

The Potential Social Impacts of Shale Gas Development in North Carolina

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Table of Contents

Recommendations.....	i-ii
Executive Summary.....	iii-vii
I. Housing Availability.....	1-8
II. Property Values.....	7-13
III. Demand for Social Services.....	14-17
IV. Recreation Activities.....	18
V. Commercial and Residential Development.....	19-20
VI. Noise.....	21-26
VII. Visual Impacts.....	27-33
VIII. Crime.....	34-40
IX. Community Impacts.....	41-44
Appendix A: Images of Recreation Areas.....	45-64
Appendix B: Common Noise Sources and Levels at 50 Feet.....	65
Appendix C: Statistical Analysis Methodology.....	66-72
Interviews Conducted.....	73
Works Cited.....	74-87

Table of Images

Image 1: Estimated Vacant Rental Units in Dan River Basin, 2010	5
Image 2: Estimated Vacant Rental Units in Durham Sub-Basin, 2010	6
Image 3: Estimated Vacant Rental Units in Sanford Sub-Basin, 2010.....	6
Image 4: Estimated Vacant Rental Units in Wadesboro Sub-Basin, 2010.....	7
Image 5: Hydraulic Fracturing in Upshur Valley, West Virginia.....	25
Image 6: Natural Gas Compressor Stations in North Carolina.....	26
Image 7: Accessing Shale Field via Vertical Drilling	27
Image 8: Accessing Shale Field via Horizontal Drilling	28
Image 9: Drilling Rig from Two Miles, Bradford County, PA	31
Image 10: Marcellus “Double Rig”	31
Image 11: Hydraulic Fracturing Operation, Canadian County, Oklahoma	32
Image 12: Lighting and Gas Flaring at a Marcellus Gas Well, Pennsylvania	32
Image 13: Brine Tanks at a Producing Well, Bradford County, PA.....	33
Image 14: Dan River Basin Population Density	39
Image 15: Durham Sub-Basin Population Density	39
Image 14: Sanford Sub-Basin Population Density	40
Image 15: Wadesboro Sub-Basin Population Density	40
Image A1: Anson County State, County, and Local Parks.....	45
Image A2: Chatham County State, County, and Local Parks.....	46
Image A3: Davie County State, County, and Local Parks.....	46
Image A4: Durham County State, County, and Local Parks	47
Image A5: Granville County State, County, and Local Parks	47
Image A6: Lee County State, County, and Local Parks	48
Image A7: Montgomery County State, County, and Local Parks	48
Image A8: Moore County State, County, and Local Parks.....	49
Image A9: Orange County State, County, and Local Parks	49
Image A10: Richmond County State, County, and Local Parks.....	50
Image A11: Rockingham County State, County, and Local Parks.....	50
Image A12: Stokes County State, County, and Local Parks.....	51
Image A13: Union County State, County, and Local Parks	51
Image A14: Wake County State, County, and Local Parks.....	52
Image A15: Yadkin County State, County, and Local Parks	52
Image A16: Dan River Basin and Game Lands.....	53
Image A17: Durham Sub-Basin and Game Lands.....	54
Image A18: Sanford Sub-Basin and Game Lands	55
Image A19: Wadesboro Sub-Basin and Game Lands.....	56
Image A20: Dan River Basin and Bike Routes	57
Image A21: Durham Sub-Basin and Bike Routes	58
Image A22: Sanford Sub-Basin and Bike Routes.....	59
Image A23: Wadesboro Sub-Basin and Bike Routes	60
Image A24: Dan River Basin, Boat Access Points, and Major Water Bodies.....	61
Image A25: Durham Sub-Basin, Boat Access Points, and Major Water Bodies	62
Image A26: Sanford Sub-Basin, Boat Access Points, and Major Water Bodies.....	63

Image A27: Wadesboro Sub-Basin, Boat Access Points, and Major Water Bodies	64
Image C1: Texas Barnett Region, Index of Change in Gas Production and Index of Nonviolent Crime Rates with Least Fit Squares Line	71
Image C2: Colorado Western Slope Region, Index of Change in Gas Production and Index of Violent Crime Rates with Least Fit Squares Line	71
Image C3: Wyoming Green River Basin Region, Index of Change in Gas Production and Index of Violent Crime Rates with Least Fit Squares Line	72
Image C4: Wyoming Green River Basin Region, Index of Change in Oil Production and Index of Violent Crime Rates with Least Fit Squares Line	72

Table of Figures

Figure 1: Demographics and Economics of Housing in Deep River Basin Counties	3
Figure 2: Demographics and Economics of Housing in Dan River Basin Counties	3
Figure 3: Housing Characteristics of Counties in the Deep River Basin, 2005-2009	4
Figure 4: Housing Characteristics of Counties in the Dan River Basin, 2005-2009	4
Figure 5: Commute Times (in minutes) to North Carolina Shale Regions.....	8
Figure 6: Change in Average Property Values, 2009-2012	12
Figure 7: HUD Daytime Land Use Compatibility Guidelines for Noise.....	21
Figure 8: Distance in Feet/Sound Pressure Levels in Decibels for Road Construction.....	22
Figure 9: Distance in Feet/Sound Pressure Levels in Decibels for Wellpad Construction	22
Figure 10: Distance in Feet/Sound Pressure Levels in Decibels for Vertical Drilling	23
Figure 11: Distance in Feet/Sound Pressure Levels in Decibels for Horizontal Drilling ..	24
Figure 12: Distance in Feet/Sound Pressure Levels in Decibels for Hydraulic Fracturing	24
Figure 14: Population Densities in Oil/Gas Regions and in the North Carolina Deep and Dan River Basin Regions.....	30
Figure B1: Common Noise Sources and Levels at 50 Feet	65
Figure C1: Natural Gas Production Changes per Thousands Cubic Feet and Crime Rates per 100,000 People: “T” and “P” Values.....	67
Figure C2: Natural Gas Production Changes per Thousands Cubic Feet and Crime Rates per 100,000 People: Coefficients and Confidence Intervals.....	68
Figure C3: Oil Production Changes per Barrel and Crime Rates per 100,000 People: “T” and “P” Values.....	69
Figure C4: Oil Production Changes per Barrel and Crime Rates per 100,000 People: Coefficients and Confidence Intervals.....	70

Executive Summary

Recommendations

Rental Housing

- If extensive natural gas development occurs in North Carolina, some rural regions may face a shortage of affordable rental housing. State and local governments should be prepared to provide additional housing assistance for low- or fixed-income residents.

Property Values and Mortgage Issues

- Drilling companies or their agents, when negotiating agreements with landowners, should be required to inform those landowners that natural gas development on their land could inhibit their ability to obtain refinancing packages on those properties.
- Sellers of new homes or properties in the potentially affected regions of North Carolina should be required to inform potential buyers as to whether or not mineral rights are attached as part of the purchase. Sellers should also be required to inform potential buyers of the implications of mineral rights being severed: that the mineral rights owner may undertake natural gas development on the property, and that the severance of mineral rights could inhibit future financing for mortgages or refinancing on the property.

Community Impacts

- Drilling companies wishing to operate in North Carolina should hold multiple public meetings to inform local officials and residents of all major potential impacts including, but not limited to: infrastructure impacts, traffic impacts, noise impacts, and visual impacts.
- Drilling companies wishing to operate in North Carolina should engage in an ongoing dialogue with members of any impacted communities, and seek to address their concerns related to shale gas exploration to the greatest possible extent.

Recreation Areas

- State recreation areas, including state-owned parks, game lands, and conservation easements are important for North Carolina's residents and visitors. Regulations on shale gas development in North Carolina should consider restricting drilling access to all state recreation areas, game lands, and conservation easements.
- Local governments should retain the right to restrict drilling access to their county parks, city parks, or other recreation areas.

Visual Impacts, Noise, and Quality of Life Concerns

- Local governments should have flexibility to regulate natural gas development in their communities as they see fit; however, if statewide regulations are adopted determining setbacks and other zoning-type limitations, local governments should have significant input into the creation of those standards.
- When operating within 2000 feet of a residence or commercial business area, shale gas developers should construct temporary sound barriers to mitigate noise impacts from drilling and hydraulic fracturing.
- Nighttime lighting on drilling sites should be regulated to minimize visual impacts on surrounding residences, businesses, farms, and traffic.
- Shale gas developers should work with local officials to determine optimal routes for trucks and other service vehicles to minimize the impact of heavy truck traffic.

Policing

- Additional funds for traffic control should be directed to local governments where shale gas development occurs.
- If large-scale natural gas development occurs in North Carolina, local communities may experience impacts on crime; which may include drunk driving or aggravated assault. If such impacts occur as a result of shale gas development, local governments should be provided additional funds for additional policing and resources.

Social Services

- If large-scale natural gas development occurs in North Carolina, local communities may experience impacts on demand for housing assistance, mental health counseling, or schooling. If such impacts occur as a result of shale gas development, local governments should be provided additional funds to manage these impacts.

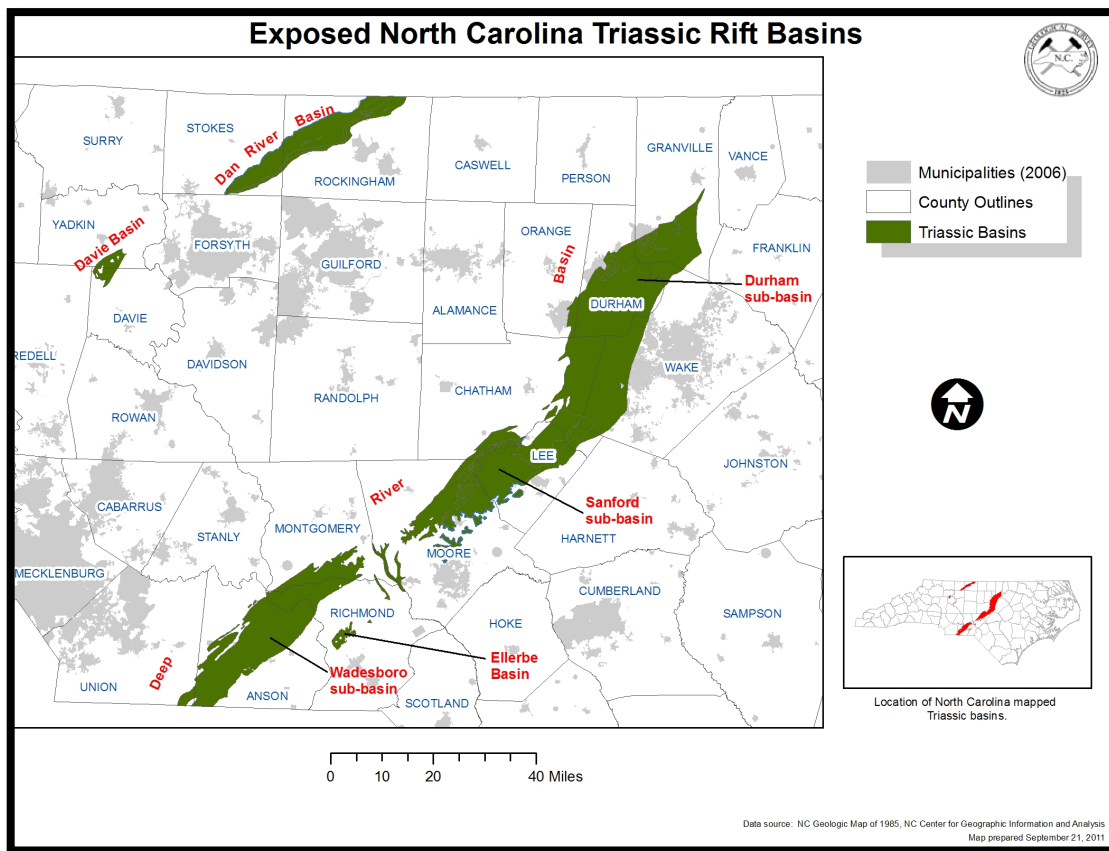
Emergency Services

- If shale gas development occurs in North Carolina, local government will require additional funds to train their local emergency services providers. These providers will need training in responding to a variety of potential emergencies that could occur as a result of large truck accidents, hazardous materials truck accidents, and accidents on drilling sites.

Overview

In 2011, North Carolina's legislature passed Session Law 2011-276, which directed the North Carolina Department of Environment and Natural Resources (DENR) to conduct a study of the potential impacts of developing natural gas from shale formations in North Carolina. These formations, dating from the Triassic Era, are located primarily in two river basins in North Carolina: the Deep River Basin and the Dan River Basin (see below). The United States Geological Survey (USGS) is currently studying samples to estimate how much gas or oil is located in North Carolina's shale formations.

Image One: Triassic Basin Shale Formations in North Carolina



This report, part of the DENR study, examines the potential social impacts of developing shale gas in North Carolina. For the purposes of this report, “social impacts” include potential impacts on housing, demand for social services, community character, recreation activities, commercial and residential development, noise, visual impacts, and crime rates.

Background: Shale Gas Development and Controversy in the United States

The development of natural gas and oil from shale formations has expanded rapidly since the mid-2000's primarily due to the widespread adoption of two extraction techniques: horizontal drilling, which allows drillers to access long vertical portions of the shale formation; and hydraulic fracturing, which injects water, sand, and chemicals at high pressure to increase

production from those formations. Due to these techniques, estimates of recoverable natural gas and oil reserves in the United States have grown dramatically.

Hydraulic fracturing, sometimes called “fracking,” has generated significant controversy in North Carolina and around the United States. Residents in a variety of states where hydraulic fracturing was used have claimed that the extraction process contaminated their drinking water wells. Widespread publication of these stories has led to vocal opposition of “fracking” from some environmental groups, government officials, and celebrities.

However, when contamination of water wells has occurred, that contamination appears to have resulted primarily from methane migration. Methane migration typically occurs due to technical errors in the cementing or steel casing surrounding the oil or gas well, and is not a direct result of hydraulic fracturing. A number of scientists, along with federal, state, and local governments are currently studying the risks to water quality from hydraulic fracturing.

Potential Social Impacts in North Carolina

Natural gas drilling, like any industrial process, has the potential to create social impacts in the community where it occurs. The extent of some of these impacts, such as housing, social services, recreation, and crime will largely depend on the speed and scale of development. Other impacts, such as community character, quality of life, noise, and visual impacts are likely to occur in the specific area where drilling occurs. These impacts are likely to impact some residents negatively. However, local economic activity generated by gas development will create financial benefits for some local land and business owners.

Housing (pp 1-13)

Shale gas development in the United States has generated two major types of housing impacts. First, rural regions in Colorado, North Dakota, Pennsylvania, Texas, and Wyoming have experienced significant increases in rental housing costs. These increases are largely due to an influx of industry workers, who typically travel from their homes in other states to work on drilling or hydraulic fracturing sites. In North Carolina, a dense population and adequate housing stock indicate that major impacts on housing costs are unlikely.

Second, property values in regions with significant new drilling operations appear to have increased. Anecdotal evidence from some active drilling areas, along with data included in this report, indicate that the newfound mineral wealth located below a landowner’s property may increase the value of that property. The scale of such impacts in North Carolina is impossible to determine, and will depend on the amount, type, and accessibility of the gas or oil resources.

Demand for Social Services (pp 14-17)

Natural gas development, for North Carolina, would likely mean a temporary influx of workers trained in the specialized skills required to drill and hydraulically fracture natural gas wells. Some heavily drilled regions in rural parts of the United States have experienced increased demand on social services as a result of this type of population growth.

In parts of North Dakota and Pennsylvania, rapid population increases have increased demand for emergency services, housing assistance, mental health counseling, policing, schooling, and other social services. Rural areas that have experienced the heaviest impacts tend to lack the governmental resources required to provide the services required by a fast-growing population.

Most of the North Carolina counties that sit atop shale deposits are significantly less rural than heavily impacted regions of North Dakota and Pennsylvania. Additionally, the scale of drilling activity in North Carolina is not expected to be as large as those seen in North Dakota, Pennsylvania, or other heavily producing regions of the country. In the absence of thousands of wells being drilled in rural counties, North Carolina is unlikely to see significant increased demand on most social services. Due to the large amount of truck traffic required for drilling and hydraulic fracturing; however, any region where drilling occurs is likely to require new training and staffing for emergency services, and some increased demand on traffic policing.

Commercial and Residential Development (pp 19-20)

Each of the impacts described in this report, along with potential impacts to air, water, or land quality may impact commercial and residential development in North Carolina’s shale gas regions. Positive impacts from increased property values, an influx of workers, and increased employment may encourage businesses to open new branches, expand, and take on more employees. These positive impacts may also enable individuals and families to purchase new homes, encouraging residential development.

Negative impacts from shale gas development, including noise, visual, and quality of life concerns, may decrease demand for residential development in North Carolina’s shale gas areas. Negative impacts from increased traffic, increased crime, or unaffordable housing options would likely inhibit the development of new businesses or residential developments.

Noise Impacts, Visual Impacts (pp 21-33)

Construction, drilling, and hydraulic fracturing each create noise and visual impacts in the vicinity of the wellpad. These impacts are temporary, typically lasting two to three months overall. Noise levels associated with these activities are shown below:

Figure 1: Noise levels, in decibels, of construction, drilling, and hydraulic fracturing

Activity	Duration	50 ft	250 ft	500 ft	1000 ft	1500 ft	2000 ft
Wellpad Construction	2-3 weeks, daytime	84	70	64	58	55	52
Well Drilling	4-5 weeks, 24 hours	76-79	62-64	56-58	50-52	47-48	44-45
Hydraulic Fracturing	2-5 days, 24 hours	99-104	85-90	79-84	73-78	69-74	67-72

Source: New York State Department of Environmental Conservation, 2011

For reference, the United States Department of Housing and Urban Development (HUD) uses the following scale to determine acceptable daytime noise levels for different types of land use:

Figure 2: HUD Daytime Land Use Compatibility Guidelines for Noise

Land Use Category	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	<60	60-65	65-75	>75
Livestock farming	<60	60-75	75-80	>80
Office buildings	<65	65-75	75-80	>80
Wholesale, industrial, manufacturing	<70	70-80	80-85	>85

Source: US Department of Housing and Urban Development

Visual impacts will also occur in the areas near a drilling site. First, heavy construction equipment, such as graders and bulldozers, create visual impacts during the construction phase. The wellpad, once completed, covers 3.5 acres of surface area on average. Second, drilling rigs can range in height from 40 to 150 feet, and require hundreds of heavy truck trips to deliver the necessary equipment. Third, hydraulic fracturing requires on average 843 heavy truck round-trips to transport the water, chemicals, and other materials necessary to fracture the well. During fracturing, dozens of “pumper trucks” remain on site to maintain adequate pressure in the well, and create a local visual impact.

Two additional visual impacts are likely to occur. First, high-powered lighting, which illuminates the wellpad 24-hours per day during drilling and fracturing, can create a significant visual impact in the site’s immediate vicinity. Second, natural gas flaring, which occurs when gas is flowing but not captured for distribution, can create significant visual impacts. This flaring, according to one resident in rural Pennsylvania, is so bright that “you don’t need a nightlight anymore.”

Crime (pp 34-40)

Rapid population growth and an influx of oil and gas workers has the potential to increase crime in areas where drilling occurs. A variety of sociological literature from the American Mountain West in the 1970’s and 80’s indicates that in some energy boomtowns, crime rates increase at a faster rate than population growth. Anecdotal evidence from today’s heavily drilled rural areas, including North Dakota, Wyoming, and Pennsylvania also indicate increased local crime rates.

As part of this study, a statistical analysis was conducted to determine whether there were significant relationships between drilling and crime rates in communities around the United States between 2000-2010. Using county-level data on oil and gas production, along with county-level crime statistics from the FBI’s Unified Crime Reporting system (UCR), linear regression models were created to analyze data from six states that have seen recent spikes in drilling activity: Colorado, North Dakota, Oklahoma, Pennsylvania, Texas, and Wyoming.

The results of these tests showed that in Colorado and Wyoming, increased natural gas production was significantly correlated with high rates of violent crime, particularly aggravated assault. In North Dakota, Oklahoma, and Pennsylvania, no relationship was found between

increased natural gas and oil drilling and crime rates. In Texas, the data showed a significant relationship between increased natural gas production and *lower* non-violent crime rates. These mixed results indicate that one cannot make a broad generalization between oil and gas production and crime rates.

One hypothesis for these results has to do with the transient nature of many oil and gas workers. Based largely in the southwest, drilling crews must travel to regions of the country where skilled oil and gas labor does not exist, such as Wyoming and Colorado. In these rural areas, where workers are away from families and social support networks, crime rates may increase. In Texas, where many crews are based, increased employment and wealth creation from new drilling may decrease rates of property crimes that are associated with poverty.

The mixed results from other states makes the above hypothesis far from certain, and further research will be necessary to determine whether a causal relationship exists between transient work crews and crime rates.

Community Impacts (pp 41-44) and Recreation (p 18)

Natural gas drilling has the potential to affect community character in both rural and urban areas. Some residents will favor drilling, while others will oppose it. This divide can affect relationships between families, neighbors, and community groups. Natural gas drilling also has the potential to impact the character of a community by introducing an industrial-scale activity to a tranquil, rural area.

If gas drilling occurs in North Carolina, some residents will benefit more than others. Uneven distribution of benefits and costs from drilling activity, while a natural result of economic processes, has the potential to create divisions within communities. This uneven distribution of benefits and costs has the potential to increase local tensions, potentially disrupting the hard-to-define “sense of community” that exists in many parts of North Carolina.

Natural gas drilling also has the potential to impacts recreational activities in the areas where drilling occurs. Increased noise, visual impacts, and traffic may result in impacts to local, county, and state parks, along with game lands, bike routes, and water recreation areas. North Carolina’s shale formations lie beneath thousands of acres of recreation areas; however, the mere presence of shale formations underneath a park, lake, or bike route does not mean that recreation area will necessarily be impacted.