runoff Control.** Any practice that reduces or eliminates gully, channel, and stream erosion by minimizing, diverting, or conveying runoff.
- **Sediment Control.** Any practice that traps the soil particles after they have been detached and moved by wind or water. Sediment control measures are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them prior to leaving the site boundary.

BMPs may also be classified as either structural or non-structural controls:

- **Structural Control.** Handles sediment-laden stormwater prior to it leaving each site. Structural BMPs are used to delay, capture, store, treat, or infiltrate stormwater runoff. Some examples of structural BMPs include sediment traps, diversions, and silt fences. Most Runoff Controls and Sediment Controls can also be classified as Structural Controls.
- **Non-structural Control.** Reduces the generation and accumulation of pollutants, including sediment, from a construction site by stabilizing disturbed areas and preventing the occurrence of erosion. Some examples of non-structural BMPs include revegetation, mulching, and surface roughening. These types of stabilization techniques are not only the most effective method for reducing soil loss, but they are also normally the most cost effective due to low initial cost and reduced maintenance requirements. Most, but not all, Erosion Controls can also be classified as Non-structural Controls.

The Site Plans, as mentioned previously and kept with the Site Specific Records (Volume 2 of the Master SWMP), show the proposed locations of all erosion, drainage, and sediment control BMPs (both structural and non-structural). Detailed descriptions, design criteria, construction specifications, and maintenance information for all BMPs are provided in the BMP Manual (discussed in Section 3.3).

3.2 Non-Stormwater Control BMPs

Non-stormwater controls include general site and materials management measures that indirectly aid in the minimization of water pollution. Types of pollution sources include, but are not limited to, litter, oil and grease, hazardous material spills, and sediment.

3.2.1 Materials Delivery and Storage

The good housekeeping practices listed below will be followed on site during construction and operation:

- An effort will be made to store only enough product required for task completion.
- All materials stored on site will be stored in a neat and orderly manner in appropriate containers and, where possible, under a roof or other enclosure, and/or within secondary containment areas to avoid contact with stormwater.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of the product will be used before disposing of the container.
- Manufacturer's recommendations for proper use and disposal will be followed.

Additional information on material delivery and storage is available in the BMP Manual (discussed in Section 3.3).

3.2.3 Vehicle Cleaning, Fueling, Maintenance, and Tracking Controls

As required by Encana Oil & Gas (USA), Inc. master service agreement(s) and drilling contract(s), contracting companies and/or vendors are required to service all vehicles and equipment prior to entering Encana facilities. However, in the event maintenance procedures are required at Encana facilities, all fluids transferred must utilize secondary containment and drip pans to minimize a release of materials and properly dispose or recycle spent materials in compliance with local, state, and federal guidelines.

While on site, equipment will be parked, serviced, and fueled within designated areas once they become available. Before designated fueling areas become available or when not designated and along right-of-ways and/or other linear construction where equipment progresses with the construction activities temporary parking, fueling and maintenance BMP's will be utilized. Periodic inspections of equipment and control procedures will be implemented. Selected equipment may be fueled in place using fuel trucks. When necessary, equipment and machinery will be decontaminated at an on-site decontamination area prior to removal from the construction area. Areas will be provided with adequate waste disposal receptacles for liquid as well as solid waste.

Vehicle tracking of sediments is not expected to be a problem due to construction scheduling. Construction vehicles will remain on site throughout earth-moving activities. All other vehicles remain in stabilized areas and do not enter the construction area until that area is stabilized. However, applicable BMPs (such as scheduling (to minimize site access), stabilized construction entrances, vehicle cleaning, etc.) will be utilized if sediment tracking does become a problem.

In addition to the typical practices listed above, the BMP Manual (discussed in Section 3.3) provides more detailed information on vehicle cleaning, fueling, maintenance, and tracking controls.

3.2.2 Vehicle Cleaning, Fueling, Maintenance, and Tracking Controls

As required by Encana Oil & Gas (USA), Inc. master service agreement(s) and drilling contract(s), contracting companies and/or vendors are required to service all vehicles and equipment prior to entering Encana facilities. However, in the event maintenance procedures are required at Encana facilities, all fluids transferred must utilize secondary containment and drip pans to minimize a release of materials and properly dispose or recycle spent materials in compliance with local, state, and federal guidelines.

While on site, equipment will be parked, serviced, and fueled within designated areas. Equipment fueling on pipeline rights-of-way will be completed where necessary during active construction. Periodic inspections of equipment and control procedures will be implemented. Selected equipment may be fueled in place using fuel

trucks. When necessary, equipment and machinery will be decontaminated at an on-site decontamination area prior to removal from the construction area. Areas will be provided with adequate waste disposal receptacles for liquid as well as solid waste.

Vehicle tracking of sediments is not expected to be a problem due to construction scheduling. Construction vehicles will remain on site throughout earth-moving activities. All other vehicles remain in stabilized areas and do not enter the construction area until that area is stabilized. However, applicable BMPs (such as scheduling (to minimize site access), stabilized construction entrances, vehicle cleaning, etc.) will be utilized if sediment tracking does become a problem.

In addition to the typical practices listed above, the BMP Manual (discussed in Section 3.3) provides more detailed information on vehicle cleaning, fueling, maintenance, and tracking controls.

3.2.3 Waste Management and Disposal

As required by Encana Oil & Gas (USA), Inc. master service agreement(s) and drilling contract(s), contracting companies and/or vendors are required to manage all waste generated by their activities at Encana facilities in compliance with local, state, and federal guidelines. Encana Oil & Gas (USA) utilizes a periodic inspection program to ensure waste management requirements are fulfilled and inspections are documented.

A few of the waste management procedures that will be followed include the following:

- Proper bins will be provided for trash collection and disposal in compliance with local, state, and federal guidelines.
- Contaminated soils will be placed into a lined and bermed area. Samples of the impacted soil will be collected and a complete characterization analysis will be performed. When applicable, the impacted soil will be sent to a licensed disposal facility.
- The contractor will provide portable toilets. Sanitary waste will be regularly collected by a licensed sanitary waste management contractor and disposed of in an approved manner.
- In the event that sediment is inadvertently transported off the construction site, it will be collected and returned to the site and placed on the soil stockpile or spread over the construction pad area and compacted.

On well pads and access roads concrete washout is used as an interior conductor pipe ballast. Concrete washout water can NOT be discharged to surface waters or to storm sewer systems without separate permit coverage. However, discharge to the ground of concrete washout water from washing of tools and concrete mixer chutes may be authorized by this permit, provided that (CDPHE, 2007a):

1. The source is identified in the SWMP;
2. BMPs are included in the SWMP to prevent pollution of groundwater; and
3. These discharges do not leave the site as surface runoff or to surface waters.

Locations where concrete washout activities take place are shown on the Site Plans.

Additional waste management procedures, including solid waste, hazardous waste, contaminated soil, concrete washout, and septic and sanitary waste, are included in the BMP Manual (discussed in Section 3.3).

3.2.4 Dewatering

Dewatering refers to the mechanical removal of water from an excavation or other structure. Both groundwater and stormwater may require dewatering during construction. Dewatering of pipelines at the completion of hydrostatic testing will be required for most pipeline installations.

3.2.4.1 Groundwater Dewatering

Groundwater is very rarely encountered during the construction activities associated with either E&P sites or Midstream Services sites. If groundwater is encountered, it is typically during construction of a pipeline across a stream crossing. These pipelines are either bored under the stream or a flume is utilized.

Non-stormwater construction dewatering of groundwater can NOT be discharged to surface waters or to storm sewer systems without separate permit coverage. However, discharges to the ground of water from construction dewatering activities may be authorized by this permit, provided that (CDPHE, 2007a):

1. The source is groundwater and/or groundwater combined with stormwater that does not contain pollutants in concentrations exceeding the State groundwater standards in Regulations 5 CCR 1002-41 and 42;
2. The source is identified in the SWMP;
3. BMPs are included in the SWMP; and
4. These discharges do not leave the site as surface runoff or to surface waters.

Dewatered groundwater shall be pumped or diverted to a sediment control BMP prior to discharge to the ground. Locations of groundwater dewatering, as well as any BMPs utilized, will be noted on the Site Plans as soon as such dewatering occurs. Additional information on groundwater dewatering is provided in the BMP Manual, discussed in Section 3.3.

3.2.4.2 Stormwater Dewatering

The discharge of pumped stormwater (not including groundwater or other non-stormwater sources) from excavations, ponds, depressions, etc., to surface water, or to a municipal separate storm-sewer system is allowed by the Stormwater Construction Permit, as long as the dewatering activity and associated BMPs are identified in the SWMP (including location of the activity), and BMPs are implemented in accordance with the BMP Manual, discussed in Section 3.3 (CDPHE, 2007c).

Stormwater that collects in open depressions or trenches during construction activities will be dewatered into an existing sediment control, such as a detention pond, a sediment trap, or simply into a well-vegetated area to percolate into the ground and catch suspended sediment. The quality, source, and location of dewatering, as well as any BMPs utilized, will be noted on the Site Plans as soon as such dewatering occurs. Additional information on stormwater dewatering is provided in the BMP Manual, discussed in Section 3.3.

3.2.4.3 Pipeline Dewatering

New Department of Transportation (DOT) pipelines are hydrostatically tested with water upon completion of construction. Once the hydrostatic testing has been completed, dewatering of the pipeline must occur. This will involve the insertion of a displacer, commonly referred to as a pig, in the pipeline. The discharge rate will be regulated, and energy dissipation devices, and/or sediment controls will be used, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow. Locations on pipeline dewatering, as well as any BMPs utilized, will be noted on the Site Plans as soon as such dewatering occurs. Additional information on stormwater dewatering is provided in the BMP Manual, discussed in Section 3.3.

3.3 Stormwater Manual of BMPs

A Stormwater Manual of Best Management Practices (BMP Manual) is provided as Appendix E. The BMP Manual has been prepared to provide Encana personnel, contractors, and subcontractors with information on the proper selection, design, installation, and maintenance of BMPs to manage oil and gas related stormwater and to meet federal and state SWMP implementation requirements. The main objectives of the BMP manual are to:

- Serve as an easy-to-use guide for selecting, designing, installing, and maintaining BMPs.

- Function as a reference for construction plans and specifications.
- Ultimately lead to the avoidance of any net increase in off-site erosion and sedimentation of waters of the U.S.

The BMPs within this BMP Manual are organized into four main types of controls for easy reference: Erosion Controls, Runoff Controls, Sediment Controls, and Non-stormwater Controls. Each of these types of controls has been discussed earlier in this section of the SWMP.

3.4 Phased BMP Implementation

Various BMPs will be implemented and maintained during different phases of the project. A description of each phase is as follows:

- **Preconstruction.** The preconstruction phase involves the installation of BMPs (temporary and/or permanent) around each site perimeter and at discharge points (such as vegetation buffers (no installation required for this BMP), slash, wattles, diversions, sediment basins and reservoirs, etc...).
- **Construction.** The construction phase involves the stripping and stockpiling of topsoil, the excavation and backfill for access roads, pipelines, and well pads, and the installation of additional BMPs (preferably permanent BMPs) to control erosion and sedimentation (such as tracking topsoil piles and the installation of roadside channels, culverts, diversions, etc...).
- **Interim Reclamation.** The interim reclamation phase primarily involves seeding of all disturbed areas not needed during operation of the well pads. However, this phase also involves the installation of any additional permanent BMPs that may be needed, as well as the continued maintenance and inspections of all BMPs until final stabilization occurs. Final stabilization occurs once all surfaces are built on, paved or graveled, and/or a uniform stabilized vegetative cover with a density of 70 percent of pre-disturbance levels has been established or when an equivalent permanent, physical erosion reduction method has been employed. A further explanation of final stabilization is provided as section 4 of this plan.
- **Final Reclamation.** For pipelines, this phase involves seeding of all disturbed areas, and the installation of any additional permanent BMPs that may be needed, as well as the continued maintenance and inspections of all BMPs until final stabilization occurs. For other areas (roads, well pads, facilities, etc...), this phase (which may occur after termination of this permit and under the coverage of a new construction permit) occurs when operation of the area is no longer necessary. In these cases, this phase will include the installation of any additional BMPs required during facility decommissioning as well as the spreading of any remaining topsoil, the application of seed, and the inspection/maintenance of all BMPs until final stabilization occurs.

Temporary controls, such as silt fencing, may be used to control sediment and erosion during preconstruction and construction activities. Permanent controls, such as diversions and sediment traps, may also be used during the initial phases of the project. However, only permanent controls will be used during interim reclamation and final stabilization. Temporary controls may be converted into permanent controls (such as revegetating a diversion) if needed. The primary control used during interim and final stabilization will be revegetation. Seeding will occur as soon as possible after disturbance of an area is complete. If the seeding is not successful, the area will either be reseeded or other controls will be put in place until reseeding can occur.

4.0 Interim Reclamation and Final Stabilization

As soon as practicable after construction activities have been completed in a disturbed area, interim (for well pads, or other facilities) or final (for roads and pipelines) reclamation will be started to prevent further erosion of soil from that area. This typically occurs immediately upon completion of earthwork activities. All disturbed areas (except for the surface of dirt roads, those portions covered by pavement or a structure, and those areas used during operation of a well) will be stabilized with permanent controls. The most common measure used to achieve final stabilization is revegetation. Mulching, erosion control blankets, surfacing with gravel or slash, and/or other methods may also be used. Structural controls (such as diversions, berms, and sediment traps) may be revegetated and used as permanent measures to control pollutants in stormwater discharges that will occur after construction operations have been completed. Appendix E includes detailed information on each of the previously discussed BMPs. In addition, a revegetation manual is provided as Appendix B, which provides guidance as to possible methods and materials needed to accomplish revegetation on differing site conditions. The specific BMPs used at each site are shown on the Site Plans which are kept with the Site Specific Records (Volume 2 of the Master SWMP).

Final stabilization means that all ground surface disturbing activities at the site have been completed, and all disturbed areas have been either built on, paved, or a uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed. For purposes of this permit, establishment of a vegetative cover capable of providing erosion control equivalent to pre-existing conditions at the site will be considered final stabilization. Areas developed as stabilized unpaved surfaces as needed for operation of the facility after interim reclamation, will also qualify as “finally stabilized.” This includes dirt road surfaces and the portions of the well pad surfaces that cannot be revegetated due to operational necessity, but does not include slopes, ditches, and other areas where revegetation is necessary. Stabilized unpaved surfaces will be prepared in such a way as to prevent ongoing erosion issues.

Coverage under the Stormwater Construction Permit may be inactivated for any individual site or a portion/section of that site (i.e. the access road to a well pad) when the area has attained final stabilization and all temporary erosion and sediment control measures associated with that area have been removed. An area will be considered finally stabilized when construction and interim reclamation is complete and when the above final stabilization criteria have been met, even though the site may be disturbed again in the future for final reclamation. However, future land disturbances that follow final stabilization and result in disturbance of one acre or greater (such as final reclamation) will require new permit coverage at that time.

Upon final stabilization of any site or portion/section of a site, a signed Oil and Gas Construction Field Permit Certification NOTICE OF AMENDMENT OF PERMIT COVERAGE and/or Final Stabilization Certification (provided in Appendix F) will be placed into the Site Specific Records binder to replace the Site Plans and the inspection and maintenance records for that area. However, the Site Plans and inspection reports shall be retained in a separate location for a period of three years following final stabilization of the Permit Coverage Area. These documents will be made available to WQCD or EPA upon request and at the time of inspection.

5.0 Inspection and Maintenance

Inspections and maintenance is an extremely important part of the Stormwater Construction Permit.

The Construction Manager will ensure that all stormwater management controls are constructed or applied in accordance with governing specifications or good engineering practices. Experienced teams will be used for construction. A first inspection will occur upon installation of the controls. In addition, all workers on the site will be trained as to the location and use of the controls, especially those controls that will be disturbed as construction proceeds across the site. The goal is to minimize the potential for inadvertent removal or disturbance of BMPs and to prevent the off site transport of sediment and other pollutants.

5.1 Inspection Schedule

Inspections are required as soon as the first soil disturbance occurs at the site. Once final stabilization of the site has occurred and the Encana inspector has filled out the final stabilization certification sheet (see Section 4), inspections are no longer necessary. Specific information regarding inspection schedules are provided in the following sections.

5.1.1 Minimum Inspection Schedule for active sites

The minimum inspection schedule applies to those sites under active construction, which includes the period from when the ground is initially disturbed to when construction activity is completed, and also includes the preparation of areas that will be revegetated for interim reclamation. During the Active Site period, a thorough inspection of the site stormwater management system (which includes all utilized BMPs) must be conducted at least every 14 calendar days. Also, post-storm event inspections must be conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion.

There are three exceptions to the minimum inspection schedule which are described in detail within the next three sections: post-storm event inspections at temporarily idle sites (inspections required within 72 hours after a storm), inspections at completed sites (inspections required monthly), and inspections during certain winter conditions (inspections may not be required). Any use of an exception is temporary, and does not eliminate the requirement to perform routine maintenance due to the effects of a storm event or other conditions that may impact BMP performance, including maintaining vehicle tracking controls and removing sediment from impervious areas. Inspections, as described above, are required at all other times.

5.1.2 Post-Storm Event Inspections at Temporarily Idle Sites

Temporarily idle sites are those where there are no construction activities occurring following a storm event. At such sites, post-storm event inspections must be conducted prior to restarting construction activities at the site, but no later than 72 hours following the storm event, and the delay noted in the inspection report. Routine inspections still must be conducted at least every 14 calendar days.

5.1.3 Completed Sites

Once construction is completed and the site has been prepared for interim or final stabilization (including completion of appropriate soil preparation, amendments and stabilization practices), the site (or portion of the site) is considered a Completed Site (for purposes of the stormwater permit). Note: only construction activities that result in a disturbance of the ground surface must be completed. Construction activities that can be conducted without disturbance of the ground surface, such as certain well completion activities, would not prohibit a site from otherwise qualifying as a Completed Site. (Completed Sites still require permit coverage until the final stabilization criteria have been met)

Completed Sites qualify for a reduced inspection schedule, as the potential for pollution is reduced if the site has been adequately prepared and/or seeded. However, because slopes and other disturbed areas may not be fully vegetated, erosion in these areas still occurs which requires maintenance activities such as regrading

and seeding of problem areas. As such, inspections must continue in order to address these situations. During the Completed Site period, a thorough inspection of the site stormwater management system (which included all utilized BMPs) is required at least once every month. The SWMP must be amended to indicate those areas that will be inspected at this reduced frequency.

5.1.4 Winter Conditions Inspections Exclusion

Inspections are not required at sites where construction activities are temporarily halted, snow cover exists over the entire site for an extended period, and melting conditions posing a risk of soil erosion do not exist. This temporary exclusion is applicable only during the period where melting conditions do not exist, and applies to the routine 14-day and monthly inspections, as well as the post-storm-event inspections. It is typical that when snow cover exists, even at a Completed Site, significant potential for erosion and BMP failure exists when melting does finally occur. Therefore, the site should be prepared prior to snow cover to ensure it is as stabilized as possible, and be prepared to perform site maintenance when melt-off occurs, to alleviate any potential problems. Inspection records (see Section 5.4) will document that winter conditions exist and that inspections will be excluded.

5.2 Performing Inspections

Inspections will be conducted by qualified personnel on the following areas:

- All vegetated areas until 70% of pre-disturbance vegetation levels are reached.
- All BMP measures identified in this document.
- Construction site perimeter and discharge points.
- All disturbed areas.
- Areas used for storage of material/waste that are exposed to precipitation.
- Other areas determined to have a significant potential for stormwater pollution, such as demolition areas or concrete washout locations, or locations where vehicles enter or exit the site.

These areas will be inspected to determine if there is evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters. All BMPs will be evaluated to determine if they still meet the design and operational criteria in the SWMP and if they continue to adequately control pollutants at the site. Any BMPs not operating in accordance with Appendix E of this SWMP will be addressed as soon as possible, immediately in most cases, to minimize the discharge of pollutants, and the Site Specific Records will be updated.

5.3 Maintenance

Maintenance activities will ensure that all control measures are functioning at optimum levels and that all procedures and techniques will be in proper working order during a runoff event or spill condition. Any maintenance, repairs, or replacements deemed necessary after required inspections will be corrected as soon as possible (if not immediately), to minimize the discharge of pollutants. Certain maintenance procedures may take a short period of time to make sure that all the proper safety precautions are in place, such as a "one call" for utilities, if the maintenance involves excavation of sediment located above a buried pipeline.

Maintenance will include, but is not limited to:

- Pickup or otherwise prevention of litter, construction debris, and construction chemicals from becoming a pollutant source prior to anticipated storm events.
- Removal of sediment from silt fences, sediment traps, and other sediment controls.
- Reseeding of any bare spots where vegetation has failed to establish.

- Repairs and/or adjustments to any erosion and sediment control that is deteriorating or found to be performing inadequately.

Detailed maintenance requirements for each BMP are identified in Appendix E.

When maintenance is required, the following process will typically be followed:

1. Perform inspections according to the minimum inspection schedule discussed in Section 5.1.
2. Note the need for maintenance on the inspection and maintenance report form.
3. If necessary, collect the additional materials and/or resources needed to perform the maintenance activity.
4. Perform maintenance and note the date performed on the inspection and maintenance report form.
5. Re-inspect the area to ensure compliance.

5.4 Documenting Inspections and Maintenance

The permittee must document inspection results, maintenance activities, and maintain a record of the results for a period of 3 years following expiration or inactivation of permit coverage. A typical inspection and maintenance report form is provided in Appendix G. Although the site may have a phased construction schedule, all construction areas may be inspected at the same time and on one form. Each well pad, road, pipeline, or other facility which is inspected shall be clearly written on the inspection form. Inspection reports will include the following:

- Date of inspection, name of inspector, and title of inspector
- The area inspected (Site ID), type of area (well pad, access road, pipeline, etc.), phase of construction (preconstruction, construction, etc.), and type of inspection (active, completed, etc.)
- Site specific information including disturbed area, soil type(s), ecosystem/vegetation type(s), receiving waters, etc.
- Vegetation observations including the percent pre-disturbance vegetation and whether or not vegetation growth has reached 70% of pre-disturbance levels
- Specific inspection requirements (all BMPs and areas of potential pollutant sources)
- Observed conditions including:
 - Location(s) of discharges of sediment or other pollutants from the site
 - Location(s) of BMPs that need to be maintained
 - Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location
 - Location(s) where additional BMPs are needed that were not in place at the time of inspection
- Description and date(s) of corrective action(s) taken, and measures taken to prevent future violations
- Changes necessary to the SWMP

A hand drawn Site Plan shall be included, if necessary, to show the location(s) of any observed condition (as listed above).

After adequate corrective action(s) has been taken and recorded, or where a report does not identify any incidents requiring corrective action, the report will contain a signed statement indicating the site is in compliance with the permit to the best of the signer's knowledge and belief.

All completed inspection and maintenance report forms (a blank copy of which is included in Appendix G) are kept with the Site Specific Records (Volume 2 of the Master SWMP).

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6.0 Plan Revisions and Retention

When BMPs or site conditions change, the Master SWMP (Volume 1) and/or the Site Specific Records (Volume 2) will be amended to accurately reflect the actual field conditions. Examples include, but are not limited to, removal of BMPs, identification of new potential pollutant sources, addition of BMPs, modification of BMP installation/implementation specifications or maintenance procedures, and changes in items included in the Site Plans. Changes to the Master SWMP (Volume 1) shall be noted on the SWMP Revisions log at the front of this plan. Changes to individual site conditions will be noted in the Site Specific Records (Volume 2) on the applicable inspection and maintenance report form. All changes in Volume 1 and Volume 2 shall be made prior to actual changes in the site conditions, except for responsive SWMP changes, which shall be made immediately after changes are made in the field or as soon as practical, but in no case more than 72 hours after the change(s) in BMP installation and/or implementation occur at the site that require development of materials to modify the SWMP. At a minimum, the Master SWMP will be updated annually.

The Master SWMP and the Site Specific Records will be retained at the Encana field office in Parachute during active construction and site inspections to ensure accurate implementation and maintenance of BMPs, and required revisions. These documents will be retained for a period of three years following final stabilization of the Permit Coverage Area. These reports will be made available to WQCD or EPA upon request and at the time of inspection.

7.0 Inactivation Notice

When all disturbed areas associated with the Stormwater Construction Permit have reached "final stabilization" (as described in Section 4), all temporary erosion and sediment control measures have been removed, and all components of the SWMP are complete, the area no longer requires coverage under the permit terms. At that time, Encana will submit an Inactivation Notice that closes this permit to the WQCD upon final stabilization of all areas covered by the permit. A blank copy of this form is included in Appendix H of this document.

Upon receipt of the Inactivation Notice, the WQCD will provide written confirmation that coverage under this permit has been terminated. This historical documentation will be maintained at the Encana field office in Parachute for a period of at least three years following termination of permit coverage.

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8.0 Signature

The signature page will not be signed unless the SWMP is requested by an agency as a legal document. At that time, the supervisor will review the most updated version of the SWMP and sign it before submitting to an agency.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment or knowing violations."

Printed name _____ Title _____

Signature _____ Date _____

Printed name _____ Title _____

Signature _____ Date _____

9.0 References

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- USEPA, 1990. *NPDES Stormwater Regulations*, 40 CFR Parts 122.26. U.S. Environmental Protection Agency.

Appendix A

General Permit Application

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Appendix B

Revegetation Manual

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Appendix C

Existing Soil and Vegetation Data

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Appendix D

Master SWMP Permit Area Map

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Appendix E

Stormwater Manual of Best Management Practices (BMPs)

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Appendix F

Oil and Gas Construction Field Permit Certification NOTICE OF AMENDMENT OF PERMIT COVERAGE and/or Final Stabilization Certification

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Appendix G

Inspection and Maintenance Report Form

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Appendix H

Inactivation Form

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