

# CITY OF FORT COLLINS

## **DRAFT Best Management Practices For Oil and Gas Exploration, Production and Seismic Operations**

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## **BEST MANAGEMENT PRACTICES FOR OIL AND GAS DRILLING AND PRODUCTION**

### **I. PLANNING INFRASTRUCTURE PLACEMENT AND DEVELOPMENT ACTIVITIES**

- A.** Representatives from the City, Operators, Colorado Department of Parks and Wildlife (DPW), and other interested organizations, will meet early in the planning process to assess natural and cultural resource needs and operational needs and constraints. The report titled “Mountains to Plains Energy by Design, Report to the Colorado State Land Board (date) (MTP EBD) will be used to provide guidance to avoid, minimize and mitigate biological, cultural, scenic, and recreational resources. Issues identified in the report must be addressed as part of the Surface Use Agreement. The City will provide site specific details within each Surface Occupancy category described below for the Operator to address:
1. No Surface Occupancy – Mandated no surface occupancy due to biological or cultural values that are either irreplaceable or would take decades to restore.
  2. Limited Surface Occupancy – Areas subject to highest restrictions on surface use due to sensitivity of biological or cultural resources.
  3. Controlled Surface Occupancy – Areas generally suited for oil and gas development. Biological and cultural resources are present throughout.
  4. Preferred Surface Occupancy – Areas where surface occupancy is preferred from a due to previous disturbances such as roads and grazing infrastructure.
- B.** Planning of development activities will occur at the largest scale possible (i.e. landscape level) to allow for a more comprehensive review of potential impacts and ways to avoid or minimize impacts to natural and cultural resources. Unitization, operator agreements, and other agreements will be used to improve communication, to consolidate and minimize infrastructure, and to allow for effective landscape level planning.
1. Once the field has been characterized, the City will require the use of the Geographic Area Plan (GAP; *COGCC Rule 513*, or Comprehensive Drilling Plans (CDP), *COGCC Rule 216*) or an equivalent planning process, for the entire Mountains to Plains region.
- C.** The operator, in consultation with the City, DPW, and other interested parties, will develop and implement a natural and cultural resource monitoring and evaluation program to document a baseline condition, then monitor environmental change that occurs during the exploration, production, and well abandonment process. Information gathered will be adequate to correlate oil and gas operations with environmental change and adapt operations of oil and gas development activities to address impacts to natural and cultural resources.
- D.** Monitoring:
1. At the City’s request, the Operator will provide an independent, third-party quality control monitor (QA/QC Officer) to oversee the oil and gas exploration and production program. The third party monitor will report directly to the City. If a third party QA/QC Officer is not requested, the City will perform this task.
  2. Operator shall give the City twenty-four (24) hours advance notice prior to the initiation of any Oil and Gas Operations, including without limitation commencement of drilling, testing upon attainment of total depth and commencement of completion operations. The City may request such notice be provided simultaneously to any surface lessee or occupant. The City shall have the option, but not the obligation, to observe Operator, its

agents, contractors or sub-contractors conducting all Oil and Gas Operations, including without limitation fracing operations, subject to the City's compliance with all of the Operator's safety protocols.

3. The QA/QC Officer will be responsible for assuring the BMP's are followed.
4. The QA/QC Officer will prepare biweekly written reports of activities on site, and keep the City informed verbally of operations on a weekly basis.
5. The QA/QC Officer will establish long-term photo monitoring sites within the project area and will provide these photos, along with GPS coordinates of the photo points, to the City at the end of operations. The photo monitoring will be across the project area, representative of habitat type, project activities, slopes, and soils present.
6. The QA/QC Officer will record Operator activity via video recordings. The recordings will be taken at times identified by the City.

## **II. ELEMENTS OF AN IMPACT AVOIDANCE AND MINIMIZATION PLAN**

### **A. GENERAL WILDLIFE AND ENVIRONMENTAL PROTECTION MEASURES**

1. Provide annual educational training for staff and contractors on specific wildlife issues of concern, (e.g., the location and importance of seasonal wildlife habitats and migratory patterns, how to locate mountain plover nests, the effects of winter range disturbance on wildlife, etc.) and on the overall aspects of the landscape planning documents and any agreements with DPW.
2. Establish policies to protect wildlife. These include, but are not limited to:
  - a. no poaching or harassment of wildlife
  - b. no collection of wildlife, parts or whole, living or dead, including shed antlers (CDOW, 2)
  - c. no plant collection
  - d. no firearms on City property
  - e. no dogs on City property
  - f. no feeding of wildlife
3. Promptly report in and all chemical, hydrocarbon, or other hazardous material spills to the City, the Water Quality Control Division of CDPHE and DPW.
4. Store and stage emergency spill response equipment at strategic locations along perennial water courses so that it is available to expedite effective spill response.
5. Avoid locating staging, refueling, and storage areas within 300 feet of any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river.
6. Install automated emergency response systems (e.g., high tank alarms, emergency shut-down systems, etc.).
7. The City, in consultation with DPW and other interested parties, will require the implementation of a Compensatory Mitigation Plan as described in the MTP EBD that addresses impacts to biological and natural resources. Compensation required in a Compensatory Mitigation Plan would be in addition to any Administrative Fees for the project.

### **B. INFRASTRUCTURE LAYOUT WILDLIFE PROTECTION MEASURES (Including production facilities, ancillary facilities, and roads)**

1. A map must be provided to the City showing the location of all existing and proposed facilities associated with oil and gas exploration and production wells. The Operator shall provide GPS coordinates for each facility.
2. Avoid new surface disturbance and new facilities in sensitive wildlife habitats identified in consultation with DPW and the City
3. Minimize disturbances in areas identified in MTB EBD as Limited Occupancy Areas and avoid No Occupancy Areas.
4. Phase and concentrate all development activities so that large areas of undisturbed and unfragmented habitat for wildlife remain. Maintain undeveloped areas within development boundaries that are sufficient to allow wildlife to persist during all phases of construction, drilling, and production. Minimize the duration of development and avoid repeated or chronic disturbance of developed areas. Complete all anticipated drilling within a phased and/or concentrated, uninterrupted time period.
5. Well sites, facilities, or roads may not be sited in a geologic hazard area or an area with slopes exceeding 30 percent; within 300 feet of wetlands under the jurisdiction of the U.S. Army Corps of Engineers or as identified by the City; in an area within a floodway of a stream or river as shown on the flood insurance rate maps (FIRM) or as determined by a state licensed professional engineer.
6. Well sites shall be clustered to the maximum extent practicable to reduce surface use fragmentation, and to centralize exploration and production facilities. To the maximum extent practicable, oil and gas operations shall be sited at the edge of large habitat blocks to help reduce fragmentation of overall habitat blocks.
7. Develop a Transportation Plan to incorporate the following strategies:
  - a. Conduct a road transportation analysis to determine the optimum road system for an area, user needs, and to evaluate future options;
  - b. Minimize the number, length, and footprint of oil and gas development roads; (*COGCC Rule 1204(a)(3)*).
  - c. Utilize existing roads where possible;
  - d. Combine utility infrastructure (gas, electric, and water) planning with roadway planning to avoid separate utility corridors;
  - e. Combine and share roads to minimize habitat fragmentation;
  - f. Place roads to avoid obstructions to migratory routes for wildlife, and to avoid displacement of wildlife from City property;
  - g. Design roads with visual and auditory buffers or screens (e.g., topographic barriers, vegetation, and distance);
    - i. follow topographic contours when practical
    - ii. Locate roads below ridgelines or behind topographic features (knolls, rises) to minimize the zone of visual and auditory effect.
  - h. Design the road surface to ensure the anticipated volume of traffic, 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;
  - i. Control or prevent erosion, siltation, and the air pollution consequent to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practice.
  - j. Ensure adequate drainage control, using structures such as, but not limited to, culverts, bridges, ditches, cross drains, and ditch relief drains. Culverts will be

installed by Operator for any roads as needed to maintain current drainage. Roads will be crowned to the extent necessary to ensure appropriate drainage. Locate primary roads on the most stable available surface

- k.** Locate roads as far from riparian areas and bottoms of drainages as possible and outside of riparian habitat;
- l.** Avoid constructing any road segment in the channel of an intermittent or perennial stream;
- m.** Avoid low water crossings. Structures for perennial or intermittent stream channel crossings should be engineered using bridges or appropriately sized culverts;
- n.** Design road crossings of streams to allow fish passage at all flows and to minimize the generation of sediment;
- o.** Design road crossings of streams at right angles to all riparian corridors and streams to minimize the area of disturbance;
- p.** Construct stream crossings “in the dry” to minimize sedimentation;
- q.** Protect culvert inlets from erosion and sedimentation and install energy dissipation structures at outfalls;
- r.** Construct waterbars on ascent/descent slopes and in areas of erodible soils to direct runoff from the disturbed areas to adjacent vegetation or rock, thereby minimizing erosional channels and sediment transport prior to the reestablishment of vegetation. Waterbars will be of sufficient size to survive 3 to 5 years, and will be constructed at frequencies as directed by environmental conditions and road grade. Topsoil will not be used in the construction of waterbars
- s.** Implement fugitive dust control measures; Water or non-chloride based dust suppressants may be used. Production and flowback water cannot be used for dust control.
- t.** Each well site shall be kept clean and free from debris in strict adherence to Commission standards. At the City’s request Operator shall install additional screening, fencing or landscaping around a well site to minimize noise and aesthetic impacts and shall comply with the Reclamation Plan.
- u.** Establish company guidelines to minimize wildlife mortality from vehicle collisions on roads;
  - i.** The maximum speed limit for access from public roads to the well locations is 20 miles per hour, 15 night time, and 10 for all oversized vehicles. *COGCC Rule 1203(a)(12)* and Lowry, 6. Operator shall install one or more speed monitoring devices to enforce the speed limits set forth herein. Operator agrees that images or videos generated by such device and depicting speeding or other unacceptable conduct will be deemed to be proof of violation, and Operator shall address and remedy such conduct or be deemed in breach hereof.
  - ii.** Require operators to avoid “running” wildlife herds by requiring them to stop their equipment if their movement is causing a herd to be pushed down the road.
- v.** Coordinate employee transport, require carpooling or provide bus transport to work sites from a central location;

- i. Limit vehicles to amount of parking available within pad. Carpool from an offsite area as needed.
  - ii. No Personal vehicles allowed on pad and only essential operator vehicles should be parked on pads
- w. Prohibit or substantially limit the amount of traffic in important wildlife habitats within 3 hours of sunrise and sunset;
- x. Install and use locked gates or other means to prevent unauthorized vehicular travel on roads and facility rights-of-way. *COGCC Rule 1203(a)(11)*;
  - i. Operator must place appropriate signs on roads or other rights of way to direct traffic and to control the use of any such roads or rights of way by unauthorized persons. All gates on the rights of way may be locked by the City and keys provided to the Operator, its employees, contractors or sub-contractors.
  - ii. All gates must be closed and locked to prevent public access to City property.
  - iii. Operator will only use access roads and not allow any sub-contractor or employee to drive or travel on any road not authorized and will assist in maintaining closures.
- y. Access roads shall only be used by Operator employees, its co-owners, its designated agents, contractors and subcontractors, state, local and federal regulators and any other person as required by law or court order to conduct oil and gas operations. Off road driving shall be strictly prohibited. The roads may also be used by the City, its lessees, and existing surface occupants, who shall be required to adhere to the same standards of conduct.
- z. Limit parking to already disturbed areas.
- aa. Maintain road for the appropriate use for the life of the well(s). Operator shall bear sole expense for maintenance except for damages caused by parties unassociated with Operator.
- bb. Operator shall keep all roads reasonably free of ruts and potholes, and shall conduct routine inspection, and complete routine maintenance operations to keep roads to the standards set forth herein. The costs of such maintenance and repair of all roads used for oil and gas operations shall borne by Operator, provided if such road is used by other parties with access to the property, the City shall cooperate with the Operator and the additional users to establish a maintenance cost sharing agreement providing for allocation of maintenance costs on a fair and reasonable basis, according to use and impacts by each user.
- cc. Reclaim all roads when no longer needed for operations. In addition to removing the roadbed and reseeding, the process may include removing all bridges and culverts; restoring natural drainage patterns; reshaping cut and fill slopes.
- dd. Inclement Weather and Wet Ground Conditions. If using unimproved two-track roads, limit use during inclement weather and wet ground conditions when severe rutting and other resource impacts might occur;
  - i. No construction or routine maintenance activities will be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of two inches deep,

the soil will be deemed too wet to adequately support construction equipment.

ii. Operator must repair any damage as soon as conditions allow.

- ee. **Minimizing Road Development.** Access roads for drilling shall be limited in size to the minimum size necessary to transport required drilling equipment and personnel. Topsoil will be removed and stockpiled adjacent to the road. The remaining soils surface shall be disked to level the site with the application of water for stability and packing and maintained to minimize dust impacts and rutting of the surface. Acceptable road surfacing shall be determined by the Operator with City approval and must accommodate heavy drilling and completion tools. (Lowry, 5) Where it is operationally feasible and safe, encourage the use of two-track roads into well locations. Topsoil may remain on two-tracked roads.
- ff. New road construction will be avoided when possible. When constructed, roads will not exceed fifteen feet in width except on turns or curves where engineering requirements require more width;
- gg. Low use traffic roads should be reclaimed as two-tracks as soon as use patterns allow;
- hh. Absolutely no off road travel or parking;
- ii. If the City determines a road will remain after production, the City may specify construction to a higher standard; and
- jj. It should always be preferred to use existing roads and two tracks first, improving them when needed. Only after all existing access roads are fully utilized to the maximum extent possible should any new roads be built.

In the event Operator constructs roads on the Leased Premises, Operator shall pay to the City an agreed upon per rod fee for use of any newly constructed roads. For any existing roads used by Operator on the Leased Premises Operator shall pay to City an agreed upon per rod fee for use of the existing roadways. All payments made to Owner shall be made in good funds payable by certified funds, cashier's check, wire transfer or a check from Operator. Payment shall be made no later than thirty (30) days prior to the proposed spud date for any well ("Payment Due Date"). Develop and implement appropriate density caps or thresholds on wells sites, facilities and infrastructure (i.e. no more than one well pad per section in mule deer and elk winter range and in elk production areas. See the other species-specific well site density recommendations in this document).

- 8. 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 areas.
- 9. Minimize the number, size and distribution of well pads and locate pads along existing roads where possible.
  - a. Operator shall restrict the production site to as small a dimension as possible for prudent Operations. Without the advance written consent of the City, the surface location shall not exceed ten (10) acres for drilling for any single well, and approximately two (2) acres for any resulting production site, including

the area disturbed by any uphill cut or downhill fill. Should more than one well be drilled from a single pad site the surface location may be enlarged to accommodate the additional operations to avoid disturbance of multiple surface sites.

10. Cluster well pads in the least environmentally sensitive areas. Where possible, site away from open meadows. Site on level ground to avoid cut slopes, but avoid ridge top knolls that may be used by prairie grouse. (CDOW, 5)
11. Consolidate and centralize fluid collection and distribution facilities. *COGCC Rule 1203(a)(3)*.
12. Locate and bury power, flow, and pipe lines in or adjacent to the road to eliminate cross-country vegetation clearing and resulting habitat fragmentation.
  - a. Operator will locate its flowlines or pipelines at a depth of no less than forty-eight inches (48") below the surface. Operator will bury utility lines (including electric lines) in all cases. Utility lines will be buried at a depth compliant with industry standards and local building codes. The construction and burying of flowlines, pipelines, and utility lines will be at the sole cost and expense of Operator. Any trench required for subsurface lines shall be refilled and surface grade maintained level (when necessitated due to settling) so as not to adversely affect drainage and reclaimed to the standards set forth in the Reclamation Plan. All pipelines and flowlines shall be constructed of steel or another material of comparable strength and durability, and wrapped as determined appropriate in order to prevent corrosion, leaks and degradation. Prior to backfilling all lines will be checked for damage to the protective coating and damage shall be repaired prior to final installation to insure pipeline and flowline integrity.
13. Operator shall pressure test each flowline and pipeline to a pressure level adequate to confirm the mechanical integrity of the flowlines and pipelines annually, and following any fracturing or re-stimulation to confirm continued integrity. All rights to use any subsurface line constructed on the Property shall terminate if Operator fails to use such for a period exceeding twenty-four consecutive months. At the request of the City the subsurface lines shall be removed and the Leased Premises disturbed in the removal operations shall be restored consistent with the Reclamation Plan.
14. Share/consolidate corridors for pipeline right of way to the maximum extent possible. *COGCC Rule 1203(a)(4)*.
15. Engineer pipelines to avoid field fitting and reduce excessive right of way widths and reclamation. *COGCC Rule 1203(a)(6)*.
16. All rights to use any approved underground facility constructed on the Property for wells drilled thereon shall terminate if production ceases to be allocated to the Property, provided the right to use any pipeline installed that benefits other properties shall not be terminated subject to the continued payment of the annual rental provided for herein. (Lowry, 4). All payments made to City shall be made in good funds payable by certified funds, cashier's check, wire transfer or a check from Operator. Payment shall be made no later than thirty (30) days prior to the proposed spud date for any well ("Payment Due Date").
17. Adequately size infrastructure and facilities to accommodate both current and future gas production. Economize gas transportation.

## C. AQUATIC AND WETLAND ENVIRONMENT PROTECTION MEASURES

1. No surface or ground water from City property shall be used without express permission of the City.
2. The source of any fresh or potable water required for minor and/or major facility operation will be identified by the operator.
3. A baseline water quality study of the near-surface unconfined aquifer, deeper aquifers, and surface water in proximity to the planned well locations will be conducted prior to drilling at the expense of the Operator.
4. Water quality testing shall include:
  - a. Tests for volatile organic compounds, semi-volatile compounds, polycyclic aromatic hydrocarbon, naphthalene, pH, total dissolved solids, chloride, fluoride, alkalinity, sulfate, arsenic, barium, chromium, sodium, calcium, magnesium, nitrate/nitrite, iron, sulfur, selenium, and uranium.
5. City has prepared **Exhibit XX**, attached hereto and incorporated herein, identifying the types, locations, and yield or capacity of any sources of water of concern to City. These may include lakes, ponds, reservoirs, rivers, streams (including ephemeral), springs, seeps, and wells. Operator hereby acknowledges the existence of these water bodies.
  - a. Prior to commencement of drilling operations on the Property, Operator agrees to inspect and/or test, and provide to City the results of, the yield on a gallon per minute basis (or similar flow measurement) if the yield has not been provided in **Exhibit XX**.
6. Monitoring water quality and quantity
  - a. Establish a regular and repeated water chemistry monitoring and reporting program for groundwater and surface waters to detect and allow effective response to water quality issues that may impact aquatic wildlife as listed above.
    - i. For those surface waters supporting fisheries, establish baseline water chemistry prior to development and establish a regular and repeated water chemistry monitoring and reporting program for groundwater, surface waters, and produced water discharged on the surface to detect and allow effective response to water quality issues that may impact aquatic wildlife. Quantify levels of pH, alkalinity, specific conductance, major cations/anions (including Cl, F, Sulphate, Sodium), total dissolved solids, BTEX/GRO/DRO, TPH, PAH (including benzo (a) pyrene), and metals (including As, Ba, Ca, Cd, Cr, Fe, Mg, Pb, Se), nitrate, nitrite, ammonia-N, turbidity, dissolved oxygen, hydrogen sulfide, and water temperature. (CDOW, 14)
  - b. Operator will re-inspect and retest, and provide to City the results of, the productive yield on a gallon per minute basis (or similar flow measurement) of water bodies, and the quality of water produced from wells or springs at 1) no more than three-month (90-day) intervals during drilling and drilling completion operations; 2) no more than 6-month (180-day) intervals for a minimum of two (2) years following drilling and completion of operations, whether or not production ensues; 3) no more than 6-month (180-day) intervals during production from any well on the Property; and 4) upon abandonment,

immediately and 12 months thereafter to ensure there is, at minimum, the same baseline yield and quality found prior to commencement of drilling operations.

- c. In the event there is any decrease in yield, capacity or quality of the water bodies caused by drilling operations of Operator during drilling operations or within three (3) years upon abandonment or after completion of drilling operations, Operator will remediate the yield, capacity or quality to at least the baseline conditions within 180 days after notification by City. If damage caused by drilling operations to a water body is irreversible, Operator will be liable for such damage, including but not limited to providing, at Operator's sole risk and expense in perpetuity, alternative water supplies equal to or better than baseline conditions.
7. No surface occupancy, and/or operations within 300 feet of the ordinary high water mark of any reservoir, lake, spring, wetland, or natural perennial or seasonally flowing stream or river.
8. Minimize occupancy, operations, and activity within 300 to 600 feet of the ordinary high water mark of any reservoir, lake, spring, wetland, or natural perennial or seasonally flowing stream or river.
9. Schedule necessary construction in stream courses to avoid critical spawning times.
10. Maintain the normal flow of water in streambeds or drainage channels.
11. Bore pipelines that cross perennial streams.
12. Use the minimum right-of-way width where pipelines cross riparian areas and streams.  
*COGCC Rule 1204(a)(5).*
13. Do not remove native riparian canopy or stream bank vegetation.
14. Avoid direct discharge of pipeline hydrostatic test water to any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river.
15. Avoid dust suppression activities within 300 feet of the ordinary high water mark of any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river. If water is used as a dust suppressant, application can occur within the 300 foot buffer.
16. Screen water suction hoses to exclude fish.
17. Design stream crossings to minimize the total number of crossings and so that crossings are at or as near to 90 degrees to the direction of stream flow.
18. Restrict trucks from crossing streams and utilize appropriate and effective culverts that do not preclude upstream movement of fish.
19. Avoid using low water crossings.
20. Control erosion and sedimentation, and manage storm water runoff; reclaim sites as quickly as possible to restore vegetation.
21. Restore incised channels where excessive erosion and sedimentation is occurring.
22. Avoid alteration of natural drainage patterns.
23. No drilling pits of any kind will be allowed when drilling with water or other drilling fluids. Drilling with fluids must be conducted with closed systems.
24. Water used for drilling and fracture treatments and produced water from the well sites should be transported in pipelines to a centralized facility rather than hauled with trucks whenever reasonable.
25. Operator will prepare a Waste Disposal Plan indicating how liquid and other waste will be disposed. Wastewater must be transported to a permitted wastewater disposal site off

City property. No wastewater will be discharged on City property or stored on City property other than in temporary storage in tanks.

- a. Evaporative pits will not be allowed on City property.
  - b. Land treatment of produced or process waters is not allowed on City property
  - c. Underground injection wells for disposal of wastes of any type are not permitted on City property.
- 26.** All hydraulic fracturing operations ('fracing') within City property shall be conducted with 'green frac' methods, utilizing only sand and water as fracing materials or other 'green frac' materials agreed upon. The use of diesel fuel, petroleum products or chemicals containing aromatic compounds such as benzene and toluene or other compounds such as 2 BE, will not be permitted as a part of the fracing process.

#### Aquatic Species/Amphibians

- 27.** Consult with DPW and collect baseline aquatic species and macro-invertebrate inventory data prior to any development. All surveys will be repeated at the end of the production stage or as determined in consultation with the City and DPW.
- 28.** Conduct two pass population estimations for streams potentially affected. Report species composition, length-frequency and individual weights.
- 29.** Disinfect heavy equipment, hand tools, boots and any other equipment that was previously used in a river, stream, lake, pond, or wetland prior to moving the equipment to another water body. The disinfection practice should follow this outline:
- a. Remove all mud and debris from equipment and spray/soak equipment with a 1:15 solution of disinfection solution containing the following ingredients:
    - i. Dialkyl dimethyl ammonium chloride, 5-10% by weight;
    - ii. Alkyl dimethyl benzyl ammonium chloride, 5-10% by weight;
    - iii. Nonyl phenol ethoxylate, 5-10% by weight;
    - iv. Sodium sesquicarbonate, 1-5%;
    - v. Ethyl alcohol, 1-5%; and
    - vi. Tetrasodium ethylene diaminetetraacetate, 1-5%;
    - vii. and water, keeping the equipment moist for at least 10 minutes and managing rinsate as a solid waste in accordance with local, county, state, or federal regulations; or

NOTE: Bleach, containing the active ingredient sodium hypochlorite, is effective at killing Chytrid fungus at concentrations of 1% sodium hypochlorite and above. Didecyl dimethyl ammonium chloride at a concentration greater than 0.0012% for 2 min, or sodium hypochlorite at a concentration greater than 1% for 1 min are effective treatment procedures.

- b. Spray/soak equipment with water greater than 140 degrees Fahrenheit for at least 10 minutes.
- c. Sanitize water suction hoses and water transportation tanks (using methods described above) and discard rinse water at an appropriately permitted disposal facility.

#### **D. GROUND WATER PROTECTION MEASURES**

1. Comply with all state and federal regulations for waste and wastewater disposal.
2. Comply with state requirements for drilling permits and well construction.
3. Comply with Colorado's WQCC's stormwater runoff regulations, including:
  - a. Siting requirements for oil and gas locations under Rule 1002f(2).
  - b. Develop a Stormwater Pollution Prevention Plan.
4. Develop a Spill Prevention, Control, and Countermeasures (SPCC) Plan if required in accordance with CFR Part 112.
5. If a SPCC Plan is not required, develop a plan for management of hazardous materials storage and spills that:
  - a. Requires adequately designed containment structures for produced water tanks that have sufficient volume and freeboard to prevent spills.
  - b. Prevents storage of hazardous materials near drainage channels.
  - c. Prevents storage of stockpiled materials in areas with high groundwater levels.
  - d. Avoids refueling equipment or vehicles near drainage channels.
  - e. Requires that well cutting piles be placed on an impermeable barrier prior to authorized waste disposal.
  - f. Requires all production facilities with the potential to leak to have appropriate containment.
  - g. Operator will install and maintain steel containment rings around production tanks and associated facilities, and to install steel berms and impervious synthetic liner within bermed areas to prevent any hydrocarbons substances from infiltrating soil or ground water. (Lowry, 4)
  - h. Avoids mixing of incompatible produced waters.
6. Develop a comprehensive drilling plan that includes Best Management Practices (BMPs) to minimize harm to groundwater resources.
7. Conduct a baseline groundwater quality study prior to drilling and a comprehensive groundwater sampling and analysis plan (SAP) for the production phase of the site.

**E. DRILLING AND PRODUCTION OPERATIONS WILDLIFE PROTECTION MEASURES**

1. Schedule construction, drilling, and completion activities to avoid sensitive seasonal wildlife habitats in consultation with the City and DPW.
2. Schedule construction, drilling, and completion activities to avoid seasons and locations when public use of City property is at its highest.
3. Reduce visits to well-sites through remote monitoring and the use of multi-function contractors. *COGCC Rule 1203(a)(15)*.
4. Temporary housing will be considered for only those personnel required to be present at all times during drilling and only during the active drilling. All temporary housing will be removed immediately upon cessation of drilling. Tent camping on the Property by Operator's personnel is not permitted.
5. Use centralized hydraulic fracturing operations.
6. Before transporting any Hydraulic Fracturing Fluid onto any site, the Operator shall notify the Owner of the proposed number of frac trucks to be used and the estimated time period to complete any fracture stimulation. Operator shall prepare the fracing site with

appropriate impervious liners, and shall comply with all reasonable, additional safety measures required by the Owner in connection with such operations. (Lowry, 5)

7. Transport water through centralized pipeline systems rather than by trucking. *COGCC Rule 1203(a)(16)*.
8. Locate pipeline systems under existing roadways, or roadways that are planned for development.
9. Maximize the use of state-of-the-art drilling technology (e.g., high efficiency rigs, coiled-tubing unit rigs, closed-loop or pitless drilling, etc.) to minimize disturbance.
10. Conduct well completions with drilling operations to limit the number of rig moves and traffic.
11. Employ state-of-the-art technology to protect existing vegetation (e.g., use mats if possible to preserve topsoil/vegetative root stock).
12. Mow or brushhog vegetation where appropriate, leaving root structure intact, instead of scraping the surface. *COGCC Rule 1203(a)(10)*.
13. Install exclusionary devices to prevent bird and other wildlife access to equipment stacks, vents and openings.
14. 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.). Appropriate noise limits are included in the species-specific recommendations included in this document.
  - a. All facilities with engines or motors (excepting wellhead compressor engines) shall be electrified if located within 1,320 feet of distribution voltage. Operator may provide information demonstrating that such electrification is infeasible. The City shall review this information and may provide a waiver of this requirement. If distribution voltage is not currently within 1,320 feet of the proposed minor facility, the Operator will contact and provide the City an opportunity at the City's cost to extend distribution voltage to within 1,320 feet of the proposed facility. Artificial lift equipment powered by internal combustion engines may be used prior to the time that a site facility is electrified. All minor and major facilities which are not electrically operated shall be equipped with quiet design mufflers (also referred to as hospital grade or dual dissipative) or equivalent. Such equipment mufflers shall be properly installed and maintained in proper working order.
  - b. Additional noise mitigation may be required. In determining noise mitigation, specific site characteristics shall be considered, including but not limited to the following:
    - i. Nature and proximity of adjacent development (design, location, type).
    - ii. Prevailing weather patterns, including wind directions.
    - iii. Vegetative cover on or adjacent to the site.
    - iv. Topography.
  - c. Based upon the specific site characteristics set forth in this section, the nature of the proposed activity and its proximity to surrounding development, and the type and intensity of the noise emitted, additional noise mitigation measures may be required, including but not limited to the following:
    - i. Acoustically insulated housing or cover enclosing the motor or engine.

- ii. Vegetative screen consisting of trees and shrubs which may be placed within a fenced enclosure.
  - iii. Solid wall or fence of acoustically insulating material surrounding all or part of the facility.
  - iv. Acoustically insulated building enclosing the installation.
  - v. Noise management plan identifying hours of maximum noise emissions, type, frequency and level of noise to be emitted; and proposed mitigation measures.
- d. Sound emissions shall at minimum be in accordance with the standards as adopted, and amended from time to time by COGCC. In all instances a major or minor facility must comply with sound emission standards designated for residential land uses unless a specific exemption is granted by the department, the Commission or the City.
  - e. Other special mitigation measures. Construction of buildings or other enclosures may be required where facilities create noise and visual impacts cannot be mitigated due to adjacent land use.
- 15.** Reduce light pollution by using methods such as limiting height of light sources, timing of lighting operations, limiting wattage intensity, and constructing light shields.
- a. All outdoor lighting fixtures with an initial output of more than 2000 lumens (equivalent to a 26 watt compact fluorescent or 100 watt standard incandescent lamp type) shall have a full cutoff fixture (also known as a fully shielded fixture). The fixture shall be designed to shield the source of illumination from view from above or from adjacent property, and to not cast significant light other than straight down from the source.
- 16.** The placement of production facilities on hilltops and ridgelines will be prohibited where they are highly visible.
- 17.** All produced oil or gas shall be transported from the well to the production facilities by buried pipeline when possible. All electrical lines serving pumping and accessory equipment shall be installed below ground.
- 18.** A Visual Mitigation Plan shall be required for all facilities. The minimum requirements are as follows:
- a. Scaled drawing.
  - b. Site boundary dimensions and descriptions.
  - c. Existing and proposed contours and pad elevations.
  - d. Existing conditions and site features that incorporate and surround such site to be developed.
  - e. Existing and proposed access.
  - f. Visual mitigation techniques to be employed at the facility.
  - g. Orientation and dimensions of facilities and equipment that will be used once the facility is operational.
  - h. Description of existing and proposed vegetation.
  - i. Location, height and extent of perimeter berms, if applicable.
  - j. Type, location and amount of mulch materials, if applicable.
  - k. Type, location and height of fencing, if applicable.
  - l. Delineate drainage and runoff patterns.
  - m. Direction and type of lighting, if applicable.

- n. Written maintenance and irrigation plan for at least one year after revegetation.
  - o. Title block:
    - i. Name of development;
    - ii. Name of applicant or developers;
    - iii. Project number;
    - iv. Date of preparation; and
    - v. Section, township and range.
  - p. Pad dimensions for a facility shall be the minimum size necessary to provide a safe work area and minimize surface disturbance.
  - q. Consider the use of appropriate natural features such as native trees, rock formations, terrain, or berms to conceal disturbed areas.
  - r. In areas where the facilities will have a substantial visual impact on the surrounding area, landscaping with appropriate native vegetation or screening of the site, or the use of low profile tanks or less intrusive equipment, may be required. Specific landscaping or screening requirements may include, but are not necessarily limited to, establishing and properly maintaining ground cover, shrubs, and trees; shaping cuts and fills to appear as natural forms; designing the operation to utilize natural screens; or constructing fences for use with or instead of landscaping. *COGCC Rule 1203(a)(14)*.
  - s. Remove unnecessary equipment and structures from the site that are not necessary for daily operation.
    - i. Operator will be responsible for regular removal of any trash or debris on site and responsible for any windblown trash that goes off-site.
  - t. Absent City consent, Operator's equipment and materials shall not be stacked, stored or maintained on the Property, other than short-term storage of well site construction equipment and materials.
    - i. Unless otherwise agreed by Owner in writing, Operator shall not store any other equipment at the surface location for any well that is not necessary for Operator to produce hydrocarbons from the Leased Premises.
  - u. All above ground facilities including power boxes, building doors, roofs, and any visible equipment will be painted a color selected in consultation with the City. Other considerations in more visually sensitive areas may include the aesthetic siting of roads, well locations, and production facilities; avoiding straight roads; modifying production facility or well pad shape or size; using low-profile or below ground pumping units and low-profile tanks; avoiding the placement of tanks on the ridgeline; manipulating vegetation to feather straight edges; using natural-looking earthwork berms or vegetative screening; and completing interim reclamation of disturbed areas.
  - v. Unless otherwise agreed to by the Owner in writing, all facilities for a completed well, regardless of its surface location, shall be painted in accordance with Commission Rule 804, as amended from time to time.
- 19.** During pipeline installations install trench plugs, earthen ramps, or other means as necessary to ensure that open pipeline trenches do not trap wildlife, and that pipe strings do not impair wildlife movements. For areas within 300 feet of a public trail or other public area, safety fencing shall be installed.

## F. RECLAMATION PLAN

The Operator in consultation with the CPW, NRCS, and other interested parties, and with final approval by the City, develop a reclamation plan that incorporates wildlife species-specific goals and that defines reclamation performance standards, including the following components:

### 1. Soil

- a. Strip and segregate topsoil prior to construction unless the area has been designed for fabric installation or bushhogging techniques, as detailed above. Appropriately configure topsoil piles and immediately seed with the City approved seed mix to control erosion, prevent weed establishment and maintain soil microbial activity.
- b. Store topsoil in windrows no higher than 5 feet.
  - i. Topsoil salvaged from drill sites and stored for more than one year should be bladed to a specified location at these areas, seeded with a prescribed seed mixture, and covered with mulch for protection from wind and water erosion. A weed management plan will be required for all topsoil windrows.
- c. Salvage topsoil from all road construction and other rights of way and re-apply during interim and final reclamation.
- d. Develop a soil amendment plan if necessary. Evaluate the efficacy of soil amendment application.

### 2. Seed

- a. Consult with the City to select a reclamation seed mix that is based on native species found within a reference area for the site being reclaimed (see also species-specific recommendations).
- b. The City will only allow seed collected on site to be used in the interim or final reclamation. *NOTE: The City may allow seed propagation off site if needed to provide an adequate quantity of seed. (Collect seed, plant offsite to create a seed source).*
- c. Test seed regularly and frequently for purity, germination/viability, and the presence of weeds.
- d. Use appropriately diverse reclamation seed mixes that are based on the reference area for the site being reclaimed (see also species-specific recommendations).
- e. Conduct seeding in a manner that ensures that seedbed preparation and planting techniques are appropriate for grasses, forbs and shrubs (e.g., seed forbs and shrubs separately from grasses).
- f. Emphasize bunchgrass over sod-forming grasses in seed mixes in order to provide more effective wildlife cover and to facilitate forb and shrub establishment.
- g. Seed immediately after recontouring and spreading topsoil. Spread topsoil and conduct seeding during optimal periods for seed germination and establishment. Use of the same contractor for re-contouring land as used for seeding is often the most effective approach.
  - i. If extenuating circumstances are present, seeding shall be completed within 30 days after completion of grading.
- h. Non-native species are not allowed in reclamation seed mixes.

- i. Select quick germinating native grass species for interim reclamation on cut and fill slopes and topsoil piles.
  - j. Plan for reclamation failure and be prepared to repeat seeding as necessary to meet vegetation cover, composition, and diversity standards.
  - k. Consider reclaiming with tubelings/plantings where seed failure is likely or has occurred.
- 3. Vegetative Standards**
- a. Reference areas approved by the City will be used to establish reclamation standards. Reference areas will be within the same Ecological Site, represent areas of high wildlife value, and contain a diverse mixture of native grasses, forbs, and shrubs.
  - b. The vegetation cover standard will be a total perennial non-invasive plant cover of at least eighty (80) percent of reference area levels. *COGCC Rule 1003*.
    - i. Non-invasive plant cover shall be measured using a valid and reliable method, such as point-intercept. Sufficient data shall be collected to allow the operator to estimate the mean total non-noxious plant cover to within ten percent of the true mean with 90 percent confidence.
    - ii. It will be the responsibility of the Operator to insure that adequate ground cover is established upon the disturbed soils and operator will reseed and water as necessary to accomplish that obligation.
  - c. The plant diversity standard will be a plant diversity of non-invasive species which is at least fifty percent (50%) of reference area levels. Species with at least three percent (3%) relative plant cover can be included in the diversity calculation. All species in the reference area regardless of relative cover will be used to establish the vegetation standard.
  - d. Establish permanent photo points and vegetation measurement plots or transects; monitor at least annually until plant cover, composition, and diversity standards have been met.
  - e. 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.
- 4. Timing**
- a. Initiate reclamation as soon as possible, including interim reclamation, to accelerate return of disturbed areas for use by wildlife.
  - b. Remove all unnecessary infrastructure and equipment from the site.
  - c. Close and reclaim roads once they are no longer necessary, including removal of all bridges and culverts and recontouring/reclaiming all stream crossings.
  - d. Remediate hydrocarbon or other spills on disturbed areas prior to reclamation.
  - e. Reclaim sites during optimum seasons (e.g. late fall/early winter or early spring).
  - f. Complete final reclamation activities so that topsoil placement and reseedling can occur within the first season following abandonment of oil and gas wells.
  - g. Each proposed well shall be completed as either a producing well or plugged and abandoned as a dry hole within a reasonable time, not to exceed one hundred eighty (180) days from the date of drilling rig release. Within a reasonable time,

not to exceed one hundred eighty (180) days after the completion of all wells planned for a single well pad, the pad size shall be reduced to that necessary and agreed to for an acceptable production facility. If reclamation has occurred, and the pad has been reclaimed, and the Operator desires to reenter and re-access the pad site the Operator shall so notify City and the parties shall have the opportunity to discuss a Surface Use Agreement for the new operations.

**5. Interim reclamation**

- a.** Perform interim reclamation on all disturbed areas not needed for active support of production operations.
  - i.** Low traffic roads should be reclaimed as two-tracks as soon as usage patterns allow.
- b.** Use native grasses and forbs on all disturbed areas (e.g., road shoulders and borrow areas), including disturbed areas where additional future ground disturbance is expected to occur.
- c.** Perform interim reclamation to final reclamation species composition and establishment standards.
- d.** Reclaim beginning with grading, top soil replacement, and seeding with a locally collected weed-free seed mixture. Seed at the time of year appropriate for germination.
- e.** Steps to Interim Reclamation:
  - i.** Leave an area sufficient to set up a workover rig.
  - ii.** Recontour remaining areas to the original, natural contour.
  - iii.** Spread stockpiled topsoil to, or within 10 to 15 feet of the production facilities.
  - iv.** Gravel a drive-around or load-out area, only if necessary. Consider seeding the drive-around and access spur road.

**6. Riparian areas**

- a.** Replace all riparian trees and shrubs at a rate of at least 3:1.
- b.** Restore both form and function of impacted wetlands and riparian areas and mitigate erosion.
- c.** The City may require fencing riparian in areas being reclaimed.
- d.** Replace non-native riparian vegetation such as tamarisk and Russian olive with appropriate native plantings such as cottonwood or willow.

**7. Contamination**

- a.** Operator agrees that it will maintain the Property free from all contamination including but not restricted to, hazardous waste, oil, gas, petroleum, petroleum products, used oil, production waste, including produced water, distillates, or fractions or any other regulated substance, the presence of which on, in or under the Property is prohibited by any law, and shall comply with all regulations and requirements regarding any substance which by law, regulation or ordinance requires special handling or disposal.

**8. Disposal**

- a.** Remove well pad and road surface materials that are incompatible with post-production land use and re-vegetation requirements.
- b.** Remove and properly dispose of degraded silt fencing and erosion control materials after their utility has expired.

**9. Inspection**

- a. Operator in cooperation with City shall have an independent engineer inspect and evaluate the wellsite. If the independent engineer concludes there is a risk that the Property or adjoining lands and/or water may be affected as a result of Operator's operations on the Property, the Operator and City shall immediately consult regarding best mitigation practices that shall be implemented as soon as possible to minimize any damage to the Property or adjacent lands.

**10. Establishing reclaimed areas**

- a. Site Preparation: Establish a contour that approximates the natural condition. Prepare the final seedbed in a manner that will trap seed and moisture, deter off-road travel, and match the surrounding landscape.
- b. Compacted soils will be ripped to a depth of at least eighteen inches (18 inches) to alleviate compaction and increase water percolation.
- c. Remove all non-essential access roads, hillsides, beds, and other areas where earth has been moved. Backfill trenches and compact soil properly.
- d. Redistribute topsoil over the entire disturbed area from which it is salvaged. Topsoil shall not be handled during excessively wet conditions or at times when the ground or topsoil is frozen. Leave topsoil in a roughened condition to discourage erosion. Stream beds and banks, and erodible soils shall be stabilized using best management practices.
- e. Soils with high runoff potential will be deep ripped (18 inches or more) before planting to increase percolation. Water bars may be required on disturbed slopes in areas with unstable soils where seeding alone may not adequately control erosion. Install sediment barriers adjacent to streams, rivers, ponds, and wetlands, to minimize sediment transport into these sensitive areas. Certified weed-free straw bales shall be used for these installations. A minimum of four sediment barriers shall be installed at stream crossings.
- f. Utilize staked soil retention blankets for erosion control and reclamation of large surface areas with 3:1 or steeper slopes.
  - i. Use only biodegradable erosion blankets to stabilize disturbed soil and enhance revegetation.
- g. On steep slopes or rocky areas, dozer-track perpendicular to the slope or leave slope with adequate roughness following topsoil placement to provide micro sites for seed germination, and reduce soil movement. All areas seeded must be mulched with weed free hay or straw at a rate of 2 tons/acre. Mulch should be spread uniformly and crimped to a depth of 4" using a mulch crimper. A minimum of 50% of the mulch by weight should be 10" or more in length. (Apply certified weed free mulch and crimp or tacify to remain in place to reclaim areas for seed preservation and moisture retention. Scarify, till, or harrow the seedbed to a depth of 3 to 4 inches to enhance revegetation. Use fertilizer only if recommended by the City.
- h. Install cattle guards if necessary to regulate livestock pasture utilization;
- i. Control weeds within and surrounding the reclaimed sites .
- j. Educate employees and contractors about weed issues. (see *Weed Management Plan*)

**11. Fencing (COGCC Rule 1203(a)(13)).**

- a. Fence livestock and/or wildlife out of newly reclaimed areas until reclamation standards have been met and plants are capable of sustaining grazing and herbivory. Once grazing can be allowed, remove fencing.
- b. Any new fencing that is built, or fencing that is replaced, shall be built to the DPW wildlife-friendly fencing standards.
- c. Remove obsolete, degraded, or hazardous fencing.

**G. WEED MANAGEMENT PLAN:**

1. The Operator, in consultation with the City, DPW, and other interested parties will develop an aggressive, integrated, noxious and invasive Weed Management Plan. The Plan will utilize an adaptive management strategy that permits effective responses to weed issues and reflects local site and geologic conditions. The plan must be approved by the City. Use of dedicated personnel with single responsibility for weed control is often the most effective approach.
2. The Weed Management Plan is subject to the Colorado Noxious Weed Act and Larimer County Noxious Weed regulation. The Weed Management Plan must be completed prior to the City signing a Surface Use Agreement and prior to surface disturbance. The Weed Management Plan will, at a minimum, include:
  - a. A map showing the distribution of weeds prior to development.
  - b. A plan to thoroughly clean vehicles and other equipment to remove weed seeds before moving vehicles and equipment onto City property;
    - i. Identification of weed cleaning stations for vehicles and equipment.
    - ii. All vehicles and equipment entering the City property will be decontaminated per USFWS procedures to prevent the introduction of noxious weeds. Decontamination will include removal of skid plates for inspection and cleaning if necessary.
    - iii. Wash and/or treat drill rigs and other portable equipment which may carry soil between deployments. Wash oilfield service pickup trucks daily and after visits to areas of known weed infestation.
  - c. Appropriate weed control and removal methods when found;
    - i. Hand pull plants if areas are small or infestations are new
    - ii. Land Application of Chemicals. The use of pesticides, herbicides and fertilizers within the City property must be approved by the City before use.
      - o All herbicides must be applied by certified commercial applicator(s)
    - iii. Use of domestic animals and approved biological agents may be utilized and must be approved by the City, noting that biological agents are species specific and can take up to five years before any results may be detected. Considerations for use of domestic livestock include, but are not limited to, livestock species, target weed species, and necessary management of the livestock (fencing, water, herding, etc).
  - d. Implementing all necessary preventative methods to reduce the potential of invasion from a variety of causes or sources;

- i. Gravel and other surfacing materials used for the project will be free of noxious weeds.
  - ii. Mulches and seed mixes must be certified weed free.
- e. Establish a systematic and thorough noxious and invasive vegetation monitoring program for all disturbed areas;
  - i. Monitoring should last as long as the seed longevity for the weeds found at the site, and for a minimum of 3-5 years after successful vegetation is established.
    - o Incorporate all weed management plans and regulations of the local, county, and federal stakeholders into on-the-ground operations and other required plans prior to surface disturbance.
    - o Maintain monitoring records
  - ii. Continue control programs for the life of the well field
  - iii. Use reclamation as a weed management tool. Plant competition provided by established reclamation is the most effective weed management tool.
  - iv. Educate employees and contractors about noxious and invasive weed issues.
    - o Weed education policy: Distribute and review weed education material at onsite inspections and pre-construction conferences.

#### **H. RECLAMATION MONITORING:**

1. Conduct all necessary reclamation and invasive plant monitoring.
2. Determine use of the reclaimed areas by the target wildlife species.
3. Maintain pre and post development site inspection records and monitor operations for compliance.
4. Monitor the long-term success of revegetation efforts to ensure successful establishment of desired species and detect any noxious weed infestations. If revegetation is unsuccessful, continue efforts to establish native species in disturbed sites.
5. Wetland and Drainage Channel Crossings: Wetland areas and natural drainage channel crossings should be monitored annually for invasive, non-native species invasion and establishment of undesirable species.
6. Soil stability should be measured using an erosion condition class/soil surface factor rating method to numerically rate soil movement, surface litter, surface rock, pedestalling, flow patterns, and rill-gully formation.
7. Utilize GIS technologies to assess the extent of disturbance and document the reclamation progression and the footprint of disturbances.
8. General environmental monitoring: Monitor conditions or events that may indicate environmental problems. Such conditions or events can include any significant chemical spill or leak, detection of wildlife mortalities, sections of roads with frequent and recurrent wildlife collisions (especially big game), poaching and harassment incidents, severe erosion into tributary drainages, avian electrocutions, structures associated with frequent bird or bat collisions, migration impediments (e.g., pronghorn concentrating along a fence), wildlife entrapment, sick or injured wildlife, or other unusual observations.
9. Surety: Operator, prior to the commencement of any construction, will furnish a Performance Bond to City to guarantee the timely completion of the reclamation work

detailed in the Reclamation Plan and also to guarantee that all material and labor on this reclamation work or incidental to the work will be fully paid for by Operator or its Surety, and that any and all direct and indirect costs incurred by City for reclamation or revegetation work required by this section including, but not limited to, regrading, filling, revegetation, erosion control, and replacing of topsoil, are fully paid or reimbursed. These Bonding requirements are in addition to, and notwithstanding, any and all bonding requirements of the COGCC Series 700 Rules (Financial Assurance and Oil and Gas Conservation and Environmental Response Fund). The amount of the Bond will be calculated at \$10,000 / acre of disturbance or an amount estimated and approved by the City for the revegetation work. The Bond will be in a form, and with Surety or Sureties, satisfactory to City. Notwithstanding the foregoing, Operator and its Surety will remain responsible for the completion of the final revegetation of the Pad Sites at the conclusion of this Agreement. For those purposes, this provision will extend until City provides written approval of the successful recontouring and revegetation of the sites, upon which written approval the bond will be released.

### **III. RESEARCH:**

- A.** Collaborate and/or fund research investigation into the impacts of oil and gas development activities on natural and wildlife resources.
- B.** Support research to test the effectiveness of specific Best Management Practices.
- C.** Support research to test production wastes for naturally occurring radioactive materials (NORM) if pursued by the state of Colorado.
- D.** Conduct reclamation field trials to match seed mixes, soil preparation techniques, and planting methods to local conditions.
- E.** Conduct test plot studies to develop more effective revegetation practices. Variables might include slope, aspect, soil preparation, soil amendments, irrigation, and seed mix composition.
- F.** Cooperate in implementation of existing visibility and atmospheric deposition monitoring studies if requested.
- G.** Cooperate in determining regional oxides of nitrogen emission levels if requested.
- H.** Cooperate in regional groundwater quality research efforts.

### **IV. SENSITIVE WILDLIFE AREAS**

#### **A. DEER AND ELK**

- 1.** Consult with DPW at the earliest stage of development to identify the locations of mule deer and elk important wintering habitats and production areas. Adjust development sites to avoid critical habitat patches.
- 2.** Conduct comprehensive development planning that provides a clear point of reference in evaluating, avoiding, and mitigating large scale and cumulative impacts.
- 3.** Avoid oil and gas activities within mule deer critical winter range, elk winter concentration areas, elk production areas, and migration corridors.
- 4.** Where oil and gas activities must occur in mule deer critical winter range or elk winter concentration areas, conduct these activities outside the time period from December 1 through April 15.

5. Restrict post-development well site visitations to between the hours of 10:00 a.m. and 3:00 p.m. and reduce well site visitations between December 1 and April 15 in mule deer and elk winter range.
6. Where oil and gas activities must occur in elk production areas, conduct these activities outside the time period from May 15 through June 30.
7. Establish company guidelines to minimize wildlife mortality from vehicle collisions on roads.
8. Avoid surface facility density in excess of 10 well pads per 10-square mile area (one well pad per section) in mule deer and elk winter range and in elk production areas.
9. Phase and concentrate all development activities, so that large areas of undisturbed habitat for wildlife remain and thorough reclamation occurs immediately after development and before moving to new sites. Development should progress at a pace commensurate with reclamation success.
10. Identify critical habitat types and patches. Adjust development sites to avoid these areas.
11. Prior to development, establish baseline vegetation condition and inventory and to provide a basis for post-development habitat restoration.
12. Gate single-purpose roads and restrict general public access to reduce traffic disruptions to wildlife.
13. Close and immediately reclaim all roads that are redundant, not used regularly, or have been abandoned to the maximum extent possible to minimize disturbance and habitat fragmentation.
14. Implement the species appropriate reclamation guidelines found in Section II E-G of this document.
15. Avoid aggressive non-native grasses and shrubs in mule deer and elk habitat (CDOW, 21)
16. Restore appropriate sagebrush species or subspecies on disturbed sagebrush sites. Use locally collected seed for reseeded (CDOW, 21)
17. Reclaim mule deer and elk habitats with native shrubs, grasses, and forbs appropriate to the ecological site disturbed.
18. The City may require mitigation for impacts to elk and mule deer by requiring off-site production facilities for any parcel within crucial elk winter range
19. Implement a monitoring program to detect and evaluate ongoing wildlife effects, including avoidance responses, distribution shifts, habituation, evidence of migration barriers, mortalities, and depressed productivity (e.g., low fawn ratios), and to determine effectiveness of mitigation.
20. If substantial condensate is produced, disturbance to wildlife can be greatly reduced by piping rather than trucking condensate off site, or by installing larger storage capacity to minimize truck trips and eliminate truck trips during sensitive times of year such as winter and breeding seasons. This recommendation generally applies to winter ranges on which more than 1 truck trip per month is necessary to remove condensate

## **B. PRONGHORN ANTELOPE**

1. Avoid surface disturbance to and construction activities within pronghorn winter concentration areas west of I-25 from January 1 through March 31.
2. Avoid surface-disturbing activities from May 1 to July 15 within pronghorn fawning grounds.

3. To the extent reasonable, develop multiple wells from single pads by employing directional or horizontal drilling. Reducing densities of well locations, roads, and minimizing associated activities, are the highest priorities within crucial winter ranges.
4. Identify critical habitat types and adjust development sites to avoid these areas.
5. Gate single-purpose roads to reduce traffic disruptions to wildlife.
6. Close and immediately reclaim all roads that are redundant, not used regularly, or have been abandoned to the maximum extent possible to minimize disturbance and habitat fragmentation.
7. Limit fence construction in pronghorn habitat. Use DPW recommended pronghorn fence designs.
8. Prior to development, establish baseline vegetation condition and inventory to provide a basis for post-development habitat restoration.
9. Reclaim pronghorn habitats with native shrubs, grasses, and forbs appropriate to the ecological site disturbed.
10. Restore appropriate sagebrush species or subspecies on disturbed sagebrush sites. Use locally collected seed for reseeded. Sagebrush is less important in pronghorn reclamation on the eastern plains than it is in western Colorado (west of I-25). (CDOW, 31-32)
11. Implement a monitoring program to detect and evaluate ongoing wildlife effects, including avoidance responses, distribution shifts, habituation, evidence of migration barriers, mortalities, and depressed productivity (e.g., low fawn ratios), and to determine effectiveness of mitigation.
12. If substantial condensate is produced, disturbance to wildlife can be greatly reduced by piping rather than trucking condensate off site, or by installing larger storage capacity to minimize truck trips and eliminate truck trips during sensitive times of year such as winter and breeding seasons. This recommendation generally applies to winter ranges on which more than 1 truck trip per month is necessary to remove condensate.

## **C. RAPTORS**

### **1. General Raptor Mitigation Measures**

- a. Prior to ground disturbing activities, consult with DPW and the City to determine locations of raptor nesting and roosting sites. If requested, conduct surveys necessary to determine nest and roost locations.
- b. Provide raptor survey data for incorporation into the DPW raptor database.
- c. Consult with and implement DPW recommendations regarding raptor protection measures including seasonal timing restrictions and recommended buffer zones.
- d. Avoid disturbance of raptor nesting habitat during the breeding season (variable by species--January 1 to July 15).
- e. Avoid impacts to raptor roost sites during the wintering period (variable by species--November 15 to April 1).
- f. Survey suitable habitat (cliffs, large trees, snags) within 1 mile of a proposed project site for raptor nests.
- g. Site the project area based on suitable buffer zones, and/or place sufficient seasonal limitations on construction activity to protect the nest site.

- h. Bury existing utility lines in defined areas with high collision risk for birds.

## **2. Bald Eagle**

- a. Surveys are required prior to any operation unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s), and be conducted according to protocol.
- b. No surface occupancy (beyond that which historically occurred in the area) within 0.25 mile of any active or historic bald eagle nest site.
- c. No human disturbance or construction activity within 0.5 mile of any active bald eagle nest from November 15 to July 31. Activity within 0.5 mile of bald eagle nest sites would be best conducted between August 15 and October 15.
- d. No surface occupancy or construction within 0.25 mile of any active bald eagle winter night roost site, where there is no direct line of sight to the roost, between December 1 and February 28 and within 0.5 mile of any active bald eagle winter night roost site, where there is a direct line of sight to the roost, between December 1 and February 28.
- e. No human disturbance within 0.5 mile of any active bald eagle winter roost site from November 15 to March 15 except for periodic visits such as well maintenance and monitoring. Maintenance and monitoring work within the buffer zone after development should be restricted to the period between 10:00 a.m. and 2:00 p.m.
- f. No human disturbance within any mapped winter concentration areas between November 15 and March 15.
- g. Avoid potentially disruptive activities or permanent above-ground structures in the bald eagles' direct flight path between their nest and roost sites and important foraging areas.

## **3. Ferruginous Hawk**

- a. No surface occupancy (beyond that which historically occurred in the area) within 0.5 mile of active nest sites and associated alternate nests.
- b. No human encroachment or construction activity within 0.5 mile of any active ferruginous hawk nest or alternate nest site from February 1 to July 15.

## **4. Golden Eagle**

- a. No surface occupancy (beyond that which historically occurred in the area) within 0.25 mile of any active golden eagle nest site.
- b. No human encroachment or construction activity within 0.5 mile of any active golden eagle nest from December 15 to July 15.

## **5. Peregrine Falcon and Prairie Falcon**

- a. No surface occupancy (beyond that which historically occurred in the area) within 0.5 mile of any active or historic peregrine or prairie falcon nest site.
- b. No human encroachment or construction activity within 0.5 mile of any active peregrine or prairie falcon nest site from March 15 to July 31.

## **6. Burrowing Owl**

- a. Follow recommended survey protocol and actions to protect nesting Burrowing Owls (e.g. survey active and inactive prairie dog colonies for presence of Burrowing Owls when construction will occur between March 1 and October 31).
- b. Do not create any surface disturbance within 300 feet of any active burrowing owl nest site outside the period between March 1 and August 15.
- c. Follow recommended survey protocol and actions to protect nesting Burrowing Owls. If present, no human encroachment or surface disturbance within 300 feet of nesting burrows from March 1 to August 15.

## **7. Swainson's Hawk**

- a. No surface occupancy (beyond that which historically occurred in the area) within 0.25 mile of any active or historic Swainson's hawk nest.
- b. No human encroachment or construction activity within 0.25 mile of any active Swainson's hawk nest from April 1 to July 15.

## **D. PRAIRIE DOGS (Black-Tailed)**

1. Map occupied and potential habitat prior to development.
2. Avoid construction on or in prairie dog colonies.
3. Construction, or seismic surveys, should not occur within 100 feet of an active colony.
4. Prairie dog colonies should be monitored before, during and after development.
5. Minimize road development and close to recreational use.
6. Avoid construction activities within and over active prairie dog colonies March 1 to June 15.

## **E. MOUNTAIN PLOVER**

1. Survey suitable nesting habitat proposed for development during the appropriate season. Flag active nests and apply the seasonal restriction described below.
2. For surface disturbing activities, surveys will be conducted within suitable plover habitat by a qualified biologist in accordance with USFWS 1999 guidelines. Plover surveys will be conducted during early courtship and territorial establishment. Throughout the breeding range, this period extends from approximately mid-April through early July.
3. Sites must be surveyed 3 times between the April 10 and July 10 period, with each survey separated by at least 14 days.
4. No surface occupancy within 300 feet of active mountain plover nest sites until young are hatched and independent of nest.
5. No surface occupancy within an identified staging areas plus a 200 meter buffer
6. No human encroachment within 0.25 miles of an active nest from April 1 to May 15.
7. Set work scheduled and shift changes to avoid periods of 30 minutes before and after sunrise and sunset in June and July.
8. Limit speed within 0.50 miles of nesting areas to 25 mph or less from March 15 to July 31
9. Locate roads outside of plover nesting areas.

10. Ancillary facilities (for example, compressor stations and processing plants) will not be located within ½ mile of known nesting areas.
11. Avoid creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design
12. Disturbance to prairie dog towns will be avoided.

#### **F. MCCOWNS LONGSPUR**

1. Limit surface occupancy within the core area plus a 450 foot buffer.
2. Maintain noise levels at or below 49 dB from April 1 to June 30.

#### **G. CHESTNUT COLLARED LONGSPUR**

1. No surface occupancy within identified breeding areas plus a 300 foot buffer
2. Maintain noise levels at or below 49 dB from April 1 to June 30.

#### **H. LARK BUNTING**

1. Limit occupancy within identified core areas plus a 450 foot buffer
2. Maintain noise levels at or below 49 dB from April 1 to June 30

#### **I. SWIFT FOX**

1. Survey for swift fox den sites and avoid surface disturbance within 0.25 mile while young are den dependent (March 15 to June 15).
2. Establish company guidelines to minimize wildlife mortality from vehicle collisions on roads.
3. Utilize native vegetation for reclamation within swift fox overall range.
4. Restrict use of pesticides for rodent control in swift fox overall range.

### **V. RARE PLANTS AND PLANT COMMUNITIES AND OTHER SPECIES**

#### **A. Plants and Plant Communities of Concern**

1. Operator will consult with the City to determine the plant species and plant communities of concern in the project area.
2. Surveys will be performed by qualified field botanists/biologists who will provide documentation of their qualifications, experience and knowledge of the species prior to starting work. Surveyors must also include in their report a dated photograph of the plants taken at a nearby location to show the flowering status at the time of the surveys.
3. Plant surveys will be conducted in all suitable habitats within 200 meters of edge of proposed disturbance areas for all plant species and plant communities of concern.
4. Surveys for occupied suitable habitat will be performed prior to any ground disturbance, including staking. Surveys will take place when the plants can be positively identified, during the appropriate flowering periods.
5. For linear features such as roads and pipelines, surveys will extend at least 100 meters beyond the edge of the proposed ground disturbance along each side of the right of way.

#### **B. Mountain Mahogany**

1. No surface occupancy within mountain mahogany communities.
2. Restricted occupancy is allowed within 300 feet of the edge of the community or from primary roads traversing the community.

### **C. Management of Plants of Concern**

1. Where plants and/or plant communities of concern occur in a project area, no occupancy is allowed within 300 feet from the edge of the occurrence. The 300 meter buffer reduces dust transport, weed invasion, unauthorized vehicular activities, and chemical and produced-water spills. It also reduces impact to pollinators and their habitat.
2. Construction should take place down slope of plants of concern where feasible. Down slope ground disturbing activities should be conducted in such a way as to avoid as much as is reasonably possible, undercutting and sloughing of the slopes where rare plant habitat occurs. If well pads and roads must be sited upslope, no surface occupancy buffers of at least 200 meters shall be established between the surface disturbance and plants of concern.
3. Control noxious weeds using integrated techniques. Limit chemical control in areas with rare plant species to avoid damage to non-target species. Mechanical or chemical control in and near rare plant habitat should only be implemented by personnel familiar with the rare plants.
4. Herbicide application should be kept at least 200 meters from known plant populations, except in instances where weed populations threaten habitat integrity or plant populations. Chemical control in and near rare plant habitat should only be implemented by licensed applicators familiar with the rare plants.
5. Monitor and control all infestations of noxious weeds (Colorado Noxious Weed Act 2003) and other non-native invasive plant species in and adjacent to occupied habitat for plants of concern.
6. Noxious weeds in close proximity (within 400–800 meters) to the plants of concern should be the highest priority for control. Ensure that the rare plants are protected from undue damage resulting from weed control efforts.
7. Because many rare plants occur within wetland environments, protection of wetlands is of highest priority. Design and construction methods will be selected based on their ability to minimize or prevent disruption, alteration, or interruption of the hydrologic and ecological processes that support rare plants or significant plant communities.

### **D. Locally Unique Plant Communities**

1. Locally-unique plant communities such as Cedar Canyon and the Soapstone Ponderosa Pine stand will require a no-surface occupancy stipulation because of their importance. The City has identified several “tracked” plant communities (see MTP EBD and the Soapstone Management Plan) that will require the BMP’s listed here

### **E. Rare Plants**

1. Avoid federally listed species and those rated as globally or critically imperiled (G1 or G2) by the Colorado Natural Heritage Program.
2. No surface occupancy within 300 feet of any rare plant occurrence.

3. Minimize impacts within 300 to 600 feet of the rare plant occurrence.

**F. *Smithiomyces crocodilinus***

1. No surface occupancy within 600 feet of any known occurrence.

**G. Colorado Blue**

1. No surface occupancy within 300 feet of any known occurrence.

**H. Iowa Darter**

1. No surface occupancy within 600 feet from the high water mark of creeks and streams where this species occurs.

**VI. CULTURAL RESOURCE PROTECTION**

- A. A Class III cultural resources survey, conducted by a qualified archaeologist approved by the City and Office of Archaeology and Historic Preservation, will be required for all areas proposed for surface disturbance that have not been previously surveyed.
- B. Historic properties (previously known or discovered during the inventory) considered eligible for the National Register of Historic Places (NRHP) will be avoided.
- C. No Surface Occupancy or access is allowed into or within one mile (1 mile) of the Lindenmeier Archaeological Site (National Historic Landmark) for the exploration or development of oil and gas.
- D. The Operator and their contractors will inform their employees about relevant state and federal regulations intended to protect cultural resources. Equipment operators will be informed that if a site is uncovered during construction, activities in the vicinity immediately will cease, and the City will be notified.
- E. The Operator and their contractors shall avoid or minimize impacts to any area identified during the Class III inventory as having a high probability of encountering potentially significant sub-surface archaeological sites.
  1. If avoidance is not possible, a qualified archaeologist will be required to monitor surface disturbance during construction.
  2. All major pipelines (12" and larger) will be made accessible to archaeological open trench inspections during construction in these areas.
  3. Operators will halt construction activities in the area of concern if previously undetected cultural resource properties are discovered during construction.
  4. If a significant surface or sub-surface archaeological site is discovered during construction, the Operator will be responsible to mitigate the disturbance to the cultural property through an approved data recovery plan.
- F. The operator must consult with the City to determine activities that will be allowed at cultural sites where the landscape features are important for understanding the property or sites where the setting directly contributes to the significance of the property. The landscape included in this consultation will be within ¼ mile or within the visual horizon, whichever is closer, of cultural site.
- G. Paleontological Resources: Any significant fossils or localities previously known or discovered during the survey will be avoided by the permitted activity

1. Significant fossils or localities previously known or discovered during the survey will be avoided by permitted activity.
2. All major pipelines (12" and larger) will be made accessible to paleontological open trench inspections and geologic research by a qualified geo-archeologist.
3. The operator will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operation.

## **VII. RANGE PROTECTIONS**

1. The Operator will coordinate with the City's livestock operators on an annual basis or more frequently as needed to discuss (1) the annual grazing plan, (2) concerns identified by the City or livestock operator along with any agreed-upon corrective actions, and (3) planned energy development and operations during the grazing season. This meeting will occur at least 60 days prior to the start of the annual grazing plan.
2. All gates within the project area will be left as they are found (i.e., open gates will be left open, closed gates will be closed).
3. Where access requires the disruption of an existing fence, a cattle guard should be installed at the junction at operator expense.
  1. Operator shall construct cattle guards with wings at all fence crossings designated by the City. Installation of the cattle guards shall be at the sole cost and expense of Operator. Fence braces shall be installed on each side of the cattle guards. Fence braces shall be constructed as specified by the City. Cattle guards shall be constructed approximately 6 inches above the existing grade of the road so that water does not run into the cattle guard. Operator shall be responsible for maintenance of all cattle guards used by Operator, together with wings and attached braces. All cattle guards currently in existence on roads used by Operator which are not aligned with existing fence lines shall be reconstructed by Operator so as to be in line with the fence.
4. Removal or alteration of existing range improvements will be prohibited unless prior approval is obtained from the City.
5. Operator personnel and contractors will be instructed to minimize contact with, and avoid harassment of livestock.
6. If a fence must be crossed by vehicular traffic, the contractor will provide advance notice to the appropriate City personnel.
7. Gates will be used for crossing fences wherever practical. If a fence must be crossed by a vehicle at a location other than an existing gate, contact with the appropriate City personnel will be made before any activity is started at any fence crossing location and specified procedures will be followed.
8. All range improvements (stock water tanks, pipelines, corrals, etc.) should be avoided by 500 feet unless no other alternative is available and impacts can be mitigated as per the City. If requested by the City, the Operator will fence drill pads and other oil and gas related facilities. Final fencing materials shall be determined based on best management practices.

## **VIII. AIR QUALITY PROTECTIONS**

### **A. General Air Quality Protection Measures:**

This section discusses general protection measures and regulatory requirements for protection of ambient air as a result of oil and gas exploration and production activities in or

near City natural areas. These measures are intended to provide protection of natural resources and human health (e.g., visitors) from the following categories of contaminants:

1. Emissions associated with combustion (Particulate matter, N<sub>2</sub>O, sulfur oxide, CO<sub>2</sub>, and CO)
  2. Volatile organic compound (VOC) emissions from natural gas wells and storage or handling of petroleum hydrocarbons or solvents.
  3. VOCs mixed with N<sub>2</sub>O from combustion that leads to ozone formation.
  4. Greenhouse gas emissions.
- B.** Comply with all applicable laws, statutes, regulations, standards, and implementation plans for protection of ambient air quality to include:
1. Obtain approved air quality permits before any site construction or operations begin.
  2. Follow well test procedures for NO<sub>x</sub> and SO<sub>2</sub> emissions.
  3. Control fugitive dust using approved, practical, and effective methods.
  4. Comply with air quality permit monitoring requirements.
- C.** Implement preventive maintenance, alarms, and monitoring for vehicle and equipment to reduce emissions.
- D.** Reduce emissions by monitoring, pinpointing, and sealing fugitive emissions.
- E.** Keep paint and solvent containers closed to reduce evaporation of VOCs.
- F.** Eliminate use of sparge or stripping gas in dehydrators.
- G.** Employ direct electrical power for drill rigs when feasible.
- H.** Employ use of “end-of-pipe” control solutions when possible to allow capture of saleable product and reduce environmental impacts.
- I.** Operator with a tank or tank battery that has emission greater than two tons per year must submit an Air Pollutant Emission Notice (APEN) to the Air Pollution Control Division. Copies of this APEN will be submitted to the City.
- J.** Any tank or tank battery on City land must employ emission controls for Volatile Organic Compounds (VOCs) of 95% efficiency or greater. A shielded combustion device with an auto-igniter must be employed. The City encourages the use of vapor recovery units but a combustion device will still be required as a back-up.
- K.** Pneumatic controllers installed on City property must meet the APCD definition of “low bleed” controller.
- L.** Employ authorized dust suppression measures to minimize impacts to air, water, vegetation, and wildlife (e.g., includes roads and stockpiles).
- M.** Install low-emission engines at compressor facilities.
- N.** Power generators will be Tier 4 engines.
- O.** Diesel fuel used in the generators and all other locally fuelled non-road engines will be ultra-low-sulfer.

## **IX. BEST MANAGEMENT PRACTICES FOR SEISMIC SURVEYS**

### **A. Monitoring**

1. Operator will provide an independent, third-party quality control monitor to conduct compliance to the Quality Control/Quality Assurance (QA/QC) program. The third party monitor will report directly to the City.
2. The third party monitor will be responsible for assuring the BMP's and QA/QC program is followed. They will have the authority to act on behalf of the City.

3. The third party monitor will prepare weekly written reports of activities on site, and keep the City apprised verbally of operations on a weekly basis.
4. The third party monitor will establish long-term photo monitoring sites within the project area. The monitor will provide these photos, along with GPS coordinates of the photo points, to the City at the end of operations. The photo monitoring will be across the project area, representative of the various slopes and soils present. The photos will focus on the two staging areas; the vibroseis track lines, and the drilling points.
5. The third party monitor will record Operator activity via video recordings. The recordings will be taken at times identified by the City.

**B. Submittal requirements:**

1. Operator will provide the City with a complete listing of all pertinent company operating procedures and policies and safety plan for the project.
2. Proof of bond posted.
3. A project plan shall be submitted that will disclose all access, transportation, and methods to be used for the survey. The City will require all project details in writing prior to signing the agreement. Details include, but are not limited to
  - a. The method used to conduct the survey. This may include thumper trucks, vibrasizers, or shot-holes, depending on the location.
  - b. Analysis used to establish the selected methodology will be the least damaging to surface resources.
  - c. Where and what kind of vehicles will be used, where there will only be foot traffic, any bulldozing required, number of trips per line, where helicopters will be used, what equipment will be used where, the size, handling and supervision of explosives.
4. Site-specific reclamation plan, identifying methods and seed mix to be used as well as photo monitoring sites.
5. Site-specific plans to mitigate or avoid wildlife impacts.
6. If using shot holes, Operator will be required to hire an independent professional to provide a baseline study as to quality, flow and location of all water sources prior to commencement of any phase of testing operations. A copy of all results will be provided to the City.
7. The Operator will submit a weekly report to the City as directed (i.e. every Wednesday morning). Weekly updates will be discussed.
8. At the end of the project, a summary compliance report will be completed by Operator in conjunction with the QA/QC Officer regarding the environmental compliance program and the overall compliance effort. This report will be submitted to the City within 30 days of project completion.

**C. Conditions of Approval:**

**General**

1. Operator will be subject to a quality control/quality assurance plan that will be written by the City. The plan will be signed by the Operator, the independent on-site monitor, and the City.

2. All geophysical operations will be executed in accordance with applicable federal, state, and local regulations.
3. Operator will inform the City approximately one week prior to commencement of actual surveying. Prior to commencement Operator will communicate directly with the City to incorporate all existing global information system (GIS) information identifying areas of special resource concern, cultural resource sites, T&E species locations, or other resource concerns so that these may be flagged for avoidance prior to actual cultural, biological or other field surveys.
4. No camps or overnight stays on City property.
5. All shot holes must be refilled immediately after charging.
6. There shall never be any open shot holes left unattended.

#### Recreation

1. If a vehicle leaves an existing road or route, its point of exit from the road or route will not be a perpendicular departure so that the off-road access is not immediately visible to the public.

#### Soil Resource Protection

1. Vehicles will be instructed to travel at slow speeds to limit disturbance to soils and vegetation.
2. The spinning of vehicle tires will be avoided to minimize the potential for soil displacement.
3. If a detonated shot will blow the plug and drill cuttings out of the hole (a blowout), the crew will rake the blowout cuttings into the hole. Any remaining cuttings will be raked to blend with the surrounding soils.

#### Vegetation Resource Protection

1. Larger shrubs, trees, and other obstacles will be avoided where possible.
2. Project employees and contractors will not be allowed to drive off-road.

#### Wildlife Resource Protection

1. Schedule operations during least sensitive periods, avoiding migration, nesting and mating seasons.
2. Avoid surface disturbance to and construction activities within pronghorn winter concentration areas west of I-25 from January 1 through March 31.
3. Raptor surveys will be conducted prior to seismic operations if it is expected to commence during the nesting season for raptors and other migratory birds.
4. Operator will follow timing and avoidance buffers to minimize impacts to wildlife as directed by the City.
5. Project personnel would be subject to the following requirements: no harassing wildlife; no dogs on the project area; no firearms on the project area; no hunting on the project area; and no littering.
6. If project activities are to occur during raptor mating/nesting season (March 1-August 31), surveys will be conducted during nesting season by qualified biologists to locate nesting raptors. The information will be provided to the City biologist to determine the appropriate avoidance or mitigation measures and spatial and temporal buffers.

7. If project activities are to occur during migratory birds typical nesting season (typically April 1st -July 31st), surveys will be conducted during nesting season by qualified biologists to locate nesting birds. The information would be provided to the City biologist to determine the appropriate avoidance or mitigation measures and spatial and temporal buffers.
8. Habitat and/or sites identified for protection by the Colorado Division of Wildlife or City will be avoided, or adverse impacts minimized or mitigated as outlined in Colorado Division of Wildlife's Actions to Minimize Adverse Impacts to Wildlife Resources, October 27, 2008. .
9. No "after dark" work or access to the site (especially during sensitive time periods – winter, breeding/mating seasons etc)
10. No seismic within 200 feet of an active black tailed prairie dog town.
11. No seismic activity within 200 feet of any active burrows or below ground den site used by wildlife (burrowing owls, badger, swift fox, etc).
12. Manage noise levels following techniques outlined in the Colorado Division of Wildlife's Actions to Minimize Adverse Impacts to Wildlife Resources, October 27, 2008.

#### Range

1. All gates within the project area will be left as they are found (i.e., open gates will be left open, closed gates will be closed).
2. Damage to and/or the need for removal of existing fences and other range improvements as a result of the seismic survey will be immediately repaired.
3. Removal or alteration of existing range improvements will be prohibited unless prior approval is obtained from the City.
4. Operator personnel and contractors will be instructed to minimize contact with, and avoid harassment of livestock.
5. If a fence must be crossed by vehicular traffic, the contractor will provide advance notice to the appropriate City personnel.
6. Gates will be used for crossing fences wherever practical. If a fence must be crossed by a vehicle at a location other than an existing gate, contact with the appropriate City personnel will be made before any activity is started at any fence crossing location and specified procedures will be followed.
7. Damage caused to grazing infrastructure by winter seismic surveys may not be revealed until spring summer (underground water pipes, etc). Operator is responsible for the repair of damage to the grazing infrastructure for a period of 12 months following the initial seismic survey.

#### Air Quality

1. Dust control measures, as approved by the City, will be applied as appropriate. Water will be used to control dust, if necessary, as determined by the third party monitor.

#### Cultural Resources

1. Impacts to cultural resources will be mitigated by following the procedures specified in BMPs for Cultural Resource Sites on the City and State lands. A file search and a Class III archaeological inventory will be conducted for source lines and alternate routes to the source lines, if applicable.

2. Operator will flag a cleared route around all cultural sites accessible by vehicle. Each buggy drill will carry a GPS unit that will identify appropriate routes such that all sites will be avoided. Exceptions may occur if the site is crossed by an existing road or two-track, according to the City guidance.
3. If other cultural resources are discovered during operations, the findings will be immediately reported to the City. Work that would affect the immediate site location will be halted until an evaluation of significance is made by the City.
4. Archaeological monitoring will be performed as needed based on the project stipulations. Discoveries will be handled in the following manner. Upon discovery of an unanticipated archaeological site during seismic activity, Operator will immediately suspend activities in the vicinity of the site and report the discovery to QA/QC Compliance Officer. Activities will be suspended in the area of the discovery until authorization to proceed is issued by the City in consultation with the City's designated Field Archaeologist.
5. All questions concerning proper archaeological procedures will be directed to the City's designated Field Archaeologist as appropriate to the lands jurisdiction of the discovery.
6. Operations personnel will be informed as to the restriction on collecting or harming artifacts during startup meetings and ongoing safety meetings.

#### Invasive, Noxious, and Non-native Species

1. The Operator, in coordination with the City and the CDOW, will develop 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. The plan must be approved by the City.
2. The Operator will develop and implement a plan to decontaminate all vehicles and equipment from outside the City property to prevent introduction of noxious weeds. Decontamination will include the removal of skid plates for inspection and cleaning. This plan must be approved by the City.
3. Vehicles and other equipment will be cleaned to remove weed seeds before moving to new sites. Wash equipment and vehicles after visits to areas of known weed infestation.
4. Operator will clean all equipment that will leave established roads to remove seed and soil that may contain seeds prior to commencing operations within the project area.

#### Soils and Vegetation

1. Drilling will be conducted no closer than 100 feet from edges of cliffs or upland escarpments.
2. Drilling and data acquisition operations will use existing roads and trails where possible.
3. To minimize surface disturbance, source generation vehicles will, if possible, proceed from one source location to another with one pass per source line. The number of times that vehicles pass over their designated routes will be minimized.
4. Cut seismic lines by hand to minimize disturbance.
5. Drill holes will be stacked to avoid riparian areas, wetlands, sensitive plants, steep slopes, springs and seeps, or other areas of concern.
6. Residual cuttings from the drill hole will be spread so that they are approximately two inches or less in thickness.

7. To minimize soil erosion, heliportable drills will be used on slopes greater than 20 percent. Drilling will not be conducted in areas in excess of 30 degrees of slope.
8. Cross-country vehicular travel will not be allowed.
9. No vehicles will be allowed off established gravel roads if ground is muddy and operations will be suspended during wet weather. The decision as to definitions of “muddy” and “wet weather” will be made by the City.
10. Disturbed areas, where the City has determined the site will not naturally revegetate in a reasonable time or areas where soil stability is threatened by operations will be reseeded using a seed mix specified by the City. All reseeding will occur as outlined in the Reclamation section of these BMP’s
11. Operator will minimize the potential for soil compaction by having all source generation vehicles on a source line or access route slightly offset their tracks to the extent possible, or would utilize procedures specified by the City.

#### Protection of Existing Facilities and Rights-of-Way

1. Source point placement will comply with applicable state regulations. Safe operating distances to pipelines, telephone lines, railroad tracks or highways, electric power lines, water and oil and gas wells will be determined by the size of the charge according to the regulation.

#### Surface Water

1. The Operator will avoid vehicle crossing of all wet or active drainage channels.
2. The Operator will avoid crossing of all dry drainage channels if feasible. If avoidance is not feasible, vehicular traffic across dry drainage channels will be limited to locations with vertical banks less than two feet high. Crossing routes will be aligned to be perpendicular to a stream channel, to the extent practicable. Vehicles will not be allowed to cross wet channels.
3. Minimum distances from source point placement will conform to applicable state regulations.
4. Drill holes will avoid springs by offsets approved by COGCC regulations.

#### Waste

1. All pin flags, flagging, and other debris will be gathered and disposed of at an approved site or landfill.
2. All oil, diesel, or hydraulic fluid spills will be cleaned up immediately and removed, including any contaminated soils. All spill-related materials will be hauled to an approved disposal site. An approved disposal site will be located before operations begin.
3. Mobile lavatory facilities will be required during all phases of the testing program.

#### Safety

1. Operator’s standard safety procedures and applicable federal, state, and local regulations will be followed during shot detonation. A pre-operations meeting will be held to review all safety procedures for shot detonation.
2. Each shot will be cleared and secured by the trained shooting personnel prior to its detonation. Ultimate responsibility for explosives handling rests with the principals of operator. Explosives storage will be conducted in compliance with ATF requirements.

### Fire Protection

1. All ATVs will be equipped with spark arrestors and all four-wheel drive buggies will be diesel powered. All vehicles will be equipped with fire extinguishers and shovels. Any helicopter on location will be equipped with a water bucket. Operator will coordinate project activities with fire personnel in the area.
2. All fires resulting from the testing program must be extinguished at the cost of the Operator. All burned areas will be fully reclaimed, repaired and replaced at Operator's expense.

### Reclamation

1. All surface disturbances must be protected from wind and water erosion.
2. All stream crossings shall be regraded to approximate original contour and reseeded with the final approved seed mix.
3. All flagging, stakes, cables, cement, mud sacks, or other materials associated with seismic operations shall be removed.
4. Areas within the limits of disturbance that have been driven over, compacted or rutted by equipment must be scarified to a depth of 8" and regraded to original grade and contours
5. All seed used in interim and final reclamation must be gathered on site unless otherwise approved by the City. If the City approves commercial seed use, and where more than one ecotype of a given species is available and potentially adapted to the site, all ecotypes shall be included in the seed mix.
6. Seeding must occur between November 1 and March 15, unless soil conditions are not appropriate. Additional planting dates may be authorized by the City.
7. All areas seeded must be mulched with weed free hay or straw at a rate of 2 tons/acre. Mulch should be spread uniformly and crimped to a depth of 4" using a mulch crimper. A minimum of 50% of the mulch by weight should be 10" or more in length.
8. Vegetative Cover Standard
  - a. A reference area will be selected if directed by the City. Reference areas will be within the same Ecological Site, represent areas of high wildlife value, with attributes such a diverse and productive understory of vegetation, productive and palatable shrubs, and a high prevalence of native species.
  - b. Vegetation will be considered established when total perennial non-invasive plant cover of at least eighty (80) percent of pre-disturbance or reference area levels is achieved. .
    - i. Non-invasive plant cover shall be measured or estimated using a valid and reliable method, such as point-intercept. Sufficient data shall be collected to allow the operator to estimate the mean total non-noxious plant cover to within ten percent of the true mean with 80 percent confidence.
  - c. It will be the duty of operator to insure that vegetation is established upon the disturbed soils and operator will reseed and water as necessary to accomplish that obligation.
  - d. Vegetation must have a plant diversity of non-invasive species which is at least 50% of pre-disturbance or reference area levels. Diversity will be measured or estimated using a valid and reliable method such as point-intercept. Native non-

invasive species with at least 3 percent relative cover will be included in the diversity calculation.

D. Non-Compliance:

1. QA/QC Officer will determine any non-compliance on the project and report it to Operator and the City.
2. In the event of non-compliance with any of the conditions in this document, state or federal environmental regulations or requirements, the cause will be determined and corrective action(s) will be taken immediately. If the non-compliance cannot be corrected or results in significant environmental impacts, work will not resume in that area of the project until the City authorizes work to resume. The QA/QC Officer will keep Operator and the City apprised of the situation as information becomes available.
3. Under specific conditions, special resource monitors (i.e., archaeologist) will have authority to stop work at a site-specific location.
4. In the event of non-compliance actions, Operator reserves the right to remove the responsible individual(s) from the project. If there is continued non-compliance or lack of response by the Contractor, Operator will shut down some or all construction activity, at the Contractor's expense, until the issue is resolved.
5. The City will cause Operator to remove the QA/QC Officer and/or environmental inspectors from this project if spot inspections by the City personnel (occurring on a random, unannounced schedule) reveal unreported non-compliance in the QA/QC Officer's area of responsibility.
6. If Operator and/or contractors and subcontractors do not take action to remove an employee (including supervisors) that are causing/ordering the non-compliance, a written order to temporarily suspend activities may be issued by the City.
7. The City will cause Operator to remove individual truck drivers or equipment Operators that are involved directly in more than three (3) cases of non-compliance. The supervisor that may be causing/ordering the non-compliance may also be removed from the project.
8. Excessive and/or continuous non-compliance with this compliance plan will result in suspension, revocation or cancellation of activities.
9. The QA/QC Officer will conduct periodic on-site inspections, review records and keep track of the project's overall efficiency and compliance with the City and Operator's project standards.
10. The City will inspect the project with and without the QA/QC Officer on a random schedule.

11. Operator shall remain liable for any replacement or repair to property, water quality and flow, animals, buildings or people due to the seismic testing, including the actions of any contractors or subcontractors.

E. Other Negotiated Items:

1. A payment of \_\_\_\_\_ per acre will be paid prior to first use of property. This use will be restricted to testing purposes only and will be for a term of \_\_\_\_\_ (period of time). Operator shall provide a copy of the map of area surveyed and all areas that will be used.

**X. GENERAL PROTECTIONS**

- A. Human Waste Facilities.** Portable human waste facilities will be provided by Operator and emptied on a regular basis.
- B. Heavy Equipment.** Operator will give City verbal notice at least thirty (30) days prior to bringing heavy equipment onto the Property for the construction of wells, drill sites, access roads, pipelines and other associated production facilities.
- C. Dry Hole.** If Operator determines a well to be a “dry hole” or upon cessation of production, the Operator will give the City thirty (30) days written notice of the opportunity to take over any abandoned well and convert the well to a water well. If the City elects in writing to take over the abandoned well and convert the well to a water well, the City will assume all liability and costs associated with the well thereafter, and both parties shall execute any and all documents necessary to provide that the water in the well shall become the property and responsibility of the City. If the City does not elect to take over the well and convert it to a water well, the Operator shall plug and abandon the well as required by applicable law and regulations and complete the reclamation of the site. All cleanup and restoration shall be completed, if weather permits, by Operator within six (6) months after termination of drilling or production activities at the well site.
- D. First Preference for Work.** Operator shall give first preference to the City in awarding contracts for any work required to be performed on the City’s land including but not limited to earthmoving, grading or plowing roads, spraying noxious weeds, or reseeding, provided that City has the equipment and personnel necessary to accomplish the work.
- E. Subcontractor Education.** Operator will design and conduct an extended education program for all subcontractors. At a minimum, the program will include a review of DPW required plans, all local and state permit and review requirements, temporary use permits conditions, right-of-way conditions and terms, Surface Owner Agreements if appropriate, Surface Use Agreements, Surface Use Plans, Conditions of Approval associated with permits to drill, and the City’s Best Management Practices. Also included will be emergency response procedures, health and safety requirements, and rules of conduct. The outcome of this program will be an understanding by subcontractors of the contents of these requirements, plans, and programs, and the content of the Plan.

**F. Subcontractor Conduct.** Operator must have a zero-tolerance policy regarding drug and alcohol use. All subcontractors prior to working on City property will have to demonstrate active drug, alcohol, and safety programs regarding hiring, training and conducting spot-checking programs. Operator will also have an education and compliance program to help reinforce the zero -tolerance policy.

**G. Fire / Emergency response**

1. Operator must submit an emergency response plan, including a Fire Protection and Hazardous Materials Spills Plan, which specifies planned actions for possible emergency events, a listing of persons to be notified of an emergency event, proposed signage, and provisions for access by emergency response teams. The emergency plan must be acceptable to the appropriate fire district or the County Sheriff, as appropriate. The plan shall include a provision for the operator to reimburse the appropriate emergency service provider for costs incurred in connection with emergency response for the operator's activities at the site.
2. Details on the emergency response plan: Each operator with facilities in the county is required to provide an emergency response plan to the county office of emergency management. No applications for a minor or major facility shall be considered complete until the operator has provided such plan to the county. The plan shall be filed with the county and updated on an annual basis or within ten working days as conditions change (responsible field personnel change, ownership changes, etc.). The emergency response plan shall, at a minimum, consist of the following information:
  - a. Name, address and phone number, including 24-hour emergency numbers for at least two persons responsible for emergency field operations.
  - b. An as-built facilities map showing the name, location and description of all minor and major facilities, including the size, type and content of all pipelines, and tanks. The map shall be prepared either manually on U.S.G.S. 7.5 Minute Series maps (one inch = 2,000 feet), or digitally on the county geographic information system parcel maps. To the extent allowed by law, the as-built facilities map shall be held confidentially by the county's office of emergency management, and shall only be disclosed in the event of an emergency. To the extent allowed by law, the county's office of emergency management shall deny the right of inspection of the as-built facilities map to the public pursuant to C.R.S. § 24-72-204(3)(a)(IV).
  - c. A written response plan for any potential emergencies that may be associated with the construction, drilling, completion or operation of the facilities. This plan shall include but not be limited to any or all of the following: explosions, fires, gas, chemical, or water pipeline leaks or ruptures, hydrogen sulfide or other toxic gas emissions, or hazardous material vehicle accidents or spills.
  - d. Project specific emergency response plans are required for any project (minor or major) that involves drilling or penetrating through known zones of hydrogen sulfide gas. This plan shall be coordinated with and approved by the county's office of emergency management prior to beginning field operations.
3. To help in the prevention and suppression of fires within the City's property, the Operator will take the following precautions at all applicable locations:
  - a. Minimize venting to the extent possible and only use when properly permitted and supervised;

- b. Refrain from flaring except when necessary to avoid safety risks or greater damage to the surrounding environment and only use when properly permitted and supervised;
- c. Ensure that all “hotwork”, such as welding is performed in approved areas posing low to no risk to starting wildfires or the generation of sparks or flames leaving work area; and
- d. Hire and use a third party entity to provide additional fire suppression equipment on locations should operator or City believe that weather conditions pose a higher risk of fire danger.
- e. Operators and contractors are required to have fire extinguishers in all vehicles, equipment, and facilities located on site.

#### **H. Spill Prevention, Control, and Countermeasures (SPCC) Plan**

1. Develop a Spill Prevention, Control, and Countermeasures (SPCC) Plan if required in accordance with CFR Part 112.
2. If a SPCC Plan is not required, develop a plan for management of hazardous materials storage and spills that:
  - a. Requires adequately designed containment structures for produced water tanks that have sufficient volume and freeboard to prevent spills.
  - b. Prevents storage of hazardous materials near drainage channels.
  - c. Prevents storage of stockpiled materials in areas with high groundwater levels.
  - d. Avoids refueling equipment or vehicles near drainage channels.
  - e. Requires that well cutting piles be placed on an impermeable barrier prior to authorized waste disposal.
  - f. Requires all production facilities with the potential to leak to have appropriate containment.
  - g. Operator will install and maintain steel containment rings around production tanks and associated facilities, and to install steel berms and impervious synthetic liner within bermed areas to prevent any hydrocarbons substances from infiltrating soil or ground water. (Lowry, 4)
  - h. Avoids mixing of incompatible produced waters.

#### **XI. Non-Compliance**

1. The City (or QA/QC Officer) will determine any non-compliance on the project and report it to Operator and the City.
2. In the event of non-compliance with any of the conditions in this document, state or federal environmental regulations or requirements, the cause will be determined and corrective action(s) will be taken immediately. If the non-compliance cannot be corrected or results in significant environmental impacts, work will not resume in that area of the project until authorized by the City. The City will report all non-compliance events to the appropriate State or Federal Agency.
3. Under specific conditions, special resource monitors (i.e., archaeologist) will have authority to stop work at a site-specific location.
4. In the event of non-compliance actions, Operator reserves the right to remove the responsible individual(s) from the project. If there is continued non-compliance or lack of response by the Contractor, Operator will shut down some or all construction activity, at the Contractor's expense, until the issue is resolved.

5. The City will remove the QA/QC Officer and/or environmental inspectors from this project if spot inspections by the City personnel (occurring on a random, unannounced schedule) reveal unreported non-compliance in the QA/QC Officer's area of responsibility.
6. If Operator and/or contractors and subcontractors do not take action to remove an employee (including supervisors) that are causing/ordering the non-compliance, a written order to temporarily suspend activities may be issued by the City.
7. The City will cause Operator to remove individual truck drivers or equipment Operators that are involved directly in more than three (3) cases of non-compliance. The supervisor that may be causing/ordering the non-compliance may also be removed from the project.
8. Excessive and/or continuous non-compliance with BMP's and any plan required by the City will result in suspension, revocation or cancellation of activities.
9. The QA/QC Officer and/or City will conduct periodic on-site inspections, review records and keep track of the project's overall efficiency and compliance with the City and Operator's project standards.
10. The City will inspect the project with and without the QA/QC Officer on a random schedule.
11. Operator shall remain liable for any replacement or repair to property, water quality and flow, animals, buildings or people due to the seismic testing, including the actions of any contractors or subcontractors.

## **XII. SUBMITTAL REQUIREMENTS**

The applicant shall submit three copies of the proposed development plan with the completed application form to the City. The following information must be submitted with a development plan application:

- A. A vicinity map indicating the section, township, and range of the site, and its relation to surrounding public roads and municipal boundaries.
- B. A detailed drawing of the site at a scale of 1 inch to 100 feet, including the following:
  1. The dimensions of the site, indicating area in square feet and acres, and the area of the site to be disturbed;
  2. The location of all structures, flowlines or pipelines, tanks, wells, and any other oil and gas operation facilities or equipment;
  3. Existing and proposed roads within the site as well as ingress and egress from public or private roads;
  4. Lease lines, if applicable;
  5. On-site features such as floodplain designations, water courses, drainage, utility lines and easements, ditches, wetlands or aquatic habitat, significant plant ecosystems, wildlife habitat and migration routes, geologic features, vegetative cover, dams, reservoirs, mines, and known cultural resources;
  6. Existing and proposed topography of the site at intervals of five feet; and
  7. Existing and proposed vegetation, buffers, berms, fences, and other screening devices.
- C. Diagram showing adjacent properties and the approximate location of buildings and their uses within a distance of 350 feet of any proposed structure, facility, or area to be disturbed. This may be drawn at a smaller scale than the site plan.

- D.** Copies of application forms for all applicable local, state, or federal permits, including COGCC Forms 1 and 2, 2a.
- E.** Evidence of mineral lease agreements or mineral ownership.
- F.** Copies of financial guarantees in the form of bonds, letters of credit, cash, certificates of deposit, or other guarantees acceptable to the City. This requirement may be waived by the City if the City is satisfied that individual bonds posted with the COGCC for the proposed operation cover the conditions of the development plan approval granted under this Article, or if the operator posts a blanket bond with the City covering all operations conducted on City property in an amount determined by the City.
- G.** An operation plan including the method of and schedule for the drilling, completion, production, abandonment, and reclamation phases of the operation.
- H.** An emergency response plan, including a fire protection and hazardous materials spills plan.
- I.** A Spill Prevention, Control, and Countermeasures Plan (SPCC) if applicable or a plan for the management of hazardous materials storage and spills.
- J.** Wildlife Avoidance and Impact Minimization Plan
- K.** Visual Mitigation Plan
- L.** Reclamation Plan
- M.** Transportation Plan
- N.** Waste Disposal Plan
- O.** Drainage and Erosion Control Plan for both on-site and off-site drainage. (*required by CDPHE through a storm water permit*) and Post Construction Stormwater plan (*COGCC Rule 1002(f)*).
- P.** Weed Management Plan for the site.
- Q.** Copies of all related permits issued by Local, County, State, or Federal agency.
- R.** Compensatory Mitigation Plan