

Fawn 2734-2833

## 304 c. (19): Cumulative Impacts Plan



Verdad Resources LLC

3/1/2022

## TABLE OF CONTENTS

---

1	Project Overview.....	2
1.1	Surface Disturbance .....	2
2	Cumulative Impact Methodology and Definitions.....	3
2.1	Definitions.....	4
3	Air Resources and Public Health .....	4
3.1	Description of Potential Impacts.....	4
3.2	Air Resources & Public Health Minimization Measures .....	6
3.3	Air Resources & Public Health Mitigation Measures .....	8
4	Water Resources.....	8
4.1	Description of Potential Impacts.....	8
4.2	Water Resources Minimization Measures.....	9
4.3	Water Resources Mitigation Measures .....	10
5	Terrestrial and Aquatic Wildlife Resources and Ecosystems .....	10
5.1	Description of Potential Impacts.....	10
5.2	Terrestrial and Aquatic Wildlife Resources and Ecosystems Minimization Measures .....	11
5.3	Terrestrial and Aquatic Wildlife Resources and Ecosystems Mitigation Measures.....	12
6	Soil Resources .....	12
6.1	Description of Potential Impacts.....	12
6.2	Soil & Vegetation Resources Minimization Measures.....	14
6.3	Soil & Vegetation Resources Mitigation Measures .....	15
7	Public Welfare – Noise, Odor, and Light .....	15
7.1	Description of Potential Impacts.....	15
7.2	Public Welfare Minimization Measures.....	16
7.3	Public Welfare Mitigation Measures .....	18

# 1 PROJECT OVERVIEW

---

Verdad Resources LLC (Verdad) is proposing to construct the Fawn 2734-2833 Oil & Gas Location (Fawn Pad). The location consists of the development of infrastructure to support the drilling and production of fourteen oil wells from a new well pad located in the S2 Section 22, Township 1 North, Range 65 West, 6th Principal Meridian. The proposed Fawn Pad is in an area with other existing oil and gas operations as well as agricultural and rangeland activities.

Construction of the new Fawn Pad would utilize an existing access road from County Road (WCR) 45 to the location. Construction of the proposed location, with associated cut and fill slopes, would disturb approximately 10 acres of crop land. The Fawn Pad will contain fourteen wells and their supporting production equipment. The Fawn Pad would be constructed by clearing vegetation, stripping, and stockpiling topsoil and subsoil, and leveling the pad area. The well pad would be constructed from the native earthen materials present and leveled by standard cut- and-fill techniques and topped with imported road base material. Construction of a typical well pad involves the use of heavy equipment, such as a dozer, flat blade grader, scraper, dump truck, and crane; however, equipment needs may vary depending on the site-specific conditions of the individual well pad.

Total initial surface disturbance from construction the location would be approximately 10 acres. Following interim reclamation, well pad surface disturbance would be reduced to approximately 4.35 acres.

Flowlines installed for production operations at the Fawn Pad will be installed within the footprint of well pad. Therefore, flowline disturbance is not calculated separately from the overall disturbance of the pad.

In accordance with COGCC Rule 1003, interim reclamation at the Fawn Pad will commence as soon as practicable and within three months following drilling and subsequent completion operations. Debris, waste material, and equipment associated with drilling, and completion operations will be removed from the facility. All disturbed, non-working areas affected by drilling or subsequent operations, except those areas needed for production operations or for subsequent drilling operations to be commenced within 12 months, shall be reclaimed as nearly as practical to their original condition or their designated final land use. The disturbed areas will be reseeded with the crop species consistent with the landowners wishes in the first favorable season following rig demobilization. Areas needed for production operations or for subsequent drilling operations to be commenced within twelve months will be stabilized and maintained to minimize dust and erosion to the extent possible.

## 1.1 SURFACE DISTURBANCE

Construction associated with the Fawn Pad would result in an estimated initial disturbance of about 10 acres and long-term disturbance of 4.35 acres. Initial and long-term disturbance by project feature is summarized in Table 1. Residual disturbance includes acreage that would remain disturbed for the life of the project, which is approximately 29 years plus the time required to successfully reestablish vegetation (those acres not subject to interim reclamation). As previously stated, site reclamation would be initiated for portions of the well pad not required for the continued operation of the wells within three months of completion, weather permitting.

**Table 1 – Estimated Surface Disturbance**

Project Feature	#/Miles	Initial (acres)	Long-Term (acres) <sup>1</sup>
Fawn pad	1 well pad	10.00	4.35
New Access Roads	0	0.19	0.19
<b>Location Total</b>	<b>1</b>	<b>10.19</b>	<b>4.54</b>

Additionally, the development of the Fawn Pad would result in the plugging and abandoning (P&A) of 12 wells in the vicinity of the Fawn Pad. Assuming an average disturbance footprint of 1.2 acres per well, this P&A activity equates to approximately 40 acres of vegetation and wildlife habitat that will be restored to the ecosystem surrounding the Fawn Pad. The P&A of these older wells also reduces the impact created by historic development of single, vertical wells, resulting in more connectivity of wildlife habitat. Effectively, the surface disturbance during interim reclamation of the Fawn Pad will be offset by the reclamation of approximately 14.4 acres of land from the P&A of the 12 wells resulting in a reduction of land use dedicated to oil and gas development in the area.

## 2 CUMULATIVE IMPACT METHODOLOGY AND DEFINITIONS

Cumulative impacts on the environment may result when the environmental effects associated with a proposed project are added to other past, current, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The proposed Fawn Pad is within an area of existing oil and gas development, and is surrounded by agricultural, rangeland, and other industrial/developed areas in Weld County, Colorado. The majority of past, present, and reasonably foreseeable development in the vicinity of the Fawn Pad is associated with current or planned oil and gas exploration, midstream infrastructure, industrial development, and agricultural development. Information for this cumulative impact assessment was obtained from county, state, and federal websites, and other public domain sources. Specifically, the Fawn Pad has approximately 6 oil and gas locations considered “active” within a 1-mile radius of the proposed location according to the COGCC location files online.

In an effort to provide information relevant to COGCC decision making, a practical delineation of the spatial and temporal scales is needed for an informative cumulative impacts’ analysis. The geographic extent of each specific Project Review Area varies by resource and is larger for resources that are mobile or migrate, as compared to those that are stationary. For some resources, the Project Review Area is smaller due to the geographically confined nature of cumulative impacts (e.g., vegetation), while for others the area is much larger (e.g., air quality). Table 2 provides the geographic extent for cumulative impact analysis that was applied for the Fawn Pad location. For most resources, the temporal boundary is assumed to be the 29-year life of production. For wildlife and vegetation, the temporal boundary is extended an additional 5 years to account for the time required to reach 75-100 percent reclamation.

**Table 2 – Geographic Scope for Cumulative Impact Analysis**

<b>Environmental Resource</b>	<b>Project Review Area</b>
Air Quality	1-mile radius
Public Health	1-mile radius
Water Resources	½-mile radius
Terrestrial and Aquatic Wildlife Resources and Ecosystems	1-mile radius (specifically High Priority Habitats [HPH] within 1-mile)
Soil Resources	Limits of disturbance for the location (including access roads and pipeline rights-of-ways [ROWs])
Vegetation	1-mile radius
Public Welfare – Noise, Odor, Light	1-mile radius

## 2.1 DEFINITIONS

COGCC defines “minimizing adverse impacts” as provided by § 34-60-106(2.5), C.R.S., as “providing necessary and reasonable protections to reduce the extent, severity, significance, or duration of unavoidable direct, indirect and cumulative adverse impacts to public health, safety, welfare, the environment, or wildlife resources from oil and gas operations. Minimization measures reduce impacts to the smallest amount possible and can include operational and engineering controls.

COGCC defines “mitigating adverse impacts” as “measures that compensate for unavoidable direct, indirect, and cumulative adverse impacts and loss of such resources from oil and gas operations.” Mitigation measures are used to offset the intensity or severity of impacts and can include compensatory actions and administrative controls.

## 3 AIR RESOURCES AND PUBLIC HEALTH

### 3.1 DESCRIPTION OF POTENTIAL IMPACTS

The following section describes the resources for which cumulative impacts are anticipated, based on the information included on the Form 2B and the site-specific plans associated with Form 2A.

Air quality in an area is generally influenced by the quantities of pollutants that are released within and upwind of the area, and it can be highly dependent upon the pollutants’ chemical and physical properties. Air quality regulations and source-specific permits limit the allowable quantities of pollutants that may be emitted. The topography, weather, and land use in an area will also affect how pollutants are transported and dispersed and the resulting ambient concentrations.

The location of the Fawn well pad and broader Project Review Area currently contains various emission sources including agricultural fields, vehicle traffic, houses, and oil and gas production. The addition of the infrastructure needed to construct, drill, and operate the Fawn Pad and associated wells would have a cumulative impact on air quality within the 1- mile area. However, the proposed wells’ contribution to cumulative effects would be minor, as demonstrated by the Emissions Inventory results reflected in

Form 2B and modeling assessment results from similarly sized development projects including one addressed within a 2017 Environmental Assessment (EA) prepared by the Bureau of Land Management. This EA evaluated the direct, indirect, and cumulative impacts of a 23-well project (BLM 2017a).

The results of the cumulative impact assessment included in this 2017 EA are incorporated by reference. Similarly, the BLM Colorado State Office completed the second iteration of the Colorado Air Resource Management Modeling Study (CARMMS) (BLM 2017b), which provides cumulative analyses for multiple projected oil and gas development scenarios in Colorado through year 2021 (CARMMS 1.5) and year 2025 (CARMMS 2.0). For the CARMMS 2.0 study, oil and gas emissions increases were projected and modeled for 2025, according to projected reasonably foreseeable development in the region, as well as recent oil and gas development growth data. These CARMMS projections were determined for each BLM Field Office in Colorado including the administrative planning area for the Royal Gorge Field Office, within which the Fawn Pad occurs. The CARMMS 2.0 results are also incorporated by reference within this evaluation.

The Air Resources impacts would be minimized and mitigated by the measures included in Section 3.2 and 3.3 of this Cumulative Impacts Plan. However, in the context of cumulative impact assessment, any contribution to emissions, no matter how small, adds to the cumulative effects from past, present, and reasonably foreseeable future projects. Oxides of nitrogen (NO<sub>x</sub>), Carbon monoxide (CO), Volatile Organic Compounds (VOCs), Methane (CH<sub>4</sub>), Ethane (C<sub>2</sub>H<sub>6</sub>), Carbon dioxide (CO<sub>2</sub>), Nitrous oxide (N<sub>2</sub>O) will be in the air will be increased by this project. Verdad does not anticipate any cumulative adverse impacts to air resources from this project due to measures taken to avoid and minimize the pollutants expected to impact air resources. This facility will be a synthetic minor source operating in an Ozone Non-Attainment Area and facility emissions will not exceed the Ambient Air Impact Analysis thresholds for modeling. Emissions from this facility will be permitted and regulated by the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division, and subject to appropriate controls to reduce emissions to minimal levels.

IFC/CDPHE Study, Final Report: Human Health Risk Assessment for Oil & Gas Operations in Colorado (the Study), estimated that, for a hypothetical person that spend all of their time at a location close to an oil and gas facility for the lifetime of the facility during worst-case hypothetical meteorological conditions and hypothetical high-rate emissions from a hypothetical oil and gas facility, exceedances of exposure health guidelines were possible. Excerpts from the Study are used below in this evaluation.

The Study focused particularly on conservative (health-protective) hypothetical scenarios where people spend all of their time at a location close to an oil and gas facility for the lifetime of the facility. ICF/CDPHE's "identification of these estimated exceedances of acute health guidelines is highly conservative in that these highest-estimated exposures occur when the highest chemical emissions are highly concentrated by "worst-case" meteorological conditions onto a hypothetical person who is outdoors or in a highly ventilated area, which might happen only rarely".

"Exposure modeling for most chemicals indicated that acute exposures were below guideline levels for all hypothetical people and facilities. At the 500-foot distance, for a small number of chemicals (including benzene, toluene, and ethyltoluenes), the highest estimated acute exposures exceeded guideline levels at the most-exposed (downwind) locations, in isolated cases by a factor of 10 or more during oil and gas development activities, particularly during flowback activities at smaller well pads.

Those highest predicted acute exposures decreased rapidly with distance from the hypothetical facilities, but remained above guideline levels out to 2,000 feet under a relatively small number of oil and gas development scenarios.”

“The chronic exposures during production operations were generally the lowest, relative to guideline levels, from among all simulated exposures in the assessment. At the 500-foot distance from the facility, all chronic non-cancer exposures during production activities were below guideline levels, and the average incremental lifetime cancer risk from chronic benzene exposure was 5-in-one million or less (dropping below 1-in one million before the 2,000-foot distance). When estimates of chronic exposure include exposure to development activities occurring sequentially with exposure to production activities, exposures were only slightly higher than those estimated during the production activities alone.”

The location of the Fawn 2734-2833 is greater than 2000 feet from any residential building unit.

In addition to the protective distance from residential building units, operations at the Fawn 2734-2833 will use emission reduction practices to ensure that pre-production emissions from the location will be much lower than that of the hypothetical high emission rate facilities used in the Study. The Fawn 2734-2833 will use low emission drilling mud, a gas buster on the closed loop mud system to control gas while drilling, emission controlled flowback process including controlled flowback tanks, and produced gas sent to sales as soon as it is produced to eliminate prolonged flowback flaring. Production will occur through an oil tankless facility design that utilizes LACT and pipeline take away for oil, eliminating oil tank emissions.

Due to the distance from residential building units and the emission reduction practices to be employed, we conclude that no public health impacts will exist.

To confirm there are no public health impacts from facility emissions, perimeter ambient air monitoring for VOC and HAPs will be employed for the duration of pre-production operations and six months of production operations.

It should also be noted that the Fawn Pad is not located within a disproportionately impacted community (DIC).

### 3.2 AIR RESOURCES & PUBLIC HEALTH MINIMIZATION MEASURES

#### *Air Quality*

- Verdad will employ practices for continuous control of fugitive dust caused by operations. These practices shall include, but are not limited to:
- Speed restrictions on lease roads and location of 25 MPH
- Regular lease road maintenance to consist of, grading and recompacting the road surface with the optimum amount of water applied when the road surface becomes deteriorated or monthly when heavy traffic is present.
- Restriction of construction activity during high-wind days. On windy days or days when dust becomes fugitive (leaves or threatens to leave the site) construction or activities will be halted until either fresh water can suppress dust or dust is no longer visible.
- Coordinate dust mitigation on gravel surfaced roads with Weld County Public Works in applying

- Magnesium Chloride or an alternative surfacing material Prior to construction and maintaining through completion of Interim reclamation of the drill pad.
- Verdad uses a gravity fed box proppant delivery system that meets OSHA standards, rather than the historic pneumatic trailer proppant transfer system that blows sand out of the trailer into frac sand silos on the location; a method that required supplemental dust control to meet OSHA requirements. With a gravity fed proppant delivery system, the delivery container is also a well pad storage container, eliminating the need for frac sand silos on location. Storing frac sand in containers reduces sand dust during fracing operations by dropping sand directly from the container into the blender sand hopper. As a result of the gravity fed box proppant delivery system, Verdad does not anticipate any silica dust to migrate off of the Fawn Location during completion operations.
- Weld County roads, up to the lease road access point, would be upgraded with hardened, dust-resistant surfacing to reduce dust emissions where practical.
- Verdad will not flare produced gas during normal operations.
- Flowback fluid emissions will be captured in vapor tight tanks with emissions controlled at the combustor.
- Verdad will use supervisory control and data acquisition (SCADA) systems to monitor well operations, which will reduce emissions from vehicle traffic due to the reduced number of vehicle trips to the site.
- Verdad will employ tankless facility design with pipeline take away to eliminate condensate storage tank emissions.
- Verdad has an 24/7 SCADA System Monitoring that allows for continuous monitoring operating conditions when personnel are not on-site in order to identify and correct any improper operations as soon as possible.
- Verdad has a sophisticated Directed Inspection/Preventative Maintenance (DI/PM) program that contributes to the decrease in fugitive emissions and spills related to non-functioning or aging equipment. Verdad completes daily audio/visual observations at every active location which provides early detection of equipment malfunctions thereby minimizing emissions from leaks.
- Verdad will capture produced water storage tank emissions and route them to an emission control device with at least 95 percent design destruction efficiency.
- Verdad will use non-emitting pneumatic controllers at both the well heads and the production facilities.
- Verdad will utilize Lease Automatic Custody Transfer (LACT) to transfer the condensate product directly into a pipeline, eliminating truck traffic for condensate oil transport.
- Verdad will employ perimeter air quality equipment to continuously monitor the air around the site during pre-production and for the first six months of production.
- Tanks and Vapor Control Systems will also be designed and constructed in accordance with Air Quality Control Commission Regulation Number 7.
- Verdad will implement a Leak Detection and Repair program (LDAR). The LDAR would involve monthly inspections using infrared (e.g., FLIR) cameras.
- Verdad will employ perimeter air quality monitors to confirm.



### 3.3 AIR RESOURCES & PUBLIC HEALTH MITIGATION MEASURES

#### *Air Quality*

Minimization measures listed for air quality in Section 3.2 will address the potential impacts to air resources. Therefore, no additional mitigation measures for air quality are included.

#### *Public Health*

HAP emissions are not expected to contribute to acute or chronic risks to human health. The emission minimization measures described in section 3.2 support the conclusion that HAP emissions are not expected to contribute to acute or chronic risks to human health. Therefore, no additional mitigation measures are required.

## 4 WATER RESOURCES

---

### 4.1 DESCRIPTION OF POTENTIAL IMPACTS

There are no public water system intakes located within a mile of the proposed Fawn Pad. Construction of oil and gas facilities and associated infrastructure and industrial development would likely have the greatest potential impact on water resources within the ½-mile radius of the project review area due to the potential for increased erosion and sedimentation rates. Soils compacted on existing roads, new access roads, and well pads contribute to slightly greater runoff than undisturbed sites. Increased erosion and subsequent increased sedimentation of intermittent streams and ephemeral drainages within the Project Review Area is possible, especially during construction and other surface disturbing activities. These effects could have negative impacts on aquatic habitat within affected drainages. The nearest receiving waterbody is the Denver-Hudson Canal, a Waters of the State, a National Wetland Inventory (NWI)-mapped freshwater emergent wetland classified as a palustrine emergent temporary-flooded (PEMA) wetland located approximately 300 feet to the Northeast of the Fawn Pad.

This Waters of the State would be along the potential migration pathway from the Fawn Pad. Additionally, there are five other NWI-mapped wetlands within the ½-mile buffer of the Fawn site. There is also a National Hydrography Dataset (NHD)-mapped canal/ditch, the Neres Canal located approximately 1,000 feet to the north of the Denver-Hudson Canal. While direct impacts to this waterbody are expected to be eliminated due to the implementation of minimization and mitigation measures, the development of the Fawn Pad could contribute to the cumulative effects of other past, present, and reasonably foreseeable development.

In addition, production activities at the Fawn Pad or other past, present, or reasonably foreseeable production facilities or industrial development could increase the potential for accidental spills of fuels, lubricants, and other petroleum products, which could contaminate surface water within the ½-mile review area. Based on the proposed storage volumes included in Form 2B, the Fawn Pad could store approximately 800 barrels (bbls) of oil in two tanks; 3200 bbls of produced water in eight tanks; and approximately 20000 bbls of fresh water in a large MLVT tank. Spills of fuels or produced fluids from well pads and pipelines also have the potential to contaminate shallow alluvial groundwater. However, oil and gas development regulatory requirements to prevent spills from reaching surface and groundwater make these impacts unlikely, and therefore, represent a negligible potential cumulative impact. Finally,

the P&A of the 12 wells in the vicinity of the Fawn Pad will also eliminate additional volumes of liquids being stored on oil and gas locations in the area, and will lessen the potential for spills.

Total water volume needed for the Project would be approximately 6,278,800 barrels (bbls). Water for the Project would come from existing, permitted sources (groundwater) outside of the Fawn Pad area; no new water wells or water storage areas are proposed. The use of approximately 6.3 million bbls of water for the drilling and completion of wells on the Fawn Pad would cumulatively contribute to water use from other oil and gas development, industrial, and agricultural activity within the Project Review Area. Verdad does not reuse or recycle water as it is not feasible for the Fawn Pad.

Verdad is committed to reducing emissions and noise/traffic nuisances to the nearby communities, and as such Verdad does not truck any water used for hydraulic fracturing to locations, and instead employs pipelines, temporary surface lay-flat water pipelines, or ditches. Minimization and mitigation measures intended to protect water resources are described in Section 4.2 and 4.3; Verdad's commitment to implementation of these measures will further limit impacts to water resources.

## 4.2 WATER RESOURCES MINIMIZATION MEASURES

- Verdad will implement a site-specific Stormwater Management Plan (SWMP) (included with Form 2A) to protect Waters of the State that could receive stormwater runoff from the Location.
- Verdad will have no staging, refueling, or chemical storage areas associated with the Project in the vicinity of water resources.
- Verdad will manage potential pollutants located onsite by sealing, wrapping, covering, or having containment/protection while not actively being used in order to eliminate/minimize contact with stormwater runoff, and prevent discharges of chemicals or other materials from the site.
- Verdad will practice proper storage, safe-handling, good housekeeping and spill prevention practices and procedures to prevent pollutants or contaminants from leaving the site.
- Energy dissipaters such as coconut blankets, straw mulch, rock socks, or straw waddles will be installed during construction and will be left in place and maintained for the life of the project or until disturbed slopes have been revegetated and stabilized. Locations for these BMPs will be dictated by the Site Specific SWMP for the Fawn Pad
- All tanks and process vessels will be in secondary containment and control measures around the site, including ditches, berms and ponds will prevent any spill outside of secondary containment from leaving the site.
- Verdad will implement a Spill Prevention, Control, and Countermeasure plan to protect water resources from potential spills.
- Upon surface owner authorization and per COGCC Rule 615, Verdad will collect baseline water quality samples from an appropriate set of water wells within the vicinity of the oil and gas location. Baseline samples will be collected prior to drilling (setting of conductor casing) operations for the initial site well.
- Verdad will use SCADA to allow for rapid well shutdown in the event of a potential release.

### 4.3 WATER RESOURCES MITIGATION MEASURES

Minimization measures included in the site-specific SWMP for the Fawn Pad and other measures included above address the potential impacts to water resources. Therefore, no additional mitigation measures are required.

## 5 TERRESTRIAL AND AQUATIC WILDLIFE RESOURCES AND ECOSYSTEMS

---

### 5.1 DESCRIPTION OF POTENTIAL IMPACTS

Cumulative impacts on terrestrial wildlife populations and habitats primarily result from surface-disturbing activities. Cumulative impacts to aquatic species primarily occur from water depletion and impacts to the quality of surface and groundwater.

#### *Wildlife Populations*

#### *Surface Disturbance Impacts*

Development of the Fawn Pad would incrementally increase the acres of cumulative surface disturbance from past, present, and reasonably foreseeable development within the 1-mile Project Review Area. Cumulative impacts to wildlife species can include habitat fragmentation, habitat loss, loss of foraging opportunities, and animal displacement; impacts that can last until successful final reclamation is completed. However, given the vast extent of available habitat for terrestrial wildlife species beyond the 1-mile Project Review Area, and the relatively small size of the final Fawn Pad after interim reclamation (approximately 4.35 acres), implementation of the Project is expected to have a minimal contribution to cumulative impacts on habitat loss. Similarly, Verdad and other operators continued plugging and abandonment of older, vertical wells and subsequent reclamation of those production pads is returning previously disturbed areas back to habitat available for wildlife. Newer pads, including the Fawn Pad, are constructed to host multiple, horizontally drilled wells in consolidated locations that require far fewer miles of access road and pipelines needed for production. Horizontal drilling from multi-well, well pads is significantly reducing the habitat fragmentation effect of historic vertical well pads and their associated linear infrastructure. Specifically, construction, development, and operation of the Fawn Pad will result in the plugging and abandoning of approximately 12 wells in the vicinity of the Fawn Pad. Assuming that plugging and abandoning also means that the facility will be dismantled and allowed to be reclaimed, Verdad is estimating that approximately 14.4 acres will be reclaimed as a result which means these acres can be restored to pre-disturbance conditions. Restoration of these acres would increase available habitat again for wildlife use, which is a positive cumulative impact of the Fawn Pad. Additionally, there are two High Priority Habitat (HPH) areas designated by the Colorado Parks and Wildlife (CPW) within the 1-mile buffer of the proposed Fawn Pad. An active un-occupied Bald eagle nest and inactive- unoccupied Raptor nest is within one mile of the working pad surface. No impact to these nests is expected as the pad is outside the CPW protective buffers.

#### *Noise and Light Impacts*

Noise and light from anthropogenic activities both have the potential to adversely impact terrestrial and aquatic wildlife. Artificial light can have a number of effects on wildlife. Nocturnal animals rely on darkness for hunting, foraging, and scavenging. Predatory animals rely on darkness for hunting, while

prey animals rely on the cover of darkness for protection from predators. Artificial light can also impact migratory birds including causing them to migrate too early or too late and miss ideal climate conditions for nesting, foraging, and other behaviors. Birds can also be attracted to sources of artificial light, which can lead to collisions and bird mortality. Artificial lights can also impact aquatic species. For example, glare from artificial lights can impact wetland or riparian habitats and interfere with activities such as nighttime croaking of frogs and toads, which can impact breeding and reproductive success and lead to reduced populations.

Noise from human activity can also have an adverse impact on wildlife. Wildlife species use sound for a variety of reasons, including to navigate, find food, attract mates, and avoid predators. Anthropogenic noise, especially loud or high frequency noise intrusions, can be perceived by wildlife as a threat, causing them to flee an area. Noise can distract foragers such as big game species, reducing their efficiency of finding and handling food. Noise may increase physiological stress levels, which can impact behaviors and result in decreased physical health of animals and decreased reproduction.

Noise can have indirect effects on wildlife, such as scaring away prey from an area predators rely on, or conversely, driving predators into prey habitat. Human introduced noise can also impede acoustic communication between wildlife or mask the sounds of an approaching predator or potential prey. Noise can also hinder animal communication by reducing the distance at which a signal can be detected, limiting the ability of the signal to reach its intended receiver, and decreasing the amount of information that can be extracted from a signal. For example, anthropogenic noise can reduce the ability of birds, small mammals, and insects to collect information on their surroundings, increase their predation risk (by masking the sounds of predators), and interfere with signals that are crucial for their breeding success and parental care.

The pre-production potential for light and noise related impacts on wildlife will be decreased at the Fawn Location because Verdad intends to down-shield lighting during drilling and completion, and they will also construct a sound wall around the Location on the west and east sides. Additionally, no permanent lighting will be located on the well pad, so long-term light and noise related impacts would be limited to headlights and vehicle engine noise from operational vehicles on location and enroute to and from the location during production.

In addition, given the existing oil and gas, industrial, and agricultural activity in and around the Project Review Area, local wildlife has likely become habituated, to some extent, to human presence, vehicle traffic, and operational activities (including associated noise and light from vehicle traffic) associated with these current land uses. Finally, the minimization and mitigation measures outlined in Sections 5.1 and 5.2 of this Plan would further diminish cumulative impacts on terrestrial and aquatic wildlife.

## 5.2 TERRESTRIAL AND AQUATIC WILDLIFE RESOURCES AND ECOSYSTEMS MINIMIZATION MEASURES

- Verdad will implement fugitive dust control measures.
- Verdad will inform and educate employees and contractors on wildlife conservation practices, which includes no harassment or feeding of wildlife.

- Verdad will install screening or other devices on the stacks and on other openings of heater treaters or fired vessels to prevent entry by migratory birds.
- Verdad will install screening or other devices portable tank secondary containment.
- Verdad will minimize rig mobilization and demobilization by completing all wells on the well pad before moving rigs to a new location.
- Verdad will post speed limits and caution signs to the extent allowed by surface owners, Federal and state regulations, local government, and land use policies.
- Verdad will use remote monitoring of well production to the extent practicable.
- Verdad will reduce traffic associated with transporting drilling and completions water and produced liquids with pipelines, large tanks, or other measures.
- Verdad will install automated emergency response systems (e.g., high tank alarms, emergency shutdown systems).

### 5.3 TERRESTRIAL AND AQUATIC WILDLIFE RESOURCES AND ECOSYSTEMS MITIGATION MEASURES

- During final reclamation, Verdad will re-contour and re-vegetate all roads and pads to a stable condition to restore natural habitats for wildlife species or crops.
- Verdad will install wildlife escape ramps at a minimum of one ramp per 0.25 mile of trench.

## 6 SOIL RESOURCES

---

### 6.1 DESCRIPTION OF POTENTIAL IMPACTS

The review area for soils is a ½-mile radius around the Location. Construction of the Fawn Pad would result in the disturbance of approximately 10.00 acres of soils made up of:

- Vona loamy sand, 3 to 5 percent slopes,
- Weld Loam, 1 to 3 percent slopes, and
- Olney loamy sand, 1 to 3 percent slopes.

Cumulative impacts on soil resources can occur from any surface-disturbing activity that removes native vegetation and topsoil. These impacts can result in soil compaction, increased erosion, and sediment yield, all of which reduce soil productivity, stability, and viability. Of these impacts, compaction may be the most deleterious. Compaction affects the movement of water and air across the soil surface boundary. Infiltration, the movement of water into the soils, is critical for plant and soil health. If water can't move into the soil quickly, it will pond and run off, leaving vegetation dry and dying, increasing erosion, and increasing flood frequency and magnitude. Compaction can also cause a shift from aerobic to more anaerobic organisms and may increase losses of nitrogen to the atmosphere (denitrification). Surface disturbance can also impact soil biological functions and viability because the disturbance can 1) enhance or degrade the microbial habitat, 2) add to or remove food resources, and/or 3) directly add or kill soil organisms.

Most soil organisms – especially larger ones that contribute to soil health and viability – live in the top few inches of soil. Surface disturbance, compaction, and erosion disrupts and removes that habitat for soil organisms. As such, one of the most effective ways to reduce impacts to soil viability from surface disturbance is to protect and preserve topsoil. During initial pad construction, topsoil on the Location will be stripped from the disturbance area and stored onsite for future use during pad pull-back and interim reclamation. All stockpiled topsoil will be protected from degradation due to contamination, compaction, and, to the extent practicable, from wind and water erosion.

This will be achieved initially by applying cat-tracking/soil roughening to the topsoil pile and employing additional BMPs if and when needed (e.g., if needed, the addition of organic matter and/or cover crops to topsoil piles). Verdad also maintains a weed mitigation maintenance schedule to prevent the weed establishment on the topsoil pile.

Implementation of this and other minimization and/or mitigation measures listed in this Plan, would help to lessen the potential for impacts to soils at the Fawn Pad, and therefore, reduce its cumulative contribution to soil disturbance and loss of soil viability. In addition, Verdad and other operators' commitments to plug, abandon, and reclaim older wells and well pads result in restoring previously disturbed areas and reducing soil-related impacts within the Project Review Area and beyond. Specifically, the P&A of 12 wells as result of the construction and operation of the Fawn Pad will have direct beneficial impacts to soils in the CIAA and vicinity as it will result in the reclamation of approximately 14.4 acres of land can be restored to pre-disturbance conditions.

In accordance with COGCC requirements. Interim reclamation would reduce the production pad size to approximately 4.35 acres. Minimization and mitigation measures, found in 6.2 and 6.3 will be used to implement noxious weed management, erosion control, and apply dust abatement, would reduce impacts to native vegetation communities by reducing the potential for competition with invasive and noxious weed species, minimizing soil erosion and sedimentation, and reducing fugitive dust on plant surfaces. In addition, Verdad and other operators' commitments to plug, abandon, and reclaim older wells and well pads result in restoring previously disturbed areas to pre-disturbance conditions. Newer pads, including the Fawn Pad, are constructed to host multiple, horizontally drilled wells in consolidated locations that require far fewer miles of access road and pipelines needed for production. Horizontal drilling from multi-well, well pads is significantly reducing the vegetative community fragmentation effect of historic vertical well pads and their associated linear infrastructure. Specifically, the 12 wells to be P&A as a result of the construction and operation of the Fawn Pad would result in approximately 14.4 acres of land being reclaimed and restored to pre-disturbance conditions. The reclamation of these 12 locations will result in a reduction of land use dedicated to oil and gas development in the area. Restoration of these acres would increase native vegetation communities in area which is a positive cumulative impact of the Fawn Pad. Based on these collective measures, Verdad would reduce its contribution to cumulative impacts on vegetation within the Project Review Area and beyond considerably.

## 6.2 SOIL & VEGETATION RESOURCES MINIMIZATION MEASURES

### *Soils*

- Verdad will implement a site-specific Topsoil Management Plan and Stormwater Management Plan (Form 2A). Key control measures from those documents are included here:
- During initial pad construction, the topsoil will be stripped from the disturbance area and stored onsite for future use during pad pull-back and interim reclamation. All stockpiled topsoil will be protected from degradation due to contamination, compaction, and, to the extent practicable, from wind and water erosion. This will be achieved initially by applying cat-tracking/soil roughening to the topsoil pile and employing additional BMPs if and when needed (e.g., the addition of organic matter).
- Verdad maintains a weed mitigation maintenance program to prevent the establishment of weeds on the topsoil pile and location.
- BMPs such as coconut blankets, straw mulch, or straw waddles, sediment basins, swales and perimeter ditches will be used to prevent excess erosion of soils from disturbed areas. These structures will be installed during construction and left in place and maintained for the life of the project or until the disturbed slopes have been revegetated and stabilized.
- The site will be inspected bi-weekly for BMP integrity and current installation. Any deficiencies noted will be addressed in a timely manner
- Verdad will limit construction activities during wet periods to avoid excess disturbance of areas surrounding operations.
- Unless specifically requested by the landowner, all roads and pads will be contoured and revegetated to a stable condition.
- Verdad will regrade cut and fill areas awaiting reclamation to match pre-existing contours to the nearest extent possible to provide long term erosion control and site stability.
- Verdad will grade the topsoil stockpile to ensure that all surfaces can be stabilized safely and effectively.
- Verdad will stabilize and maintain areas needed for production operations or for subsequent drilling operations to minimize dust and erosion to the extent possible.
- Verdad will implement a Spill Prevention, Control, and Countermeasure plan to protect soil from potential spills.

### *Vegetation*

- Verdad will confirm that erosion and sedimentation controls are implemented as necessary before and after seeding operations, as detailed in the Site SWMP.
- Verdad will monitor and maintain the vegetation on the topsoil stockpile and cut/fill slopes to promote native vegetation and to suppress invasive and noxious weeds.



### 6.3 SOIL & VEGETATION RESOURCES MITIGATION MEASURES

#### ***Soils***

Minimization measures for the Fawn Pad included in Section 6.2 will address the potential impacts to soil resources. Therefore, no additional mitigation measures are required.

#### ***Vegetation***

Verdad will reseed disturbed areas in the first favorable season following rig demobilization with species consistent with the plant community in the vicinity of the Location.

Verdad will monitor the site to identify areas of poor growth or areas that fail to germinate; these areas will be reseeded as needed.

Verdad will monitor the site for the presence of noxious weeds. If encountered, Verdad will implement weed control measures consistent and in compliance with the Colorado Noxious Weed Act.

## 7 PUBLIC WELFARE – NOISE, ODOR, AND LIGHT

---

### 7.1 DESCRIPTION OF POTENTIAL IMPACTS

The Fawn Pad is wholly located within an agricultural area and zoned as such. There are no RBUs located within 2,000 feet of the location. The Project Review Area for Public Welfare is a 1-mile radius around the Location. There are no recreation areas within a 1-mile radius, and the Fawn Pad is located in an area that has active oil and gas development meaning that visual impacts from oil and gas is already present in the area. The scenic value of the location will not be impacted by the construction and operation of the Fawn Pad.

#### ***Noise***

The Fawn Pad is wholly located within an agricultural area and zoned as such. There are no RBUs located within 2,000 feet of the location. Ambient noise levels in the vicinity of the proposed Fawn Pad are influenced by traffic, other facilities, other human activity, or environmental factors.

Noise mitigation for drilling operations will reduce noise levels in the surrounding environment. The noise mitigation includes installation of approximately 1600 total linear feet of 32-foot-high, sound wall on the east, north and west perimeter of the site. These absorptive noise barriers prove to be an effective noise mitigation tool. Additionally, Verdad has planned to use a Quiet Frac fleet for the Fawn Pad to further mitigate noise during pre-production activities.

Noise during production operations would be limited to daily operational activities including pumper and operator vehicle traffic to and from the production pad, and the operation of production equipment generators and compressor engines.

Adverse noise related impacts as a result of production equipment are not anticipated because distance to the nearby RBUs, the existing ambient noise levels, and Verdad will site production equipment at the well pad in a manner to minimize impact to the surrounding area. In the event of a noise related



complaint from homeowners, Verdad would evaluate potential mitigation measures to reduce production related noise, as needed.

### ***Odor***

Odor from existing and proposed oil and gas operations, including the Fawn Pad, as well as other industrial operations within the Project Review Area could have a cumulative impact on residential building units (RBUs) in the Project Review Area. Odor impacts from the Fawn Pad would primarily occur during drilling and as result of the oil-based mud utilized and drill cuttings being stored on site. However, Verdad will utilize D822 as our base fluid which is a distillate and has the benefits of lower BTEX levels and is recognized as having lower odor than traditional oil-based mud, greatly reducing the potential for odor impacts. Cuttings will not be stockpiled, but rather they will be removed from the location on a regular and timely basis to reduce potential odor impacts. Other exploration and production activity wastes stored onsite would be stored in compatible containers or engineered containment devices. Wastes would be transported offsite via truck by a licensed transporter, and transportation frequencies would vary based on waste volumes. These measures would help to contain odors from being noticed within the Project Review Area. Additionally, the minimization and mitigation measures listed in Sections 7.2 and 7.3 would further limit the impacts of odor.

### ***Light***

Verdad's development of the Fawn Pad would require work activities to be performed 24 hours per day during drilling, completion, drill-out, and flowback stages; all of which require the use of temporary lighting. Lighting needed for these activities would conform to nationally recognized industry and federally mandated safety standards. However, during nighttime work activities, lighting required for safe operations may be observed from locations beyond the boundaries of the well pad site. As such, nighttime drilling and completion activities would result in a short-term contribution to cumulative light pollution. However, light pollution BMPs would be used to minimize light impacts during all phases of the Fawn Pad's proposed operations including precautions to ensure that site lighting does not directly shine outside of the site boundaries, which would decrease potential light impacts on nearby receptors. Cumulative light impacts within the Project Review Area during these phases would be short-term and temporary. Weld county also requires photometric plans that demonstrate compliance to lighting requirements pursuant to Weld County Code 21-5-405 for operations during the "Construction" phase of the development.

During production, operations would typically only occur during daylight hours. No permanent lighting is anticipated on the site during production operations. Therefore, there would be little or no long-term contribution to cumulative light pollution from the Fawn Pad.

## **7.2 PUBLIC WELFARE MINIMIZATION MEASURES**

### ***Public Welfare – General***

- To minimize the possibility of fires during the construction phase, equipment, including welding trucks, will be equipped with fire extinguishers and spark arresters.
- Where alignment of pipelines will cross or parallel roads, highways, or waterways, Verdad will provide warning signs to inform the public of the presence of the line.

- Vehicle users associated with the oil field will be instructed to travel at low speed and remain on existing roads and well pads at all times.
- Verdad will not truck any water to location for development. Rather, pipelines or infrastructure will be utilized.
- Verdad will use SCADA to reduce the frequency of vehicle trips to the Oil and gas location to monitor well operations.
- Verdad will implement a Transportation Plan to guide the management of transportation throughout the implementation of the proposed project.

### **Noise**

- Verdad will utilize a quiet frac fleet for completions operations.
- Verdad will construct 32 feet sound walls of acoustic panel to dampen equipment noise along East and West side of the pad nearest the Residential Building Unit will be installed.

### **Odor**

- Verdad will ensure that oil and gas operations will be in compliance with the Department of Public Health and Environment, Air Quality Control Commission, Regulation No. 2 Odor Emission, 5 C.C.R. 1001-4, Regulation No. 3 (5 C.C.R. 1001-5), and Regulation No. 7 Section XVII.B.1 (a-c) and Section XII.
- Verdad will utilize a freshwater mud system for surface hole.
- Verdad will utilize D822 as our base fluid which is a distillate and has the benefits of lower BTEX levels and is recognized as having lower odor than traditional oil-based mud, greatly reducing the potential for odor impacts.
- Due to the low VOC and BTEX counts of the mud system, odor neutralizer is not anticipated.
- Verdad will store oil-based drilling fluid not being used in the active mud system in closed, upright tanks.
- In an effort to keep odor from oil base cuttings as low as possible, Verdad continuously hauls cuttings to an approved disposal facility throughout the drilling process. Verdad will not stockpile cuttings or store any large number of cuttings on location. Trucks run continuously during daylight hours to keep the volume of cuttings on location at a bare minimum.
- Verdad will wipe the OD and ID of the drill pipe to remove any residual mud upon tripping out of the hole.
- Verdad will utilize a catch can system mounted around the BOP to catch any mud that falls through the rotary table, thereby preventing any spillage and reducing the source of odor.
- Verdad will gauge tanks using infrared; thief hatches will not be opened for these purposes.
- Verdad will install vapor recovery systems on storage tanks.
- Verdad will control truck loadouts, well unloads, and swabbing, thereby eliminating high pressure venting or flaring.
- Verdad will perform emission testing on all natural gas-powered engines to ensure the emission control devices are operating properly.

### **Light**

- Verdad will utilize BMPs to minimize light pollution which may include the following:

- Placement of the sound barrier walls to reduce light trespass to surrounding receptors.
- Light fixtures mounted on the sound barriers will be placed beneath the top of the wall and angled in a downward direction.
- Use of LED fixtures, as feasible, to reduce skyglow.
- Position lights in a downward direction where vertical light is not required.
- Angle light away from off-site buildings.
- Reduce lighting within well pad to the minimal level for safe pre-production activity.
- Use of light sensors that automatically switch light sensors on and off on light masts.
- Direct lights to drilling and completion tasks only.

### 7.3 PUBLIC WELFARE MITIGATION MEASURES

#### **Noise**

- Prior to the commencement of the pre-production activities of drilling and completions, Verdad will install approximately 1600 total linear feet of a 32-foot-high wall. The installation will include approximately 400 total linear feet on the west side of location, and 700 total linear feet on the north side of location and 500 total linear feet on the east side of the location.
- Verdad will orient the drilling rig on the pad so that the pieces of equipment with a higher sound signature such as the shakers and generators, will be directed away from the residential building units to the northwest of location.

#### **Odor**

Minimization measures listed for odor in Section 7.2 will address the potential impacts from odors. Therefore, no additional mitigation measures for odors are included.

#### **Light**

Minimization measures listed for lighting in Section 7.2 will address the potential impacts from lighting. Therefore, no additional mitigation measures for lighting are included.