

BMP's

GM 333-31

In addition to compliance with General Operating Requirements required under COGCC rule 1203 to be applied in Sensitive Wildlife Habitat and Restricted Surface Occupancy areas or COGCC 1204 to be applied statewide or in areas noted in the Rule, Williams will employ the following BMPs either field wide or at the specific location for which this Form 2A is being submitted.

Field Wide BMPs:

General

- Prepare plans and studies to support wildlife conservation and protection
- Contribute to and participate in wildlife studies and research efforts related to oil and gas activity's relationship to wildlife
- Treat/control noxious weeds/plants including Tamarisk
- Assist CDOW in obtaining access to private lands for wildlife research and conservation
- Focus BMPs on critical wildlife seclusion and "crucial habitats"
- Contribute to organizations that acquire/manage habitat
- Continue to Support Operation Game Thief
- Continue to support CDOW sportsman's programs
- Participate in wildlife seminars and conferences (e.g. AFWA)
- Focus Ranch and Property Management (Williams' owned/managed properties) on wildlife resources
- Restrict and/or manage grazing to benefit wildlife
- Fence and restrict activities in locations that provide high value habitat
- Construct habitat improvement projects as practical
- Enforce policies to protect wildlife (e.g., no poaching, no firearms, no dogs on location, no feeding of wildlife, etc.).
- Inventory, monitor and remove obsolete, degraded, or hazardous fencing on Williams owned property
- Support research to test the effectiveness of specific Best Management Practices

Planning

- Conduct wildlife surveys to determine presence of game/non-game species/habitat
- Identify and Protect "crucial habitats"
- Site access roads, pads and facilities in locations that minimize habitat impacts
- Identify and protect migration corridors
- Minimize well pad density to the extent possible
- Minimize the number, size and distribution of well pads and locate pads along existing roads where possible.
- Plan pipelines routes ahead of time to avoid field fitting and reduce excessive ROW widths and reclamation.

- Adequately size infrastructure and facilities to accommodate both current and future gas production.

Construction

- Schedule necessary construction in stream courses to avoid critical spawning times.
- Surface roads to ensure that the anticipated volume of traffic and the weight and speed of vehicles using the road do not cause environmental damage, including generation of fugitive dust and contribution of sediment to downstream areas.
- Protect culvert inlets from erosion and sedimentation and install energy dissipation structures at outfalls
- Use the minimum right-of-way width and vegetation mats where pipelines cross riparian areas and streams wherever possible
- Construct fluid pit fences and nets that are capable of withstanding animal pressure and environmental conditions and that are appropriately sized for the wildlife encountered.
- Install impermeable barriers beneath fluid pits to protect groundwater, riparian areas and wetlands.
- Salvage topsoil from all road construction and other rights-of-way and re-apply during interim and final reclamation.
- Strip and segregate topsoil prior to construction. Appropriately configure topsoil piles and immediately seed to control erosion, prevent weed establishment and maintain soil microbial activity

Drilling/Completions

- Continue application of BMPs to prevent wildlife from entering pits including fencing and netting where appropriate
- Limit days/hours operations where practical to minimize disturbance and traffic
- Promptly report spills that affect wildlife to the CDOW.
- Store and stage emergency spill response equipment at strategic locations so that it is available to expedite effective spill response.
- Limit parking to already disturbed areas that have not yet been reclaimed
- Screen water suction hoses to exclude fish.
- Reduce noise by using effective sound dampening devices or techniques (e.g., hospital-grade mufflers, equipment housing, insulation, installation of sound barriers, earthen berms, vegetative buffers, etc.).

Production/Reclamation

- Gate access roads where necessary to minimize/control access to “crucial habitats”
- Install automated emergency response systems (e.g., high tank alarms, emergency shut- down systems, etc.).
- Implement fugitive dust control program

- Avoid direct discharge of pipeline hydrostatic test water to any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river.
- Locate above-ground facilities to minimize the visual effect (e.g., low profile equipment, appropriate paint color, vegetation screening in wooded areas, etc.).
- Skim and eliminate oil from produced water ponds and fluid pits at a rate sufficient to prevent oiling of birds or other wildlife that could gain access to the pit.
- Apply an aggressive, integrated, noxious and invasive weed management plan. Utilize an adaptive management strategy that permits effective responses to monitored findings and reflects local site and geologic conditions
- Map the occurrence of existing weed infestations prior to development to effectively monitor and target areas that will likely become issues after development.
- Evaluate the utility of soil amendment application or consider importing topsoil to achieve effective reclamation.
- Use locally adapted seed whenever available and approved by landowner.
- Use appropriately diverse reclamation seed mixes that mirror an appropriate reference area for the site being reclaimed where approved by landowner.
- Conduct seeding in a manner that ensures that seedbed preparation and planting techniques are targeted toward the varied needs of grasses, forbs and shrubs (e.g., seed forbs and shrubs separately from grasses, broadcast big sagebrush but drill grasses, etc.)
- Emphasize bunchgrass over sod-forming grasses in seed mixes in order to provide more effective wildlife cover and to facilitate forb and shrub establishment.
- Seed during appropriate season to increase likelihood of reclamation success
- Do not include aggressive, non-native grasses in reclamation seed mixes
- Choose reference areas as goals for reclamation that have high wildlife value, with attributes such a diverse and productive understory of vegetation, productive and palatable shrubs, and a high prevalence of native species.
- Establish vegetation with total perennial non-invasive plant cover of at least eighty (80) percent of pre-disturbance or reference area levels.
- Establish vegetation with plant diversity of non-invasive species which is at least half that of pre-disturbance or reference area levels. Quantify diversity of vegetation using a metric that considers only species with at least 3 percent relative plant cover.
- Establish permanent and monumented photo points and vegetation measurement plots or transects; monitor at least annually until plant cover, composition, and diversity standards have been met.
- Observe and maintain a performance standard for reclamation success characterized by the establishment of a self-sustaining, vigorous, diverse, locally appropriate plant community on the site, with a density sufficient to control erosion and non-native plant invasion and diversity sufficient to allow for normal plant community development.
- Use early and effective reclamation techniques, including interim reclamation to accelerate return of disturbed areas for use by wildlife
- Remove all unnecessary infrastructure during the production phase.

- Reclaim reserve pits as quickly as practical after drilling and ensure that pit contents do not contaminate soil.
- Remediate hydrocarbon spills on disturbed areas prior to reclamation.
- Complete final reclamation activities so that seeding occurs during the first optimal season following plugging and abandonment of oil and gas wells.
- Perform interim reclamation to final reclamation species composition and establishment standards.
- Perform interim reclamation on all disturbed areas not needed for active support of production operations
- Remove and properly dispose of degraded silt fencing and erosion control materials after their utility has expired
- Remove and properly dispose of pit contents where contamination of surface water, groundwater, or soil by pit contents cannot be effectively prevented
- Apply certified weed free mulch and crimp or tacyfy to remain in place to reclaim areas for seed preservation and moisture retention
- Control weeds in areas surrounding reclamation areas in order to reduce weed competition
- Educate employees and contractors about weed issues
- Where possible, fence livestock and/or wildlife out of newly reclaimed areas until reclamation standards have been met and plants are capable of sustaining herbivory
- Conduct necessary reclamation and invasive plant monitoring.
- Census and assess the utilization of the reclaimed areas by the target species
- Maintain pre and post development site inspection records and monitor operations for compliance
- Utilize GIS technologies to assess the extent of disturbance and document the reclamation progression and the footprint of disturbances
- Conduct reclamation field trials to match seed mixes, soil preparation techniques, and planting methods to local conditions.

Site Specific BMPs:

Planning

- Share/consolidate corridors for pipeline ROWs to the maximum extent possible.
- Maximize the utility of surface facilities by developing multiple wells from a single pad (directional drilling), and by co-locating multipurpose facilities (for example, well pads and compressors) to avoid unnecessary habitat fragmentation and disturbance of additional geographic areas.
- Locate roads outside of drainages where possible and outside of riparian habitat.
- Avoid new surface disturbance and placing new facilities in key wildlife habitats in consultation with CDOW.
- Minimize the number, length, and footprint of oil and gas development roads;
- Use existing roads where possible

- Combine utility infrastructure (gas, electric, and water) planning with roadway planning to avoid separate utility corridors
- Combine and share roads to minimize habitat fragmentation
- Where possible, consolidate pipeline and existing roadways, or roadways that are planned for development
- Place roads to avoid obstructions to migratory routes for wildlife, and to avoid displacement of wildlife from public to private lands.
- Design roads with visual and auditory buffers or screens (e.g., topographic barriers, vegetation, and distance).
- Maximize the use of directional drilling to minimize habitat loss/fragmentation
- Maximize use of remote completion/frac operations to minimize traffic
- Maximize use of remote telemetry for well monitoring to minimize traffic
- Phase and concentrate development activities, so that large areas of undisturbed habitat for wildlife remain.
- Maintain undeveloped areas within development boundaries sufficient to allow wildlife to persist within development boundaries during all phases of construction, drilling, and production.

Construction

- Close and reclaim roads not necessary for development, including removing all bridges and culverts and recontouring/reclaiming all stream crossings.
- Structures for perennial or intermittent stream channel crossings should be constructed using appropriately sized bridges or culverts
- Construct retention basins and ponds that benefit wildlife

Drilling/Completions

- Use centralized hydraulic fracturing operations.
- Install and maintain adequate measures to exclude all types of wildlife (e.g., big game, birds, and small rodents) from all fluid pits (e.g., fencing, netting, and other appropriate exclusion measures).
- Conduct well completions with drilling operations to limit the number of rig moves and traffic.

Production/Reclamation

- Remove well pad and road surface materials that are incompatible with post-production land use and re-vegetation requirements
- Use only certified weed-free native seed in seed mixes, except for non-native plants that benefit wildlife
- Williams will use certified, weed free grass hay, straw, hay or other mulch materials used for the reseeding and reclamation of disturbed areas.
- Install exclusionary devices to prevent bird and other wildlife access to equipment stacks, vents and openings.

- Reduce visits to well-sites through remote monitoring (i.e. SCADA) and the use of multi-function contractors.
- Bore pipelines that cross perennial streams