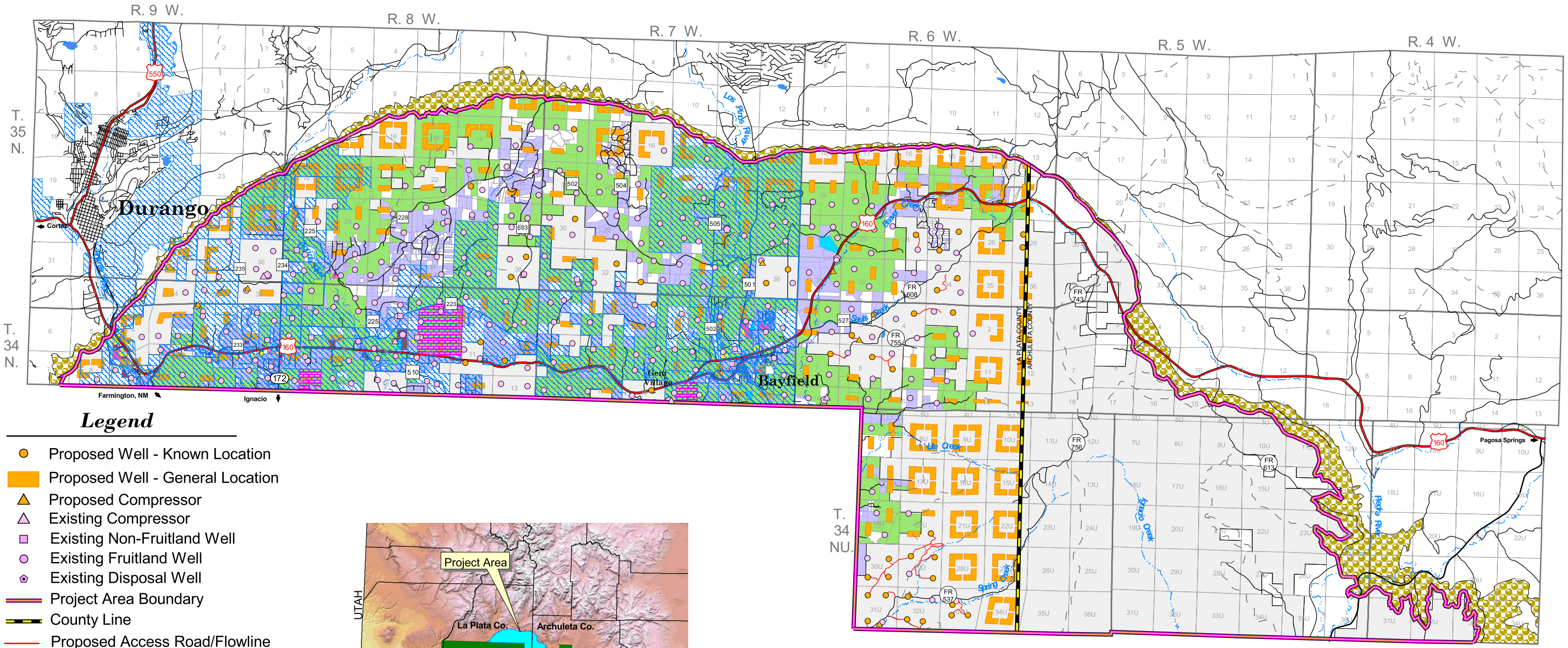
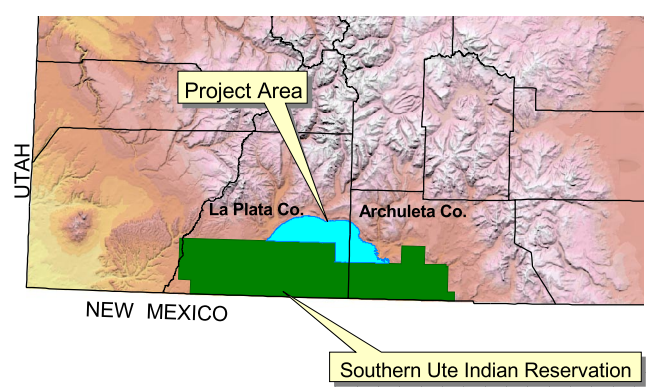


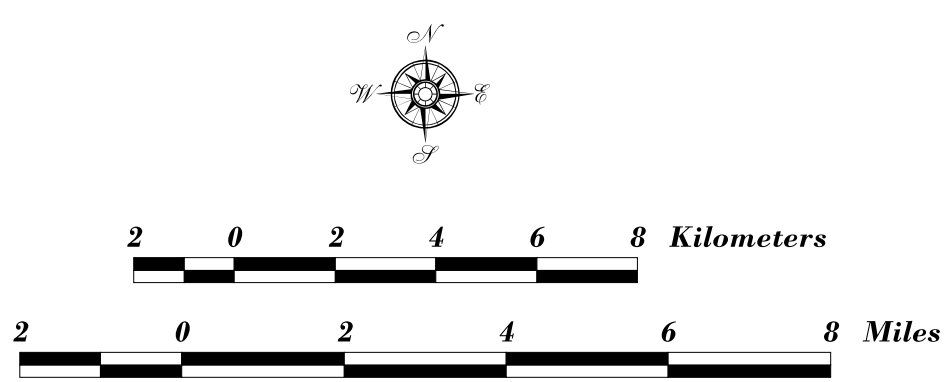
Legend

- Proposed Well - Known Location
- Proposed Well - General Location
- Proposed Compressor
- Existing Compressor
- Existing Non-Fruitland Well
- Existing Fruitland Well
- Existing Disposal Well
- Project Area Boundary
- County Line
- Proposed Access Road/Flowline
- U.S. Highway
- Primary Road
- Secondary Road
- River/Stream
- Fruitland Outcrop
- Projected Growth Area
- Proposed Subdivisions

Surface Ownership
- Federal
- Private

Land Use
- Agriculture/Rangeland
- Commercial
- Industrial
- Public Facilities
- Residential
- School/Church/Library/Museum
- Undeveloped





La Plata County transportation data provided by the La Plata County Transportation Study, 1998. Hydrologic and Archuleta County transportation features extracted from 1:100,000 USGS SDTS data.
Land Use types from La Plata County 'jparcels' file. Existing wells extracted from COGCC well database and edited by the BLM & USFS.

Transverse Mercator Projection
1927 North American Datum
Zone 13

LA PLATA COUNTY IMPACT REPORT

FIGURE 5-3
ANTICIPATED CBM DEVELOPMENT IN PROJECTED GROWTH AREAS

ANALYSIS AREA: LA PLATA COUNTY, COLORADO

Date: 06/15/02	ArcView File: C:\994-sanjuan\cir.apr
	Prepared By: JG

Table 5-4 CBM-Related Disturbance on Private Land in CIR Study Area

Existing Land Use	Acres of Private Land	CBM Wells		Acres of Short-term Disturbance	Acres of Long-term Disturbance	Acres within Growth Areas	CBM Wells	Acres of Short-term Disturbance within Projected Growth Areas	Acres of Long-term Disturbance within Projected Growth Areas
		Existing	Proposed				Proposed		
Agriculture	34,353	159	136	354	299	19,559	64	166	141
Residential	11,968	47	73	190	161	5,178	38	99	84
Total*	**60,492**	**206**	**194**	**504**	**460**	**24,737**	**102**	**265**	**225**

Notes: Assumes total short-term disturbance is 1.4 for well pad and 1.2 acres for roads per well, for a total of 2.6 acres per well; and one well per well pad.
Assumes long-term disturbance is 1.0 acre for well pad and 1.2 acres for roads per well, for a total of 2.2 acres per well.
* The total is not the sum of columns for the two land uses based on the number of well widows that are split between the two land use categories.

Table 5-5 Summary of Impacts by Land Use Category

Land Use	Total Acres of Private	Acres of Disturbance		Percent of Land Use Area Disturbed	
		Short Term	Long Term	Short Term	Long Term
Agriculture	34,353	354	299	1.0	0.8
Growth Areas in Agricultural Areas	19,559	166	141	0.8	0.7
Residential	11,968	190	161	1.6	1.3
Growth Areas in Residential Areas	5,178	99	84	1.9	1.6

Based on the summary of impacts by land use category shown in **Table 5-5**, the greatest amount of both short-term and long-term acreage disturbed by the anticipated development of CBM would occur on agricultural lands, primarily rangeland. The amount of agricultural land potentially disturbed is a relatively low percentage of the total private agricultural land in the study area. Most of these agricultural lands are used for rangeland and are generally considered compatible with CBM development.

Less total acreage would potentially be disturbed within residential lands compared with agricultural lands in both the short term and long term. The amount of land potentially disturbed is a higher percentage of the total residential land than the percentage of agricultural land that would potentially be disturbed. In addition, residential lands are generally more sensitive to development of CBM than are agricultural lands. CBM facilities are generally considered incompatible with residential land uses. The compatibility effects to residential areas would vary based on distance, topography, vegetation, and type of facilities, and would need to be evaluated on a site-by-site basis.

Potential conflicts in land use are most likely to occur within the projected growth areas in both agricultural and residential lands. The potential land use conflicts associated with the anticipated development of CBM would occur primarily in areas that are growing and densities are increasing; therefore, the mitigation section (see Chapter 6.0) primarily focuses on the projected areas of growth.

5.2 SOCIAL AND ECONOMIC IMPACTS

5.2.1 Objectives

This section addresses the social and economic impacts associated with maximum well development and focuses on the objectives defined in the *La Plata County Impact Report, Northern San Juan Basin CBM Project, County Goals and Objectives for the Impact Analysis Process* (**Appendix A**). Objective B states:

7c. Socioeconomics

- *i. What will the eventual decline in gas revenues mean for the maintenance of service levels?*
- *ii. How will employment and purchasing patterns associated with well drilling and production affect local employment and income?*

7b. Property Value

- *i. Use specific comparable sales data to determine if oil and gas development affects property values? Can this data be used to adjust property taxes?*
- *ii. If this specific data is not available, can changes in property values be quantified and translated into property tax relief?*
- *iii. Does increased well density also affect property values vs. the original 320-acre drilling program?*

The objective of this section is to quantify the potential impacts to social and economic resources in the study area that would result from the anticipated development of CBM.

5.2.2 Employment, Income, and Population

Many of the potential socioeconomic impacts to the county from the anticipated development of CBM are based on the number of new employees required for the project. A reasonable estimate of the number of new CBM-related employees and the foreseeable impacts to employment in the county is provided. Impacts from new project-related employees to both per capita income and population are also addressed in this section.

As discussed in Chapter 4.0, the anticipated development of CBM would result in an additional 318 CBM wells within the study area over the estimated 30-year life of the project. The project would consist of three phases. The construction and installation phase of the project would be underway for the first 10 years of the project, concurrently with operation and maintenance as new wells are completed. Operation and maintenance of the CBM wells would occur for the entire 30-year production period. Decommissioning and reclamation, such as plugging wells and removing access roads, would occur for 5 years during the last years of the project life, as gradual reclamation of inactive wells and the associated access roads would be an ongoing effort.

5.2.2.1 Employment

The anticipated development of CBM would create some additional employment opportunities within the county. The numbers of new employees associated with the various phases of the anticipated development are estimated in **Table 5-6**.

Table 5-6 New Employees for Anticipated CBM Development					
Phase of Project Development	**Years of Project**	**Total Years**	**Number of Employees***		
			Local	**Non-Local**	**Total**
Construction/Installation	Year 1 to Year 10	10	18	17	35
Operation/Maintenance	Year 1 to Year 30	30	106	0	106
Decommissioning/Reclamation	Year 25 to Year 30	5	8	0	8
Total of all Phases			132	17	149

Note: *Estimated maximum number of employees based on similar CBM projects.

In 2000, there were an estimated 226 workers in the county who directly worked in the oil and gas industry sector. This number of oil and gas workers represents about 1 percent of the total basic employment of 19,745 in the county (DOLA 2001d). The anticipated CBM development is estimated to require a total of 149 new workers over the 30-year project for all phases of the project.

The project would create employment opportunities related to the three phases of the project, as shown in **Table 5-6**. These workers would be employed at the same time because of the timing and overlap of the three project phases. However, The total number of 149 new employees for all phases of the project is used in this analysis to provide a worst-case estimate of the impacts that could occur as a result of the anticipated CBM development. The 149 new workers associated with the anticipated development of CBM would represent only 0.75 percent of the total basic employment of 19,745 in the county (DOLA 2001d).

Even when the existing oil and gas workers are combined with the additional workers for all phases of the project, the cumulative total of about 375 represents less than 1.9 percent of employment in the county. Therefore, no significant effect on the employment rate in the county is expected to occur as a result of this project.

The economy of La Plata County is well diversified. The oil and gas industry is not one of the top 10 employers in the county and represents about 1 percent of the total direct basic employment (DOLA 2001d). Tourism is the largest basic employment sector in the county, accounting for more than 40 percent of direct basic employment (DOLA 2001d).

In 1999, the unemployment rate in La Plata County was about 3.8 percent (DOLA 2001d). Although the unemployment rate in the county was low between 1990 and 2000, employment in the oil and gas industry diminished between 1990 and 2000 both statewide and coutywide (BEA 2001). For La Plata County, the number of employees in oil and gas extraction decreased by more than 153 people between 1991 and 1999 (DOLA 2001c). Therefore, it is assumed that most of the total number of new employees for the project would already live within daily commuting distance of the study area and would be available for work.

The anticipated employment during the construction and installation phase of CBM development would occur primarily within the first 10 years of the project. It is estimated that approximately half of the new employees for the construction and installation phase of the project would be non-local, and that half would be local employees who currently reside within daily commuting distance. Local employees already live within the region and could commute daily from their place of residence to the study area. Non-local employees would relocate to the area during the employment period and would need housing.

Many of the local employees would be expected to commute daily from Farmington, New Mexico, which is considered the regional center for the oil and gas industry (BLM 2000b).

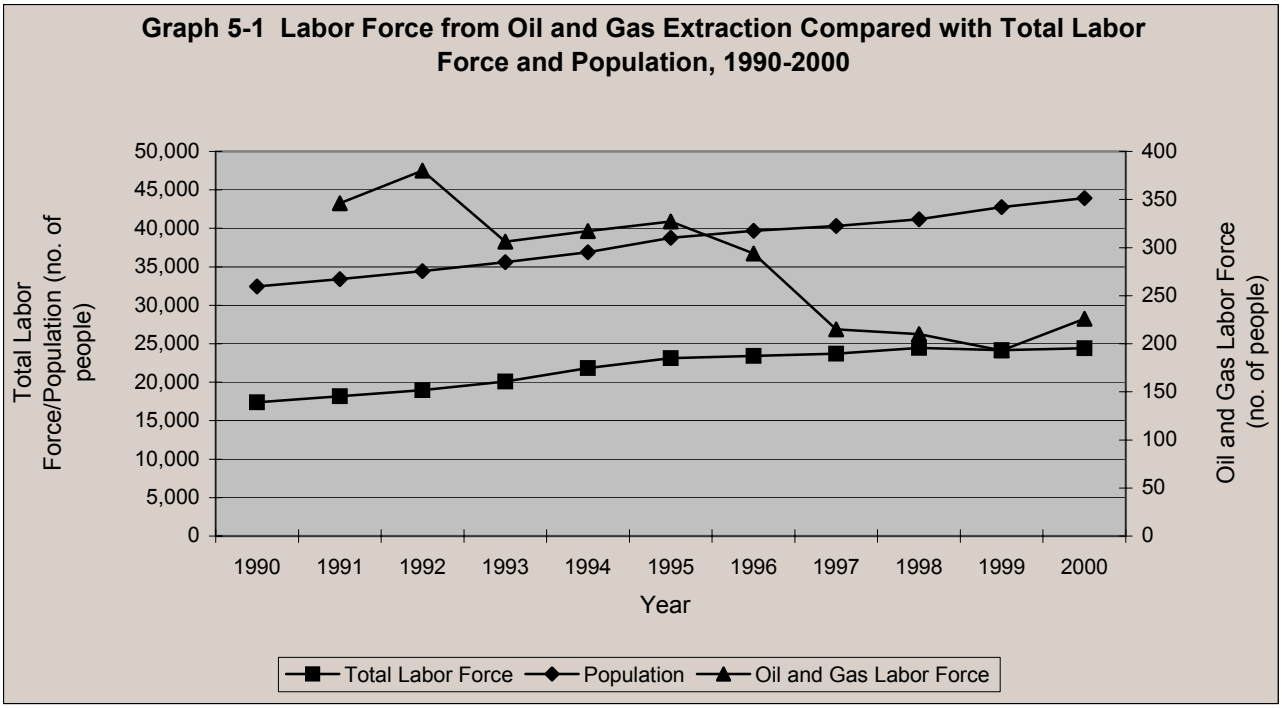
Workers would be hired to construct and maintain the access roads and well pads, construct utility trenches, and install underground gas flowlines, water pipelines, and utility lines. Local contractor jobs would likely include gravel and water truck drivers, heavy equipment operators, and pipeline workers. It is estimated that about 17 short-term, non-local specialized workers may be needed for the construction and installation phase to drill and complete the wells.

After the construction and installation of wells is completed, sustained long-term employment would be required for the operation and maintenance phase of the project over the estimated 30-year period of production. Based on the gradual and long-term nature of the project, it is assumed that most of the new long-term employees for the operation and maintenance and decommissioning and reclamation phases would be local residents.

The decommissioning and reclamation phase of the project would occur throughout the study area for approximately 5 years, and would be concurrent with production in later years of the project. The gradual plugging of wells, removal of access roads, and reclamation would be an ongoing effort after production declines for a well. It is assumed that most of the new employees for the decommissioning and reclamation phase would be local residents.

A few indirect or secondary jobs would also be created in support industries related to CBM, such as parts and materials production and equipment refueling services. These indirect or secondary employment needs would likely be filled by employees who currently reside in the study area, primarily in or near the existing communities of Durango and Bayfield. Indirect employment related to CBM development would result in approximately 216 additional indirect jobs based on the multiplier of 1.45 used in the SUIT draft environmental impact statement (DEIS) (BLM 2000b).

The total labor force for the oil and gas industry in La Plata County has been declining since 1992. The oil and gas labor force decreased from 380 in 1992 to 193 in 1999, and then increased slightly to 226 in 2000 (DOLA 2001c). The change in labor force for the oil and gas industry compared with the total labor force and total population in La Plata County from 1990 to 2000 is shown on **Graph 5-1.**



5.2.2.2 Income

Because of the relatively low number of new employees who would be required for the project (Section 5.2.2.1), development of CBM is not expected to significantly alter salaries or the average per capita income in the county. In 2000, the average per capita income in the county was about $17,000 (U.S. Census 2000a). Based on per capita income in 1995, it was determined that approximately 11 percent of the La Plata County residents were considered living below the poverty line (U.S. Census 2001b).

Jobs in the oil and gas industry generally are higher paying than in other employment sectors in La Plata County. The average per capita income for workers in the oil and gas industry is estimated at about $56,800 per year (Beville 2001). Although the oil and gas industry has historically represented about 1 percent of the total direct basic employment in the county, it has generated about 2.5 percent of the direct basic income of the county because pay is higher (DOLA 2001c). Still, the contribution would not be significant because of the low number of jobs.

5.2.2.3 Population

The total number of new employees expected to migrate to the county for the anticipated development of CBM would not have a significant effect on county population. As discussed in Section 5.2.2.1, only the construction and installation phase would employ both local and non-local workers (**Table 5-6**). Based on the gradual and long-term nature of the project, it is assumed that most of the new employees for the operation and maintenance and decommissioning and reclamation phases of the project would be local employees who currently reside within commuting distance of the project. It is estimated that a maximum of 17 new non-local employees may migrate to the county for the construction and installation phase over the first 10 years of CBM development (**Table 5-6**).

It is assumed that approximately half of the new non-local employees who would relocate to the county would bring their families. Using the average number of persons per household of 2.53 (U.S. Census

2001a) for the half who bring their families, a total of 22 new people may relocate to the county as a result of the anticipated CBM development. This amount represents an increase of less than 0.1 percent when compared with the total population in the county of more than 43,941 (U.S. Census 2000a). This change is not expected to result in significant short-term or long-term impacts to local population conditions.

The population of La Plata County has been growing over the last decade and is expected to continue to grow with or without development of CBM. Between 1990 and 1999, the population of the county increased by about 36 percent as a result of both natural increases (births) and net in-migration. The population in La Plata County is also projected to increase at a faster rate than the state as a whole through the year 2025. The population in the county grew at an average annual rate of 3.4 percent from 1990 to 1999 and is projected to continue to increase, but at a slower rate of 1.7 percent annually (DOLA 2001a). This continued growth would make the small contribution to local population related to CBM less significant over time.

5.2.2.4 Spending and Purchasing

The anticipated development of CBM would contribute both direct and indirect income to the county through spending and purchasing of tangible and intangible goods. Direct spending for tangible goods would include purchase of materials, equipment, and services for construction and installation of 318 new CBM wells and seven new compressors in the study area (Section 4.0). Most of the tangible expenditures would pass out of the county to suppliers and manufacturers elsewhere. Intangible expenditures (primarily labor) would be expected to enter the county economy.

The total cost per new CBM well is estimated at $600,000 (Brown 2002). The tangible costs (materials, equipment, and services) per well are estimated at approximately $500,000. Intangible costs (primarily labor) are estimated at about $100,000 per well.

The cost of each compressor depends on its size. Based on the costs provided in the SUIT DEIS (BLM 2000b), the total costs for the seven new compressors proposed in La Plata County are estimated at more than $7 million, including labor. Approximately 80 percent of these costs ($5.6 million) are for tangible goods, and about 20 percent ($1.4 million) would be intangible (primarily labor).

The CBM workers would provide additional indirect benefit to the county by purchasing supplies, goods, and services locally. Employee spending and purchasing would be expected to increase slowly as employees are added for the first 10 years during the construction and installation phase of the project. Spending and purchasing would then be expected to decrease slowly over the remaining life of the project as the construction and installation phase is completed and the number of project-related employees gradually declines. Based on the long-term and gradual nature of the anticipated CBM development and because the oil and gas industry represents less than 1 percent of the total employment in the county, spending and purchasing associated with CBM development are not expected to result in significant impacts to the overall economy of the county.

5.2.3 Housing

The small number of new non-local employees and their families who would relocate to the county as a result of the anticipated CBM development are not expected to have much impact on the housing supply in the area. As discussed in Section 5.2.2.3, up to 17 new non-local employees may migrate to the county for the construction and installation phase during the first 10 years of the project. The non-local employees would require local housing (**Table 5-6**) for some time. The workers required for the operation and maintenance and decommissioning and reclamation phases of the project are expected to be local

residents with existing housing.

During the construction and installation phase of the project, most of the 17 workers who would come into the area would reside for several months in motels and rental housing that is available in the area. There are many motel units in the area and 2001, there were an estimated 9,000 rental units, including apartments, condominiums, and single-family homes in the county (DOLA 2001f). The vacancy rate for the rental units was 2.9 percent for the first quarter of 2001. This equates to approximately 261 rental units available for the estimated 17 non-local workers expected to relocate to the county for the project.

Because the total number of workers for the anticipated development of CBM is less than 0.1 percent of the population of the county and most of the workers for the project are expected to be local residents, it is not expected that a marked increase in demand on housing would occur within the study area.

5.2.4 County Facilities and Services

The anticipated CBM development is not expected to affect community facilities and services. First, requirements for utilities and services would not directly affect capacity. The companies would purchase needed utilities (electric power) from existing sources, and the service provider would supply the capacity needed. No other uses would be displaced.

Second, the small number of project-related employees and their families who would relocate to the area would have a small impact on the community facilities and services. Because the population in the county has increased at a high rate over recent years and is projected to continue to increase in the future, there may be impacts to county services that result from general population increases but that are unrelated to the anticipated development of CBM. Only the additional impacts related to the anticipated development of CBM are addressed in the following subsections.

5.2.4.1 Roads and Bridges

Property taxes, sales taxes, and highway-user taxes are currently the primary sources of funding for roads and bridges. Currently, the county maintains 173 miles of paved roads and 485 miles of gravel roads (Villers 2001). Road maintenance costs have increased in some areas where CBM wells have already been drilled (Villers 2001).

Access to portions of the study area for the anticipated development of CBM would require use of certain county roads, as discussed in Section 5.3, Traffic and Transportation. The project-related activities would result in small amounts of increased traffic and additional wear and tear on county roads, primarily during the construction and installation phase, when heavy truck traffic associated with each new CBM well would temporarily occur about 2 months for an area. Some equipment loads may exceed bridge or road weight restrictions; however, when combined with the short duration of heavy use, overweight vehicles are not expected to have significant effects on the structural integrity of and maintenance needed for the roads and bridges.

During the 30-year operation and maintenance phase of the project, the additional traffic from all vehicle types would represent less than a 1 percent increase in average daily traffic compared with existing levels on county roads (Section 5.3). The specific county roads and bridges that may experience increased traffic are addressed in Section 5.3, Traffic and Transportation. This small amount of additional traffic is not expected to significantly increase the amount of wear and tear on roads and bridges.

5.2.4.2 Public Services

The employees and their families who would migrate into the area for this project may slightly affect public services in the county through increased demands on existing services, including local law enforcement, emergency response, utilities, hospitals, and schools. Because only 17 additional workers are estimated to be moving into the area for CBM development, the anticipated project-related effects to most public services are expected to be minimal. However emergency response and fire fighting services may experience approximately 23 additional incidents per year (Section 5.6, Health and Safety).

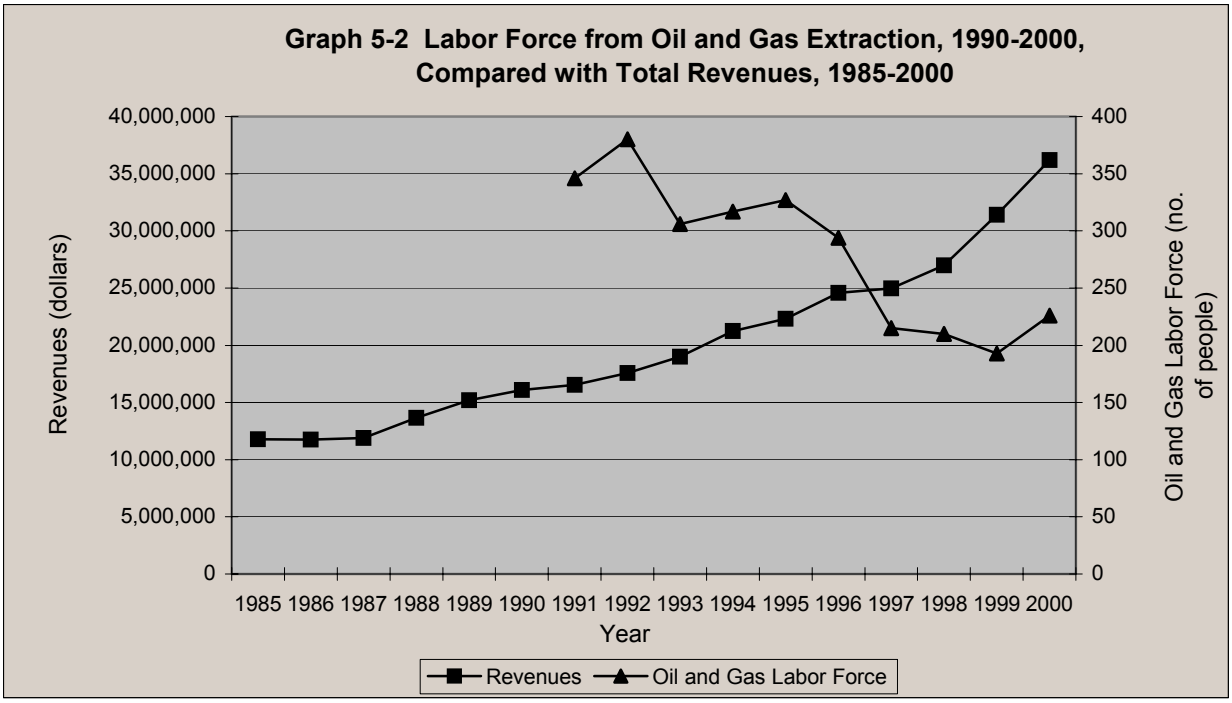
5.2.4.3 Planning Services Department

Planning issues and permitting would require the involvement of general government services in La Plata County, primarily the Planning Services Department. A total of 271 permit applications of all kinds were reviewed in 2000 (Keller 2001). The number of applications reviewed for oil and gas projects increased from 33 in 1997 to 73 in 2000, which represents a 45 percent increase in 3 years. In 2000, oil and gas projects represented approximately 27 percent of the total 271 permit applications reviewed.

Based on the number of proposed CBM wells on private land within the study area, an additional 194 permit applications may require county review over a 10-year period. Assuming an even distribution of these 194 application reviews over the 10-year construction and installation period, there would be an estimated 19 additional applications per year. Including these additional 19 applications per year, the cumulative total for the existing 73 and the new project-related applications per year would be 92. This number would represent about 34 percent of total applications reviewed per year. The total number of all land use permit applications reviewed per year is estimated to increase by 7 percent as a result of the anticipated development of CBM. Staffing increases may be required to review and process the additional number of permit applications.

5.2.5 Local Government Revenues and Expenditures

In the year 2000, the total revenues for La Plata County were about $36.2 million (DOLA 2001g). Of the total county revenues, approximately $20.6 million were from taxes collected from all sources (DOLA 2001g). Revenues have increased three-fold since 1985. As shown in **Graph 5-2**, the total revenues in La Plata County increased between 1985 and 2000, but the labor force for oil and gas decreased from 1992 to 2000. Revenues have continued to increase over time as the labor force for oil and gas decreased.



Correlations were calculated between revenues and (1) population, (2) total labor force, and (3) the oil and gas labor force for the years 1990 to 2000 to identify relationships between revenues and the three other variables. The Colorado Department of Local Affairs reports population estimates for 1990 to 2000, and labor data on force, revenues, and expenditures for 1985 to 2000 (DOLA 2001g).

Correlations, or r-values, are often used to measure how closely two variables are associated. The more positive the r-value, the more positive the association between the two variables. The more negative the r-value, the more negative the association between the two variables. The r-values for the revenue correlations are reported in **Table 5-7**. The results of the correlations show that the r-values for revenues and population (0.96) and revenues and total labor force (0.86) are high, indicating a strong positive association between both revenues and population and revenues and total labor force. However, the magnitude of the r-value for revenues and population is greater than the r-value for revenues and total labor force. This difference suggests that revenues are more strongly associated with population than with total labor force. On the other hand, the r-value for revenues and oil and gas labor force is negative, indicating a negative relationship between the two variables. This value suggests that revenues have a moderate negative association with the oil and gas labor force.

Additionally, the correlation of total labor force to population is also high (r = 0.96), indicating a strong positive association between the total labor force and population. However, total revenues are more closely associated with population than with the total labor force.

Table 5-7 Correlations (r-values)

Correlations	r-value
Revenues-population	0.96
Revenues-total labor force	0.86
Revenues-oil and gas labor force	-0.82
Population-total labor force	0.96

La Plata County revenues would be expected to increase in several ways because of the anticipated development of CBM. County revenues would increase from *ad valorem* property taxes, severance tax monies, energy impact assistance grants, distribution of collected royalty fees from the MMS and sales tax revenues.

The following assumptions were used to estimate the additional revenues to the county from the anticipated CBM development.

- Based on information compiled from COGCC, BLM and FS, there are an estimated 279 existing conventional and CBM wells in the study area; 247 of these wells are currently producing oil and gas, and the remainder are temporary or abandoned, shut in, or disposal wells.
- Of the 318 proposed new CBM wells, based on window spacing, a maximum of approximately 194 new CBM wells could be located on private land and 124 wells would be located in federal lands in the study area.
- The following was assessed to calculate federal mineral royalties; of the 194 wells on private surface, about 46 wells involve federal mineral ownership. Of the 124 wells located on federal surface, all were assumed to involve federal minerals. Therefore, it is estimated that 159 of the 318 wells will involve federal minerals.
- The total production period for the existing CBM wells in the study area has not yet been defined because the wells are still actively producing; however, an estimated production period of 30 years for a CBM well is used for this analysis.
- Although production varies between CBM wells and for a specific well over the production period, an average annual production rate of 133,333 million cubic feet (mmcf) per well over the 30-year production period was assumed.
- Although gas prices are expected to vary significantly over the life of the project, an average reported by COGCC over a 5-year period (1995 to 2000) was considered a representative price for a conservative estimate of revenues over the life of the project; therefore, an average gas price of $2.50 per mcf (in constant 2000 dollars) was assumed for this analysis.

5.2.5.1 Assessed Valuation

The total assessed valuation in La Plata County may increase during the production period of the anticipated CBM development. The state set valuation or assessment for producing oil and gas properties is 87.5 percent of the average wellhead selling price of oil and gas sold or transported from the premises from primary recovery during the preceding calendar year.

In 2000, the total assessed valuation for all property in La Plata County was $1.16 billion (La Plata County 2000a). Since 1993, oil and gas property has consistently contributed more than 30 percent of the total assessed valuation in La Plata County. In 2000, oil and gas properties represented 46 percent of the total assessed valuation in the county (DOLA 2001g). Over the production period of the project, the anticipated CBM development would increase both the total valuation for the county and the share of oil and gas property valuation compared with the total assessed valuation in the county. The assessed valuation of the CBM properties would gradually decline in the later years of the project.

5.2.5.2 Ad Valorem Property Taxes

Revenues would be generated from *ad valorem* property taxes levied on the properties where the proposed CBM facilities would be located. The mill levy is set by the county and is multiplied by the assessed value of a property to calculate the property tax. The mill levy in La Plata County is 8.5, which is the fourth lowest of the 63 counties in Colorado (La Plata County 2002). The assessed value of an oil

and gas property is based on the total gas production and a percentage of the total sales, as previously discussed.

Since 1993, property tax revenues have represented 22 to 35 percent of the total annual tax revenues of the county. In 2000, the total property tax revenues in the county were $9.9 million, and the revenues derived from the property tax on oil and gas production were about $4.5 million. This amount represents about 46 percent of the total property tax revenues (Section 5.2.5.1) or about 14 percent of the total county revenues of $36.2 million (Beville 2001). Between 1993 and 2000, revenues from the oil and gas property tax averaged 38 percent of total property tax revenues (DOLA 2001g).

Total revenues as compared with oil and gas tax revenues from property tax and the total property tax in La Plata County from 1985 though 2000 are shown in **Graph 5-3**. The La Plata County Condensed Budgets for 1989 through 2000 report revenue from oil and gas property tax as a percent of total property tax (**Table 5-8**). Property tax revenues parallel total tax revenues and have averaged 23 percent of total revenues from 1989 through 2000. In comparison, revenues from oil and gas property tax as a percentage of the total property tax have increased from 11.8 percent in 1989 to 45.3 percent in 2000 (**Table 5-8**).

Revenues and expenditures in La Plata County between 1985 and 2000 are shown in **Graph 5-4**. Also shown in **Graph 5-4** are the total county revenues and expenditures compared with the oil and gas property tax revenues between 1989 to 2000. Revenues from oil and gas property tax range from approximately 2 to 15 percent of total revenues.

Information for the year 2000 is used to illustrate how property tax is calculated for oil and gas operations. In 2000, the total taxable oil and gas production sales income from producing wells in the county was about $622.8 million. As discussed in Section 5.2.5.1, 87.5 percent of actual is the assessed value, so the total assessed value is about $554.5 million. Applying the county mill levy of 8.5, the total property tax revenue would be about $4.7 million.

The projected additional average annual revenues from property taxes for the 194 new CBM wells on private land were estimated using the calculation method described in the previous paragraph:

(133,333 mcf/well/year x 194 wells x $2.50/mcf) x 0.875 x 0.0085 = $481,000/year (in year 2000 dollars)

Thus, an estimated additional $481,000 in annual property tax revenues may be available to the county each year during the peak production years during the 30-year production period for the anticipated CBM development (when all 194 wells are producing).

The property tax revenues from oil and gas to the county would decrease proportionately with declining production in the later years of the anticipated new CBM development. Because of the increasing population, however, the reduced revenues from oil and gas may be offset by other sources of property tax revenues. Overall, the total county revenues from property taxes are expected to increase over time.

5.2.5.3 Severance Tax Distributions

The anticipated development of CBM would provide additional revenues to the county through severance tax distributions during the initial years of the project. Counties and municipalities receive direct redistributions from the Colorado Department of Local Affairs, based on the number of employees involved in oil and gas production residing in their jurisdiction (BLM 2000b).

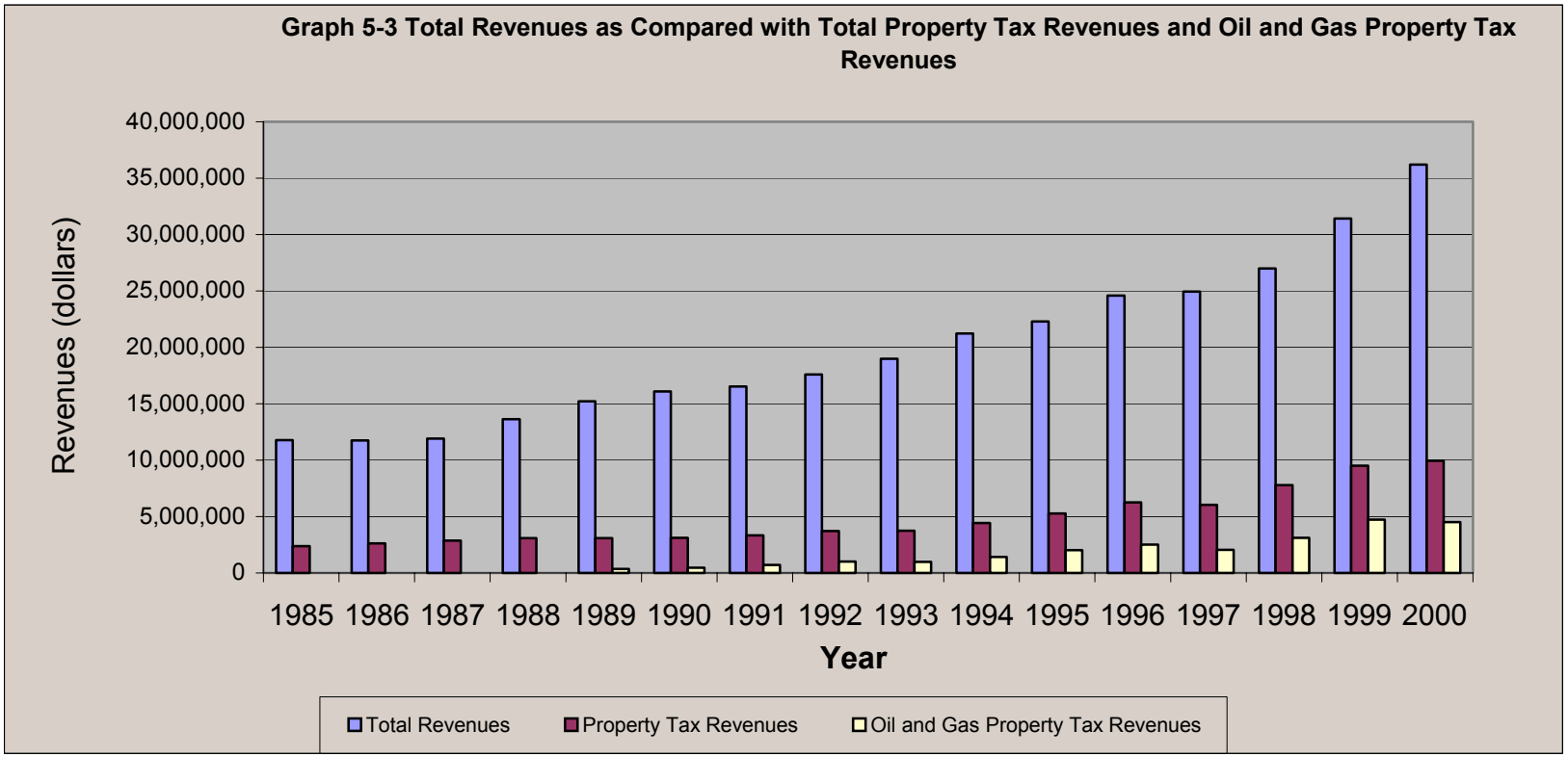
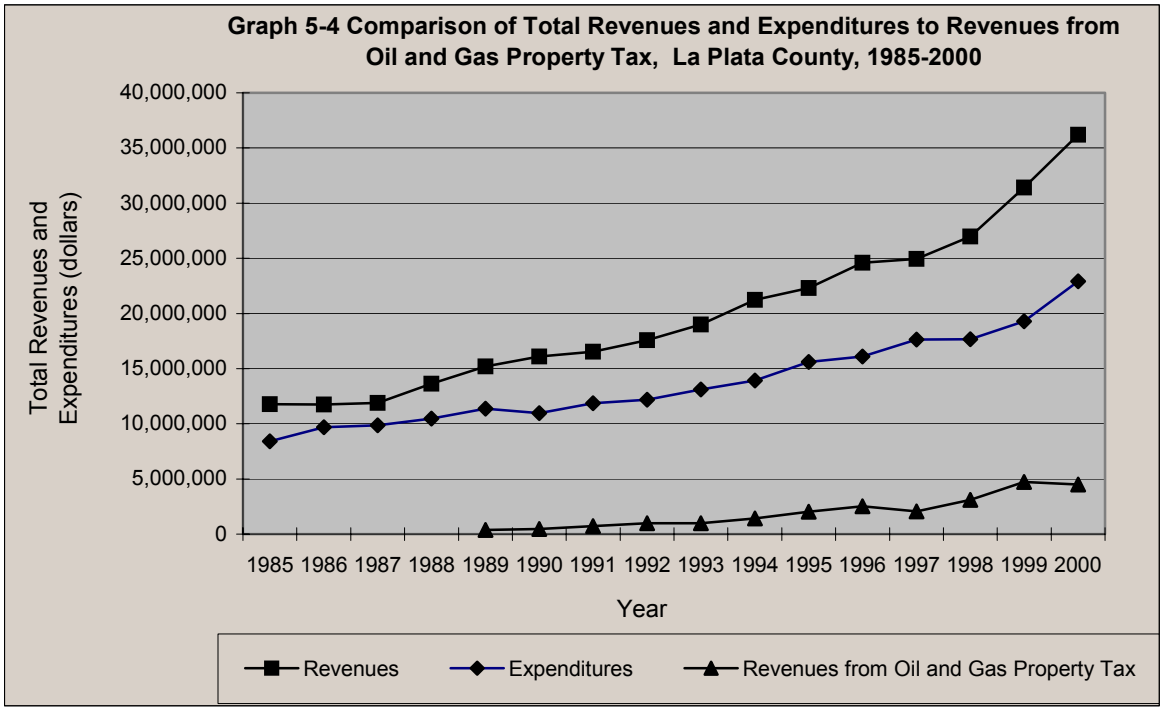

Graph 5-3 Total Revenues as Compared with Total Property Tax Revenues and Oil and Gas Property Tax Revenues
Revenues (dollars)
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000
Year
Total Revenues
Property Tax Revenues
Oil and Gas Property Tax Revenues

Table 5-8 Percentage of Total La Plata County Property Tax Revenues Paid by Oil and Gas			
Year	**Property Tax Paid by Oil and Gas Industry[1] (Dollars)**	**Total Property Tax [2] (Dollars)**	**Percentage of Property Tax Paid by Oil and Gas Industry[3] (Percent)**
1989	363,364	3,079,358	11.8
1990	456,521	3,126,858	14.6
1991	711,222	3,339,072	21.3
1992	999,191	3,728,324	26.8
1993	977,943	3,746,908	26.1
1994	1,408,138	4,414,226	31.9
1995	2,023,526	5,283,359	38.3
1996	2,524,019	6,263,075	40.3
1997	2,056,467	6,030,695	34.1
1998	3,117,289	7,773,789	40.1
1999	4,739,187	9,497,368	49.9
2000	4,506,449	9,948,011	45.3

Sources: 1 Calculated.
2 DOLA 2001g.
3 Verheyden 2002.



State severance taxes are assessed at 2 to 5 percent based on the gross income from production. A rate of 5 percent is currently used in La Plata County.

Under Colorado law, producers are allowed to reduce or offset the assessed value by a credit equal to 87.5 percent of the property taxes paid in the same year. State severance taxes can be

completely offset when production is falling; however, revenues generally accrue when production is increasing. In 2000, La Plata County received $145,558 in severance tax revenues for the existing oil and gas facilities in the county (Colby 2001), which represents only 0.4 percent of total county revenues.

Production would increase during the initial years of the project, and the revenues available to the county from severance tax distributions would be expected to increase. The severance tax revenues for the anticipated development of CBM are expected to be less than 1 percent of the total county revenues. State severance tax distributions to the county are expected to fall to zero after the initial few years of production because state severance taxes would be offset by property tax credits.

5.2.5.4 Energy Impact Assistance Grants

Energy impact grant funds are available to counties and municipalities that may be affected by the growth and decline of energy and mineral industries in the state. Funds come from the state severance tax on energy and mineral production and from a portion of the state's share of royalties paid to the federal government for mining federal minerals. The Energy and Mineral Impact Assistance Program administers these funds. The amounts distributed depend on the receipt of applications and are not directly tied to production, as are the direct distribution of severance taxes or the state's share of royalties for federal minerals. Because the annual amounts available may fluctuate significantly from year to year, the grant funds available cannot be estimated for the life of the project.

La Plata County received energy assistance grant funds of about $4.6 million in 2000 (Colby 2001). Including energy impact grant funds and gaming impact funds, the county anticipates that $3.1 million in grant funds will be received in 2002 for road maintenance and construction, public safety, and planning efforts (La Plata County 2002). Although there are anticipated to be more oil and gas production wells in the county in 2002 than in 2000, the grant funds distributed to the county are expected to be lower. The grant funds available to the county are related to the number of applications submitted, grant funds, and are not directly related to the number of producing oil and gas wells or cumulative production.

The energy impact grant funds distributed to the county are used to improve to county roads heavily used because of oil and gas development, to complete long-range planning efforts, to improve county facilities, and to purchase capital equipment such as road graders. In addition, the Durango School District received $600,000 in grants in 2000, some of which was from energy impact grant funds (Barter 2001).

The anticipated development of CBM would be expected to contribute to the annual amount of energy assistance grant funds available to the county. The amounts will likely vary significantly from year to year. In addition, energy impact assistance grants may help to offset declining revenues from oil and gas in the later years of CBM production.

5.2.5.5 Federal Mineral Royalty Distributions to La Plata County

The anticipated development of CBM would increase the revenues to the county from federal mineral royalties. MMS collects federal mineral royalties for gas produced from wells on lands with federal mineral ownership. Federal mineral royalties are collected at a rate of 12.5 percent of the sales value. After administrative charges are deducted, the net is split evenly (50 percent) between the federal government and the state of origin. The state's share of royalties is distributed

to the State School Fund, the Department of Local Affairs, and the Colorado Conservation Board; a portion of the remaining funds is redistributed to the county where the federal mineral leasing revenues were generated.

In 2000, the State of Colorado received about $42.3 million in total federal mineral royalties; about $1.3 million of this amount (or about 3.1 percent) was redistributed to La Plata County (MMS 2001). About $1.0 million (79 percent) of the county' share was natural gas royalties from the existing wells in the county (MMS 2001). This amount represents 2.4 percent of the total federal royalties allocated to the state. Federal royalty distributions attributable to oil and gas in La Plata County were about 3.6 percent of the total county revenues of $36.2 million for the year 2000 (from taxes and all other sources).

The royalties for the year 2000 are used to illustrate the calculations for redistribution of federal mineral royalties to the county. In 2000, the total oil and gas production sales value for federal minerals within the state was about $756.8 million. The 12.5 percent federal royalties for this amount of production is $94.6 million. After administrative charges, the state's share is 50 percent or $42.3 million. In 2000, 2.4 percent of the state's total federal royalty revenue was redistributed to the county ($1.0 million) for the oil and gas production in the county.

About 159 of the 318 new wells are expected to involve federal minerals. Therefore, the projected average annual royalties distributed to the county from the anticipated CBM development were estimated using the calculation method described in the previous paragraphs:

[133,333 mcf/well/year x 159 wells x $2.50/mcf) 0.125] x 0.50 x 0.024= $79,499/year (in year 2000 dollars)

An estimated additional $79,499 in annual revenue may be available to the county during the 30-year production period for the proposed new 159 CBM wells that involve federal minerals. This amount is only an estimate and is expected to vary from year to year. This calculation assumed that La Plata County will receive roughly the same percentage of total state federal royalty revenue each year (2.4 percent) that it received in 2000. Actual production of each CBM well depends on the reserves and can vary significantly from well to well. Annual gas production, natural gas price, and La Plata County's allocation of the state's federal royalties are used to calculate the annual royalties, and these royalties could vary substantially over the life of the project. The revenues allocated to the county from federal oil and gas royalties would gradually decline as production declines.

5.2.5.6 Sales Tax Revenues

The anticipated CBM development would also generate sales tax revenues for La Plata County as a result of employee spending on goods and services in the area, both from new employees who migrate to the county and from the higher disposable income for employees in the oil and gas industry. The local sales tax rate in the county is 2 percent.

Most of the large tangible items (materials and equipment) for the project would be purchased elsewhere, so minimal sales tax revenues from these purchases would be accrued by the county. The year 2000 total sales tax revenues were about $9 million for the county (La Plata County 2000b). Based on the relative population increase of less than 0.1 percent anticipated for this project (Section 3.2.2.3), the amounts of goods and services purchased by the employees who move into the area for the project would also be expected to result in increased annual sales tax revenues of less than 0.1 percent.

5.2.5.7 Expenditures for County Services

There is public concern that the anticipated CBM development may increase expenditures for La Plata County services. Potential impacts to expenditures would result if additional staff members in various county departments or additional road and bridge maintenance (or both) would be needed due to the anticipated CBM development.

Between 1990 and 2000, the total county expenditures have increased by about 52 percent, compared with a population increase of about 26 percent. In 2000, total county expenditures were $22.9 million. Currently, public safety accounts for about 16 percent of the annual county expenditures; public works, including maintaining and improving county roads and bridges, accounts for about 14 percent of these expenditures. About 14 percent was spent for general government services.

Expenditures for public safety include the La Plata County Sheriff's Office's for law enforcement, traffic control, and emergencies. Vandalism on or around oil wells accounts for about 1 complaint per month (Griggs 2001). Because the number of wells in the county will more than double (279 currently plus 318 proposed), this increase could result in one additional vandalism complaint per month. The total of 17 new non-local workers estimated to migrate to the area for the anticipated CBM development represents a population increase of less than 0.1 percent, and they are not expected to significantly increase the expenditures required for law enforcement and traffic control. Potential impacts to public safety and emergency and fire fighting services caused by the anticipated development of CBM are discussed in Section 5.6, Health and Safety.

The anticipated development of CBM would result in increased traffic on local roads. Heavy truck traffic associated with the construction and installation phase of each new CBM well would be temporary, occurring over about 2 months in an area. Additional traffic associated with the operation and maintenance phase of the development of CBM would increase the daily traffic on the county roads by less than 1 percent. Therefore, road maintenance is not anticipated to increase significantly due to the project. Traffic congestion and increased risk of traffic accidents may occur at some intersections where CBM-related vehicles and equipment would enter and exit major roads. The specific county roads that would experience additional vehicular traffic from CBM-related activities are discussed in Section 5.3, Traffic and Transportation.

Based on the number of non-local employees estimated to relocate to the county with their families for the project (Section 5.2.2.3), an additional five students could be expected to enroll in the public schools in the county during the 10-year construction and installation phase of the project. These students represent an estimated school enrollment increase of less than 1 percent, so project-related impacts to local school expenditures are expected to be minimal.

As discussed earlier, any increased expenditures associated with the anticipated development of CBM would be offset by the increased property taxes and energy impact grants that result from increased oil and gas production in the county.

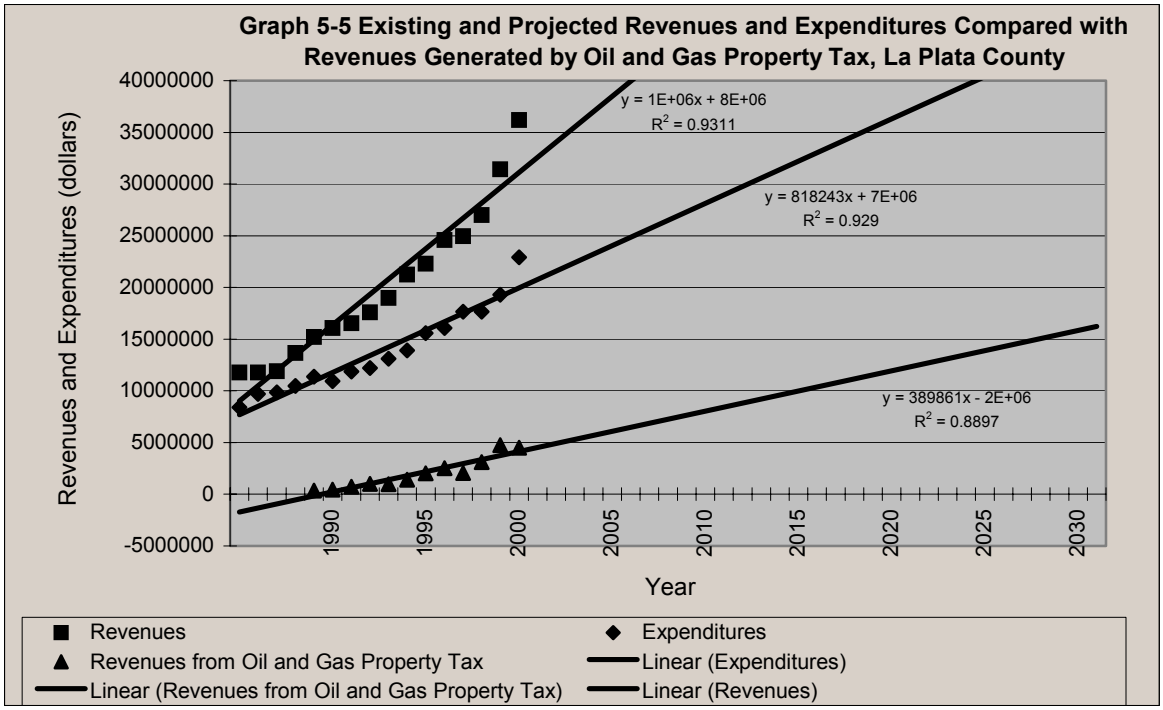
5.2.5.8 Impacts from Eventual Decline in Gas Revenues

Gas revenues available to the county would eventually decline at the end of the production period for the CBM wells. As discussed in earlier sections, these revenues come from property taxes, severance taxes, energy impact assistance funds, and federal royalties – all tied directly or

indirectly to production. Future reduced revenues from gas may limit the government budgets available to maintain service levels in the county.

Oil and gas industry contributed about 46 percent of the total property tax collections in the county in 2000 (DOLA 2001g). The production from the existing oil and gas wells in the county is expected to decline over time, decreasing property tax revenues. Likewise, after the estimated 30-year production period for CBM development, the county revenues from property taxes would also be expected to decline. Because property taxes in the county are used to support the schools, county government, and services, alternative sources of revenue may be needed after the CBM-related property tax revenues decline.

The most significant impact to revenues associated with the anticipated CBM development is increased property tax revenues. The existing and projected total revenues and expenditures for La Plata County are compared with the revenues generated from oil and gas property tax in **Graph 5-5**. Existing revenues and expenditures are shown for 1985 through 2000 and are depicted by symbols. Projected revenues and expenditures are shown through 2030 and are estimated using a trend line. The trend line represents a linear fit of the data in all three cases. Although an exponential regression is a better fit for both the revenue and expenditure data sets, it does not seem reasonable that revenues and expenditures will continue to grow exponentially through 2030. Therefore, a linear regression was used to illustrate a projected trend. Additionally, the projection does not reflect the anticipated spike, potential leveling off, and gradual decline in well production associated with CBM-related activities. Likewise, the projection does not reflect a gradual decline in production of existing wells. These projections are difficult to quantify given the variables associated with CBM such as the extent of existing gas reserves and the rate at which the wells extract gas.



The percentage of property tax paid by the oil and gas industry compared with the total property tax has been steadily increasing over time, from 11 percent in 1989 to about 50 percent in 2000. It is anticipated that this percentage will continue to increase during the height of CBM-related activities and then decrease gradually as production decreases, eventually dropping back to 1989 levels of 11 percent or less around 2030.

However, because La Plata County expenditures have decreased relative to revenues, the county has observed a steady increase in net revenues. Net revenues are defined as total revenues minus total expenditures. Despite fluctuating oil and gas revenues, a steady net revenue increase over time is shown in **Graph 5-6**. From 1985 to 2000 net revenues have increased from $3.3 million to $13.3 million. As shown in **Table 5-9** and **Graph 5-6**, if oil and gas property taxes were not collected, net revenues (minus the portion of revenues from oil and gas property tax) over the same period would have been reduced by 9.5 percent to 34 percent. For example, in the year 2000, net revenues excluding oil and gas property tax would have been $8.7 million, compared with the actual revenues of $13.3 million (including oil and gas property tax).

The existing net revenue through 2000 and the projected net revenues through 2030 are shown in **Graph 5-7**. Again, projected net revenues are depicted using a linear regression when an exponential regression is a better fit of the data. Based on current net revenues, net revenues in 2030 are projected to be about $30 million. This projection assumes a steady increase in production for the CBM wells. Therefore, it is not likely that by the year 2030 the net revenue would be $30 million. It is more likely that the highest production years may yield a net of about $30 million.

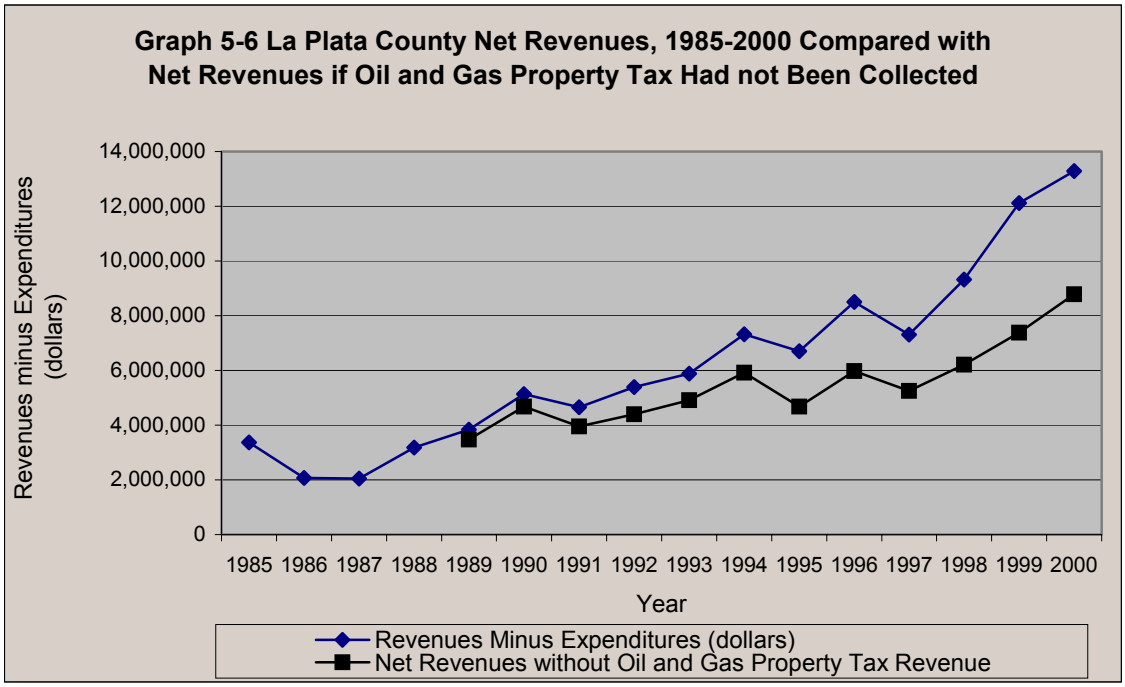
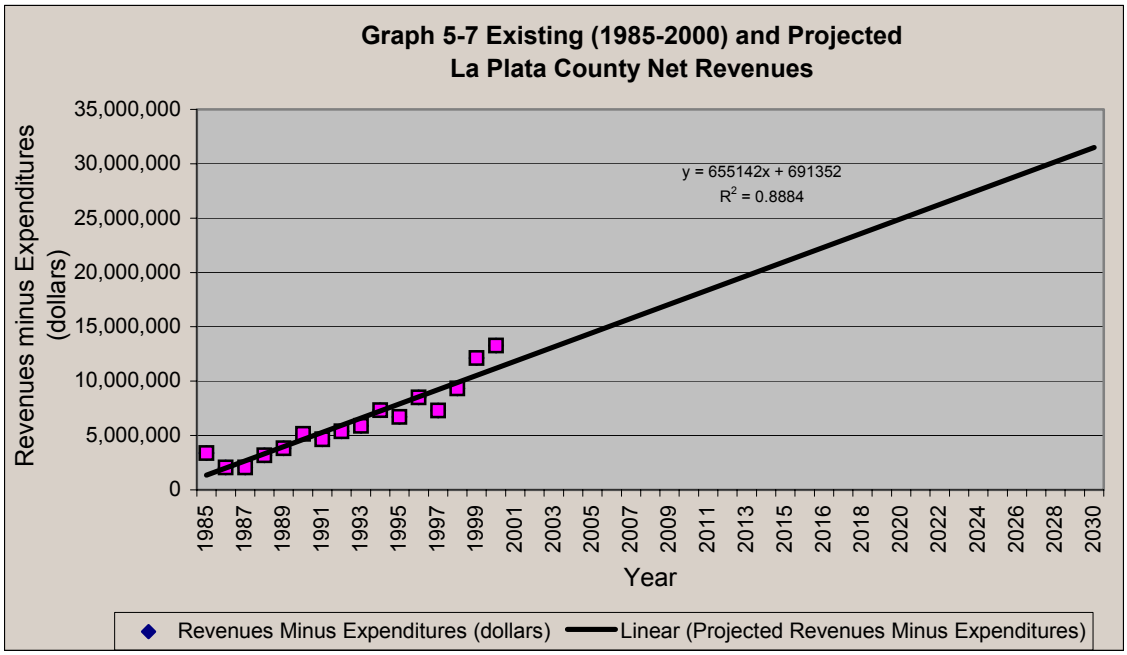


Table 5-9 La Plata County Net Revenues, 1985-2000, Compared with Oil and Gas Property Tax Revenue, 1989-2000				
Year	**Net Revenue (Dollars)**	**Oil and Gas Property Tax Revenue (Dollars)**	**Oil and Gas Property Tax as a Percentage of Total Net Revenue (Percent)**	**Net Revenues Without Oil and Gas Property Tax Revenues (Dollars)**
1985	3,372,387	nr	nr	Nr
1986	2,070,520	nr	nr	Nr
1987	2,048,649	nr	nr	Nr
1988	3,184,908	nr	nr	Nr
1989	3,837,580	363,364	9.47	3,474,216
1990	5,138,469	456,521	8.88	4,681,948
1991	4,659,261	711,222	15.26	3,948,039
1992	5,393,122	999,191	18.53	4,393,931
1993	5,886,458	977,943	16.61	4,908,515
1994	7,324,919	1,408,138	19.22	5,916,781
1995	6,700,662	2,023,526	30.20	4,677,136
1996	8,501,190	2,524,019	29.69	5,977,171
1997	7,307,820	2,056,467	28.14	5,251,353
1998	9,326,012	3,117,289	33.43	6,208,723
1999	12,120,027	4,739,187	39.10	7,380,840
2000	13,289,020	4,506,449	33.91	8,782,571

Notes: nr = not reported
Source: DOLA 2001g.



As revenues continue to outpace expenditures, the county may be able to direct funds toward future years when collections from oil and gas are anticipated to decline.

Royalties and production payments to the county would decline as gas production diminishes over the life of the project. In the later years of the project, declining production would result in discontinued state severance tax payments, and fewer CBM-related employees would be needed within the county.

Because CBM production would begin and end in a gradual manner over the 30-year period and because the county is projected to continue to grow with or without development of CBM, it is expected that other sources of employment and revenues would be created along with the projected population growth (Section 3.2.1.1). In addition to net revenues gained over the 30-year period, the reduced portion from oil and gas revenues that result from the conclusion of the project may be offset by other sources.

5.2.5.9 Boom and Bust Cycle

The potential for the anticipated development of CBM to result in a significant economic boom and bust cycle is low. The economy of La Plata County is well diversified (Section 5.2.2.1). The oil and gas industry represents only 1.1 percent of the total direct basic employment in the county (DOLA 2001c). Implementation of the anticipated CBM development would result in a total cumulative employment that would still represent less than 1 percent of the total basic employment in the county.

Because CBM-related activities would begin and end gradually over the 30-year production period, a major lay off is not anticipated from the end of the project. In light of the gradual nature of the decline in CBM-related activities, and the relatively small percentage of the total employment in the oil and gas industry sector, the decline of the project is not expected to result in a significant gap in employment or depression cycle in the overall economy of the county. The continuing population growth in the county would be expected to provide additional revenue sources over time, offsetting some of the economic losses from the end of the project.

5.2.6 Social Values

Social values or subjective measures of the quality of life may be affected by the anticipated development of CBM. CBM development may affect quality of life issues, depending on the locations of CBM facilities (wells or compressors) on a case-by-case basis, and on the perceptions of the residents located near the facilities. Most of the potential impacts related to quality of life are addressed in more detail in other sections of the CIR and are only summarized in this section.

Over the 30-year life of the project, economic benefits would be experienced as a result of increased employment, royalty payments, and tax revenues for the county. CBM wells near residential properties may affect property values and may pose health and safety risks to residents.

The anticipated development of CBM would result in very small increased traffic on local roads. Traffic congestion and risk of traffic accidents may increase at some locations where CBM-related vehicles and equipment would enter and exit major roads. Noise, dust, and road damage may be associated with increased road traffic and CBM construction operations.

The CBM-related activities and facilities would change the visual appearance of some landscape areas. Visual effects, noise, and dust generated during drilling and operation and maintenance of the proposed CBM wells may be an annoyance for nearby residents and would change the

character of open space in the area. New access roads and an increased level of activity within areas that are currently secluded and isolated may create conditions that are perceived as negative and may reduce recreational opportunities in primitive or roadless areas.

5.2.7 Property Values

The potential for the anticipated development of CBM to decrease property values for residential properties, both for properties with wells, and for properties near CBM wells, was identified as an issue. To examine these correlations, a report on property value, *Measuring the Impact of Coalbed Methane Well on Property Values* was completed and is provided in **Appendix B**.

Based on the report, the sales values for 754 properties the study area that were sold between 1989 and the first half of 2000 were used to estimate the effect of the proximity of an existing CBM well on the sales value. Of the 754 properties sold during this period, a well was located off but within 2,600 feet of the center of 544 properties, and a CBM well was located on 12 at the time of the sale. For the properties with CBM wells, the property size averaged 39 acres, the house size averaged 1,670 square feet, and the property value averaged about $307,000. For the remainder of the properties with potential well proximity effects (544 properties with a well near but not on the property), the property size averaged 7 acres, the house size averaged 1,460 square feet, and the sales price averaged $171,300 in the year 2000. The average sales values for the properties in the study area that were sold between 1990 and 2000 indicated that property values have appreciated by about 6.9 percent per year over the past decade (BBC 2001). In 1999, the median price of a home in rural La Plata County was $154,450 (SCAN 2002).

Based on the average property profile for the 544 transactions with potential effects of well proximity, the total impact in the year 2000 was estimated to be an average reduction in sales value of $1,200 (BBC 2001), a decrease of only 0.7 percent. The property values with well proximity effects are expected to increase at the same relative rate as properties with no well effects. Therefore, the value of properties near wells may be less than 1 percent lower than properties not near wells.

Currently, the county assessor adjusts the assessed values for properties and proximity effects CBM wells on a case-by-case basis. In the future, if assessed values are reduced based on well proximity, lower property values may slightly reduce tax revenues from specific parcels but would not decrease total revenues available to the county because of the contribution from each well. The CBM-related activities and facilities could affect residential property values caused by changes in the visual appearance of some areas due to construction equipment, CBM facilities, increased vehicular traffic, noise, and dust that may be an annoyance for nearby residents during all three phases of the anticipated development of CBM. Surface owners have also expressed concerns about the risks of groundwater contamination, methane gas seeps, and coal fires associated with development of CBM.

Based on overall increases in property values of about 6.9 percent per year over the last decade, overall property values in the study area are likely to continue to increase over the life of the project.

5.3 TRAFFIC AND TRANSPORTATION

5.3.1 Objectives

The objective of this section is to describe the impacts to transportation from the maximum well development according to the *La Plata County Impact Report, Northern San Juan Basin CBM Project, County Goals and Objectives for the Impact Analysis Process* (**Appendix A**). Specifically, this section addresses Issue 7 (a), which states:

a. "Roads: What is the fiscal impact to the County of trying to maintain roads subjected to traffic from drill rigs, gravel trucks, water trucks, and other use related to well drilling and production?

Based on the goals and objectives of the CIR, this study addresses the impacts from the maximum well development (approximately 318 additional wells) to the road network in the study area. Anticipated development of CBM would result in an increase in traffic associated with well construction and operations and maintenance traffic on the existing roadway network. CBM-related traffic travels between well sites and staging areas on highways and county roads and may affect local traffic patterns, create safety problems, and damage roads. The majority of CBM traffic would travel county roads under the jurisdiction of La Plata County. County roads in the study area are generally light duty and connect residential subdivisions with U.S. Highway 160, Durango, and Bayfield.

5.3.2 Impacts

Five types of impacts would affect the ability of the county to maintain roads that would be used during maximum well development. These impacts consist of (1) additional traffic volume on county roads; (2) existing roadway congestion; (3) the number of traffic accidents in the study area; (4) the potential cost increases related to road maintenance from truck traffic related to anticipated development of CBM, including maintenance related invasions of noxious weeds; and (5) conflicts with public access to existing residential uses from CBM traffic on county roads, as well as from construction and operation of well access roads.

CBM-related traffic consists of construction vehicles that would build access roads, well pads, and vehicles that haul drill rig components, equipment, and supplies. Typical vehicles include a tractor dozer, tractor/backhoe, motor patrol (road grader), gravel trucks, and light trucks used to transport employees. It is anticipated that CBM construction would use four rigs on an annual basis, limited to seasonal restrictions. An average of two round trips per construction of a road segment would be required for the trucks that haul the dozers, graders, and backhoes. An average of three round trips per day by management and worker vehicles (pickups) would occur for the duration of road construction. Approximately 6 to 12 days would likely be required to drill each target well.

Traffic levels and impacts resulting from long-term CBM operations would consist of travel of employees involved in the operations, metering, and maintenance of production wells, flowlines, and compression facilities. Vehicles used in maintenance and other operations would consist of light trucks. Maintenance would occur daily during each year over the life of the anticipated CBM production, with an additional 1 to 2 days for an annual workover.

5.3.2.1 Federal Highway Network

Volume

U.S. Highway 160 is the only federal highway that CBM-related traffic will use. Daily traffic volumes on most segments of U.S. Highway 160 are expected to increase substantially between 1998 and 2020, as shown in **Table 5-10**. The number of vehicle trips proposed for CBM facilities that would use the highway as the primary route to reach access roads is small relative to existing 1998 and to projected 2020 daily background traffic volumes. There would be no discernible impact to daily traffic volumes from CBM vehicles.

In addition to trips generated by facilities located on parcels linked to highways, most vehicles required for all of the anticipated CBM development in the study area would likely travel on U.S. Highway 160. The 318 wells proposed for development in the study area would require 324 daily vehicle trips for maintenance. The maximum development scenario assumes that all 324 daily vehicle trips would travel on U.S. Highway 160, excluding the Business Loop, to reach county roads and well access roads from Durango, Bayfield, or staging areas. These trips would increase traffic from 1998 levels on the U.S. Highway 160 to SH 3 by about 3 percent. Traffic on the U.S. Highway 160 to the county line would increase from 1998 levels by 8 percent. These increases are less than 10 percent, which is typically the threshold for a significant impact (BLM 2000b). An impact would occur if CBM were projected to generate 10 percent or more additional daily vehicle trips over the number that is projected to occur without further development of oil and gas in the study area.

Table 5-10 Highway Traffic Volume and LOS

U.S. Highway 160 (segment)	1998 Daily Volume	1998 LOS	Projected 2020 Daily Background Volume	Projected 2020 LOS	Proposed Daily CBM Vehicle Trips	Percent Increase in Daily Background Volume from CBM Trips
U.S. Highway 160 - SH3 to Bayfield Business Loop	10,432	E	17,507	F	20	<1
U.S. Highway 160 Business Loop	1,979	E	2,703	F	3	<1
U.S. Highway 160 - CR501 E. to county line	4,134	E	4,021	F	26	<1

LOS E – operating conditions near or at capacity
LOS F – forced or breakdown flow conditions
Source: Southwest Transportation System Inventory

Congestion

Roadway congestion is defined by the relationship between traffic volume and roadway capacity. LOS is used to rate roadways on the ability to accommodate the required traffic levels. **Table 5-10** summarizes recent and projected daily volumes and LOS for U.S. Highway 160 between Durango and the La Plata/Archuleta county line. The LOS classes for 2020 shown for highway segments in **Table 5-10** were projected in the Southwest Transportation System Inventory. Several roadway projects have been identified in the Southwest Colorado 2020 Transportation Plan. None, however, involve widening or other improvements that would increase capacities on U.S. Highway 160.

Accidents

Any potential increase in accidents from CBM vehicles would occur over the life of anticipated CBM production. Construction traffic includes vehicles ranging in size and weight from light to heavy trucks. Maintenance traffic generally consists of light trucks. As shown in **Table 5-10**, the increase in daily levels projected from anticipated CBM-related traffic is small. There would be no perceivable effect on overall accident rates on highways because the volume of traffic from anticipated CBM development on most of these roads is projected to be less than 1 percent.

The locations along U.S. Highway 160 where conflicts between CBM vehicles and other highway traffic are most likely to occur are at intersections where CBM vehicles turn onto highways from access roads.

5.3.2.2 County Transportation Network

Volume

Traffic on county roads generated by anticipated development of CBM in the study area is projected from the method used to calculate trips to wells and compressors presented in Transportation, Section 3.3.1.5.1, Oil and Gas Development Characteristics Related to Transportation. This methodology and the following significance criteria have been used to analyze the impact on transportation of other oil and gas developments in southwest Colorado.

An impact would occur if CBM development were projected to generate 10 percent or more additional daily vehicle trips over the number that is projected to occur without further development of oil and gas in the study area. A significant impact on traffic volume would exist if anticipated development of CBM were projected to generate 25 percent or more additional daily vehicle trips. Traffic from CBM development would have no perceivable impact if it generates less than 10 percent of additional vehicle daily trips. **Table 5-11** summarizes daily trips associated with existing and anticipated CBM wells in the study area, and compares the trips with the Average Daily Traffic (ADT) volume of all vehicle types for 1998 and the projected 2020 ADT for selected roads in La Plata County.

Anticipated vehicle trips to compressors and for well maintenance associated with each segment of county road were developed based on the methodology developed in the La Plata County Comprehensive Traffic Study (Bechtolt 1999) project population and housing growth in the county. Section 3.1.5 summarizes the methodology, which is based on road segments and associated land parcels. Each parcel of land was assigned to a road segment primarily based on locations and connectivity of minor roads, topography, and local knowledge. The road segments identified in the process were used to develop projections of anticipated CBM vehicle traffic, summarized in **Tables 5-11** and **5-12**. The CBM-related traffic volumes were linked to road segments, and rated as Low, Medium, and High to indicate the level of impact from additional CBM traffic on roads in the study area.

Low impacts would occur on roads that would experience no increase in traffic volume or an increase in traffic from CBM vehicle trips for a maximum of one well. Medium levels of impact would occur on roads that would experience increases in traffic volume from CBM vehicles that service two to seven wells. High levels of impact would occur on roads that would experience increases in traffic from CBM vehicles that service eight or more wells.

The additional maximum CBM maintenance traffic on roads in the study area from all vehicle types is less than 1 percent of total existing daily traffic for most county roads affected. There is no significant impact on traffic volume because projected CBM-related vehicle trips would not generate 25 percent or more additional daily vehicle trips on any county roads in the study area. The projected CBM-related vehicle trips would generate less than 10 percent of additional vehicle daily trips on every affected county road; therefore, there would be no perceivable impact to traffic on county roads in the study area.

Traffic levels and impacts from construction-related activities are expected to occur over a 10-year construction period for all anticipated wells. Each well would require about 2 months for construction and installation. County roads that would be used to access well sites would experience traffic increases ranging from 0 to 2,000 percent. However, these

Table 5-11 Summary of Average Daily Traffic Count, Existing and Anticipated Daily Trips for CBM Wells and Compressors for Selected La Plata County Roads in the Study Area

Route Name[1]	Location	ADT for All Vehicle Types		Daily Trips for Existing CBM Wells[2]		Daily Maintenance Trips for Anticipated CBM Facilities[2]		Daily Construction Trips for Anticipated CBM Facilities		Cumulative Daily Trips	
		1998 ADT	Projected 2020 ADT	Average Daily Trips (incl. in ADT for all vehicles)	Percent included in 1998/2020 ADT	Average Daily Trips	Percent Increase in 1998/2020 ADT	Average Daily Trips	Percent Increase in 1998/2020 ADT	Average Daily Trips	Percent Increase in 1998/2020 ADT
CR 220	2.3 Mile W of SH 172	1817	3579	2	<1.0/<1.0	2	<1.0/<1.0	666	36.8/18.7	670	36.7/18.6
CR 220	0.67 Mile W of SH 172	1378	2715	3	<1.0/<1.0	0	0	0	<1.0/<1.0	3	<1.0/<1.0
CR 223	1 Mile E. of CR 225	245	385	27	2.9/1.8	13	5.3/3.4	4329	1783/1135	4369	1767/1124
CR 225	0.67 Mile N. of CR 223	574	1366	1	<1.0/<1.0	0	0	0	<1.0/<1.0	1	<1.0/<1.0
CR 225	2.81 Mile N. of CR 223	427	1017	2	<1.0/<1.0	7	1.6/<1.0	2331	548/230	2340	546/229
CR 228	0.31 Mile E. of CR 234	289	690	2	<1.0/<1.0	0	0	0	<1.0/<1.0	2	<1.0/<1.0
CR 228	2.02 Mile E. or CR 225	374	895	3	<1.0/<1.0	3	<1.0/<1.0	7326	1960/819	7332	1959/819
CR 229	0.26 Mile N. of U.S. Highway 160	562	1404	1	<1.0/<1.0	0	0	0	<1.0/<1.0	1	<1.0/<1.0
CR 233	0.53 Mile N. of U.S. Highway 160	330	491	2	<1.0/<1.0	0	0	0	<1.0/<1.0	2	<1.0/<1.0
CR 234	2.1 Mile N. of U.S. Highway 160	898	1401	1	<1.0/<1.0	8	<1.0/<1.0	4505	503/322	4514	502/322
CR 234	0.5 Mile N. of U.S. Highway 160	1249	1948	0	0	5	<1.0/<1.0	4505	361/232	4510	361/231

Table 5-11 Summary of Average Daily Traffic Count, Existing and Anticipated Daily Trips for CBM Wells and Compressors for Selected La Plata County Roads in the Study Area

Route Name[1]	Location	ADT for All Vehicle Types		Daily Trips for Existing CBM Wells[2]		Daily Maintenance Trips for Anticipated CBM Facilities[2]		Daily Construction Trips for Anticipated CBM Facilities		Cumulative Daily Trips	
		1998 ADT	Projected 2020 ADT	Average Daily Trips (incl. in ADT for all vehicles)	Percent included in 1998/2020 ADT	Average Daily Trips	Percent Increase in 1998/2020 ADT	Average Daily Trips	Percent Increase in 1998/2020 ADT	Average Daily Trips	Percent Increase in 1998/2020 ADT
CR 501	4.2 Mile N. of U.S. Highway 160	2182	5346	16	<1.0/<1.0	24	1.1/<1.0	8168	376/153	8208	374/153
CR 502	0.77 Mile N. of U.S. Highway 160	707	1950	2	<1.0/<1.0	0	0	0	<1.0/<1.0	2	<1.0/<1.0
CR 502	3.4 Mile N. of U.S. Highway 160	342	945	7	2.0/<1.0	2	<1.0/<1.0	4995	1463/530	5004	1461/529
CR 509	0.56 Mile S. of U.S. Highway 160	907	2784	1	<1.0/<1.0	0	0	0	<1.0/<1.0	1	<1.0/<1.0
CR 510	0.52 Mile E. of CR 222	883	1854	2	<1.0/<1.0	1	<1.0/<1.0	333	38.1/18.1	336	37.7/18.0

Source: Bechtolt 1999.
1 – Road segments from Table 3-36 correspond to road segments presented in Table 3-41 to compare traffic volumes.
2 – Each well requires a daily maintenance trip and an annual workover (six trips per workover), for a total 371 trips per year per well, or 1.02 daily trips per well. The total daily trips per well has been rounded to the nearest whole number in the table.
3 – Daily construction trips for each well would occur over a 2-month period at some unspecified time during the 10-year construction period. The daily trips represent the potential maximum traffic that would occur on a road segment that would occur only over the 2-month period.

increases would occur only during the construction period for each well. Traffic on roads crossed by any flowlines would experience relatively minor delays caused by lane closures during construction. The remaining lanes would be capable of handling the expected traffic levels.

Congestion

Roadway congestion is defined by the relationship between traffic volume and roadway capacity. Where the physical characteristics of roadways are fixed, congestion varies primarily with volume.

The design capacity of county roads classified as Local is based on an estimated 0 to 999 ADT, as described in the standards of the La Plata County Code. The majority of county roads within the study area are local. County Roads 234 and 501 are classified as Minor Collector roads, which is based on an estimated 1,000 to 1,499 ADT. The existing traffic volumes (see Table 3-35) on most county roads in the CIR are within the design capacity. Existing daily traffic levels on segments of CRs 220 and 501 exceed the maximum design capacity, however. Projected 2020 daily traffic levels for all vehicle types, excluding anticipated CBM traffic, would exceed design capacities for CRs 225, 229, 234, 502, 509, and 510, as well as for CRs 220 and 501. Additional

traffic from anticipated CBM vehicles would be a minor increase, or less than 1 percent for most county roads in the study area, as summarized for selected county roads in **Table 5-11**.

The largest traffic increases from CBM-related traffic would occur on CR 223, averaging 27 daily vehicle trips from the current year through 2020. The maximum projected ADT for all vehicles is 385 in 2020. The total daily traffic of about 412 vehicles in 2020 is within the maximum design capacity of 999 for CR 223. Other county roads with increases greater than 1 percent in daily traffic from additional CBM maintenance vehicles are CR 225 and CR 501. These increases are slightly greater than 1 percent for the base year ADT of 1998.

Accidents

Accident records compiled by La Plata County indicate that the majority of accidents occur at intersections (**Table 3-37**). According to the La Plata County Emergency Response department, an estimated 6 to 10 traffic incidents involve CBM related vehicles. These are generally water trucks that provide dust control on access roads. No other data describes incidents that involve CBM –related vehicles in the study area. The potential for increased accident rates from traffic conflicts with vehicles involved in construction of access roads and well pads and well drilling, completion, and installation would occur over the construction period of approximately 6 to12 days per well. Typical vehicle weights and frequencies of trips for each type of vehicle that would be required for field development as shown in **Table 3-40**. The disparity in size and weight between passenger vehicles (automobiles and light trucks) and medium to heavy trucks required for facilities construction of CBM could result in an increase in accidents that are fatal or inflict serious injury.

Any potential increase in accident rates from maintenance vehicles would occur from anticipated CBM production, which for this analysis was assumed to be between 2003 and 2020. Maintenance traffic generally consists of light truck traffic. Four county roads in the study area include segments with high rates of accidents. These roads include CR 228, 234, 501, and 509. These roads provide access to residential subdivisions within the study area, and north and south of the study area. As shown in **Table 5-11**, the increase in daily traffic levels projected from anticipated maintenance traffic related to CBM is small over the estimated 17-year life (2003 to end of LOS projected time period of 2020) of CBM development. There would be no perceivable effect on overall accident rates on county roads because traffic from anticipated CBM development on most of these roads is projected to be less than 1 percent.

CR 228

Seventeen existing CBM well sites contribute one daily maintenance vehicle per well to existing traffic on CR 228. Anticipated CBM facilities would add 22 daily maintenance vehicle trips at one trip per well, and 7,326 construction-related trips. The relatively high number of wells proposed for the parcel that abuts CR 228 could increase the potential for accidents at blind curves and where access roads intersect CR 228. The location of most accidents on CR 228 is at a curve in the road, and is the highest accident rate of all county roads in the study area.

CR 234

The location of most accidents on CR 234 occurs near the Florida River crossing. Eight proposed wells would require vehicles to access this portion of CR 234. CBM traffic required for other wells on parcels that use the road are south of the location and would not access this portion of

the road. The La Plata County traffic study recommends that this portion of the road be realigned to improve safety.

CR 510

Most accidents occur at four locations on CR 510, which provides access from U.S. Highway 160 to residential subdivisions the study area and to the San Juan National Forest north of the study area. Sixteen existing well sites contribute to traffic on this road. The 24 additional wells proposed for parcels that would use this road would contribute an additional 24 daily maintenance and 333 construction vehicle trips to daily traffic. Recommended safety improvements identified in the traffic study include bridge replacement and roadway realignment.

CR 509

CR 509 provides access to residential subdivisions south of the study area from U.S. Highway 160. The highest rate of accidents occur on CR 509 about one-half mile south of the intersection with U.S. Highway 160. No proposed CBM facilities would be accessed from this road.

CBM Access Roads

The development of CBM facilities in the study area would require new access roads constructed over natural terrain to reach well sites and facilities. The roads would supplement state, county, FS, and private road systems already in place. Existing roads would be improved only as necessary. Wherever feasible, each access road would be constructed in a transportation corridor that would also include gas and water pipelines.

Development of access roads and well facilities would result in greater physical access to the study area. However, a majority of this access would be not be available to the public because much of the surface in the study area is privately owned.

5.3.2.3 CBM Traffic Conflicts with Land Uses

CBM-related traffic would increase the percentage of heavy truck traffic on County roads to a greater degree than indicated by the small increases in overall traffic volume. **Table 3-40** summarizes relative weights of vehicles required for the construction and maintenance of anticipated CBM operations in the Study Area. **Table 5-13** summarizes the daily vehicle traffic required for wells on selected County roads. The daily traffic trips for all vehicle weight classes as shown in **Table 5-12** is based on the assumption that all wells, compressors, and associated facilities such as access roads and pipeline installation associated with each road segment would be drilled within a two month period.

Light trucks account for about 29 percent (107,126 trips) of the total number of CBM construction vehicle trips made for wells and compressors. The costs for road maintenance from light trucks is the same as costs from road deterioration caused by other passenger vehicles. The total of 34,408 light truck vehicle trips would be spread out over an estimated 10 year construction period. Any road maintenance costs associated with light trucks would also be spread out over the construction period. Light truck traffic associated with each well would be temporary, occurring over an estimated construction and installation period of two months.

Heavy truck traffic would account for about 25 percent of the total number of CBM construction vehicle trips. Heavy truck traffic would result in increased road maintenance costs because heavy

trucks cause more damage to road surfaces of all types than automobiles and light trucks. The County Road and Bridge Department indicates that maintenance costs on roads with heavy truck CBM traffic have increased. This is because one combination truck (a truck with three axles or more) has the same impact as 1,350 passenger cars. The total of 31,800 light truck vehicle trips would be spread out over an estimated 10 year construction period. Heavy truck traffic associated with each well would be temporary, occurring over a construction and installation period of two weeks.

During wet weather conditions, heavy truck traffic can result in rutting of gravel or dirt surfaces, creating erosion problems and hazardous road conditions for other vehicles. County roads surfaced with gravel or dirt are listed in **Table 3-35**.

Some heavy trucks or loads carried by CBM trucks may exceed allowable weight limits for bridges on County roads. These vehicles would require a special permit from the County. The special permit is a conditional permit that is valid for one-way trip for loads that exceed the maximums established on the bridge weight limit map, which is on file in the County clerk and recorder's office. Overweight vehicles may also require a transport permit to move or operate on a roadway.

Medium to medium-heavy trucks account for the remaining 46 percent of the total number of CBM construction vehicle trips. The total of 49,290 medium to medium-heavy truck vehicle trips would be spread out over an estimated 10 year construction period. Any road maintenance costs associated with these trucks would also be spread out over the construction period. Medium to medium-heavy truck traffic associated with each well would be temporary, occurring over an estimated construction and installation period of two weeks.

The La Plata County Code (Chapter 1, General Provisions, Subpart B, Land Use System) includes surface disturbance standards for oil and gas facilities located on lands within the unincorporated area of the County, with the exception of lands under federal or State jurisdiction. The standards for installation of facilities which are accessible by non-maintained roads included in the County road system shall be permitted only if such roads are improved and maintained by the applicant to a level which the County engineer determines is necessary to allow such traffic to use such roads in accordance with applicable state and County standards.

Construction

For each of the selected La Plata County roads for which there was existing and projected ADT data, the addition of anticipated CBM traffic would result in impacts from heavy truck axle loadings that are considerably larger than the projected increase in traffic levels. Equivalent Single Axle Loadings (ESALs) were calculated to evaluate the impacts to paved surfaces from CBM construction traffic.

Passenger vehicles used for CBM maintenance and construction operations would not result in any measurable increase in axle loadings (< 1 percent), even though they accounted for about 32 percent of the total increase in traffic levels from CBM construction traffic. Most of the projected increase in passenger vehicle traffic on County roads between 1998 and 2020 would be from non-CBM traffic. The majority of impacts to paved road surfaces would result from the addition of heavy trucks used to haul equipment and supplies to CBM facility sites.

2-axle single unit trucks would account for about 9 percent of anticipated CBM construction traffic on County roads. Impacts from these vehicles would account for five percent of the total

impact to paved road surfaces from CBM construction vehicles. Table 3-40 summarizes the type of vehicle and proposed construction activity for each vehicle type by vehicle class.

Approximately 27 percent of CBM truck traffic would be 3 +axle single unit trucks. Impacts from these vehicles would account for 35 percent of the total impact to paved road surfaces from CBM construction vehicles. Three axle truck semi-trailer trucks would account for 13 percent of CBM traffic, and nearly 12 percent of the total impact to paved road surfaces from CBM construction vehicles.

The vehicle class with the lightest use in construction activities is 4 axle truck semi-trailer trucks, which would account for less than one percent of CBM traffic, and less than one percent of the total impact to paved road surfaces from CBM construction vehicles.

The heaviest CBM vehicles that would be used for construction and installation activities are 5-axle trailer semi-trailer trucks. These vehicles account for less than 19 percent of the total construction CBM traffic that would use County roads, however, they would account for nearly half of the impact (48 percent) to paved road surfaces.

The number of trips for the construction and installation of wells and associated by vehicle class is shown in Table 3-40. The round trips related to well and compressor installation include:

- Access road and well pad construction; 135 round trips per BLM well, 116 round trips per well drilled on private land, and 176 round trips per FS well.
- Well drilling; 160 round trips per site.
- Well completion and testing; 46 trips per site.
- Well site facilities installation; 31 trips per site.
- Pipeline installation; 52 round trips for BLM wells, 40 round trips for well on private land, and 79 trips for FS wells.
- Compressor installation; 176 round trips per site

5.3.2.4 Road Maintenance

CBM-related traffic would increase the percentage of heavy truck traffic on county roads to a greater degree than is indicated by the small increases in overall volume. The vehicle classes required for the construction and maintenance of anticipated CBM operations in the study area as shown in **Table 3-40**. **Table 5-14** summarizes the daily construction vehicle traffic required for wells on selected county roads. The impacts to paved road surfaces from anticipated heavy truck traffic would result in increased maintenance costs to La Plata County. Heavy truck traffic would also damage gravel roads, but the impact would be mitigated with county maintenance on gravel roads.

Paved Roads

The impacts to paved road surfaces from heavy truck traffic was evaluated by calculating Equivalent Single Axle Loads (ESALs) for each vehicle class on county roads paved with asphalt. These roads were evaluated with 1998 and projected 2020 daily traffic counts in the traffic study conducted by La Plata County. ESALs were calculated for eight road segments on the six county roads selected, as summarized in **Table 5-14**.

T. 35 N.

T. 34 N.

R. 8 W.

R. 7 W.

T. 34 NU.

LA PLATA COUNTY

ARCHULETA COUNTY

US 550 Corridor - US160 south to New Mexico state line

CR 221 - SR172 east to CR222

CR 223 - US160 north to CR230

CR 222 - CR510 south to SR172

CR 509 - US160B south to CR510

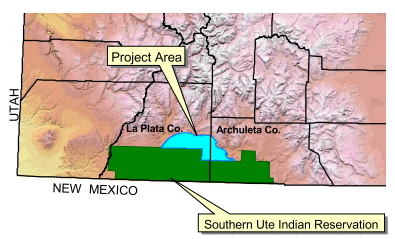
CR 516 - US160B south to CR520

Legend

- Project Area Boundary
- Proposed Well - General Location
- Proposed Well - Known Location
- Proposed Compressor
- Existing Disposal Well
- Existing Non-Fruitland Well
- Existing Fruitland Well
- Existing Compressor
- County Line
- Projected Growth Area
- Fruitland Formation Outcrop

Projected Traffic Levels

- High
- Med
- Low
- Segment Not Linked In Study



N W E S

1 0 1 2 3 4 5 Kilometers

1 0 1 2 3 4 5 Miles

La Plata County transportation data provided by the La Plata County Transportation Study, 1998. Hydrologic and Archuleta County transportation features extracted from 1:100,000 USGS SDTS data. Existing wells extracted from COGCC well database.

Transverse Mercator Projection
1927 North American Datum
Zone 13

The road segments represented here are ones extracted from the La Plata County road file that have the 'LEVEL7' attribute field populated. LEVEL7 appears to be the only field that would properly join the 'jparcels' coverage to the La Plata County roads coverage.

LA PLATA COUNTY IMPACT REPORT

FIGURE 5-4
ANTICIPATED CBM DEVELOPMENT PROJECTED TRAFFIC LEVELS IN GROWTH ZONE

ANALYSIS AREA: LA PLATA COUNTY, COLORADO

Date: 06/15/02	ArcView File: C:\944-san-juan\CIR.apr
	Prepared By: JG

Table 5-12 Projected Cumulative Maintenance CBM Trips by Road Segment							
	Compressors			Wells			
Road Segments	# of Cumulative Compressors	# of Trips/ Year/Road Segment Parcel	# of Projected Trips Between 2003 and 2020	# of Cumulative Wells	# of CBM Trips/ Year/Road Segment	# of CBM Projected Trips Between 2003 and 2020	CBM-related Trip Distribution
CR 213 - U.S.550/160 south to CR 214	0	0	0	6	2,226	37,842	Med
CR 220 - CR 301 east to SR 172	0	0	0	3	1,113	18,921	Med
CR 220 - U.S. 550 east to CR 301	0	0	0	4	1,484	25,228	Med
CR 221 - CR 222 east to end	0	0	0	3	1,113	18,921	Med
CR 221 - SR 172 east to CR 222	0	0	0	0	0	0	Low
CR 222 - CR 510 south to SR 172	0	0	0	0	0	0	Low
CR 222 - U.S. 160 south to CR510	0	0	0	0	0	0	Low
CR 223 - CR 225 east to U.S.160	0	0	0	40	14,840	252,280	High
CR 223 - U.S. 160 north to CR 230	0	0	0	0	0	0	Low
CR 224	0	0	0	3	1,113	18,921	Med
CR 225 - CR 223 north to CR 226	0	0	0	1	371	6,307	Low
CR 225 - CR 226 north to CR 228	0	0	0	4	1,484	25,228	Med
CR 225 - CR 228 north to CR 234	0	0	0	9	3,339	56,763	Med
CR 226	0	0	0	3	1,113	18,921	Med
CR 227	0	0	0	4	1,484	25,228	Med
CR 228 - CR 224 east to CR502	0	0	0	31	11,501	195,517	High
CR 228 - CR 225 east to CR 224	0	0	0	6	2,226	37,842	Med
CR 228 - CR 229 north to CR 225	0	0	0	2	742	12,614	Med
CR 228 - CR 234 east to CR 229	0	0	0	1	371	6,307	Low

Table 5-12 Projected Cumulative Maintenance CBM Trips by Road Segment							
	Compressors			Wells			
Road Segments	# of Cumulative Compressors	# of Trips/ Year/Road Segment Parcel	# of Projected Trips Between 2003 and 2020	# of Cumulative Wells	# of CBM Trips/ Year/Road Segment	# of CBM Projected Trips Between 2003 and 2020	CBM-related Trip Distribution
CR 229 - CR 230 north to CR 228	0	0	0	1	371	6,307	Low
CR 229 - U.S. 160 north to CR 230	0	0	0	1	371	6,307	Low
CR 230	0	0	0	3	1,113	18,921	Med
CR 232	0	0	0	0	0	0	Low
CR 233	0	0	0	2	742	12,614	Med
CR 234 - CR 225 north to CR 237	0	0	0	5	1,855	31,535	Med
CR 234 - CR 228 north to CR 235	2	732	12,444	1	371	6,307	Low
CR 234 - CR 235 north to CR 236	0	0	0	1	371	6,307	Low
CR 234 - CR 236 north to CR 225	0	0	0	7	2,597	44,149	Med
CR 234 - CR 237 north to CR 240	0	0	0	2	742	12,614	Med
CR 234 – U.S. 160 north to CR 228	0	0	0	1	371	6,307	Low
CR 235	2	732	12,444	12	4,452	75,684	Med
CR 236	0	0	0	1	371	6,307	Low
CR 501 - U.S. 160 north to Forest Lakes	1	366	6,222	40	14,840	252,280	High
CR 502 - CR 228 east to CR503	0	0	0	1	371	6,307	Low
CR 502 - CR 245 west to CR 228	0	0	0	14	5,194	88,298	Med
CR 502 - CR 503 east to CR 504	0	0	0	6	2,226	37,842	Med
CR 502 - CR 504 east to CR 505	0	0	0	9	3,339	56,763	Med
CR 502 - CR 505 south to U.S. 160	0	0	0	2	742	12,614	Med
CR 503	0	0	0	7	2,597	44,149	Med

Table 5-12 Projected Cumulative Maintenance CBM Trips by Road Segment							
	Compressors			Wells			
Road Segments	# of Cumulative Compressors	# of Trips/ Year/Road Segment Parcel	# of Projected Trips Between 2003 and 2020	# of Cumulative Wells	# of CBM Trips/ Year/Road Segment	# of CBM Projected Trips Between 2003 and 2020	CBM-related Trip Distribution
CR 504	0	0	0	23	8,533	145,061	High
CR 505	0	0	0	20	7,420	126,140	High
CR 506	0	0	0	2	742	12,614	Med
CR 507	0	0	0	4	1,484	25,228	Med
CR 508	0	0	0	7	2,597	44,149	Med
CR 509 - U.S. 160B south to CR510	0	0	0	1	371	6,307	Low
CR 510 - CR 222 east to CR513	0	0	0	5	1,855	31,535	Med
CR 516 - U.S. 160B south to CR 520	0	0	0	2	742	12,614	Med
CR 521 – U.S. 160B to CR 525	0	0	0	0	0	0	Low
CR 525 - CR 523 east to end	0	0	0	10	3,710	63,070	Med
CR 526	0	0	0	5	1,855	31,535	Med
CR 527 - CR 526 east to CR 528	0	0	0	3	1,113	18,921	Med
CR 527 - CR 528 north to end	1	366	6,222	120	44,520	756,840	High
CR 528	0	0	0	5	1,855	31,535	Med
SR 172 Corridor - U.S.160 south to CR309	0	0	0	1	371	6,307	Low
SR 3 Corridor	0	0	0	7	2,597	44,149	Med
U.S. 160 B Corridor - U.S. 160 east to U.S.160	0	0	0	4	1,484	25,228	Med
U.S. 160 Corridor - CR 223 (west end) east to CR 223 (east end)	0	0	0	20	7,420	126,140	High

Table 5-12 Projected Cumulative Maintenance CBM Trips by Road Segment							
	Compressors			Wells			
Road Segments	# of Cumulative Compressors	# of Trips/ Year/Road Segment Parcel	# of Projected Trips Between 2003 and 2020	# of Cumulative Wells	# of CBM Trips/ Year/Road Segment	# of CBM Projected Trips Between 2003 and 2020	CBM-related Trip Distribution
U.S. 160 Corridor - CR 223 east to CR501	1	366	6,222	20	7,420	126,140	High
U.S. 160 Corridor - CR501 east to Archuleta County line	1	366	6,222	45	16,695	283,815	High
U.S. 160 Corridor - SR 172 east to CR 223	1	366	6,222	8	2,968	50,456	Med
U.S. 160 Corridor - U.S. 550 east to SR 172	0	0	0	17	6,307	107,219	Med
U.S. 550/160 Corridor - CR 203 south to Farmington Hill	0	0	0	5	1,855	31,535	Med
NOT IN LINK AREA	3	1,098	18,666	27	10,017	170,289	High
Total	12	4,392	78,687	597	221,487	3,765,279	

Table 5-13 Projected CBM Vehicle Trips for Construction by Road Segment

Route Name and Location[1]	Number of Proposed Wells	Number of Proposed Compressors	Pavement Type	Number of Proposed CBM Trips for Wells							Number of Proposed CBM Trips for Compressors					
				Pickups and Passenger Vehicles	2 ax 6 tire SU	3+ax SU	3 ax TST	4 ax TST	5 ax TST	Total Number of Trips for Wells	Pickups and Passenger Vehicles	2 ax 6 tire SU	3 +ax SU	5 ax TST	Total Number of Trips for Compressors	Total Number of Trips for Wells & Compressors
CR 213 - U.S. 550/160 south to CR214	3	0	Gravel	318	84	273	132	3	189	999	0	0	0	0	0	999
CR 220 - CR 301 east to SR172	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 220 - U.S. 550 east to CR301	2	0	Asphalt	212	56	182	88	2	126	666	0	0	0	0	0	666
CR 221 - CR 222 east to end	1	0	Gravel	106	28	91	44	1	63	333	0	0	0	0	0	333
CR 221 - SR 172 east to CR 222	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 222 - CR 510 south to SR 172	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 222 - U.S. 160 south to CR 510	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 223 - CR 225 east to U.S. 160	13	0	Gravel	1378	364	1183	572	13	819	4329	0	0	0	0	0	4329
CR 223 - U.S. 160 north to CR 230	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 224	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 225 - CR 223 north to CR 226	0	0	Dirt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 225 - CR 226 north to CR 228	0	0	Dirt	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5-13 Projected CBM Vehicle Trips for Construction by Road Segment

Route Name and Location[1]	Number of Proposed Wells	Number of Proposed Compressors	Pavement Type	Number of Proposed CBM Trips for Wells							Number of Proposed CBM Trips for Compressors					
				Pickups and Passenger Vehicles	2 ax 6 tire SU	3+ax SU	3 ax TST	4 ax TST	5 ax TST	Total Number of Trips for Wells	Pickups and Passenger Vehicles	2 ax 6 tire SU	3 +ax SU	5 ax TST	Total Number of Trips for Compressors	Total Number of Trips for Wells & Compressors
CR 225 - CR 228 north to CR 234	7	0	Dirt	742	196	637	308	7	441	2331	0	0	0	0	0	2331
CR 226	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 227	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 228 - CR 224 east to CR 502	19	0	Gravel	2014	532	1729	836	19	1197	6327	0	0	0	0	0	6327
CR 228 - CR 225 east to CR 224	3	0	Gravel	318	84	273	132	3	189	999	0	0	0	0	0	999
CR 228 - CR 229 north to CR 225	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 228 - CR 234 east to CR 229	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 229 - CR 230 north to CR 228	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 229 - U.S. 160 north to CR 230	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 230	1	0	Gravel	106	28	91	44	1	63	333	0	0	0	0	0	333
CR 232	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 233	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 234 - CR 225 north to CR 237	5	0	Asphalt	530	140	455	220	5	315	1665	0	0	0	0	0	1665

Table 5-13 Projected CBM Vehicle Trips for Construction by Road Segment

Route Name and Location[1]	Number of Proposed Wells	Number of Proposed Compressors	Pavement Type	Number of Proposed CBM Trips for Wells							Number of Proposed CBM Trips for Compressors					
				Pickups and Passenger Vehicles	2 ax 6 tire SU	3+ax SU	3 ax TST	4 ax TST	5 ax TST	Total Number of Trips for Wells	Pickups and Passenger Vehicles	2 ax 6 tire SU	3 +ax SU	5 ax TST	Total Number of Trips for Compressors	Total Number of Trips for Wells & Compressors
CR 234 - CR 228 north to CR 235	0	1	Asphalt	0	0	0	0	0	0	0	100	64	4	8	176	176
CR 234 - CR 235 north to CR 236	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 234 - CR 236 north to CR 225	6	0	Asphalt	636	168	546	264	6	378	1998	0	0	0	0	0	1998
CR 234 - CR 237 north to CR 240	2	0	Asphalt	212	56	182	88	2	126	666	0	0	0	0	0	666
CR 235	4	1	Gravel	424	112	364	176	4	252	1332	100	64	4	8	176	1508
CR 236	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 501 - U.S. 160 north to Forest Lakes	24	1	Asphalt	2544	672	2184	1056	24	1512	7992	100	64	4	8	176	8168
CR 502 - CR 228 east to CR 503	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 502 - CR 245 west to CR 228	10	0	Gravel	1060	280	910	440	10	630	3330	0	0	0	0	0	3330
CR 502 - CR 503 east to CR 504	3	0	Gravel	318	84	273	132	3	189	999	0	0	0	0	0	999
CR 502 - CR 504 east to CR 505	2	0	Gravel	212	56	182	88	2	126	666	0	0	0	0	0	666
CR 502 - CR 505 south to U.S. 160	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5-13 Projected CBM Vehicle Trips for Construction by Road Segment

Route Name and Location[1]	Number of Proposed Wells	Number of Proposed Compressors	Pavement Type	Number of Proposed CBM Trips for Wells							Number of Proposed CBM Trips for Compressors					
				Pickups and Passenger Vehicles	2 ax 6 tire SU	3+ax SU	3 ax TST	4 ax TST	5 ax TST	Total Number of Trips for Wells	Pickups and Passenger Vehicles	2 ax 6 tire SU	3 +ax SU	5 ax TST	Total Number of Trips for Compressors	Total Number of Trips for Wells & Compressors
CR 503	1	0	Gravel	106	28	91	44	1	63	333	0	0	0	0	0	333
CR 504	12	0	Gravel	1272	336	1092	528	12	756	3996	0	0	0	0	0	3996
CR 505	8	0	Gravel	848	224	728	352	8	504	2664	0	0	0	0	0	2664
CR 506	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 507	1	0	Asphalt	106	28	91	44	1	63	333	0	0	0	0	0	333
CR 508	3	0	Gravel	318	84	273	132	3	189	999	0	0	0	0	0	999
CR 509 - U.S. 160B south to CR 510	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 510 - CR 222 east to CR 513	1	0	Gravel	106	28	91	44	1	63	333	0	0	0	0	0	333
CR 516 - U.S. 160B south to CR 520	1	0	Asphalt	106	28	91	44	1	63	333	0	0	0	0	0	333
CR 525 - CR 523 east to end	4	0	Gravel	424	112	364	176	4	252	1332	0	0	0	0	0	1332
CR 526	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 527 - CR 526 east to CR 528	0	0	Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0
CR 527 - CR 528 north to end	102	0	Gravel	10812	2856	9282	4488	102	6426	33966	0	0	0	0	0	33966

Table 5-13 Projected CBM Vehicle Trips for Construction by Road Segment

Route Name and Location[1]	Number of Proposed Wells	Number of Proposed Compressors	Pavement Type	Number of Proposed CBM Trips for Wells							Number of Proposed CBM Trips for Compressors					
				Pickups and Passenger Vehicles	2 ax 6 tire SU	3+ax SU	3 ax TST	4 ax TST	5 ax TST	Total Number of Trips for Wells	Pickups and Passenger Vehicles	2 ax 6 tire SU	3 +ax SU	5 ax TST	Total Number of Trips for Compressors	Total Number of Trips for Wells & Compressors
CR 528	3	0	Dirt	318	84	273	132	3	189	999	0	0	0	0	0	999
SR 172 Corridor - U.S.160 south to CR 309	0	0	Asphalt	0	0	0	0	0	0	0	0	0	0	0	0	0
SR 3 Corridor	7	0	Asphalt	742	196	637	308	7	441	2331	0	0	0	0	0	2331
U.S. Highway 160 B Corridor - U.S. 160 east to U.S. 160	3	0	Asphalt	318	84	273	132	3	189	999	0	0	0	0	0	999
U.S. Highway 160 Corridor - CR 223 (west end) east to CR 223 (east end)	4	0	Asphalt	424	112	364	176	4	252	1332	0	0	0	0	0	1332
U.S. Highway 160 Corridor - CR 223 east to CR 501	6	0	Asphalt	636	168	546	264	6	378	1998	0	0	0	0	0	1998
U.S. Highway 160 Corridor - CR501 east to Archuleta County line	26	1	Asphalt	2756	728	2366	1144	26	1638	8658	100	64	4	8	176	8834
U.S. Highway 160 Corridor - SR 172 east to CR 223	2	0	Asphalt	212	56	182	88	2	126	666	0	0	0	0	0	666
U.S. Highway 160 Corridor - U.S. 550 east to SR 172	8	0	Asphalt	848	224	728	352	8	504	2664	0	0	0	0	0	2664

Table 5-13 Projected CBM Vehicle Trips for Construction by Road Segment

Route Name and Location[1]	Number of Proposed Wells	Number of Proposed Compressors	Pavement Type	Number of Proposed CBM Trips for Wells							Number of Proposed CBM Trips for Compressors					
				Pickups and Passenger Vehicles	2 ax 6 tire SU	3+ax SU	3 ax TST	4 ax TST	5 ax TST	Total Number of Trips for Wells	Pickups and Passenger Vehicles	2 ax 6 tire SU	3 +ax SU	5 ax TST	Total Number of Trips for Compressors	Total Number of Trips for Wells & Compressors
U.S. 550/160 Corridor - CR 203 south to Farmington Hill	4	0	Asphalt	424	112	364	176	4	252	1332	0	0	0	0	0	1332
NOT IN LINK AREA	17	3		1802	476	1547	748	17	1071	5661	300	192	12	24	528	6189
Total	318	7		33708	8904	28938	13992	318	20034	105894	700	448	28	56	1232	107126

For each of the La Plata County roads selected and where data on existing and projected daily traffic data were available, the addition of anticipated CBM traffic would result in impacts from heavy truck axle loadings that are considerably larger than the projected increase in traffic levels.

Passenger vehicles used for CBM maintenance and construction would not result in any measurable increase in axle loadings (less than 1 percent), even though they accounted for about 32 percent of the total increase in traffic levels from CBM construction traffic. Most of the projected increase in passenger vehicle traffic on county roads between 1998 and 2020 would be from non-CBM traffic. The majority of impacts to paved road surfaces would result from the addition of heavy trucks used to haul equipment and supplies to CBM sites.

Two-axle single unit trucks would account for about 9 percent of anticipated CBM construction traffic on county roads. Impacts from these vehicles would account for 5 percent of the total impact to paved road surfaces from CBM construction vehicles. **Table 3-40** summarizes the type of vehicle and proposed construction activity for each vehicle type by class.

Approximately 27 percent of CBM truck traffic would be three or more axle, single-unit trucks. These vehicles would account for 35 percent of the total impact to paved road surfaces from CBM construction vehicles. Three-axle, semi-trailer trucks would account for 13 percent of CBM traffic and nearly 12 percent of the total impact to paved road surfaces from CBM construction vehicles.

The vehicle class with the lightest use in construction is four-axle semi-trailer trucks, which would account for less than 1 percent of CBM traffic and less than 1 percent of the total impact to paved road surfaces from CBM construction vehicles.

The heaviest CBM vehicles that would be used for construction and installation are five-axle trailer semi-trailer trucks. These vehicles account for less than 19 percent of the total construction CBM traffic that would use county roads; however, they would account for nearly half of the impact (48 percent) to paved roads.

There is a range of design ESALs for paved County roads that are determined by the thickness of pavement structures in the Study area. Pavement design is determined by traffic levels, the ability of the soil to accommodate pressures from traffic loads (R-value), and the material properties of asphalt pavement. Most soils in the County have R-values ranging from 5 to 10. Typical paved roads in the county include pavement structures that range from a poor to excellent accommodation of increased traffic loadings. At the poor end of the range, pavement structures consist of 3 inches of hot bituminous pavement (HBP) and a road base of 4 inches of CL 6 (¾ road base) and 8 inches of CL 2 (3-inch base). At the excellent end of the range, pavement structures consist of 5 inches of HBP and a road base of 4 inches of CL 6 and 10 inches of CL 2.

The maximum ESALs that the pavement at the poor end of the range is designed to accommodate is 40-50,000 ESALs. The maximum ESALs that the pavement at the excellent end of the range is designed to accommodate is 250-350,000 ESALs. The selected County roads for which ESALs from additional CBM construction traffic loadings were calculated include CRs 220, 234, and 501. The existing daily traffic on these roads is currently among the highest in the Study area, as these roads are the primary roadways through the Study area. Because of the existing daily traffic levels, it is assumed that these roads have pavement structures at the excellent end of the range for La Plata County roads, accommodating at least 250,000 ESALs. The projected total ESALs from all construction vehicle traffic presented in Table 5-14 shows that the total traffic loads from projected CBM traffic will increase by 234 to 3120 percent over loads from existing traffic levels.

Table 5-14 Equivalent Single Axle Loads (ESALs) for Selected La Plata County Roads in the Study Area

					ESAL							
Route Name [1]	Location	Existing ADT	ESAL from Existing Traffic (Pickups & passenger vehicles)	Number of Wells/Compressors	Total Number of Trips	Pickups and passenger vehicles	2 ax 6 tire SU	3 +ax SU	3 ax TST	4 ax TST	5 ax TST	ESAL Total For Road Segment
CR 220	2.3 Mile W of SH 172; US550 E. to CR301	1817	16672.81	2/0	2483	18618.124	183520.19	1383742.3	449886.65	13370.757	1866400.4	3915538.3
CR 220	0.67 Mile W of SH 172; CR301 E. to SR 172	1378	12648.01	0/0	1378	12648.013	0	0	0	0	0	12648.013
CR 228	0.31 Mile E. of CR 234; CR234 E. to CR229	289	3325.26	0/0	289	3325.2573	0	0	0	0	0	3325.2573
CR 233	0.53 Mile N. of US Highway 160	330	2358.01	0/0	330	2358.0081	0	0	0	0	0	2358.0081
CR 234	2.1 Mile N. of US Highway 160; CR228 N. to CR 240	898	6656.56	13/1	5403	17612.465	1133077	7290450.6	2362306.8	70208.418	9895998.3	20769654
CR 234	0.5 Mile N. of US Highway 160; CR228 N. to CR.240	1249	9256.11	13/1	5754	20209.297	1132796.3	7288644	2361721.4	70191.02	9893546	20767108
CR 501	4.2 Mile N. of US Highway 160; US160 N. to For. Lakes	2182	25988.44	24/1	10350	57479.463	3130726.8	21592487	7007383.3	208261.39	29224654	61220992
CR 509	0.56 Mile S. of US Highway 160; US160B S. to CR510	907	15340.72	0/0	907	15340.717	0	0	0	0	0	15340.717

Gravel Roads

Construction and maintenance costs for gravel roads are generally lower costs for paved roads. The damage on a gravel road caused by heavy truck traffic would be easier to maintain.

La Plata County currently maintains gravel roads as needed. Maintenance consists of blading, cleaning ditches, and application of fresh gravel. Gravel is applied on a 3- to 4-year roatation, or as needed.

The impact to gravel roads from heavy trucks is minimal under optimal conditions (dry weather). Heavy trucks can cause considerable damage to gravel roads under wet conditions. Heavy trucks cause rutting, which contributes to erosion of the graveled surface and creates difficult driving conditions for other vehicles. Vehicles that turn onto gravel roads from muddy access roads can carry large amounts of clay or silt, contaminating the gravel surface with fine sediments. The maintenance costs to the county from these impacts are higher than from heavy truck traffic under optimal conditions. La Plata County currently maintains informal agreements with operators to maintain gravel roads.

County Code

Some heavy trucks or loads carried by CBM trucks may exceed the allowable weight limits for bridges on county roads. These vehicles would require a special permit from the county. The special permit is conditional and is valid for a one-way trip for loads that exceed the maximum weights established on the bridge weight limit map. The permit on file in the County Clerk and Recorder's Office. Overweight vehicles may also require a transport permit to move or operate on a roadway.

The La Plata County Code (Chapter 1, General Provisions, Subpart B, Land Use System) includes surface disturbance standards for oil and gas facilities located on the unincorporated area of the county, with the exception of lands under federal or state jurisdiction. Facilities that are accessible by non-maintained roads in the county system are permitted only if the roads are improved and maintained by the applicant to a level the county engineer determines is necessary in accordance with applicable state and county standards.

5.3.2.5 County Weed Management

Construction and operation associated anticipated CBM in the study area would be likely to indirectly affect vegetation by increasing the potential for noxious weeds to become established. This increase would be driven by two factors. First, creation of disturbed areas such as new access roads would increase the number of areas that are hospitable to weedy invasions; and second, CBM-related traffic in and out of the area could transport weed seeds into areas disturbed by CBM development. Roads often serve as dispersal corridors between patches of disturbed ground, facilitating the spread of these species into new areas. Once they are established, non-native species can out-compete and eventually replace native species, reducing forage productivity and the overall vigor of native plant communities.

No data are available that describe the incidence of infestations by undesirable plants within the study area. The La Plata County Code includes objectives and goals for managing undesirable plants such as noxious weeds. They include education, mapping, support of private enterprise, management, control, intergovernmental agreements, and environmental quality. The county would use these objectives and goals to develop a weed management plan. Control of noxious weeds on private and federal lands in the study area would be negotiated with individual landowners.

Currently, CBM operators must maintain a Weed Management Plan with the County. The Weed Control Plan contains specifics on how a company will control weeds; however, individual landowners control the

efforts of the companies. Private individual landowners are notified before weeds are sprayed to determine their acceptance. In some cases, areas along roads will not be treated depending upon the preference of the landowner. Operators are currently working with the county with weed management plans, but operators also must work within the limits imposed by landowner preferences for chemical weed control.

5.3.2.6 Public Land (BLM/FS) Roads

It is anticipated that 2 miles of access road would be constructed on BLM parcels in the study area. The rights of way for the access road would be 40 feet. Assuming that the entire right of way would be disturbed during road construction, approximately 9.6 acres of land would be disturbed on BLM parcels. No existing roads accommodate vehicles on the affected parcels. There would be no conflict with other traffic on BLM lands.

The La Plata County road network would be used to access CBM facilities and associated roads on public land. The daily trips on selected county roads for maintenance vehicles that service wells on public lands is included in **Table 5-12**. The trips for construction-related vehicles are included in **Table 5-13**. The potential for traffic conflicts would occur at intersections of BLM access roads with county roads.

There is potential for new roads to provide access for dirt bikes, four-wheelers, all-terrain vehicles (ATVs), and snowmobiles in previously roadless areas on BLM and FS lands. BLM lands are accessible only via public roads or across private land, which requires permission of the landowner. BLM lands in the study area are isolated parcels surrounded by private lands, and are not large enough to provide motorized and nonmotorized road and trail users a satisfying recreational experience.

5.3.2.7 Other Types of Transportation

Federal Regulation Sub-Part 77 (FAR Part 77) establishes standards for identifying obstructions to air navigation. The standards apply to existing and proposed manmade objects, objects of natural growth, and terrain. Any structure would be an obstruction to air navigation if it is a height that is 200 feet above ground level or above the established airport elevation, whichever is higher, and is within 3 nautical miles of the established reference point of an airport.

FAA would require notification at least 30 days before anticipated construction takes place near an airport (FAA Form 7460-1, "Notice of Proposed Construction or Alteration") under the following situations:

> Construction or alteration requires notice in the event that the construction or alteration is of greater height than an imaginary surface extending outward and upward at one of the following slopes:
>
> (1) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport (public use or military) with at least one runway more than 3,200 feet in actual length, excluding heliports.
>
> (2) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport (public use or military) with its longest runway no more than 3,200 feet in actual length, excluding heliports.
>
> (3) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport (public use or military).

A small portion of the study area is within the 2-mile safety zone of Animas Air Park. The approach and takeoff flight path for runway 01/19 is oriented in a northeast - southwest direction. No anticipated wells are located under the flight path of the runway.

Well rigs would be approximately 100 feet. All rigs within 20,000 feet (3.8 miles) therefore pose a potential hazard to aircraft; therefore, FAA Form 7460-1, "Notice of Proposed Construction or Alteration," would need to be submitted to FAA at least 30 days before construction.

5.4 VISUAL RESOURCES

This section describes the potential impacts to visual resources associated with implementation of the anticipated CBM development.

5.4.1 Objective

According to the *La Plata County Impact Report, Northern San Juan Basin CBM Project, County Goals and Objectives for the Impact Analysis Process* (**Appendix A**), issues include:

B.6. - Include thematic maps to provide visual comparisons of development characteristics and trends

B.7. (g) -"What opportunities exist for mitigating the visual impacts of well drilling in the area?"

Thematic maps have been used throughout the document to provide visual comparisons of the existing and the anticipated CBM development for all resources. Specifically, thematic maps were presented in the baseline information in Chapter 3.0. All maps in Chapter 5.0 show the existing and anticipated well themes to present characteristics and trends in development. Because of the nature of visual resources, photographic simulations will also be provided in Chapter 6.0, as they serve as a valuable tool in identifying development activities and mitigation measures.

The objective of this section is to briefly describe the impacts from a potential maximum development scenario, which consists of 318 additional wells to the study area. As discussed in Chapter 3.0, the landscape currently supports 285 wells in the study area. An additional 318 wells would result in 603 well pads on the landscape within the study area.

5.4.2 General Impacts

Because the numbers of wells increase, the number of viewers will also increase. The visual impacts from the anticipated development of CBM will be similar to those discussed in Chapter 3.0 and illustrated in the photographs in **Figure 3-16**. As a result of the increased number of wells in the study area, the anticipated development of CBM would change the visual character of the existing landscape. Construction of well pads, facilities, and roads would result in a mixed rural/industrial landscape, just as the existing wells have altered the visual character. After the construction period, the most visible and common component of the project would be well pads, pumping units, and access roads.

Visual impacts will vary depending on the state of reclamation. During construction, the machinery used in well drilling, as well as an unvegetated surface disturbance, will affect the viewer. Once the construction phase is over, the long-term surface disturbance will lessen as vegetation begins to establish and cuts and fills are recontoured. The contrast of exposed soils will visually dissipate as the vegetation begins to establish, therefore decreasing the visual impact.

5.4.2.1 Increased Frequency of Wells and Associated Facilities

The increased number of wells viewed by the receptors or viewers will undoubtedly increase regardless of whether the receptors are in residential areas, transportation corridors, recreation areas and agricultural areas. This overall increase to all land use categories is illustrated in **Table 5-15** below. This table identifies frequency of wells throughout all land uses that already exist and were presented in **Table 3-44** of Chapter 3.0, but includes a new column, Frequency of Occurrence from Existing Wells and Anticipated Wells. As the number of wells increase within the study area, the frequency of occurrence when added to the already existing frequency of occurrence will be higher for certain facilities. Because there is an additional increase in wells, major facilities would likely increase from being categorized as common to very common.

In some instances, the frequency of occurrence from existing and anticipated CBM development does not increase. For instance, up to seven additional compressor stations are anticipated; however, because there are only four existing compressors in the study area, that does not make the facility "common." Additionally, it is anticipated that gathering lines will, for the most part, be buried alongside the roads, and no new major transmission lines will be constructed. Based on this information, gathering and transmission lines will not increase in frequency of occurrence with the anticipated development of CBM.

5.4.2.2 Increased Sensitivity of Wells

The impacts by each distance zone (immediate foreground, foreground, middleground, and background) associated with the level of sensitivity will not increase with an increase in wells; instead, more receptors or viewers will be within these distance zones, therefore increasing viewer sensitivity. The highest impact likely will occur within the foreground distance zone (150 feet to 0.25 miles) based on sensitivity within all land uses. For this reason, special mitigation measures for this distance zone will be discussed in Chapter 6.0.

Visual Sensitivity by Land Use

The impacts for each land use considered will be different based on sensitivity and frequency as a result of the vegetation and topographical and structural differences associated with each land use. As previously discussed, CBM-related visual impacts will increase with the number of wells. However, for visual impacts, the cumulative number of wells is the most important issue in each land use because more receptors are affected as the number of wells increases. This impact analysis considers only cumulative visual impacts from CBM development and does not assess visual impacts with respect to individual residences, commercial/industrial structures, roads, and other like structures. It does, however, assess impacts of CBM development by land use category and includes such man-made objects into the analysis as screening mechanisms to CBM development.

Agricultural, rural residential and high density residential land uses were examined this impact analysis. As illustrated on **Table 5-4** in the Land Use Section, anticipated development results in up to 73 additional CBM well windows on residential and up to 136 additional CBM well windows on agricultural land uses. Transportation and recreation areas were examined; however, because of their nature, they often intersect with several land uses.

Because of this increase in wells on these land uses, as illustrated on **Tables 5-16, 5-17** and **5-18** below, the level of sensitivity will rise in these areas. The level of sensitivity is based on the anticipated CBM development and on the characteristics that may increase or decrease the impacts. The level of sensitivity depends on the types of vegetation (height, color, and texture), the topography (percent slope within the land use and the amount of varying topography) as well as the "man-made features" (houses, fencing, and

landscaping, for example) within each distance zone. For all land uses, foreground, middleground and background distance zones were incorporated into the analysis. Immediate foreground was not specifically addressed in this zone because all facilities can be considered prominent in all land uses.

Table 5-15 Increased Frequency of Occurrence of CBM Wells and Facilities

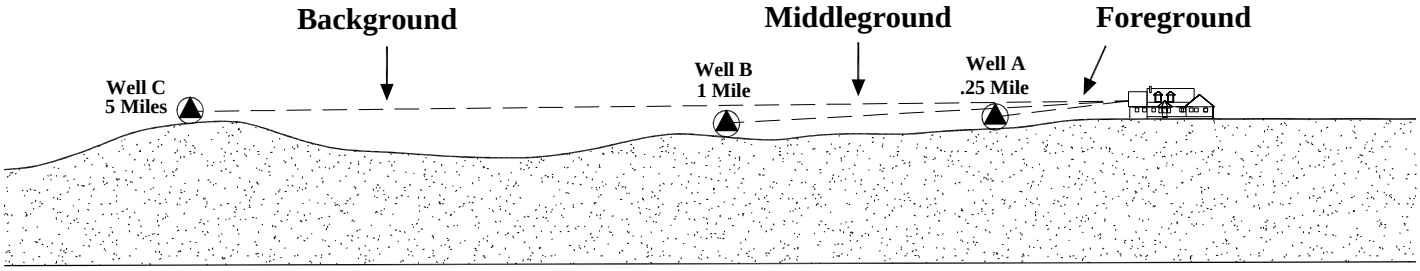
Well Facility (CBM and Conventional)	Frequency of Occurrence from Existing	Frequency of Occurrence from Existing and Anticipated
Well head	Common	Very Common
Separator	Common	Very Common
Meter house	Common	Very Common
Pump jack (CBM)	Moderate	Common
Dehydrator	Sporadic	Moderate
Condensate tank	Sporadic	Moderate
On-site water storage tanks	Moderate	Common
Uncovered produced water pit	Sporadic	Sporadic
Covered produced water pit	Sporadic	Sporadic
Water disposal well facilities	Sporadic	Sporadic
Compressor station/gas plant	Sporadic	Sporadic
Access roads	Common	Very Common
Gathering pipeline	Common	Common*
Transmission pipeline	Common	Common**
Well pad that contains well head	Common	Very Common

Notes: Sporadic occurrence - very few structures
Moderate occurrence - found with only one well type, optional components of well
Common occurrence - widespread, common distribution of wells
Very Common occurrence – increased density, very common distribution of wells
*Does not increase because it is anticipated that all gathering lines will be alongside the roads
** Does not increase because existing transmission lines are assumed to incorporate this project's gas volumes

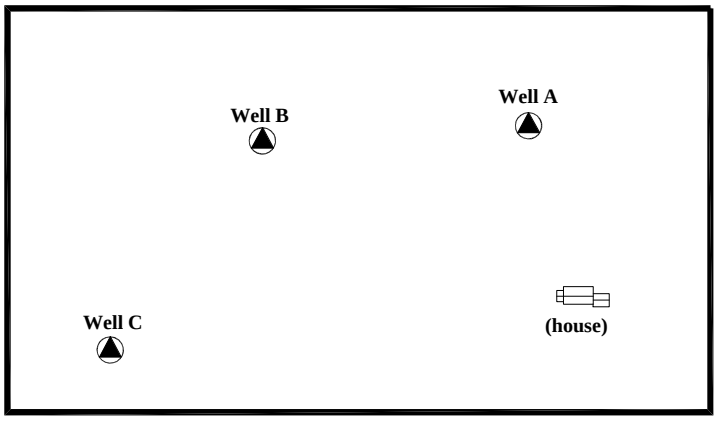
Agricultural Land Use

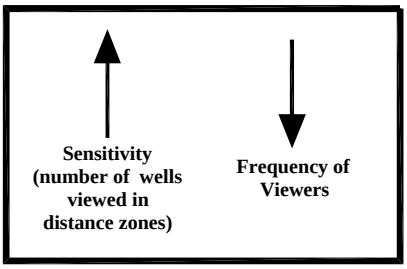
Landscape characteristics for agricultural land uses, including rangeland and farmland, generally are very specific. Typically agricultural lands consist of vegetation less than 4 feet in height, generally ranging from dark green to light brown. Typically, on private lands the topography is less than 10 percent on farmland and less than 20 percent on rangeland. There are fewer receptors in this land use than in residential land uses; still, wells on agricultural lands, particularly farmlands, are quite visible in the foreground, middleground, and background distance zones because of the lack of screening mechanisms (houses, vegetation, and topography. The level of sensitivity from anticipated CBM wells by agricultural land use and distance zone is presented in **Table 5-16**. Additionally, **Figure 5-5** illustrates the increased sensitivity of wells viewed in multiple distance zones, as well as the number of relative number of viewers of the land use category.

As illustrated in **Table 5-16,** screening mechanisms are few in this land use and well characteristics will tend to be more prominent in the foreground and middleground distance zones since the topography is less varied and vegetation is relatively short. Based on the frequency of occurrence and the well characteristics, this land use will have the highest visual sensitivity, based on the number of distance zones that can be viewed and will have the fewest number of permanent receptors or viewers compared with high-density residential and rural residential land uses.



From a cross-section view, the sensitivity in all distance zones increase.
(not to scale)





Aerial View
(not to scale)

LA PLATA COUNTY IMPACT REPORT	
FIGURE 5-5 ***VISUAL SENSITIVITY AND WELL FREQUENCY ON AGRICULTURAL LAND***	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 04/03/02	AUTOCAD FILE: 1023_PROFILE.dwg
SCALE: NTS	PREPARED BY: RLZ

Table 5-16 Visual Impacts from Anticipated CBM Wells by Agricultural Land Use

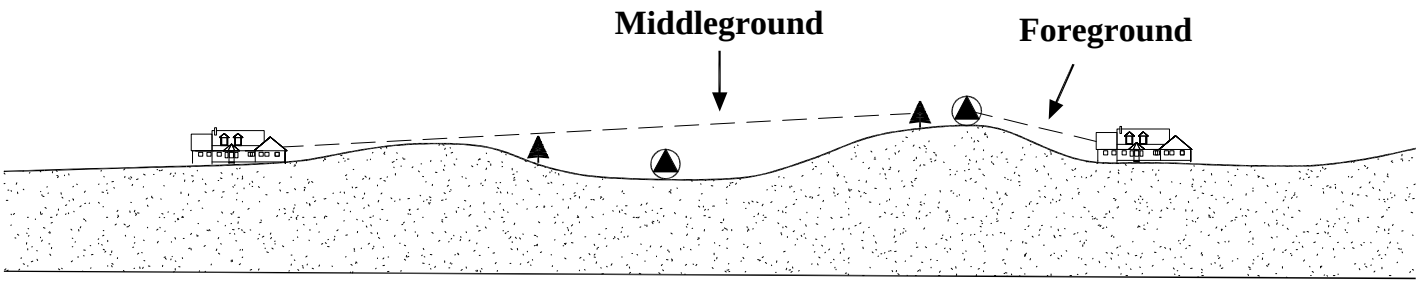
Well Facility (CBM and Conventional)	Frequency of Occurrence from Existing and Anticipated	Agricultural (farmland and rangeland) Foreground (150 feet to 0.25 miles)	Agricultural (farmland and rangeland) Middleground (0.25 to 1 mile)	Agricultural (farmland and rangeland) Background (1 to 5 miles)
Well head	Very Common	P	S	S
Separator	Very Common	P	P	S
Meter house	Very Common	P	P	S
Pump jack (CBM)	Common	P	P	S
Dehydrator	Moderate	P	P	S
Condensate tank	Moderate	P	P	S
On-site water storage tanks	Sporadic	P	P	S
Uncovered produced water pit	Sporadic	S	S	U
Covered produced water pit	Sporadic	P	S	U
Water disposal well facilities	Sporadic	P	P	S
Compressor station/gas plant	Sporadic	P	P	S
Access roads	Very Common	P	S	S
Gathering pipeline	Common	S	S	U
Transmission pipeline	Common	P	S	S
Well pad that contains well head	Very Common	P	P	S

Notes: U= unnoticed - does not attract attention
S = subordinate - begins to attract attention
P= prominent - dominates surrounding setting

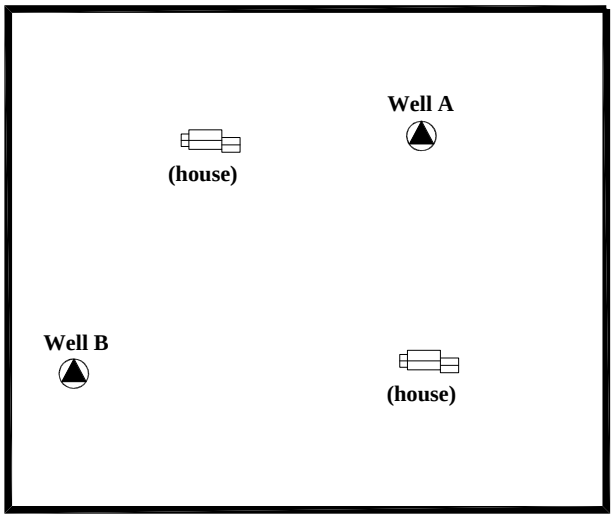
Rural Residential Land Use

Rural residential land use category includes residential areas such as is represented in Polygon D of **Figure 3-14,** which is located in the south-central portion of the study area, 1 mile north of U.S. Highway 160. Typically, the vegetation consists of native plants of all shades and textures and varies in height. The topography ranges from 0 to 30 percent slopes and varies considerably throughout the land use. Based on the land use, the number of structures that could decrease CBM-related impacts are minimal and are not considered screening mechanisms. Although there are fewer receptors in this category, the well-related facilities will likely be greater in the foreground and middleground distance zones than in high-density residential. The level of sensitivity from anticipated CBM wells by rural residential land use and distance zone is presented in **Table 5-17**. Additionally, **Figure 5-6** illustrates the sensitivity of wells viewed in multiple distance zones, as well as the number of relative number of viewers of the land use category.

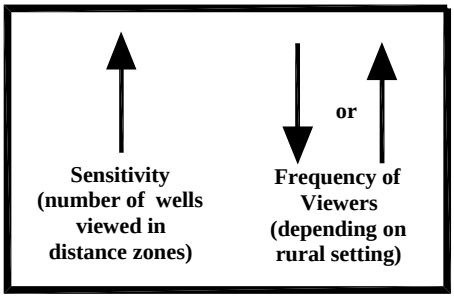
As illustrated in **Table 5-17**, screening mechanisms will be moderate in this category since the topography is varied and vegetation is varied. In this land use, well characteristics will tend to be more prominent in the foreground, will begin to dissipate in the middleground, and will generally be unnoticed in the background distance zones. It is likely that most background distance zones cannot be viewed because of the topography and vegetation. Based on the frequency of occurrence and the well characteristics, this land use will be moderately visual compared with other land uses, and will have a moderate number of permanent receptors or viewers compared with high-density residential and agricultural land uses.



From a cross-section view, some distance zones are hidden by topography.
(not to scale)



Aerial View
(not to scale)



LA PLATA COUNTY IMPACT REPORT	
FIGURE 5-6 ***VISUAL SENSITIVITY AND WELL FREQUENCY ON RURAL RESIDENTIAL***	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 04/03/02	AUTOCAD FILE: 1023_PROFILE.dwg
SCALE: NTS	PREPARED BY: RLZ

High-Density Residential

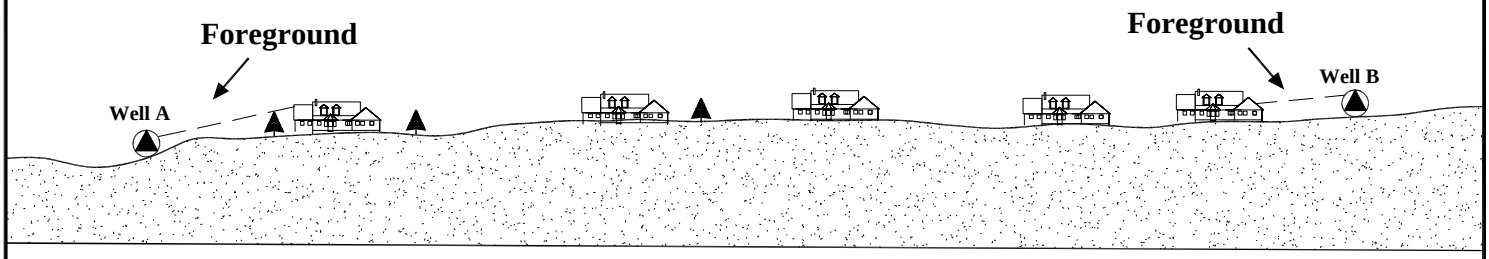
The high-density residential land use category includes residential areas such as is represented in Polygon H of **Figure 3-14** located directly north of Bayfield and ½ mile north of U.S. Highway 160. Typically, the topography ranges from 0 to 5 percent and is relatively constant. Based on the land use, multiple structures within the land use slope increase the screening of wells. For instance, although there are more receptors, not all are affected because of the visual impacts of other residential related structures. Impacts will be considerable for the receptors closest to the well; however, the impact to the community as a whole will involve a smaller percentage because of the other visual impacts within the land use. In other words, the impacts in the immediate foreground and foreground will be very prominent for all facilities; however, impacts will decrease drastically in the middle ground and background, as a result of other visual screening (houses, fences, and landscaping). The level of sensitivity from anticipated CBM wells by high-density residential land use and distance zone is presented in **Table 5-18**. Additionally, **Figure 5-7** illustrates the sensitivity of wells viewed in multiple distance zones, as well as the relative number of viewers of the land use category.

As illustrated in **Table 5-18,** since the topography is relatively flat, vegetation is varied and consists of landscaping, and structures can be assumed to be more frequent, screening mechanisms can be considered to be high in this land use category. Based on the frequency of occurrence and the well characteristics, this land use will have the lowest sensitivity level based on the number of wells that can be viewed in all distance zones. However, it will have the highest number of permanent receptors or viewers compared with the rural residential and agricultural land uses. Based on the number of viewers within this category, the visual impact is slightly more weighted by this phenomenon.

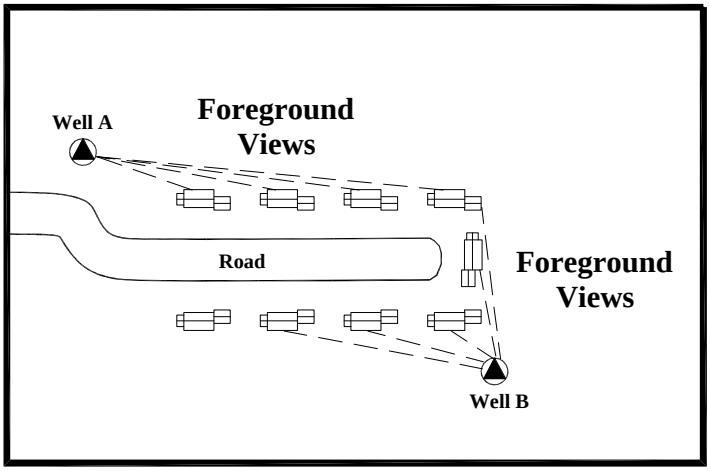
Table 5-17 Visual Impacts from Anticipated CBM Wells by Rural Residential Land Use

Well Facility (CBM and Conventional)	Frequency of Occurrence from Existing and Anticipated	Rural Residential – Residences on 3 to 5 acre parcels Foreground (150 feet to 0.25 miles)	Rural Residential – Residences on 3 to 5-acre parcels Middleground (0.25 to 1 miles)	Rural Residential – Residences on 3 to 5 acre parcels Background (1to 5 miles)
Well head	Very Common	P	S	U
Separator	Very Common	P	S	U
Meter house	Very Common	P	S	U
Pump jack (CBM)	Common	P	S	U
Dehydrator	Moderate	P	S	U
Condensate tank	Moderate	P	S	U
On-site water storage tanks	Sporadic	P	S	U
Uncovered produced water pit	Sporadic	P	S	U
Covered produced water pit	Sporadic	P	S	U
Water disposal well facilities	Sporadic	P	P	U
Compressor station/gas plant	Sporadic	P	P	S
Access roads	Very Common	P	S	U
Gathering pipeline	Common	S	S	U
Transmission pipeline	Common	P	S	U
Well pad that contains well head	Very Common	P	U	U

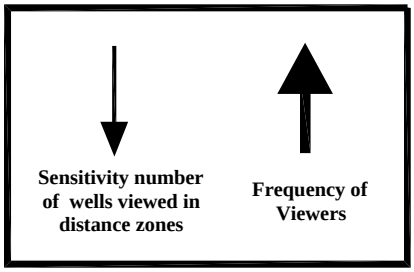
Notes: U= unnoticed - does not attract attention
S = subordinate - begins to attract attention
P= prominent - dominates surrounding setting



From a cross-section view, most middleground and background views are screened by residences.
(not to scale)



Aerial View
(not to scale)



LA PLATA COUNTY IMPACT REPORT	
FIGURE 5-7 ***VISUAL SENSITIVITY AND WELL FREQUENCY ON HIGH DENSITY RESIDENTIAL***	
ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO	
DATE: 04/03/02	AUTOCAD FILE: 1023_PROFILE.dwg
SCALE: NTS	PREPARED BY: RLZ

Table 5-18 Visual Impacts from Anticipated CBM Wells by High-Density Residential Land Use

Well Facility (CBM and Conventional)	Frequency of Occurrence from Existing and Anticipated	High Density Residential – Residences on less than 1/2 acre parcels in the Foreground	High Density Residential – Residences on less than 1/2 acre parcels in the Middleground	High Density Residential – Residences on less than 1/2 acre parcels in the Background
Well head	Very Common	P	S	U
Separator	Very Common	P	S	U
Meter house	Very Common	P	S	U
Pump jack (CBM)	Common	P	S	U
Dehydrator	Moderate	P	S	U
Condensate tank	Moderate	P	S	U
On-site water storage tanks	Sporadic	P	S	U
Uncovered produced water pit	Sporadic	S	S	U
Covered produced water pit	Sporadic	P	S	U
Water disposal well facilities	Sporadic	P	P	S
Compressor station/gas plant	Sporadic	P	S	S
Access roads	Very Common	P	S	S
Gathering pipeline	Common	S	S	U
Transmission pipeline	Common	S	S	U
Well pad that contains well head	Very Common	P	S	U

Notes: U= unnoticed – does not attract attention
S = subordinate – begins to attract attention
P = prominent – dominates surrounding setting

Transportation and Recreation

The main difference between the land uses previously discussed and the transportation and recreation land use categories is based on the duration of exposure to the well facility. Additionally, because the viewer is moving, whether it is in a car at 65 miles per hour, or is temporarily camping on nearby public lands for several days at a time, visual impacts in the distance zones are similar to the residential and agricultural land use categories. An increase in wells will increase the overall impact to these viewers; however, the impact may not be as severe as they are not permanent viewers of the well facility. Topography, vegetation, and other screening mechanisms, such as structures, vary throughout the study area in transportations corridors and recreation areas.

Typically, more wells can be viewed on minor arterials and collector roads because of the decreased speed of the vehicle. However, based on traffic counts, there are fewer viewers on these roads than on major arterials. Although there are more viewers along major arterials, typically speeds are higher and the impact from the well characteristics are not as great. As with high-density residential visual impacts, visual sensitivity (viewed in most distance zones) is relatively low, in this case based on the viewing duration; however, more viewers are affected by the presence of additional CBM wells in this case.

Recreation areas, which typically represent natural settings, will tend to have more dramatic impact to the viewer. The nature of the recreational experience varies, depending on the activity. Recreational experiences might include snowmobile, horseback riding, biking, hiking, or ATV use. A person horseback riding or hiking might be more sensitive to the development because of the nature of the activity than would a snowmobiler or ATV user. For all users, these visual impacts are relatively short term based on the amount of time the development is viewed (compared with a resident, who has long-

term visual impacts). Regardless of the amount of visual exposure, the increased CBM development will likely decrease the experiences for some recreationalists.

Because of the limited designated and undesignated private recreation areas within the study area, few locations would be considered representative recreation observation areas. Therefore, a similar analysis as was presented for agricultural lands and residential areas would not be representative of the recreation sites in the study area. As the number of wells increase, more will be visible to recreationalists. Therefore, the recreation experience, for some, will also be impaired. Although the viewer's recreation experience may be impaired by the increase in wells, the impact is short term because of the limited duration.

5.4.3 Summary of Impacts

To summarize, as the number of wells within the study area increase, more receptors will be visually affected. The impacts will be more prominent during the construction phase and less prominent during the operation phase.

Land use characteristics influence the level of sensitivity to well facilities. Agricultural land uses will have the fewest viewers; however, the well characteristics are most apparent in this land use category because of the relatively flat topography and short vegetation of homogeneous color. Rural residential land uses will have fewer viewers than on agricultural lands, and the topography and colors and heights of vegetation will vary, which screen the well facilities in the middleground and background distance zones. High-density residential will have more viewers, however the wells are often screened by the homes in the land use area. These land use impacts from anticipated CBM are summarized in **Table 5-19** below. In all instances, site-specific situations influence impacts.

Table 5-19 does not illustrate the visual impacts from transportation and recreation land uses in the area because the distance zones vary with the viewer's perspective. When the receptor or viewer is not permanent, the impact by distance zone cannot be analyzed. In both transportation and recreation land uses, visual impacts from anticipated CBM development to the viewer are increased simply because, as wells increase, the number of viewers or the impact increases. Transportation visual impacts will be similar to other land uses; however, the duration of the view to the well facility is reduced. Recreation views of wells will typically be dramatic because the viewer's intent is to enjoy a natural setting. Increased frequency of an industrial-like activity within or near designated or undesignated recreation areas may disrupt the experience. The impacts will be short term based on the duration of viewing.

Table 5-19 Anticipated CBM Well Impacts by Land Use and Distance Zone

Land Use	Immediate Foreground Distance Zone 0 to 150 Feet	Foreground Distance Zone 150 feet to 0.25 mile	Middleground Distance Zone 0.25 to 1 Miles	Background Distance Zone 1 to 5 Miles
Agricultural	High	Med – High	Med- High	Low - High
Rural Residential	High	Med - High	Med - High	Low- High
High Density Residential	High	Med - High	Med - High	Low- High

Notes: High = prominent well facility characteristics and likely to affect the viewer
Medium = subordinate well facility characteristics and may affect the viewer
Low = unnoticed well facility characteristic and unlikely to affect the viewer

This impact analysis indicates that the frequency of wells viewed and the sensitivity by distance zone are correlated. Regardless of this correlation, mitigation in most instances will be similar for all land uses and will vary only by distance zone; however, site-specific mitigation by land use can be proposed where

applicable. A series of these mitigation measures will be presented in Chapter 6.0 of this document that are intended to decrease the overall impact of additional wells or well-related facilities.

5.5 NOISE

This section describes the potential impacts to noise associated with the anticipated CBM development.

5.5.1 Noise Objectives

According to the *La Plata County Impact Report, Northern San Juan Basin CBM Project, county goals and objectives for the Impact Analysis Process*, issues for noise include:

B(7)(f) i. *"What is an appropriate standard for noise, based on specific characteristics of pumping and compression?"*

B(7)(f) ii. *"Ancillary facilities are not always clearly defined in field development scenarios. For example, how much additional compression will be needed, can its location be projected, and what will be the noise impact?"*

This section addresses these issues by identifying the noise levels measured in communities near existing and projected CBM development. The measurements included construction and operation and the noise produced by compression and pumping facilities. This section also discusses predicted changes in noise levels in these communities resulting from multiple CBM facilities.

5.5.2 Predicted Noise Impacts from Anticipated CBM Development

The existing number of CBM wells in the study area totals 266. The anticipated CBM development for the study area, as illustrated in **Figure 4-1**, will be an increase of approximately 119 percent, or 318 CBM wells, for a cumulative total of 584 oil and gas wells. Therefore, elevated noise levels will result from an increase in construction and operation associated with the increased CBM development. The construction of new CBM wells, the operation of the CBM wells, and other associated noise such as well completion or re-completion were analyzed to assess the impacts from the increased CBM development and resulting increased noise levels.

CBM Construction Noise Impacts

Elevated levels of noise will result from the maximum anticipated well development (approximately 318 wells). This noise will be a result of additional vehicles and the construction equipment during the construction phase of CBM well pads, as well as during the operation phase. However, the noise related to construction will be temporary at each location or noise source. The noise level of various construction equipment is shown in **Table 3-46** along with the expected levels at 50, 500, 100, 1,500 and 2,000 feet from the equipment.

Noise above the average background level will occur as a result of CBM development. Noise associated with construction of CBM facilities, including drilling the wells or completion and recompletion, will be short term. After drilling is completed, the noise produced by the operation of CBM facilities will be long term for the duration of the project. The main sources of noise will be the pumping units used to extract the CBM gas and the associated compressor stations needed to move the natural gas from the wells to pipelines. This section describes the estimated levels of noise near these CBM activities.

For both construction and production, the CBM noise is estimated using a level measured near the activity and then predicted at various distances using the Inverse Square Law of Noise Propagation, which states that noise will decrease by 6 dBA with every doubling of distance from the source (Harris 1991). This methodology of estimating noise propagation is represented by:

$$L_2 = L_1 - 20 \log (R_2/R_1)$$

where:

L_2 = noise level at a selected distance R_2 from the source

L_1 = noise level measured at a distance R_1 from the source.

Not all construction equipment would operate continuously or simultaneously, so the maximum noise level during construction of the well pad is assumed to be 85 dBA. Using the noise propagation formula, noise levels would fall below 55 dBA at approximately 1,500 feet from construction. Because construction usually will occur between 7:00 a.m. and 7:00 p.m., nighttime noise levels are not commonly affected by construction of a CBM well.

Noise during the drilling phase would also be elevated above pre-existing levels. Typically, the noise from a drilling rig is 74 dBA at 200 feet from the rig (USDI 1981). Noise emanating from drilling rigs would decrease to 60 dBA at 1,000 feet, to 57 dBA at 1,500 feet, 54 dBA at 2,000 feet, and 50 dBA at 3,000 feet. These noise levels would be experienced for 24 hours per day for the 1 to 4 days generally needed to drill a CBM well. Construction and drilling noise or completion and recompletion would be short term and would be realized only when the one of these activities occurred.

Construction of compressor stations would take 1 to 2 months. Therefore, the elevated noise levels during daylight hours would continue for the duration of the construction.

Noise Impacts from CBM Operation

This section predicts the noise impacts from compressor stations and pumping units at selected distances beyond the property boundary of the CBM facility. Separation distances are recommended between these facilities and existing residences so the COGCC noise criteria will be attained. **Figure 4-1** shows the planned location of CBM facilities.

Noise levels would decrease substantially after the well pads, roads, and pipelines have been constructed and the wells have been drilled. Sources of noise would then be limited to periodic vehicle trips to the well sites and the pumping units, except for any completion or recompletion that would be similar to construction-related noise but only short term. Typical noise from a pumping unit operating 24 hours per day would be 61 dBA at 100 feet (USDI 1981). A pumping unit would occupy by less than one-quarter acre on an approximate 100 by 100 parcel of land. Noise emanating from pumping units would be 67 dBA at 50 feet from the well, 55 dBA at 200 feet from the well, and 41 dBA at 1,000 feet from the well.

Caterpillar engines, model 3516, will be installed at compressor stations to provide the compression required to move the gas from the wells to transmission pipelines. For an industrial engine model 3516, the bhp ranges from 1,355 to 200 bhp at 1,200 to 1,800 revolutions per minute (rpm). The sources of noise constitute the total noise from this engine. According to Caterpillar (Wagner Power Systems 2002), the exhaust produces a noise of 109 dBA at 4.9 feet. The mechanical noise from the engine produces 99 dBA at 3.2 feet. To calculate the total noise from this engine, the two noises are added together logarithmically in the following manner (Harris 1991)

$$\text{Noise (dBA)} = 10 * \text{LOG} (10^{L_1/10} + 10^{L_2/10})$$

Where: L_1 and L_2 are the source sound levels (dBA) of individual collected sources.

This results in a total source noise of 109.4 dBA at 4.9 feet. However, the engines would be enclosed in a building for noise suppression, protection from climate, and security. The enclosed building where the compressor would operate would attenuate noise by approximately 20 dBA (Cohn 1981). Therefore, the effective noise level would be 89.4 dBA at 5 feet from the edge of the building enclosure. In the event that booster compressor units are used in the field, a 300 hp booster compressor is 3 to 5 dBA less than the Caterpillar engines.

The property line for a compressor station is defined as a fenced or unfenced parcel of approximately 1 acre on a square parcel that is 200 by 200 feet. The property line for a pump jack is defined as a fenced or unfenced parcel of approximately 1/4 acre as on a square parcel 100 by 100 feet. A typical compressor station would occupy approximately 1 acre on an approximate 200 by 200 parcel of land. Therefore, the noise emanating from the compressor would decrease to 75 dBA at the property line. **Table 5-20** demonstrates the predicted noise levels at selected distances from the compressor stations and pumping units.

As demonstrated above, noise from a compressor station will decrease to the COGCC commercial noise level of 60 dBA at 50 feet from the CBM facility property line. The residential criteria of 55 dBA during the day will occur at 175 feet from the property line. The residential criteria of 50 dBA at night will occur at 375 feet. At a distance of 1,000 feet from the property boundary of the compressor station, noise from the compressor engine will decrease below the general background levels and will not be audible. Noise levels from each pumping unit are also predicted to below the COGCC night criteria at 325 feet from the property line.

This noise analysis demonstrates that the noise from any CBM activity would be below 40 dBA, a typical average night background level, at 1,000 feet or less than one-quarter mile from the CBM facilities. If compressor stations were located at least 375 feet from existing residences, the regulatory guidelines of the COGCC would be met during the day and night. The COGCC criteria would also be met if pumping units were located at least 325 feet from existing residences.

Table 5-20 Noise Impacts from CBM Facilities

Distance from Compressor Property Line	Noise from Compressor Station (dBA)	Distance from Pumping Unit Property Line (feet)	Noise from Pumping Unit (dBA)
At Property Line	63.4	At Property Line	67.0
50	59.9	50	61.0
100	57.4	100	57.5
150	55.4	150	55.0
200	53.8	200	53.0
250	52.5	250	51.5
300	51.3	300	50.1
350	50.3	350	49.0
400	49.4	400	47.9
450	48.6	450	47.0
500	47.8	500	46.2
550	47.1	550	45.4
600	46.5	600	44.7
650	45.9	650	44.1
700	45.3	700	43.5
750	44.8	750	42.9
800	44.3	800	42.4
850	43.8	850	41.9

Table 5-20 Noise Impacts from CBM Facilities			
Distance from Compressor Property Line	**Noise from Compressor Station (dBA)**	**Distance from Pumping Unit Property Line (feet)**	**Noise from Pumping Unit (dBA)**
900	43.4	900	41.4
950	43.0	950	41.0
1000	42.6	1000	40.6
1050	42.2	1050	40.2
1100	41.8	1100	39.8
1150	41.4	1150	39.4
1200	41.1	1200	39.1
1250	40.8	1250	38.7
1300	40.5	1300	38.4
1350	40.2	1350	38.1
1400	39.9	1400	37.8

5.5.3 Multiple CBM Facilities

The impacts above describe the noise produced by a single compressor station or pumping unit. However, The cumulative effect of multiple facilities must be considered to estimate the total noise impact from CBM activities. The cumulative impact analysis for noise from CBM development was based on associated common sources rather than receptors in the study area based on the amount of noise receptors to be assessed. The cumulative impact analysis factored in all activities related to CBM development and calculated the total noise created from these combined activities generally for study area.

Since development of CBM would be widespread throughout the project area, two hypothetical scenarios are presented to demonstrate the cumulative effect on noise. The first case, shown on **Figure 5-8**, considers an approximate square-mile area with a compressor station in the center and four pumping units centered in each quadrant of the square-mile area. The second case, shown on **Figure 5-9**, considers the location of the southwest pumping unit at 1,000 feet east and the southeast pumping unit 1,000 feet north from the proposed CBM well pad.

A grid was established every 200 feet within this analysis area. The noise from each source at every grid point was then calculated using the previously described equation:

$$L_2 = L_1 - 20 \log (R_2/R_1)$$

where:

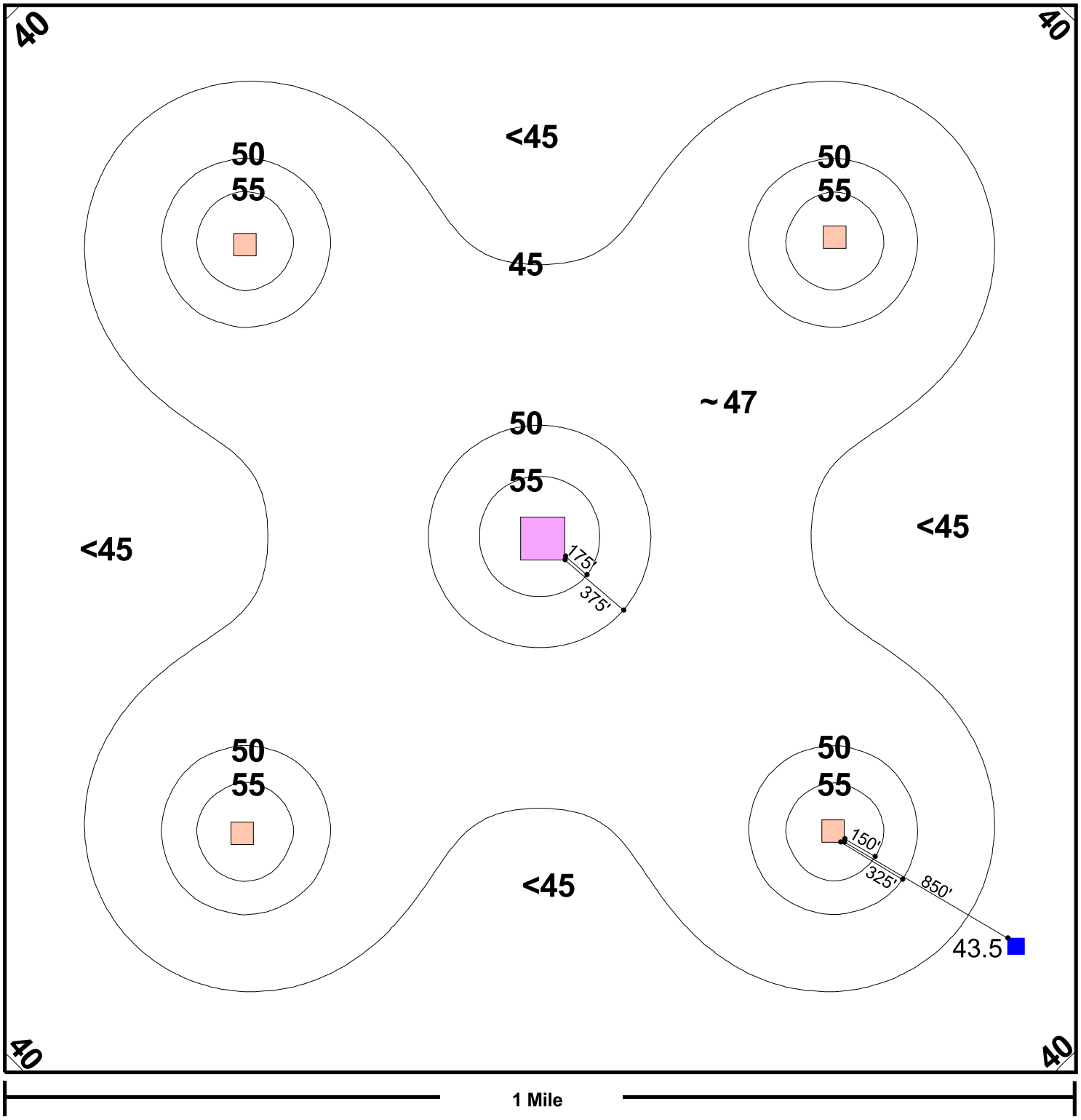
L_2 = noise level at a selected distance R_2 from the source

L_1 = noise level measured at a distance R_1 from the source.

Similar to the effect of collected noise sources, the total noise at a location produced by two or more sources is not logarithmically additive, but rather is a logarithmic summation. The following equation was used to sum the contribution to noise from every source at each grid point (Harris 1991):

$$L\ (dBA) = 10 * LOG\ (10^{L_1/10} + 10^{L_2/10} + ... + 10^{L_n/10})$$

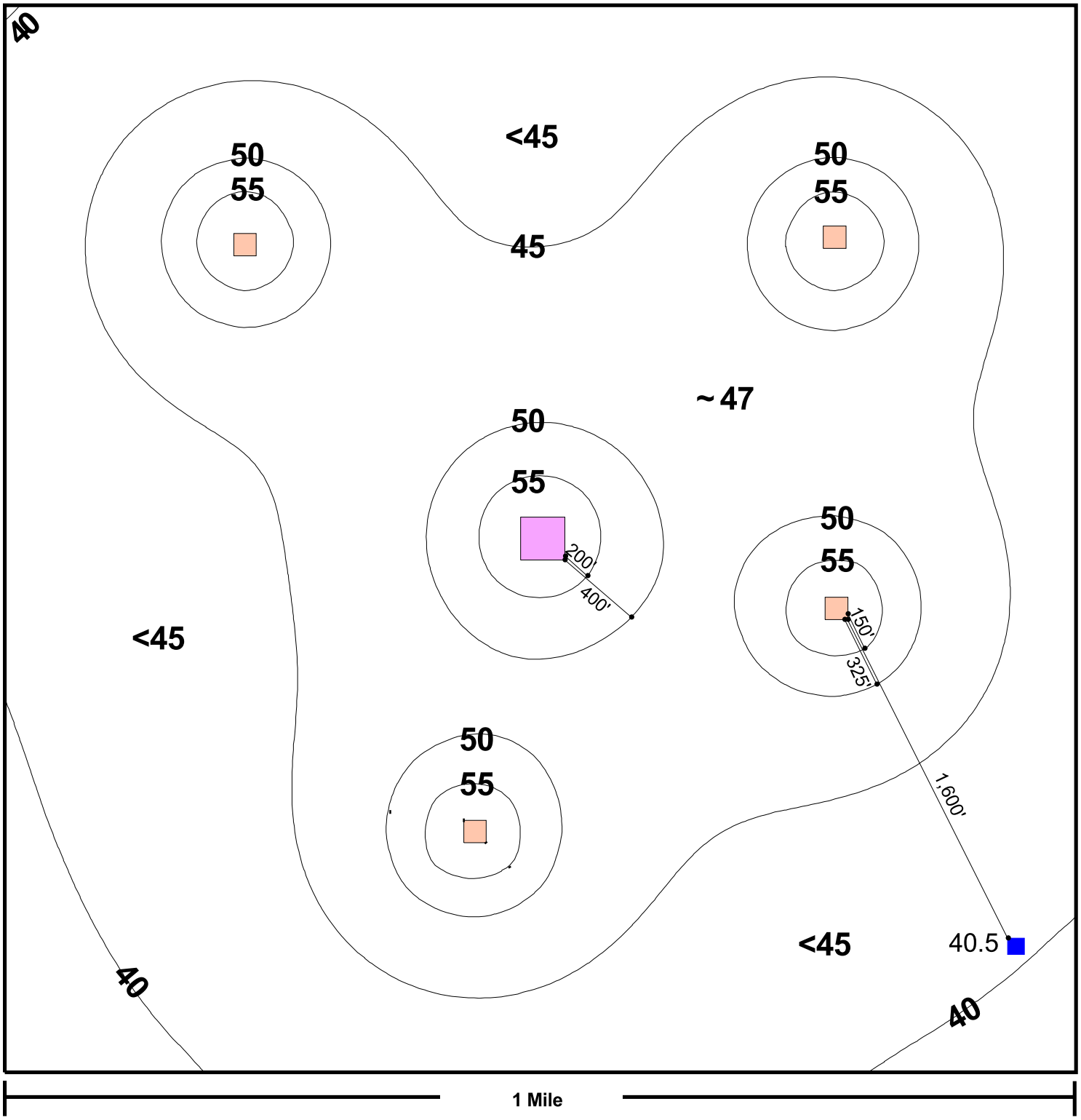
Where: $L_1, L_2, ..., L_n$ are the sound levels produced by sources of varying distances at one location.



Legend

- 50 Noise Contours (dBA)
- Representative Square Mile
- Representative Structure (75ft x 75ft)
- Proposed CBM Well Pad (100ft x 100ft)
- Proposed Compressor Pad (200ft x 200ft)

LA PLATA COUNTY IMPACT REPORT	
FIGURE 5-8 ***REPRESENTATIVE SECTIONS AND ASSOCIATED NOISE IMPACTS FROM CBM FACILITIES, SCENARIO 1***	
ANALYSIS AREA: La Plata and Archuleta Counties, CO	
Date: 6/14/02	ArcView File: C:\..\1023\noise\noise.apr Layout--Equal Spacing
PLOT SCALE: 1" = 2,000"	Prepared By: MSH



Legend

50 Noise Contours (dBA)

Representative Square Mile

Representative Structure (75ft x 75ft)

Proposed CBM Well Pad (100ft x 100ft)

Proposed Compressor Station w/Building Pad (200ft x 200ft)

LA PLATA COUNTY IMPACT REPORT

FIGURE 5-9
REPRESENTATIVE SECTIONS AND ASSOCIATED NOISE IMPACTS FROM CBM FACILITIES, SCENARIO 2

ANALYSIS AREA: La Plata and Archuleta Counties, CO	
Date: 4/4/02	ArcView File: C:\..\1023\noise\noise.apr Layout--Offset Spacing
PLOT SCALE: 1" = 2000"	Prepared By: MSH

The results of the noise modeling are shown on **Figures 5-8** and **5-9.** When the facilities are equally spaced, the 55 dBA and 50 dBA noise contours from the compressor station and the pumping facilities expand slightly in response to the contribution from the pumping units. However, when the CBM facilities are moved closer to each other, the size of the 50 dBA contour surrounding the compressor expands more to the east through south in response to the cumulative noise contribution from the two closer pumping units. Recommended mitigation measures to minimize the cumulative noise impact related to the proximity of CBM facilities are discussed in Chapter 6.0 of this document.

5.6 HEALTH AND SAFETY

This section describes the potential impacts to public health and safety associated with the anticipated development of CBM.

5.6.1 Objectives

The objective of this section is to describe the impacts to health and safety from the maximum well development according to the *La Plata County Impact Report, Northern San Juan Basin CBM Project, County Goals and Objectives for the Impact Analysis Process* (**Appendix A**). Specifically, this section addresses Issues B (d) and (e) that state:

d. "Public safety: What are the specifics of drilling and production safety that pertain to reasonable provisions for setbacks and fire/emergency response?"
Setbacks were identified and impacts from an increased number of CBM wells in the study area were addressed to assess impacts to health and safety. Setbacks are necessary based on noise, visual impacts, and safety of the public that could ultimately result in a land use conflicts. Certain issues with respect to health and safety are driven by potential groundwater contamination, potential methane seepage, and effects on springs from injection.

e. "Fire and emergency response: Evaluate the current emergency response system in La Plata County. Suggest changes for a more effective system."
An evaluation of the increase in number of CBM wells in the study area was used to assess impacts to the fire and emergency response systems.

Based on the goals and objectives of the CIR, this study focuses on the planning-related issues associated with the anticipated CBM development. Analysis of natural resources, including soils, air, and water, was not part of this study. Studies are currently in progress to address the potential impacts of additional CBM development on soils, air quality, and water quality in the study area. Public health and safety issues that relate specifically to the objectives defined by La Plata County are discussed in this section.

5.6.2 Related Setback Regulations

Existing setbacks for CBM wells are required by both existing La Plata County regulations and COGCC (Sections 3.1.3.1 and 3.1.3.2). The existing regulations provide for setbacks related to oil and gas facilities for the protection of public health and safety and are discussed in the following subsections.

The results of numerous ongoing investigations during the anticipated development of CBM will provide additional information on to concentrations of methane in soils and water wells that will help to identify potential hazards within the study area. Public safety-related buffer zones for these hazards could then be used to guide future development. Setbacks for future residential development near of the identified hazard areas may be defined and regulated in the future.

La Plata County Oil and Gas Setbacks

Requirements for oil and gas facilities in La Plata County are provided in Chapter 90 of the Code of La Plata County, Ordinance No. 2000-32 (La Plata County 1998a). A minor oil and gas facility is defined as "an individual well site built and operated to produce petroleum and/or natural gas (methane), including auxiliary equipment required for production, …. and other equipment located within the perimeter of the well site pad." Gas gathering lines, water collection lines, facilities associated with gas gathering and water collection lines, motors or engines with a cumulative horsepower rating of less than 200 bhp, pumping equipment, and storage yards are also included in the definition of a minor oil and gas facility.

A setback of at least 400 feet is required between the site perimeter of a minor facility and the closest existing residential structure, unless verified written consent is obtained from the affected surface property owner to a waiver of this standard.

A setback of at least 200 feet is required between the site perimeter of a minor facility and the closest platted subdivision lot line, unless verified written consent is obtained from the affected property owner.

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 setback requirements. The applicant must, 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 as described in this article.

Setbacks between a major facility and the closest existing residence or platted subdivision lot line are determined on a site-specific basis, based on the review criteria for major facilities identified in Section 90-43(c) and (d), as applicable.

State Oil and Gas Setbacks

COGCC statewide rules apply to drilling and operation of oil and gas wells in the State of Colorado, regardless of land ownership. Generally, no well to be drilled in excess of 2,500 feet can be located less than 600 feet from any lease line or 1,200 feet from any other producible oil or gas well unless authorized by order of COGCC. A well to be drilled less than 2,500 feet cannot be located less than 200 feet from any lease line or 300 feet from any other producible oil or gas well unless authorized by COGCC (COGCC 2001a). The setback requirements between producing gas wells in the same formation apply only in areas where a spacing order has not been applied. For the Fruitland Formation, the drilling windows are the setbacks from lease lines and other Fruitland Formation wells.

COGCC safety regulations require wellhead locations in all areas of the state to be a minimum of 150 feet or 1½ 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 2001a) High-density areas are generally defined as an average density of one occupied building unit per 2 acres. In high-density areas, wellheads, production tanks, and associated equipment are to be not less than 350 feet from building units. Production tanks and associated equipment are to be located not less than 350 feet from an educational facility, assembly building, hospital, nursing

home, board and care facility, or jail. The local government designee has the authority to request up to a 500-foot setback from these facilities.

The COGCC has established setback requirements between existing oil or gas wells and existing coal mines and drilling and operation of additional natural gas wells. Oil and gas wells may not be located less than 200 feet from a mine shaft or entrance to a coal mine that has not been obviously abandoned or sealed; less than 100 feet from any mine shaft house, mine boiler house, mine engine house, or mine fan; or less than 15 feet from any mine haulage or airway (COGCC 2001a).

5.6.3 Public Health and Safety

Most of the risks to public health and safety resulting from drilling and production associated with the anticipated CBM development would be posed by the potential for methane gas seepage to occur near residences primarily near the outcrop. Increased development of CBM in La Plata County may cause environmental changes at the Fruitland Outcrop, increasing the risk of methane seeps or fires and associated risks to public health and safety. Direct impacts associated with the anticipated development of CBM in the study area include an increased risk of methane seepage, releases of toxic gases and odors and fires or explosion. Although the potential impacts from increased development of CBM are not yet well understood, studies are in progress, as stated above.

Risks to public safety exist primarily for residential properties in areas near the outcrop of the Fruitland Formation and in low-lying areas. Additional indirect impacts to residential properties in the study area may result from noise, visual intrusion of project facilities, traffic, and dust generated by CBM development-related vehicles and equipment. These impacts would occur primarily during the construction phase. The indirect impacts from noise, visual intrusion of project facilities, traffic, and dust are discussed in other sections of the CIR; therefore, these impacts are not addressed in this section.

As population and the density of residential development increases over time, the potential for the anticipated CBM development and any associated methane seeps, fires, or accidents to affect residential land uses and public health and safety will increase. Over time, these risks to public health and safety will increase proportionately with the number of CBM facilities and with proximity of CBM facilities to other land uses, primarily residential.

Based on discussions with the COGCC field inspectors on historical information for the existing 1,000 CBM wells in the Northern San Juan Basin (BLM 2000a), the number of reported public safety incidents related to CBM has been low, almost rare (Weems 2002). Based on this historical information on CBM-related public safety incidents, additional impacts to public health and safety are expected to be minimal; however, ongoing natural resource studies may provide additional information in the near future.

Historical risks to public safety posed by methane seepage have primarily been identified for areas near the Fruitland Outcrop. Based on the results of ongoing methane monitoring in this area, the BLM has defined a 1.5-mile outcrop buffer zone down basin from the outcrop where no federal CBM-related drilling will occur with the exception of monitoring and experimental wells (BLM 2000a). The COGCC 3m model shows that additional CBM is not anticipated to cause significant change to the existing seeps along the outcrop. However, subsurface and soil investigations could be required for residential development at or within 1.5 miles of the Fruitland Outcrop. There is a risk to residential property from methane seeps at the Fruitland Outcrop.

5.6.4 Impacts to Emergency Response and Fire Fighting Services

CBM development in La Plata County could increase the risk of accidents and fires that require assistance from the existing emergency response and fire fighting services; however, based on historical information for the existing CBM wells in the Northern San Juan Basin, CBM-related incidents are low (Weems 2002).

Under cooperative agreements, several emergency response and fire fighting resources serve the study area, including the Durango Fire and Rescue District, and the Upper Pine Fire District as discussed in Section 3.2.4.2. The number of new wells associated with the anticipated CBM development within each fire district is included in **Figure 5-10** and **Table 5-21**. The historical number of oil and gas related incidents per year in each fire district and the estimated response times are also shown on **Table 5-19**. This information was then used to estimate the projected increase in number of annual incidents that may occur for the anticipated CBM development. Because the actual number of CBM-specific incidents per year was not available, the total incidents related to oil and gas are used for this analysis; therefore, it is a conservative estimate.

At present, specific emergencies related to oil and gas are reported not to be a heavy burden on the Durango Fire and Rescue District (Waters 2001). The district recorded two fire fighting response incidents in the last few years, about five responses to medical emergencies per year that are deemed related to oil and gas, and an occasional emergency response for private contractors that accidentally strike a gas line (Waters 2001).

Currently, the existing oil and gas facilities in the county are reported to have somewhat affected the Upper Pine Fire District as a result of several fires caused by gas well flare-ups, minor spills, and hazardous material response (Cavaliere 2001). The personnel of the Upper Pine Fire District are volunteers. Paid personnel may be required to accommodate the anticipated development of CBM. For chemical spills, hourly rates are currently charged for responses, and may increase over time to accommodate increased demands on these services.

Increased demands on the existing emergency response and fire fighting, and associated potential impacts to these services, are expected to increase proportionately for the additional 318 wells associated with the anticipated development of CBM, compared with the 285 existing CBM wells in the study area. Based on the number of new wells associated with the anticipated development compared with the existing CBM wells in the study area, a 123 percent increase in CBM-related incidents per year may be anticipated in the Durango Fire and Rescue District and an 81 percent increase in the Upper Pine Fire District. This would increase result in an estimated annual total of 23 oil and gas- related incidents. Of these, approximately 12 incidents may occur annually in the Durango Fire and Rescue District and 11 incidents annually in the Upper Pine Fire District.

5.6.5 Summary of Health and Safety Impacts

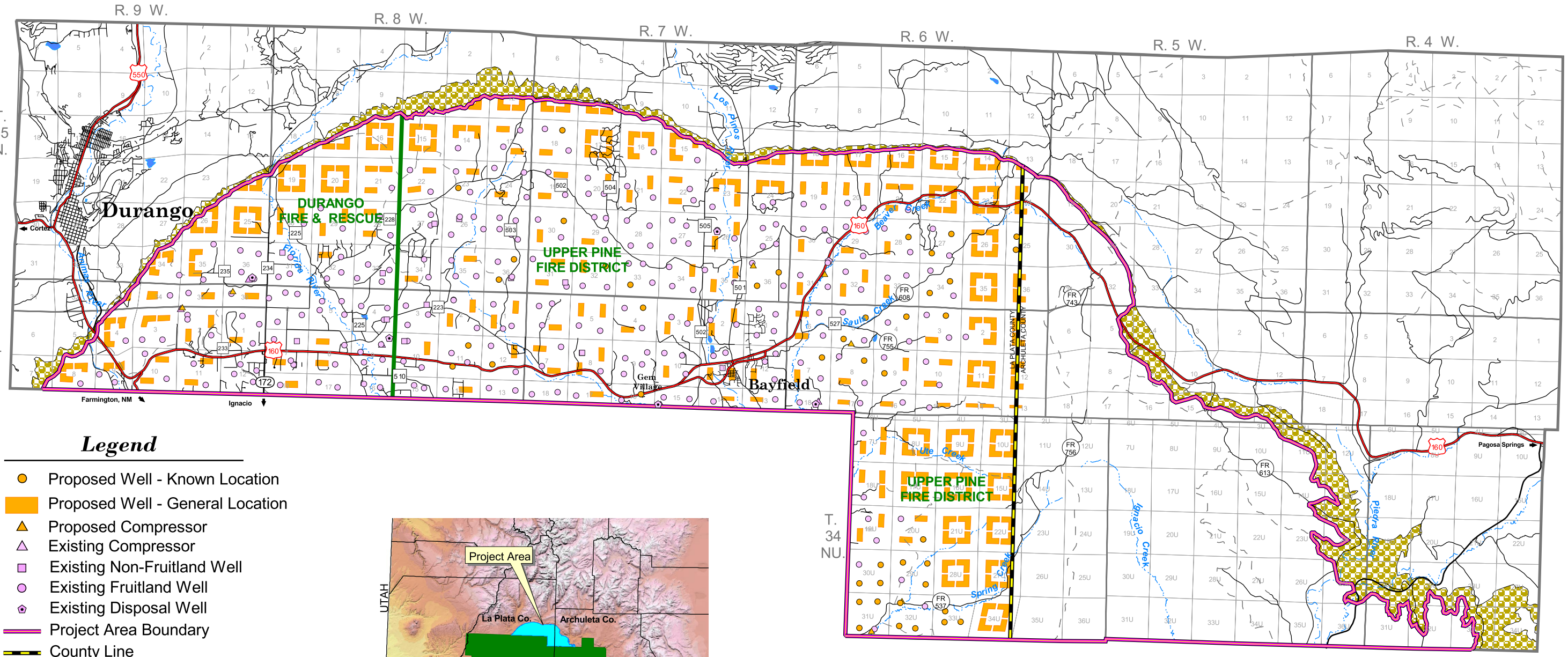
There would be an unavoidable increased risk of methane seepage in soils and water wells, fires and accidents with increased CBM development. Residential properties near the anticipated CBM facilities would be most sensitive to these risks. Although the potential impacts for increased CBM development in the study area are not currently well understood, increased risks to public safety are anticipated to occur in proportion to the number of additional CBM-related facilities.

The response times for both fire districts within the study area may not be adequate in the event that emergency medical assistance is needed. Additional professional (rather than volunteer) response services

may be required as development of CBM occurs. For chemical spills, the fire districts may need to charge increased hourly rates for response services.

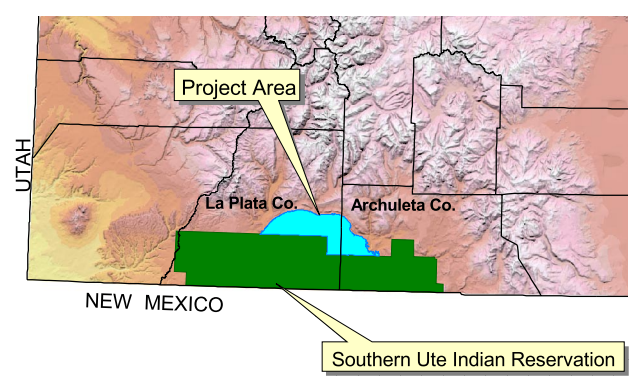
Table 5-21 Emergency Response and Fire Fighting Services in CIR Study Area

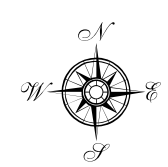
Fire Districts	Total Service Area (Acres)	Portion of Service Area in CIR Study Area (Acres)	Response Times for Total Service Area (Minutes)	Number of CBM Wells in CIR Study Area				Annual Number of Oil and Gas Related Incidents in Total Service Area	
				Existing	Proposed	Future Total	Percent Increase	Existing	Projected Future
Durango	169,600	70,469	8-10	206	254	460	123	5	12
Upper Pine	183,680	20,807	5-20	79	64	143	81	6	11
Total	**353,280**	**91,276**	**NA**	**285**	**318**	**603**	**112**	**11**	**23**



Legend

- Proposed Well - Known Location
- Proposed Well - General Location
- Proposed Compressor
- Existing Compressor
- Existing Non-Fruitland Well
- Existing Fruitland Well
- Existing Disposal Well
- Project Area Boundary
- County Line
- U.S. Highway
- Primary Road
- Secondary Road
- River/Stream
- Fruitland Outcrop
- Fire District Boundary





2 0 2 4 6 8 Kilometers

2 0 2 4 6 8 Miles

La Plata County transportation data provided by the La Plata County Transportation Study, 1998. Hydrologic and Archuleta County transportation features extracted from 1:100,000 USGS SDTS data. Existing wells extracted from COGCC well database and edited by the BLM & USFS.

Transverse Mercator Projection
1927 North American Datum
Zone 13

LA PLATA COUNTY IMPACT REPORT

FIGURE 5-10
ANTICIPATED CBM DEVELOPMENT IN FIRE DISTRICTS

ANALYSIS AREA: LA PLATA & ARCHULETA COUNTIES, COLORADO

Date: 06/15/02	ArcView File: C:\994-sanjuan\CIR.apr
	Prepared By: JG