6.0 MINIMIZING IMPACTS FROM ANTICIPATED CBM DEVELOPMENT

This section provides options for minimizing impacts from the anticipated development of CBM in La Plata County based on the goals and objectives and potential impacts discussed for each resource in Section 5.0. The intent of this section is not to recommend or set policy, but to present reasonable options for minimizing impacts.

This section summarizes the methods that currently are available to minimize impacts from CBM in La Plata County through existing county regulations, the federal operating requirements for onshore oil and gas facilities, the BLM surface operating procedures for oil and gas exploration and development on federal leases, and state and COGCC rules. This section also considers innovative mitigation measures and precedents used by other local governments.

There are multiple approaches to mitigation of anticipated CBM development, from the initial siting to construction and operation measures. For example:

- The site of the CBM development can be strategically located so that the potential impacts are minimized.
- Construction and operation of the CBM facilities can be mitigated using specific methods that also decrease the potential impacts.
- Residential development can be sited to minimize potential impacts from existing and future CBM development.

Options that were considered economically infeasible from the perspective of industry or the regulatory agencies were not included. The only options considered include practices that industry could employ, as well as options that could be implemented by various regulatory agencies at the local, county, state, and federal levels.

This section addresses four primary topics. First, the existing regulations related to mitigating oil and gas impacts will be identified and discussed. Second, existing mechanisms for surface interests to influence the facility siting process are identified. Third, the practices used by other local governments to minimize impacts from oil and gas development are summarized. Fourth, some general options that may be used to minimize impacts from CBM development are discussed. Finally, some additional options for mitigation are presented for the specific resources of land use, socioeconomics, traffic and transportation, visual impacts, noise, and health and safety.

6.1 EXISTING REGULATIONS/REQUIREMENTS THAT MITIGATE IMPACTS

The existing regulations and operating procedures that mitigate many of the potential impacts from development of CBM are summarized in this section. First, the existing La Plata County regulations for oil and gas facilities that minimize many of the potential impacts of the anticipated development of CBM are also summarized. The state and federal regulations are discussed later in this section.

6.1.1 Summary of Existing County Permitting Regulations

The existing La Plata County regulations mitigate many of the potential land use impacts from CBM development and are summarized in this section.

6.1.1.1 County Permits

Under the La Plata County Land Use Code, permits are required for certain land uses to be undertaken on a property and are separate and distinct from building permits. Currently, land use permits are not required for single-family residences, most agricultural uses, or single-family residential development at a density of less than one unit per 35 acres, up to a maximum of three units per parcel. Building permits are used to limit development within designated floodplains or proposed sites that may pose potentially hazardous conditions.

Oil and gas development as defined in the Code of La Plata County includes oil and gas wells and production facilities. Oil and gas development in the unincorporated county requires either a minor administrative permit or a major oil and gas permit. Criteria for these permits are shown in **Table 6-1**.

Table 6-1 La Plata County Oil and Gas Permits

Permit	Application
Administrative Permit (minor oil and gas facility)	Individual well site and gas gathering lines with a cumulative horsepower rating of less than 200 bhp.
Class II Permit (major oil and gas facility)	A compressor station with a cumulative rating of 200 bhp.

The procedures for obtaining either a minor or major oil and gas permit specify that development must comply with both the required and encouraged review standards in the entire land use code, including the subparts of the code with performance standards in the oil and gas regulations provided in Sections 82 and 90 of the code. Proposals for oil and gas facilities are reviewed for general consistency with the standards and policies set forth in these documents:

- County oil and gas regulations,
- County land use regulations,
- County master plan,
- County road and drainage design specifications and standards,
- Plans and regulations of municipalities in the county, and
- Other applicable local, county, state, and federal plans, policies, and regulations.

In addition, for access roads on private lands, right-of-way (ROW) approvals and access agreements would be negotiated with the surface owner or secured through the permitting processes of the federal, state, or local jurisdictional agencies. La Plata County requires an access permit for all private driveways or roadways that access a county road, and requires a permit for all roadway work within county ROWs.

6.1.1.2 County Setbacks

The existing county performance standards for oil and gas facilities are provided in Section 90-122 of the La Plata County Land Use Code. One key performance standard that mitigates impacts from CBM development is the setbacks for oil and gas facilities.

Setbacks are used to coordinate land uses and to minimize conflicts between differing land uses. The setbacks for oil and gas facilities, as defined in the code, are the following:

- A setback of at least 400 feet is required between the perimeter of a minor facility and the closest existing residential structure, unless verified written consent is obtained from the affected surface property owner to waive this standard [Sec. 90-122 (b) (1)].

- A setback of at least 200 feet is required between the perimeter of a minor facility and the closest platted subdivision lot line, unless verified written consent is obtained from the affected property owner [Sec. 90-122 (b) (2)].

- Where compliance with COGCC spacing regulations makes it impossible for the applicant to meet the 400-foot setback or the 200-foot setback and a waiver is not obtained from the affected property owner, the applicant will not be required to fully meet the setbacks described above. The applicant will, however, meet the 400-foot or 200-foot setbacks to the maximum extent possible within the COGCC spacing regulations and may be required to implement special mitigation measures [Sec. 90-122 (b) (3)].

- Setbacks between a major facility and the closest existing residence or platted subdivision lot line are established on a site-specific basis based on the review criteria for major facilities identified in Section 90-108 of the county code, as applicable.

- Major facilities must be located outside of a designated quiet zone (defined as within ½ mile of a school, hospital, institution of learning, court, rest home, or other designated area) [Sec. 90-122 (b) (5)].

6.1.1.3 Other County Performance Standards

Section 90 of the La Plata County Code also establishes performance standards and mitigation measures for oil and gas facilities. In addition, Section 82, Natural Resources, of the La Plata County Land Use Code offers or requires mitigation for general or specific resource areas, including buffering as described in Section 82-165. A request for a special exception or an operational conflict special exception may be processed for major facilities relative to the requirements or mitigation measures. These are summarized below.

General Land Use

- Construction of buildings or other enclosures may be required where facilities create noise and visual impacts that are not able to be mitigated because of proximity, density, or intensity of adjacent land use.
- Work in streams should be conducted in a manner that minimizes siltation and erosion and at a period of little or no flow.
- All pipes must be placed below the channel scour depths in streams to avoid partial diversion or channel discharges.

Buffering

- Buffering is required between development of different intensities and uses when necessary to achieve compatibility or when the development creates noise, glare, traffic, dust, unsightly views, or other negative external effects that are perceptible off the site.
- Buffering must be accomplished though use of a fence, a planted berm, a landscaped area, an increased setback, or a combination of these techniques.

Disturbance and Weed Control

- Where minor and major facilities reduce or destroy existing vegetation, the applicant, in consultation with the National Resource Conservation Service (NRCS), must develop a revegetation plan for the remainder of the facility site to be approved by the county planning department.
- Appropriate weed control methods and species to be controlled must be identified though review and recommendation by NRCS.
- Reclamation shall be in accordance with COGCC regulations.

Nuisance

- Security fencing and a locked gate for minor and major facilities is required for locations where there are four or more existing residences within 660 feet of the facility perimeter, and the criteria that dictate when fencing are required is established in Section 90-122 (e) (1).

Transportation

- Vehicular access should be confined to established roads except under emergency circumstances.
- Locking gates should be installed at the first property boundary crossed when a facility is accessed from the closest public road.

Visual

- Where the applicant's visual mitigation plan specifies alternative security fencing, the alternative fencing will apply.
- Visual impacts from oil and gas facilities must employ mitigation measures to avoid impacts to the maximum extent possible.
- Landscaping practices are to be applied on a site-specific basis.
- Exterior lighting should be directed away from residential areas.
- A visual mitigation plan is required for all new minor and major facilities.

Noise

- Where a minor or major facility does not comply with the required setback or other portions of the performance standards, additional noise mitigation may be required. In identifying mitigation measures for noise, specific site characteristics are to be considered.
- Sound emissions must be at a minimum to be in accordance with the standards as adopted, and as amended from time to time, by COGCC.

Health and Safety

- Each operator with facilities in the county is required to provide an emergency preparedness plan.
- Safety practices generally accepted by the oil and gas industry must be used at all times during drilling and production to minimize the danger to the general public.
- Open-ended discharge valves on all storage tanks, pipelines and other containers must be secured where the facility site is unattended or accessible to the general public.
- All land within 25 feet of any tank, pit, or other structures that contains flammable or combustible materials must be kept free of dry weeds, grass or rubbish.
- Construction equipment should be fueled and lubricated away from aquatic environments.

6.1.1.4 County On-site Inspections

The current method for the county to be involved in the COGCC siting process for a new CBM well is through participation in the on-site inspection process, as described in this section. Currently, three avenues provide the county the opportunity to be involved in the COGCC on-site inspection process. First, if requested by the local government, an on-site consultation on the proposed location of roads, production facilities, and wells is conducted before operations with heavy equipment begin, in accordance with COGCC Rule 306 a (3). Second, by COGCC Orders 112-156 and 112-157 (applicable to remaining drilling windows in La Plata County), an on-site inspection that involves the local government and surface owner is required under any of the following conditions:

- The proposed location would be within 2 miles of the Fruitland/Pictured Cliffs contact,
- The proposed location would be within an approved subdivision, or
- The operator and surface owner have not reached a surface use agreement.

Third, in instances where there are split estate lands (land with private surface ownership and federal minerals ownership), the La Plata County planner and the surface owner are also invited to attend the federal on-site inspection. Under the La Plata County Land Use Code, the operator, surface owner, or any landowner who received notice of drilling field inspections can request a field inspection. This requirement can be found at Section 90-123(a)(5). Administrative determination of satisfactory mitigation is described in Section 90-70 of the county code.

6.1.2 COGCC and Federal Requirements

The state and federal requirements related to oil and gas well are provided in the following subsections.

6.1.2.1 COGCC Permit

For wells to be located on private lands, the operator typically develops a surface use agreement with the surface owner. COGCC requires that the operator post bond to cover the costs of remediation. Operators are required to provide financial assurance prior to commencing operations with heavy activity. In addition, an on-site inspection is conducted before drilling can begin, and the surface owner is invited to the inspection for locations on private lands.

COGCC Setbacks

The existing COGCC rules address fencing requirements for CBM facilities, reclamation procedures, standards for prevention and control of spills and wastes, best management practices for installation of

well pads and roads to minimize surface disturbances, dust and erosion, and installation, maintenance, and reclamation of flowlines.

COGCC statewide rules apply to drilling and operating oil and gas wells in the State of Colorado, regardless of land ownership. For the Fruitland Formation, the drilling windows are defined in the spacing order, and include regulatory setbacks from lease lines and other wells.

COGCC safety regulations require wellhead locations in all areas of the state to be a minimum of 150 feet or $1^1/_2$ times the height of the derrick, whichever is greater, from any occupied building, public road, major aboveground utility, or railroad. In addition, wells are to be a minimum distance of 150 feet from a surface property line (COGCC 2001b). High-density areas are defined as an average density of one occupied building unit per 2 acres. Wellheads, production tanks, and associated equipment in high-density areas are to be not less than 350 feet from building units. Production tanks and associated equipment are to be located not less than 500 feet from an educational facility, assembly building, hospital, nursing home, board and care facility, or jail. A summary of these setbacks are provided in **Table 6-2**.

Table 6-2 Summary of Setback Requirements

La Plata County		
All wells	400 feet	Required between the site perimeter of a minor facility and the closest existing residential structure.
All wells	200 feet	Required between the site perimeter of a minor facility and the closest platted subdivision lot line.
COGCC		
All wells	150 feet or 1.5 times derrick height (whichever is greater) from the well head	Required from occupied buildings, public road, major aboveground utility line, or railroad.
Wellheads in high density areas	350 feet from the well head	Required from building units, educational facility, assembly building, hospital, nursing home, boarding and care facility, or jail.
Production equipment	500 feet from the well head	If requested by local government designee, required from educational facility, assembly building, hospital, nursing home, boarding and care facility, or jail.
All wells	150 feet from the well head	Required minimum distance from a surface property line.

6.1.2.2 Federal Permits and Surface Operating Standards

BLM must analyze and approve each component of the disturbance on a site-specific basis for all CBM wells in federal mineral reserves. Either a Notice of Staking (NOS) or an Application for Permit to Drill (APD) begins the process required to obtain a drilling permit. The APD includes surface use program and

a drilling plan as described in Onshore Oil and Gas Order No. 1 and at Title 43 CFR Part 3162.3. The method used to evaluate each surface-disturbing activity is the APD or ROW Grant/Surface Use Permit, which would be required before any construction can begin.

Operations authorized under federal oil and gas leases must also comply with the Surface Operating Standards for oil and gas development. Although these standards were developed for federal lands, some of these applications may be effective for private lands. These standards address road design and road drainage structures, specifications for construction of pipelines and flowlines, design and construction of well sites, and reclamation procedures. A summary of State and Federal Permits are provided in **Table 6-3**.

Table 6-3 Summary of State and Federal Permits

Requirement	Purpose	Timing
APD	Application for Permit to Drill	Begins the process for obtaining an approved APD required to drill a well.
NOS	Notice of Staking	Begins the process for obtaining an approved APD required to drill a well.
ROW	ROW and access agreements	Required for access roads on private lands.
SUP	Surface Use Permit	Required for surface disturbances.

6.1.3 Mechanisms for Surface Interests to Influence the Facility Siting Process

One of the objectives the county defined for this report was to address the legal and practical means surface owners can use to influence the federal APD process concerning siting of new CBM facilities on private surface that is underlain by federal minerals. Currently, surface owners and adjacent landowners are notified of a new facility through the county and state notification procedures outlined in Section 6.1.3.1. Opportunities for surface interests to participate in the facility siting process are currently offered several ways, including the public notification process of the county and COGCC, the public hearing required for a major oil and gas permit, and participation in the county's field inspection, or the COGCC on-site consultation.

While adjacent landowners have the opportunity to participate in the county review process the time line for this participation is short, since a decision on a minor facility permit is required to be made five days after its submittal.

However, nearby property owners potentially affected by the proposed development have minimal opportunities to participate in facility siting. Opportunities for surface interests to participate in the facility siting process are currently offered in several ways, including the public notification processes of the county and COGCC, the public hearing required for a major oil and gas permit permits, and by participation in the county's field inspection, or the COGCC on-site consultation.

6.1.3.1 Notification

La Plata County requires several types of notification. When land is subdivided and platted, applicants must be provided with notices on the plat. Five days before an application for a minor oil and gas permit (individual well), is submitted to the planning office, the applicant must notify all owners of property within ¼ mile of the wellhead, as required in Section 90-75 of the county code. Proof of notice to the

surrounding property owners (within ¼ mile) is required. Minor facilities are not required to post notice on the property. The applicant for a major oil and gas permit (compressor), is required to post a notice on the proposed property at least 14 days before the public hearing.

Under COGCC rules, the oil and gas operator is required to notify the surface owner by mail, deliver a notice, and post a notice on the drill location before drilling, other significant surface disturbances, or final reclamation can begin. The oil and gas operator must consult with the surface owner about the locations of well sites and access roads. In addition, COGCC provides notice of wells to be drilled so that a local government designee may participate in the on-site consultation for well sites, production facilities, and access roads. In addition, operators in La Plata County are required to submit an annual drilling plan to COGCC in accordance with Order Number 112-156. A summary of the number of wells to be drilled is sent to La Plata County. A summary of Notification Requirements are provided in **Table 6-4**.

Table 6-4 Summary of Notification Requirements

Jurisdiction		Time Requirements	Notification	Format
La Plata County				
	Minor Oil and Gas Facility Permit	Notification is submitted to COGCC director. Summary of number of wells provided to La Plata County 5 days before an application is submitted to the planning office.	Notify the surrounding homeowners within ¼ mile.	A notice to the surrounding property owners is required by copy of letter and certified mail.
	Major Oil and Gas Facility Permit	Within 5 days after the application is submitted.	Notify the surrounding homeowners within ¼ mile. The applicant must post a notice on the proposed property at least 14 days prior to the public hearing.	A notice to the surrounding property owners is required by copy of letter and certified mail.
COGCC				
	Approved APD		Operator is required to offer to consult with the surface owner about the locations of well sites and access roads.	30 days prior to the use of heavy equipment, the operator is required notify the surface owner by mail, deliver a notice, or post a notice before drilling, other significant surface disturbances, or final reclamation can begin. The landowner may waive this requirement.

Table 6-4 Summary of Notification Requirements				
Jurisdiction		**Time Requirements**	**Notification**	**Format**
	Notice		Notice of wells to be drilled is provided to the county via a fax of the APD so that a local government designee may participate in the consultation about well site and access road locations	

6.1.3.2 Public Hearings

Currently, a major oil and gas facility permit is required for compressors with cumulative horsepower of more than 200 bph, and for disposal wells, processing plants, and pipelines with the power of eminent domain. Two public hearing are required for major oil and gas facilities, one with the Planning Commission and one with the Board of County Commissioners (BOCC). A public hearing before the BOCC is required only if an operator or surface owner appeals the administrative decision of the Planning Department. A notice must be posted on the property at least 14 days in advance of the public hearing. Surface owners near the proposed facility are given the opportunity to comment at the Planning Commission and BOCC public meeting. Currently, CBM wells are permitted under an administrative land use permit that does not require a hearing.

6.1.3.3 Surface Owner Agreements and Federal On-site Inspections

An on-site inspection of the locations proposed for the well, access road, pipelines, and other areas of surface land used is conducted for proposed federal wells before it can be approved. The inspection team includes BLM, lessee or designated representative, the primary drilling and construction contractors, the surface owner (for split estate lands land with private surface ownership and federal minerals ownership), and other affected interests.

The on-site inspection identifies potentially sensitive areas and the environmental consequences associated with the proposal at each specific location. It also applies the methods needed to mitigate these effects on a site-specific basis. After the site inspection, the APD may be revised or site-specific mitigation may be added as Conditions of Approval to the APD. These conditions are consistent with applicable terms of the lease and was intended to protect surface or subsurface resource values near the proposed activity. These stipulations to the lease may include adjusting the proposed locations for well sites, roads, and pipelines; identifying the construction methods to be employed; and identifying reclamation standards for the lands.

For private lands, ROW and access agreements would be negotiated with surface owners, and approvals must be obtained through the permitting processes of the federal, state, or local jurisdictional agencies. BLM and the Forest Service require a surface use agreement for split estate wells.

6.2 GAS-RELATED ACTIVITY REGULATIONS USED BY OTHER LOCAL GOVERNMENT ENTITIES

Some of the best practices employed by other local governments to minimize impacts associated with oil and gas development are summarized in this section. The various regulatory methods used by counties in

Colorado with a moderate to high concentration of oil and gas development are identified in **Table 6-5**. Although the specific methods used in each county vary, the summary compares the general methods used to regulate oil and gas and residential development. In addition to La Plata County, the other counties in Colorado considered were Adams, Arapahoe, Archuleta, Boulder, Garfield, Mesa, and Weld. With the understanding that county regulations rely and are based on the framework of state regulations, a representation of the regulations for two counties in Wyoming and one county each in New Mexico and Kansas is also listed in **Table 6-5** independent of relevant state regulations.

The majority of the 12 counties reviewed had established countywide zoning regulations and associated land use regulations. With zoning in place, these counties have the authority to require conditional or special use permits or a "use by special review" for developments such as oil and gas in a defined zone or district.

Some type of subdivision regulation is also available for most counties. If it is not available, it could be regulated through design standards or plans. It does not appear to depend on current or estimated growth in the county or for any of the states whether these types of regulations have been developed.

Reviews of site development plans were not as common as some other regulatory methods but were found in the more developed counties and are also included in the CUP process for Johnson County, Kansas.

The majority of the counties have also developed a variety of hazard overlays or districts. Four counties had developed specific geologic hazard areas or overlays, and Arapahoe County has defined mineral resource areas to protect their development. Garfield County has developed regulations for managing development or restricting specific types of development in geologic hazard areas.

Performance standards related to oil and gas development are common in almost half of the counties reviewed, with specific development review, submittal, and permit requirements in Archuleta and Boulder Counties. Most counties have setback requirements for oil and gas development related to residential areas or public institutions. These requirements are generally based on state regulations or are more stringent. Weld County, Colorado, and Johnson County, Kansas, are two counties that were reviewed which had established setbacks for oil and gas development as well as for residential and commercial areas from existing or producing oil and gas facilities.

6.3 OPTIONS TO MINIMIZE IMPACTS FROM CBM DEVELOPMENT

This section presents options or measures that could be implemented to generally minimize potential impacts from CBM development on multiple resource issues (land use conflicts, intrusion of visual and noise effects, and health and safety risks). The options, along with the advantages and disadvantages of each, are summarized in **Table 6-6,** which also serves as a guide and overview for the following subsections.

There are multiple solutions or options for minimizing the impacts of CBM development. In some instances, the options mitigate the impact of all issues addressed in this document, and in other instances, the options are specific to one issue or resource.

Table 6-5 Local Government – Regulations Related to Oil and Gas

	Colorado Counties								Wyoming Counties		NM County	KS County
Category	***La Plata***	***Adams***	***Arapahoe***	***Archuleta***	***Boulder***	***Garfield***	***Mesa***	***Weld***	***Campbell***	***Sheridan***	***San Juan***	***Johnson***
Countywide Zoning	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No (Only Planning Districts and all new subdivisions)	Yes	No	Yes
Countywide Land Use Regulations	No	Yes Land Development Regulations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Comprehensive Plan (future land use)	Yes	Yes	Yes	Yes Community Plan	Yes	Yes	Yes Master Plan	Yes	Yes	Yes	No	Yes
Subdivision Regulations	Limited Standards for Lot Design	Yes	Yes	No Standards and Plans (not referred to as regulations)	Yes	Yes (April 23, 1984 amendments through 2001)	No	Yes	Yes	Yes	Yes	Yes
Conditional or Special Use Permit Process	Only for the Animas Valley Area	Yes Conditional Use (formerly permitted), designated as a "C" on the zone map	Yes Use by Special Review	Yes	Yes Use Permitted by Special Review	Yes	Yes	Yes Use by Special Review Special Review Permit for Major Utilities or Government	No	Yes	No	Yes
Site Development Plan Reviews	Yes Limited to Class II land uses	No	No	Yes	Yes Specific for oil and gas operations	No	Yes	Yes	No	No	Only related to the Subdivision Regulations	Yes Included in the CUP process
Mineral/ Geologic Hazard Overlay Zone	No	No	Yes Subpart D (B) Mineral Resource	Yes Geologic Hazards Radiation	Yes Geologic Hazard (Comprehensi	No Proposed Regulations for Geologic	No Other: Open Land Overlay	Yes Geologic Hazard Overlay	No	No Policy to regulate development	No	No Airport Overlay

Table 6-5 Local Government – Regulations Related to Oil and Gas

	Colorado Counties								Wyoming Counties		NM County	KS County
Category	***La Plata***	***Adams***	***Arapahoe***	***Archuleta***	***Boulder***	***Garfield***	***Mesa***	***Weld***	***Campbell***	***Sheridan***	***San Juan***	***Johnson***
			Areas (Regulations for Areas of Special Interest) Geologic Hazard Areas Other: Flood Hazard Zones Actual Overlays: Airport Influence Area Voided/De-annexed Regulations	Hazards Wildfire Hazards Mineral Resource Areas Flood Hazard	ve Plan) Map Other: Floodplain Overlay District View Protection Overlay District Natural Resource Overlay District	Hazard Areas	District Floodway District	District Other: Airport, Flood Hazard and PUD Overlay Districts		in natural hazard areas (Comp Plan)		Floodplain Zone
O&G Regulations w/Performance Standards	Yes	Yes	No	Yes Oil and Gas Development Permit and Submittal Requirements	Yes Development Plan Review Standards and Criteria for Approval – Operation plan required	No	No	No	No	No	No	Yes
O&G Identified Setbacks	Yes 400 feet required between site perimeter of minor facility and closest existing residential structure 200 feet for site perimeter	No (Not compatible if within 1000 feet of a dwelling)	No	Yes A minimum setback of 400 feet shall be required between the site perimeter of a major/minor facility and the closest existing or planned residential or	Yes Minimum of 350 feet from occupied buildings; minimum of 150 ft from any public ROW	No	No	Yes (Setbacks related to development and agriculture from existing oil/gas facilities and vice versa)	No	No	No	Yes Oil wells are not to be drilled within 200 feet of existing residence and other habitable structures are not to be built within 200 feet of any producing oil well. Drilling

Table 6-5 Local Government – Regulations Related to Oil and Gas

	Colorado Counties								Wyoming Counties		NM County	KS County
Category	***La Plata***	***Adams***	***Arapahoe***	***Archuleta***	***Boulder***	***Garfield***	***Mesa***	***Weld***	***Campbell***	***Sheridan***	***San Juan***	***Johnson***
	of minor facility and closest platted subdivision's lot line Major facility setbacks are determined on a site-specific basis.			commercial structure								location should be no closer than 165 ft from any point on tract line or public street ROW. Oil well shall not be within 300 feet of public institution.
Source	La Plata County Land Use Code	Adams County Zoning Ordinance	Arapahoe County Land Development Code Book, Zoning Regulations	Archuleta County Land Use Regulations	Boulder County Land Use Code, Article 4 December 20, 1999	Garfield County Zoning Resolution (1978), amendments through December 9, 1997	Mesa County Land Development Code	Weld County Comprehensive Plan, Zoning Ordinance, Charter and Code	Campbell County Zoning Resolutions	Sheridan County Zoning Resolution	Linda Thompson, Personal Communication May 15, 2002, County Project Development Administrator	Johnson County Zoning and Subdivision Regulations

Notes:
CUP = Conditional use permit
O&G = Oil and Gas
PUD = Public utilities district
ROW = Right of way

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
6.3.1 Identify Oil and Gas Development Areas					
Impact/Conflict To Be Mitigated: Uninformed property owners, resulting in conflicts with existing and future land uses on both properties with wells and nearby properties.					
6.3.1.1	Require Full Disclosure of Mineral Estate Upon Transfer of Land	Require Full Disclosure of Mineral Estate Upon Transfer of Land.	County	The new property owner would have full knowledge on ownership of the mineral estate and the opportunity to make an informed decision regarding pending or future mineral development before the land is acquired. This process would ensure that property owners understand ownership of the mineral estate.	The surface owner would incur a significant cost (probably on the order of $3,000.00 to $6,000.00 for smaller tracts of land) to obtain a title opinion from an attorney or a title company. The mineral ownership of the land would need to be examined beginning with a patent to the land, unless a title opinion had already been rendered for the property in question. It might take considerable time to obtain the necessary title opinion.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
6.3.1.2	Identify Lands Subject to Existing Oil and Gas Leases	Identify Lands Subject to Existing Oil and Gas Leases.	County, Colorado Department of State Lands, and BLM	The surface owners could use the information to determine if an existing oil and gas lease covers the property they are considering purchasing or that they already own. The potential buyer could use the data to determine if existing oil and gas wells or facilities are located on the property.	Significant start-up costs would be associated with gathering the data and preparing ownership maps. Certain fixed costs would be associated with administering and maintaining the data on ownership and wells.
6.3.1.3	La Plata County CBM Land Development Map	Prepare a "La Plata county CBM/Land Development Map."	County, COGCC, and BLM/FS	The availability of accurate information would support the process of developing informed consent among diverse interests. Land use conflicts likely would be reduced through use of this information by CBM operators and real estate developers.	May increase expenditures by county to implement.
6.3.2 Early/Streamlined County Involvement Changes					
Impact/Conflict To Be Mitigated: Uninformed property owners, resulting in conflicts with existing and future land uses on both properties with wells and nearby properties.					
6.3.2.1	Involve County at Pre-APD Stage	Add county involvement at the "Pre-APD" stage of the process for non-federal wells to provide for early involvement of the county and all potentially affected surface ownership interests. An NOS would be submitted to the county.	County or COGCC	Likely that land use conflicts would be reduced.	May increase permitting time and costs to industry and expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
6.3.2.2	Streamline County Regulatory Process	Streamline La Plata County's oil and gas/CBM regulatory process by providing several standard options for site plans.	County	May abbreviate permitting time. May decrease costs to industry to implement standard site plans.	May increase expenditures by county to implement.
6.3.2.3	Prioritize County Issues	Prioritize CBM development issues addressed by the county in its regulatory process.	County	Allows county to focus on timeliness of responses to issues of greatest significance to county, and issues that were not addressed by any other authority.	May increase expenditures by county to implement.
6.3.2.4	County Screening for On-site Inspections	Use a screening procedure to evaluate the need for county planning staff to attend site visits or on-site inspections for proposed CBM facilities.	County	May reduce permitting time. May decrease county staffing needs and expenditures.	May increase expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
6.3.3 Land Development Controls					
Impact/Conflict To Be Mitigated: Uninformed property owners, resulting in conflicts with existing and future land uses on both properties with wells and nearby properties.					
6.3.3.1	Future Land Use	Develop future land use categories with specific goals, objectives, and policies through the Comprehensive Plan.	County	Likely that land use conflicts would be reduced.	Increased expenditures by county to implement.
6.3.3.2	Zoning	Establish zoning districts for major land use categories with specific performance standards for developments within each zone. Zone districts to include High Density Residential and Subdivisions, and Agricultural Preservation Areas.	County	Likely that land use conflicts would be reduced.	Restricts rights of landowner and mineral owners. May increase permitting time and costs to industry and developers. Increased expenditures by county to implement. May decrease some property values. May increase cost of residences.
6.3.3.3	CBM or Oil and Gas Development Overlay Districts	Establish Overlay Zoning District for CBM windows and define specific performance standards and setbacks for development within this zone.	County	Likely that land use conflicts would be reduced.	Restricts rights of landowner and mineral owners. May increase permitting time and costs to industry. Increased expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
6.3.4 Other General Options					
Impact/Conflict To Be Mitigated: Uninformed property owners, resulting in conflicts with existing and future land uses on both properties with wells and nearby properties.					
6.3.4.1	County CBM Report	Require a "CBM Report" prepared by a qualified professional for all proposed oil and gas or land development projects.	County	Likely that land use conflicts would be reduced.	May increase permitting time and costs to industry and expenditures by county to implement.
6.3.4.2	Develop Pipeline Corridors	Develop pipeline corridors along section and quarter-section lines.	County	Likely that land use conflicts would be reduced.	If the developer must convey additional land to the county for right-of-way corridors, it would increase the purchase prices of properties. The county would incur administrative costs and would no longer receive property taxes on the land conveyed.
6.3.4.3	Surface Use Program	Require a Surface Use Program (SUP) for CBM wells.	County or COGCC	Improved process design would be likely based on cooperative effort to identify Best Management Practices, and would minimize land use conflicts.	May increase permitting time and costs to industry and expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
6.3.4.4	MOU/MOA	Develop Memorandum of Understanding or a Memorandum of Agreement (MOU/MOA) between La Plata County, COGCC, and the Colorado Geological Survey (CGS). The MOU/MOA would document the county's needs and provide a foundation for sound working relationships.	COGCC, CGS, and County	Improve working relationships among state agencies and La Plata County. Additional expertise from state agencies may become available to La Plata County. May decrease expenditure by county to address technical issues.	May increase costs to industry and expenditures by state and county to implement.
6.3.4.5	Public Information	Use educational brochures, videos, web pages and seminars to share regulatory and CBM issue related information.	COGCC and County	Educate the public about CBM issues so that land use conflicts could lessen	May increase costs to La Plata county to implement.
6.3.5 Options for Affected Resources					
Impact/Conflict to Be Mitigated: Conflicts with existing and future land uses on both properties with wells and nearby properties. Direct loss of some acres of agricultural lands. Introduction of weeds.					

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
6.3.5.1	Land Use	Require building inspection approval of locations, type and appearance of equipment.	County oil and gas permit process	Likely that land use conflicts and visual and noise impacts reduced.	Additional costs to industry and may delay permitting process. May increase expenditures by county to implement.
		Require operators to provide county with annual drilling plans and to post public notices on properties.	COGCC enforcement of existing requirements	Early notification of potentially affected interests with accurate information. Likely that land use conflicts would be reduced.	Additional costs to industry.
		Increase required setbacks to between 1,000 feet and 1/4 mile from existing or platted subdivisions.	County	Likely that land use conflicts would be reduced.	May decrease some property values. May increase cost of residences.
		Define enforceable and specific subdivision design standards and performance standards.	County	Likely that land use conflicts would be reduced.	Restricts rights of landowner and may increase cost of residences.
6.3.5.1	Land Use	Define zoning districts in land use code, including high-density residential areas, methane seepage hazard areas, and oil and gas development overlay districts.	County	Likely that land use conflicts and health and safety risks would be reduced.	May decrease some property values. Restricts rights of landowner. May increase cost of residences. May decrease some property values. May increase cost of residences.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
		Change encouraged standards into required performance standards.	County	Likely that land use conflicts would be reduced.	Restricts rights of landowner May increase cost of residences.
		Require land use permit with site plan review for all development, including single-family residential.	County	Likely that land use conflicts would be reduced.	Restricts rights of landowner and may increase cost of residences.
		Make performance-based standards more detailed and specific.	County	Likely that land use conflicts would be reduced.	Restricts rights of landowner and may increase cost of residences.
		Require notification of owners of residences within 1,000 feet of well locations.	County oil and gas permit	Early notification of potentially affected interests with accurate information.	Additional costs to industry.
6.3.5.1	Land Use	Expand flood hazard overlay district to include riparian protection and visual corridor areas within overlay district and show on plat maps.	County	Likely that land use conflicts would be reduced	May decrease some property values. May increase cost of residences.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
		Provide mechanisms for participation of nearby landowners in facilities siting through permitting or on-site inspection processes before the APD is approved.	County	All surface interests could participate in the well siting process.	May delay and permit process. May increase expenditures by county to implement.
		Require minimum setback for new residences from existing oil and gas facilities and require setbacks to be shown on plat maps.	County	Likely that land use conflicts and risks to health and safety would be minimized.	Restricts rights of landowner and may increase cost of residences.
		Require well windows for existing leases to be shown on plat maps, provide disclosure at time of property sale, or provide as CBM development overlay district.	County	Notifies property owners of potential oil and gas facility sites.	May decrease some property values. May increase cost of residences. May increase expenditures by county to implement.
		Define methane seepage or geologic hazard overlay district 2 miles from outcrop and do not allow residential development in this area.	County	Notifies property owners of potential oil and gas facility sites.	May decrease some property values. Restricts rights of landowner. May increase cost of residences. May increase expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
6.3.5.1	Land Use	Require setbacks for development from gas flowline easements.	County	Likely that land use conflicts and health and safety risks would be reduced.	Restricts rights of landowner and may increase cost of residences. May increase expenditures by county to implement.
Impact/Conflict to Be Mitigated: Reduced proportion of property tax revenues from oil and gas at conclusion of production for CBM wells.					
6.3.5.2	Socioeconomics	Increase land use permit application fees for oil and gas facilities.	County	Provides additional revenues to the county.	Additional costs to industry. May increase expenditures by county to implement.
		Require bond for successful establishment of vegetation.	County oil and gas permit	Provides financial compensation to the county in the event reclamation is inadequate.	Additional costs to industry. A bond for the same purpose may already be held by another regulatory authority.
		Increase mill levy for property taxes.	County	Provides additional revenues to the county.	Additional costs to all industries and constituents of the county.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
		Provide tax incentives to encourage new industry for diversification of economy.	County	Long-term increase in revenues and jobs from new employment sectors	Slight, short-term decrease in revenues available to county.
		Increase fees (annual, per trip, or both) for overweight and oversize vehicles (drilling rigs) using county roads.	County vehicle permit	Provides additional revenues to the county.	Additional costs to industry.
Impact/Conflict to Be Mitigated: Reduced property values due to well proximity effects					
6.3.5.2	Property Values	Disclosure of potential CBM development at time of property transfers.	County	Likely that land use conflicts with increased well density would be reduced.	May decrease some property values.
		Provide tax relief for properties devalued by proximity to a well.	County	Provides tax relief for owners of private property affected by CBM wells.	Slight, short-term decrease in revenues available to county.
Impact/Conflict to Be Mitigated: Increased vehicular traffic, and associated air quality impacts, additional wear and tear on roads, increased road maintenance costs, increased risk of traffic accidents.					

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
6.3.5.3	Traffic and Transportation	Increase fees (annual and/or per trip fees) for overweight and oversize vehicles (drilling rigs) using county roads.	County vehicle permit	Provides additional revenues to the county.	Additional costs to industry.
		Require permit fee (fine) if vehicles uses roads without permit.	County vehicle permit	Provides additional revenues to the county.	Additional costs to industry. May increase expenditures by county to implement.
		Require proof of liability insurance coverage to guarantee payment for damages to roads and bridges.	County oil and gas permit	Provides financial compensation to the county in the event of damage to road or bridge.	Additional costs to industry.
		Require permits for all new access roads using design specifications and performance standards, including criteria for road alignment, dust control (gravel, watering), weed control, traffic control, revegetation, landscaping, and buffering, depending on distance from closest residence, recreational use area, or other sensitive receptors.	County oil and gas permit	Limit air quality, visual, and noise impacts from CBM-related vehicles.	Additional regulations and costs for industry. May increase expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
		Require operators to construct improvements directly related to operations, such as paving gravel roads, improving intersections, improving sight distances, posting hazard warning signs, and installing traffic control devices.	County	Long-term decrease in county expenditures as a result of the decreased road maintenance costs related to CBM development. Reduced risks of traffic accidents.	Additional regulations and costs for industry.
6.3.5.3	Traffic and Transportation	Agreements for preventative and corrective road and bridge maintenance of county roads used by CBM vehicles.	County	Long-term decrease in county expenditures related to CBM development as a result of decreased road maintenance costs.	Additional regulations and costs for industry.
		Require permit for road use for all CBM-related vehicles.	County	Increased county revenues.	May increase expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
		More intensively enforce speed limits.	County	Increased county revenues.	May increase expenditures by county to implement.
		Provide specific performance standards for traffic control, signage, and other traffic-related impacts associated with oil and gas facilities.	County	Lessened traffic impacts and reduced potential for traffic accidents.	Additional regulations and costs for industry. May increase expenditures by county to implement.
Impact/Conflict to Be Mitigated: Visual intrusion during construction and operation of CBM facilities.					
6.3.5.4	Visual Resources	Provide specifications and performance standards for well siting, type and appearance of facilities, landscaping and buffering, weed control, signage, and other standards to minimize the visual impacts of oil and gas facilities, depending on distance from residences and viewpoints.	County	Likely that land use conflicts would be reduced.	Additional regulations for industry. May increase expenditures by county to implement.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
		Define and implement well siting performance standards.	County	Likely that land use conflicts would be reduced.	Additional regulations and costs for industry. May increase expenditures by county to implement.
		Define and implement performance standards for appearance of operational facilities and landscaping.	County	Likely that land use conflicts would be reduced.	Additional regulations and costs for industry. May increase expenditures by county to implement.
		Use a combination of well siting and performance standards for appearance of operational facilities and landscaping.	County	Likely that land use conflicts would be reduced.	Additional regulations and costs for industry. May increase expenditures by county to implement.
Impact/Conflict to Be Mitigated: Noise from drilling and earth moving operations, compressors, pump units, and vehicular traffic noise.					

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
6.3.5.5	Noise	Provide specifications and performance standards for type of equipment, when building enclosures are required for compressors, conditions that require mufflers, landscaping, sound obstacles, and buffering, and other standards for minimizing the noise impacts of oil and gas facilities.	County	Likely that noise impacts would be reduced.	Additional regulations for industry. May increase expenditures by county to implement.
		Define minimum setbacks (distance) for new development from existing oil and gas facilities.	County oil and gas permit	Likely that risks to health and safety would be reduced.	May increase cost of residences.
		Increase minimum setbacks (distance) for new wells from existing residences.	County oil and gas permit or new COGCC rule	Likely that risks to health and safety would be reduced.	Additional costs to industry.
Impacts/Conflicts to Be Mitigated: Methane or hydrogen sulfide gas seeps, water well contamination, or drawdown, or risks of fire and explosion. Increased number of incidents requiring emergency response and fire fighting services.					
6.3.5.6	Health and Safety	Require proof of liability insurance coverage.	County and COGCC	Provides additional revenues to the county.	Additional costs to industry.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts					
CIR Section	**Resource/Topic Impacts**	**Options**	**Implementing Method/Agency**	**Advantages**	**Disadvantages**
		Require dust control, traffic control, and spill and drainage control plans.	County oil and gas permit, CDPHE, and BLM or FS (where applicable)	Likely that risks to health and safety would be reduced.	Additional costs to industry.
		Increase the setbacks required from property lines to minimize risks related to releases of flammable gases from wells.	County or new COGCC rule	Likely that risks to health and safety would be reduced.	Additional costs to industry.
		Charge response fees for EMS, Fire Fighting, and Hazmat for oil and gas incidents	County	Increased revenues for EMS and fires fighting services.	Additional costs to industry.
		Hire professional, staffed employees in addition to volunteers	County	Reduced response times.	Additional county expenditures.
		Require annual updates to electronic Emergency Preparedness Plan.	County oil and gas permit	Reduced response times.	Additional costs to industry.

Table 6-6 La Plata County Impact Report Options for Minimizing CBM Development Conflicts or Impacts

CIR Section	Resource/Topic Impacts	Options	Implementing Method/Agency	Advantages	Disadvantages
		Require geo-referenced (GIS) data for roads, wells, pipelines as part of annual updates to Emergency Preparedness Plan.	County oil and gas permit	Reduced response times. Minimized risks to health and safety for accidental excavations into gas lines.	Additional costs to industry.

Notes:
APD = Application for permit to drill
BLM = Bureau of Land Management
CBM= Coalbed methane
CDPHE = Colorado Department of Public Health and Environment
CGS = Colorado Geological Survey
COGCC = Colorado Oil and Gas Conservation Commission
EMS = Emergency medical service
FS = U.S. Forest Service
GIS = Geographic information system
MOA = Memorandum of agreement
MOU = Memorandum of understanding
NOS = Notice of staking
SUP = Surface use program

6.3.1 Identify Oil and Gas Development Areas

The following options could be used to identify the areas of the county where there is potential for oil and gas development and, therefore, provide knowledge and information to property owners before specific oil and gas development are proposed.

6.3.1.1 Require Full Disclosure of Mineral Estate Upon Transfer of Land

Recent legislation (Colorado Revised Statutes 10-11-123) enacted April 30, 2001, requires that the mineral estate owners must be notified as part of the application for development of surface uses for properties with severed surface and mineral ownership. In a similar manner, before of any real property located in La Plata County is sold, the state could require the seller to make a full disclosure as to the mineral ownership of the land to the prospective buyer.

The county could implement this option by requiring that a disclosure statement be signed by each potential purchaser a fixed number of days (such as 3 to 5 days) before the sale (closing) of land. The disclosure statement would identify the mineral owner of the property and would be signed by the potential purchaser and either attached as an exhibit to the deed, deed of trust, or other instrument that conveys title to the land, or be recorded separately. Under this concept, the disclosure statement would be recorded (if the potential buyer elects to purchase the land) in La Plata County to show actual notice.

Another option would require information on mineral ownership as part of the application process for land use permits for surface activities. This option could be implemented by requesting that the state legislature enact a bill that requires disclosure of information on mineral ownership during the surface use permitting process of the county government.

Under this option, the new property owner would be provided with the best available knowledge on ownership and existing leases of the mineral estate. Thus, the buyer would be afforded the opportunity to make an informed decision regarding pending or future mineral development before the land is acquired. This process would provide accurate information on ownership at the time of the property sale, helping to ensure that surface property owners understand ownership of the mineral estate.

Under this option, the surface owner would incur a significant cost (possibly up to $3,000 to $6,000 for smaller tracts of land) to obtain a title opinion from an attorney or a title company. The mineral ownership of the land would be examined, beginning with the patent to the land, unless a title opinion had all ready been rendered for the property.

Implementation of this option would also be time-consuming because of the title search required. It might take considerable time to obtain the necessary title opinion. The title opinion may need to be updated with each subsequent sale or transfer of the land.

6.3.1.2 Identify Lands Subject to Existing Oil and Gas Leases

The county could require that oil and gas companies or any entity that owns some fixed number of oil and gas leases (such as two to 10 leases) on lands in the county file information that would include the legal description of each oil and gas lease.

The county could then use these data to create and maintain lease interest maps that show the location of all existing oil and gas leases. The maps could be updated monthly or quarterly. The lease interest maps would show: (1) whether the mineral interest had been severed from the surface estate (split estate), and

(2) if there is an existing oil and gas lease for the land. The maps could also show whether there are any existing oil and gas wells or facilities located on the property.

Under this option, this information could be used to determine if there is an existing oil and gas lease covering the property considered for purchase or already owned. In addition, a purchaser or owner could examine the potential for oil and gas development on nearby lands as well. Furthermore, the potential buyer could use the data to determine if any existing oil and gas wells or facilities are located on or near the property.

Disadvantages of this option would be significant start-up costs associated with gathering the GIS or other mapping data and preparing lease interest maps and annual costs associated with administering and maintaining the data on leases and wells.

This option could be implemented by requesting that the COGCC permit process include a requirement for submittal of GIS data coverage for well windows and mineral leases as part of the state permit process, and requesting that this information be forwarded to the county.

6.3.1.3 La Plata County CBM Land Development Map

Under this option, the county would prepare a *La Plata County CBM Land Development Map* that would contain accurate information on both CBM and land development. This map would provide CBM siting information so that residents, real estate developers, and CBM operators could be aware of the existing land use and the potential for CBM or land development proposals. Under this option, the land development proposals, the Fruitland outcrop, roads, seep areas, areas of groundwater contamination, water wells, existing CBM wells, and CBM well spacing patterns (open windows where drilling could occur) would be plotted on a map in a GIS format. This readily available map would be updated frequently. Implementation of this option could involve cooperation and funding under a Memorandum of Understanding with other regulatory agencies, CBM operators, and real estate developers. A county representative would identify components and specifications of the map and the adequacy and sources of the data that meet the county's needs.

6.3.2 Early/Streamlined County Involvement Changes

Two options were considered for changing the county's involvement at the on-site inspection stage. One would involve the county earlier in the process, at the pre-APD stage, and the other would provide a screening procedure for the county to evaluate whether an on-site inspection is appropriate.

6.3.2.1 Involve County at Pre-APD Stage

The county is currently invited to participate in the on-site inspection as part of the well siting process after the APD has been submitted to COGCC. Under the existing system, the county regulatory process must be completed before the local government designee can decide how to comment on the Form 2 (State of Colorado APD). Once the operator has obtained an approved APD from COGCC, a well is cleared for construction and drilling. COGCC can withhold approval of an APD, when appropriate, based on information from the county on significant adverse impacts to public health, safety, and welfare (COGCC Rule 303k). Under the current system the county has the burden of identifying and supplying COGCC with information that a proposed well raises significant concerns about potential adverse impacts to public health, safety, and welfare. This information is confirmed through an onsite inspection.

In an effor to be proactive, rather than reactive, it would be beneficial to the county to partificpate at an earlier stage of the process. This option would involve the county at the "pre-APD" stage. This option would provide for early involvement of the county and all potentially affected surface ownership interests in La Plata County. This option could be implemented either by the county or under COGCC rulemaking using the NOS process as described in the following subsection. A county proposal, including a detailed description of the NOS process envisioned for CBM wells in La Plata County and supporting rationale, could be prepared and presented to COGCC in an informal coordination meeting. The county could request at the meeting that COGCC accept the proposal as the state agency's proposed rulemaking, thereby limiting the county's need to implement the rulemaking process or enforcement. If COGCC is unable to implement the county NOS process as a new rule, the county could add an NOS process to its regulations for oil and gas facilities, as discussed in the following subsection.

New County Requirement for NOS for CBM wells

An NOS process could be required for CBM wells under county regulations for oil and gas facilities. Under this option, an NOS could be provided to the county at least 60 days before the state APD is submitted. If requested by the county, the operator, COGCC, county representative, and surface ownership interests could conduct an informal on-site inspection within 30 days after the NOS is received the county. The operator would be responsible for notifying all participants in the on-site inspection. The paperwork burden for the NOS could be minimal (a 7.5-inch quadrangle with hand-drawn, approximate locations for wells and access routes); therefore, it would not impose an undue burden on industry or county staff.

COGCC Rulemaking Requiring NOS in La Plata County for CBM wells

Under this option, COGCC could modify its current rules to require that an NOS be submitted to COGCC and the local government at least 60 days before the state APD is submitted. An on-site inspection could be held for each proposed well in La Plata County within 30 days after the NOS is received, and before the state APD is submitted. COGCC could invite the operator, surface owner, local government, and potentially affected surface interests, such as adjoining landowners, to the onsite inspection. As above, the paperwork burden for the NOS would be minimal (a 7.5-inch quadrangle with hand-drawn, approximate locations for wells and access routes).

6.3.2.2 Streamline County Regulatory Process

If the county's challenge of COGCC Rule 303a is unsuccessful, a well would be cleared for construction and drilling after the operator has obtained an approved APD from COGCC. An option to facilitate county involvement in the well siting process would streamline the schedule for La Plata County's oil and gas facility permitting process. Under this option, the county could complete its review of a proposal and identify required mitigation measures within the typical approval timeframe of a COGCC APD. County involvement earlier in the APD approval process (Section 6.3.2.1) also would facilitate completion of the county's regulatory process in a timely manner. La Plata County's ability to adhere to its regulatory process for minor or major CBM facilities and implement mitigation would be limited by the following factors: (1) ability to work within COGCC's APD approval timeframe; and (2) budget and access to highly skilled professionals capable of addressing technical issues such as groundwater contamination or methane seepage. The county would still be able to request that approval of the APD be withheld when potential adverse impacts related to public health, safety, or welfare are involved. As part of this process, the county could request a COGCC rulemaking that addresses many aspects of the county's existing issues. The county could then defer mitigation of these issues to the COGCC. Implementation of this option would require revisions to existing regulations for the oil and gas facilities to streamline the schedule for the process; the county's review would de-emphasize issues that would be addressed by

COGCC or other regulatory authorities. To streamline the county process, typical plans and performance standards could be prepared for many of the components of a facility, such as roads, safety fences, cattle guards, landscape screens, noise barriers, and other features. The county could pre-approve these typical plans.

6.3.2.3 Prioritize County Issues

The CBM development issues addressed by the county in its regulatory process could be prioritized so that critical concerns are addressed early enough for timely submission to COGCC under Rule 303k. A possible list of priorities could include:

- **A-1** Mitigation of risks of wildfire associated with the interface of wild land, residential areas, and gas production. This issue would include defensible space, emergency preparedness of crews working in an area, and safety and risk reduction.
- **A-2** Mitigation of methane contamination (residences and water wells).
- **A-3** Siting, fencing, and signage for public safety.
- **A-4** Maximum setbacks from various types of existing improvements.
- **B-1** Noise reduction (for sensitive receptors and in general).
- **B-2** Minimize visual or experience intrusion.
- **B-3** Maximize the quality of the reclamation effort through sound project design (control disturbance and minimize slopes, for example).
- **B-4** Control traffic to minimize effects on residential areas (control trips, minimize road construction, or establish separate CBM roads in an area to retain the residential experience and keep industrial vehicles off key residential roads).

6.3.2.4 County Screening Procedure for On-site Inspections

The county could develop and use a screening procedure to evaluate the need for its staff to attend site visits or on-site inspections for proposed CBM facilities. Possible evaluation criteria for use in evaluating the need for county involvement during the field review are provided in the following list, which identifies potential threshold levels of concern for various site conditions:

- Proposed facility would be located within 0.25 mile (1,320 feet) of an existing residence or live water.
- Proposed facility would be located within 0.25 mile (1,320 feet) of an existing county road.
- Proposed facility would be located within 0.5 mile (2,640 feet) of a proposed or existing subdivision, school, park, designated open space, or other sensitive site.
- Proposed facility would be located within 0.5 mile (2,640 feet) of a property boundary or federal surface ownership lands.

- Proposed facility would be located within 0.5 mile (2,640 feet) of an existing water well, spring, or warm spring.
- Proposed facility would be located within 1.0 mile (5,280 feet) of a known methane seep area.
- Proposed facility would be located within 1.0 mile (5,280 feet) of an active coal or gravel/aggregate mining operation.
- Proposed facility would be located within 3.0 miles of the Fruitland outcrop.
- Proposed facility would be located on federal mineral ownership lands.
- Proposed facility would be located in a densely vegetated (high loading of fuels) area.
- Proposed facility would be located along a ridge top or steep slope.
- Proposed facility is a facility other than a CBM well (disposal well, compressor, or gathering line).

These criteria could also be used to specify appropriate mitigation measures, such as buffering or landscaping, based on the location of the proposed facility. These criteria could be implemented by detailed performance standards in the La Plata County Land Use Code.

6.3.3 Land Development Controls

Land development controls are mechanisms to guide land use planning through goals, policies, and objectives and to regulate land uses. There are many mechanisms for implementing land development (such as future land use designations and zoning and overlay districts).

6.3.3.1 Future Land Use

Land use categories have been established for the Study Area through the county transportation plan. Although this effort was important for transportation planning, it does not help guide future land use planning. Therefore, an option would be to develop future land use categories with specific goals, objectives, and policies in a comprehensive plan. The land use categories and future land use map would be developed and include a category to define CBM development areas and methane seepage or geologic hazards.

This overlay district could also prohibit certain development as a more detailed hazard overlay. This option could include a defined buffer zone of about 1.5 miles to 2 miles from the outcrop; the geologic hazard overlay zone could be defined as an area where residential development would be prohibited or considered only on a site-by-site basis.

This option could be implemented by development of a comprehensive plan that would include designated future land use districts.

6.3.3.2 Zoning

La Plata County has not currently defined a countywide zoning code or zoning districts on a countywide basis. One option would expand the zoning to include the entire county. Under zoning regulations,

specific performance standards could be applied for oil and gas development within each zoning district. This option could include define zoning or overlay districts for CBM development, methane seepage, or geologic hazard areas; designating agricultural protection areas; and revising the floodplain zone to include riparian and visual corridor protection areas, wildlife protection areas. It also could include preferred high-density residential development areas, and sensitive areas where residential development should be limited, such as areas where well windows or leases are located. In addition, zoning could help define areas in the county where high-density residential or subdivisions could be planned or zoned. More detailed requirements for siting and mitigation of facilities could be specified for the High-Density Residential Zoning District than for other zoning districts (such as agriculture). More detailed subdivision guidelines could also be developed to present these requirements and mitigations up-front to developers.

This option could be implemented by development of a performance-based zoning code with designated zoning and overlay districts.

6.3.3.3 CBM or Oil and Gas Overlay Districts

In addition to defining zoning districts on a countywide basis, overlay districts for CBM development could be developed. Under this option, the county would define a CBM Overlay District to address siting and setback issues that are too complex or controversial to be addressed in the state APD approval timeframe. The overlay district could be defined in several ways, such as by drilling windows or by existing CBM facilities. In addition, methane seepage hazard areas could be defined in a similar manner. Overlay districts could be implemented using a performance-based zoning code.

CBM Overlay District for Windows

The overlay district could apply to drilling windows or to all areas with existing CBM facilities. Field and office review of drilling windows could be used to establish the CBM Overlay District for each window. This review would be similar to a federal on-site inspection, except that no proposal for drilling would be evaluated.

One option would apply smaller setbacks within CBM drilling windows or the overlay district and larger setbacks outside CBM drilling windows or overlay district. The areal extent of CBM drilling windows could be refined or reduced during this review by verifying that surface occupancy within each drilling window is feasible, is environmentally responsible, and adequately considers potential effects on public health, safety, and welfare. Factors that would be reviewed include: access routes; setbacks from existing structure or improvements; site conditions, including topography and landforms, drainage, soils, and slope stability; potential for reclamation; visual impacts; noise impacts; existing impacts, such as groundwater contamination or methane seeps; conflicts associated with land uses or resource values, such as proposed subdivisions, parks and open space, recreation use, or wildlife and fisheries; or other requirements of zoning or code.

Overlay District for All Existing CBM Facilities

An overlay district could also be defined for all existing CBM facilities, including wells, access roads, gathering lines, the Fruitland outcrop, seep areas, areas of groundwater contamination, and existing and proposed residential subdivisions. This information could be required to be submitted as part of the oil and gas permit performance standards.

6.3.4 Other General Options

Other general options to minimize impacts for multiple resources are discussed in the following subsections.

6.3.4.1 County CBM Report

The county could require a CBM Report prepared by a qualified third-party professional for all proposed projects (CBM facilities or land development proposals) in La Plata County. Under this option, the county would require CBM operators and real estate developers to provide accurate information regarding on the activities planned in La Plata County. A CBM Report could be required as part of the submittal for an application for an oil and gas facility permit. The CBM Report would focus on specific information regarding the project, projected impacts from development of CBM or land, and projected changes to the county's mapped information on proposals for CBM and land development. A sample outline format, list of requirements, and instructions for report preparation could be prepared. This option could be implemented by requiring the CBM Report as part of permitting for oil and gas facilities.

6.3.4.2 Develop Pipeline Corridors

This option would apply in areas that are being developed for either residential or commercial use. The county could require, where possible, that the developer convey sufficient land along major access routes (section and quarter-section boundaries) to the county when a project is located within a CBM Overlay District. County-owned land corridors could be designated as easements for oil and gas gathering and transportation pipelines, as well as for other utilities.

This option could minimize the land use impacts of oil and gas development. However, if the developer must convey additional land to the county for ROW corridors, the price of the remaining portion of the property may be increased proportionately. Implementation of this option may increase the costs of property.

6.3.4.3 Surface Use Program

Another option involves development of a Surface Use Program similar to the one required for all federal wells under Federal Onshore Oil and Gas Order No. 1. A Surface Use Program would be required for all CBM wells on lands with non-federal surface ownership in La Plata County. This option could be implemented by either the county or COGCC under a new rulemaking.

New County Requirement for a Surface Use Program for CBM Wells

A county Surface Use Program could be required for CBM wells under the county regulations for oil and gas facilities. Under this option, the CBM operator would be required to submit a Surface Use Program to the county within 14 days after the NOS on-site inspection. The Surface Use Program would contain all of the components addressed in a federal Surface Use Program, and would rely heavily on the existing federal "Gold Book – Third Edition" standards. A listing of mitigation measures that applicant would agree to carry out also would be included in the Surface Use Program. This option could be implemented as performance standards for oil and gas facilities under the county permitting process.

COGCC Rulemaking Requiring a Surface Use Program in La Plata County for CBM Wells

Under this option, a Surface Use Program would be submitted to COGCC and the local government within 14 days after the NOS on-site inspection. The format of the Surface Use Program would be identical to the program proposed for the county (see above).

A county proposal, including a detailed description of the Surface Use Program envisioned for CBM wells in La Plata County and supporting rationale, could be prepared and presented to COGCC in an informal coordination meeting. The county could request at the meeting that COGCC accept the proposal as the state agency's proposed rulemaking, thereby limiting the county's need to implement the rulemaking process or enforcement. If COGCC accepts the county proposal, it would limit the county's need to implement the rulemaking process or enforcement.

6.3.4.4 Memorandum of Understanding or a Memorandum of Agreement

Under this option, a Memorandum of Understanding or a Memorandum of Agreement (MOU/MOA) among La Plata County, COGCC, and the Colorado Geological Survey (CGS) could be developed. This agreement would document the county's needs and provide a sound foundation for the working relationship between La Plata County and COGCC. The following points could be addressed in the MOU: (1) early consultation with the county on proposed CBM drilling and other facilities; (2) availability of COGCC and CGS staff to provide technical assistance to the county on methane seepage and groundwater contamination; and (3) sharing results of COGCC operator surveys under Order Nos. 112-156 and 112-157 regarding proposed CBM drilling in the San Juan Basin.

Under this option, La Plata County would prepare a draft a cooperative agreement and submit the proposed agreement to COGCC and CGS for implementation.

6.3.4.5 Public Information

Educational information might be used to help La Plata County constituents review and understand the complex issues and statutes of authority associated with CBM development. This information might include a flow chart of the rules and regulations for CBM development for each governmental agency (La Plata County, COGCC, EPA, BLM, Forest Service, etc.). CBM related monitoring and mitigation to date would also be shared. Information would be curtailed to La Plata County issues and applicable regulations, in addition to COGCC related public information. This information would include local resources and contacts for additional information. Dissemination of information would be through informational brochures, videos, web pages, hotlines or informational seminars given to schools and local community groups. The County and the COGCC have some existing brochures that may be helpful.

6.3.5 Options for Affected Resources

The general options described in Section 6.2 would mitigate many of the potential impacts from anticipated development of CBM. Additional options available for minimizing impacts for specific resource areas are described in this section.

6.3.5.1 Land Use

This section provides options for mitigating the key impacts to land use associated with the anticipated development of CBM. These impacts include direct loss of agricultural land displaced by the CBM

facilities, convergence of residential and CBM development over the life of the project, land use conflicts, and impacts to property values caused by proximity of wells.

Objectives defined by the county for mitigation related to land use impacts included the following:

- Develop quantitative measures for mitigating land use conflicts and impacts to property values,
- Provide full disclosure of information on all relevant topics,
- Provide information on precedents on ways to ease surface impacts through policy and code changes,
- Define legal and practical ways for surface interests to influence the APD facility siting process, and
- Define options to mitigate impacts of well drilling and production on agricultural activities.

The county land use process is the mechanism to control patterns of development through the Comprehensive Plan, Development District Plans, and La Plata County Land Use Code. The land use code is to be updated over the next year, presenting an opportunity to identify changes to mitigate and coordinate development of oil and gas with residential development in the CIR Study Area, It is anticipated that a large percentage of the growth in the county will occur in the CIR Study Area for the following reasons:

- Land Ownership: Only 41 percent of the land in the county (696.5) square miles) is privately owned. Almost half (47 percent or 324.2 square miles) of this land is located in the San Juan Basin. Therefore, almost half of all private acreage available for development in the county is located in the Fruitland gas field.

- Water: The Colorado Division of Water Resources has designated some areas of the county as water critical, borderline, and non-water critical. These designations indicate whether an area is overappropriated, is nearing overappropriation, or whether water rights are available for use. Land designated as overappropriated may not be available for subdivision because well permits could not be obtained for residential use without an augmentation agreement. This limitation has significantly reduced the pressure for development on the western side of the county because its status is water critical. Some 306.6 square miles of private land are classified as non-water critical in the county. About 85 percent (259.5 square miles) of this land is located in the gas field. Therefore, more lots have been created in the San Juan Basin than in other areas of the county that are designated water critical.

  A study is also under way to evaluate the feasibility of a rural water system that would extend from the airport to Durango and would encompass a large part of the U.S. Highway 160 corridor. This water system could facilitate an increase in the residential density of the area. Suburban to urban levels of density may develop for this region if the Grandview area is annexed by the City of Durango.

- Road Infrastructure: Major transportation corridors in the San Juan Basin portion of La Plata County make travel quick and efficient from the rural areas of the county to the incorporated areas of Durango, Bayfield, and Ignacio. Proximity to employment and commercial hubs and the infrastructure available make the area desirable for residential development.

These factors indicate that residential development will continue to increase in the San Juan Basin portion of La Plata County. Current and future development of CBM also will occur in this area. The Fruitland coal formation is one of the most productive CBM fields in the United States. COGCC has approved an additional well for most of the drilling windows in the county, enabling development of numerous wells over the next 5 to 10 years. Residential and CBM development of numerous wells over the next 5 to 10 years.

The general options discussed previously would minimize most of the land use conflicts and impacts from development of CBM. Of the options previously discussed, the key options for minimizing land use conflicts and impacts from development of CBM include the following:

- The county could prepare a comprehensive plan that defines designate future land use categories, including CBM development areas.

- The county could develop performance-based zoning by revising the La Plata County Land Use Code, with defined zoning districts and specific performance standards.

- The county could define overlay districts for CBM development areas, methane seepage areas, and geologic hazard areas (or any combination) where residential development could be limited, setbacks increased, or both. For example, the county could identify potential hazardous areas where additional scientific study or special building techniques would be required. These areas would include the Fruitland coal outcrop and areas of know methane seeps, coal fires, and existing wells with thermogenic methane. These areas could be shown on the existing planning district maps; studies required prior to issuing building permits could include measurements of soil gas, groundwater testing, and reports on soil types and properties. Required mitigation could include separation equipment for the well water and foundation designs that help vent gases from under the residence. In some circumstances, development could be restricted or moved to another portion of the lot. Data on water wells could be obtained from BLM and COGCC.

- More detailed performance standards could be developed and implemented for oil and gas development permits to include mitigation measures to minimize visual and noise impacts to adjacent properties. For example, additional mitigation measures and procedures could be included in the gas well permitting process, as suggested in the CIR sections on visual, traffic, and noise impacts.

- The county or state could require a Surface Use Program for private lands similar to the requirements for CBM wells on federal lands. This option would give surface owners more power in influencing facility siting. Additionally, the county could attempt to become more proactive in the well locating process. Under the current system, county staff often face opposition in attempting to change a proposed well location after the surface owner and operator have agreed on a site. These conflicts can delay the permitting process and expand considerable staff resources. Options to facilitate county involvement in the selection of well locations could include:

    - Requiring an NOS so that county staff could evaluate the site before a permit is issued and at the same time that the surface owner and operator are negotiating the surface use agreement.

    - Require an on-site consultation by a county representative along with the operator and surface owner for every well or for wells within setback or buffer areas.

    - Participate aggressively under COGCC rules that require consultation with the local government on selecting well location.

- The county could require independent appraisals to assess effects on property value caused by proximity to CBM wells. These assessments could be used to identify appropriate tax relief or other compensation methods for properties devalued by proximity to CBM wells.

- Establish subdivision guidelines or regulations that address potential development of CBM or existing well windows within the subdivision plat. For example, the following procedures could be applied through the subdivision and platting process:

    - Established COGCC drilling windows could be displayed on the plat map to indicate where a CBM well could be located.

    - A note could be included on the plat map to indicate that lots in the area are affected by an established COGCC drilling window where a CBM well may be drilled.

    - Subdivisions that occupy a significant portion of an un-drilled window could be required to set aside an area where a well will be located.

    - Subdivisions could be required to implement mitigation measures for noise and visual impacts from existing wells or drilling windows.

    - Safety recommendations could be incorporated that are site specific from the lease holder on the location of existing wells or future drilling plans.

    - Safety setbacks could be developed that would be applied to existing or proposed wells. Buffer areas could be established around these areas where homes would be prohibited, and this restriction could be indicated on the plat map.

Implementation of these options may affect sales prices of properties in proximity to well windows, and would require agreement among the developer, operator, surface owner and mineral owner.

- The county could encourage oil and gas processes that decrease multiple surface disturbances. For example, one company operating in the area uses a method of horizontal drilling that exposes more of the bore hole to the coal allowing for an increased amount of methane production.

- The company drills from the existing Fruitland well in the drilling unit and calculates that it can adequately drain the entire 320-acre unit with this method. Such drilling practices would limit the proliferation of wells in the county. This type of practice, as well as other techniques, should be closely tracked by the county and the operators with the intention to possibly apply the practice in other areas, which would ultimately decrease the related land use conflicts.

6.3.5.2 Socioeconomics and Property Values

This section provides options for mitigating the impacts to socioeconomic resources associated with the anticipated development of CBM. The primary socioeconomic impacts identified are a reduced

proportion of property tax revenues from oil and gas when production for the CBM wells ends, and impacts to property values because of proximity of wells.

Data on property sales were used to evaluate the affect of well proximity on property values. The results of this analysis indicated that, in general, the proximity of one or more CBM well to a residential property reduced the selling price. Objectives defined by the county for mitigating socioeconomic impacts included evaluating whether data on sales for properties affected by oil and gas development may be used to adjust property taxes, and how risks to future buyers and developers could be disclosed without reducing property values unnecessarily.

Additional CBM development may affect county revenue, employment, and property values. This topic is very complex because of uncertainty in the price of CBM, production rates, the number of wells drilled, and the taxing rate. The impacts related to CBM production include:

- County Revenue: Production of CBM is a significant source of revenue that enables the county to fund a number of capital projects and administrative programs. Revenues related to CBM development will diminish as production declines in the later years of production. The decline in production may leave the county with significantly less revenue to fund existing programs, so that the county must either generate additional revenue sources or reduce services. The following options could be considered to minimize impacts to county revenues:

    - Provide projections of county expenditures over the next 30 years as compared with projected revenues from CBM based on the average production over the last 15 to 20 years.

    - Identify the increased revenue over the next 30 years from development of CBM.

    - Calculate the amount of revenue needed from other sources to replace declining tax revenues during the later years of CBM development and declining production, and calculate the changes in the mill rate necessary to provide this amount of revenue. Mill levy increases would require voter approval.

    - Identify county expenditures or services that could be reduced to balance the reduction in revenue, such as programs established to monitor CBM-related industry.

    - Set-up a county fund and allocate a portion of the revenues from CBM production taxes to this fund to offset the reduced revenues caused by decreasing production.

- Employment: The CBM-related sector of the economy employs a low percentage of the population. Although the average salary is significantly higher than for the county as a whole, little impact to employment is anticipated from the increase in development or the subsequent decline in production over time. No options to mitigate impacts to employment are suggested for this topic.

- Property Values: Impacts to property values may affect the owner of the property where the well has been drilled. Options that the county could implement to minimize impacts to property values associated with CBM development include:

    - Request that the state legislature require surface use agreements between a surface owner and the operator. The “bond and drill” option should be eliminated because it creates an

inequitable balance in negotiations. Any requirement for a surface use agreement should include a mechanism that would enable an arbiter to make binding decisions on factors such as compensation, location, and landscaping.

- Request that the state legislature require an independent appraisal of a property identified as a drilling location. This appraisal would calculate any possible reduction in value and establish the compensation required.

- Establish a county requirement for surface use agreements that would incorporate some or all of the above suggestions.

Impacts to property values from development of CBM could also be minimized by including performance-based zoning in the Land Use Code to limit residential development near CBM facilities, well windows, or lease areas; by requiring disclosure of mineral ownership and proposed CBM development when a property is transferred; or by reducing tax assessments for properties that are affected by proximity to CBM wells.

6.3.5.3 Traffic and Transportation

This section discusses options for mitigating the impacts to traffic and transportation associated with the anticipated development of CBM. The primary impacts identified for traffic and transportation resources are a minimal increase in daily traffic and the associated and slightly increased risk of accidents during construction and operation of the CBM facilities. Other impacts include wear on county roads and bridges as a result of the additional traffic and heavy equipment during construction of new CBM facilities.

Increased vehicular trips associated with additional development of CBM can affect traffic and transportation in three ways. First, increased traffic associated with the wells can increase the average daily traffic on the road system, creating congestion and an increased potential for traffic accidents. Second, the use of roads and intersections by large trucks can create safety concerns. Third, equivalent single axle loads (ESAL) for vehicles used for new well development could increase the rate of damage to the county road system.

Based on the number of wells to be developed and the amount of associated basic vehicle trips, the impacts from the first two concerns are expected to be minor. The traffic generated by industry is a small percentage of the overall existing and projected traffic in the area. However, traffic related to development of CBM may have impacts on the maintenance costs for the county road system. Based on the ESAL calculations, the heavy trucks associated with well construction can have a significant impact on the road base, particularly on paved county roads. Therefore, the county could consider the following options to mitigate these impacts:

- Require a review of existing access points (such as roads that serve multiple wells and have been in existence for many years) onto county roads when a new well is proposed. This measure could identify and mitigate potentially dangerous access points.

- Require gravel pullout areas before large trucks turn onto a public road providing the opportunity for cleaning the vehicles during wet weather to avoid dragging mud onto the county road system.

- Require a signoff sheet in the minor facility permit process to ensure that access and work in the ROW permits, as well as permits for overweight vehicles and other transportation issues are addressed.

- Establish a road impact fee for development that uses paved roads in the county. The fee should be based on the associated ESAL calculations and the potential impacts from heavy equipment used for construction. This fee should be applied to any project that requires a land use permit from the county.

- The county could allocate a specific portion of the tax revenue generated by production of CBM to be used to maintain the county roads most affected by the gas industry.

- County permits with specifications for road design and maintenance could be required before construction of all new access roads for development of CBM. Currently, permits are required from the county only for flowline crossings of a county road, or for any construction within the right of way for a county road. New permits could require:

    - Maintenance, including the addition of gravel to access roads to avoid rutting.

    - Watering or other approved dust-abatement procedures for heavily used dirt and gravel roads to reduce dust to the maximum extent practicable.

    - Specific limits on size, weight, and load limit, specified as performance standards for CBM facilities, such as restricting vehicle loads to meet maximum allowable loadings posted at each bridge.

    - Signs placed at intersections of well access roads with county roads to warn travelers of heavy truck traffic during construction, drilling, and completion.

    - Operators to notify state and county administrative offices of the roads that will be used by traffic related to CBM development. Traffic and road impact plans could be required as performance standards in the permitting process for facilities.

- A permitting process could be developed for all CBM-related vehicles that use county roads. Currently, only overweight or oversize vehicles must hold permits. Additional permits could create a revenue stream that would address the impacts of trucks on county roads.

- Existing road use permit fees could be increased along with efforts to enforce existing regulations for overweight and oversize vehicles. Additional fees also could be assessed for vehicles that use county roads without permits.

- The CBM operators could participate in any preventative or corrective maintenance of county roads used by CBM-related construction and maintenance vehicles for the anticipated duration of operations. Maintenance would include, but not be limited to, blading, cleaning ditches and drainage facilities, control of noxious weeds, or other requirements as directed by the county.

- Instructions to require company and contractor personnel to obey speed limits could be included in CBM permits.

- The ESAL calculations and information on the current condition and quality of the road base for the paved county roads (Section 5.3) could be used to identify the roads most likely to be affected by increased CBM traffic, and to estimate rates of damage and the life and maintenance schedule for specific roads.

- Additional permits or impact fees could be required for paved county roads that are expected to have major impacts from CBM development. These fees could be based on ESAL information concerning current road conditions and anticipated ESAL loads from heavy equipment and additional traffic related to CBM development (Section 5.3).

Access Roads on Federal and Private Lands

In addition to the measures identified above, additional options for mitigation related to new access roads constructed on federal and private lands include:

- Operators could be held responsible for maintenance of all access roads authorized through a lease or right of way. Construction and maintenance would comply with landowner requirements or agency standards. Maintenance includes, but is not limited to, blading, cleaning ditches and drainage facilities, control of noxious weeds, or other requirements as directed by the landowner or agency.

- Road barriers or signs could be required to discourage public use of access roads to wells.

- Access roads could be reclaimed and revegetated in accordance with agency regulations and landowner agreements.

New fees or permits related to use of county roads for CBM could be implemented through revisions to the county code. Revisions to the code also could include performance standards for use of county roads and bridges; standards and specifications for new CBM-related roads and bridges; and specific size, weight, and load limits for CBM vehicles that use county roads and bridges. Road use and maintenance agreements could also be implemented using performance standards for the use of county roads that would be included in the permitting process for oil and gas facilities.

6.3.5.4 Visual Resources

This section provides options for mitigating the impacts to visual resources associated with the anticipated development of CBM. The primary visual impacts identified are the intrusion of both project-related facilities and activities and of CBM facilities.

The county has defined as an objective opportunities for mitigating visual impacts of well drilling and production.

Based on the impacts described in Section 5.4, the visual mitigation measures recommended in this section focus primarily on cumulative impact from the increased frequency of and increased sensitivity to oil and gas facilities (impacts by land use and by distance zone).

As the facilities increase in frequency from “common” to “very common,” mitigation measures can be designed to decrease the cumulative impact of the increased occurrence. The facilities rated “very common” in terms of occurrence include the wellhead, separator, meter house, access roads, and well pad.

Mitigation for specific land uses and distance zones are recommended based on the impacts from the increased sensitivity to oil and gas facilities. In all land uses, the immediate foreground and foreground will require specific mitigation measures. Based on the topography and contrast of vegetation, agricultural land uses will be most prominent, with increased sensitivity in the middleground and background. The

number of receptors in residential areas is also a determining factor in the recommendations for visual mitigation.

La Plata County has established extensive performance standards for mitigation of visual impacts related to oil and gas facilities (Section 6.1.1.3). The agreement between the operator and surface owner determines the location of an oil and gas well on the property, provided the location lies within the drilling window allowed by the state. However, the county requires a visual mitigation plan when a location is selected that is closer than 400 feet from the property line. The county visual mitigation plan balances economic development with protection of the environment and natural resources.

Approaches to Visual Mitigation

There are two approaches to visual mitigation. First, the site can be strategically located so that the visual impacts are minimized to the receptors and the likelihood is reduced that the site will attract attention. Examples of this type of visual mitigation include locating facilities at the base of slopes instead of on ridges and designing roads to follow the contours of the land. The design of the facility, adjacent land uses, and visual observation points will control the level of sensitivity and the number of viewers affected. Careful site selection during the siting process can ultimately decrease the level of buffering and landscaping that will be required, so that the site is less likely to attract attention from a casual observer (decreases sensitivity). Using topography and natural vegetation can decrease the costs of visual mitigation for the operator. More importantly, this approach represents the best mitigation possible because it involves less alteration to the natural landscape.

Secondly, construction and operation at a location can be visually mitigated using specific post-construction and operation measures that decrease the number of viewers and the likelihood that the site will attract attention. This approach can be used in addition to siting mitigation, or can be used when siting mitigation is not feasible. Examples of this type of mitigation include painting facilities, landscaping, feathering or rounding the edges of the surface, and using low-profile equipment. For example, low-profile equipment such as horizontal meters and separators, progressive cavity pumps, and squat tanks could be used instead of landscaping. These mitigation measures could be implemented using performance standards that require landscaping unless the operator adopts alternative equipment or uses electricity to power the site.

Both types of mitigation are further discussed in this section and are illustrated using visual simulations shown in **Figure 6-1**. These mitigation measures for siting and construction are designed to decrease the frequency of occurrence and limit overall sensitivity levels of the receptors.

Specific visual measures by land use and distance zone are an option by drawing on the characteristics of mitigation and in matching mitigation for the land use - intended to decrease the sensitivity of the receptors or viewers by land use. Typical landscapes correlate to specific land uses. These landscapes can be mitigated so that the character of the landscape is altered to only a small degree and the impact to the receptor is decreased.

Well Siting

In addition to the existing county siting mitigation requirements (see Section 6.1.1.3), the following are additional options for minimizing the visual impacts from CBM development:

- Use existing vegetation and topographic features to screen wells, facilities, and roads;
- Position pumping units to be in line with sensitive receptors (such as a nearby house);

- Position pumping units that are visible to sensitive receptors from roads perpendicular to the road so that pumping units are in line with viewpoints of travelers;

- Avoid straight line-of-sight road construction and design roads through wooded areas to follow a curvilinear path. All road designs would consider the requirements of the anticipated vehicles including travel way, width, grade, curve radius, sight distance, and design speed;

- Where feasible, maximize setbacks to move CBM facilities beyond the foreground viewing distance (0.25 mile or 1,320 feet); and

- For visual mitigation plans that do not involve oil and gas (such as Subdivision Plans), request "line of sight" identification to the window or existing well closest to the proposed development to disclose the anticipated visual impact to the receptors at the land use. The applicant will be required to use visual buffering techniques on the area of development in the event the impact is in the immediate foreground or foreground.

A series of simulations is provided in **Figure 6-1** to illustrate these site-specific visual siting mitigation measures. These photographic simulations are based on existing wells in or near the CIR Study Area to illustrate mitigation using topography and vegetation. The applicable siting mitigation that are simulated include:

- Using topography to hide the facility,

- Positing pumping units (parallel to road), and

- Using contours in road design.

Post-Construction/Operation

In addition to the county post-construction and operation mitigation (**Table 6-1**), the following are additional or an expansion on county post-construction and operation mitigation measures:

- Use non-reflective material on chain link fences that would be highlighted by sunshine glare from a distance;

- Require vigorous self-sustaining vegetation (that does not burn off after grazing) as a reclamation measure that must be established in less than 3 years;

- Minimize the heights of the pumping unit where possible, using vegetative and topographic screening when siting well locations, designing well pad and facilities with scalloped edges in wooded areas, avoiding high wall cuts, and shielding lights from the drilling rig; and

- When feasible (based on geology), request that the operator use the cavitation method, instead of conventional completion to avoid use of a pump jack. This measure is most effective near high-density residential land uses where utilities to run the compressor that would provide power are available. Workover rigs may be required more often, but the visual impact is small because of the short time a workover rig is present. For example, performance standards for oil and gas facilities could require landscaping unless the operator uses alternative pieces of equipment or electricity to power the site.

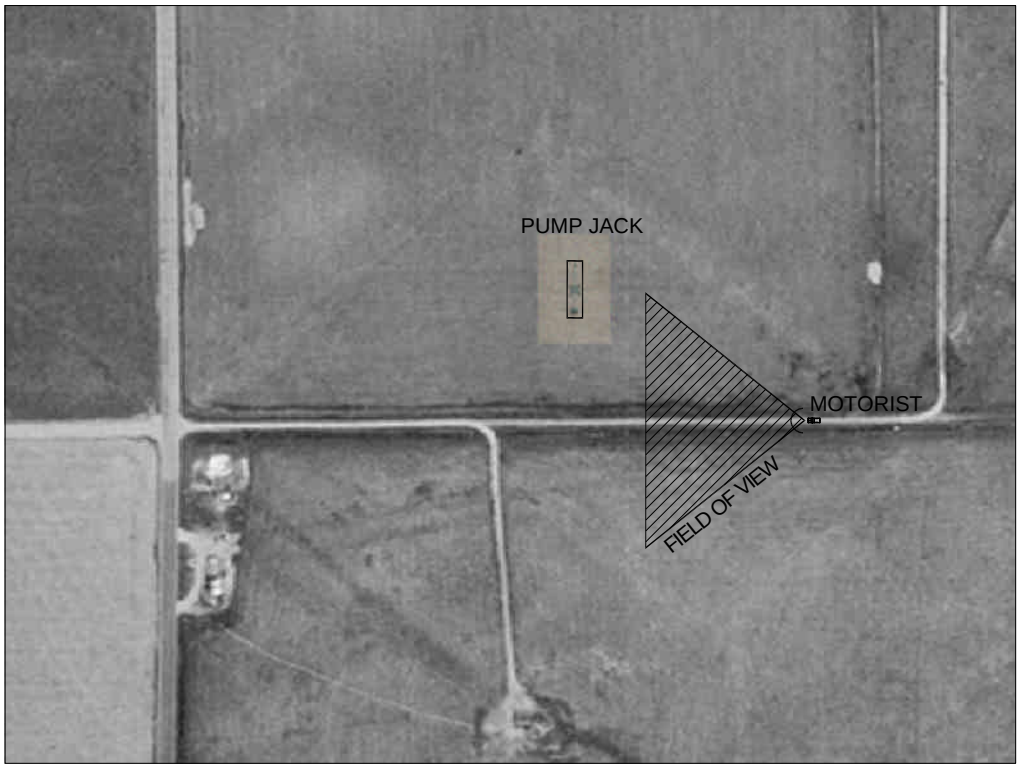
SIMULATED WELL PAD ON RIDGE

SIMULATED WELL PAD BLENDING WITH TOPOGRAPHY

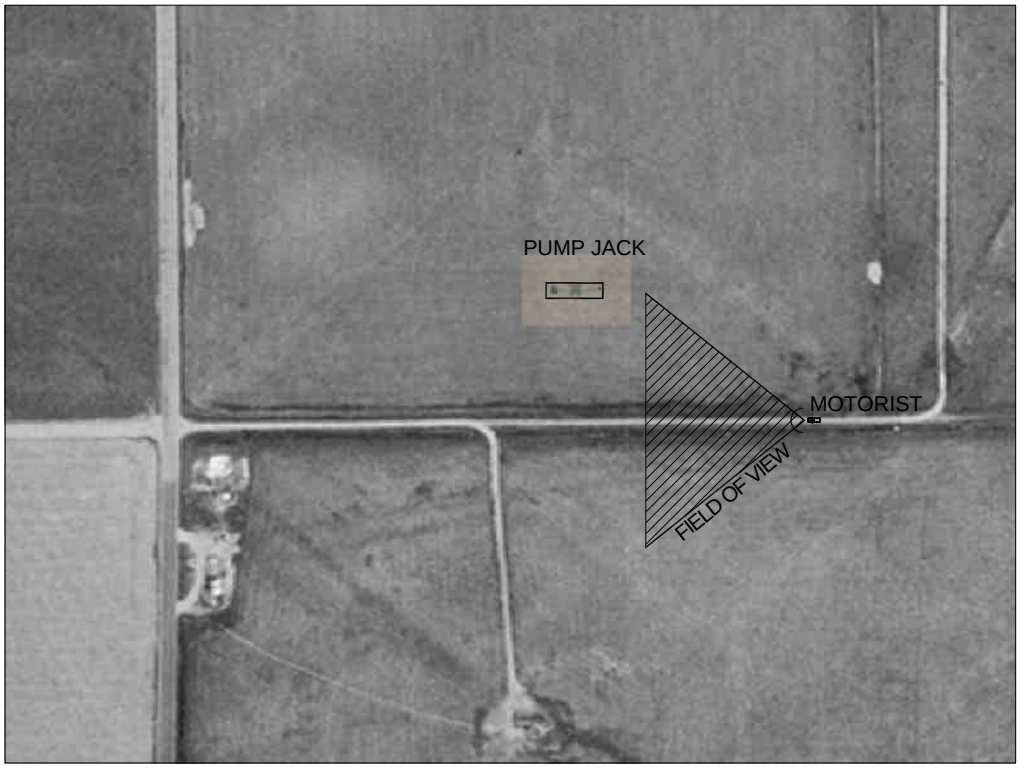
MINIMIZE TOPOGRAPHY FOR WELL PAD SITING

Topography can be used so that visual sensitivity to facilities and surface disturbance can be minimized. When wells are located so that they are "tucked" into the topography, visual impacts are often lessened. When facilities and surface disturbance occur on a ridge, it will often create a skylining effect, which is more likely to draw the viewer's attention. Such siting of the facilities and surface disturbances are often best mitigated by locating wells off hillsides and ridges, in relatively flat topography, when possible, and using breaks in vegetation as preferable siting opportunities.

LA PLATA COUNTY IMPACT REPORT	
FIGURE 6-1 ***SITING MITIGATION MEASURES***	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 05/15/02	AUTOCAD FILE: 1023 SIMS.dwg
SCALE: NTS	PREPARED BY: MTM



PERPENDICULAR: INCREASED VISUAL IMPACT TO MOTORIST

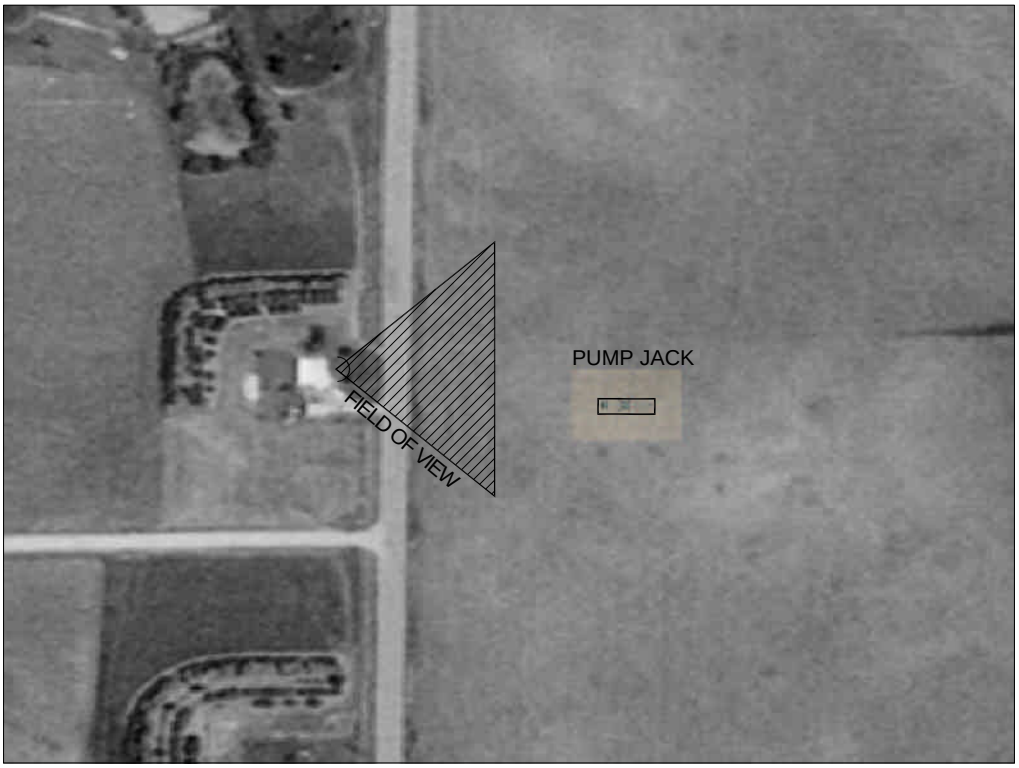


PARALLEL: MINIMIZE VISUAL IMPACT TO MOTORIST

STRATEGICALLY PLACE PUMPING UNITS

When possible, the positioning of the pumping units can decrease the visual sensitivity of permanent (resident) or temporary (motorist) receptors. By positioning the pumping units parallel to residents and roads, the visual sensitivity may be decreased. For instance, if a pumping unit is placed perpendicular to the road, the components may appear larger and will be more likely to attract attention. When these components are parallel to a road, they will appear smaller and will not likely attract as much attention as they would if perpendicular to the road.

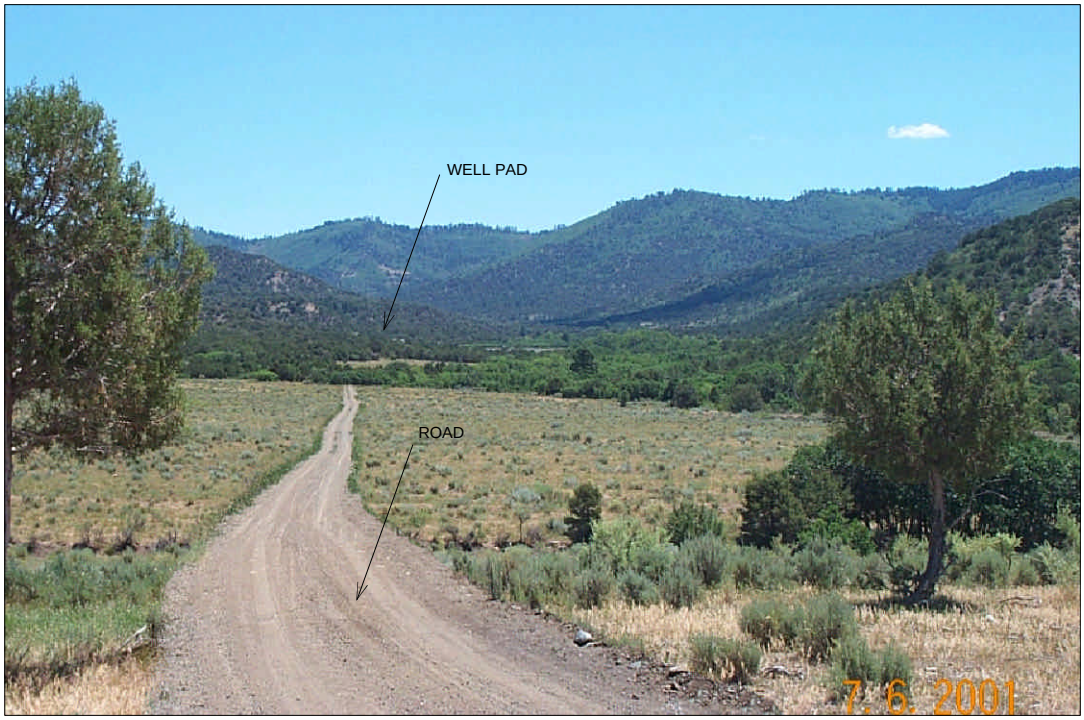
PERPENDICULAR: INCREASED VISUAL IMPACT TO RESIDENCE



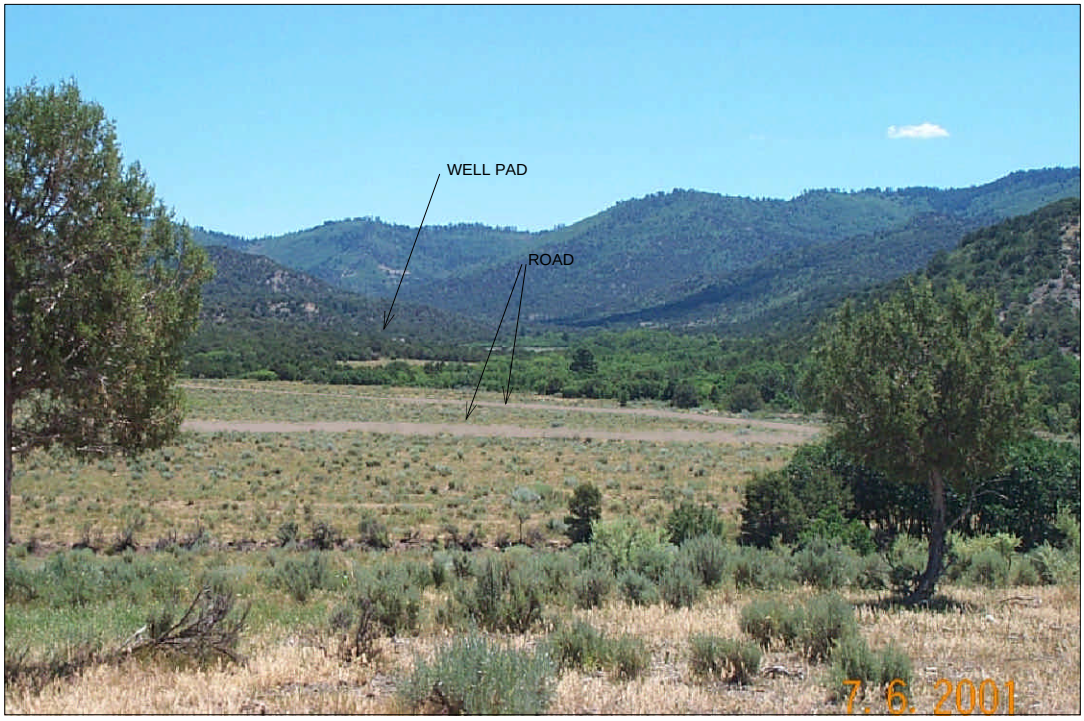
PARALLEL: MINIMIZE VISUAL IMPACT TO RESIDENCE

STRATEGICALLY PLACE PUMPING UNITS

When possible, the positioning of the pumping units can decrease the visual sensitivity of permanent (resident) or temporary (motorist) receptors. By positioning the pumping units parallel to residents and roads, the visual sensitivity may be decreased. For instance, if a pumping unit is placed perpendicular to the road, the components may appear larger and will be more likely to attract attention. When these components are parallel to a road, they will appear smaller and will not likely attract as much attention as they would if perpendicular to the road.



STRAIGHT LINE AFFECT FROM ROAD



ROAD FOLLOWS TOPOGRAPHY

MINIMIZE TOPOGRAPHY FOR ROAD SITING

Often the linear effect of a road is most likely to draw attention to the viewer, because of the "straight lining" effect that emphasizes the contrast of color and texture between the road surface and the surrounding vegetation. Aligning roads with the topographical contours where the road is designed to take a curvilinear path can mitigate visual sensitivity of roads. This technique is particularly useful in steeper, wooded terrain because the road impacts do not attract the viewer's attention.

A series of visual simulations is provided in **Figure 6-2** to illustrate these site-specific visual siting mitigation measures**.** These photographic simulations are based on existing wells in or near the CIR Study Area to illustrate mitigation using topography and vegetation. The applicable post-construction and operation visual mitigation that are simulated include:

- Facilities painted in earth-tone colors, and
- Vegetative screening.

Option of Combined Siting and Post-Construction/Operation Mitigation by Land Use and Distance Zone

Siting, post-construction, and operation mitigation measures can by combined on different levels, depending on the site-specific issues. Generally, the most extensive mitigation should occur in the immediate and foreground distance zones in all land uses. Based on the changing topography and screening mechanisms, such as vegetation, middleground views in residential zones require the least amount of mitigation. Background distance zones require less mitigation; however, if the background distance zone is viewed by many receptors (such as High-Density Residential), it will likely require more mitigation.

Implementation and Monitoring of Visual Mitigation

Options used to resolve visual impacts on various land uses can be recommended. Still, without tools for implementation, they are ineffective in managing oil and gas facilities. Therefore, the review process for oil and gas activities could include a checklist with a quantitative ranking system for visual impacts and mitigation measures to implement these mitigation measures. A buffering setback could be established based on the visual analysis of prominent features of a well site located a specific distance from a receptor. A visual impact analysis to be performed by a county representative could be required for wells located in this buffering setback (which could extent the review time) to evaluate the facility and to determine appropriate buffering requirements. These requirements could be constructed as a checklist or matrix that would add or subtract points based on the proposed facilities and location. Landscaping, as outlined in Section 82-165 of the La Plata County Land Use Code, could be required for facilities that received a negative score. The landscaping requirements could be waived if, for example, the operator agreed to use low-profile pumps (such as submersible or gas actuated), horizontal separators and meters, squat tanks (if some water storage is necessary), and electricity to run any motors on the site.

In light of the varied visual sensitivity of the public, historically it has been challenging to objectively evaluate the mitigation measured needed for development of CBM. In an attempt to inject some objectivity into this assessment, a sample checklist has been created as a preliminary method for identifying mitigation needs and tracking visual mitigation, and is provided in **Table 6-7.** This checklist is intended to track planned (proposed at a site) and actual (implemented in the field) mitigation. The planning department could use the checklist to score and assess the extent of mitigation proposed and the mitigation that already exists at the site.

The review process for oil and gas facilities could include this same checklist with a quantitative ranking system for visual impacts and mitigation measures. These measures could be incorporated into performance standards for specific zoning or overlay districts and in the permitting process for CBM facilities.

WELL FACILITIES WITH NO VEGETATIVE BUFFERING

WELL FACILITIES WITH SIMULATED VEGETATION PROVIDES A VISUAL BUFFER

USE OF VEGETATION TO SCREEN FACILITIES AND SURFACE DISTURBANCES

When a well is located within a wooded area, the contrast from the break in vegetation will likely attract attention to the viewer. In wooded areas, well locations can be sited among the vegetation so that the amount of vegetation disturbance is reduced when possible. In instances where vegetation cannot be preserved, vegetation should be established as soon as reasonably possible. By planting vegetation similar to the adjacent vegetation, the disturbance will be visually minimized. Trees can be planted as seedlings, or transplanted on berms surrounding the surface location. In all landscapes (wooded, shrub lands, or grasslands), immediate reseeding of unused portions of the pad such as the cut and fill will decrease the visual impact from the exposed surface disturbance.

LA PLATA COUNTY IMPACT REPORT	
FIGURE 6-2 POST CONSTRUCTION / OPERATION MITIGATION MEASURES	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 05/15/02	AUTOCAD FILE: 1023 SIMS.dwg
SCALE: NTS	PREPARED BY: MTM

ACTUAL WELL PAD WITH BERMING AND GROUND COVER

ACTUAL WELL PAD WITH BERMING AND LANDSCAPING

USE OF BERMING AND LANDSCAPING

As shown in both of these examples, berming and landscaping can decrease the visual impacts that result from contrasts in color, line, and texture of newly disturbed surface. Established vegetation, which consists of grasses, forbs, shrubs, and trees, can buffer views from the observer within the immediate foreground and foreground, as well as blend the disturbance with the adjacent topography and vegetation, therefore decreasing the visual impacts from middleground and background zones. The placement of rocks on the berms dissipates the color and texture contrasts from the exposed soils. These rocks also facilitate the reclamation process by creating areas of shade and water where vegetation will likely establish.

PAINTED FACILITIES USING NON-EARTH TONE COLORS

PAINTED FACILITIES USING EARTH TONE COLORS

PAINT FACILITIES

Painting of facilities is a typical "best management practice" generally applied to the majority of wells in the CIR Study Area. By using earth-tone colors, the color contrast is minimized and therefore, the visual sensitivity decreases. In addition to painting the typical facilities, additional visual mitigation would be to paint non-reflective material on fences that would normally be highlighted by sunshine glare from a distance.

SIMULATION OF CUT AND FILL WITHOUT SCALLOPING AND SQUARE CORNERS

SIMULATION OF CUT AND FILL WITH SCALLOPING AND ROUNDED CORNERS

BLEND DISTURBANCE WITH NATURAL ENVIRONMENT

When the disturbance can be created in such a manner that is blends with the natural environment (to the extent possible), it is more likely to decrease the visual sensitivity. Wells should be located away from ridges and steep side slopes, but when they cannot be strategically located, specific "blending" measures can be applied.

Typically the greatest impact from well surface disturbances sited on steep slopes is the large cut and fill. When possible, it is best to reshape these cuts and fills to a 3:1 slope, not only from an environmental standpoint (increased sedimentation), but also from a visual standpoint. By doing so, revegetation is more likely to establish on these slopes, lessening the color contrasts and length of visual impact. Although a 3:1 slope may require more disturbed surface, ultimately it is more likely to be revegetated than a 1:1 slope that may never be able to establish vegetation. By scalloping or rounding square edges of these cuts and fills and adding slash on the top of the cut and bottom of the fill, the "straight line" and contrast impacts will be minimized.

Table 6-7 Sample Visual Mitigation Checklist for CBM-Related Development in La Plata County

Mitigation	Industry Action	Ratings	Proposed Mitigation Score	Actual Mitigation Score	Comment
Separator heights					
	Horizontal	+1			
	Vertical	-1			
Pump jack height					
	Cavitation	+1			
	Pump jack Installed	-1			
Color of Facilities					
	Painted appropriate earth-tone colors	+1			
	Not painted, not maintained, or wrong color	-1			
Roads					
	Designed to follow road contours or use existing roads	+1			
	Straight line, poor location of road	-1			
Placement of Facility					
	Use topography and landscaping	+1			
	Poor use of topography and landscaping	-1			
Status of Reclamation					
	Self sustaining, vigorous	+1	NA		
	Majority is weedy or bare ground	-1	NA		
Total					

Score:

3-6 points – Visual mitigation efforts are acceptable. Additional visual mitigation not likely necessary.

0-2 points – Visual mitigation efforts are partially acceptable. Additional visual mitigation likely necessary.

Less than 0 points – Visual mitigations efforts are unacceptable. Additional visual mitigation necessary.

6.3.5.5 Noise

This section describes options for mitigating the noise impacts associated with the anticipated development of CBM. The primary noise impacts identified are from drilling and earth- moving operations, compressors, pump units, and vehicular traffic.

Two noise-related objectives defined by the county are to define appropriate standards, based on specific characteristics of pumping and compression, and to define the ancillary facilities (such as compressors) associated with CBM development, and the impacts of additional compressors.

Four options could be used to minimize the impacts of noise from CBM sources and could be implemented by land use regulations such as setbacks and performance standards for oil and gas facilities.

- Increase the distance between a CBM facility and an existing receptor that is sensitive to noise. Noise decreases by 6 dBA each time the distance from a source doubles. For instance, if the noise were 55 dBA at 100 feet from a CBM source, the noise would decrease to 49 dBA at 200 feet from the source and to 43 dBA at 400 feet from the source.
- Compressor engines could be enclosed in buildings. Closed buildings generally afford about 20-dBA attenuation in noise. The compressor engines would be enclosed in buildings for security and protection from the climate in any case. It would, however, be impractical to enclose pump jacks in buildings.
- Noise mufflers could be installed on the exhaust of compressor engines to reduce noise.
- Placing obstacles in the direct path from the source to a receiver can also reduce noise. Obstacles can be tightly spaced wood fences (with no gaps in the wood panels located on the peripery of the facility so that a fire hazard is not created), concrete fences, earth berms, structures, or naturally occurring hills. Care must be taken with a tightly spaced wood fence, however: even a small opening between the slats on a fence can allow a pathway for noise. In fact, the noise can be enhanced through a small opening because the energy is channeled. Wood fences are generally constructed with two faces, with the slats on one face overlapping the adjacent face, to mitigate this problem.

The attenuation of noise by barriers is a complex process controlled by the location of the barrier between the source and the receptor, the height of the berm, and the resultant difference between the length of the direct sound path (no obstruction) from the source to the receptor and the sound path over the barrier (FHWA 1978). The attenuation afforded by a barrier is calculated using the following equation:

$$\text{Attenuation} = 20 * \text{LOG}([2 * \Pi * N])^{1/2})/(\tanh [2 * \Pi * N]^{1/2})) + 5$$

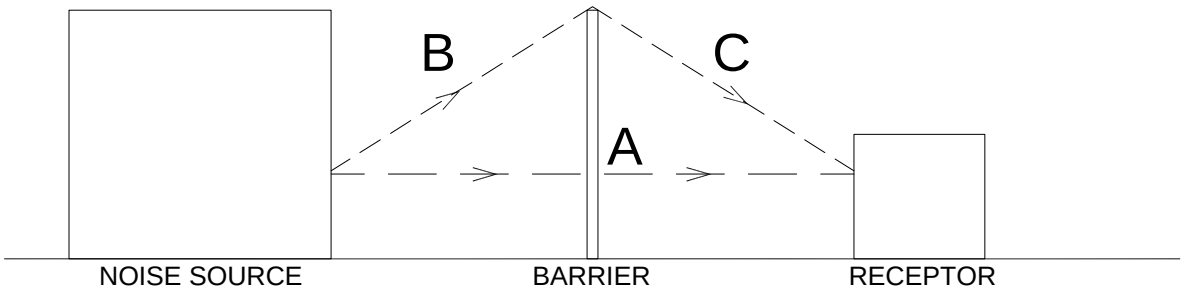
where:

N (Fresnal Number) = (2 * f * del)/average speed of sound (1,120 ft/sec) = .89286 * del
f (frequency) = Conservative low A-weighted frequency = 500 Hz
del = Distance sound wave travels over the barrier compared with the line-of-sight distance
LOG = The common logarithm base 10
Π = The mathematical constant = 3.14
tanh = The hyperbolic tangent function

The geometry of the source, receptor, and barrier is shown on **Figure 6-3**. **Figure 6-3** also shows an example of a noise barrier that is ineffective because it does not extend high enough to interrupt the line of sight between the source and the receptor.

A noise barrier can achieve a reduction of at least 5 dBA when it is tall enough to break the line of sight between the source and the receptor. An approximate 1.5 dBA reduction can generally be achieved with each 3.5 feet of height after the barrier breaks the line of sight. The barrier should be set on the property line facing the receptor and then extend along the adjacent boundary back toward the source to avoid sound that bends around the end of the barrier (**Figure 6-4**). If the barrier is not located along the boundary of the facility to avoid sound that bends around the edge of the barrier, it should extend four times as far in each direction as the distance from the receiver to the barrier. Therefore, the barrier should extend 1,200 feet in each direction for a total barrier length of 2,400 feet to properly mitigate the noise from a CBM source to a distance 300 feet away. A barrier along the boundary of the CBM property would be approximately 400 feet long. Therefore, a barrier on the boundary of the property would be more cost effective and as effective as a distant barrier to mitigate noise.

For example, if a wall or earthen berm were constructed on the property line in the direction of an existing residence 250 feet from a proposed compressor station with three engines, the unmitigated noise would be approximately 60 dBA, an unacceptable environmental level. A 5-foot barrier would result in a noise level of 55 dBA at the residence. An 8-foot barrier would result in a noise level of 54 dBA. A 10-foot barrier would result in a noise level of 52 dBA. A 12-foot barrier would result in a noise level of 50 dBA.



UNMITIGATED NOISE PATH (A)

MITIGATED NOISE PATH (B+C)

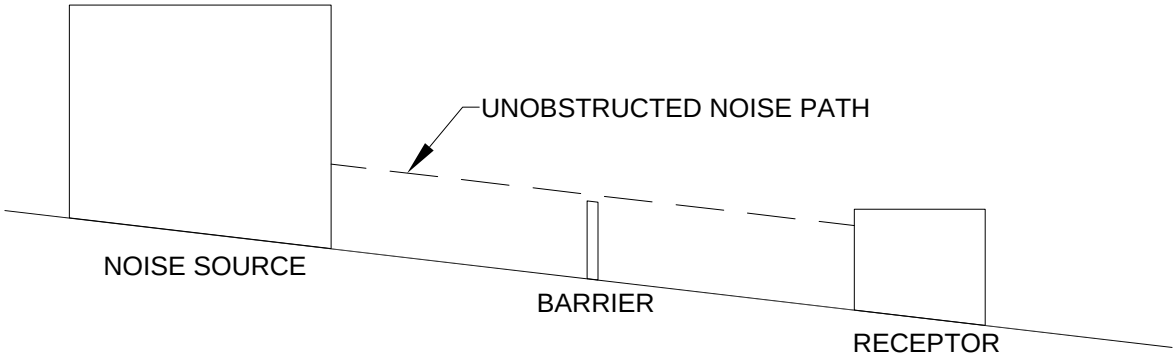
(B+C) > A

DELTA = B + C - A

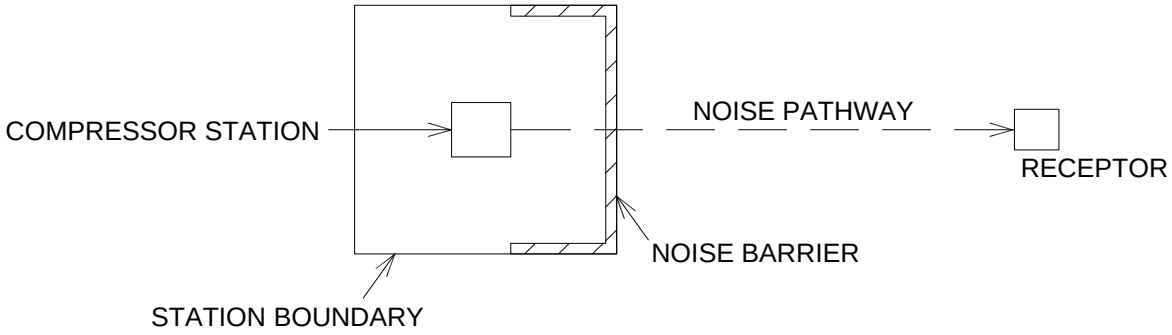
FRESNAL NUMBER (N) = $\frac{2f}{c}$ * DELTA

= .89286 * DELTA

ATTENTUATION = 20 * LOG $\left[\frac{\sqrt{2\pi N}}{\tan h \sqrt{2\pi N}} \right]$ + 5



LA PLATA COUNTY IMPACT REPORT	
FIGURE 6-3 ***NOISE PATHWAYS***	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 04/24/02	AUTOCAD FILE: 1023 SCH.dwg
SCALE: NTS	PREPARED BY: MTM



LA PLATA COUNTY IMPACT REPORT	
FIGURE 6-4 NOISE BARRIER CONFIGURATION	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 04/24/02	AUTOCAD FILE: 1023 SCH.dwg
SCALE: NTS	PREPARED BY: MTM

Figure 6-5 shows a graphical representation of the decrease in noise from 100 to 800 feet using 8-, 10-, and 12-foot barriers.

Table 6-8 is an interactive spreadsheet that can be used to calculate the predicted noise attenuation for any configuration of barrier by copying a row of data to a new row and entering the following data:

- Column A: distance (feet) from source to receptor of noise
- Column B: effective barrier height (above line of sight between source and receptor)
- Column C: distance (feet) from noise source to barrier.

An example calculation is included for the example shown above. The assumed noise source is 5 feet above the ground, the ground is level between the source and the receptor, and the receptor is 5 feet above the ground. The height of 5 feet above the ground represents the average human ear and is commonly used in analysis of environmental noise.

The resulting reduction in noise is calculated in Column L; the values in Columns D through K should be ignored. These values are calculated to estimate the total reduction in noise and are included only as verification.

Vegetation is sometimes regarded as an effective barrier to noise. However, studies have indicated that that a dense stand of trees more than 300 feet deep would be needed to afford effective noise mitigation (Bell 1982). Conversely, these studies have indicated that a dense stand of trees with a depth of 50 feet would afford no mitigation for noise. Therefore, planting vegetation between a CBM noise source and a receptor is not recommended as effective mitigation because of the cost and the time required to grow dense stands of trees.

Noise is one of the most intrusive aspect of additional CBM development; however, the legal authority of the county to regulate noise has recently been challenged. If it is concluded that the county has the legal right to impose noise regulations, the following measures could be considered:

- The county could enact a noise regulation that applies to all development in the county. The baseline values of 42 to 45 dBA could be used as a standard, or site-specific readings could be collected to measure the ambient noise of the specific area. In that case, noise from development could be restricted to within the baseline range or nominally higher.
- The county could evaluate noise mitigation measures for land use proposals using the noise reduction worksheet (**Figure 6-8**). For example, noise is reduced by approximately 6 dBA with every doubling of distance, and a barrier can reduce noise at least 5 dBA if it breaks the line-of-sight between a CBM facility and a receptor. In addition, noise can be reduced by 1.5 dBA with each 3 feet of barrier height above the line-of-sight. Locating facilities in areas where electrical hook-up is available can also significantly reduce the noise emitted from a facility.
- The noise reduction worksheet (**Figure 6-8**) could be used to evaluate or determine appropriate mitigation measures for compliance with either the state or local noise ordinances.

Figure 6-5 Noise from 3-Engine Compressor Station (Wall or Berm at Property Boundary)

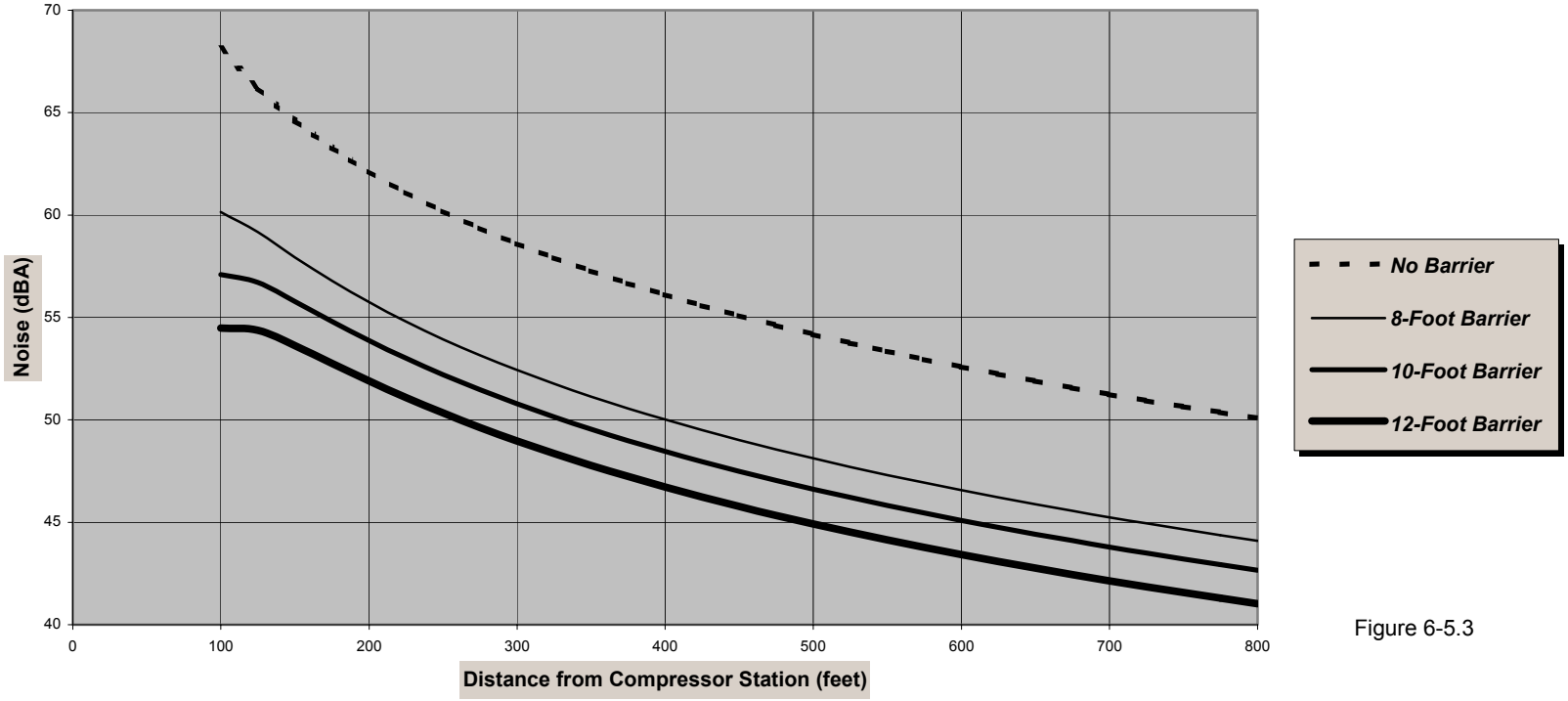


Figure 6-5.3

Table 6-8 Noise Reduction Worksheet

Distance Source to Receptor (feet)	Relative Barrier Height Above Line-of-Sight (feet)	Source to Barrier (feet)	Barrier to Receptor (feet)	Source to Receptor (feet)	Source-Barrier ABC (virt feet)	Barrier-Receiver DE (virt feet)	Delta	Fresnal	Sqrt of Fresnal* 2PL	Tanh of Sqrt Fresnal* 2PL	Noise Decrease (dBA)
250	0.01	75	175	250	75.0000	175.0000	0.0000	0.0000	0.0023	0.0023	5.0
250	3	75	175	250	75.0600	175.0257	0.0857	0.0765	0.6932	0.6000	6.3
250	5	75	175	250	75.1665	175.0714	0.2379	0.2124	1.1550	0.8194	8.0
250	7	75	175	250	75.3260	175.1399	0.4659	0.4160	1.6163	0.9241	9.9

- The county could contract or obtain independent studies and modeling to evaluate the effect of noise mitigation measures at specific locations, primarily for compressor facilities.

6.3.5.6 Health and Safety

This section describes options for mitigating the health and safety impacts associated with the anticipated development of CBM. The primary impacts to public health and safety are the potential increase in risks from releases or seeps of methane or hydrogen sulfide gas, contamination of water wells, risk of fire or explosion, and the potential for an increased number of incidents that require emergency response or fire fighting services.

Two health and safety related objectives defined by the county are to define specific aspects of drilling and production safety that pertain to setbacks and to fire and emergency response, and to suggest changes that would make the current emergency response system more effective.

The general options previously discussed would minimize many of the potential impacts to public health and safety from development of CBM. The key options to minimize impacts to public health and safety from CBM development include the following:

- Use zoning and adequate setbacks to create buffer zones between methane seepage hazard areas, CBM facilities, and residential or other development to minimize risks to public health and safety in the event of accidental releases of combustible gases.

- In considering locations for wells, avoid unventilated deep or narrow areas where combustible gases may accumulate in the event of an accidental release.

- Keep well sites free of flammable materials, vegetation, and debris to limit the risk of wildfires. Monitor soils and vegetation to identify fires while they are small, control coal fires if they occur, clear of trees and brush near any fires, and monitor fires if they occur.

- In permitting oil and gas facilities, require geo-referenced spatial data for as-built locations of well, access road locations, flowlines, and other facilities to minimize incidents associated with accidental excavation of gas lines and to facilitate emergency response, if needed.

- Enforce requirements for operators to submit annual updates for Emergency Preparedness Plans.

- Require dust suppression as needed and traffic control plans to minimize potential risks to health and safety and traffic accidents for access roads.

The options to minimize impacts to public health and safety from development of CBM could be implemented using performance standards for new development in the zoning code or as part of the requirements in the permitting process for oil and gas facilities. The county could develop cooperative agreements with federal and state agencies to facilitate information sharing and to defer regulation and monitoring of health and safety-related issues associated with CBM development to other regulatory agencies.

One area of great concern is the possibility that equipment could strike gas pipelines when a property is excavated, primarily in situations where pipeline locations are not adequately delineated. Options to minimize this potential hazard include:

- Require that all easements be recorded and the dimensions provided on a title report.
- Consider a setback for all development from the edge of the easement for pipelines.
- Require delineation of all utility lines on a development property prior to issuing any building permit.
- Establish a grading permit system requiring notification of the county for all proposed excavation on private property.
- Contact the Utility Notification Center of Colorado and gather all electronic data on utility locations to and incorporate this information into the county GIS database.
- Continue as an ongoing effort to gather data from the operators on the location of facilities, with particular attention to pipeline locations. Consider requiring that the information be in a digital format that is compatible with the county GIS system.

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