

**FIELD WIDE STORMWATER MANAGEMENT PLAN  
FOR CONSTRUCTION ACTIVITIES**

**AREA 1  
DJ BASIN DRILLING PROGRAM  
COLORADO**

**REVISED  
FEBRUARY 2009**

**Prepared for:**

**PETROLEUM DEVELOPMENT CORPORATION  
3801 Carson Avenue  
Evans, Colorado 80620**

**Prepared by:**

**LT ENVIRONMENTAL, INC.  
4600 West 60<sup>th</sup> Avenue  
Arvada, Colorado 80003  
(303) 433-9788**



### **6.1.11 Dedicated Concrete and Asphalt Batch Plants**

No dedicated concrete or asphalt batch plants are located within the PDC Area 1 DJ Basin Drilling Program.

### **6.1.12 Non-Industrial Waste Sources**

Cleanup of trash and discarded materials will be conducted as noticed. Cleanup will consist of patrolling the roadway, access areas, and general work areas in order to pick up trash, debris, scrap, or other discarded materials.

All waste from materials imported to the construction site are placed in appropriate containment and then removed for disposal/recycling to an appropriate licensed disposal/recycling facility. This also includes sanitary sewage facilities (typically portable), which will be placed, anchored, and maintained with proper care.

### **6.1.13 Potential Spills**

In the event of any spills or leaks the SWMP Administrator for PDC will be contacted immediately for further direction. Additional information regarding management of contaminated soils, material handling and spill prevention can be found in PDC's SPCC Plan, DJ Basin, Colorado, General Field Plan, located at PDC's Evans, Colorado office.

## **6.2 Best Management Practices (BMPs)**

BMPs for sediment and erosion control will be accomplished through a combination of construction techniques, vegetation and re-vegetation, administrative controls, and structural features. Typical configurations of structural controls discussed below and technical drawings with references are provided in a BMP Manual (Appendix C). BMP selection is guided by the criteria listed in Table 2. Structural and non-structural BMPs are discussed in the following sections, and are summarized in Table 3.

### **6.2.1 Structural Practices for Erosion and Sediment Control**

Structural practices primarily include physical attributes of the pads and access roads designed to reduce erosion and control stormwater or sediment movement.

#### **6.2.1.1 Erosion Control**

Construction of the pads and access roads requires the removal of vegetative cover and topsoil, thereby increasing peak flood flows, water velocity, and the volume of stormwater runoff. An increase in water runoff volume and velocity may result in increased erosion. Erosion and runoff control procedures that will be used to mitigate and reduce the erosive transport forces of stormwater during and after construction of the pipelines will include but will not be limited to the following:

- Diversion and control of runoff water;



- Diversion and control of runoff water;
- Vegetation establishment and maintenance;
- Berms;
- Erosion Control Blanket (ECB); and
- Application and maintenance of mulches, tackifiers, tracking and contouring.

Existing vegetation cover and topsoil are removed only where necessary for the operation of equipment and construction of the pads, access roads, and pipelines. Refer to Tables 2 and 3 for a list of all BMPs to be used throughout the PDC Area 1 DJ Basin Drilling Program. Appendix C includes details on BMP installation and maintenance procedures.

#### **6.2.1.2 Sediment Control**

The control of sediment contained in stormwater runoff will be accomplished by the use of sediment controls. Sediment controls allow the detention of suspended particles via gravity, filtering or entrapment. Sediment controls that will be used to mitigate and control sediments generated from the erosive transport forces of stormwater during and after construction of a pad will include but will not be limited to the following:

- Silt Fence;
- Natural Drainage Swales;
- Wattles; and
- Stabilized Construction Entrance (Cattle Guard).

Refer to Tables 2 and 3 for a list of all BMPs to be used throughout the PDC Area 1 DJ Basin Drilling Program. Appendix C includes details on BMP installation and maintenance procedures.

#### **6.2.1.3 Detailed Structural and Administrative Site Management Practices**

The following structural and administrative site management practices are expected to reduce, minimize and control erosion and sediment transport:

- In order to minimize disturbances associated with installation of pads, access roads, and pipelines, level and gently sloping terrain outside the construction project area will not be graded, except where necessary.
- To prevent tracking of sediment mud and rocks onto public roads, portions of access roads may be graveled, as appropriate. Other means such as track pads/angular rock or cattle guards may be utilized if appropriate.
- Straw wattles will be installed as needed on down-gradient portions of project areas.



- Side hill cuts (cut slopes) will be kept to a minimum to protect local resources while providing a safe and stable plane for the efficient and safe use of equipment.
- Where conditions warrant, erosion control structures such as berms will be constructed to divert water away from project areas. These control structures will also reduce soil erosion along and adjoining areas disturbed during construction.
- During construction near perennial streams, lakes or wetlands, silt fence, or wattles may be utilized in order to prevent suspended sediments from reaching down slope watercourses, streams, lakes or wetlands.
- Where appropriate, wattles, or silt fence will be constructed adjacent to crossings to reduce potential sedimentation in streams or wetlands.
- In areas that have steep slopes, wattles, erosion control blankets or runoff diversions may be installed.
- During the reclamation of the pads, access roads and pipelines, all cut and fill slopes in steep terrain will be graded and contoured to blend into the adjoining landscape. Natural drainage patterns will also be re-established. When possible cut and fill slopes will be constructed so they are no steeper than a 1 to 3 ratio.
- Reclaimed pads may have a fence constructed around areas that have been seeded. These fences will be installed in order to keep livestock and vehicles off reseeded areas.
- Pipelines connect pad sites to other gathering operations within the basin. Pipeline connections are regularly maintained, added to, or repaired. These sites are included in this SWMP. Pipeline maintenance can include excavation, backfilling, and re-contouring the disturbed area, as listed above.

Appendix C includes details on BMP installation and maintenance procedures.

#### **6.2.1.4 Implementation of Structural Practices**

The following structural practices (sediment controls) may be utilized at disturbed areas: vegetative buffers, wattles, silt fence, natural drainage swales, or equivalent sediment controls. These sediment control structures will be installed so as to protect down slope surface waters, wetlands and roads from sediment flow due to runoff from a precipitation or snow melt event.

All graded surfaces, walls, dams and structures, vegetation, erosion and sediment control measures and other protective devices identified in the site plan will be maintained, repaired, and restored as necessary.

Table 3 contains a summary list of structural and non-structural BMPs.

### **6.2.2 Non-Structural Practices for Erosion and Sediment Control**

Erosion and sediment can also be controlled via non-structural BMPs. Non-structural BMPs are not engineered as structural and are capable of limiting the amount of potential pollutants available to reach receiving water bodies. Non-structural BMPs can achieve the same effect as structural BMPs through erosion control, filtration, trapping and the settling of sediment load within a perimeter.

PDC has implemented non-structural practices for stormwater management into their pipeline site development, including Program Oversight, Construction Site Planning and Management, and Materials Management. Table 3 summarizes the details of such practices.

Pad sites can include a slope to the reserve pit or a buffer zone of natural vegetation used as a non-structural BMP to inhibit sediment travel offsite and minimize the footprint of the pad. Appendix C includes a typical pad site figure with the use of a buffer zone as a BMP.

All disturbed areas of the site will be re-vegetated in accordance with the CDPS General Permit re-vegetation requirements to coincide with existing site vegetation patterns. Final site grading will reflect existing grades in order to maintain pre-construction discharge patterns. Crimp mulching, using hay or cereal grain straw and will be used in conjunction with the seeding for final stabilization.

### **6.2.3 Phased BMP Implementation**

The development of access roads, pads, and pipelines is generally accomplished in three distinct work phases. The first phase is the development (construction/completion/reclamation), the second phase is the production (operation/maintenance), and the third phase is the abandonment with final reclamation. Each work phase is briefly discussed below.

During pre-construction, drilling, and other active construction, the focus will be primarily on containment type BMPs. An example would be a continuous berm to contain stormwater pollutants on site. During this phase, stormwater runoff is specifically controlled so as not to leave the pad site.

The development phase includes clearing and grubbing of construction areas, excavation activities, and trenching through rural landscape and intermittent unnamed dry washes and streams. BMPs utilized during active construction include the following:

- vehicle tracking controls;
- silt fence and or berms on the down-gradient limit of construction for erosion and sediment control;
- straw bales, sediment control logs (wattles) or equivalent BMPs in unnamed dry washes and streams;

BMPs will be implemented during construction to control and minimize any runoff of sediment and erosion associated with construction activities. Reclamation activities during this phase are



accomplished by contouring disturbed soils to conform to the surrounding terrain, replacing any stockpiled topsoil, seeding, and mulching of disturbed soil areas in order to re-establish vegetative cover. For completed sites, containment BMPs are generally removed and areas are re-seeded. These are less active construction periods and less attention is needed regarding runoff when reclamation types of BMPs are put in place to mitigate the potential pollutants.

The production phase includes the operation and maintenance activities during construction. The stabilized staging areas will provide for storage of staging materials and equipment and be used to define the contractor mobilization area. The staging areas can contain a construction trailer; a parking lot; dumpsters; a storage area for heavy on-site equipment; unloading/loading areas and a portable sanitary facility. No fuel storage tanks will be present in the staging areas but mobile fueling will take place within the construction limits of the project.

Dirt/mud will be removed from staging areas as needed. Stabilized staging areas will be inspected for adequate vehicle tracking control and perimeter control. The stabilized staging areas should be repaired or modified as needed. Reclamation activities during this phase include maintenance of access roads via stabilization of the given roadways, and long term maintenance of the erosion and sediment control structures.

When the construction activity is completed, all disturbed areas of the site will be re-vegetated with seed mixtures based on existing native vegetation. Abandonment with Final Reclamation activities are accomplished by contouring disturbed soils to conform to the surrounding terrain, by replacing any stockpiled topsoil, and by seeding of disturbed soil areas in order to re-establish cover vegetation. Erosion control blankets, mulching, using hay or cereal grain straw, may be used in conjunction with the seeding for final stabilization. Permanent stormwater BMPs, such as culverts and check dams, will remain in place after final stabilization.

Depending upon the type of site, the site terrain, and the phase of construction, different stormwater BMPs will be utilized. Various BMP options are listed in Table 2, and design specifications are shown in the BMP Manual (Appendix C).

The above discussion focuses primarily on pad sites and access roads. Phased BMP installation activities for pipeline sites are similar to those discussed above. Since these sites usually involve deeper trenching and excavation work, pre-construction BMPs may include additional containment around soil stockpiles, and may involve temporary access road construction BMPs, instead of the pipeline site access roads which are more or less permanent features of the typical pipeline site. Upon backfilling of trenched materials, reclamation activities are accomplished by contouring disturbed soils to conform to the surrounding terrain, replacing any stockpiled topsoil, seeding, and mulching of disturbed soil areas in order to re-establish vegetative cover.

#### **6.2.4 Material Handling and Spill Prevention**

Consistent with the permit requirements, all potential pollutants other than sediment will be handled and disposed of in a manner that does not cause contamination of stormwater. Non-sediment pollutants that may be present during construction activities include petroleum products used in construction of a pad, pipeline, or tank battery including pipe joining materials and waste, and fertilizer used for final stabilization. Material Safety Data Sheets (MSDS) for



materials to be used or that are produced, are maintained at the Evans, Colorado office and on site during drilling.

Refueling and lubrication of vehicles and equipment will be conducted a minimum of 100 feet from flowing streams and wetlands. Any spills will be promptly remediated and contaminated materials hauled off-site and properly disposed of/recycled. Quantities of fuel and lubricants will be limited to “as-needed” for the immediate operations underway. In general, small spills will be handled by PDC personnel. The SWMP Administrator or his designee will handle spills and emergencies. In most cases, an absorbent material is used to pick up the spill. The spill response equipment is also located at PDC’s Evans, Colorado office. In the situation of a larger spill, the SWMP Administrator would be notified and a contractor would be called to respond to the spill. For the protection of spill response personnel, all drums, tanks, and other containers are clearly labeled to identify contents, in the event of a spill. Additional information regarding material handling and spill prevention can be found in PDC’s SPCC Plan, DJ Basin, Colorado, General Field Plan, located at PDC’s Evans, Colorado office.

#### **6.2.5 Dedicated Concrete or Asphalt Batch Plants**

PDC does not have or subcontract any dedicated concrete or asphalt batch plants for its pad site development or construction in the Area 1 DJ Basin Drilling Program.

#### **6.2.6 Vehicle Tracking Control**

PDC will employ BMPs to minimize vehicle tracking. Further discussion on this topic is in Section 6.1.2 of this SWMP.

#### **6.2.7 Waste Management and Disposal, Including Concrete Washout**

Waste management and disposal are further discussed in Sections 6.1.9 and 6.1.12 of this plan. Concrete washout does not occur at PDC’s sites, and therefore, will not be a potential pollutant to stormwater.

#### **6.2.8 Groundwater and Stormwater Dewatering**

Construction dewatering may take place on a limited basis at PDC sites. The permit allows for conditional discharge of construction dewatering to the ground (to infiltrate), however no groundwater from construction dewatering can be discharged as surface runoff or to surface waters. For large construction projects with planned dewatering activity, PDC will apply for a separate dewatering permit from the state, as required.

#### **6.2.9 Stormwater Practices and Landowners**

PDC will always go above and beyond to accommodate landowners and at the same time, maintain compliance with the CDPS general permit. If a landowner has concerns with the installation or use of certain BMPs, PDC will discuss other options with the landowner for BMP implementation that are state compliant. If landowners are insistent upon particular practices on their land, or have previous agreements with PDC regarding well pad site installations, PDC will attempt to negotiate the best solution for all parties that maintain stormwater compliance.

