

Impact Table															
Impact	Timing/Potential Impact Level									Duration	Impact Level	General Receptor/s	Sensitive Receptor/s	Cumulative Impact	BMP/Solution/Order
	Planning/Spacing	Construction		Drilling		Completions		Production						Based on Multiple Locations	Potential Issues
	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic						INTERUNIT/AGENCY INVOLVEMENT
Noise  <u>Source</u> <b>Construction:</b> Heavy Equipment, Warning Alarms, Traffic <b>Drilling/Completions:</b> Drilling Equipment, Alarms, Traffic, Hydraulic Fracturing <b>Production:</b> Compressors, Engines	X	Moderate	X	High	X	High	X	X	Low	Noise Impact potential is anticipated to remain for the lifetime of the well.	Acute - Moderate to High Chronic - Low	Residential- Neighborhoods Wildlife	High Density Neighborhoods / UMA/LUMAFs Sensitive Wildlife	Potential exponential increase in nuisance for high density residential developments, based on the construction of multiple locations within proximity of each other.  Potential exponential increase in nuisance causing low reproduction rates for wildlife. Potential nest/offspring abandonment for sensitive avian species.	Create a Range-Wide BMP calling for site specific sound surveys (including ambient/background sound) for chosen as well as alternate potential Locations. Provide Operator BMPs that include both Administrative (topography) and Structural BMPs.  Current structural BMPs (i.e. sound walls) may create hazardous working conditions. All Locations should have active gas monitoring.  <b>FIELD INSPECTION &amp; ENGINEERING</b>
Light  <u>Source</u> <b>Construction:</b> Temporary Lighting (Daytime Ops.) <b>Drilling/Completions:</b> Temporary Lighting <b>Production:</b> Permanent Lighting	X	Daytime Ops. X  Nighttime Ops. High	X	High	X	High	X	X	Low to Moderate	Light Impact potential is anticipated to remain through drilling and completions.	Acute - High Chronic - Low to Moderate	Residential- Neighborhoods Wildlife	High Density Neighborhoods / UMA/LUMAFs Sensitive Wildlife	Potential exponential increase nuisance for high density residential developments, based on the construction of multiple locations within proximity of each other.  Potential exponential increase in impacts to traffic visibilty, based on the construction of multiple locations within proximity of each other.  Potential exponential increase in nuisance causing low reproduction rates for wildlife	24-Hour lighting for oil and gas operations is essential. Use of sound walls and other structural barriers should be required .  <b>FIELD INSPECTION &amp; ENGINEERING</b>
Odor  <u>Source</u> <b>Construction:</b> Deisel Exhaust <b>Drilling:</b> Shakers, Cuttings Management, Oil-Based Drilling Muds <b>Completions:</b> Flowback <b>Production:</b> Tank Emissions, Equipment Exhaust	X	Moderate	X	High	X	High	X	X	Moderate	Odor Impact potential is anticipated to remain through the lifetime of the well.	Acute - Moderate to High Chronic - Moderate	Residential- Neighborhoods	High Density Neighborhoods / UMA/LUMAFs	Potential exponential increase nuisance for high density residential developments, based on the construction of multiple locations within proximity of each other.  Potential exponential increase in impacts to traffic visibility, based on the construction of multiple locations within proximity of each other.	Create a Range-Wide BMP calling for the use of synthetic (low VOC) oil-based mud.  Create a Range-Wide BMP calling for the use of electric generators.  <b>FIELD INSPECTION, ENVIRONMENTAL &amp; LOCATION ASSESSMENT</b>
Dust  <u>Source</u> <b>Construction:</b> Vegetation Clearing <b>Drilling/Completions :</b> Equipment Traffic, Truck Traffic <b>Production:</b> Poorly Maintained Roads	X	High	X	High	X	High	X	X	Low	Dust Impact potential is anticipated to remain through construction to completions.	Acute - High Chronic - Low	Residential- Neighborhoods Wildlife	High Density Neighborhoods / UMA/LUMAFs Sensitive Wildlife	Multiple Locations being developed within proximity may increase truck traffic, thus, increasing both construction and road dust.  Poorly constructed or maintained Locations may increase fugitive dust, increasing with the construction of multiple locations within proximity of each other.	Create a Range-Wide BMP calling for the use of soil/sand stabilization.  Minimal surface disturbance.  <b>FIELD INSPECTION, RECLAMATION &amp; LOCATION ASSESSMENT</b>
Vibration  <u>Source</u> <b>Construction:</b> Heavy Equipment Operation <b>Drilling/Completions:</b> Hydraulic Fracturing <b>Production:</b> Combustors, Compressors	X	Low	X	High	X	High	X	X	Low	Vibration Impact potential is anticipated to remain through completions.	Acute - Low to High Chronic - Null	Residential- Neighborhoods Wildlife	High Density Neighborhoods / UMA/LUMAFs Sensitive Wildlife	Potential exponential increase in nuisance for high density residential developments, based on the construction of multiple locations within proximity of each other.  Potential exponential increase in nuisance causing low reproduction rates for wildlife. Potential nest/offspring abandonment for sensitive avian species.	  <b>ENGINEERING</b>
Vegetation Removal  <u>Source</u> <b>Construction:</b> Vegetation Clearing for Pad Construction <b>Drilling and Completions:</b> Vegetation Removal for Drilling and Completions Activities <b>Production:</b> Minimal Impact after Interim	X	X	High	X	High	X	High	X	Low	Vegetation Removal Impact potential is anticipated to remain through the lifetime of the well.	Acute - High Chronic - Low	Residential- Development Agriculture Plant Communities Wildlife Soil Surface Water	Residential Development Agriculture Sensitive Wildlife Prairie Grass- Communities Wetlands and Waters of the US Drainage Patterns	Multiple Locations being constructed concurrently or consecutively would potentially increase stormwater erosion issues and dust emissions impacting communities.  Soil degradation and carbon loss leading to desertification. Multiple Locations constructed within proximity to each other may potentially cumulatively increase soil degradation ultimately having high chronic, long-term impacts from the reduction of the soil viability to sustain vegetation.	  <b>LOCATION ASSESSMENT &amp; RECLAMATION</b>

Habitat Removal  <u>Source</u> <b>Construction:</b> Vegetation Clearing for Pad Construction <b>Drilling and Completions:</b> Vegetation Removal for Drilling and Completions Activities <b>Production:</b> Long-term Impact through the life of the well	X	X	High	X	High	X	High	X	High	Ecosystem Modification Impact potential is anticipated to remain through the lifetime of the well.	Acute - High Chronic - High	Plant Communities Wildlife Soil Surface Water	Sensitive Wildlife Prairie Grass- Communities Wetlands and Waters of the US Drainage Patterns	Multiple Locations being constructed within proximity of each other will potentially increase impacts from long-term habitat removal and further increase impacts resulting from habitat fragmentation by decreasing viable habitat for sensitive and susceptible wildlife.  Soil degradation and carbon loss leading to desertification may potentially increase impacts to habitat and potentially reduce viability of the soil regime and the ability to sustain future habitat.	LOCATION ASSESSMENT, RECLAMATION & CPW
Stormwater Erosion  <u>Source</u> <b>Construction:</b> Vegetation Clearing for Pad Construction <b>Drilling and Completions:</b> Vegetation Removal for Drilling and Completions Activities <b>Production:</b> Low to null impacts after Interim Reclamation	X	High	X	Low	X	Low	X	X	X	Stormwater Impact potential is anticipated to remain from construction through to completions	Acute - High Chronic - Null	Soil Surface Water Groundwater	Drinking Water Shallow Groundwater Wetlands and Waters of the US Soil	Potential increase in sediment transport into nearby waterways causing siltation of nearby streams and lakes.  Potential increase in loss of topsoil in agricultural communities.  Vegetation suffocation from sheet flow of fine-grained sediment.	LOCATION ASSESSMENT & RECLAMATION
Traffic Congestion  <u>Source</u> <b>Construction:</b> Truck traffic for heavy equipment during pad construction <b>Drilling and Completions:</b> Heavy truck traffic during hydraulic fracturing operations <b>Production:</b> Low impacts from traffic due to maintenance operations	X	Moderate	X	High	X	High	X	X	Low	Increase in Traffic would have the highest potential impact during drilling and completions, however, slightly elevated traffic would continue through the life of the well and Location due to production and maintenance activities.	Acute - Low Chronic - High	Residential- Neighborhoods	High Density Neighborhoods / UMA/LUMAFs	Multiple Locations being constructed concurrently or consecutively may cause either linear or exponential increased impacts from traffic activity.	LOCATION ASSESSMENT & LOCAL JURISDICTION
Product Release	X	High	High	High	High	High	High	High	High	Increase potential of a release from production equipment, flowlines, valves.	Acute - High Chronic - High	Soil Surface Water Groundwater Vegetation	Drinking Water Shallow Groundwater Wetlands and Waters of the US Rare/Sensitive Plant-Communities	Increase in release potential as number of facilities increase.  Adverse impacts to underlying aquifers.	ENVIRONMENTAL, FLOWLINE & FIELD INSPECTION
Health Impacts/ Chronic Exposure	X	Low	X	Low	X	Low	X	Moderate	Moderate	Health Impact potential is anticipated to remain for the lifetime of the well.	Acute - Low Chronic - Moderate	Humans	Hospitals Schools Elderly Institutions	Increase in Health Impacts due chronic exposure to nuisance sources (i.e. odor/vapor, dust).	Create a Range-Wide BMP for tankless production in areas where there is infrastructure.  ENVIRONMENTAL & CDPHE
Fire/Explosion Hazards	X	Low	X	High	X	High	X	Moderate	X	Fire/Explosion Hazard potential is anticipated to remain for the lifetime of the well.	Acute - High Chronic - Moderate	Humans Wildlife	High Density Residential Neighborhoods (UMAs) Schools Hospitals Sensitive Wildlife	Increase in fire/explosion potential due to increase in well density.	FIELD INSPECTION & ENGINEERING
Mineral Resource Waste	High	X	X	X	X	X	X	X	X		Chronic - High / Long-Term	Mineral Resources	Mineral Resources	Minimal planning may hold mineral resources hostage in perpetuity. Also noting that Colorado is seeing great advancement of residential development into historically rural/industrial areas previously used by agricultural and oil and gas development. While spacing has traditionally afforded Operators the advantage of spacing large acreage for minimal activity, the current trend of surface development in concert with short-range planning, may ultimately lead to a greater percentage of State mineral resources being stranded.	Create Range-Wide BMPs that will not allow operators to space entire sections for a minimal number of wells (i.e. 2 Hz).  ENGINEERING, PERMITTING & HEARINGS
Intangible Impacts															
View Sheds	X	Moderate	X	X	High	X	High	X	Moderate		Acute - High Chronic - Moderate	Housing Development Humans	Humans	Increase in density of oil and gas development may potentially increase impacts to view sheds.  Better topographic planning. Use of low-profile tanks.  Use of View Shed Analysis in sensitive areas.	LOCATION ASSESSMENT

Fear	X	X	High	X	High	X	High	X	High		Acute - High Chronic - High	Humans	Humans	Events of high-profile nature in concert with a lack of understanding of Industry practices may cause a continued increase in overall public perception.  Local Jurisdictions' continued effort in development of residential neighborhoods sprawling further into historic areas of oil and gas development may cause a continued increase in public perception.	Augmented Public Outreach  COGA, COGCC COMMUNITY LIAISON, LOCAL JURISDICTIONS, DNR ATTORNEY GENERAL'S OFFICE & LGL
------	---	---	------	---	------	---	------	---	------	--	--------------------------------	--------	--------	---	---