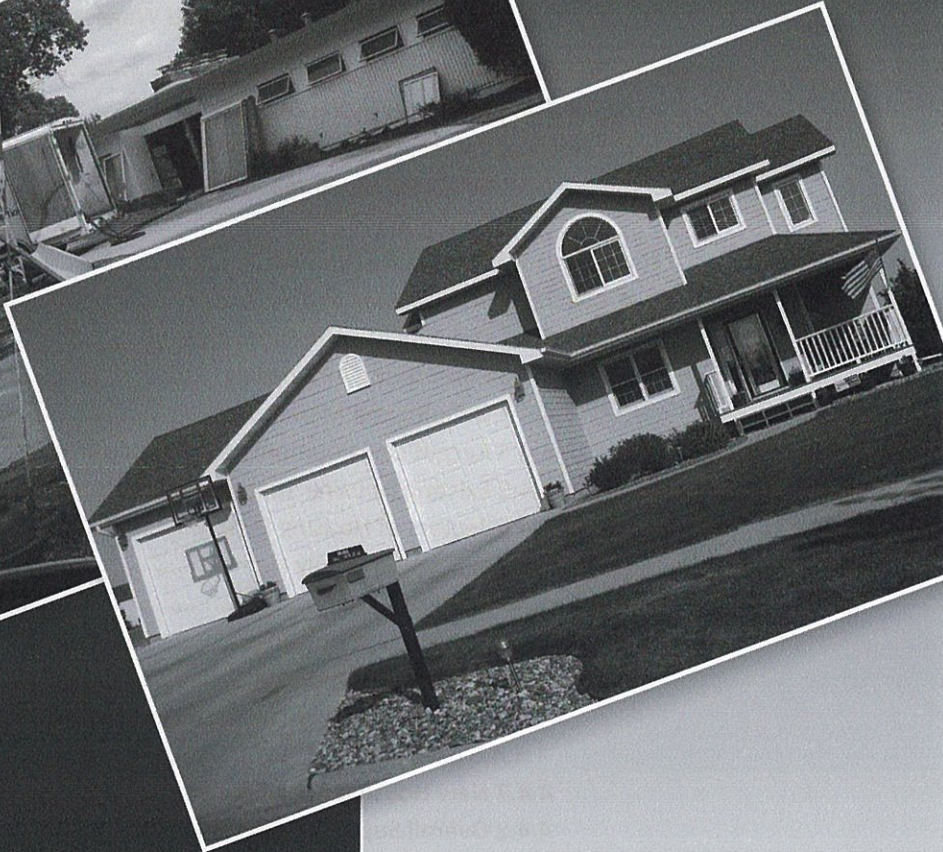
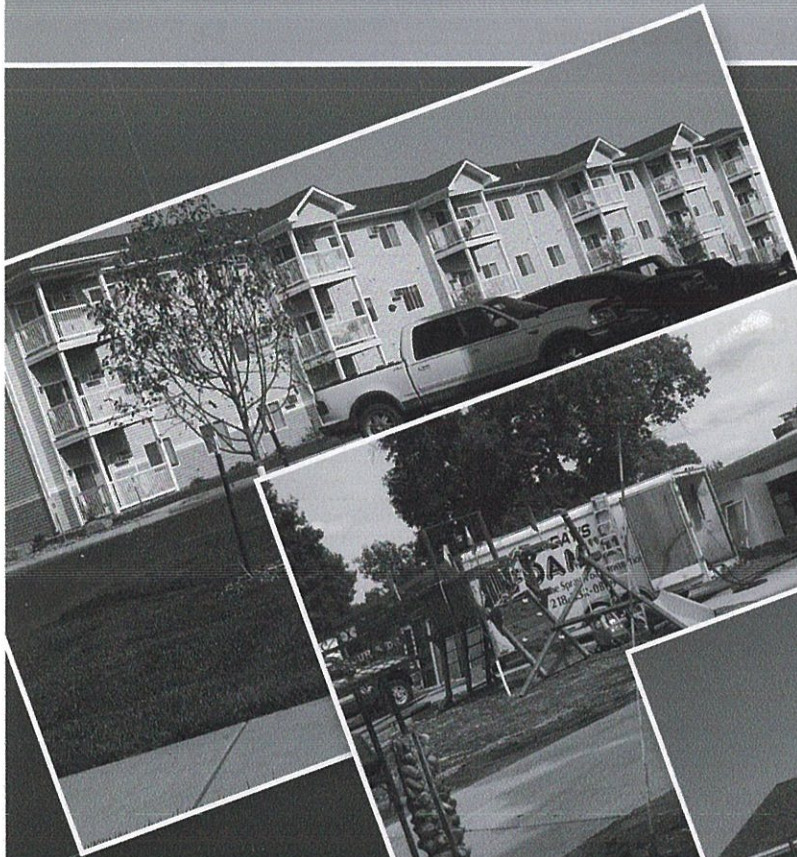


Minot Affordable Housing Strategy

SUPPLY AND DEMAND ANALYSIS



CITY OF MINOT, NORTH DAKOTA



DRAFT REPORT

December 20, 2012

Table of Contents

Section 1	Executive Summary.....	1-1
1.1	Major Findings	1-2
1.2	Initial Recommendations.....	1-3
1.3	What is Affordable Housing, and Why Does It Matter to Minot?.....	1-4
1.4	Affordable Housing Needs: Reconciling Supply and Demand	1-6
1.4.1	Affordable Housing in Minot: Homeowners	1-6
1.4.2	Affordable Housing in Minot: Renters.....	1-8
Section 2	The State of Affordable Housing in Minot	2-1
Section 3	Analyzing Housing Demand in Minot.....	3-1
3.1	Estimating 2012 Population	3-1
3.2	Defining Affordable Housing Needs in Minot.....	3-3
3.3	Factors Affecting Affordable Housing Needs	3-4
3.3.1	Growth Industry Sectors and Wages.....	3-4
Section 4	Analyzing Housing Supply in Minot	4-1
4.1	Housing Inventory in Minot.....	4-1
4.2	Housing Values, Sales Prices, and Rental Rates	4-1
4.2.1	Single Family Homes.....	4-1
4.2.2	Rental Rates	4-4
4.3	Assisted Affordable Housing.....	4-5
4.4	Market Rate Housing Supply	4-6
4.4.1	Defining Market Rate Housing	4-6
4.4.2	Considering All Housing.....	4-6
4.4.3	Defining the Market Area	4-7
4.4.4	Recent Developments and Trends in Housing Construction.....	4-7
4.4.5	Existing Housing Supply and Locations of Housing	4-8
4.4.6	Sectors of Housing Supply	4-8
4.4.6.1	Single Family Homes	4-8
4.4.6.2	Apartments	4-9
4.4.6.3	Student Housing.....	4-9
4.4.6.4	Military Housing.....	4-9
4.4.6.5	Mobile and Manufactured Home Communities.....	4-11
4.4.6.6	Hotels.....	4-11
4.4.7	New Housing Construction	4-12
4.4.8	Overall Supply of Available Housing	4-13
Section 5	Cost Factors for Housing Construction in 2013.....	5-1
Appendix A	Terms and Definitions	A-1
Appendix B	Prior Housing Studies	B-1
Appendix C	Methodology.....	C-1

C.1 Estimating Housing Demand.....	C-1
C.2 Estimating Housing Supply	C-2
C.2.1 Approach Methodology	C-2
C.2.2 Assisted Affordable Housing Supply	C-4
C.3 Population Projections.....	C-5
C.3.1 IMPLAN Model Analysis	C-5
C.3.2. IMPLAN Analysis	C-6
C.3.2.1 The Economic Modeling Process	C-7
C.3.2.2 Data Requirements and Model Assumptions	C-8
C.3.2.3. Study Multipliers – Multiplier Impacts.....	C-11
C.3.3. Employment, Payroll, and Output Impacts	C-12
C.3.3.1 Oil and Gas Extraction Sector.....	C-12
C.3.3.2 Drilling Oil and Gas Wells Sector.....	C-13
C.3.3.3. Support Activities for Oil and Gas Operations Sector	C-15
C.4 Summary	C-16
C.5 Additional Population Estimate Calculations.....	C-17

List of Figures

Figure 1-1 Housing Affordability in Minot	1-5
Figure 2-1 Assessed Value of Single Family Housing in Minot, 2010.....	2-2
Figure 2-2 Assessed Value of Single Family Housing in Minot, 2012.....	2-3
Figure 4-1 Percentage of Housing Types in 2012	4-1
Figure 4-2 Owner Occupied vs. Rental Housing in Minot in 2010, by Census Tract.....	4-2
Figure 4-3 Median Value of Single Family Housing in Minot in 2012.....	4-3
Figure 4-4 Home Values by Percentage in 2010 and 2012	4-4
Figure 4-5 Locations of Apartments in Minot in 2012	4-10

List of Tables

Table 1-1 Affordable Owner Occupied Housing Costs by Income Range	1-7
Table 1-2 Assessed Values of Habitable Single Family Housing in 2010 and 2012.....	1-7
Table 1-3 Cost of Available Rental Units in Minot, Sept. and Oct. 2012	1-8
Table 1-4 Rental Housing Supply in 2012	1-9
Table 3-1 2012 Minot Population Estimates	3-2
Table 3-2 Minot Population Projections Based on IMPLAN Model	3-3
Table 3-3 Household Income and Housing Budget.....	3-4
Table 3-4 Key Employment Growth Areas and Average Wages	3-6
Table 4-1 Assessed Value of Single Family Housing in Minot in 2010 and 2012	4-4
Table 4-2 Current Rental Rates in Minot	4-4

Table 4-3 Cost of Available Rental Units Sept and Oct 2012.....	4-5
Table 4-4 Residential Building Permits Issued in Minot in 2011 and 2012	4-7
Table 4-5 Minot Home Sales in 2012.....	4-8
Table 5-1 Housing Cost Factors	5-1
Table 5-2 Housing Cost Factors for a Hypothetical 900 Square Foot Unit	5-2
Table 5-3 Manufactured Home Cost Examples	5-3
Table C-1 Household Income Distribution in Minot in 2010 and 2012	C-1
Table C-2 Housing Owned or Managed by MHA.....	C-4
Table C-3 Changes in Section 8 Housing Funds for Ward County	C-5
Table C-4 Population Projections Based on IMPLAN Modeling	C-6
Table C-5 Direct Employment Estimates for Oil and Gas Extraction Sector	C-9
Table C-6 Direct Employment Estimates, Drilling and Support Activities Sector	C-10
Table C-7 Minot, ND Region IMPLAN Multipliers by Economic Sector	C-11
Table C-8 Economic Impacts for the Oil and Gas Extraction Sector.....	C-12
Table C-9 Employment Impacts, Top Ten Industries Affected by Oil and Gas Extraction.....	C-13
Table C-10 Economic Impacts for the Drilling Oil and Gas Wells Sector	C-14
Table C-11 Employment Impacts, Top Ten Industries Affected by Drilling Oil & Gas Wells ..	C-15
Table C-12 Economic Impacts, Support Activities for Oil and Gas Operations	C-15
Table C-13 Employment Impacts, Support Activities for Oil and Gas Operations	C-16
Table C-14 Economic Impacts Summary, Petroleum Industry	C-17
Table C-15 Detailed Methodology for Additional Population Estimates	C-18

Section 1

Executive Summary

Many people assume that affordable housing is for people on welfare or people who don't work. Often they don't realize that affordable housing is a serious concern for many of the people they deal with every day. In Minot, over 11,900 people live in households that spend more than 30 percent of their monthly income for housing. Retired school teachers, police officers, the friendly lady who bags your groceries, and the certified nursing assistant who helps to care for your Mom at the long-term care facility likely have or will have concerns about the cost of housing in Minot. Affordable housing is an issue for people in any income bracket, but it is particularly challenging for lower and moderate income people; they have fewer options. In Minot today, with the rapidly increasing demand for housing and dramatically increasing costs for housing, there are fewer affordable housing options than ever before.

The rising cost of housing may begin to impact existing businesses and their decisions to expand in Minot, or perhaps they will relocate elsewhere because their employees can no longer afford to live here. Employers in the health care sector report major challenges in retaining their workforce because of rising rents. One employer we spoke with said they lost employees to work in the oil fields almost every month, in part because of the increasing cost of living in Minot. In some respects this is a challenge facing all of northwest North Dakota, but Minot's challenges are unique:

- The 2011 flood damaged an area of the city that provided the highest percentage of affordable housing in the entire city. Many of the homeowners have repaired their homes and return to their old neighborhoods, but renters, the elderly and lower income families are still displaced.
- A substantial percentage of the military personnel at Minot Air Force Base live in off-base housing and a substantial number live in Minot. The community is "home" to more than just local residents, which drives up the demand for housing. The military recently increased their Base Housing Allowance significantly to enable military personnel to find suitable housing in the Minot area.
- As the regional trade center, Minot attracts a higher percentage of employment in retail trade, professional services, health care and other services that are used by people throughout the region. Many of the service sector jobs have average annual wages resulting in incomes below 80 percent of the median income in Minot. These people are important to the economy, but they are challenged to find affordable housing.
- The proximity of Minot to the Bakken Formation has resulted in new jobs, increased population, and new developments. While this economic stimulus brings many wonderful benefits to the community, it has also exacerbated the affordable housing challenge in Minot and that condition will increase in the future as more oil-related employees locate in Minot.

Today, more than 28 percent of Minot's population is cost burdened due to the high cost of housing.

Businesses, agencies, and residents report that people have to take a second job to pay rent and buy groceries. One businessman said a number of his employees had come to him in the past year to tell him they would not be available to work extra hours or help out when a special order needed to go out, because they had taken another job to make ends meet. Affordable housing is a cornerstone of a strong, vibrant community, and it is critical to maintaining a diversified economy and ensuring excellent public services and community facilities. Consider this: in October an analysis of available rental units in Minot found the average rent for a two bedroom rental unit was \$1,313, the average rent for a three bedroom rental unit was \$1,887, and a four bedroom unit was \$2,238, not unlike the rents you expect to find in downtown New York City.

This is a serious and challenging problem, but it is also a problem that can be resolved. The City of Minot has taken steps to do just that, and this affordable housing supply and demand analysis is the first step in developing an Affordable Housing Plan and Strategy for Minot to take the necessary actions to ensure there is housing that is affordable to the people of Minot.

1.1 Major Findings

- 28 percent of the households in Minot are cost burdened due to the high cost of housing, 3,534 of the households living in rental housing are cost burdened and 1,755 homeowner households are cost burdened.
- The 2012 median household income for Minot is \$46,687. Households with incomes below 80 percent of the median household income, or \$37,349, are considered by HUD to be lower income. Those with an income of \$37,349 can afford to purchase a home priced at \$116,000 or less.
- There are only 3,098 single family housing units (does not include rental units) assessed at or below \$116,000. According to the 2012 assessment, there are 7,736 households with incomes at or below \$37,349, which is 80 percent of the median household income in Minot, who are or may want to become homeowners.
- Based on information from the City's 2012 assessment there are 837 fewer affordable homes in Minot today than there were in 2010.
- 48 percent of Minot households could not afford the median rent for a two bedroom unit and 70 percent could not afford the median rent for a three bedroom unit, based on the rental rates of available rental units in October 2012.
- Based upon the IMPLAN analysis used to project Minot's population, the city's population will exceed 50,000 before 2015. As the population increases, the number of households that need affordable housing will increase as well.

1.2 Initial Recommendations

More than 5,289 households in Minot are paying more than 30 percent of their annual income for housing. To begin to address this challenge, the City of Minot is developing an Affordable Housing Plan and Strategy to develop policies, programs, and practices to preserve and increase the availability of affordable housing in Minot. The city's involvement in this effort is absolutely essential, and financial resources will be required to support specific activities to increase the affordable housing stock.

New affordable housing units will be developed through a range of activities involving the private sector, non-profit developers and agencies, local and national volunteer organizations, financial institutions, the state and federal government, and community stakeholders. Based upon the analysis contained in this study, an understanding of reasonable production constraints over an 18 to 24 month period, and an analysis of cost factors and programmatic criteria that are based on previous housing development experience and discussion with several local contractors, the following recommendations are offered:

- 1) \$5,280,000 – Creation of an infill redevelopment program in the flood area to acquire and demolish substandard structures that remain in the area that are suitable for redevelopment and ensure the redeveloped homes are preserved long-term for affordable housing. Assumes 80 properties including acquisition, demolitions and clearance of structures, and development of suitable programmatic criteria, marketing strategies, and so forth leading to program implementation.
- 2) \$11,550,000 – Creation of an affordable housing homeownership program on scattered sites and developments throughout the city. Various tools and programmatic requirements would be developed to optimize the production of high quality affordable housing units and contractual requirements would be put in place to ensure the affordability of these homes is preserved for at least 10 years. Assumes development of 300 units.
- 3) \$23,650,000 – Creation of 600 units of affordable rental housing throughout the city, including 200 units specifically designed for the elderly. A variety of tools and programmatic criteria would be used to facilitate the development of this housing. A portion of these units may be developed to provide opportunities to transition to homeownership. Excellence in design, LEED certification, and other sustainable features will be incorporated into these homes to ensure they are cost efficient and provide a high quality of life for residents and surrounding neighbors for many years.

An investment of \$40,480,000 in support of affordable housing in Minot will significantly improve the quality of life for nearly 1,000 households and protect the vitality of neighborhoods and the sustainability of the region's diversified economy.

1.3 What is Affordable Housing, and Why Does It Matter to Minot?

Affordable housing is important for everyone in Minot. While there are more options for affordable housing for those at higher income levels, ultimately every household needs housing that is affordable for them. The generally accepted definition of affordable housing is paying no more than 30 percent of annual household income on housing. Those who pay more than 30 percent are considered to be “cost burdened” for housing, and often face serious challenges affording other daily costs of living such as food, medicine, clothing, health care, and transportation.

In this study, household income data will be used. A household is defined as all persons occupying a housing unit, including one-person households and multi-person households of unrelated individuals. Household income includes the income of the householder and all other persons 15 years of age and older in the household who may or may not be related to the householder. The 2012 median household income for Minot is \$46,687¹. Households with incomes below 80 percent of the median household income are considered to be low income and often face greater challenges finding housing that is affordable. Eighty percent of the 2012 median income is \$37,349.00.

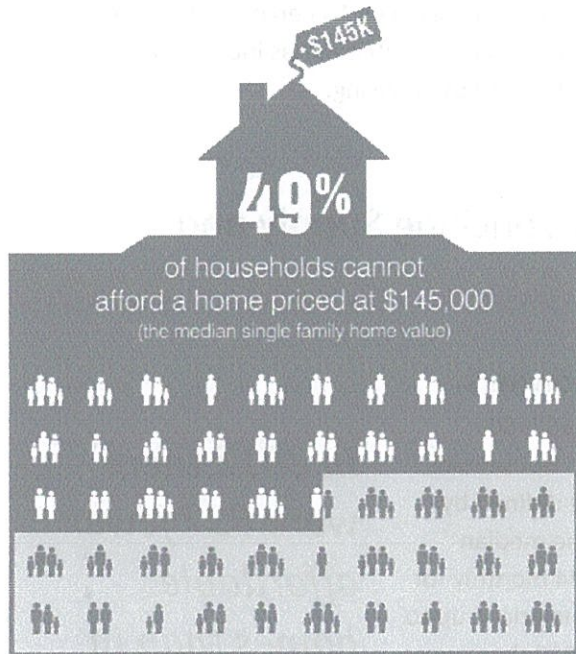
The availability of housing at various price points, affordable to people earning a range of incomes, helps to support a diversified economic base and ensures that entry-level workers, service employees, and other members of the workforce who are critical to the sustainable operation of a community can afford to live and work there. Communities without affordable housing options for school teachers, health care workers, police officers, maintenance personnel, and other employees face many serious issues that can have significant consequences affecting livability, public safety, economic development, and future revenues.

Finding affordable housing is significantly more challenging for low and moderate income families. The combined impacts of the flood damage to an area of the city that provided a significant percentage of Minot’s more affordable housing, the dramatic influx of population and the demand for housing resulting from the oil and gas industry, and the off-base housing needs for Minot Air Force Base has created a very serious affordable housing problem for Minot. The housing market in Minot reflects the interaction between supply and demand. Demand is affected by population growth and income of area residents. The supply of housing responds to this demand and hopefully reflects the price-to-income relationship. As one local Minot realtor put it, “it isn’t a question of IF the housing market in Minot will be over built; it’s only a question of WHEN.”

While there has been a dramatic increase in the construction of new single family homes and multi-family developments, none of this new construction provides housing that is affordable to a significant percentage of Minot residents. For example, the average price of a home (including both existing homes and newly constructed homes) sold in Minot from January to September, 2012 was \$256,842. Ninety-six percent of Minot residents could not afford a home in that price range. The housing that is

¹ U.S. Census American Community Survey data 2011

being constructed in Minot today is being developed for households that are moving into the community to support the oil and gas industry. It is important to provide housing for the employees of this important economic driver; however, it is also very important to provide housing options for long term residents of the community and young people who want to build their future in the community they grew up in. Ultimately this study and the Affordable Housing Plan and Strategy that will be developed will focus primarily on them.



Source: CDM Smith

Figure 1-1 Housing Affordability in Minot

The housing affordability challenge is not unique to Minot, as evidenced in the recently released *2012 North Dakota Statewide Housing Needs Assessment*. However, the affordable housing challenge in Minot has been dramatically impacted by other issues.

- The 2011 flood damage affected portions of the City that provided the highest percentage of its affordable housing stock.
- Minot is the regional trade center for northwestern North Dakota. Higher employment concentrations in retail trade, professional services, accommodations and food services, and health care services reflect the City's role in serving the needs of a broader population beyond its boundaries. These services are vital to consumers, both locally and in a broader region. The

average annual wages for many of these jobs are well below 80 percent of the median household income² and many of these employees are cost burdened for housing.

- The proximity of the Bakken Formation to Minot and the employment impacts from the petroleum industry and related population growth affects housing availability and affordability.
- A substantial percentage of military personnel at Minot Air Force Base live in off-base housing. The 2009 Minot Air Force Base Housing Requirement increased by 16 percent, to planned manpower of 5,495. The Base Housing Allowance for rent and utilities has increased dramatically to enable military staff to find suitable off-base housing.

1.4 Affordable Housing Needs: Reconciling Supply and Demand

1.4.1 Affordable Housing in Minot: Homeowners

The 2012 median household income for Minot is \$46,687; 80 percent of the median household income is \$37,349.³ Households with incomes below 80 percent of median income are defined by HUD as low income. A family earning 80 percent of the median household income in Minot could afford to spend \$934 monthly for housing, which would enable them to purchase a home priced up to \$116,667.⁴ Based on the city's assessment study, in 2010 there were 3,935 habitable single family homes with values less than or equal to \$116,000. In 2012 there were only 3,098 homes with values less than or equal to \$116,000, which is 837 fewer affordable homes.

In 2012 there were 837 fewer affordable homes than in 2010.

Many of the city's more affordable homes were impacted by the 2011 floods. Some homes were rehabilitated after the 2012 assessment and will be reflected in the next assessment. However, based on interviews with some homeowners and contractors in the area, the value of these rehabilitated homes may well exceed the affordable housing threshold of \$116,667.

The table below shows the loan amount and home price that would be affordable for households in various income ranges. This is based on the lowest down payment allowable under FHA programs for a 30 year fixed rate mortgage. It assumes a slightly higher interest rate and hazard and private mortgage insurance, and property taxes were calculated in a separate spreadsheet.

² 2011 Employment and Wages by Industry, Labor Market Information Center, Job Services North Dakota

³ U.S. Census American Community Survey 2011

⁴ Assumes a 30 year fixed rate FHA mortgage at 4%, including hazard and PMI insurance and property taxes; does not include points or closing costs

Table 1-1 Affordable Owner Occupied Housing Costs by Income Range

Gross Annual Household Income	3.0% Down Payment	Loan Amount	Affordable Home Price
\$10,000	\$1,250	\$36,153	\$37,403
\$14,999	\$1,800	\$54,244	\$56,044
\$24,999	\$2,500	\$80,833	\$83,333
\$34,999	\$3,000	\$97,000	\$100,000
\$37,349	\$3,500	\$113,167	\$116,667
\$49,999	\$4,300	\$139,033	\$143,333
\$74,999	\$5,200	\$168,138	\$173,333
\$99,999	\$6,800	\$219,867	\$222,667
\$149,999	\$7,500	\$242,500	\$250,000
\$199,999	\$8,500	\$274,833	\$283,333

NOTE: Assumes 4% interest, 30-year fixed rate FHA mortgage, does not include points, closing cost, or debt allocation, www.realtor.com/home-finance/financial-calculators

Table 1-2 identifies the number of habitable single family housing units in 2010 and in 2012. Although more than 1,067 units were identified in the 2012 assessment, a review of many of these units found that 78 percent of units valued below \$50,000 were located in the flood zone. In 2010 there were only 158 homes with an assessed value under \$50,000 in the flood zone. A review of homes valued less than \$50,000 listed on the Minot MLS found homes damaged by the flood but not rehabilitated, and several structures that had been gutted after the flood but not repaired.

A GIS map was developed to show all of the 230 homes valued at less than \$50,000 that were located outside of the flood area. From a review of the map, it appears that a number of these units are incomplete homes in newer subdivisions. However, a few homes and smaller condos valued at less than \$50,000 were identified.

Table 1-2 Assessed Values of Habitable Single Family Housing in 2010 and 2012

Assessed Value	Single Family Housing Units 2010		Single Family Housing Units 2012	
	Number	Percent	Number	Percent
\$0 to \$50,000	92	1%	92	1%
\$50,000 to \$75,000	864	8%	963	9%
\$75,000 to \$100,000	1,752	16%	1,207	11%
\$100,000 to \$116,000	1,227	37%	836	28%
\$116,000 to \$150,000	2,887	26%	2,276	20%
\$150,000 to \$200,000	2,349	21%	2,630	23%
Greater than \$200,000	1,999	18%	3,252	29%
Total	11,170	100%	11,255	100%

Source: Minot Assessor's Office

It is important to identify habitable housing units in this affordable housing analysis; therefore, based upon an analysis of the housing units included in the 2012 assessor report, it was determined that for

purposes of this study only 92 units in this value range would be included. These 92 units represent units valued between \$40,000 to \$50,000 located outside the flood zone in Minot.

In 2012 there were 18,879 households in Minot and 61 percent of those households were homeowners.⁵ Based on median household income data, there are 4,853 homeowner households with annual incomes below \$37,349, which is 80 percent of the city's median household income. These household could afford a home priced at or below \$116,000. However, there are at present only 3,098 homes valued at or below \$116,000. This means **at least 1,755 homeowner households in Minot with incomes below 80 percent of the median income are cost burdened for housing.**

1.4.2 Affordable Housing in Minot: Renters

There are 7,363 households that live in rental housing in Minot (39 percent of total households).⁶ Evaluating the number of renter households that are cost burdened is a far more complex problem, primarily due to the rapidly changing rental rates and lease terms in the city. Over the past two years rents have escalated dramatically. Because of the demand for housing for oil and gas workers, rental properties that were previously affordable now have much higher rental rates and often shorter lease terms that allow owners to increase rents more frequently to reflect market conditions.

According to data from the 2011 American Community Survey, 40 percent of renter households in Minot were considered cost burdened for housing, meaning they were paying more than 30 percent of their income for rent. Anecdotal information from interviews with social service organizations, the housing authority, and individuals looking for affordable housing indicates the percentage of cost burdened households in Minot is much higher than 40 percent today.

In order to develop a more current assessment of cost burdened renter households, the consultant team interviewed several experienced Realtors and property managers and evaluated nearly 500 rental units that were available for rent in September and October 2012. These rental units included one, two, three, and four bedroom units in Minot that were considered habitable. A spreadsheet incorporating information and rent rates for these 500 rental units was developed and an analysis was performed to identify the rental rate range, the average rent based on bedroom size, and the median rent for each bedroom size. The table below shows the cumulative analysis of these rental units.

Table 1-3 Cost of Available Rental Units in Minot, September and October 2012

Number of Bedrooms	Rent Range by Bedroom Size	Average Rent by Bedroom Size	Median Rent by Bedroom Size
1 bedroom	\$500 - \$1600	\$816.31	\$750
2 bedroom	\$550 - \$3950	\$1,312.88	\$1150
3 bedroom	\$875 - \$4600	\$1,887.62	\$1800
4 bedroom	\$650 - \$4000	\$2,238.91	\$2195

Source: FEMA Housing Portal and Minot AFB Housing Database

⁵ U.S. Census Bureau, American Community Survey, 2011 household income data

⁶ 2010 U.S. Census Data for Minot housing tenure

Table 1-4 was developed to determine a current percentage of cost burdened renter households. Based on the median rent for a two bedroom rental unit in the fall of 2012 and interviews with experienced property managers and local realtors, it is reasonable to conclude that 48 percent of renter households are cost burdened due to housing. Forty-eight percent of renter households in Minot can't afford the current median rent for a two bedroom unit, and property managers indicate rents for two bedroom units now range from \$845 to \$1,400.

Table 1-4 Rental Housing Supply in 2012

Percent of Total Rental Units	Bedroom Size	Number of Units	Median Rent	Gross income Required	Not affordable to % of Minot households
28%	1 bedroom	1,967	\$750.00	\$29,999	30%
52%	2 bedroom	3,653	\$1150.00	\$45,999	48.1%
15.4%	3 bedroom	1,082	\$1800.00	\$72,499	70%
4.5%	4 bedroom	316	\$2195	\$87,749	79.5%
TOTAL		7,026			

Source: FEMA Housing Portal and Minot AFB Housing Database

Given the dramatic increases in rents over the past two years, conventional analysis of the affordability of rental housing in Minot will not produce a reasonable result. Based on an analysis of currently available rental units, interviews with experienced property managers and local realtors, and a correlation between the 2012 median household income, current conditions indicate that 48 percent of renter households are cost burdened for housing. **There are 7,363 rental households in Minot, and at least 3,534 of them are cost burdened due to housing.**

More than 5,309 households in Minot, or 28 percent of all households, are cost burdened as a result of the high cost of housing. This means that nearly 11,900 people in Minot live in housing that is not affordable to them. This housing cost burden impacts a significantly greater percentage of low and moderate income households, and the cost burden for housing will continue to increase unless strategic actions are taken to ensure more affordable housing opportunities are available in Minot, particularly for local residents. It is important to note that recent housing construction is focused on providing housing for higher income households, and most of this housing is well beyond the financial means of a significant percentage of Minot residents.

28% of all households in Minot, or 11,900 people, live in housing that is not affordable for them.

Section 2

The State of Affordable Housing in Minot

Minot has seen unprecedented growth in employment and population in the past few years, largely due to new technologies that enable extraction of oil and natural gas from shale deposits such as the Bakken Formation in northwest North Dakota, thought to be the largest oil deposit in the U.S. except for Alaska. In fact, Minot was one of the fastest-growing micropolitan areas in the country between April 2010 and July 2011, increasing by 2,527 residents or 3.6 percent during that short time⁷. As a result of this population increase, housing demand was already rising in 2011 prior to the flood. Home sale prices had risen nearly 30 percent between 2007 and 2009⁸, and rental costs were increasing as well because oil and gas workers could afford to pay more. Demand for affordable housing in Minot had already outstripped supply by the beginning of the summer of 2011, even though 769 apartments, 209 condominium units and townhouses, and 440 single family homes were built or permitted between January 2008 and December 2010⁹.

The 2011 floods damaged 4,100 structures in Minot including 2,376 homes with extensive damage and 805 homes damaged beyond repair. The most severe flood damage occurred in the heart of the city, which was the most densely developed section. Much of the oldest and most affordable housing was located in the area that was inundated by the flood waters. . The maps in Figures 2-1 and Figure 2-2 show the assessed values of single family homes prior to the flood and after the flood in various parts of the city, including the flood zone. According to the Minot City Assessor's Office, at least 2,360 units of rental housing were also damaged in the flood, and this number does not include mobile homes.

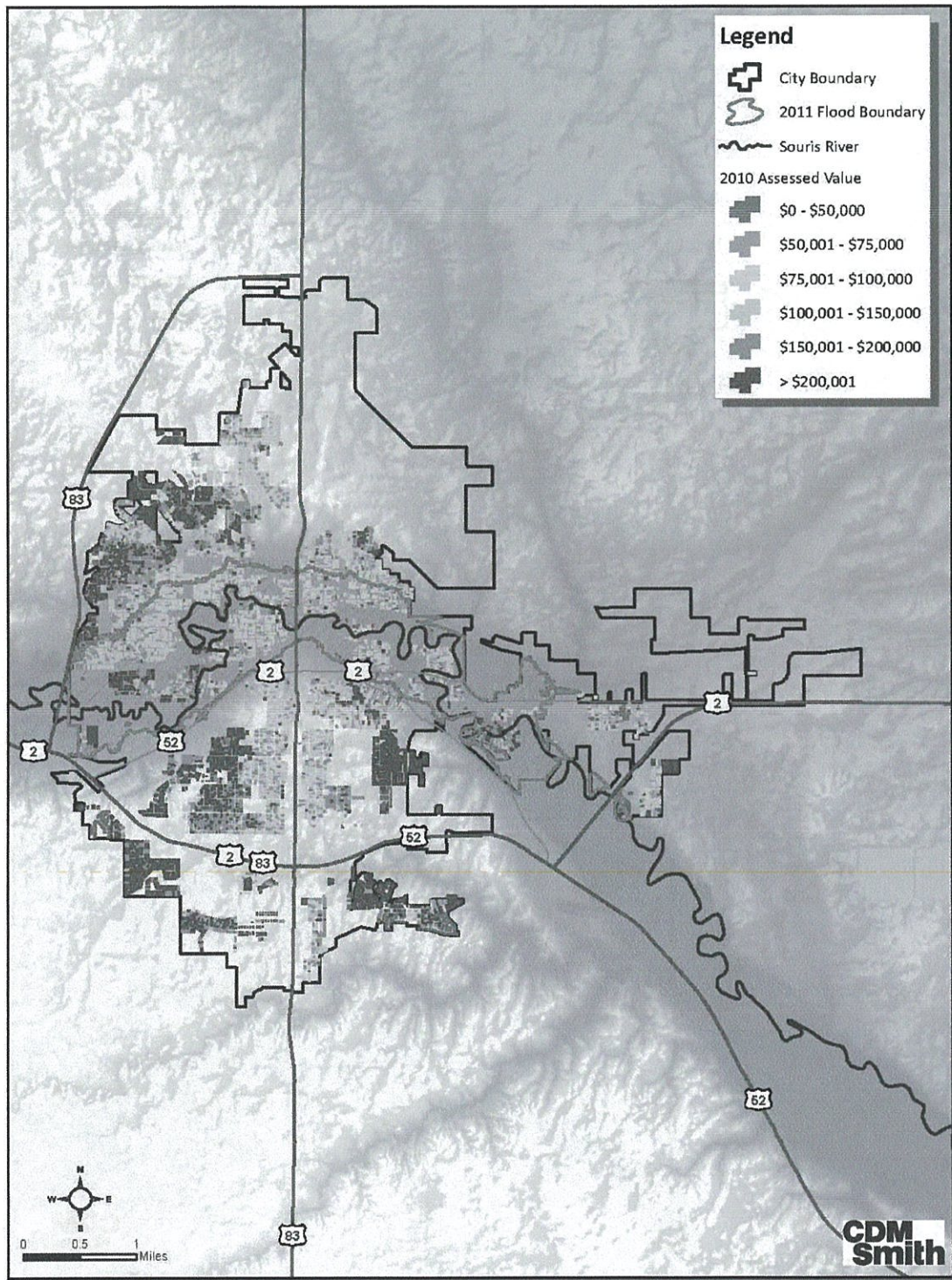
In December 2011, 1,978 households in Minot were living in FEMA temporary housing units at two community sites – Virgil Workman Village and Recovery Village – or in FEMA temporary housing units located on residents' private property next to their damaged homes. Other displaced residents moved in with family and friends, and an unknown number moved away from Minot altogether. The rental vacancy rate in Minot in the months after the flood was essentially zero percent, and hotels and motels were fully booked as well. This shortage drove rents and hotel rates even higher, exacerbating the already critical shortage of housing. Nearly a third (486) of households in FEMA temporary housing were former renters and the remaining 1,492 were former homeowners. By July 2012, 589 or 39 percent of the former homeowners had moved out of temporary housing but only 70 of the former renters, or just over 14 percent, had found permanent housing. Thirty-five percent of households living in FEMA temporary housing had incomes of \$25,000 or less, and another 31 percent had incomes between \$25,000 and \$50,000.¹⁰

⁷ U.S. Census news release <http://www.census.gov/newsroom/releases/archives/population/cb12-55.html>

⁸ *State of Affordable Housing Report for North Dakota, 2010 Report*, North Dakota Housing Finance Agency.

⁹ City of Minot Planning Department records

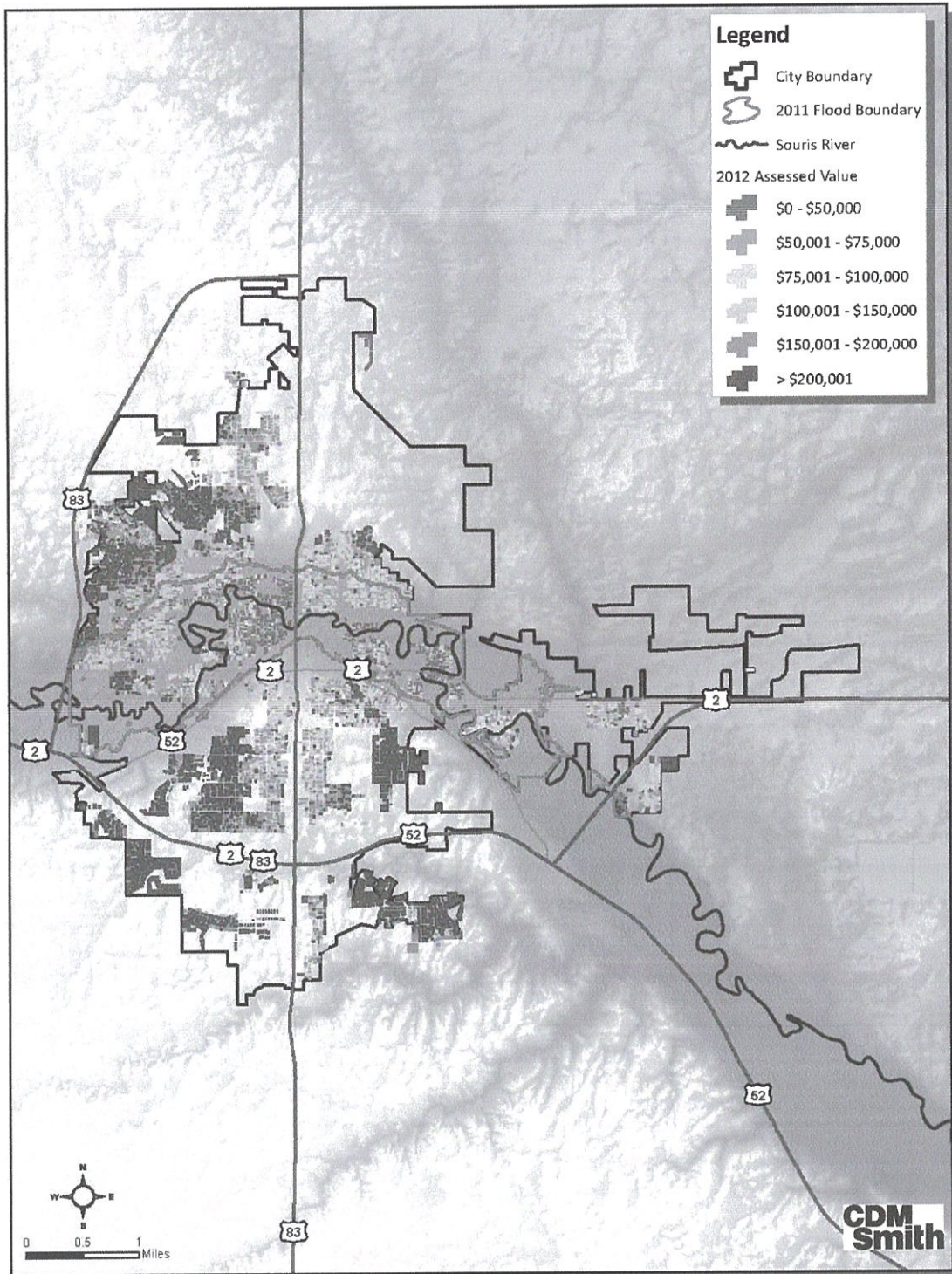
¹⁰ Dan Alexander, FEMA Region VIII Federal Disaster Recovery Coordinator, at Souris Basin Affordable Housing Forum on August 14, 2012



Source: City of Minot Assessor's Office and CDM Smith

NOTES: Map is intended for planning purposes only. Map does not include multi-family housing, mobile or manufactured homes.

Figure 2-1 Assessed Value of Single Family Housing in Minot, 2010



Source: City of Minot Assessor's Office and CDM Smith

NOTES: Map is intended for planning purposes only. Map does not include multi-family housing, mobile or manufactured homes. Data is current as of February 2012. Lower assessed values in the flood zone compared to 2010 represent properties damaged or destroyed.

Figure 2-2 Assessed Value of Single Family Housing in Minot, 2012

Many of the damaged homes were not in the FEMA-designated flood plain, so owners did not carry FEMA flood insurance; according to FEMA, only 476 of the damaged homes were insured. Nearly 80 percent of the homes with main floor damage have been repaired, according to a recently completed evaluation by City Assessor Kevin Ternes. However, based on recent information from FEMA, 64 percent of the 832 households still living in temporary FEMA units do not have plans to repair or return to their former residence. Given the higher percentage of renters that remained in temporary housing in July 2012, many of these households are renters who have been unable to find affordable rental housing.

Section 3

Analyzing Housing Demand in Minot

3.1 Estimating 2012 Population

According to the U.S. Census, the population of Minot increased 11 percent from 2000 to 2010. Under typical conditions, a housing study conducted two years after the Census would employ the most recent year population count to estimate population and housing demand. In some cases, traditional population growth estimation methodologies, such as the use of historical rates of fertility, mortality, and migration to estimate natural growth, could be applied to estimate growth since the last Census population count. However, a variety of indicators suggest that the City of Minot's population has grown substantially between 2010 and 2012, suggesting that traditional options for estimating population growth between censuses do not capture the unique situation of Minot and would consequently underestimate the demand for affordable housing.

Estimating the increase in population between 2010 and 2012 to derive an updated population total was a key step in the methodology we employed to calculate the demand for affordable housing in Minot. In order to estimate the current (2012) population of Minot, several approaches were designed to calculate the unique conditions in Minot. These different approaches employ different indicators, but all seek to account for the oil industry growth that appears to have accelerated between 2011 and 2012.

The increase in energy industry related jobs from the nearby Bakken Formation is considered the principal driver for growth in the area, suggesting that traditional growth factors would underestimate growth that has occurred since 2010. (The *2012 North Dakota Statewide Housing Needs Assessment: Housing Forecast and Detailed Tables*¹¹ corroborates our finding that population growth in the Minot area is driven by the significant expansions in the oil and gas industry sector in northwest North Dakota.) Given the difficulty of estimating the population between census years in the rapid-growth conditions present in Minot, we developed a variety of approaches using distinct data sources, with the objective of both deriving a valid population estimate and corroborating this estimate with other approaches and data sources. These population estimation approaches and their 2012 Minot population totals are summarized in Table 3-1.

¹¹ *2012 North Dakota Statewide Housing Needs Assessment: Housing Forecast and Detailed Tables*, North Dakota Housing Finance Agency and Partners, September 2012

Table 3-1 2012 Minot Population Estimates

2012 Population	Summary of Approach
44,318	IMPLAN model was used to estimate direct, indirect, and induced jobs from the oil and gas industry and project population growth from the 2010 Census.
43,734	Direct and indirect oil industry job growth in the Minot area was calculated using job per oil rig averages from the energy industry and oil well statistics from the North Dakota Department of Mineral Resources, Oil and Gas Division.
44,907	New housing units, including sold homes, multi-unit (rental) properties, and long-term hotel rooms were used to indicate new homes and households added since 2012.
43,986	The <i>2012 North Dakota Statewide Housing Needs Assessment</i> population projection for Minot for 2015 was scaled back to 2012 by assuming straight trend line growth between 2010 and 2015 and calculating an annual growth rate.
44,871	New oil industry and non-oil industry jobs in Minot counted in the Minot Area Development Corp.'s <i>Workforce Development Program-Effectiveness Report</i> , 3 rd Quarter 2012 (Nov. 1, 2011 through Oct. 31, 2012) were used to estimate new households.

NOTE: A detailed methodology of these approaches, including references and description of assumptions, is provided in Appendix A.

Of these approaches, we feel that the IMPLAN model-based estimate provides the most accurate estimate of population growth that has occurred since the 2010 Census, and provides the most useful number for the purposes of planning for Minot's affordable housing need. The primary strength of the IMPLAN model is that it centers on oil-industry related growth while simultaneously accounting for growth in other industries. However, it is important to note that the four other methodologies used to estimate population, which were based on other employment and/or new residents, indicate a general consensus that the 2012 population of Minot has accelerated from the previous decades. All of the other methodologies resulted in 2012 population estimates ranging from 43,734 to 44,907 or a spread of 1,173 people, and 2010-2012 growth rates ranged from 7.58 percent to 9.83 percent. Results of the IMPLAN model estimate a 2011 population of 42,461, and a 2012 population of 44,318 in the City of Minot. These estimates represent a population growth of 8.39 percent in two years.

Given the data constraints and unique market conditions influencing Minot as a regional trade center, traditional population analysis does not capture the growth and indirect and induced employment generation in Minot as a result of oil and gas production activity. Use of the IMPLAN model as a means of capturing employment growth attributable to Minot and Ward County, and the resulting direct, indirect, and induced employment, is a valid methodology for projecting population under these conditions. As in the *2010 North Dakota Statewide Housing Needs Assessment*, the population baseline data for this methodology utilizes the 2010 population from the U.S. Census.

Table 3-2 Minot Population Projections based on IMPLAN modeling

Year	Annual Population Growth	Total Projected Population
2011	1,573	42,461
2012	1,857	44,318
2013	2,201	46,519
2014	2,622	49,141
2015	3,231	52,372

Source: CDM Smith and IMPLAN multipliers

Based on this analysis, the 2013 population of Minot will reach 46,519. This population projection utilizes the Minot 2010 Census population of 40,888 as the baseline and subsequently estimates population based upon employment projections derived from an assessment of the impacts of local changes in economic activity, primarily driven by the oil and gas industry, using the IMPLAN econometric model.¹² Additional information on the IMPLAN analysis can be found in Appendix C.

3.2 Defining Affordable Housing Needs in Minot

In Minot 41 percent of the population live in households with incomes below \$37,349 which is 80 percent of the 2011 median household income. For these households, finding affordable housing is becoming increasingly difficult as housing costs continue to escalate. There are 2,251 extremely low income households in Minot with incomes less than \$15,000; 2,069 very low income households earning 30% to 50% of median income (less than \$23,343); and 3,416 low income households earning less than 80% of the median income, \$37,349. For those 4,320 extremely low and very low income households, there are only 858 housing units available for renter households in this income category that are owned or managed by the Minot Housing Authority that are contractual affordable. Some of the remaining 3,462 households may be homeowners now living on a fixed income but without question the majority of these households are cost burdened due to housing costs.

Table 3-3 below shows the 2012 median household income broken down by income bands to identify the households and percentage of households that are within each income band. The last column shows 30% of monthly income that could be spent for affordable housing. It is important to note, maximum monthly housing expenditure calculation is for the top of the income range in each band, in other words a household with \$19,999 in annual income could afford to spend \$500 each month for housing.

¹² IMPLAN is a software and database for estimating local economic impacts, developed by and purchased from the Minnesota IMPLAN Group, Inc.

Table 3-3 Household Income and Housing Budget

Median Household Income	2012 Households	Percent of total households	Maximum Monthly Housing Budget (30% of top of range)
Less than \$10,000	1,155	6%	\$250
\$10,000 to \$14,999	1,096	6%	\$375
\$15,000 to \$19,999	830	4%	\$500
\$20,000 to \$24,999	1,239	7%	\$625
\$25,000 to \$29,999	1,293	7%	\$750
\$30,000 to \$34,999	1,564	8%	\$875
\$35,000-\$37,349	559	3%	\$934
\$37,350-\$49,999	1,984	11%	\$1,250
\$50,000-\$74,999	3,814	20%	\$1,875
\$75,000 to \$99,999	2,884	15%	\$2,500
\$100,000-\$149,999	1,774	9%	\$3,750
\$150,000 to \$199,999	285	2%	\$5,000
\$200,000 or more	401	2%	\$5,000
Total	18,879	100%	

Source: U.S. Census Bureau, American Community Survey Data, 2011

A household with \$37,349 in annual income could afford to spend \$934 of their monthly income for housing which would enable them to afford a \$116,000 home. Only 28 percent of the habitable existing single family housing in Minot is valued at or below \$116,000.¹³

According to the 2012 City Assessment, there were 17,937 total housing units in Minot; 12,230 were classified as single family, 4,145 as multi-family, and 1,562 were mobile or manufactured homes.¹⁴ From January 2012 to September 2012, 1,032 permits were issued for residential construction in Minot. Fifty-one percent of the permitted units were multi-family apartments. As of November 14, 2012, 897 households were living in FEMA housing in Minot, and recent assessor data indicated there are approximately 600 homes in the flood area that have not been rehabilitated. Based on this data, there are 17,704 habitable housing units in Minot and 18,543 households.

3.3 Factors Affecting Affordable Housing Needs

3.3.1 Growth Industry Sectors and Wages

Most of Minot's expected population growth will be driven by the employment opportunities provided through the continued growth in industries involved in the extraction of oil from shale

¹³ City of Minot Assessment February 2012, City Assessor data

¹⁴ North Dakota Housing Finance Agency, 2012 "Statewide Housing Needs Assessment: Detailed Tables" Housing Supply data

deposits in the Bakken Formation. While some of this employment growth will occur in the form of direct jobs in petroleum-related industries related to oil extraction, other jobs will be created indirectly in retail, health, education, and other service-related industries. As discussed in **Section 3.1**, the project team developed an IMPLAN multiplier analysis to help assess population growth in the Minot area. This analysis estimated the number of indirect jobs created in other industries as a result of the direct increase in petroleum industry employment. The analysis indicated that in 2011 an estimated 405 direct jobs in Minot in petroleum-related industries created 282 indirect new jobs in more service-oriented industries. By 2020, 2,182 direct petroleum industry jobs would lead to 1,398 other jobs.

The study team supplemented this analysis with a location quotient analysis to identify the key local growth sectors for employment. These have been categorized as top industries affected by oil and gas extraction activities and are as follows:

- Food services and drinking places
- Maintenance and repair construction of nonresidential structures
- Hospitals
- Real estate
- Retail stores – general merchandise
- Physicians, dentists, health practitioners
- Nursing and residential care facilities
- Retail stores – food and beverage
- Wholesale trade businesses

In addition, the study team looked at top growth industries from the North Dakota Labor Market Study. These included:

- Transportation and material moving
- Construction and extraction
- Architecture and engineering
- Installation, maintenance and repair
- Production

Many of these sectors of employment have significantly lower wage scales than the petroleum industry, meaning it will be more difficult to attract these employees and more difficult for them to find housing they can afford. Table 3-4 lists the key employment growth areas and average wages for these industries based on recent surveys in North Dakota. Employers are already having to pay a premium to many service industry workers to meet demand because of the high cost of living in the Minot area, particularly housing.

Table 3-4 Key Employment Growth Areas and Average Wages

Growth Industry	Weekly wage (2012) if available at 2-digit NAICS Code	Average wage rates (2011) – annualized at a 40-hour work week	Notes
Food services and drinking places	NA	\$20,470	
Maintenance and repair construction of nonresidential structures	NA	\$46,710	
Hospitals	NA	\$53,550	Wage is for healthcare practitioners and technical occupations
Real estate	\$1,012	\$59,730	
Retail stores – general merchandise	NA	\$30,640	Wage is for retail salespersons
Physicians, dentists, health practitioners	NA	\$186,680	Wage is for family and general practitioners
Nursing and residential care facilities	NA	\$26,130	Wage is for nursing aides, orderlies and attendants
Retail stores – food and beverage	\$558	\$30,640	Wage is for retail salespersons
Wholesale trade businesses	\$1,079	\$40,040	Wage is for wholesale and retail buyers
Transportation and material moving	NA	\$35,420	
Construction and extraction	NA	\$48,110	
Architecture and engineering	NA	\$69,630	
Installation, maintenance and repair	NA	\$50,370	
Production	NA	\$45,250	

Source: Job Service North Dakota, Labor Market Information Center, OES Unit (2011 Data) and QCEW Unit (2012 Data)

Many of these jobs provide essential services to keep people safe and healthy, and to keep the local economy functioning. All of these new workers and their families will need to find affordable homes in the Minot area if these positions are to be filled long-term. In the short term, companies seem willing to accommodate workers in hotels and fly workers in on a weekly basis; but this practice may not be sustainable in the long run and it does not establish new residents in the community. The lack of available affordable housing will continue to affect many of the non-oil-related businesses in the community, and can ultimately impact the community's quality of life and its ability to retain a diverse economic base.

Section 4

Analyzing Housing Supply in Minot

4.1 Housing Inventory in Minot

Based on the 2012 City Assessment and information from the *North Dakota Statewide Housing Needs Assessment*, there were 17,937 housing units in Minot; including 1,562 mobile homes or manufactured homes. Of these units, 12,230 were classified as single family and 4,145 as multi-family. The relative percentages are shown in Figure 4-1. Based upon 2011 American Community Survey data, sixty one percent of Minot households are homeowners and 39 percent live in rental housing.¹⁵ Figure 4-2 shows this breakdown by Census tract.

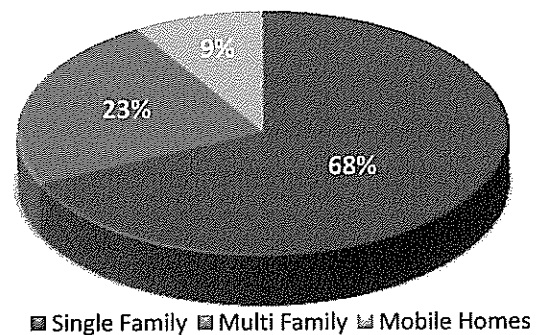


Figure 4-1 Percentage of Housing Types in 2012
Source: City of Minot Assessor's Office

4.2 Housing Values, Sales Prices, and Rental Rates

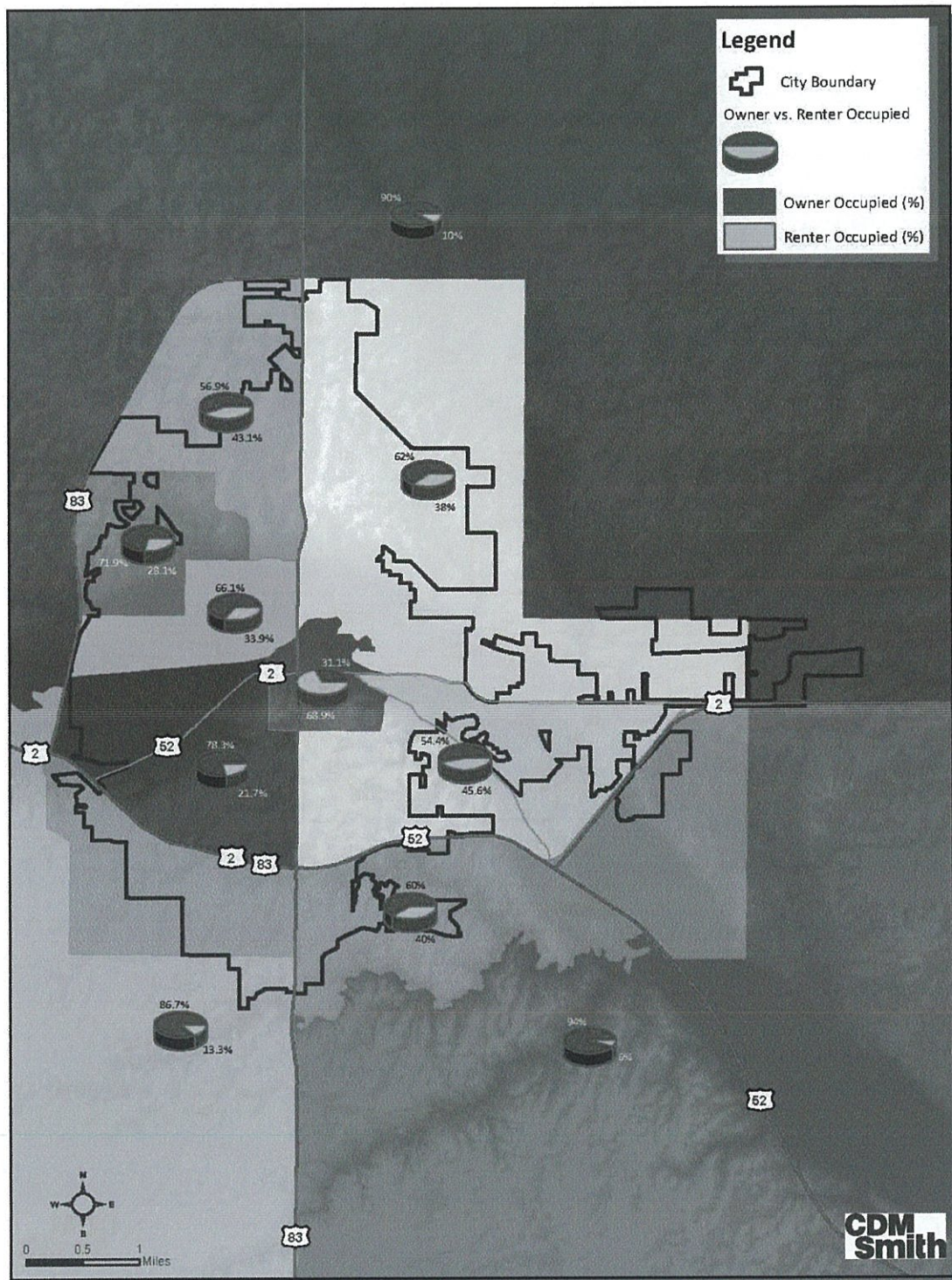
4.2.1 Single Family Homes

The median value of a single family home in Minot continues to increase. In 2009 the median home value was \$118,000, and based on data from the 2012 City Assessment, the median single family home today is valued at \$146,300 – an increase of nearly 20 percent in three years. The GIS maps that follow show the median value of single family houses throughout the city based on the City Assessor's valuation. In 2010 the majority of homes in Minot were assessed in the \$100,000 to \$150,000 range, but by 2012 a majority of houses were assessed at greater than \$200,000.

From January 1, 2012 through October 23, 2012, 512 residential homes were sold in Minot.¹⁶ This does not include sales of vacant or damaged residential units that were located in the flood area. During this period, 412 single family homes, condominiums, and townhomes were sold in Minot. Of these sales, 319 were existing homes or condos and 193 were newly-constructed units. The average selling price of the single family homes was \$256,842, while the average sales price of the new constructed units was \$278,388.

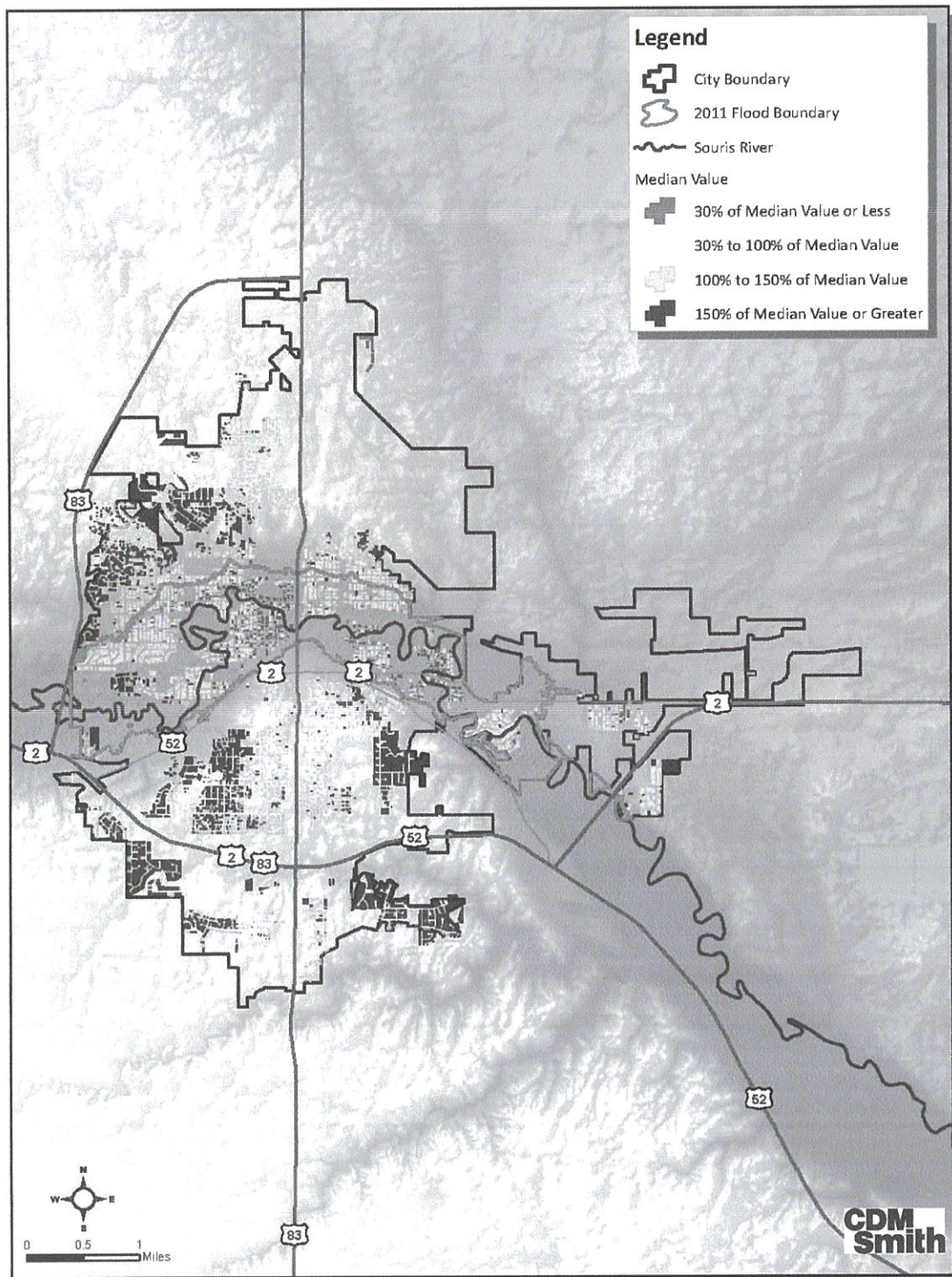
¹⁵ U.S. Census Bureau, American Community Survey 2011 housing data

¹⁶ Minot MMLS Year to Date Statistics as of 10/23/2012. Provided by Mr. Todd Fettig, Sales Manager, Coldwell Banker 1st Minot Realty



Source: 2010 U.S. Census data and CDM Smith

Figure 4-2 Owner Occupied vs. Rental Housing in Minot in 2010, by Census Tract

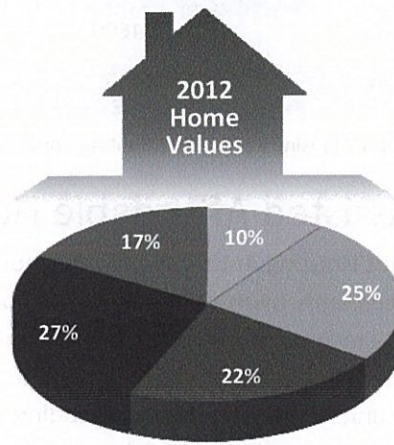
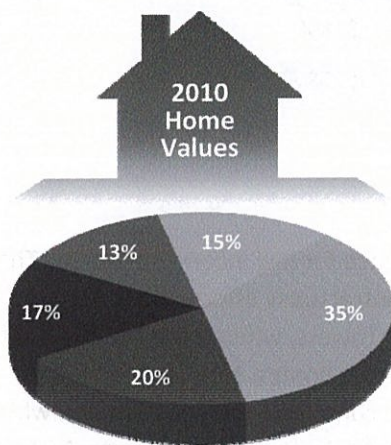


Source: Minot City Assessor's Office and CDM Smith

Figure 4-3 Median Value of Single Family Housing in Minot in 2012

Table 4-1 Assessed Value of Single Family Housing in Minot in 2010 and 2012

Assessed Value	2010		2012		Percent Change 2010 to 2012
	Number	Percent	Number	Percent	
\$0 to \$75,000	1,521	13%	1,760	17%	16%
\$75,000 to \$100,000	1,752	15%	1,207	10%	-31%
\$100,000 to \$150,000	4,114	35%	3,111	25%	-24%
\$150,000 to \$200,000	2,349	20%	2,630	22%	12%
Greater than \$200,000	1,999	17%	3,252	27%	63%
Total	11,735	100%	12,230	100%	4%

**Figure 4-4 Home Values by Percentage in 2010 and 2012**

4.2.2 Rental Rates

Several area realtors were interviewed by the study team to gain a better understanding of the rental market in Minot. Todd Fettig, Sales Manager with Coldwell Banker 1st Minot Realty, provided the most currently available data based on his discussions with several property managers. This information is shown in Table 4-2.

Table 4-2 Current Rental Rates in Minot

Number of Bedrooms	Current Rental Range
1 Bedroom	\$695-\$895
2 Bedrooms	\$845 - \$1400
3 Bedrooms	\$1200 - \$1800
4 Bedrooms	\$1700+

To better understand the dramatic increase in rental rates, the consultant team collected data on nearly 500 rental units that were available for rent in September and October 2012¹⁷. A spreadsheet was developed including the location of these units, rental rates, and bedroom sizes. An analysis was conducted to determine the rent ranges for each bedroom size, the average rent based on bedroom size, and the median rent for each bedroom size. This data, shown in Table 4-3, indicated higher rental rates than the data provided by Coldwell Banker 1st Minot Realty.

Table 4-3 Cost of Available Rental Units, September and October 2012

Number of Bedrooms	Rent Range	Average Rent	Median Rent
1 Bedroom	\$500 - \$1600	\$816.31	\$750
2 Bedrooms	\$550 - \$3950	\$1,312.88	\$1150
3 Bedrooms	\$875 - \$4600	\$1,887.62	\$1800
4 Bedrooms	\$650 - \$4000	\$2,238.91	\$2195

Source: FEMA Housing Portal and Minot Air Force Base Housing Office

4.3 Assisted Affordable Housing

The Minot Housing Authority provides housing and rental assistance for low income residents. The agency currently owns or manages 858 housing units that are contractually affordable to low and moderate income households. The authority owns Milton Young Towers, where elderly and disabled applicants are given priority, as well as 40 duplexes and single family homes. MHA also manages housing units owned by others, including the Manor Apartments complex and Henry Towers, which is for low-income seniors. A breakdown of housing owned or managed by the Minot Housing Authority can be found in Appendix C.

The Minot Housing Authority manages the HUD Section 8 program for Minot and Ward County. As of September 2012, MHA estimates they were assisting 475 households in Ward County under the Section 8 program, and could help another 20 to 25 families if units were available at the maximum monthly rent set by HUD of \$857. According to Tom Pearson, Executive Director of Minot Housing Authority, since the flood they have issued about 50 Section 8 vouchers per month to qualified households, but fewer than five families find housing that meets HUD criteria. In all, MHA provides 858 units of contractually affordable housing through Section 8 and other programs.

Phase I of Washington Townhomes, Minot Housing Authority's newest property, broke ground on August 14, 2012 and is scheduled for completion in August 2013. The project includes 18 two-bedroom units, 12 three-bedroom units, and two four-bedroom homes with rents from \$398 to \$930 per month, depending on residents' income and family size. MHA hopes to continue with Phase II in 2013, which would offer an additional 32 units, but the state can fund only four or five such projects each year and funding for Phase II is not guaranteed.

¹⁷ FEMA Rental Report, Minot Air Force Base June 2012 Rental Housing Survey

A recent article by the HUD Office of Policy Development and Research's Gas and Oil Task Force, formed in 2011 to analyze the effect of gas and oil exploration and development on housing markets, notes that many public housing agencies in North Dakota are having a hard time using their total number of vouchers because of rising rents. The seven North Dakota housing authorities nearest to the oil production area leased only 56 percent of their vouchers due to funding constraints and lack of available housing.

The same article confirms that owners of Section 8 properties are also leaving the program in order to charge market rate rents. A 96-unit project in Ward County opted out of its Section 8 rental assistance contract in 2011. Under the Section 8 program a two-bedroom unit had been renting at \$485 per month. After the shift to market rates, the same unit was rented for \$1,100 per month. The renters under the subsidized program could not pay the higher rents and were forced to move.

4.4 Market Rate Housing Supply

This section builds on the prior sections of this chapter by discussing the overall market for housing in Minot, considering sub-markets and housing types, and discussing recent trends including new housing construction. It provides a broader picture of the housing supply that can be matched with the housing demand discussed in Section 3.

4.4.1 Defining Market Rate Housing

The majority of housing in Minot, by far, is market rate housing. This includes all housing that is either owned or rented that is not actively and usually publicly assisted or publicly owned. Section 4.3 discussed the assisted affordable housing stock in the community. Not all residents living in market rate housing are currently paying a market rate. Homeowners with little or no mortgage debt may not have the same monthly house payments as a new owner of a similar house. Similarly, someone with a long-term rental arrangement may not have been subjected to recent market rate rent increases. However, if the homeowner were to sell his house, he would receive the market rate; and if the rental unit lease expired, it would likely be renewed at a market rental rate. As a result, these housing situations are still considered market rate housing.

4.4.2 Considering All Housing

The supply analysis for Minot must consider all forms of housing available, even though affordable housing is the focus of this plan. The current market conditions in the Minot area have led to population growth that has substantially outpaced housing construction. This, combined with the severe damage or destruction of more than 3,100 units by the 2011 flood, has led to an overall shortage of market rate housing in the area.

The availability of housing at various price points, affordable to people earning a range of incomes, helps to support a diversified economic base and ensures that entry-level workers, service employees, and other members of the workforce that are critical to the sustainable operation of a community can afford to live and work there. Communities without affordable housing options for school teachers, health care workers, police officers, maintenance personnel, and other employees face many serious issues that can have significant consequences. The starting salary in Minot for a police officer or firefighter is \$41,492. Thirty percent of the monthly income for these public safety officers would

allow \$1,037 for housing expenses. These critical public servants could not afford the average rent for a two-bedroom apartment in Minot, based upon the recent rental housing analysis.

Finding affordable housing is significantly more challenging for low and moderate income families. The combined impacts of the flood damage to an area of the city that provided a significant percentage of Minot's more affordable housing and the dramatic influx of population and demand for housing resulting from the oil and gas industry has created a very serious affordable housing problem for Minot.

As discussed in Section 4.2, prices for housing – both for rent and for sale – have risen substantially in the past 18 months due to shortage conditions. The result is a market where a larger number of households than normal are having issues with housing affordability. Because construction of new housing and rehabilitation of existing units may help ease the shortage, it is important to consider all housing types in this analysis.

4.4.3 Defining the Market Area

For the most part the area analyzed for housing supply was the City of Minot. However, housing supply provided by areas outside Minot including the two-mile planning boundary and further into Ward County (such as at Minot Air Force Base) were considered in the development of the overall picture of housing supply.

4.4.4 Recent Developments and Trends in Housing Construction

Active housing construction is occurring in the Minot area at a pace that is greater than has been seen in recent years. This is clearly in response to the increasing demand. In 2011, a total of 1,121 new residential building permits were obtained as shown in Table 4-4. Through November 2012, 2,485 residential building permits were issued, an increase of 243 residential permits over 2011, with December not yet included.

Table 4-4 Residential Building Permits Issued in Minot in 2011 and 2012

Residential Type	Number of Permits in 2011	Number of Permits through October 2012	Total Permits 2011/2012 (through November 2012)	Change in Number of Permits through November 2012 compared to 2011
New Single Family Homes	286	358	644	+72
New Townhouses	170	211	381	+41
New Condo Units	52	73	125	+21
New Apartment Units	613	722	1335	+109
Total New Residential	1121	1364	2485	+243

Source: City of Minot Planning and Inspection data

More than half of the new building permits are for apartment units and only approximately 26 percent are for single family homes. There is a clear emphasis on building smaller units and rental housing to serve the employment generated by the petroleum industry.

Compared to 2008 and 2010, the average number of single family home permits per year in Minot has more than doubled in 2011 and 2012. The number of townhouse unit permits per year is now nearly ten times the average from 2008 through 2010. The number of permits for multi-family units per year has also nearly doubled.

4.4.5 Existing Housing Supply and Locations of Housing

Sections 4.1 and 4.2 presented tables and maps illustrating the quantity and locations of housing supply in Minot, along with a range of values of homes based on assessed value. A total of 17,937 housing units were identified, not including on-campus residences for students. Section 4.3 discussed the housing units either owned or managed by the Minot Housing Authority; 858 of these units are contractually affordable through Section 8 or other programs. This means there are currently just over 17,000 units of market rate housing in Minot.

Housing is located throughout the city, with the highest concentrations in the southeastern and southwestern portions. Much of the more affordable market rate housing is located in the central areas, which were also hardest hit by the 2011 flood. The northwest quadrant of the city is a growth area for housing supply.

4.4.6 Sectors of Housing Supply

4.4.6.1 Single Family Homes

Single family homes are the anchor housing type in Minot, and single, detached homes are most common. In the housing supply analysis for Minot approximately 12,230 of the 17,937 housing units, or 68 percent, were single family homes as of February 2012. This does not include mobile homes. Single family homes are located throughout the City, except in the far northeast quadrant. Higher value single family homes are mostly located in the outer areas of the City with a few scattered exceptions in the core areas. As discussed in Section 2.1, much of the City's more affordable housing stock was located in the flood-affected areas, and of these units were single family homes and apartments located in single family homes.

The study team collected information on sales of homes in Minot through October 2012 based on the City Assessor's sales data. A summary of the sales of single family homes is shown in Table 4-5.

Table 4-5 Minot Home Sales in 2012

Residential Type	Bedrooms	Number of Units	Average Sale Price
Single Family	2 bedrooms	78	\$184,035
	3 bedrooms	170	\$245,959
	4 bedrooms	111	\$286,297
	5+ bedrooms	44	\$355,875
Condo/Townhome		100	\$213,646
New Construction		193	\$278,388

Source: City of Minot Planning and Inspection Data

An average home in Minot is selling for \$256,751, or \$263,983 if condos are not included. This means that the average single family home sale price was 1.8 times the average assessed value for a single family home. The mix of homes sold shows a range of sizes, without an over-emphasis on larger homes. Thus the average sales price to assessed value ratio indicative of the escalation of market prices that may be better illustrated in future reassessments. The number of new construction single family homes sold from January through October 2012 is almost 100 less than the number permitted in 2011 approximately 160 less than the number permitted through October 2012. This indicates there is still a supply of new homes underway to be completed and sold based on already permitted units.

4.4.6.2 Apartments

Apartments have been the fastest-growing segment of housing supply in the last four to five years. In 2011 and 2012 more than half of all new housing units permitted have been apartments, with a total of more than 1,300 new units. The overall housing supply analysis for Minot indicates that approximately 4,145 of the 17,937 housing units, or 23 percent, are multi-family units, and most of them are apartments. Figure 4-5 shows the locations of apartments and other multi-family units in Minot. While units are scattered throughout the city, there are clusters in the far northern and southern parts of the city, as well as in the vicinity of Minot State University.

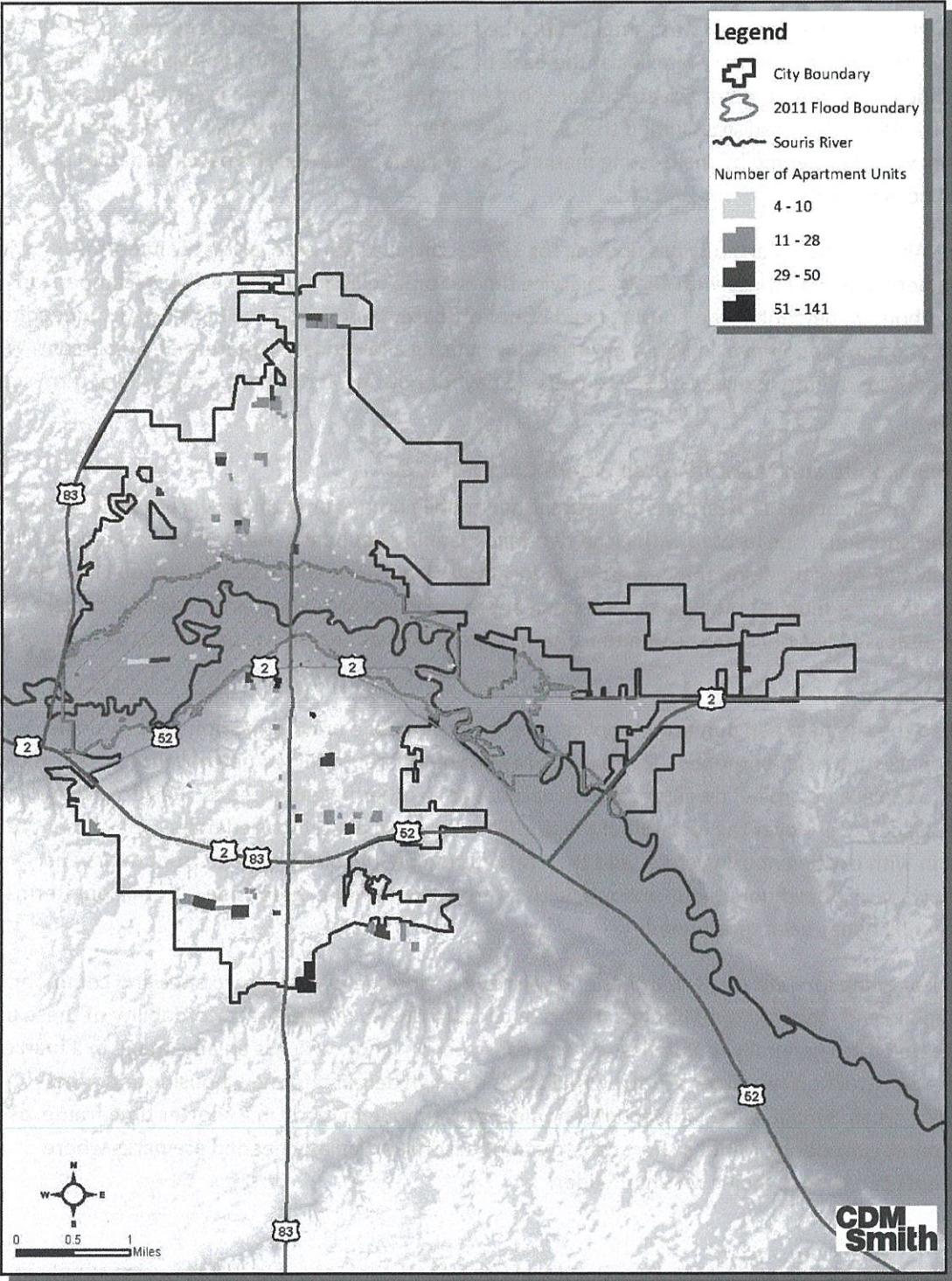
4.4.6.3 Student Housing

Minot State University provides housing to serve students and, to a lesser extent, the faculty population. Students are served by a mixture of on-campus and adjacent-to-campus residences, apartments near campus, and homes throughout the region given that many of the students are commuters. Approximately 54 percent of the 3,500 students at Minot State University in fall 2012 were from Ward County. The university has space for 721 students in residence halls as well as 78 off-campus or adjacent-to-campus apartments in three complexes. The University and University Foundation have recently partnered with private developers to construct two mixed-use apartment complexes near campus, Beaver Ridge Plaza and Beaver Suites.

The student residence units would not be considered market rate housing due to their restricted availability and rates not set directly by the market. However, the rest of the student population faces the same housing issues experienced by the wider community, and they have less opportunity to earn income to afford housing. In discussions with Minot State University officials, rising market rate rents for students has had a significant impact. As recently as a couple of years ago, students were able to find rental accommodations near campus in the range of \$500 per month. Now a student is lucky to find something under \$1,000 per month. Enrollment at Minot State has declined by approximately 300 students in the last two years, and housing costs have been cited as a factor in this decline.

4.4.6.4 Military Housing

Minot Air Force Base is located in Ward County and is approximately 13 miles north of Minot. In 2010 the base completed a Housing Requirements and Market Analysis through 2014. This analysis was



Source: Minot City Assessor's Office

4-5 Location of Apartments in Minot in 2012

completed before the 2011 flood, and as the employment boom related to petroleum extraction within the Bakken Formation was ramping up. The study forecast a planned manpower of 5,495 personnel with 2,778 military families at the base by 2014, requiring 1,606 housing units. The analysis conclude at the time that the private sector shortfall in housing for military families would be 1,101 units by 2014. This analysis assumed that 985 military family homeowners and 1,477 military family renters would be served by the existing market. The analysis suggested the base needed to provide 1,417 housing units.

Minot Air Force Base currently has housing for 1,746 individuals on base, primarily in dorms for lower grade personnel and those with shorter service times. Some military personnel live in campers on base. About 90 percent of the housing need is met off-base. Minot Air Force Base has responded to market housing conditions in Minot by increasing housing allowances by more than 50 percent. While this improves military families' ability to find and pay for housing, it does not address long term supply issues.

4.4.6.5 Mobile and Manufactured Home Communities

The City of Minot has 12 designated or established mobile home communities located within the city, with an additional one located within the two-mile planning boundary. Most of these sites are almost entirely full. After the flood the newest sites, located at Plainview, began to sell very quickly. No new applications for mobile home parks have been approved in the last two years. Potential projects have been discussed but none have come to fruition, with land costs and utility issues cited as important factors.

Instead the city has seen numerous applications to place mobile or modular homes on a single site basis in existing neighborhoods. This has occurred in both flood-affected neighborhoods, as residents seek to replace destroyed dwellings, and in vacant lots in other neighborhoods. Residents have expressed concern over the location of these infill mobile and manufactured units. They do not tend to fit in with existing housing stock, and their orientation on lots often leads to front doors and windows facing neighbors' side windows, with no front door on the street side. Overall long-term compatibility has been questioned.

It is clear going forward that Minot has and will have a shortage of designated sites and communities for mobile and manufactured homes. This is of concern due to the general affordability of these units. These units also generally require less on-site construction labor, which is an advantage in a market where construction resources are stretched given the high demand for new housing and other building types. Mobile and manufactured homes can be move-in ready in a shorter time frame, as well – a bonus, considering Minot's short construction season. Particularly needed are parks where residents can choose their own unit builder.

4.4.6.6 Hotels

Hotels now make up a substantial part of the existing short-term and mid-term housing supply in Minot in response to influx of petroleum industry and related workers, and the 2011 flood. In 2008 and 2009 no new hotels or motels were permitted or constructed in Minot. In 2010 two were constructed. In 2011 and the first half of 2012, however, there were 19 new hotel and motel projects. City staff are currently tracking three other applications as of October 2012. A total of 1,452 hotel and

motel rooms were constructed in 2011 and 2012, with approximately 200 more rooms in the application process. Hotels are predominantly clustered along Broadway near the airport and in the south part of town along US-2/US-83.

For several months vacancy rates at hotels in Minot were near zero with rates well above average for the upper Midwest. In recent months there has been some decrease in vacancy rates. With more than 1,600 rooms coming on-line in a two year time period, this is clearly part of the short-term housing supply in Minot. The question is what will be the long-term role of hotels once the supply catches up with short-term demand. There may be potential for long-term conversion of some units into apartment type housing.

4.4.7 New Housing Construction

As indicated by the building permit discussion above, the level of home building in the Minot area has increased substantially in the past two years, with approximately 2,500 housing units permitted. Limiting factors for the construction of new housing include the availability of land fully served by utilities, and landowners adjacent to newly served areas being willing and able to engage in housing development.

Three housing growth areas include the southwest, southeast, and northwest parts of the City. Expansion to the southwest requires construction of a relief sewer. Expansion to the southeast is also dependent on planned sewer extensions. Sewer construction is ongoing. The northwest is the highest growth area. The City has temporarily held a non-sewered subdivision with up to 2,000 units that will be able to come online next year once sewer projects are finished. Nearby communities such as Burlington are also growing.

Two potential areas for niche housing supply are increased density in the downtown and higher density in compatible areas. The city will support higher density projects in the right context and with sufficient parking, and new townhome units and mixed-use developments have been completed in recent years. Some of these are targeting the need for affordable housing, such as the 32 unit Washington Townhomes development under construction and the 34 unit Minot Art Space Lofts. Similarly, the city will consider needed site development for future mobile home and manufactured home communities, and what measures may be needed to create new mobile home community sites. This may require some form of land trust or specific land assembly and service planning.

The North Dakota Housing Study completed in September 2012 examined two models for housing supply growth in Minot. The first model was based on past development trends; it forecast approximately 2,800 new units being constructed between 2010 and 2015, and approximately 2,100 additional units being constructed between 2015 and 2020. The second model was based on anticipated demand, and an assumption that supply would increase to meet demand. This resulted in a forecast of approximately 3,500 new units between 2010 and 2015 and approximately 1,700 new units from 2015 to 2020. The trend in recent construction and anticipated construction in Minot would appear to exceed both of these forecasts in increasing supply. This suggests that in the long term, the market will be able to construct the supply of housing required to meet the long-term demand as long as needed infrastructure expansion continues.

The issue will be the affordability of the new construction and the ability of lower income households to find adequate housing, even with the new housing supply coming online, particularly with an average new home price of \$278,388 through October 2012, a cost of approximately \$240 per square foot.

4.4.8 Overall Supply of Available Housing

Several key conclusions can be drawn regarding the supply and cost of market rate housing based on the analysis in this section.

- Building of new housing is occurring at a much faster rate in 2011 and 2012 than in 2008-2010; the number of units permitted per year has more than doubled.
- The average home is selling for approximately \$257,000, and the average new home is selling for roughly \$278,000, which is more than 1.8 times the 2012 average assessed value for a single family home. This illustrates the tremendous price escalation in the market, creating long term affordability issues for a much wider segment of households.
- Few of the new housing units being constructed are targeted at moderate income families, other than the 32 unit Washington Townhomes development.
- No new mobile or manufactured home communities are being developed, and existing ones are filled. These have traditionally been a key source of affordable housing the area.
- The lack of off campus student housing is becoming a significant issue as students do not have the income to pay market rate rents that, in many cases, have doubled in the past year.
- Minot Air Force Base relies on the market housing supply for 90 percent of their housing needs. The base has increased housing allowances by more than 50 percent to respond to increasing market rate prices. While this helps military families find and pay for housing, it does not address long term supply issues.
- The construction of approximately 1,600 new hotel rooms in a two-year period has provided a short term supply solution for companies looking to house workers, but this is neither a long term nor an affordable housing solution.
- Rental rates have increased dramatically, from a median rent of \$569 in 2010 to a situation today where that amount will not even pay for most one bedroom apartments. The current median rent for a two bedroom apartment is \$1,150. As discussed in the following section, this is causing affordability issues for many more households who rely on rental housing.

Section 5

Cost Factors for Housing Construction in 2013

To respond to the affordable housing challenge in Minot the city is developing an Affordable Housing Plan and Strategy. This Affordable Housing Supply and Demand Analysis is the first step in that effort. The Plan and Strategy will utilize information from the supply and demand analysis to develop specific policies, actions, and programs to respond to the need for more housing that is affordable to a broader spectrum of the workforce in Minot.

In order to develop reasonable cost factors that have been utilized in the recommendations for funding in Section 1, the study team examined a report from the National Association of Home Builders: New Construction Cost Breakdown, based on 2011 Survey data, along with recent local real estate data to better understand the cost factors involved in housing construction. The fees listed above typically account for less than 3 percent of the total cost of constructing a new house, meaning more than 97 percent of the costs are market driven and are factors over which the local community has little control.

The results of the 2011 NAHB survey had an average housing price approximately \$32,000 higher than the average new home sales price in Minot through October 2012 of just over \$278,000. Based on the results of the survey, Table 5-1 shows a percentage breakdown of key elements that make up the cost of new housing.

Table 5-1 Housing Cost Factors

Cost Factor	Approximate Percentage of Total House Price
Finished Lot Cost	21.7%
Total Construction Cost not including Fees	56.4%
Fees	2.9%
Financing Cost	2.1%
Overhead and General Expenses	5.2%
Marketing Cost	1.5%
Sales Commission	3.3%
Profit	6.8%

Source: NAHB Cost Survey 2011

The NAHB survey suggested an average lot cost (finished) of approximately \$67,500. Discussions with Minot Realtor Todd Fettig indicated that lots typically cost around \$70,000 in Minot. An online review of available empty subdivision lots showed asking prices ranging in the \$65,000 to \$100,000 range for ¼ acre to 2/5 acre lots. A few isolated lots under ¼ acre are available at \$26,000 to \$45,000. Raw developable land including multiple acreage tracts is in the range of \$20,000 an acre, although there

are many sites selling at higher per-acre prices in areas where commercial development may be more feasible.

The NAHB survey suggests an average cost per square foot for construction of approximately \$80.00. Anecdotal evidence suggests the current price in Minot may be slightly higher due to the scarcity of both materials and labor.

In assessing the cost of building an affordable home or townhome in Minot, it is important to recognize that most of the cost factors for affordable housing are the same as the costs for market rate housing. Land costs are a prime example. Based on the NAHB survey data, adjusted based on local land cost conditions and considerations for constructing affordable housing, a 1,000 square foot duplex or townhome unit could have a cost structure in the range of estimates shown in Table 5-2.

Table 5-2 Housing Cost Factors for a Hypothetical 900 Square Foot Unit

Cost Factor	Dollar Amount	Percentage (Rounded)	Notes
Finished Lot Cost	\$35,000	23.6%	Based on two units in a standard 1/4 acre to 1/3 acre lot. Six to eight units per acre.
Total Construction Cost not including Fees	\$80,000	54.1%	1000 square feet at \$80 per square foot
Fees	\$4,000	2.7%	City could waive their share of any fees
Financing Cost	\$3,000	2.0%	
Overhead and General Expenses	\$7,000	4.7%	Overhead may be higher for a housing program but some overhead costs may be absorbed by general program budgets
Marketing Cost	\$2,000	1.4%	Will still be marketing costs associated with finding residents
Sales Commission	\$6,000	4.1%	Likely some sales commissions still needed to match sellers and buyers
Profit	\$11,000	7.4%	Assumption of private sector involvement in building
Total	\$148,000	100%	

Source: NAHB and CDM Smith

The above example is meant only as a hypothetical cost to illustrate the possible range of costs for building homes as part of a program. It is important to note that even using these assumptions, which include relatively low overhead and financing costs, this hypothetical example still costs more to build than the \$116,000 that is affordable by a household making 80 percent of median income, as

discussed in Section 2. The cost difference would need to be made up through programs to support and promote affordable housing, as discussed in the recommendations.

Plans for new affordable housing construction should consider the role that manufactured housing can play. There are two potential cost advantages of considering manufactured housing: it provides a lower base price for construction for basic housing units, and it lowers the demand on local materials and construction in a high-demand environment for these resources, given the amount of construction currently under way in Minot. The current issue is a lack of sites for new manufactured home communities, and land will need to be assembled and serviced in order to construct manufactured housing. The study team examined some potential cost ranges for affordable manufactured homes as presented in Table 5-3. These figures were developed by examining local land costs, assuming a large scale project, wholesale prices of certain types of manufactured homes, current retail prices on manufactured homes from dealers in Minot, and factors related to fees and sales.

Table 5-3 Manufactured Home Cost Examples

Manufactured Home Examples	Single Wide 1,100 SFT 3 Bedroom	Double Wide 1,500 SFT 3/4 Bedroom	Notes
Finished Land Cost	\$15,000	\$22,000	Based on developing a large site at \$40,000 acre and dividing for units at 4 to 6 per acre.
Base Cost of Unit	\$37,000	\$55,000	Based on a range of factory prices.
Delivery and Setup	\$20,000	\$30,000	
Fees and Inspection	\$4,000	\$4,000	Including required state inspections.
Overhead and General Expenses	\$ 7,000	\$7,000	Program and overall site expenses.
Marketing and Sales	\$4,000	\$5,000	There will still be marketing and sales costs although profit for private sector entities is included in base cost of unit and delivery and setup.
Total	\$87,000	\$123,000	

The above example is meant to be a hypothetical cost illustrating the range of possible costs for building manufactured homes as part of a program. The costs would appear to be lower than single family homes in a typical subdivision, provided appropriate sites can be developed. However, anything more than a smaller single wide unit would likely have a cost greater than the \$116,000 that is affordable by households with 80 percent of the median income.

Appendix A

Terms and Definitions

Affordable housing	generally, housing is considered affordable if a household spends no more than 30 percent of its monthly income on housing. For renters, this includes monthly rent. For homeowners, it includes monthly mortgage payments plus property tax, hazard insurance, and mortgage insurance.
Block group	clusters of blocks within a census tract.
Census tract	small subdivisions of metropolitan and other densely populated counties. Census tract boundaries do not cross county lines but may include areas outside the metropolitan area. Census tracts are designed to include those with similar population characteristics, economic status, and living conditions to allow for statistical comparisons.
Direct impacts	in economic terms, direct impacts include the employment, payroll, and spending of firms engaged in a specific industry.
Family	includes a householder with one or more persons living in the same household who are related to the householder by birth, marriage, or adoption; does not include one-person households or households made up of unrelated individuals.
Family income	includes the income of all members of a family who are 15 or older.
Household	includes all persons occupying a housing unit, including one-person households and multi-person households of unrelated individuals.
Household income	includes the income of the householder and all other persons 15 years of age and older in the household who may or may not be related to the householder.
Housing unit	includes a house, condominium, townhouse, apartment, mobile home, group of rooms, or single room occupied as separate living quarters.
Indirect impacts	these are related to the recirculation of monies spent locally by firms engaged in a specific industry.
Induced impacts	the impacts resulting from the recirculation of employee payroll from a specific industry within the local economy.
Low income	defined by the U.S. Department of Housing and Urban Development as those making 80 percent or less of the median income for the

	designated area. The CDBG program defines “low and moderate income” as 80 percent or less of the median income for the area.
Median income	median income is the amount at which half of those living in a designated area have incomes above this amount, and half have incomes below.
Market rate housing	units where rental costs or home purchase prices are based on current market prices.
Micropolitan	areas in the U.S. based around an urban area with a population of 10,000 to 49,999 that are removed from larger cities, in some cases by 100 miles or more. Micropolitan cities do not have the economic or political importance of large cities, but are nevertheless significant centers of population and production, drawing workers and shoppers from a wide local area.
Multiplier impacts	includes indirect and induced impacts.
Owner-occupied	housing that is occupied by the owner or co-owner, even if the unit has not been fully paid for or is mortgaged.
Total impact	the sum of all direct and multiplier (indirect and induced) economic activities attributable to a specific industry sector.
Very low income	households making 50 percent or less of the area median income.

Appendix B

Prior Housing Studies

A number of studies in the past few years have addressed, at least in part, issues related to housing and affordability in Minot and the surrounding area. Ranging from comprehensive plans that look at all aspects of a community, to statewide housing assessments, to studies specifically focused on the impact of the oil and gas boom or the 2011 flooding, the reports described below provide important context and background for the current effort. A literature review of these studies was conducted prior to the development of this analysis and report to ensure the valuable data and information contained in these documents were considered in the 2012 analysis of affordable housing.

State of Affordable Housing in North Dakota, 2010 Report by North Dakota Housing Finance Agency: Based on the American Community Survey conducted by the U.S. Census Bureau, this report provides statewide information on home values, rental costs, household income, and income for various occupations and industries. Specific tables for some cities and regions are included.

Minot Comprehensive Plan Background Report 2010 by Bonestroo, Inc. for the City of Minot: The report discusses the significant growth in Minot's population and development since the previous comprehensive plan was completed in 1995, and includes population projections, household income, and a housing market analysis.

North Dakota Communities Acutely Impacted by Oil and Gas Development: Housing Demand Analysis, 2010, by North Dakota Housing Finance Agency: Though this study focuses on six communities north and west of Ward County where most of the actual oil and gas drilling is occurring, the observations and conclusions are helpful in understanding the impact of the energy boom on the City of Minot. The study area is experiencing larger numbers of transient workers and the impacts on housing are even greater in these small towns.

Minot, North Dakota Housing Demand Analysis, May 2, 2011 by Ondracek and Witwer: This study, commissioned by the Minot Area Development Corporation to follow up on the above consultants' study of the recent impact of the oil and gas industry on the region to the west of Minot, projected housing demand from 2010 through 2025. Data from the 2000 Census was used to develop baseline information for 2010. Using the 2010 baseline figures, the consultants then projected key housing and demographic variables in five-year increments through 2025. The study did not take into account the effects of the Mouse River flood in June 2011, however, as the final report was completed in May of that year.

FEMA's Souris Basin Regional Recovery Strategy for Minot, Burlington, and Ward County, ND, December 2011: Based on extensive community participation over a four-month period, this strategy document offers long-term and short-term actions to help the Souris Basin region recover from the 2011 flood. The proposed projects represent an effort to retain and build on what makes the region prosperous, appealing, livable, and sustainable, and include ideas for new construction and

rehabilitation, home-buyer programs, and rental assistance to increase the number of affordable housing units.

Minot Comprehensive Plan Update, adopted May 7, 2012, by Stantec consultants for the City of Minot: The 2012 Plan Update covers land use, transportation, housing, economic development, water resources, and community character and includes a section on implementation. Because the plan was completed after the 2011 flooding, it does take into account the resulting devastation and offers recommendations for meeting the increased demand for housing.

City of Minot Community Development Block Grant Disaster Recovery Action Plan, June 6, 2012, by the City of Minot: This plan describes the areas affected by the 2011 Mouse River flooding, eligible uses for the \$67,576 in Community Development Block Grant disaster funding allocated in 2012, how the disaster recovery funds will be distributed, and how these decisions were made with citizen input. The plan documents the impact of the flood on the housing situation in Minot and outlines how HUD disaster funding will be used to help mitigate the impacts.

City of Minot Unmet Needs Assessment: Helping the City of Minot Recover from the Mouse River Flood of 2011, September 14, 2012, by the City of Minot: This report from the City of Minot quantifies the cost of repairing, rebuilding, or replacing infrastructure (including housing), as well as the needs of the public sector, businesses, and non-profit agencies a year after the flood. It describes how funding already in place will be used, and outlines work still remaining and the funds required to complete it.

2012 North Dakota Statewide Housing Needs Assessment by North Dakota Housing Finance Agency: This most recent update, conducted by the Center for Social Research at North Dakota State University, includes a comprehensive housing forecast, results of a statewide stakeholder survey, and detailed tables with data on population, housing supply and demand, special populations, and substandard housing. Information is presented not only for the state as a whole but for the eight planning regions and four Native American reservation areas. A useful web site tool provides access to detailed information based on specific levels of geography.

Appendix C

Methodology

C.1 Estimating Housing Demand

Estimates of the 2012 demand for affordable housing were developed using population projections and income. After reviewing population and income projections methodologies in the *North Dakota Statewide Housing Needs Assessment*, it was determined that the most reliable data for income distribution in Minot is the 2010 Census. The income data selected are the 2010 American Community Survey three-year estimates (2009-2011) reported in 2011 inflation-adjusted dollars. Using the growth rate of 8.39% for 2010-2012 derived from the IMPLAN model, the number of households in each income range reported in the Census was projected to 2012. The \$35,000-\$39,999 income band was segmented at \$37,349, or 80 percent of the 2011 median income¹⁸ assuming equal distribution of the 1,099 households in this group. As such, 516 households fell below \$37,349, and the remaining 583 were added to the \$40,000-\$49,000 cohort, creating a \$37,350-\$49,000 group as shown in C-1. Using this methodology, we estimate that 41 percent, or 7,737 households in 2012, had a household income at or below 80 percent of the median, qualifying them as needing affordable housing according to the HUD definition.

Table C-1 Household Income Distribution for Minot in 2010 and 2012

Household Income	2010 Households	2012 Households	Percent of total households
Less than \$10,000	1,066	1,155	6%
\$10,000 to \$14,999	1,011	1,096	6%
\$15,000 to \$19,999	766	830	4%
\$20,000 to \$24,999	1,143	1,239	7%
\$25,000 to \$29,999	1,193	1,293	7%
\$30,000 to \$34,999	1,443	1,564	8%
\$35,000-\$37,349	516	559	3%
\$37,350-\$49,999	1,830	1,984	11%
\$50,000-\$74,999	3,519	3,814	20%
\$75,000 to \$99,999	2,661	2,884	15%
\$100,000-\$149,999	1,637	1,774	9%
\$150,000 to \$199,999	263	285	2%
\$200,000 or more	370	401	2%
Total	17,418	18,879	100%

Source: U.S. Census American Community Survey 2009-2011, IMPLAN multipliers, and CDM Smith

¹⁸ U.S. Census American Community Survey data 2011

C.2 Estimating Housing Supply

C.2.1 Approach Methodology

The study team followed a ten step process in determining the supply of housing in Minot.

1. The first step was to decide what the most accurate and up to date data available on the housing stock in Minot was. The study team determined that the City's assessment by parcel data was the most accurate and up to date data available and would provide the most pertinent information for each residential parcel in the City.
2. Parcel data for the entire City of Minot was provided by the City's GIS staff to CDM Smith for the FEMA recovery project and these data was reused for this Affordable Housing Study.
3. The parcel data was provided in ArcGIS format and included the following information for each parcel:
 - Property address
 - House number
 - Legal description
 - Lot depth
 - Lot frontage
 - Owner name
 - Parcel ID number
 - Square footage of parcel
 - Zoning code

The parcel data was then joined in ArcGIS with data that City of Minot's Assessor provided for all residential (single-family and multi-family) parcels in the City. The assessment data was based on the most recent assessment completed in January 2012. This data included the following information for each residential parcel:

- Parcel ID number
- Prior year
- Total value of property
- Type of occupancy
- Architectural style
- Year built
- Deed holder name
- Deed holder name
- Property house number
- Property street address
- Property city
- Mailing address
- Mailing address city

- Mailing address state
 - Mailing address zip code
 - Date of sale (if any from January 2011 to September 2011)
 - Amount of sale
 - Adjusted amount of sale
 - Permit date (if any from January 2011 to September 2011)
 - Permit number
 - Permit amount
 - Reason for permit
4. Once these two datasets were joined it was discovered that some of the data provided by the Assessor was duplicated. After discussing the duplicates with the Assessor the following actions were taken:
 - Some of the duplicates were removed by the Assessor
 - Some of the duplicates the Assessor provided notes on and after reviewing those notes the appropriate duplicates were removed (these notes are included in the database)
 - For the duplicates with the different year built, it was assumed that a secondary structure was built on the parcel and the duplicates with newer year built were removed
 - For the multi-family duplicates with different numbers of units, the number units were added together in to one entry in the database.
 5. With the two datasets joined in one database and the duplicates removed, this information was used to determine and map the total number of units in Minot, the number of single family units, multi-family units, the assessed values, and the median value.
 6. After reviewing the single family houses with an assessed value of \$50,000 or less, it was determined that the majority of those houses did not represent housing in standard condition, and were not habitable; therefore these units should not be included in the total number of housing units in Minot. It was determined that 92 units valued between \$40,000 and \$50,000 were habitable, and these are included in the assessed housing units inventory.
 7. Because of the dynamic changes in the rental housing market in Minot, the consultant team utilized a number of local data sources to evaluate the cost and condition of rental housing in the city. Data was collected from area reconnaissance, local realtors and property managers, the FEMA Housing Portal, and the Minot Air Force Base June 2012 Rental Housing Survey, as well as interviews with area businesses and agencies and discussions with several local residents.
 8. In addition, the following data was obtained from the US Census Bureau, 2010 Census and American Community Survey and as a means of comparison and to illustrate the vast change in the housing supply in two years.
 - Median value
 - Housing units
 - Vacant housing units (%)

- Owner occupied vs. renter occupied (%)
- Median gross rent

9. Other taken into account by the supply analysis was student housing and hotels. Student housing data was provided by the Minot State University and was geocoded into ArcGIS to allow for the mapping of student housing facilities in the City. After visiting Minot several times and discussing the housing situation with various stakeholders it was determined that hotels were also a pertinent factor in the housing supply discussion. Information on the location hotels and the number of rooms in each was obtained from the Minot Convention and Visitors Bureau.

C.2.2 Assisted Affordable Housing Supply

The Minot Housing Authority provides housing and rental assistance for low income residents. C-2 lists all of the units owned or managed by the Minot Housing Authority.

C-2 Housing Owned or Managed by MHA, by Number of Bedrooms

	Total Units	Number of 1 Bedroom	Number of 2 Bedroom	Number of 3 Bedroom	Number of 4 Bedroom
Owned and managed by MHA:					
Milton Young Towers	219 apartments	213	6	0	0
Various locations (NE and SW)	40 duplex or single family	10	18	10	2
Managed by MHA, owned by others:					
Manor Apartments	96 units*	24	60	12	0
Henry Towers (for low-income seniors)	83 units	81	2		
Various locations	160 apartments**	7	116	36	1
TOTALS:	598 units	335	202	58	3

Source: Minot Housing Authority

* 45 of these apartments are rented at market rates, and are not included in the total of assisted affordable housing.

**only 80 of these apartments are currently contracted as affordable housing, under the Section 8 program.

The Minot Housing Authority manages the HUD Section 8 program for Minot and Ward County. As of September 2012, MHA estimates they were assisting 475 households in Ward County under the Section 8 program, at an average subsidy of \$500 per household. In January 2008, before the effects of the oil boom, the average assistance paid to Section 8 families was \$290 per month, and that number had varied by only one or two dollars a month for several years. MHA was assisting between 800 and 825 families, and with the maximum HUD rent set at \$562, families had no trouble finding an affordable place to live. By July 2008 rents were increasing significantly as the population grew due to the oil and wind energy boom and the addition of a second squadron of B52 aircraft at Minot Air Force Base. By January 2009 the average assistance paid for families in the program was \$320, and MHA could afford to help only 750 families with their total HUD allocation of \$240,000 per month. The flooding in the summer of 2011 damaged or destroyed many rental units, and rents rose even more sharply for the fewer units that were available. By September 2012, HUD had increased the maximum

monthly rental of a unit to \$857 per month, and the average amount MHA paid per family per month was \$500. Table C-3 shows the change in MHA's Section 8 funding over the past few years.

Table C-3 Change in Section 8 Housing Funds for Ward County

Date	Average Section 8 cost per family	No. of families assisted
January 2008	\$290 per month	800-825
January 2009	\$320 per month	750
September 2012	\$500 per month	475

Source: Minot Housing Authority

Minot Housing Authority's Tom Pearson noted that all affordable housing is in short supply; in the current market, families of all sizes, seniors, disabled residents, and any low-income household will have a difficult time finding a place where they can afford to live. Two and three bedroom units seem to be in greater demand. Before the flood MHA estimates there were 4,500 to 5,000 rental units in Minot, and two-thirds of them had two bedrooms. Though specific numbers are not available, many of the housing units impacted by the flooding had at least two bedrooms.

C.3 Population Projections

A variety of indicators support the substantial population growth in the City of Minot in the last few years. That population growth is likely to continue on the same trajectory for the foreseeable future. Traditional options for estimating population growth between censuses, such as the use of traditional rates of fertility, mortality, and migration to estimate natural growth, do not capture the unique situation in Minot. The increase in energy industry related jobs from the nearby Bakken Formation is considered the principal driver for growth in the area, suggesting that traditional growth factors would underestimate growth that has occurred since the most recent Census in 2010.

In order to estimate the current (2012) population of Minot, several different approaches were designed and subsequently evaluated to calculate the unique conditions in Minot. These approaches employ different indicators, but all seek to account for the oil industry growth that appears to have accelerated between 2010 and 2012. Details on the data sources and precise methodologies for these different approaches are summarized below.

C.3.1 IMPLAN Model Analysis

After reviewing a number of reports, including the *2012 North Dakota Statewide Housing Needs Assessment: Housing Forecast and Detailed Tables*¹⁹, the primary driver of population growth is clearly the significant expansions in the oil and gas industry sector in northwest North Dakota. Given the data constraints and unique market conditions influencing Minot as a regional trade center, traditional population analysis does not capture the growth and indirect and induced employment generation in Minot as a result of oil and gas production activity. Utilizing the IMPLAN model as a means to capture employment growth attributable to Minot and Ward County and the resulting direct, indirect and

¹⁹ 2012 North Dakota Statewide Housing needs Assessment: Housing Forecast and Detailed Tables, North Dakota Housing Finance Agency and Partners, September 2012

induced employment is a valid methodology for projecting population under these conditions. As in the *2010 North Dakota Statewide Housing Needs Assessment*, the population baseline data for this methodology utilizes the 2010 population from the U.S. Census.

Utilizing the IMPLAN analysis as a basis for projecting Minot's population, the 2013 population will reach 46,519. This population projection utilizes the Minot 2010 Census population of 40,888 as the baseline and subsequently estimates population based upon employment projections derived from an assessment of the impacts of local changes in economic activity, primarily driven by the oil and gas industry, using the IMPLAN econometric model.²⁰ These population projections focus primarily on longer-term employment generated from oil and gas extraction, as opposed to drilling and well drilling support that may not generate demand for permanent housing. The resulting employment generated from the direct, indirect, and induced jobs is converted to annual total population. Based upon this methodology, the population for Minot is projected to increase as shown in the table below:

Table C-4 Population Projections Based on IMPLAN Modeling

Year	Annual Population Growth	Total Projected Population
2011	1,573	42,461
2012	1,857	44,318
2013	2,201	46,519
2014	2,622	49,141
2015	3,231	52,372

Source: CDM Smith, using IMPLAN multipliers

Population growth in Minot increased 11 percent from 2000 to 2010, compared to an increase of 8.389 percent from 2010 to 2012. While this trend in population growth will moderate at some point in the future, the increase in housing prices and rents in the past two years, which are dramatic, can be directly attributed to this significant growth in population compounded by the sudden loss of housing stock that resulted from the 2011 floods.

C.3.2. IMPLAN Analysis

This methodology estimates the economic impacts of the petroleum industry in the Minot, North Dakota region for the period from 2011 through 2020. For the purposes of this report, the Minot region is comprised of Ward, Renville, Burke, and Mountrail counties. The total economic impact of the petroleum industry in the Minot region is quantified in terms of employment, payroll, and output. Output represents total spending or economic activity and accounts for the total value of petroleum industry activities. The analysis evaluated the economic impacts of the petroleum industry in the Minot region in terms of the following three economic sectors:

- Oil and gas extraction
- Drilling of oil and gas wells

²⁰ IMPLAN is a software and database for estimating local economic impacts, developed by and purchased from the Minnesota IMPLAN Group, Inc.

- Support activities for oil and gas operations

C.3.2.1 The Economic Modeling Process

All economic impacts for the petroleum industry in the Minot region were calculated using an input-output model. The input-output model considers economic impacts associated with oil and gas extraction, drilling of oil and gas wells, and support activities for oil and gas operations. The following impacts are discussed here:

- **Direct Impacts** – these include the employment, payroll, and spending of firms engaged in oil and gas extraction, drilling of oil and gas wells, and support activities.
- **Multiplier Impacts** – these consist of indirect and induced impacts. Indirect impacts are related to the recirculation of monies spent locally by firms conducting oil and gas extraction, drilling, and support activities. For example, when an oil operator purchases services and products from firms providing support activities to the petroleum industry, this expenditure circulates through the local economy. Induced impacts are the impacts resulting from the recirculation of employee payroll within the economy. For example, as employees in the petroleum industry spend their salaries for housing, food, and services, those expenditures also circulate through the economy resulting in increased spending, payroll, and employment throughout the Minot region. As this money is spent several times, it eventually leaks beyond the boundaries of the study area, and thus no longer benefits the region's citizens. The economic model uses parameters specific to the Minot region to estimate the leakage effect associated with petroleum industry activities.
- **Total Impacts** – these are the sum of all direct and multiplier (indirect and induced) economic activities attributable to the petroleum industry economic sectors considered in this analysis.

Note that because multiplier impacts are not as easily quantified as direct impacts, a reliable method for estimating multiplier impacts must be applied. As such, the Impact Analysis for Planning (IMPLAN) model was used to quantify multiplier (indirect and induced) impacts. IMPLAN is an input-output model that estimates purchases and sales between various sectors of the economy, and is considered to be one of the leading methods available for estimating the total economic impact of an industry (in this case, the petroleum industry).

The IMPLAN model contains a large economic database that is used to generate input-output tables. IMPLAN multipliers and input-output tables specific to the Minot region's industrial sectors were obtained and used in this analysis. The model used for this analysis requires estimates for three separate components of the economy. These categories include the following:

- **Employment** – based on the total of full-time jobs plus part-time jobs. In this analysis, two part-time positions are the equivalent of a single full-time position.
- **Payroll** – represents the annual salary, wages, and benefits paid to all employees.
- **Economic Output (Spending)** – includes expenditures for exploration, extraction and production, transportation, and processing of crude oil and natural gas in the Minot region. Output also

includes various revenue streams originating from either oil and gas exploration, such as lease bonuses, or oil and gas production, such as severance taxes and royalty payments.

It is important to note that payroll and economic output cannot be directly combined because some elements related to payroll are also contained in the output estimate. Each of the three impact components (employment, payroll, and economic output) stands alone as a measure of the petroleum industry's total economic impact in the Minot region.

C.3.2.2 Data Requirements and Model Assumptions

Data related to petroleum industry activities was gathered for this analysis. This data served as inputs to the modeling process to identify total economic impacts. Data for the following economic sectors was required to estimate direct impacts:

- Oil and Gas Extraction – Firms in this sector operate and/or develop oil and gas field properties. Such activities may include exploration for crude petroleum and natural gas; drilling, completing, and equipping wells; operating separators, emulsion breakers, desilting equipment, and field gathering lines for crude petroleum and natural gas; and all other activities in the preparation of oil and gas up to the point of shipment from the producing property. This sector includes the production of crude petroleum, the mining and extraction of oil from oil shale and oil sands, and the production of natural gas, sulfur recovery from natural gas, and recovery of hydrocarbon liquids. Firms in this sector include those that operate oil and gas wells on their own account or for others on a contract or fee basis.²¹
- Drilling Oil and Gas Wells – This sector comprises firms primarily engaged in drilling oil and gas wells for others on a contract or fee basis. It includes contractors that specialize in spudding in, drilling in, redrilling, and directional drilling.²²
- Support Activities for Oil and Gas Operations – This sector comprises firms primarily engaged in performing support activities on a contract or fee basis for oil and gas operations (except site preparation and related construction activities). Services included are exploration (except geophysical surveying and mapping); excavating slush pits and cellars; well surveying; running, cutting, and pulling casings, tubes, and rods; cementing wells; shooting wells; perforating well casings; acidizing and chemically treating wells; and cleaning out, bailing, and swabbing wells.²³

Direct economic impacts presented in this report were estimated based on data obtained from various data sources. The direct impacts served as inputs to the IMPLAN model, which estimated subsequent multiplier impacts.

C.3.2.2.1 Oil and Gas Extraction Sector

According to the North Dakota Industrial Commission's Department of Mineral Resources (DMR), there are 6,347 active oil and gas wells in North Dakota as of November 2012, with 1,732 of these

²¹ *The Economic Contributions to the U.S. National and State Economies by the Oil and Natural Gas Industry*, Prepared for American Petroleum Institute, Price Waterhouse Coopers, 2007.

²² Ibid.

²³ Ibid.

wells located in the counties comprising the Minot region (i.e., Burke, Mountrail, Renville, and Ward). The North Dakota Workforce Intelligence Network indicates the oil and gas extraction sector employed 844 workers in North Dakota in 2010 and is projected to employ 7,192 workers in 2020, representing an average annual growth rate of 23.9 percent.

To develop estimates of employees in the oil and gas sector in North Dakota in 2010 by county, each county's market share of active oil and gas wells in 2012 was applied to the total employment in the oil and gas sector in North Dakota in 2010, which was 844 workers. Employment estimates by county for 2011 through 2015 as well as 2020 were determined by successively applying the average annual growth rate of 23.9 percent for oil and gas sector employment growth for the period 2010 through 2020. Table C-5 presents the direct employment estimates generated using this methodology. As shown in Table C-5, direct employment in the oil and gas sector in the Minot region is projected to increase from 285 employees in 2011 to 1,963 employees in 2020.

The direct employment estimates in Table C-X served as inputs to the IMPLAN model, which provided direct payroll and output impacts based on the IMPLAN multipliers.

Table C-5 Direct Employment Estimates for Oil and Gas Extraction Sector, Minot ND Region, 2011-2020

County	2012 Oil & Gas Wells	Market Share	2011 Employment	2012 Employment	2013 Employment	2014 Employment	2015 Employment	2020 Employment
Billings	449	7.1%	74	92	114	141	174	509
Bottineau	507	8.0%	84	103	128	159	197	574
Bowman	535	8.4%	88	109	135	168	208	606
Burke	407	6.4%	67	83	103	128	158	461
Divide	254	4.0%	42	52	64	80	99	288
Dunn	677	10.7%	112	138	171	212	263	767
Golden	69	1.1%	11	14	17	22	27	78
McHenry	17	0.3%	3	3	4	5	7	19
McKenzie	1,197	18.9%	197	244	303	375	465	1,356
McLean	20	0.3%	3	4	5	6	8	23
Mercer	1	0.0%	0	0	0	0	0	1
Mountrail	1,035	16.3%	171	211	262	324	402	1,173
Renville	279	4.4%	46	57	71	87	108	316
Slope	17	0.3%	3	3	4	5	7	19
Stark	87	1.4%	14	18	22	27	34	99
Ward	11	0.2%	2	2	3	3	4	12
Williams	785	12.4%	129	160	199	246	305	890
North Dakota								
Total	6,347	100.0%	1,046	1,296	1,605	1,989	2,464	7,192
Minot Region								
Total	1,732		285	354	438	543	672	1,963

Source: North Dakota Department of Mineral Resources, North Dakota Workforce Intelligence Network, and CDM Smith

C.3.2.2.2 Oil and Gas Activity Methodology

Data obtained from the North Dakota Industrial Commission's Department of Mineral Resources indicates that in 2012, a total of 34 new oil and gas drilling rigs were established as of November in the counties comprising the Minot region,²⁴ with the average cost to drill and complete an oil or gas well totaling approximately \$7.3 million.²⁵ Direct employment associated with each rig can be separated into two sectors. One sector includes employees who specialize in drilling, re-drilling, and directional drilling. A second sector includes employees who provide support activities such as exploration, site preparation, well surveying, cementing wells, and perforating well casings. This analysis assumed that 60 percent of the total cost per oil and gas well, or approximately \$4.4 million, is spent within the support sector and the remainder, or approximately \$2.9 million, is spent within the drilling sector.

C.3.2.2.3 Drilling Oil and Gas Wells Sector

To generate estimates of direct employment associated with drilling of oil and gas wells, the analysis assumed a period of 48 days on average for drilling and completion of a well.²⁶ This equates to 7.6 wells per year per crew involved in both drilling and support activities. Based on the 34 new rigs established in 2012 in the study area, approximately 4.5 crews would be required to drill and complete 34 wells in 2012. IMPLAN multipliers were used to estimate the number of employees who specialize in drilling operations based on the number of jobs created per \$1 million in expenditures per well. For 2012, this yielded approximately 6.9 drilling workers per crew, which results in a total of 31 direct employees involved in the drilling of oil and gas wells sector. The projected number of drilling rigs established per year was estimated by assuming an average annual growth rate of five percent.²⁷ Table C-6 presents the direct employment estimates derived from this methodology. As shown, direct employment is projected to increase from 29 workers in 2011 to 53 workers in 2020.

Table C-6 Direct Employment Estimates, Drilling and Support Activities Sectors, Minot ND Region, 2011-2020

County	2011	2012	2013	2014	2015	2020
Burke	3	3	3	3	3	4
Mountrail	29	31	33	35	37	47
Renville	0	0	0	0	3	4
<u>Ward</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>3</u>	<u>4</u>
Total New Oil and Gas Wells	32	34	36	38	46	59
Sector Employment - Drilling	29	31	33	34	42	53
Sector Employment - Support Activities	91	96	102	108	131	166

Source: CDM Smith, North Dakota Department of Mineral Resources, and IMPLAN multipliers

²⁴ <https://www.dmr.nd.gov/oilgas/riglist.asp>

²⁵ <https://www.dmr.nd.gov/oilgas/presentations/NDOGCP2011-10-06.pdf>

²⁶ <https://www.dmr.nd.gov/oilgas/presentations/NDDOTTPDC112712.pdf>, Slide 22

²⁷ <https://www.dmr.nd.gov/oilgas/presentations/NDOGCP20182020.pdf> Slide 28, Although this presentation holds rig growth flat for the study area counties in the short term, we estimated a 5% annual increase in rig activity to 2020.

The direct employment estimates in Table C-6 served as inputs to the IMPLAN model, which generated direct payroll and output impacts based on the IMPLAN multipliers.

C.3.2.2.4 Support Activities for Oil and Gas Operations Sector

To estimate direct employment for the support activities associated with the oil and gas operations sector, the same methodology for the drilling oil and gas wells sector was used. The only difference was that IMPLAN multipliers measuring the support activities for the oil and gas operations sector were used to estimate the number of employees. These multipliers are based on IMPLAN estimates of the number of jobs created per \$1 million in expenditures per well. The direct employment estimates developed through this methodology are presented in Table 6. As shown, direct employment is projected to increase from 91 workers in 2011 to 166 workers in 2020. The direct employment estimates in Table 6 served as inputs to the IMPLAN model, which generated direct payroll and output impacts based on the IMPLAN multipliers.

C.3.2.3. Study Multipliers – Multiplier Impacts

Employment, payroll, and output impacts derived from firms engaged in the oil and gas extraction sector, drilling oil and gas wells sector, and support activities for oil and gas operations sector comprise direct economic impacts. As these impacts enter the economy, they circulate among other economic sectors, creating multiplier impacts of additional spending.

Multiplier impacts arise from various interdependencies within an economic system. For example, the operation of an oil and gas extraction firm requires inputs in the form of supplies, equipment, and maintenance. These inputs generate a boost in sales for those businesses providing these services and products. Moreover, the goods and services themselves require inputs for their production. The process continues as a large number of impacts recirculate through the economy. The total requirement for goods and services is the multiple of the initial needs of the petroleum industry related firms considered in this analysis; hence it is referred to using the term “multiplier.”

Multiplier impacts were derived from the IMPLAN model. The multipliers used in this study were developed specifically to measure the economic impacts that occur within different sectors of the Minot, North Dakota regional economy. Table C-7 summarizes the multipliers used for modeling the impacts of the firms conducting oil and gas extraction, drilling, and support activities. For example, \$100 in direct expenditures (output) in the support activities sector supports a total output impact equivalent to \$146. In this example, the multiplier impacts would be \$46 (\$146 minus \$100). This methodology was applied to the direct impacts to generate estimates of total employment, annual payroll, and annual output, or spending, for each economic sector associated with the petroleum industry.

Table C-7 Minot, North Dakota Region IMPLAN Multipliers by Economic Sector

Economic Sector	Employment Multiplier	Payroll Multiplier	Output Multiplier
Oil and Gas Extraction	1.613	1.283	1.328
Drilling Oil and Gas Wells	1.816	1.332	1.195
Support Activities for Oil and Gas Operations	1.915	1.394	1.459

Source: CDM Smith and IMPLAN multipliers

C.3.3. Employment, Payroll, and Output Impacts

The results of this analysis indicate that the petroleum industry is a significant generator of economic activity in the Minot, North Dakota region and is projected to produce an increase in economic impacts annually through 2020. The petroleum industry helps to support jobs, payroll, and output for North Dakota's economy. The following sections present economic impacts associated with employment, annual payroll, and total annual output for the oil and gas extraction, drilling oil and gas wells, and support activities for oil and gas operations economic sectors as measured by this analysis.

C.3.3.1 Oil and Gas Extraction Sector

Direct, multiplier, and total impacts estimated for the oil and gas extraction sector for the period 2011 through 2020 are shown in Table C-8. The impacts are discussed by category below.

Table C-8 Economic Impacts for the Oil and Gas Extraction Sector, Minot ND Region, 2011-2020

	2011	2012	2013	2014	2015	2020
Employment						
Direct	285	354	438	543	672	1,963
Multiplier	175	217	268	333	412	1,203
Total	460	571	706	876	1,084	3,166
Payroll						
Direct	\$22,095,000	\$28,002,000	\$35,350,000	\$44,715,000	\$56,462,000	\$182,386,000
Multiplier	\$6,254,000	\$7,926,000	\$10,006,000	\$12,656,000	\$15,981,000	\$51,623,000
Total	\$28,348,000	\$35,927,000	\$45,356,000	\$57,371,000	\$72,444,000	\$234,009,000
Output						
Direct	\$50,131,000	\$66,809,000	\$88,689,000	\$117,968,000	\$156,639,000	\$588,340,000
Multiplier	\$18,866,000	\$23,876,000	\$30,119,000	\$38,093,000	\$48,122,000	\$156,171,000
Total	\$68,997,000	\$90,685,000	\$118,808,000	\$156,061,000	\$204,761,000	\$744,511,000

Source: CDM Smith and IMPLAN multipliers

C.3.3.1.1 Direct Impacts

As shown in Table C-8, direct impacts supported by the oil and gas extraction sector in 2011 included 285 jobs earning nearly \$22.1 million in wages, with an annual output of more than \$50.1 million. By 2020, these figures are projected to increase to 1,963 direct jobs earning nearly \$182.4 million in wages, with an annual output of more than \$588.3 million.

C.3.3.1.2 Multiplier Impacts

Multiplier impacts are the employment, payroll, and output impacts created by ripple effects stemming from the direct impacts supported by the oil and gas extraction sector. Additional multiplier employment is created as a result of oil and gas extraction activity. Multiplier impacts associated with oil and gas extraction activities in 2011 accounted for 175 jobs in the Minot region; these employees received approximately \$6.3 million in annual payroll. Annual output associated with oil and gas extraction activity was approximately \$18.9 million. These impacts are estimated to increase to 1,203 jobs, more than \$51.6 million in annual payroll, and nearly \$156.2 million in annual output in 2020. These multiplier impacts are shown by category in Table C-8.

C.3.3.1.3 Total Impacts

For 2011, the total annual output (including direct and multiplier impacts) supported by the oil and gas extraction sector in the Minot region was nearly \$69 million. Total employment related to the oil and gas extraction sector was an estimated 460 jobs, with a total annual payroll of more than \$28.3 million as shown in Table C-8. By 2020, these figures are estimated to reach 3,166 jobs earning approximately \$234 million in wages, with an annual output exceeding \$744.5 million (see Table C-8).

Table C-9 identifies the top ten economic sectors experiencing employment growth due to the ripple effects generated by the direct impacts supported by oil and gas extraction activities. As shown in Table C-9, the largest employment increase is found in the food services and drinking places sector, with 21 jobs generated in 2011 and 144 jobs generated by 2020.

Table C-9 Employment Impacts for Top Ten Industries Affected by Oil and Gas Extraction Activities, Minot ND Region, 2011-2020

IMPLAN Sector	2011	2012	2013	2014	2015	2020
20 Extraction of oil and natural gas	285	354	438	543	672	1,963
413 Food services and drinking places	21	26	32	40	49	144
39 Maintenance and repair construction of nonresidential structur	13	16	20	24	30	88
397 Private hospitals	10	12	15	19	24	69
360 Real estate establishments	8	10	13	16	19	57
329 Retail Stores - General merchandise	7	8	10	13	16	45
394 Offices of physicians, dentists, and other health practitioners	7	8	10	13	16	45
398 Nursing and residential care facilities	6	8	10	12	15	43
324 Retail Stores - Food and beverage	6	7	9	11	14	41
319 Wholesale trade businesses	6	7	9	11	14	40
Other	91	115	140	174	215	631
Total	460	571	706	876	1,084	3,166

Source: CDM Smith and IMPLAN multipliers

C.3.3.2 Drilling Oil and Gas Wells Sector

Table C-10 presents the direct, multiplier, and total impacts estimated for the drilling oil and gas wells sector for the period 2011 through 2020. These impacts are discussed below.

Table C-10 Economic Impacts for the Drilling Oil and Gas Wells Sector, Minot ND Region, 2011-2020

	2011	2012	2013	2014	2015	2020
Employment						
Direct	29	31	33	34	42	53
Multiplier	24	25	27	28	34	43
Total	53	56	60	62	76	96
Payroll						
Direct	\$2,667,000	\$2,909,000	\$3,159,000	\$3,321,000	\$4,186,000	\$5,841,000
Multiplier	\$887,000	\$967,000	\$1,050,000	\$1,104,000	\$1,392,000	\$1,942,000
Total	\$3,553,000	\$3,876,000	\$4,209,000	\$4,425,000	\$5,577,000	\$7,783,000
Output						
Direct	\$12,750,000	\$14,180,000	\$15,705,000	\$16,835,000	\$21,637,000	\$32,011,000
Multiplier	\$2,636,000	\$2,865,000	\$3,104,000	\$3,256,000	\$4,097,000	\$5,712,000
Total	\$15,386,000	\$17,046,000	\$18,809,000	\$20,091,000	\$25,734,000	\$37,723,000

Source: CDM Smith and IMPLAN multipliers

C.3.3.2.1. Direct Impacts

In 2011, the drilling oil and gas wells sector supported direct impacts of 29 jobs in the region, nearly \$2.7 million in annual payroll, and nearly \$12.8 million in annual output, as shown in Table C-10. The impacts generated by this sector are projected to increase to 53 direct jobs earning more than \$5.8 million in wages in 2020. Annual output is estimated to increase to more than \$32 million (see Table C-10).

C.3.3.2.2. Multiplier Impacts

Multiplier impacts generated by the drilling oil and gas wells sector were estimated using IMPLAN multipliers. In 2011, multiplier impacts accounted for an additional 24 jobs, \$887,000 in annual payroll, and more than \$2.6 million in annual output, as presented in Table C-10. By 2020, multiplier impacts are projected to account for 43 jobs, more than \$1.9 million in annual payroll, and more than \$5.7 million in annual output (see Table C-10).

C.3.3.2.3. Total Impacts

When direct and multiplier impacts were combined, the total employment impact supported by the drilling oil and gas wells sector was estimated at 53 jobs earning a total annual payroll of nearly \$3.6 million in 2011. Total annual output was estimated at nearly \$15.4 million, as shown in Table C-10. In 2020, total employment supported by the drilling oil and gas wells sector is estimated at 96 jobs earning nearly \$7.8 million in wages. Total annual output is estimated at more than \$37.7 million (see Table C-10).

The top ten economic sectors experiencing employment growth due to the ripple effects generated by the direct impacts supported by the drilling of oil and gas wells are identified in Table C-11. Similar to oil and gas extraction activities, the largest employment increase is found in the food services and drinking places sector, with three jobs generated in 2011 and five jobs generated by 2020.

Table C-11 Employment Impacts for Top Ten Industries Affected by Drilling of Oil and Gas Wells, Minot ND Region, 2011-2020

IMPLAN Sector	2011	2012	2013	2014	2015	2020
28 Drilling oil and gas wells	29	31	33	34	42	53
413 Food services and drinking places	3	3	3	3	4	5
319 Wholesale trade businesses	1	1	2	2	2	3
360 Real estate establishments	1	1	2	2	2	2
397 Private hospitals	1	1	1	1	2	2
367 Legal services	1	1	1	1	1	2
355 Nondepository credit intermediation and related activities	1	1	1	1	1	2
394 Offices of physicians, dentists, and other health practitione	1	1	1	1	1	2
398 Nursing and residential care facilities	1	1	1	1	1	1
329 Retail Stores - General merchandise	1	1	1	1	1	1
<u>Other</u>	<u>13</u>	<u>14</u>	<u>14</u>	<u>15</u>	<u>19</u>	<u>23</u>
Total	53	56	60	62	76	96

Source: CDM Smith and IMPLAN multipliers

C.3.3.3. Support Activities for Oil and Gas Operations Sector

Table C-12 presents the direct, multiplier, and total impacts estimated for the support activities for oil and gas operations sector for the period 2011 through 2020. The impacts generated by this sector are discussed by category below.

Table C-12 Economic Impacts for the Support Activities for Oil and Gas Operations Sector, Minot ND Region, 2011-2020

	2011	2012	2013	2014	2015	2020
Employment						
Direct	91	96	102	108	131	166
<u>Multiplier</u>	<u>83</u>	<u>88</u>	<u>93</u>	<u>99</u>	<u>120</u>	<u>152</u>
Total	174	184	195	207	251	318
Payroll						
Direct	\$7,587,000	\$8,167,000	\$8,853,000	\$9,565,000	\$11,837,000	\$16,587,000
<u>Multiplier</u>	<u>\$2,987,000</u>	<u>\$3,215,000</u>	<u>\$3,486,000</u>	<u>\$3,766,000</u>	<u>\$4,661,000</u>	<u>\$6,531,000</u>
Total	\$10,574,000	\$11,382,000	\$12,339,000	\$13,330,000	\$16,498,000	\$23,118,000
Output						
Direct	\$19,221,000	\$21,097,000	\$23,321,000	\$25,691,000	\$32,421,000	\$48,167,000
<u>Multiplier</u>	<u>\$9,369,000</u>	<u>\$10,047,000</u>	<u>\$10,861,000</u>	<u>\$11,709,000</u>	<u>\$14,471,000</u>	<u>\$20,275,000</u>
Total	\$28,590,000	\$31,144,000	\$34,182,000	\$37,399,000	\$46,892,000	\$68,442,000

Source: CDM Smith and IMPLAN multipliers

C.3.3.3.1 Direct Impacts

As presented in Table C-12, direct impacts generated by the support activities for oil and gas operations sector include 91 jobs earning nearly \$7.6 million in wages, with an annual output of more than \$19.2 million in 2011. These impacts are estimated to increase to 166 direct jobs earning nearly \$16.6 million in wages, with an annual output of nearly \$48.2 million by 2020 (see Table C-12).

C.3.3.3.2. Multiplier Impacts

Multiplier impacts were estimated using IMPLAN multipliers. In 2011, multiplier impacts accounted for 83 jobs earning nearly \$3 million in annual payroll and supported nearly \$9.4 million in annual output as shown in Table C-12. Multiplier impacts are projected to account for 152 jobs, more than \$6.5 million in annual payroll, and nearly \$20.3 million in annual output by 2020 (see Table C-12).

C.3.3.3.3 Total Impacts

The total annual output (including direct and multiplier impacts) supported by the support activities for oil and gas operations sector was nearly \$28.6 million in 2011, as shown in Table C-12. Total employment supported by this sector was an estimated 174 jobs, with a total annual payroll approaching \$10.6 million. By 2020, these impacts are projected to increase to approximately \$68.4 million in annual output and 318 jobs earning more than \$23.1 million (see Table C-12).

Table C-13 presents the top ten economic sectors experiencing employment growth due to the ripple effects generated by the direct impacts supported by the support activities for oil and gas operations sector. As shown, the largest employment increase is found in the food services and drinking places sector, with 10 jobs generated in 2011 and 19 jobs generated by 2020.

Table C-13 Economic Impacts for Support Industries for Oil and Gas Operations, Minot ND Region, 2011-2020

IMPLAN Sector	2011	2012	2013	2014	2015	2020
29 Support activities for oil and gas operations	91	96	102	108	131	166
413 Food services and drinking places	10	11	12	12	15	19
360 Real estate establishments	5	5	5	6	7	9
397 Private hospitals	4	4	4	5	5	7
319 Wholesale trade businesses	4	4	4	4	5	7
355 Nondepository credit intermediation and related activities	3	3	4	4	5	6
354 Monetary authorities and depository credit intermediation activities	3	3	3	4	4	5
356 Securities, commodity contracts, investments, and related activities	3	3	3	3	4	5
394 Offices of physicians, dentists, and other health practitioners	2	3	3	3	4	5
398 Nursing and residential care facilities	2	3	3	3	3	4
Other	47	49	52	55	68	85
Total	174	184	195	207	251	318

Source: CDM Smith and IMPLAN multipliers

C.4 Summary

Table C-14 combines the economic impacts shown in Tables C-8, C-10, and C-12 to summarize the economic impacts of the petroleum industry in the Minot, North Dakota region for the period 2011 through 2020. As shown in Table C-14, when all 2011 total employment, total annual payroll, and total annual output impacts are added, the petroleum industry:

- supported 687 jobs
- generated nearly \$42.5 million in annual payroll
- produced nearly \$113.0 million in annual output

In 2020, the petroleum industry is estimated to:

- support 3,580 jobs
- generate more than \$264.9 million in annual payroll
- produce nearly \$850.7 million in annual output

Table C-14 Economic Impacts Summary, Petroleum Industry, Minot ND Region, 2011-2020

	2011	2012	2013	2014	2015	2020
Employment						
Direct	405	481	573	685	845	2,182
Multiplier	<u>282</u>	<u>330</u>	<u>388</u>	<u>460</u>	<u>566</u>	<u>1,398</u>
Total	687	811	961	1,145	1,411	3,580
Payroll						
Direct	\$32,349,000	\$39,078,000	\$47,362,000	\$57,601,000	\$72,485,000	\$204,814,000
Multiplier	<u>\$10,128,000</u>	<u>\$12,108,000</u>	<u>\$14,542,000</u>	<u>\$17,526,000</u>	<u>\$22,034,000</u>	<u>\$60,096,000</u>
Total	\$42,475,000	\$51,185,000	\$61,904,000	\$75,126,000	\$94,519,000	\$264,910,000
Output						
Direct	\$82,102,000	\$102,086,000	\$127,715,000	\$160,494,000	\$210,697,000	\$668,518,000
Multiplier	<u>\$30,871,000</u>	<u>\$36,788,000</u>	<u>\$44,084,000</u>	<u>\$53,058,000</u>	<u>\$66,690,000</u>	<u>\$182,158,000</u>
Total	\$112,973,000	\$138,875,000	\$171,799,000	\$213,551,000	\$277,387,000	\$850,676,000

Source: CDM Smith and IMPLAN multipliers

Other population growth strategies initially analyzed and evaluated to project Minot population growth include the following:

- Oil Industry Job Creation Standards: The 2012 population of Minot can be estimated using North Dakota and nationwide standards of jobs created from the Bakken Formation. Direct and indirect jobs were used to estimate additional population and added to the 2010 Census total.
- Housing Units: Newly constructed and occupied housing units (sold homes, rented homes, and extended hotel stays) from 2011-2012 were used as an indicator of a net increase in population over the 2011 Census estimate.
- Statewide Housing Needs Assessment: The statewide assessment includes projections to 2015 for Minot, which were scaled back to 2012 assuming a straight trend line between 2010 and 2015.
- Minot Area Development Corporation: The MADC's survey of employers was used to determine additional jobs and residents in Minot. Jobs were used to estimate additional population and summed to the 2011 Census estimate.

C.5 Additional Population Estimate Calculations

As discussed in Section 3.1, a number of alternative methods were employed to corroborate the IMPLAN model estimates. A detailed methodology and data sources are provided in the following

Table C-15 Detailed Methodology for Additional Population Estimates

Approach	Data Sources	Summary of Methodology	Estimate
Oil Industry Job Creation	<ul style="list-style-type: none"> Number of oil wells in area built since 2010 from the North Dakota Department of Mineral Resources, Oil and Gas Division. General Statistics page²⁸ Standard number of jobs per oil well from Wood Mackenzie 2011 and North Dakota Oil and Gas Industry 2012 Household size from 2010 U.S. Census Share of petroleum sector employment for Minot Trade Area in 2011 from Bangsund et al. 2012 2010 population of Minot from U.S. Census 	<ul style="list-style-type: none"> Calculate number of added wells in North Dakota between 2010 and 2012 (2,568) Multiply by standard number of direct and indirect jobs per well (Wood Mackenzie report identified 9 wells per rig per year and the ND Oil and Gas Industry identified 120 direct and indirect jobs per rig = 13.3 direct and indirect jobs per well) Multiply by percent of oil industry employment attributable to Minot area (in this case, Minot Trade Area was used) (14%) Multiply by average household size (2.2) Add to 2010 population of the City of Minot (40,888) The North Dakota Department of Mineral Resources also provides numbers for the amount of rigs operating in the state An alternate methodology would be to take the number of new rigs since 2010 (77) Multiply by 120 jobs per rig Multiply by percent of oil industry employment attributable to Minot area (14%) Multiply by average household size (2.2) Add to 2010 population of the City of Minot (40,888). 	43,733.9

²⁸ Accessed online at: <https://www.dmr.nd.gov/oilgas/stats/statisticsvw.asp>

Approach	Data Sources	Summary of Methodology	Estimate
Occupied Housing Units	<ul style="list-style-type: none"> Federal/State Cooperative Program for Population Estimates (FSCPE) for Minot for 2011 2010 Census Number of housing units built and sold between 2011-2012 (excludes apartments) from Minot Assessor's Office Long-term hotel residents from Minot Tourism office New rental properties 	<ul style="list-style-type: none"> Assuming the 2010 vacancy rate has been filled due to the known tight housing market, the number of 2010 vacant households was calculated as occupied in 2012 New housing units built and sold between 2011 and 2012 indicate additional new households New rental units built and rented between 2011 and 2012 indicate additional new households The number of long-term occupied hotel rooms indicates additional new households All new households were multiplied by the average 2010 household size (2.2) and added to the 2011 FSCPE Minot population estimate 	44,907
Modification of the Statewide Housing Needs Assessment	<ul style="list-style-type: none"> Population projection for Minot from <i>2012 North Dakota Statewide Housing Needs Assessment: Detailed Tables</i> (2012), Table 1.1 	<ul style="list-style-type: none"> Assuming straight trend line trend growth between 2010 and 2015, annual population growth is 1,549 Add annual growth for two years (2011 and 2012) to population amounts in 2010 total 	43,986
Minot Area Development Corporation	<ul style="list-style-type: none"> FSCPE population for 2011 Minot Area Development Corp., <i>Workforce Development Program-Effectiveness Report</i>, 3rd Quarter 2012 (Nov. 1, 2011 through Oct. 31, 2012) 2010 U.S. Census 	<ul style="list-style-type: none"> Count of 2012 individuals relocated to Minot converted into population by multiplying by 2010 average household size New 2012 population added to 2011 FSCPE estimate 	44,871

City of Minot



prepared by:

**CDM
Smith**
cdmsmith.com

