BROOKINGS BENCHMARKS

BASELINE SUSTAINABILITY REPORT

"*If future generations are to remember us with gratitude rather than contempt, we must leave them something more than the miracles of technology. We must leave them a glimpse of the world as it was in the beginning, not just after we got through with it*."

President Lyndon B. Johnson

BROOKINGS BENCHMARKS BASELINE SUSTAINABILITY REPORT

BROOKINGS, SD June 2014

BRING YOUR DREAMS.

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Introduction

In March of 2011, the City of Brookings enacted Ordinance No. 04-11 creating a Sustainability Council for the City of Brookings South Dakota.

Sustainability Council Mission Statement*: The City of Brookings is committed to becoming a leader among its peers in developing an environment that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. For this council, sustainability shall mean stewardship of all our resources in such a way that we can maintain a quality place to live today and leave a legacy of enhancement for future generations.*

Brookings transition to a sustainable city is well underway. The City improved its transportation network to widen streets and added shareways and bike paths. Brookings is the only city in the United States with bicycle safety as part of its physical education program for middle school students. Brookings Municipal Utilities (BMU) deployed demand savings practices through system-wide voltage management and interruptible rate incentives, resulting in savings of $268,510 to customers in 2012. BMU and its customers further participated in the Bright Energy Solutions Program (BESP) administered by BMU and its joint action agency, Missouri River Energy Services. BMU customers saved an estimated $265,981 from lower electricity consumption from their participation in the BESP in 2012. Customers participating in the program also received incentive payments through the Bright Energy Solutions Program totaling $77,350 in 2012.

Additionally, Brookings repurposed two landfills into recreational areas: Larson Hill and the recently opened Dakota Nature Park. Facilities for biking, rowing, walking, skiing, sledding, picnics, and a multipurpose pavilion, were all built with sustainability in mind.

McCrory Gardens and Arboretum (70 acres) is one of the 10 best small municipal gardens in the U.S. Brookings is also home to South Dakota State University, a land grant university, whose Dairy Department (one of two in the U.S.) was a large incentive for Bel Brands USA to build a state-of-the-art cheese plant in Brookings, adding 400 high tech jobs and providing a place for further research. As proof of a high quality standard of living, Brookings has been designated as #5 on Livability.com's Top 10 Best Small Towns (2013).

Our progress toward sustainability must be reliably measured though. The Brookings Sustainability Council and its partners developed some measurements of sustainability ("indicators"). This Benchmark Baseline Report includes 56 indicators. Each fits under one or more of 11 Sustainability Principles.

The eleven sustainability principles for Brookings are:

Regional Economy	Smart Energy Use	Smart Resource Use
Community Design	Green Building	Healthy Local Food
Community Knowledge	Reasonable Mobility	Healthy Air
Native Plants & Animals	Clean Water	

Within each principle, four to eight indicators provide quantitative measurements of our progress. The Sustainability Council organized the indicators into principles and themes according to the model developed by the University of Iowa School of Urban and Regional Planning and the City of Dubuque, Iowa.

Indicators allow Brookings to more clearly understand our record of sustainability. The indicators allow the City to track success toward a sustainable future. Sustainability is an abstract concept. Without measurable ways to track progress, it is hard for us to truly know how well we are doing. With these indicators in mind, government,

residents, and businesses can shore up our strengths and jump on new opportunities. By comparing our progress to similar communities, we can better understand what works and what needs to be fixed, allowing us to identify best practices and make strategic improvements.

Selecting Comparison Cities

The Sustainability Council chose five comparison cities to provide insight into how Brookings stands out. Five criteria were used to make sure comparisons were fair: population size of 22,000 to 70,000, interest in sustainability, strength in manufacturing, a non-suburb city located in the Midwest, and a college student population.

City	Population
Brookings	22,482
Dubuque	57,637
Grand Forks	52,838
Grand Island	50,440
Manhattan	56,069
St. Cloud	65,842

Table 1. 2010 Population of cities used in indicator comparisons.

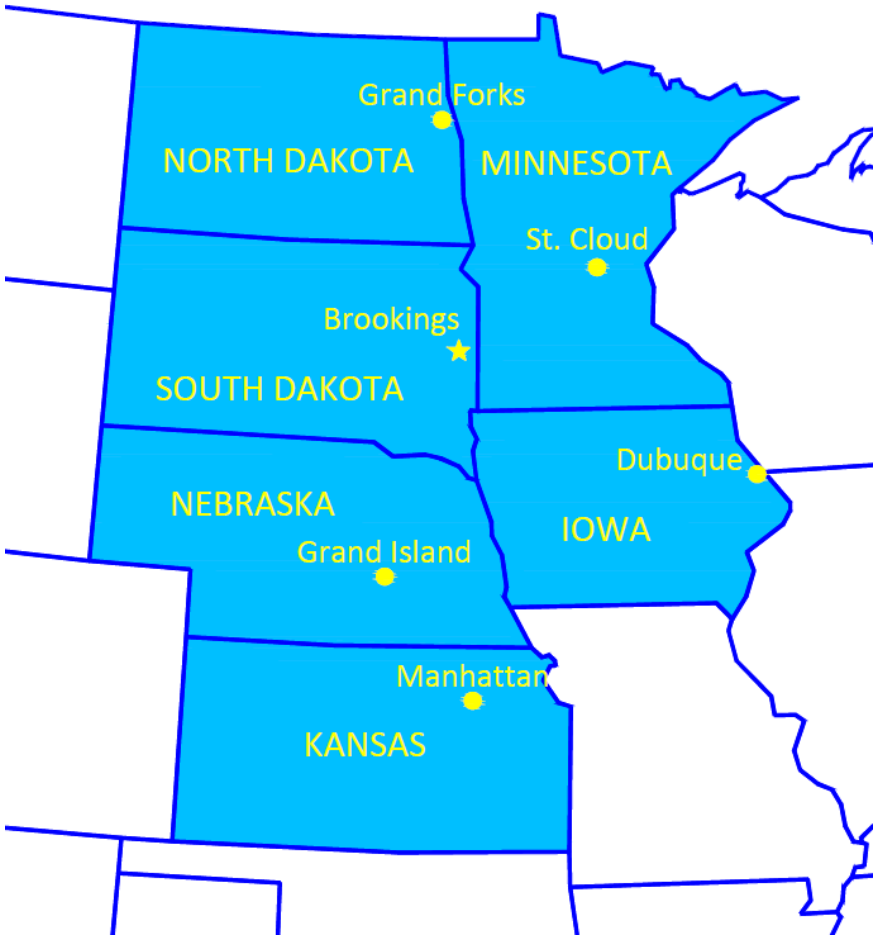
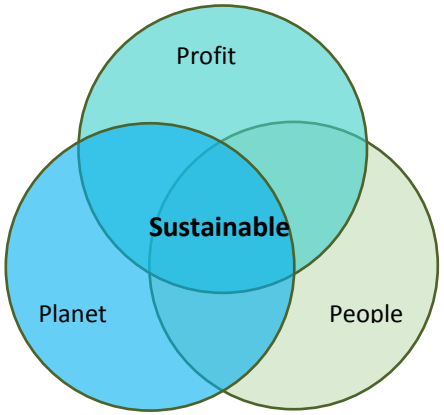


Figure 1. Location of comparison communities

Methodology

According to the City of Brookings, "Sustainability is defined by a community's ability to meet the environmental, economic and social equity needs of today without reducing the ability of future generations to meet their needs." To achieve sustainability, the three pillars of **Economic Prosperity, Social & Cultural Vibrancy, and Environmental & Ecological Integrity** ideally work in combination. However, they can occasionally compete. For example, a business's bottom line (economy) and pollution standards (environment) may conflict. To develop a comprehensive collection of indicators, sustainability should be approached from each pillar so that no single aspect of sustainability is sacrificed at the expense of another. This three-pronged approach guided us in developing the indicators.



Selecting the Sustainability Indicators

The Sustainability Council started by selecting the same indicators used by Dubuque, Iowa. Additional indicators were developed specifically for Brookings, but some were set aside for now as it was not always practical to obtain accurate, usable data.

Data Sources and Reliability

This report provides local baseline data for most of the 56 sustainability indicators from 2007-2013, which is the most recent period available at this time. Many indicators include some historical context and comparison city data.

The data came from city, state, or federal online resources and from local agencies and public websites. Most of the data comes from one-year averages or from a specific point in time. Some information is based on multi-year averages, reflecting longer time spans.

Sometimes indicators include estimates with margins of error, which are included when available.

Most indicators are based on city-level data. If city-level data was not available, regional, county, or metropolitan statistical area (MSA) data was used instead, and noted in the indicator.

Sustainability Scorecard

Indicators are marked as a *Strength*, *Neutral*, *Weakness*, or *Unknown*, depending on recent performance of the indicator in Brookings relative to similar cities. Scores for each indicator were determined by (1) identifying Brookings historical trend, (2) comparing Brookings current data to peer cities, and then (3) referencing the indicator scoring system seen at the left. Brookings trend is weighed equal to the peer community comparison to maintain objectivity. The results are found on the "Sustainability Scorecard," on pages 78 and 79.

This report should provide an important starting point for further analysis of sustainability in Brookings. The report paints an accurate picture of performance to date and compares Brookings to its peer cities. However, this report is not intended to explain why we may be trending in a particular way or why we differ from other cities. The Baseline Sustainability Report serves as a starting block for further data collection and observation to gain a more accurate and holistic view of what it objectively means to be sustainable. The Baseline Report, combined with future investigation, will allow Brookings to continue its transition to a sustainable future for coming generations.

Trend	Comparison	Score
Improving	Better	**Strength**
	Mid-range	**Strength**
	Worse	**Neutral**
	Unknown	**Strength**
Steady	Better	**Strength**
	Mid-range	**Neutral**
	Worse	**Weakness**
	Unknown	**Neutral**
Worsening	Better	**Neutral**
	Mid-range	**Weakness**
	Worse	**Weakness**
	Unknown	**Weakness**
Unknown	Better	**Strength**
	Mid-range	**Neutral**
	Worse	**Weakness**
	Unknown	**Unknown**

Figure 1. Indicator Scoring System

Principle: Regional Economy

Sustainable Brookings values a diversified regional economy with opportunities for new and green markets, jobs, products and services.

A sustainable regional economy needs strong, fair, economic growth with diversity and resiliency to weather inevitable downturns and market shifts. It also depends on financially sound municipal decision making that seizes opportunities and lays proper foundations conducive to employment and economic growth while avoiding an undue burden on taxpayers. Sustainability, however, does not mean unencumbered growth. Population growth in Brookings should be in proportion to the growth of housing, jobs, and services to maintain the balance that comes with sustainability. For instance, efforts to attract employers should be mindful that jobs be recession-resistant and high paying.

Eight indicators have been developed for the Brookings Regional Economy. Brookings did well in net job growth, unemployment rate, and gender wage. An area of concern is the percentage of residents living in poverty. Brookings it did very well by not utilizing general obligation bonds or having any true interest cost (TIC). Brookings has seen improvement in a majority of the items reviewed.

Indicator

Growth in Gross Domestic Product (GDP) per Capita – Growth in per capita GDP from previous year

Why is this important?

When the GDP of a metropolitan statistical area (MSA) rises, it indicates that businesses are profitable and residents have more earnings. This means they can spend more on necessities, such as education and healthcare, and on other programs that contribute to quality of life. A higher GDP generally correlates with higher tax revenues without increasing tax rates. This indicator measures the growth in GDP per capita in the MSA. The MSA in Brookings is comprised of eastern South Dakota, including Mitchell, Huron, Aberdeen, Madison, and Watertown.

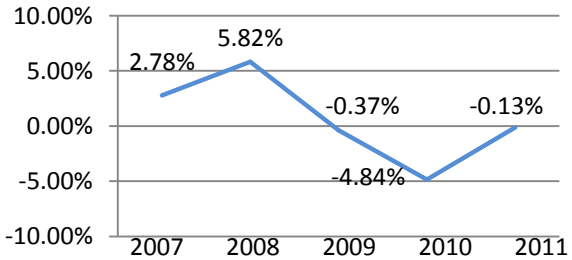


Figure 1. GDP/Capita Growth in Eastern SD
Source: U.S Dept. of Commerce (2014)

GDP is the total market value of all final goods and services produced in an area in a given year, equal to total consumption, investment, and government spending, plus the value of exports, minus the value of imports.

How are we doing?

Growth in per capita GDP peaked in Eastern South Dakota in 2008, and declined to a low of -4.84% in 2010. This economic contraction is expected due to the peak of the real estate crash of 2008 and subsequent Great Recession from the financial crisis. At the local level, during the fiscal year 2010-2011 there was a 10% state university budget cut, with 2010 showing only a 0.13% decline, and improvement was seen in 2011. Brookings is projected to continue to grow its economy and attract jobs like Bel Brands USA cheese plant, bringing with it 400 high tech jobs. The Brookings Economic Development Corporation (BEDC) has a strategic plan to attract businesses that are recession-proof and have diverse business cycles, while at the same time ensuring that persons of all abilities have access to job opportunities. BEDC's vision for Brookings consists of smart and balanced growth, economic prosperity, a competitive business environment, and a high quality, high performance community.

How does Brookings compare?

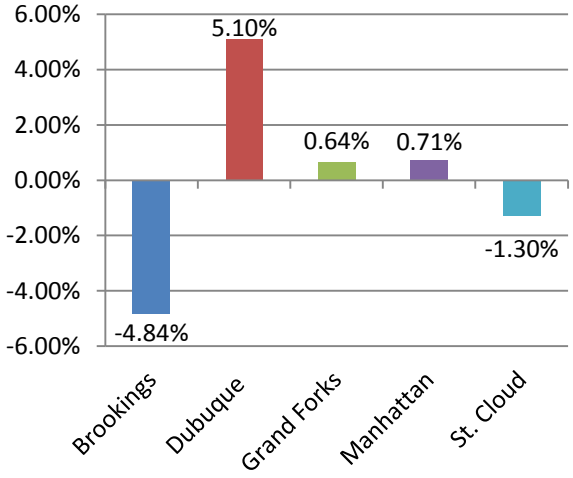


Figure 2. GDP/Capita Growth 2010
Source: U.S Dept. of Commerce (2014)

Dubuque had the highest growth rate in 2010 while Brookings fell significantly below all the other comparison communities for that same year. The trend showed Brookings is coming up from the 2010 low.

Summary

The information for Brookings is inconclusive as it is based on data for eastern South Dakota.

Indicator

Net job growth – Percent change in total employees

Why is this important?

When more people are employed in the community, is a sign of the overall quality of life in a community. A person's or family employment status can indirectly affect their health (Minnesota Department of Health).

This indicator should be read in conjunction with the unemployment rate indicator. An increase in the amount of employees is not all that significant if the unemployment rate also increases; it may simply reflect an increase in population.

How are we doing?

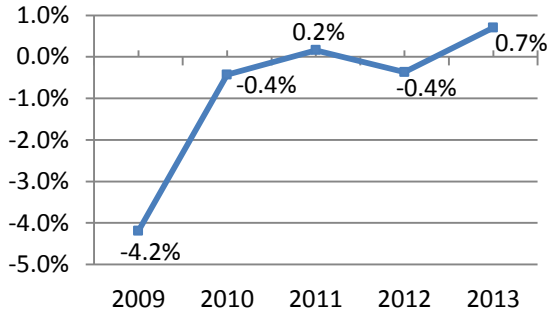


Figure 1. Net Job Growth in South Dakota
Source: Bureau of Labor Statistics (2014)

Job growth in Brookings rose from a low in 2009 from a minus 4.2% in 2009. The low percentage of net job growth in 2009 may be due to a change in Bureau of Labor calculation practices which occurred between 2008 and 2009. There has been some fluctuation in the number of people employed in Brookings in the last four years but a more significant increase was seen in 2013, a 0.7% increase.

How does Brookings compare?

Brookings net job growth in 2013 was in the middle of the comparison communities. Grand Island showed a decline of minus 1.3%. Manhattan had the most growth with a 3.5% increase in employees. With the addition of Bel Brands, Brookings is expected to have a net job growth in future years.

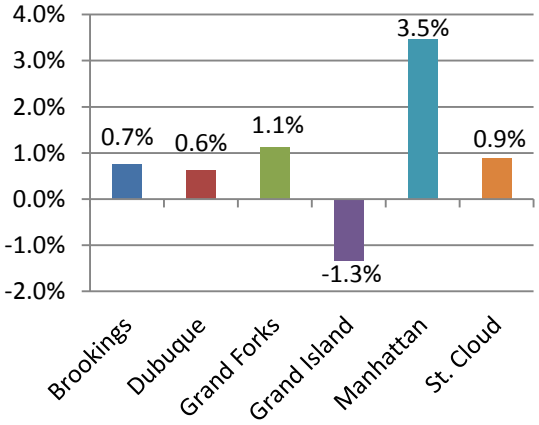


Figure 2. Percent Net Job Growth in 2013
Source: Bureau of Labor Statistics (2014)

Summary

The number of employees in Brookings has fluctuated in the past four years but is showing a general increase. Brookings net job growth in comparison to the peer cities is right in the middle. Brookings' unemployment rate is trending lower and job growth is trending higher.

Indicator

Unemployment rate – Percent of residents who are unemployed

Why is this important?

An economy with a high employment rate means more people receive wages to spend on goods and services, easing pressure on the community to provide them. It allows the community to focus on initiatives that foster other forms of community development.

A low unemployment rate usually means that money circulates throughout the community, benefitting local businesses and creating a more vibrant, stable local economy. Additionally, a low unemployment rate is indicative of a well-functioning local economy where employers are providing jobs suitable for the skills of the available labor force.

This indicator measures the unemployment rate in Brookings. According to the Bureau of Labor Statistics (BLS), people are unemployed "if they do not have a job, have actively looked for work in the prior four weeks, and are currently available for work." Therefore, this indicator only includes individuals looking for work.

Generally speaking, employers are happy when unemployment is about 3% or above, because when it falls below, they find fewer people with appropriate skills.

How are we doing?

The unemployment rate in Brookings increased from 3.9% in 2009 to 4.4% in 2010. In 2011 the rate fell to 4.2% and continued to decline in 2012 and 2013.

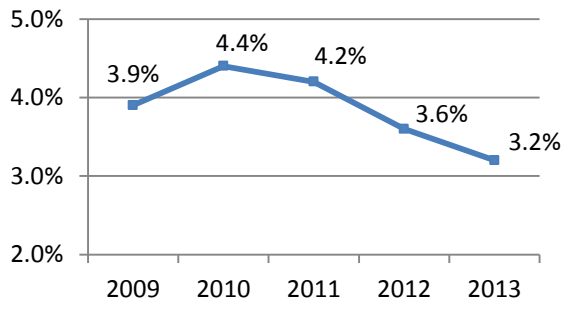


Figure 1. Unemployment rate in Brookings
Source: Bureau of Labor Statistic (2014)

How does Brookings compare?

Brookings unemployment rate of 3.2% for 2013 is well below the national unemployment rate of 7.4 % for the same period. In comparison to the peer communities it is has one of the lowest unemployment rates. The only peer city lower is Grand Forks, ND at 2.9%.

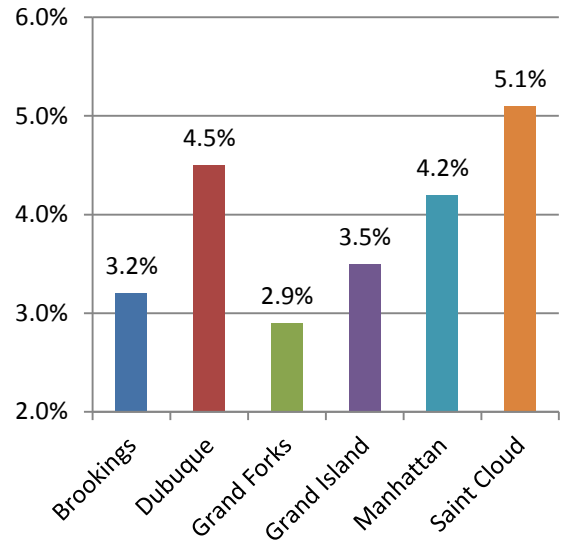


Figure 2. Unemployment Rate in 2013
Source: Bureau of Labor Statistics (2014)

Summary

The unemployment rate has fallen in recent years, but Brookings still outperforms the national unemployment rate and outperforms all but one of its peers. A decrease in the unemployment rate will benefit the community, with the optimal unemployment rate being at or around 3%.

Indicator

Economic section diversity – Index measuring diversity for the metropolitan statistical area (MSA) economy through employment by sector

Why is this important?

When an economy has a diverse employment base, it is less susceptible to widespread economic downturns affecting one particular industry and can more easily withstand an economic recession. A diverse group of industries in a city's employment base economy offers opportunities to people of all skills and educational levels, which helps keep people employed. Furthermore, a diverse economy is more likely to form regional connections with other industries, thereby improving the viability of local businesses and keeping money within the regional economy.

This indicator measures the diversity of the economy in Brookings by measuring the percent of employees in major sectors of the economy according to figures from the Bureau of Labor Statistics (BLS).

This index ranges from 1 to 100, with a score of 100 meaning that there is an equal number of employees in each two-digit BLS employment industries (e.g., Manufacturing or Educational services). On the other hand, a score of one means the economy lacks diversity and is concentrated in only one industry.

How are we doing?

In this case, the Brookings economy actually represents Brookings County at 89.1% over the past two years of data, 2011 and 2012. Even in the economic downturn, the Brookings area economy has changed with industry diversification over the last five years.

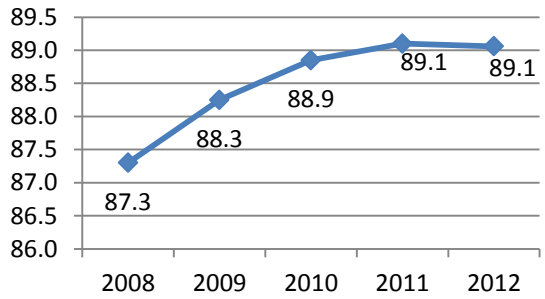


Figure 1. Sector Diversity in Brookings County
Source: Bureau of Labor Statistics (2014)

How does Brookings compare?

Brookings trails its peer cities in terms of its diverse economic base. This means there are fewer leading industries. However, Brookings is still highly diversified, which will make it more sustainable in the future, and more resilient in the event of an economic downturn.

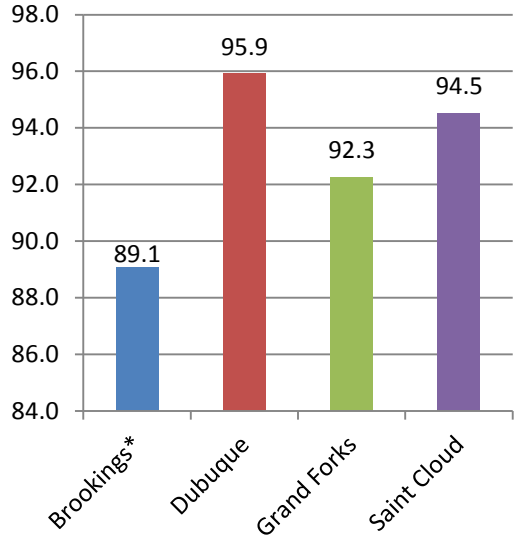


Figure 2. Sector Diversity for 2011
*Brookings County
Source: Bureau of Labor Statistics (2014)

Summary

Brookings has a highly diversified industrial economy. Compared to nationally, Brookings and its peers are in the top 11% in measuring industry economic diversity.

Indicator

Poverty – Percent of city residents living in poverty

Why is this important?

"Poverty" is defined as annual income of $11,490 for a single person; $15,510 for 2 people; $19,530 for 3 people and $23,550 for a family of 4 (Families USA 2013).

Poverty has major adverse social and economic effects on a community. Low income residents are more vulnerable to natural disasters and economic downturns (Lusigi, 2008). People living in poverty often do not have access to healthcare, healthy food, or shelter. Further, they may lack adequate or reliable transportation to work. All of these factors lower the quality of life for these individuals.

Furthermore, a higher poverty rate incurs costs for the community as a whole in the form of city services and private contributions needed to support them. Poverty may also result in a lack of social cohesion, weakened bonds between people, and reduced social capital assets such as trust, pride, volunteerism, and a sense of community.

How are we doing?

As seen in the Figure 1, Brookings poverty level has increased to 22.9% in the three year period of 2010 through 2012. The previous three year period of 2007 through 2009 the poverty level in Brookings was 18.9% in 2009 through 2011.

WEEKEND BACKPAK SNACKPAK
PROVIDING FOOD FOR CHILDREN IN NEED

How does Brookings compare?

Brookings in comparison to the peer communities is in the middle. Dubuque showed the lowest poverty percentage at 13.4% and Manhattan had the highest poverty percentage of 24.8%.

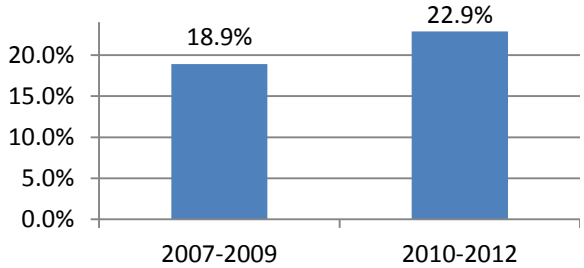


Figure 1. Poverty rate in Brookings
Source: U.S. Census Bureau (2014)

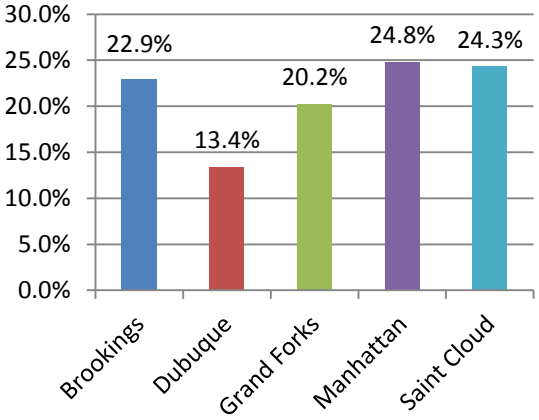


Figure 2. Percent of residents living in poverty 2009-2011
Source: U.S. Census Bureau (2014)

Summary

A little less than 23% of Brookings residents live in poverty with an upward trend in the last 6 years; the absolute number of residents living in poverty has been on the increase.

Indicator

Gender Wage Gap – Female earnings as a percentage of male earnings for full-time, year-round workers

Why is this important?

Since a significant number of households are headed by women, it is important to have equal wages between the sexes. Across the U.S., however, the median female earnings were only 77% of the median male earnings in 2011 according to Women's Policy Research. Although this statistic does not necessarily account for skills or job position, it reflects a variety of societal influences that contribute to pay disparity. These societal influences include cultural preconceptions on aptitudes based on gender, the cultural value of work traditionally performed by women, and unconscious biases about the capabilities of women. The lower median wage for females reduces equality and increases the vulnerability of single mothers and their families.

How are we doing?

As seen in Figure 1, Brookings improved in the second three year period. The two three year periods overlap by two years. Figure 1 shows the female earning as a percentage of the male earning for a full-time year-round worker.

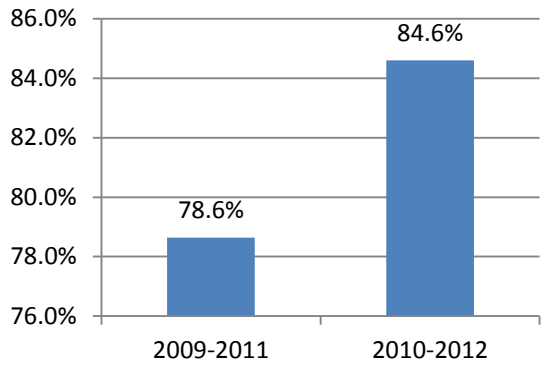


Figure 1. Gender Wage Gap Comparison three year intervals: 2009-2011, 2010-2012
Source: U.S. Census Bureau (2014)

How does Brookings compare?

For the years 2010-2012, the sex wage gap in Brookings was the highest, at 84.6%. Manhattan was a close second at 84.4% followed by Saint Cloud at 81.4%. Dubuque had the lowest with women earning 77.6% of males' earnings. With women in Brookings receiving just under 85% of the wage that a male receives for similar work, it means wage inequality still exists.

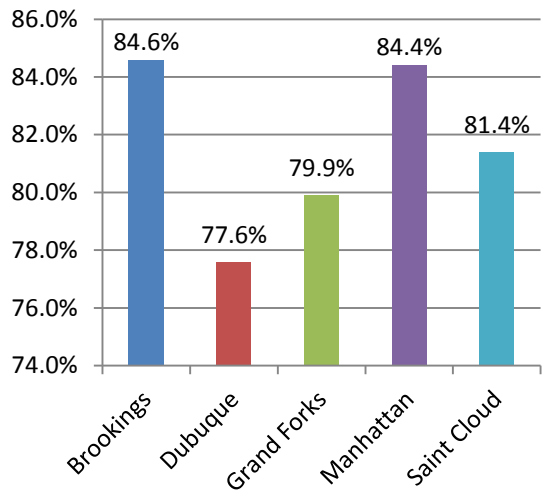


Figure 2. Gender Wage Gap Comparison for 2010-2012
Source: U.S. Census Bureau (2014)

Summary

It is important for Brookings to encourage equal opportunity for both men and women in education as well as the work environment.

Indicator

Debt Burden per Capita - Outstanding municipal debt per capita

Why is this important?

A community that is viable for both the present and the future does not incur excessive debt. Although debt financing is not inherently bad for the city if used for prudent, sustainable projects, money generated from issuing debt (e.g., from the issuance of general obligation bonds, tax-increment financing bonds, etc.) that is not used productively can burden the city for decades to come. Moreover, a city with high debt may encounter obstacles to borrowing in the future as creditors may question whether the city has the revenue-generating capacity to pay back its loans. It is important to read this indicator in conjunction with the interest rate since a high debt is not as concerning if borrowing costs are low.

How are we doing?

Debt per capita in Brookings measures the total outstanding municipal debt per resident in Brookings. In other words, how much is each citizen paying to finance the city's debt? Cities in South Dakota have a legal debt limit of 5% of the total assessed valuation of all real estate within the city's limit.

Debt per capita from 2008 to 2012 has declined from $2,786 to $2,686, which is well under the State's debt ceiling.

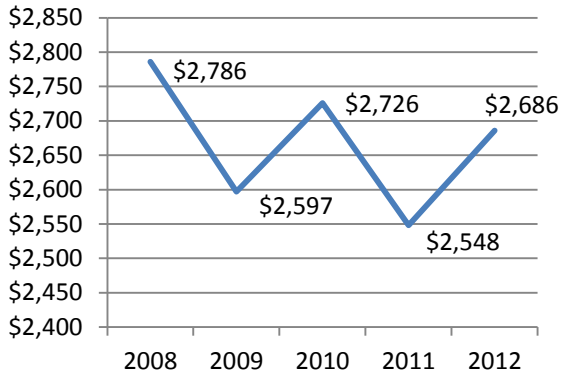


Figure 1. Debt per Capita in Brookings 2008-2012
Source: City of Brooking Reports, U.S. Census Bureau (2014)

How does Brookings compare?

Brookings' debt per capita over the last five years is higher than Dubuque in all years. However, its long term trend is generally down, whereas the trend for Dubuque is up.

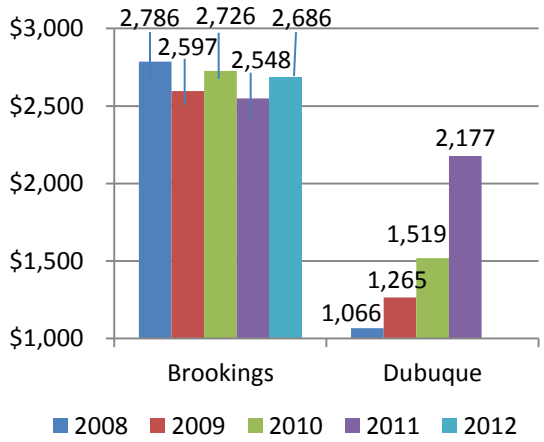


Figure 2. Debt per Capita over Five Years
Source: Dubuque Sustainable 2012 Report; City Reports; U.S. Census Bureau (2014)

Summary

Brookings' debt per capita is approximately half the legal debt limit, and over the last five years, the debt per capita has declined from $2,786 to $2,686. Particularly in a low interest rate environment, this means the city's debt load is healthy.

Indicator

Interest Rate on Municipal Bonds - True Interest Cost (TIC) on General Obligation (GO) bonds issued by the City of Brookings in a fiscal year

Why is this important?

When cities can issue bonds at a low interest rate, it allows them to borrow money more affordably. This allows a city to invest in capital projects such as street repairs or building renovations at a minimal cost to current and future taxpayers.

Furthermore, lower interest rates allow cities to take on projects with high upfront costs that ultimately benefit the city's bottom line. For example, if the city were interested in investing in an alternative energy technology with a return on investment of 5%, it may be wise to issue bonds to pay for this technology if the interest rate is less than 5%.

This indicator measures the interest rate Brookings pays on its GO bonds by calculating TIC. TIC represents the interest rate on principal and interest payments, accounting for the time value of money.

How are we doing?

Brookings does not have any outstanding GO bonds. All public improvements are financed with Revenue Bonds only, paid from city sales tax.

How does Brookings compare?

TIC comparison data for peer communities is unavailable at this time.

Summary

Brookings is very conservative with its debt and has no TIC costs on general obligation bonds.

Principle: Smart Energy

Sustainable Brookings values energy conservation and expanded use of renewable energy as a means to save money and protect the environment.

A city has sustainable energy if energy is affordable, renewable, and low polluting. Brookings owns its own utility, so access to energy data is easier than cases where a utility is privatized. Overall energy data is available, but some specific data is unavailable, especially in apartments and buildings with shared utilities. Four indicators have been developed to measure Smart Energy in Brookings. These indicators reveal Brookings Municipal Utilities (BMU) management is strong. It is to be noted 47% of the electricity distributed by BMU in 2012 originated from renewable sources. Additional effort could be made to monitor individual municipal buildings to identify easy, affordable improvements in efficiency in an effort to further reduce energy consumption. Strategies could be explored to identify the number of individual apartments in order to better calculate and monitor individual household usage.

Indicator

Energy Assistance - Percentage of households applying for energy assistance in the form of Low Income Home Energy Assistance Program (LIHEAP)

Why is this important?

Energy is a basic need and should be affordable to all citizens of Brookings. If energy is too expensive, people will sacrifice other needs. Affordable energy will also reduce dependence on local energy assistance programs in Brookings, which would allow for the redirection of city resources.

This indicator measures energy affordability by calculating the percent of households who apply for LIHEAP in Brookings County. An average of approximately 5.1% of the Brookings population has applied for assistance over the past five years. Generally, the households served include elderly and/or disabled residents. LIHEAP is a federally funded program that provides support to low income households for utility bill payments. The assumption here is that only people who need assistance apply to LIHEAP. If fewer people apply for LIHEAP, the implication is that energy has become more affordable, either because of higher incomes, lower energy cost, or decreased use of energy.

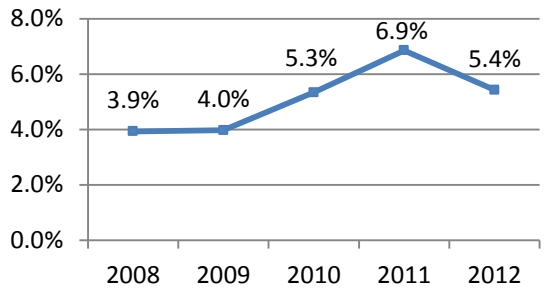


Figure 1. Percent of households receiving heating assistance in Brookings County
Source: Brookings Municipal Utilities, SD Dept. of SS, 2008-2012

How are we doing?

The percentage of households receiving assistance in Brookings County at the beginning of 2008-2009 was relatively steady at approximately 4%. A 3% rise was seen from 2009 to 2011. A slight drop of 1% was seen between 2011 and 2012, which could be related to mild winter temperatures. Brookings Municipal Utilities (BMU) served 218 customers who were participating in the Low Income Home Energy Assistance Program in 2012. BMU also served 156 telecommunications customers in 2012 who were participating in the Federal Lifeline Program intended to assist low income residents.

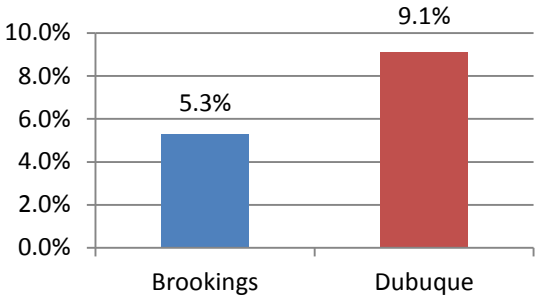


Figure 2. Brookings-Dubuque 2010 heating assistance comparison
Source: Brookings Municipal Utilities, SD Dept. of SS, 2008-2012, Dubuque 2012 Sustainable Report

How does Brookings compare?

Dubuque, in their 2012 sustainability report, noted that 9.1% of their households received LIHEAP assistance in 2010. Brookings, in contrast, was approximately 4% lower than Dubuque for that year. Numbers were not collected for the other communities.

Summary

Brookings overall is doing well in this indicator in comparison to Dubuque, although the trend for increased assistance is up.

Indicator

Household Energy Use - Residential energy use per household per year

Why is this important?

An energy efficient home is mutually beneficial to homeowners and the environment. Energy efficient homes result in lower utility bills from less energy demand and decreased reliance on the fossil fuels, which are the primary source of energy in our country and region.

Energy efficiency of any home can be increased by sealing leaks, updating windows and insulation, among other ideas. A home's efficiency can be measured using a Home Energy Rating System (HERS) Index. A HERS test is a comprehensive test measuring air leaks in the building shell, HVAC duct leaks, and insulation effectiveness. Additional variables such as windows, heating systems, and water heating systems are also considered in calculating a home's HERS score.

How are we doing?

Brookings' residential energy consumption has been increasing each year, likely due to population growth within the City as well as increased per capita energy use.

How does Brookings compare?

The average household in Brookings (defined by the 2010 US census) likely uses a comparable amount of energy to average households in peer cities, but releases fewer greenhouse gases due to the higher rate of renewable energy in the fuel mix (Figure 2).

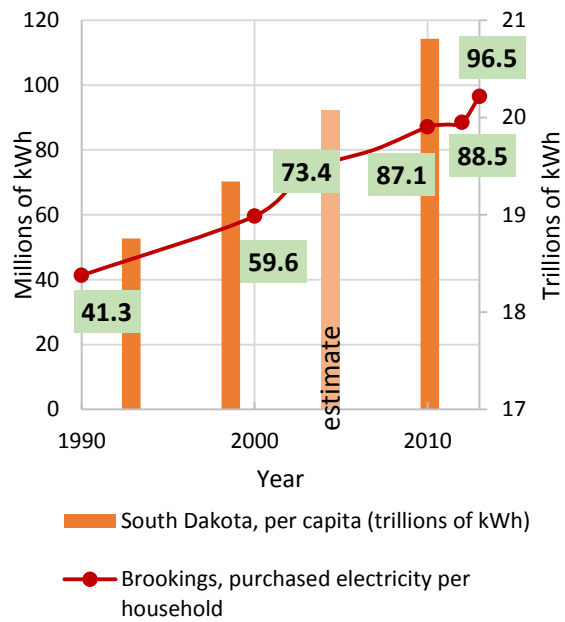


Figure 1. Brookings household electricity use compared to South Dakota per capita use.
Source: US Census.

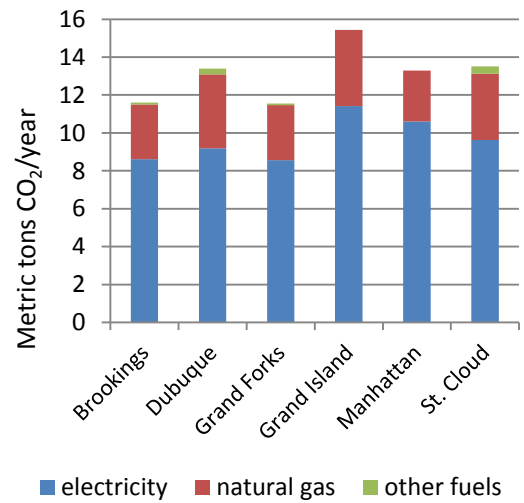


Figure 2. Comparison of annual household energy use in terms of equivalent carbon dioxide units. Considering the amount and types of fuel burned.
Source: US Census.

Summary

Overall energy usage in Brookings has increased, following the state trend. Emissions associated with household energy use are generally lower than peer cities due to higher renewable energy sources in the fuel mix. Increasing use of renewable energy and increasing building efficiency can offset future increases in energy demand. HERS score services are offered by local providers.

Indicator

Renewable Energy Use - Percent of municipal energy use derived from renewable sources

Why is this important?

Renewable energy comes from sources that restore themselves over short periods of time and do not diminish. Such fuel sources include the sun, wind, moving water, some organic plant and waste material (biomass), and the earth's heat (geothermal).

Renewable energy sources have the potential to provide enough energy to meet demands in a manner that is sustainable. For example, if all the wind power potential in the states of North Dakota, South Dakota, and Texas was harnessed, that wind energy would be enough to meet all of the electricity needs for the United States.

Generating energy from renewable resources produces no greenhouse gases from fossil fuels, reduces pollution, diversifies energy supplies (which reduced dependence on imported fuels), and creates economic development and jobs in manufacturing, installation, and more.

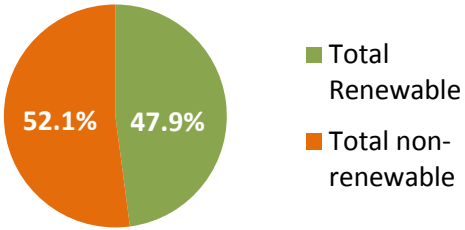


Figure 1. Proportion of electricity purchased by BMU from renewable and non-renewable sources (2012).

How are we doing?

The proportion of renewable energy purchased increased from approximately 18% in 2006 to 47.9% in 2012 (Figure 1). This far exceeds the national average of 7%, reported by the U.S. Department of Energy.

How does Brookings Compare?

The proportion of renewable energy used in the west-north central region of the U.S. is 16% (including about 4% hydro). The fuel mix purchased by BMU is representative of the region except for a large proportion of hydroelectric energy (Figure 2). It should be noted that large scale hydroelectric power plants, such as those on the Missouri River that supply Brookings with energy, are not considered to be a sustainable resource by some for a variety of reasons such as harmful impacts dams have on river ecosystems, including habitat destruction.

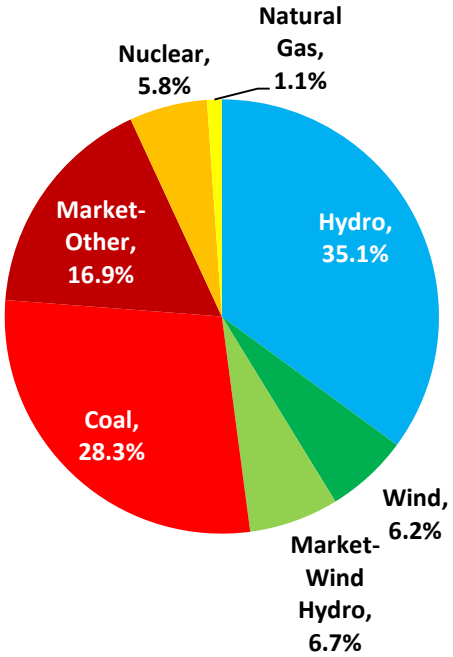


Figure 2. Sources of energy purchased by BMU (2012).

Summary

While the community has benefited from less reliance on fossil fuels for purchased electricity, the large solar and wind resource of the region is under-utilized. Local energy generation can have large impacts on several aspects of sustainability.

Additional Information

Renewable Energy Resource – Available types and amounts of renewable energy

Why is this important?

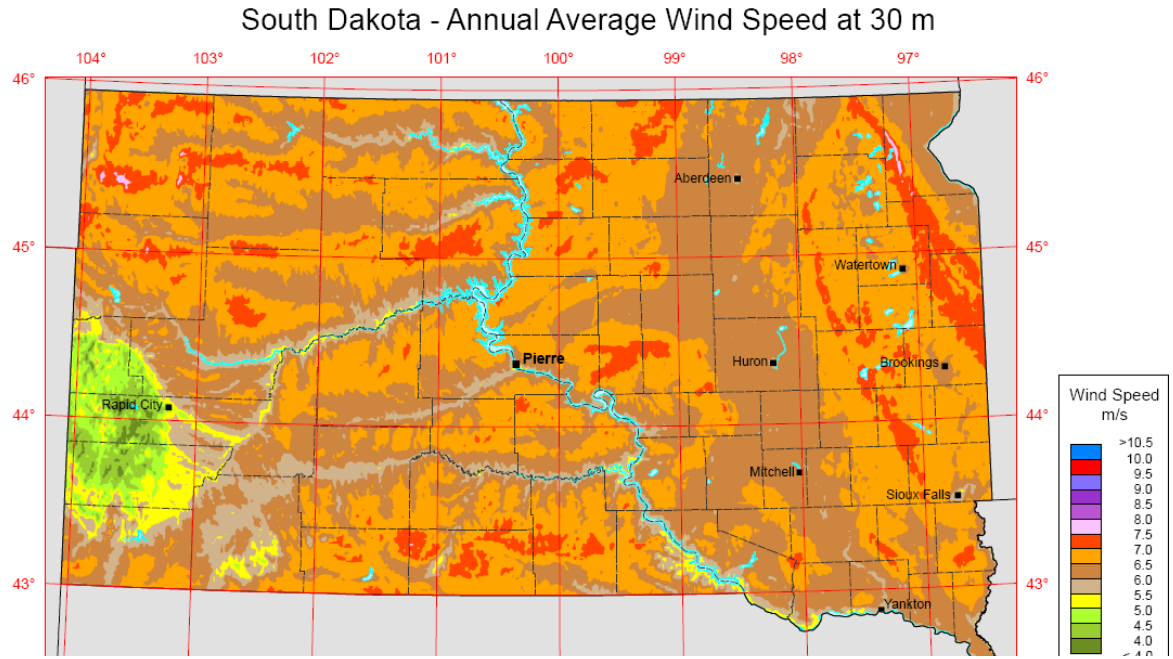
Implementing renewable forms of energy is paramount to a city pursuing sustainable practices. Wind, solar, and hydro-electric power are among the most known and effective sources of renewable energy. However, hydro-electric power generation has been scrutinized for ecosystem disturbance, land use issues, and decreasing reliability in areas experiencing higher frequency of drought, for instance.

How are we doing?

Currently, Brookings attains nearly half of its energy from renewable sources with the vast majority from hydro-electric (35%). Less than 7% of energy consumption is derived from wind energy and there are no sources of solar energy utilized by providers of electricity for Brookings.

What can be done?

Building-scale energy generation from such devices as solar panels or small wind turbines provide gains in sustainability in social, economic, and environmental ways.



For instance, installing solar panels on the roofs of public buildings provides an educational opportunity, cost savings on electric bills, diversification of energy resources, reduced reliance on fossil fuels, and an opportunity for the City to be a regional leader.

As indicated in the above map from the U.S. Department of Energy (DOE), Brookings has the potential to harness an abundance of wind energy with 30-m wind speeds above 6 m/s for the County. According to the DOE, 30-meter wind speeds above 4 m/s are suitable for small wind projects.

The state of South Dakota provides sales and property tax incentives for residents or corporations seeking to implement any source of renewable energy under 5 MW, which can include deductions on property taxes of up to $50,000.

Summary

Ample opportunities exist to increase small-scale renewable energy production that leads to greater overall sustainability.

Indicator

Energy Savings - Energy savings, measured in dollars, from demand reduction and energy efficiency projects in municipal buildings

Why is this important?

Energy savings advance sustainability both in terms of a city's long-term financial health and in terms of benefiting the environment through less energy consumption and pollution. Energy savings through efficiency initiatives and demand reduction in municipal buildings have the added benefit of saving taxpayers money. This also provides an example to residents and business leaders of the gains that can be made through demand reduction (energy conservation) and energy efficiency efforts--both financially and environmentally.

This indicator measures the City's energy saving in dollars from energy efficiency projects and demand reduction in municipal buildings.

How are we doing?

Brookings Municipal Utilities (BMU) deployed demand savings practices through system wide voltage management and interruptible rate incentives that resulted in savings of $268,510 in 2012.

BMU and its customers participated in the Bright Energy Solutions Program (BESP) administered by BMU and its joint action agency, Missouri River Energy Services. BESP is a collection of energy efficiency cash incentive programs. It is estimated that in 2012 BMU customers saved $265,981 by reason of lower electric consumption from their participation in BESP. Customers participating in the program also received $77,350 in incentive payments in 2012 through BESP.

How does Brookings compare?

No data exists that measures demand reduction and energy efficiency projects in municipal buildings. However, substantial savings were achieved due to BMU system-wide initiative.

Summary

Brookings residents and the City of Brookings received substantial financial gain due to the efforts of BMU in 2012. The results of this indicator are important but calculating an accurate value (taking into account energy costs and temperature changes) may require the expertise of an energy consultant for a complete analysis of Brookings municipal buildings.

Energy savings from demand reduction and energy efficiency projects benefits the City both economically and environmentally. For these reasons, any efforts the City undertakes to measure its current energy use and initiate actions for gains in efficiency will further benefit the community.

Principle: Smart Resource Use

Sustainable Brookings is a community that values the benefits of reducing, reusing, and recycling resources.

Sustainable resource use involves citizen access to recycling facilities and programs, utilization of these services, and practicing smart resource use behaviors at home. Smart resource use guidelines include the diversion of materials from the local landfill, appropriate disposal of hazardous materials, water conservation, and effectively reusing existing materials. These elements promote a sustainable and resource conscious community with future resource extraction, landfills, and climate impacts that are reduced. Total water consumption, groundwater conservation, trash/refuse generation, sustainable materials management, and hazardous materials are the indicators used to measure Smart Resource Use in Brookings. These indicators reveal that Brookings has done well with this principle. Brookings processes less water than the comparison communities. Innovative measures have been implemented to reduce waste added to the landfill and an increase in household recycling has been recognized in the past years.

Construction recycling indicators have not yet been developed to address items such as recycling of new construction waste, deconstructed buildings, asphalt, and concrete materials. These are important sources of usable resources. In the future, a method to track these resources should be developed.

Asphalt plant incorporates recycled materials at Brookings.

Indicator

Total Water Consumption - Residential water consumption per household

Why is this important?

Water consumption plays a key role in a community's sustainability profile as the availability of efficient use of water is an essential element of a vibrant community.

Estimates of water use in the US range from 80 to 100 gallons per day for each individual. The United States ranks among the top three highest water consuming countries globally. However, since its peak in 1975, the US water efficiency has increased. An increasing population requires increases in water use efficiency to sustain current and future water availability.

While our municipal supply is paramount to the success of our community, irrigation of agricultural fields is the largest consumer of water in our region. Municipal and agricultural water supplies are drawn from the same source, the Big Sioux aquifer. In most years, we withdraw more than is replenished. Since the success of our community relies on a reliable source of water for municipal, industrial, and agricultural purposes, not to mention the well-being of our natural environment, it is important to find ways to preserve this valuable resource.

How does Brookings Compare?

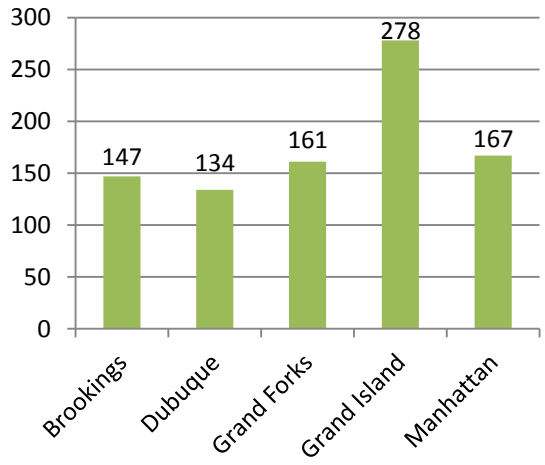


Figure 1. Average daily household water use in gallons (2012)

Source: Cities of Brookings, Dubuque, Manhattan, Grand Forks, and Grand Island.

Brookings compares favorably in terms of household water use with similar communities. At 147 gallons per day and an average household size of 2.3 individuals, Brookings domestic water use averages about 64 gallons per day for each person. Only Dubuque demonstrates more efficient water use at the household level.

However, when considering water consumption for agricultural use in the county, per capita water use increases considerably.

Summary

Average household water use for Brookings places below the national average. Yet, the largest water user in our region, the agricultural sector, shares the Big Sioux aquifer as the primary water source.

Increasing variability in precipitation means higher risks for flooding and drought, which can have dramatic impacts on the functionality of our water supply. For continued success of the community, industry, agriculture, and natural environment, it is paramount that measures be taken to increase water use efficiency, ensuring the continued reliability of the Big Sioux aquifer for our water supply.

Sources:

http://ga.water.usgs.gov/edu/qa-home-percapita.html

http://wdi.worldbank.org/table/3.5

http://water.usgs.gov/watuse/

Indicator

Groundwater Conservation - Net water withdrawal from local groundwater sources

Why is this important?

Water withdrawal from freshwater sources is expected to increase 50 percent within the next 13 years globally, which will undoubtedly create significant challenges for many (UN water, 2011).

Brookings relies on the Big Sioux aquifer, which is a sizable, high-quality, natural, underground source of water. There are several types of aquifers, but, in this case, water is stored underground in fairly shallow, glacial sediments. Aquifers offer a sustainable, reliable water supply if withdrawals do not exceed recharge rates.

The Big Sioux aquifer's relatively shallow position means that it is connected to surface water features such as streams and lakes. When the water level exceeds Big Sioux River levels, for instance, the aquifer water flows into the river; when the opposite case is true, the river can help recharge the aquifer.

The fact that the Big Sioux aquifer is near the surface (within 1-10 feet) holds advantages and disadvantages. It can be readily recharged, but it is also more susceptible to contamination from surface land use. During the drought of the mid-1970s, the level of the aquifer dropped significantly and water quality suffered.

This past event provides motivation for finding ways to protect the quantity and quality of the water in the aquifer. This becomes especially important with projections of more frequent and severe weather events such as drought.

How are we doing?

Brookings shows peak use of water in the summer months, especially June, July, and August (Fig. 1). Usage rates were lower in 2010 and 2011, likely due to very moist conditions.

How does Brookings Compare?

Except in the year 2010, Brookings used more water in summer than its peers. Increased practices that conserve water, such as xeriscaping and planting native grasses can reduce summer water demand.

Like Dubuque, Brookings is fortunate to have a reliable, high-quality source of water, unlike those communities reliant on surface water sources including Grand Forks (Red River and Red Lake) and St. Cloud (Mississippi River).

Summary

Although the City of Brookings and Brookings County have implemented an aquifer protection ordinance, a need still exists to conserve and protect the water supply through increases in efficiency and public education.

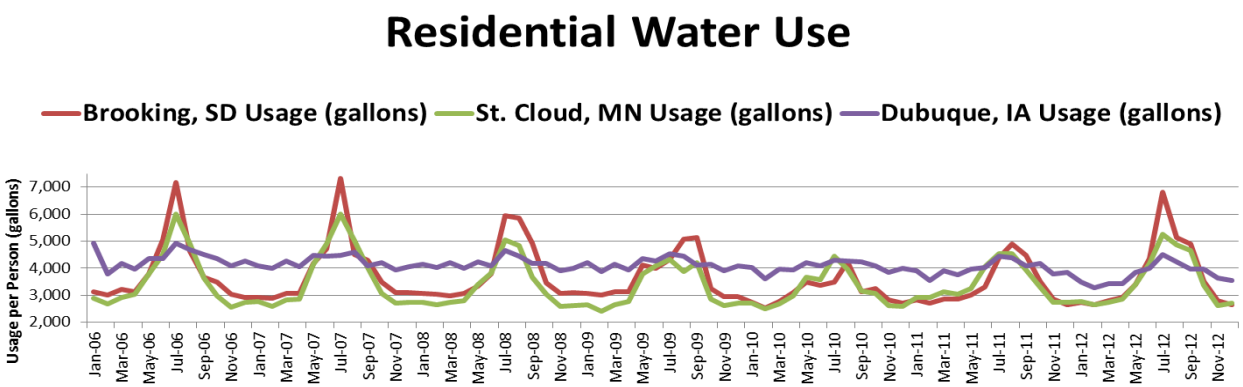


Figure 3. Monthly residential water use for three cities in gallons for 2006 - 2012.
Source: Cities of Brookings, St. Cloud, and Dubuque.

Indicator

Trash/Refuse Generation - Average weekly total pounds of solid discards produced per household

Why is this important?

Generation of trash is an important measure of household contribution to community sustainability as it reflects the value of protecting natural resources. This indicator is a measure of all trash collected by Brookings City/County curbside collection. This measure will help gauge general household consumption and the impact on the county landfill.

Nationwide, generation of trash/refuse has increased dramatically since 1960. The 0.5 tons of trash produced per capita that year pales in comparison to the 0.83 tons produced per capita in 2005.

Major benefits for reducing waste generation is reduction in landfill gas emissions, a large portion of the city's carbon footprint, as well as allowing the landfill to have a greater life expectancy.

How are we doing?

Brookings' households are throwing away an average of 2.5 fewer pounds per week compared to five years ago.

City garbage collection serves single family residential, government offices and non-profit accounts such as churches. Industrial, commercial, and large apartment complexes are served by private haulers. No information is available for these entities.

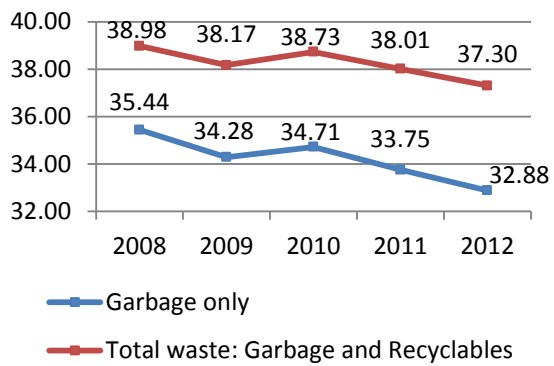


Figure 1. Waste per household per week (pounds/household/week)
Source: Brookings Landfill (2013)

The decrease may be attributable to more recycling occurring in Brookings households. The Brookings Landfill encourages residents to recycle by offering single stream recycling and providing separate recycling containers. Single stream recycling allows all recyclable material to be placed in one container for pickup. A detailed list of all 'curbside' recyclables can be located in the Brookings Single-Stream Recycling section of the Brookings Phone Book and the Brookings City web site in the landfill section.

How does Brookings compare?

Trash generation seems to be decreasing overall as a trend in the past five years in Brookings (Figure 1). Dubuque's waste may be lower than Brookings due to their higher rate of recycling. Dubuque recycles at a 33% rate compared to only 19% for Brookings (2010).

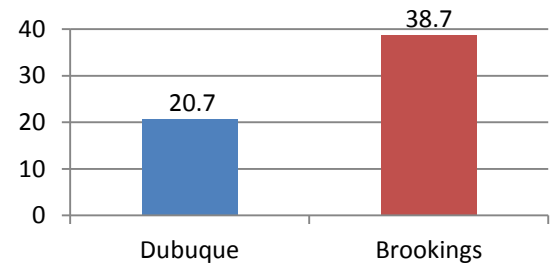


Figure 2. 2010 Garbage generated per household per week (pound)
Source: Dubuque 2012 Sustainable Report

Summary

While solid waste generation is generally decreasing, a more robust recycling program would be useful to further lower solid waste generation rates. The City could further encourage residents to take advantage of single-stream recycling or expand recycling efforts. This would extend the life of the current landfill.

Indicator

Sustainable Materials Management - Percent of city curbside discards diverted to beneficial use instead of landfilling

Why is this important?

The optimal use of Brookings' landfill space is an important issue for the resiliency of the City. Measuring the percent of solid materials diverted from local landfills can provide insight into a community's behavior in terms of recycling, re-using, or repurposing materials.

Reusing or reducing waste to offset a city's population growth serves to extend the life of landfills and removes pressure on resources needed for new products, which also benefits the environment.

Sustainable waste management has many benefits. For instance, methane (CH_4) from landfills can be captured and used for energy. Organic wastes can be used to fix carbon in the soil. Reduced waste translates to reduced carbon emissions including carbon dioxide (CO_2) from the waste cycle and CH_4 from landfills, which lowers greenhouse gas emissions; it also reduces the potential for environmental pollution from hazardous waste.

How are we doing?

In 2012, with an increasing recycling capacity, the City of Brookings diverted about 12% of household waste from the landfill (Figure 1) and 22% of City curbside discards, including trees, compost, and recycled materials. Brookings sells some of its solid waste, thus creating usefulness out of materials that were once useless.

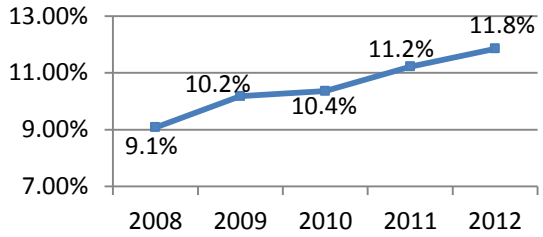


Figure 1. Percent of household curbside discards diverted from landfill
Source: Brookings Landfill (2012)

Two retired landfills have been turned into parks for citizens. The current landfill is still quite new and is not expected to fill rapidly because of a strong recycling program. The City Council annually earmarks funds for future capture of gas emissions that could be used for heat for onsite buildings.

How does Brookings compare?

In 2012, the nation generated about 251 million tons of trash and recycled and composted almost 34.5% of it, or 87 million tons (EPA). That year, Brookings recycled about 33.9% of its waste.

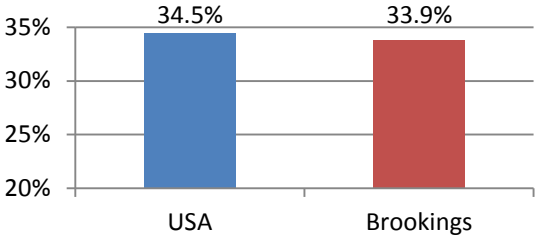


Figure 2. Percentage of waste Recycled in 2012
Source: U.S. EPA, Annual report 2012 and Brookings Landfill (2012)

Compared to the nation as whole, Brookings shows signs of catching up in recycling. The above data does not include information from recently introduced recycling containers. Therefore, the amount of trash diverted from landfill may be significantly higher than those values.

Summary

Brookings has taken positive measures to reduce the amount of waste being added to the landfill. Household recycling has been increasing over the past five years. Single stream recycling and the recycling containers introduced recently may significantly increase the amount of recycled waste.

Indicator

Hazardous Materials - Percent of residents participating in small business & household hazardous waste

Why is this important?

Hazardous materials can detrimentally impact the human and environmental health of a city, so proper use and disposal of hazardous materials is paramount to sustainability practices. Household hazardous wastes are those that are:

Toxic - poisonous or lethal when ingested, touched or inhaled;
Flammable - ignitable and burns easily;
Corrosive - eats through materials and living tissue; or
Reactive - can possibly explode or react with other chemicals.

In the not-so-distant past, many harmful substances were found in everyday household items, such as lead in paint, mercury in thermometers, and asbestos in insulation. In discovering dangers associated with these materials, most have been phased out, but may still be present and must be disposed of properly. The legacy of their use exists in contaminated soils, water, and air.

Figure 1. An E-waste collection program.
Photo by George Hotelling

Today's sources of hazardous waste are often connected to our electronic devices. This hazardous e-waste is often exported to low income countries with few, if any protections for people and ecosystems. Most sites contaminated with hazardous materials are difficult and expensive to clean up, making the case for implementing a comprehensive, effective management and disposal plan of hazardous materials.

How are we doing?

The City of Brookings landfill offers a variety of opportunities for businesses and private citizens to properly dispose of hazardous wastes including tire disposal; a paint exchange program; appliance pick up; metal/appliance disposal (Freon is removed for the customer and the metal is recycled); and electronic waste recycling (including cell phones, computers, TVs, stereos, printers, microwaves, and more).

How does Brookings compare?

All other comparison cities have comprehensive household hazardous waste programs. While some hazardous materials are handled with the efforts mentioned above, they are generally of short duration. As a result, most household wastes, some of which are hazardous, are deposited in the landfill. Brookings does not have a year-round management program for household hazardous wastes.

Summary

While the Brookings landfill offers some opportunities for households and businesses to properly dispose of hazardous wastes, they are only available for short times. Brookings is the only city among the selected peer cities that does not have a comprehensive household hazardous waste program. As a result, many hazardous materials end up in the landfill, which may not always function to protect our health or the health of our local ecosystems. For this reason it is important to consider developing a hazardous waste program.

Principle: Community Design

Sustainable Brookings values the built environment of the past, present, and future that contributes to its identity, heritage, and sense of place.

Sustainable community design requires accessibility to common destinations, open space, cultural heritage, and minimal exposure to the negative effects of development. These elements promote a sustainable community where natural and cultural resources are preserved and honored and all residents have access to common open space and destinations.

Six indicators have been developed to measure Community Design in Brookings. These indicators reveal that Brookings is neutral to good in this principle. The percentage of sidewalks and bike trails to roads is good in comparison to the other communities. A substantial amount of residents are within a quarter mile of open space. The low percentage of residents per acre could be from the amount of open space in the city limits. Also, high densities in some areas are beneficial for lower infrastructure costs, such as in a downtown. Improvements could be made in utilizing property for development while maintaining open area. Historic preservation is a value seen in Brookings that should continue to be encouraged and maintained.

Indicator

Complete Streets - Ratio of miles of sidewalks and bike paths to miles of roads

Why is this important?

Complete streets include streets that are designed to accommodate bicyclists, pedestrians, and public transportation vehicles and users, along with cars and large trucks. Complete streets may consist of streets that have bike lanes, safe crossing areas, medians, and sidewalks that are accessible.

Complete streets can improve safety for all users. For example, structures like medians eliminate left turning crashes and allow pedestrians to cross wider streets in stages. Adding bike lanes also increase safety since bicyclists riding on sidewalks are subjected to unforeseen traffic encounters at driveways and intersections.

Complete streets contribute to social equity by improved accessibility to family and friends, employment, and medical care.

Complete streets can be more economical by encouraging people to ride bicycles or walk instead of driving, which lowers the cost of transportation. In the United States, 39% of all trips are less than three miles and 17% of all trips are less than one mile. These distances could easily be traversed on a bicycle or by walking, yet 72% of these trips are taken in an automobile.

Complete streets help reduce heat trapping and ozone producing gases associated with automobiles. The average car produces 0.93 pounds of carbon dioxide per mile traveled.

How are we doing?

Although there is no official standard for accessibility, this indicator measures complete streets by comparing the ratio of miles of sidewalks and bike paths to miles of roads. According to the City's Community Development Department, Brookings currently has 123 miles of roadways and an estimated 165 miles of sidewalks, which includes 31 miles of trails. If Brookings had sidewalks on both sides of all roads, the ratio of sidewalks to streets would be near 2:1. The ratio of sidewalks and trails to streets in the City of Brookings is 1.34:1, indicating room for improvement.

How do we compare?

Figure 1 shows the number of miles of bike and pedestrian trails as well as the percentage of trails to roads for some cities that are comparable to Brookings. As the smallest city among its peers, Brookings has an admirable number of bike trails. However, the bike trails in Brookings generally occur at the fringes, which does not encourage bicycle travel within the City.

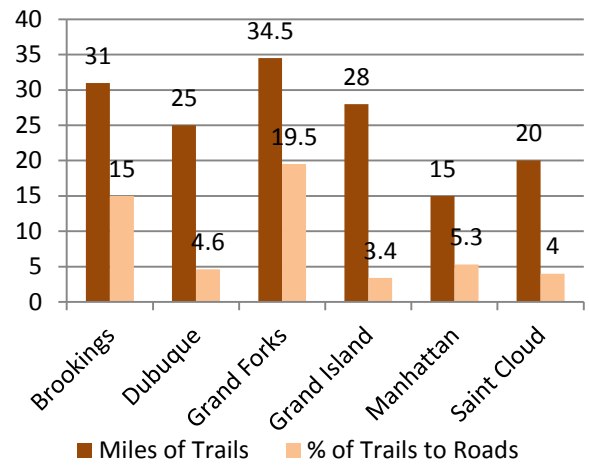


Figure 1. Miles of Bike Trails and Percent of Bike Trails to Roads 2012
Source: Cities of Grand Forks, St. Cloud, Dubuque, Grand Island, Manhattan, and Brookings (2013)

Summary

Brookings scored well on number of bike trails, although most occur at the fringes of the City, highlighting the need for more within the city's core. The ratio of bike paths and sidewalks to roadways indicated a need for more sidewalks.

Indicator

Mixed Use - Average land-use mix factor

Why is this important?

Sustainable cities have a mixture of land uses. Instead of separating land uses such as housing, schools, offices, and retail into individual districts; mixed zoning situates these uses closer together, which allows residents easier access to work, shopping, services, or school.

Higher levels of mixed use benefit residents by increasing opportunities for walking and biking, thereby reducing the total vehicle miles travelled (VMT). Reducing VMT means better air quality and fewer automobile accidents. Mixed use also minimizes the need for expansion of lanes and other costly traffic mitigation efforts.

When a city's walkability is enhanced, the health benefits are worth noting, especially with 'social land uses'; as found by Forsyth and colleagues in 2008 studies. Residents were about 50 percent more likely to walk for transportation in these cases. Cervero and Kockelman (1997) found supporting evidence that a community's ratio of those citizens with healthy weight was related to well-mixed land uses. Crime is also reduced when there are "eyes on the street" from mixed uses.

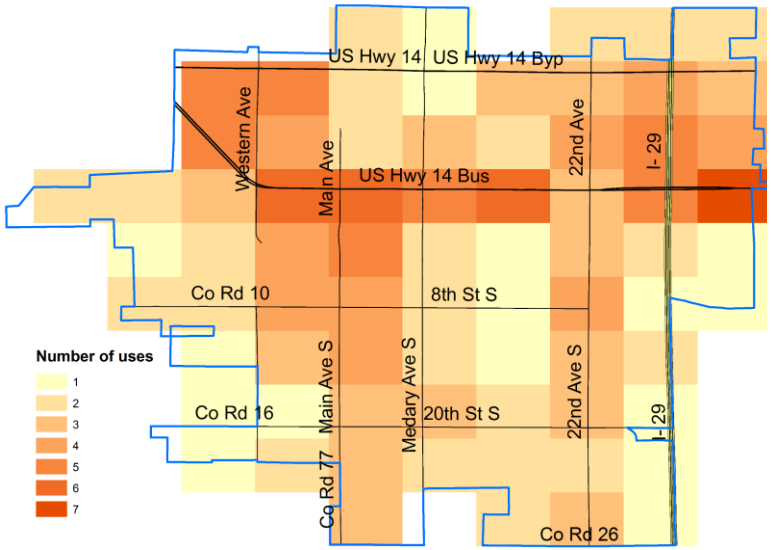


Figure 1. Brookings map estimating levels of mixed use. Number of uses for each ½ by ½ mile grid cell was calculated using the 2013 Brookings Zoning Map. Different uses that counted include residential (any zoning category), industrial, agricultural, and business. Each business subcategory counted for a different use in order to capture the variety in services offered.

Despite all the benefits of mixed use, it is usually underprovided because of antiquated zoning regulations and suburban development patterns (Dubuque Sustainable 2012 Report).

How are we doing?

According to Figure 1, the 6th Street corridor (US Hwy 14) has the highest levels of mixed use. Other areas of Brookings have very low levels of mixed uses.

How does Brookings Compare?

Since the Brookings map is based only on zoning, it does not include the same categories as other peer cities, which are based on detailed land use maps. It is not appropriate to conduct a comparison.

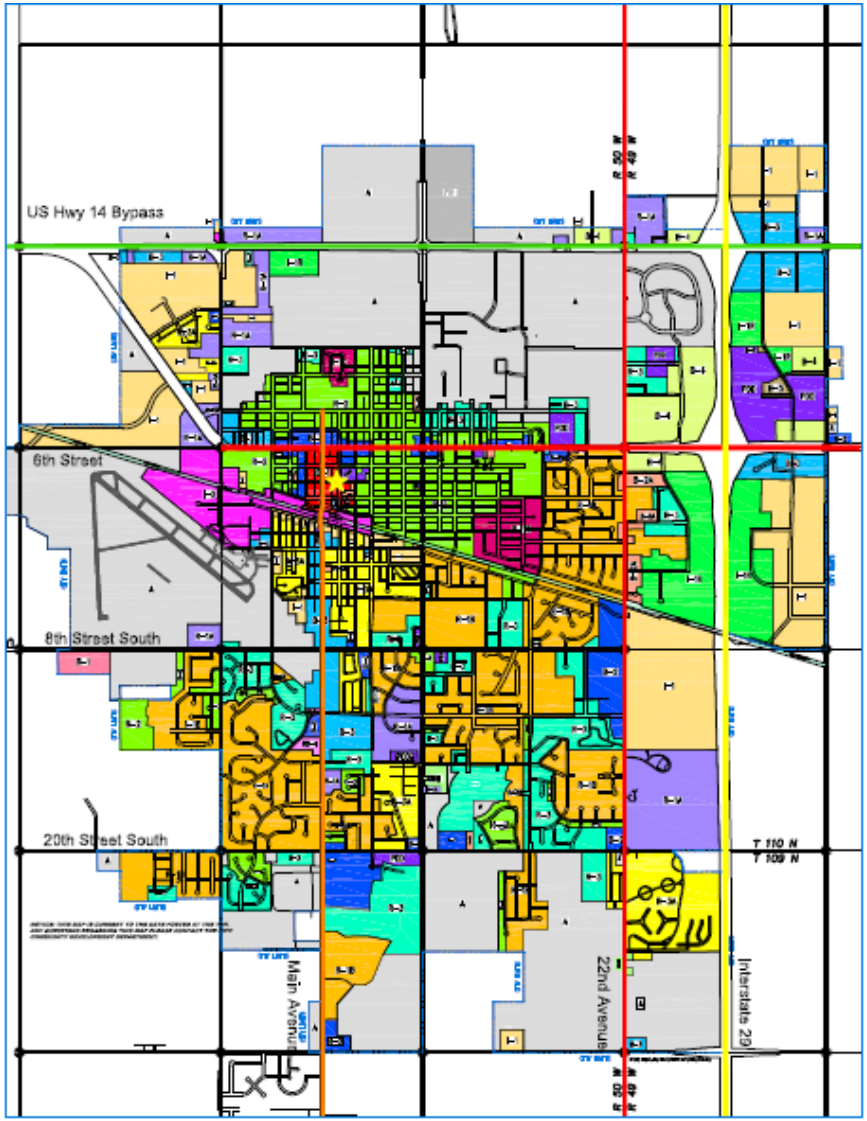
Summary

Mixed land use is important for increasing accessibility and reducing pollution. Brookings has many opportunities for increasing mixed use in future developments.

BROOKINGS, S.D. ZONING DISTRICT MAP

January 25, 2013

★	Dowtown District
	Main Avenue
	Four Lane
	Interstate 29
	Highway 14 Bypass
A	Agricultural
R-1	Rural Estate District
R-1A	Single Family Residence
R-1B	Single Family Residence
Ri-1C	Single Family Residence
R-2	Two Family Residence
R-3	Multiple Family Residence
R-3A	Mutiple Family Residence
RMH	Residential Manufactured Homes
RB-4	Neighborhood Business
B-1	Central Business
B-2A	Professional Office Business
B-3	Heavy Business
B-4	Highway Business
B-5	Planned Research & Business District
I-1	Light Industrial
I-2	Heavy Industrial
I-1R	Restricted Industrial
PDD	PDD Planned Development District



Indicator

Quantity of open space - Percent of city that is open space (including parks, schoolyards, and woodlands)

Why is this important?

The EPA identifies public open space or 'green' space as "any open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public." The quantity and quality of these areas benefit cities in countless ways.

Economic and Social Benefits: Open spaces provide recreation opportunities, attracting local and non-resident visitors who contribute to the local economy.

Environmental Benefits: Trees, shrubs, and other plants filter air and reduce noise pollution while also acting as wind breaks and moderating temperatures. Vegetated soils better capture precipitation and mitigate localized flooding and reduce groundwater contaminants, thereby improving water quality in streams and rivers. Open space provides wildlife habitat, which encourages biodiversity, which then increases a community's resiliency.

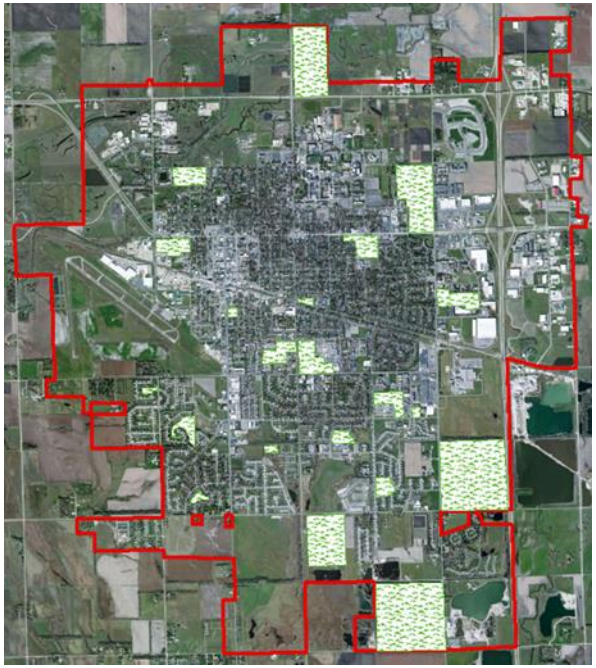


Figure 1. Map of parks (white squares with green speckles) within Brookings' city limits (red line). *Additional open space can be found in schoolyards, cemeteries, and vacant lots.* Map by Brittany Kleinsasser.

How are we doing?

A map of parks within Brookings' city limits (Figure 1) reveals many, well-distributed public open spaces. The National Recreation and Park Association suggests a minimum of ten acres of public open space available within a community per 1000 residents. Brookings surpasses this expectation by five times with 51 acres available per every 1000 residents.

How does Brookings compare?

Brookings and Dubuque rated the same at six percent open space, but well below Grand Forks and Manhattan (Figure 2).

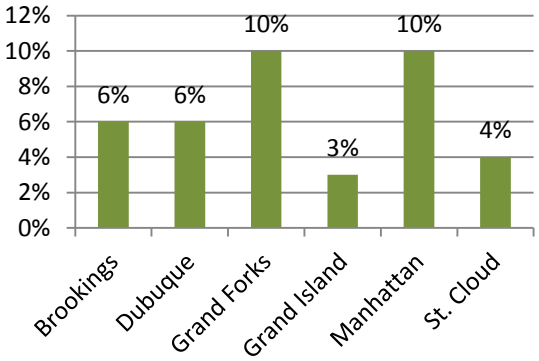


Figure 2. Percentage of urban area that is public open space.
Source: Cities of Grand Forks, Dubuque, Grand Island, Manhattan, St. Cloud, and Brookings

Summary

Brookings fell in the middle of the peer communities but is well above the National Park recommendation. As the City grows, it will be important to maintain open spaces to continue reaping the economic, social, and environmental benefits of the community's open spaces.

Indicator

Access to Open Space - Percent of households within walkability (1/4 mile) of public open space (including parks and public schoolyards) according to LEED certification

Why is this important?

Public open space includes parks, playgrounds, cemeteries, and other publically accessible open areas. Research shows that residents with access to these spaces more frequently participate in physical activity. The health benefits are evidenced by decreased obesity, decreased rates of heart disease, and improved mental health in groups living within close proximity to public open spaces.

According to the Trust for Public Land, "Proximity to parks and open space enhances the value of residential properties and produces increased tax revenues for communities." Experts point out home owners may be willing to pay premium rates for homes near areas that emanate physical beauty and recreation. Studies have found that preference is near historic, recreation and conservation, as they are considering permanent residence.

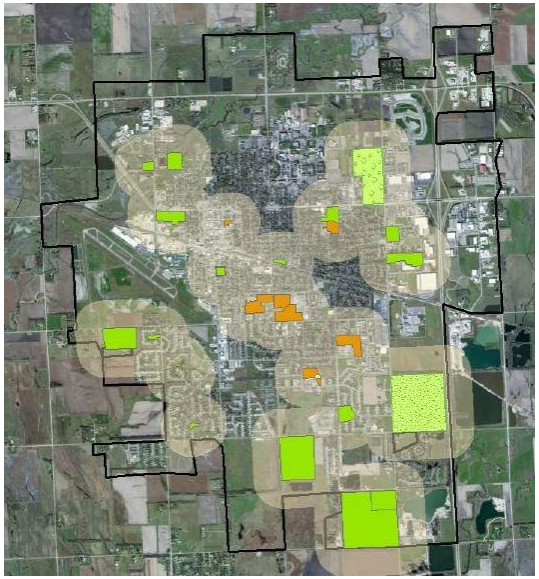


Figure 1. Households within ¼ mile of open spaces in Brookings. Shades of green represent public parks, golf course, and McCrory Gardens. Orange areas are school parks and the Children's Museum. University parks are not mapped. Each space is encircled by a light area encompassing households within 1/4 mile. Map by Tami Mishra.

Did you know?

"People living in walkable neighborhoods get about 35-45 more minutes of moderate intensity physical activity per week, and are substantially less likely to be over-weight or obese, than do people of similar socioeconomic status living in neighbor-hoods that are not walkable."

Economic Benefits of Trails, americantrails.org

How are we doing?

According to Figure 1, the majority of households within Brookings live within ¼ mile of at least one open space. While the exact number of households is difficult to calculate, the map displays fairly good household access to open space. Households in the north part of town also have access to University open spaces.

What is considered Public Open space?	
Parks	Playgrounds
Community Gardens	Public Seating Areas
Cemeteries	Public Plazas
Schoolyards	Vacant Lots

How does Brookings compare?

Different methods have been applied to measure this indicator by various cities. So using a simple visual comparison it does appear that Brookings, Dubuque, and Grand Forks rate similarly in residential access to public open space with Grand Forks having the most distribution of public open spaces.

Summary

Open spaces in Brookings are fairly well distributed so that the majority of households have access. Where there are gaps in accessibility, future planning efforts should consider ways to increase access.

Indicator

Historic Preservation - Number of buildings and structures on the National Register of Historic Places

Why is this important?

Preserving a community's cultural resources demonstrates a commitment to sustaining its future. Established in 1883, Brookings has a diverse and rich historic background that ranges across academic, agricultural, commercial, and residential. Preserving these related properties contributes to its unique identity and culture and strengthens our community.

Brookings has a commitment to its historic preservation overseen by the city's Historic Preservation Commission. This indicator measures historic designations through the National Register of Historic Places (NRHP), which is administered by the National Park Service. To qualify for the NRHP, a property must be of a historical age (typically 50 years) and be significant for events, people, architecture, or the potential to yield historic or prehistoric information (archaeology).

How are we doing?

Brookings has four historic districts: the Brookings Central Residential Historic District, the Brookings Commercial Historic District, the Brookings University Residential Historic District, and the Sexauer Seed Co. Historic District, which are comprised of 312 contributing primary buildings and structures. There are also 28 buildings and structures individually listed in the National Register of Historic Places (NRHP). Brookings has a long tradition of historic preservation and continues to focus on preserving its historical properties. Since 2006, four buildings and structures have been added to the NRHP.

How does Brookings compare?

Brookings has 340 NRHP listings as compared to 800 listings in Dubuque, 717 listings in Grand Forks, 111 in St. Cloud, 143 in Manhattan, and 16 in Grand Island. However, these comparative cities all have at least twice the population of Brookings. When the percentage of NRHP listings is compared to the percentage population, Brookings is ahead of all of them in NRHP listings.

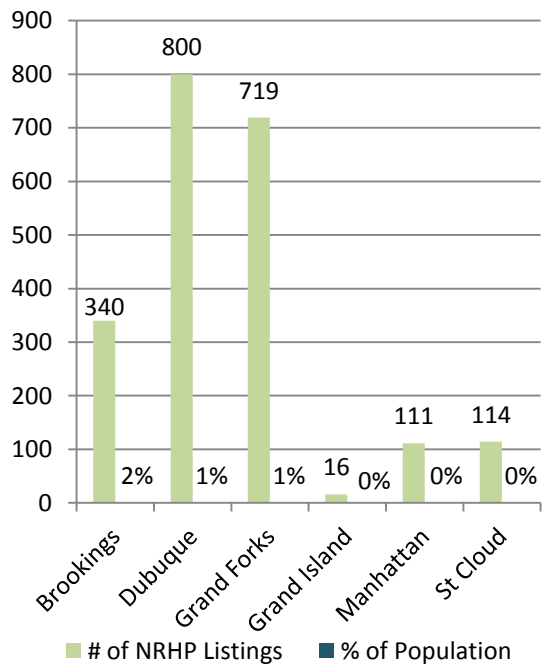


Figure 1: Brookings NRHP listings compared to other communities 2013
Source: National Register of Historic Places (2013)

Summary

Efforts toward preservation in Brookings are substantial as reflected in the high number of buildings and structures listed in the NRHP. It is important for Brookings to continue its historic preservation efforts to maintain its cultural identity.

Indicator

Urban Density - Residents per acre of developed land

Why is this important?

Each community needs to be aware of the impact of density on its community life. There should be a level of density within a community's neighborhoods that suits its purpose and structure; reduces impact on the natural environment; and maximizes benefits. One benefit is ready access to amenities. Compact development within a downtown, for instance, makes use of existing infrastructure. It also provides a near-by market for existing restaurants and other retail businesses.

On the other hand, as a city expands outward, infrastructure needs to be built. Too much sprawl increases the distance between households and amenities, increases vehicle miles and emissions. Such development may shrink or severely impact wildlife habitat, local flora and fauna. In addition, too much pavement decreases rain water infiltration. Wise development will provide housing opportunities for all income levels and allow convenient access to amenities for all residents.

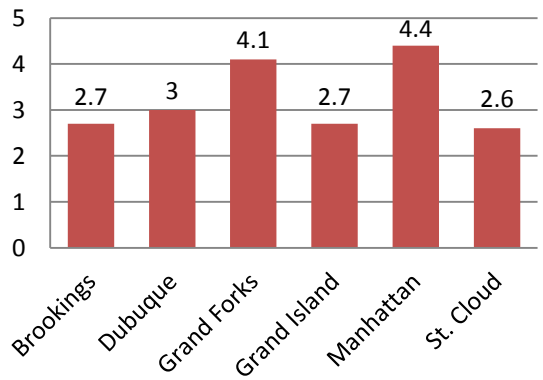


Figure 1. Number of Residents per Acre
Source: 2010 Census

How are we doing?

Brookings, with an average population density of 2.7 people per acre, is a community considered to be very low density. Brookings has an opportunity to develop certain areas described as 'tent-pole density.' University campuses often exemplify tent-pole density with ready access of goods and services (i.e., within walking distance) near residential sites, which creates a walkable community.

How does Brookings compare?

Brookings sits at a low density level among its peers, similar to St. Cloud and Grand Island. Only Manhattan and Grand Forks exceed this range, with still a rather low density of 4.1 and 4.4 people per acre respectively.

Summary

Encouraging infill and mixed use to develop more densely populated areas and more spread out access to services will help grow smaller, multipurpose micro-communities. Higher urban densities prove more economically sustainable by using pre-existing infrastructure, which minimizes costs of new development and effects of sprawl on surrounding ecosystems.

Principle: Green Buildings

Sustainable Brookings values a productive and healthy built environment.

Green buildings promote sustainability through their economic, social, and environmental benefits. They improve air and water quality and protect ecosystems by reducing energy consumption and using environmentally friendly building materials. They further reduce overall operating costs and enhance occupants' health and comfort (EPA, 2010). Homes must be safe, healthy, affordable, and efficient in terms of energy and resource use to be sustainable. Future sustainable building practices should be addressed in all areas of the construction industry to have the greatest impact: residential, commercial, industrial, and heavy (road) construction. Three indicators measure Brookings Green Buildings: Green Standards, Affordable Housing and Safe Housing. Brookings is doing well in one of the three indicators: Green Standards.

Indicator

Green Standards - percent of non-residential buildings that meet ENERGY STAR or LEED standards

Why is this important?

Green buildings support sustainability and reduce the pollution within a community. Buildings account for around 40% of the total energy usage, 13% of the total water usage, 40% of the carbon dioxide emissions, and 2.3 billion acres of the total land area in the United States.

Two of the most prevalent green building programs include the Environmental Protection Agency's (EPA) ENERGY STAR program and the Leadership in Energy and Environmental Design (LEED) program. Both of these programs have standards and ratings to gain certification for a green building. Green buildings reduce air pollution, improve indoor air quality, reduce energy usage, utilize land more efficiently, and reduce water usage.

This indicator quantifies the number of non-residential green buildings within the City of Brookings that have been certified by LEED or ENERGY STAR. This indicator does not include buildings that have not been certified but are planning to be certified by either LEED or ENERGY STAR.

How are we doing?

Between 2008 and 2012 Brookings had three non-residential buildings certified by LEED and one non-residential building certified by ENERGY STAR. In 2010, one non-residential building was certified by both LEED and ENERGY STAR. In 2012, two additional non-residential buildings were certified by LEED and non-residential ENERGY STAR.

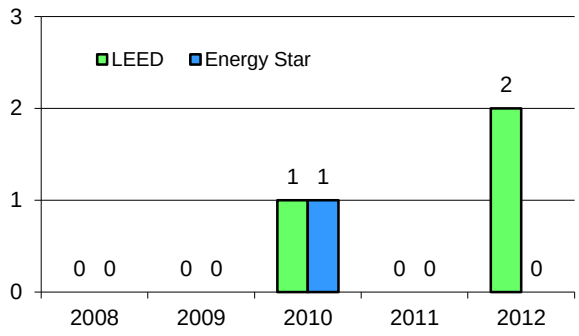


Figure 1. Number of non-residential buildings certified by LEED and ENERGY STAR from 2008 to 2012 in Brookings
Source: usgbc.org, energystar.gov (2012)

How does Brookings compare?

In 2012, Brookings had more certified Green buildings than Grand Island, Manhattan, and Saint Cloud with two Green buildings compared to their one Green building. Dubuque had seven Green buildings and Grand Forks had three in 2012.

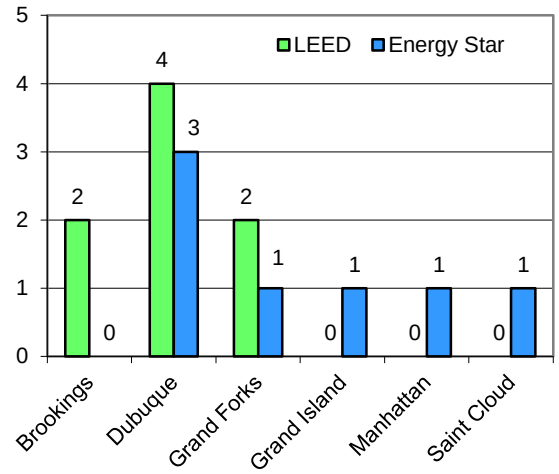


Figure 2. Number of buildings certified per year, 2008-2012.
Source: usgbc.org, energystar.gov (2013)

Summary

Although Brookings has a low number of certified buildings, the city has more LEED certified buildings than most of its peer cities. Following energy efficient building practices and sustainable guidelines in the future will create a more sustainable environment and increase building energy efficiency.

Indicator

Affordable Housing - Percent of households living in affordable housing

Why is this important?

Affordable housing is important for several reasons. It is a great indicator of how the local economy is doing. If the majority of residents are living above their means, they will have less money to spend on other necessities like healthcare, food, and education. Affordable housing in a given location is a great incentive for businesses from outside the community to open in the area. If local housing is deemed unaffordable, an outside business may open elsewhere due to limited excess income for spending. The U.S. Department of Housing and Urban Development defines affordable housing as households that spend less than 30% of their total income on housing. The costs considered include mortgage/rental payments, taxes, insurance, and utilities.

How are we doing?

Sixty-four percent of owner-occupied households in Brookings are living within their means, spending less than 30% of their income on housing. Factors contributing to this high percentage could be good wages and reasonable spending practices. However, only 47% of renters spend within these guidelines.

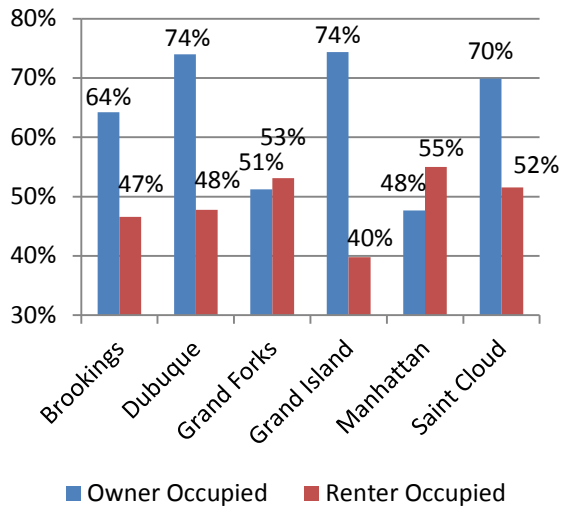


Figure 1. Housing affordability (2008-2012)
Source: American Community Survey (2013)

How does Brookings compare?

Among the comparison cities, Brookings ranks fourth in affordability of owner occupied housing at 64%, although affordability is significantly higher than Grand Forks (51%) and Manhattan (48%). All comparison cities fall within a similar range for renter occupied housing affordability, around 50%.

At the state level, Brookings is significantly less affordable than South Dakota overall in both owner occupied and renter occupied properties.

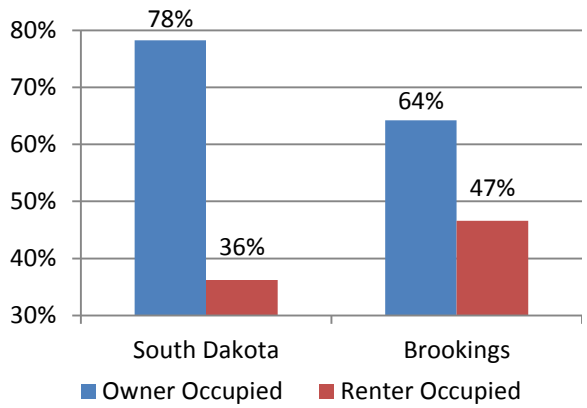


Figure 2. Housing affordability (2008-2012)
Source: American Community Survey (2013)

Summary

Approximately, 33% of homeowners are living beyond their means. More than 50% of all renters are living beyond their means. Brookings is second to last in renter affordability compared to the other cities.

Indicator

Safe Housing - Percent of rental housing inspections that result in housing code violations

Why is this important?

People spend up to half of their time each day inside their homes. Feeling safe and healthy at home should be a top priority. Following the posted code requirements will help minimize the risk of injury and illness at home.

Many health issues have been related to unhealthy living conditions. For example, illnesses like asthma, lead poisoning, and injuries due to poor lighting or poor maintenance are often related to, or exacerbated by, issues in the home that can be corrected. While a home owner maintains his/her own property, a housing management company or landlord is responsible for the upkeep of their rental properties.

Management companies and landlords need to be made aware of any and all items in need of repair, a responsibility that often falls with the tenant. A small water leak can lead to mold. A piece of carpet coming up from the floor can be a tripping hazard. Companies failing to correct issues can be subject to violations from the City or lawsuits from their tenants.

Management companies and landlords are required by law “to offer their tenants livable units including functional plumbing, heating, and electricity, as well as clean sanitary and structurally safe buildings. If your rental unit is not safe, you have options and rights that protect you” (South Dakota Housing Development Authority).

For a home to be considered safe and healthy, it must be dry, free from pests, safe for all ages, well maintained, and free of any contaminants (i.e. tobacco smoke, hazardous chemicals, etc.). Homes can take the extra step of being “green” by using natural cleaning agents, equipment, and fixtures that limit energy and water usage.

How are we doing?

No data could be found on this indicator.

How does Brookings compare?

No comparative data for this indicator.

Summary

Brookings could maintain records on housing code violations to help monitor and improve the rental standards in the community. Brookings could also improve safe housing by strengthening and enforcing a tenant’s rights policy.

Source:http://www.sdhda.org/sdhda-mainwebsite/renter/tips-for-tenants

Principle: Healthy Local Food

Sustainable Brookings values the benefits of wholesome food from local producers, distributors, farms, gardens, and hunters.

Consumption of healthy foods, accessibility to healthy food options, and community gardens all decrease negative health consequences and improve the well-being of residents. Local options and farmers markets strengthen the local economy. A sustainable community should have access to healthy food options, open space for household food production, and ample locally grown foods available for purchase.

Proximity to healthy foods, community gardens, Farmers Market attendance, dollar value of local foods purchased by local institutions, healthy diets, and obesity have been the indicators measured for the Brookings Healthy Local Food Principle. Brookings fared well in two of the six indicators, poor in three, and unknown in one of the indicators. This indicates Brookings is about average with the other communities in raising and consuming healthy food.

Children planting garden at United Living Community.

Indicator

Proximity to healthy foods – percent of residents with low access (more than one mile) to a supermarket or large grocery store in a food desert.

Why is this important?

Lack of access to healthy foods "can lead to higher levels of obesity and other diet-related diseases, such as diabetes and heart disease" according to the USDA.

Food deserts are defined by the USDA as cities without ready access to fresh, healthy, and affordable food. Instead of supermarkets and grocery stores, these communities may have no food access or are served only by fast food restaurants and convenience stores that offer few healthy, affordable food options."

Census tracts qualify food deserts if they meet low-access (living outside a 1-mile radius of a health food market) and low-income thresholds (a poverty rate of 20% or greater or a median household income at or below 80% the area's average household income). For this indicator, a health food location is defined as a store that sells fresh fruits, vegetables, and at least one baking item such as flour.

Figure 1. One mile radius around stores consistently selling fresh fruits, and vegetables in Brookings.

How are we doing?

According to the USDA's Food Environment Altas, 16% of Brookings County residents live in a food desert, which is based on income and proximity to a health food market. As seen in Figure 1, many City residents live significantly more than one mile from a consistent source of fresh produce. In addition, the USDA Economic Research Service indicates that many households north of the railroad tracks are classified as low income, so the residents living in the northwestern and western parts of Brookings have low accessibility to health foods.

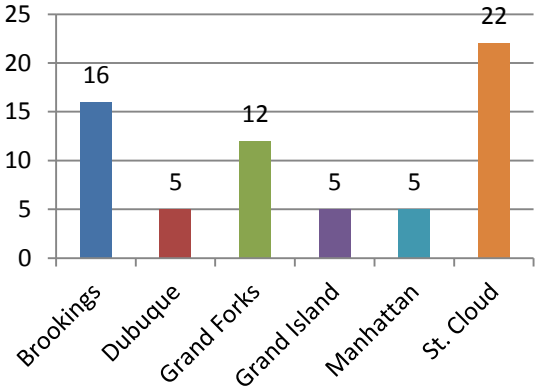


Figure 2. Percent of County population living in a food desert.

How does Brookings compare?

Brookings ranks poorly among its peer cities, having the next-to-highest proportion of county residents living in a food desert.

Summary

The majority of Brookings residents are not within walking distance of a grocery store, and 16% of county residents live in a food desert. Implementation of mixed-use development or placing a market on the western part of the City can mitigate this issue.

Indicator

Community Gardens - Square footage of community and school gardens

Why is this important?

Community gardens reacquaint us with environmental stability issues and teach us to become stewards of the land. Through gardening we learn valuable life lessons, increase food availability, reduce storm water runoff, and reduce carbon dioxide emissions that come with transporting foods longer distances. Additional benefits are seen from gardening, such as reduced crime due to increased awareness with more residents working outside.

Community gardens open social doors that may otherwise be left closed and may allow members to feel more connected to the community. We are also given the unique opportunity to learn from all ages, classes, and ethnic groups, socially enlightening us and reducing stereotypes.

Needless to say, community gardens provide us with fresh produce and the opportunity to sample unfamiliar foods. Plots of land are available for those who do not own any, which may also create economic opportunities. This is particularly important for low-income and immigrant groups.

How are we doing?

Brookings provides opportunity for residents to garden on the north side of town. Community gardens permit watering during dry weather conditions.

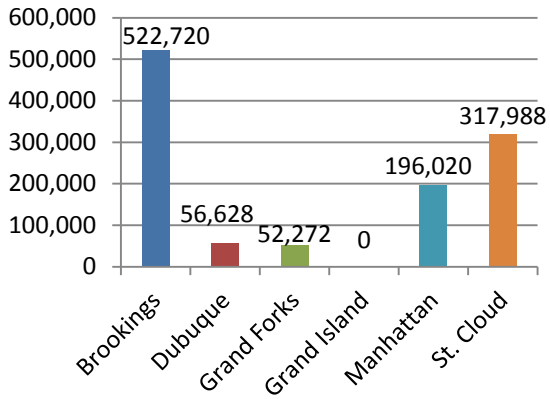


Figure 1. Community garden space available (Square footage) 2013
Source: Cities of Grand Forks, Dubuque, Grand Island, Manhattan, St. Cloud, and Brookings

Crime Reduction? Police have reported crime reduction near public gardens as more residents are working outside, which increases 'public awareness.'

How does Brookings compare?

Of the study communities, Brookings leads in total square footage of garden space per resident. The Brookings Douglass Chittick Community Garden, in itself, totals 12 acres. This provides 23 square feet per resident.

St. Cloud came in second with 7.3 acres total for the city, or 4.5 square feet available per resident. However, this Minnesota city has nine well distributed gardens, which improves accessibility. Dubuque has six throughout its community.

Summary

Brookings has by far the largest number of acres of garden space of the peer communities.

Worth Noting: Studies show that families who participate in community gardening eat healthier diets than non-gardening families.

Indicator

Farmers Market Attendance - Annual estimated attendees at the Brookings Farmers Market or produce stands

Why is this important?

Much like the community gardens, the Farmers Market generates interaction among people of all social, ethnic, and economic backgrounds and offers financial opportunities to local farmers and gardeners who can sell in town. Awareness of over-processed foods and hormones added to increase production is increasing the demand for organic and/or local foods. Consequently, these historical markets are making a comeback as more consumers turn to them for homegrown produce. They provide a healthy local food system that encourages well-being by educating consumers on healthy food choices

How are we doing?

Brookings the smallest town in the group has three markets and equally scores with the highest city, Manhattan. Grand Island markets are open seven days a week, but both Brookings and Manhattan tie for second place, with their markets open 3 days a week.

How does Brookings compare?

Brookings markets are open 3 days a week, the same as Manhattan. Only Grand Island has markets open every day of the week. All other cities are open fewer days.

Brookings Farmers Markets are open 6 months of the year. Only Dubuque is open all 12 months. Three peer cities are open 6 months and the other cities' markets are open 5 or 3 ½ months.

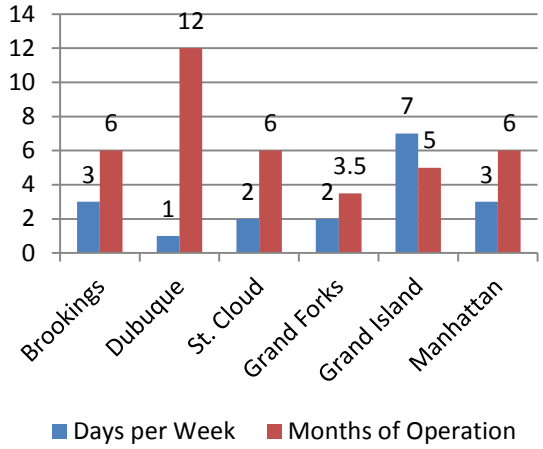


Figure 1. Days per week and months per year markets are open, 2013
Source: Individual city contacts (2013)

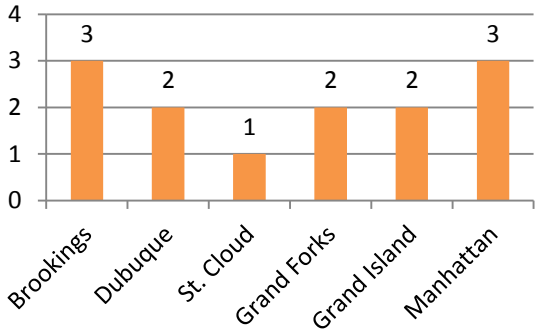


Figure 2. Number of markets per community, 2013
Source: Individual city contacts (2013)

Summary

Brookings has no information as to the number of annual attendees of Farmers Markets, so this indicator is inconclusive.

Brookings has developed a good infrastructure for this category, especially since it is the smallest town in the group. A weakness might be that the Farmers' Markets are limited to summer months.

A permanent indoor location for Brookings Farmers' Market would encourage residents to both grow and eat local all during the year, not just in the summer. Year-round markets could encourage small producer growth, healthy eating, perhaps even help fight against growing obesity.

Indicator

Dollar value of local foods purchased by local institutions (may consider percentage of businesses)

Why is this important?

When institutions purchase local foods, it returns funds into local businesses and boosts the economy. Purchasing local foods promotes sustainability because it minimizes the amount of miles food must travel, and, therefore, reduces the subsequent environmental effects associated with transportation and food preservation. Sourcing food purchases locally promotes transparency between the producer and consumer, which promotes community cohesiveness.

Local institutions have not yet been contacted for data collection, but they could include the following: Brookings Public School System, ULC/Brookview, etc., Aramark, daycares, local restaurants, and grocery stores.

Locally grown foods are more likely to be grown in soil that is not leached of natural nutrients. By reason of peer accountability, small-scale production also reduces the likelihood of contaminants. Shorter transportation distances mean that freshness and taste are preserved.

Dakota Rural Action (DRA) promotes the purchase of locally grown foods by teaching the benefits of local products and listing contact information for producers in their *South Dakota Local Foods Directory* available for free in print and online. They also offer purchasing opportunities through the South Dakota Local Foods Co-op. Additionally, DRA helps schools learn how to procure local foods by acting as South Dakota State Lead for Farm to School.

How are we doing?

A small, informal, sample indicates that The Pheasant Restaurant guesstimates that approximately 40% of its food is either grown or prepared locally, and the Old Market Eatery estimates that approximately 10-12% in the winter and 13-15% in the summer is local food.

Aramark, which services SDSU, has shown an interest in using the produce from the student garden. However, institutions need to verify to the SD Health Department that such local foods are grown in a healthy environment. Other barriers for Aramark may be as simple as food grown in the summer doesn't necessarily coordinate with food eaten by students in the fall, winter and spring.

The issue of locally grown foods is of interest to many. Systems have been developed for certifying local foods and there appears to be a demand for growing local food.

How does Brookings compare?

No data is available.

Summary

Although there is no data yet, some individuals and institutions have expressed interest in developing a way to expand the purchase of locally grown food in the future.

Indicator

Healthy Diets - Percent of adults in the county who eat an adequate amount of fruits and vegetables

Why is this important?

Fruits and vegetables are critical to promoting a good and healthy life and are the foundation of a nutritious diet. Fruits and vegetables contain crucial elements (such as vitamins, minerals, fiber, and disease-fighting phytochemicals) that can reduce the risk of heart disease, high blood pressure, Type II diabetes, and certain cancers.

How are we doing?

In South Dakota, we have had a significant drop in consumption of both vegetables and fruit. Figure 1 shows the recorded decrease in consumption as a whole from the years 2002-2009.

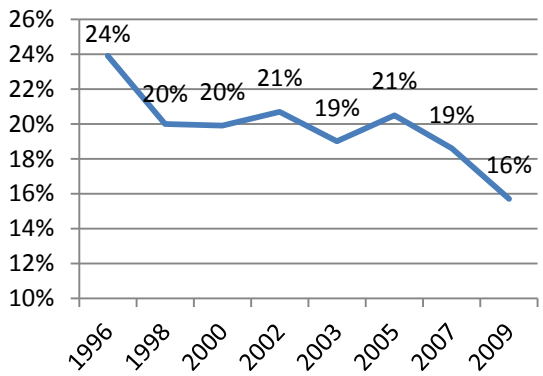


Figure 1. South Dakota adult consuming adequate fruits and vegetables. 2000-2009
Source: http://apps.nccd.cdc.gov/BRFSS/index.asp (2014)

How does Brookings compare?

Figure 2 shows the comparisons of other cities or towns compared to Brookings. Brookings performed poorly in this category compared to the other places and their data. Brookings was only better than one community in healthy diets.

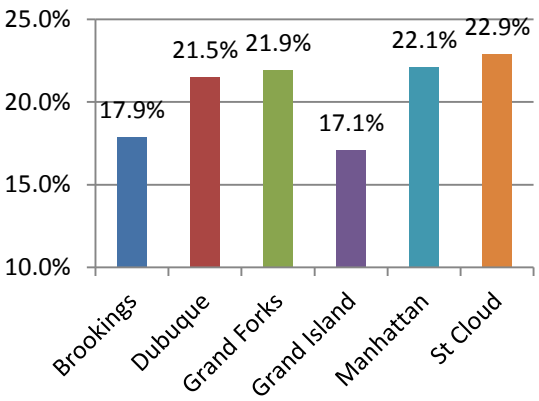


Figure 2. City comparison: consumption of fruits and vegetables, 2009.
Source: Centers of Disease Control and Prevention (2014)

Summary

Brookings comes in fifth with 17.9% of adults consuming the recommended daily amount of fruits and vegetables, with Grand Island being last. Brookings needs to make an effort to raise this number to help reduce health risks and obesity.

Indicator

Obesity - Percent of adults in the county who are obese

Why is this important?

Measuring the obesity percentage level is an important statistic used for many reasons. Obesity is defined as having a body mass index (BMI) of greater than 30.

Measuring the obesity percentage in a community can give an understanding of many factors that directly correlate to eating and exercise habits.

Maintaining an acceptable BMI is also important because one will live a much healthier and better life. Obesity leads to a higher risk of heart disease, strokes, diabetes, and some types of cancer.

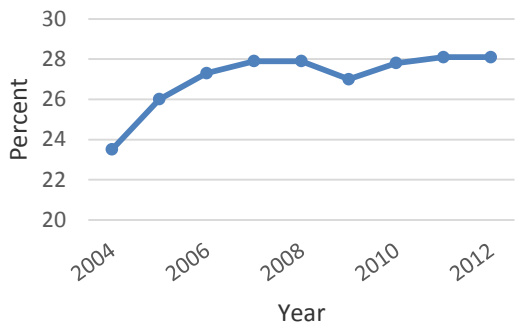


Figure 1. Obesity percentage in Brookings County. 2004-2012
Source: countyhealthrankings.org (2014)

How are we doing?

The rate of obesity in Brookings County has been on the rise, reaching 28% in 2012. When combining rates of overweight and obese individuals, the 2012 rate for Brookings was 66%, compared to 63.4% nationwide. Adults and children both contribute to this trend, with 32.6% of K-12 students in South Dakota classified as obese or overweight (healthysd.gov).

How does Brookings Compare?

Brookings obesity rate ranks within the middle of comparison communities but above the national average. Brookings rate of obesity is increasing, highlighting the urgency of this health issue within our community.

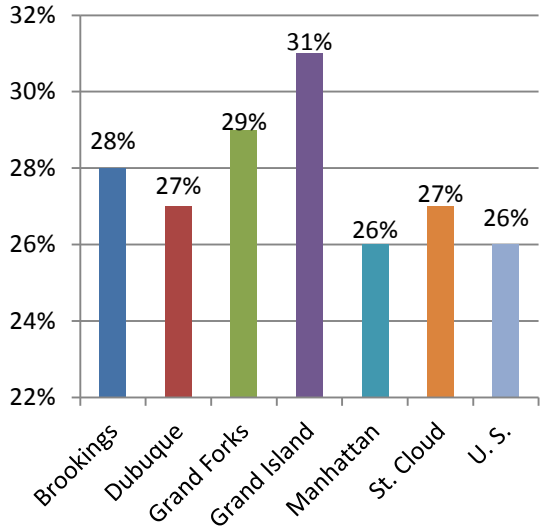


Figure 2. Obesity rates for counties of comparison communities, the U.S., and Brookings (2007).
Source: countyhealthrankings.org (2014)

Summary

Obesity contributes to cancer, heart disease, and cerebrovascular diseases, amongst many other conditions. About one-third of our school-aged children in South Dakota are obese or overweight.

Principle: Community Knowledge

Sustainable Brookings values education, empowerment, and engagement to achieve economic prosperity, environmental integrity, and social/cultural vibrancy.

Sustainable community knowledge requires a strong sense of place, public awareness of sustainability, and an emphasis on education and understanding. Through these three elements, the community develops a more insightful population with stronger, more active public lives. Five indicators have been developed to measure Brookings' Community Knowledge. The indicators for this principle reveal that voter participation was a weak area. The third grade reading proficiency was neither strong nor weak compared to the peer communities. Brookings has a strong emphasis on arts and culture. Sufficient data was not available to evaluate two indicators: volunteerism and sustainable knowledge.

Indicator

Volunteerism - Volunteer hours per capita for city initiatives and national service programs

Why is this important?

Volunteerism helps citizens remember their common ideals. A sustainable city has a sense of place, where residents are engaged with their community and feel like they belong. Volunteers are a social asset for a community, and a measure of reconnecting, caring, and building relationships. Volunteer programs help individuals connect with others.

Volunteer opportunities can be spread via media or networking and raise money. Staffing events such as dinners, walks, and concerts is another manner volunteers can contribute to the community.

According to the Bureau of Labor Statistics, over half of Americans take time to volunteer one or more times per year. The median number of hours volunteered per year was 52 per person, which is more than a week's worth of work. Critical services such as firefighting, home repairs for the poor, and disaster relief are just a few of the objectives met by volunteers.

The intent of this indicator is to measure volunteer hours for city initiatives, such as city boards and library, firefighter, and hospital volunteers. The indicator also identifies the hours donated to national service programs such as Foster Grandparents, AmeriCorps, the Retired and Senior Volunteer Program (R.S.V.P.), and Habitat for Humanity.

Benefits of volunteering: Provides networking opportunity, good for mind and body, can advance a career, and brings fun and fulfillment to life. (Helpguide.org, 2014)

How are we doing?

Brookings has an active, progressive city government supported by involved citizens who serve on the various boards, committees, and city councils. Of the 18 city boards, committees and commissions, approximately 135 volunteers logged 3,762.5 volunteer hours in 2013. The fire department, with 45 volunteer firefighters, logged 9,000 hours in that year. Hospital volunteer hours are for hospice (384 hours) and Birth Ready (8846 hours). This does not include Hospital Auxiliary or nursing home hours. Many City volunteer hours are undocumented.

Brookings has an official program called Volunteer Service Board (VSB). The primary program of the VSB is a service of transporting community members for medical reasons. The service area includes Brookings and Sioux Falls. In 2013, volunteers logged 2043 reimbursed travel hours. Unreimbursed hours are not tracked. Other national service organizations operate in Brookings, such as Habitat for Humanity.

Brookings has an outstanding reputation for volunteerism. Many hours are not logged, but strength can be inferred by reason of the 151 organizations registered with the Brookings Chamber of Commerce as of February 2014.

How does Brookings compare?

No comparison data is available.

Summary

Insufficient data was available to develop a comprehensive summary. Some data was found relating to volunteerism in general, but not wholly specific to national service programs.

Indicator

Registered Voter Participation - Voter participation in general elections

Why is this important?

Voter participation is a key component of civic engagement. Civic engagement is an important resource for the community, as it shows that residents care about each other and the community. Voter participation also reflects the extent of a city's sense of place. A strong sense of place occurs when the community has a strong identity or character and residents feel deeply connected to the community. When residents feel connected to their community, they are more likely to vote in elections, especially local elections.
It is important to monitor voter participation for both mid-term general elections and for presidential elections. The difference between participation rates for the two types of elections is also relevant because it demonstrates a lack of engagement in the local community.

How are we doing?

Voter participation in Brookings County has been going down since 2002 in all general elections including presidential elections.

The City of Brookings' participation rate was lower than the 2012 participation rate by approximately 4%. Presidential elections consistently have had a better turn-out than the non-presidential general elections.

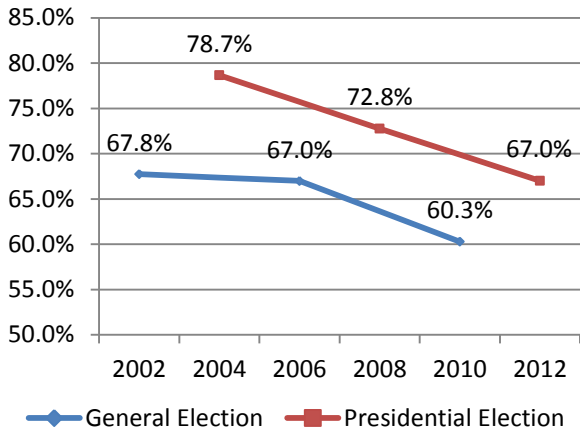


Figure 1. Percentage of Brookings Voter turnout from 2002-2012. Source: Brookings County Office (2013)

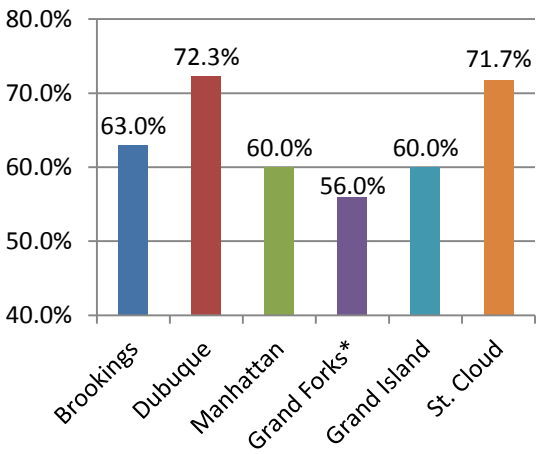


Figure 2. Percentage of voter turnout in 2012 general election. * Estimate
Source: individual county offices (2013)

How does Brookings compare?

Both Dubuque and St. Cloud have voter participation rates that are higher than in Brookings. Manhattan, Grand Forks, and Grand Island have lower rates than Brookings.

Summary

Voter participation is an important indicator for civic engagement and sense of place. To strengthen civic engagement, it will be important for Brookings to encourage civic participation.

Indicator

3rd Grade Reading Proficiency - Percent of 3rd grade students who meet or exceed proficiency standards

Why is this important?

Communication plays a big part in being sustainable. Learning early how our children develop communication skills can help improve their academics in the future. Reading is a critical portion of communication. Becoming aware of our children's abilities early is just another way to becoming sustainable. This indicator measures the 3rd grade proficiency of our youth in the field of reading and communication.

How are we doing?

This graph represents the percent of third graders proficient and advanced on the reading proficiency exam. Brookings has third grade in two schools: Medary Elementary and Hillcrest Elementary. Percentages shown in the Brookings five year trend are an average of the two schools results for the South Dakota Step Test. The overall third grade reading proficiency has fluctuated over the past five years showing a slight overall decline. A positive percentage change was noted between 2011-12 and 2012-13 school years. Fluctuation in scores can be contributed to the implementation of new standards and the use of different tests over the five year period

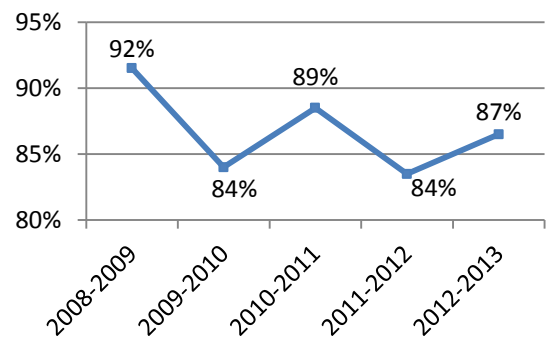


Figure 1: Brookings Reading proficiency 2008-09 to 2012-13. (2014)

How does Brookings compare?

Brookings is clearly leading the comparison cities with proficiency of 87%. The next city close to Brookings was Grand Forks with a third grade reading proficiency of 82%. Dubuque, Grand Island and St. Cloud followed Brookings and Grand Forks respectively. It is to be noted comparison scores are from different years. Standards and tests vary from state to state.

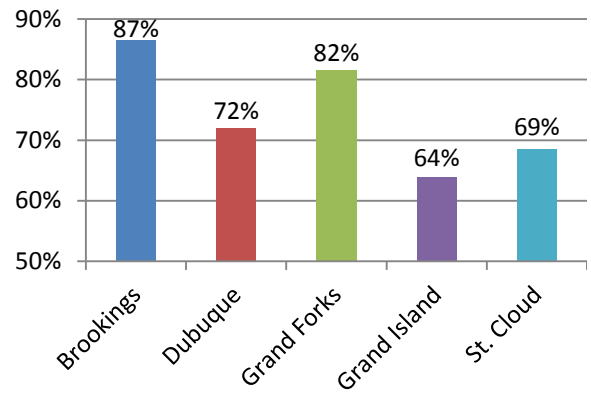


Figure 2: Reading proficiency for comparison communities.

Years very: Brookings 12-13; Dubuque 11-12; Grand Forks 12-13, Grand Island 11-12, St. Cloud 11-12, Manhattan unavailable.

Summary

The five year trend for Brookings 3rd grade reading proficiency is down slightly from a five year high of 92% in 2008-09 to 87% in 2012-13. Brookings outperformed the comparison cities with the next highest being Grand Forks at 82%.

Indicator

Sustainability Knowledge, Attitude, and Behavior - Percent of residents who are aware of sustainability and have made specific behavioral changes to contribute to sustainability

Why is this important?

It is helpful to understand the sustainable knowledge of Brookings' residents as it will assist in better supporting the community and expanding on the resident's current sustainable knowledge. Well informed citizens can make better decisions. Informed people and organizations will be able to work together to improve the quality of life in the community.

How are we doing?

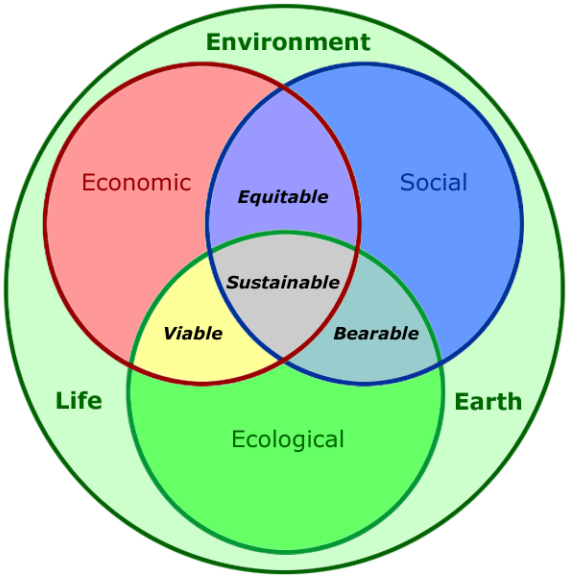
This project is helping the Brookings Sustainable Council understand more about the community. The Sustainable Council will develop a project to capture the citizens sustainable knowledge, aptitude and behaviors.

How does Brookings compare?

No compassion data is available at this time.

Summary

The Brookings Sustainability Council has a goal to learn more about the community and its residents in an effort to improve the quality of life for residents and visitors.



Triple bottom line illustration.

Indicator

Arts & Culture – Annual number of arts and cultural festivals or events

Why is this important?

A strong arts community is imperative for sustainability because it contributes to social and cultural capita by providing opportunities for social gatherings and events, celebrating diversity, and making a more well-rounded community. Cultural dimension of equity and social sustainability are the focus of this indicator. This indicator directly accounts for the vitality of the arts and culture, an important aspect of any vibrant community.

How are we doing?

In 2012, there were estimated 50-70 cultural events in the community. The events range from visual and performing arts, culinary events, charity fundraising events, heritage festivals and more.

How does Brookings Compare?

The Americans for the Arts created the Local Arts Indicator (LAI) in 2012 as a tool to better understand the characteristics of cultural life in individual communities as measured at the county level. It is comprised of a series of arts indicators measured on the county level, and drawn from a variety of secondary sources including the U.S. Census Bureau and the National Center of Charitable Statistics, among others.

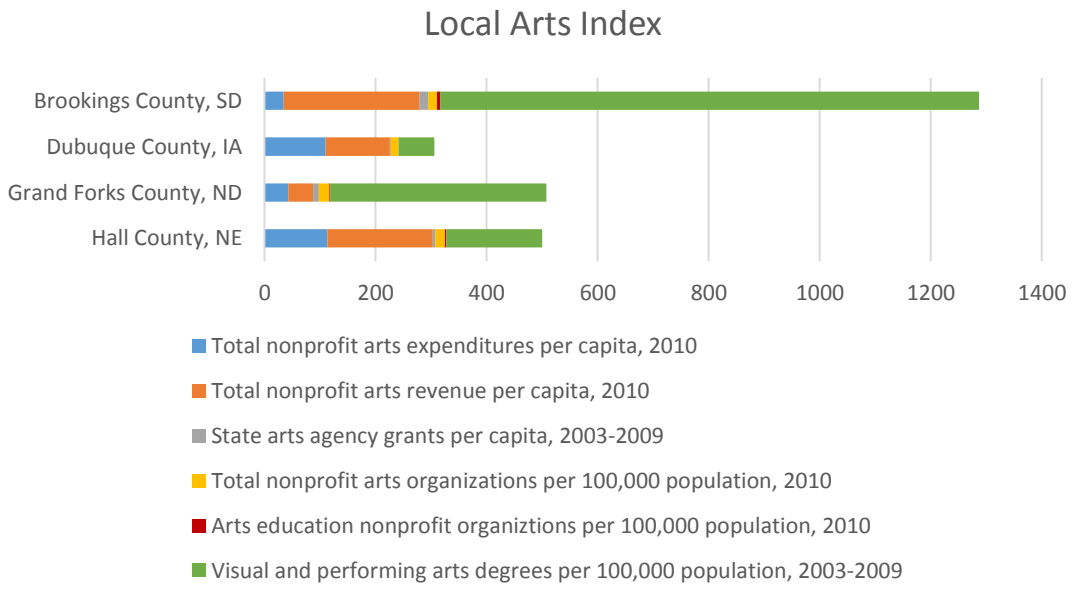


Figure 1. Peer communities Summary of Local Arts Indicator (2014)

Six main categories were selected for comparison. Brookings ranks well in most categories. When taken all together, Brookings ranks first, especially when considering the number of visual and performing arts degrees earned. The presence of these vibrant programs at SDSU coupled with other rich community and school programs enhances the community's local arts scene.

Summary

The LAI demonstrates that Brookings measures favorably to comparison communities. This single indicator is an opportunity for Brookings to identify its community character, discover opportunities for future community engagement, and evolve as a vibrant, community-centered city.

Principle: Reasonable Mobility

Sustainable Brookings values safe, reasonable, and equitable choices to access living, working, and playing opportunities.

Sustainable, reasonable mobility requires housing and transportation affordability, community design to reduce unnecessary vehicle travel, a safe travel network, and mobility. Combined, these elements promote a sustainable community where the infrastructure promotes accessibility for all residents.

Five indicators have been developed to measure Reasonable Mobility in Brookings. They are true housing affordability, net pollution--vehicle miles traveled, modal diversity-walkable neighborhoods, modal diversity-public transportation ridership, and safe travel network. Brookings stands out as driving less than the peer communities but was poor or neutral the other four indicators. This is an area for the community to work on and improve.

Indicator

True Housing Affordability - Percent of residents paying over 45% of their income on housing and transportation

Why is this important?

Housing is considered affordable if it costs less than 30% of a household's income according to Center for Neighborhood Technology's Housing and Transportation (NTHT). Likewise, household expenditures on transportation should not exceed 15% and the combination of both should not exceed 45% of the household income.

Factors influencing transportation costs include the location of a home within a community, distance to work, school, shopping, and cultural events. Higher levels of affordability correspond to reduced driving and more compact mixed-use, which contribute to more vibrant neighborhoods.

Costs are calculated based on the typical household for the region from census data, which is defined as a household earning the median income with the average size and average number of commuters. A typical Brookings household earns $41,043 annually, includes 2.25 people of which 1.19 household members commute.

Budget Category	Proportion of Typical Households	
Housing	Spend less than 30% of income	Spend more than 30% of income
	99.7%	**0.3%**
Transportation	Spend less than 15% of income	Spend more than 15% of income
	0%	**100%**
Housing + Transportation	Spend less than 45% of income	Spend more than 45% of income
	0%	**100%**

Table 1. Brookings housing and transportation costs as a proportion of typical household incomes.
Source: NTHT (H+T®) Affordability Index

How are we doing?

Brookings' 2012 data indicates that while almost all typical households spend less than 30% on housing, the opposite is true for transportation, with 100% spending more than 15% of income on transportation. Because of this, 100% of typical households spend over 45% of their income on housing and transportation.

How does Brookings Compare?

Brookings households spend the greatest proportion of income on housing and transportation among all peer communities. In contrast, only half of typical St. Cloud households spend over 45% on these items.

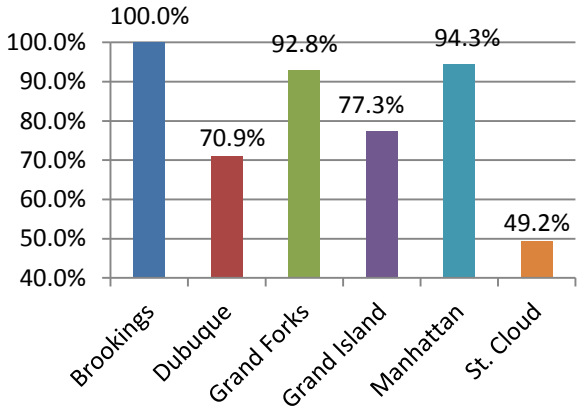


Figure 1 Percentage of typical households spending over 45% of income on transportation and housing.
Source: NTHT (H+T®) Affordability Index

Summary

Brookings performed poorly on this indicator due to high transportation costs. By increasing compact, mixed-use neighborhoods, increasing density in downtown developments, and increasing bike lanes, for instance, transportation costs can be mitigated.

Indicator

Vehicle Miles Traveled - Average annual vehicle miles traveled (VMT) per capita

Why is this important?

VMT is a statistic measuring how many total vehicles drive specific stretches of roadways. Traffic counters are typically used to determine exactly how many vehicles pass a certain point. This data is used to aid in transportation planning and programming of the public dollars from state and federal funds (USDOT).

The transportation sector is a major source of pollution in urban areas and a large contributor to greenhouse gas concentrations (EPA). Efficiency gains in vehicle manufacturing processes and better fuel efficiency has been offset by increasing numbers of vehicles on roadways.

A decreasing VMT trend in a community means improvements in air quality, reductions in water and soil pollution from vehicle sources (such as Freon or oil), and indicates an improving walkability score. High walkability comes from mixed use development, where services and markets needed by residents are located within walking distance of homes (EPA).

How are we doing?

Brookings averaged 3,774 vehicle miles traveled (VMT) per capita in 2011. This was an increase of 85 VMT per capita (2%) from 2007 and an increase of 33 VMT per capita (0.9%) from 2010. There was a peak of 4,024 VMT per capita in 2009.

The average commute time in Brookings is 13.3 minutes, almost half of the national average of 25.4 minutes. People with the lowest commute times generally live in dense urban areas where they are close to work and needed services (US Census Bureau).

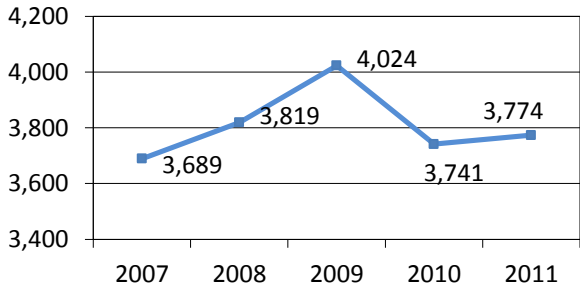


Figure 1. VMT (miles) per Capita in Brookings (2007-2011)

Source: US Census Bureau; SDDOT (2013)

How does Brookings compare?

In 2011, Brookings's VMT per capita was lowest among its peer cities (Figure 2). Figure 2 shows the comparisons between all the cities. Brookings VMT rate of 25% below the other cities, likely relates to its smaller overall area compared to its peers.

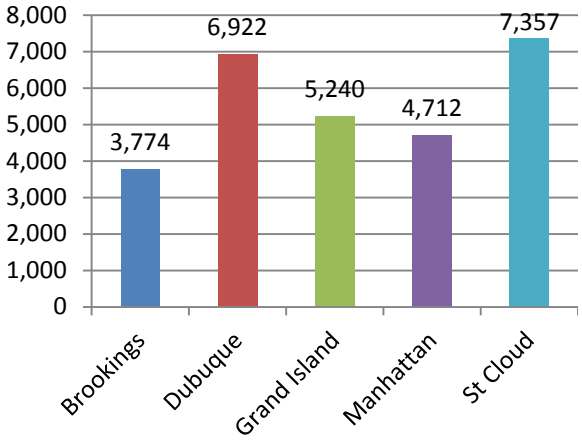


Figure 2. Avg VMT (miles) per Capita in 2011 in the comparison communities.

Source: IADOT, KSDOT, MNDOT, NEDOT, SDDOT (2013)

Summary

Per capita VMT in Brookings is on an upward trend. As the City grows, it can keep this rate low by encouraging mixed use development and bicycle lanes so that people can more easily access markets and services on foot or via bicycle. These efforts will also aid in decreasing air, water, and noise pollution, creating a more livable and sustainable community.

Indicator

Walkable Neighborhoods – "Walk Score" derived from the Street Smart Walk Score index

Why is this important?

Being able to walk to services provides an excellent way to exercise and strengthen social capital by empowering residents to participate in civic life. Walkable neighborhoods allow for a generally great sense of ownership and pride in a city and neighborhood. This can result in a decreased crime rate and create communities within a city.

Walk Score®	Description
90-100	**Walker's Paradise** Daily errands do not require a car.
70-89	**Very Walkable** Most errands can be accomplished on foot.
50-69	**Somewhat Walkable** Some errands can be accomplished on foot.
25-49	**Car-Dependent** Most errands require a car.
0-24	**Car-Dependent** Almost all errands require a car.

Figure 1. Walk Score Classifications
Source: Walkscore.com (2012)

The Walk Score is a tool that is used to measure the walkability of a city. This is based on a "Street Smart" algorithm, which measures amenities within walking distance and pedestrian accessibility metrics for the city as a whole (Score, 2012). Walkscore.com inputs this data onto Google maps, Open Street Map, and localize.com.

Walkable communities produce less CO2 emissions and save money. Walking is a great way to reduce stress and get to know your neighbors.

How are we doing?

Brookings' Walk Score in 2012 is 49. As indicated in Figure 1, the goal score is to be in the range of 90-100, "Walker's Paradise." Brookings is considered "Car-Dependent" since its score is with the range of 25-49.

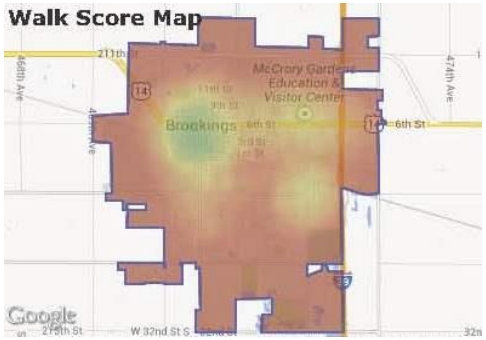


Figure 2. Brookings 2012 Walkability Map
Source: Walkscore.com

How does Brookings compare?

In comparison, Brookings is more walkable than Grand Island, Manhattan, and Saint Cloud. However, they are all considered to be "Car-Dependent." Brookings is less walkable than Dubuque and Grand Forks, which are considered to be "Somewhat Walkable."

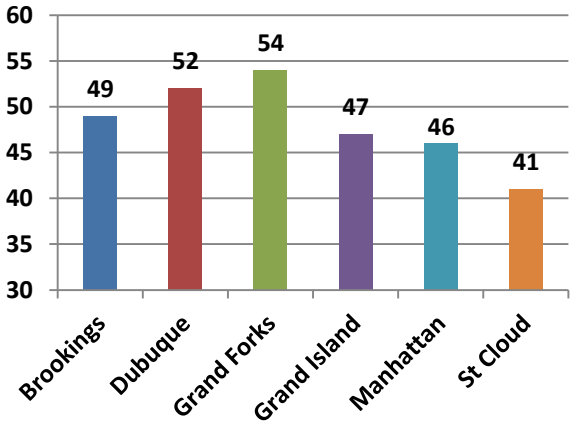


Figure 3. 2012 Walk Score Comparison
Source: Walkscore.com

Summary

The Walk Score in Brookings is lower than two of its peers, but it is in the higher range of the "Car-Dependent." The City can improve its Walk Score by providing more amenities near its residents in multi-use neighborhoods.

Indicator

Public Transportation Ridership - Number of public transportation passenger trips per 1,000 residents

Why is this important?

Public transportation produces fewer overall emissions per person than individual automobiles. Reducing emissions improves air quality and the environment. Providing public transportation allows citizens access to safe and reliable mobilization. Increasing ridership of public transportation can improve the affordability of maintenance of public services for the City. Ridership is influenced by routes, stops, service quality, fares, marketing, and many other factors. Public transportation can increase the overall well-being of the City's residents.

How are we doing?

Brookings does not have a city-funded public transportation system. However, Brookings Area Transit Authority, Inc. (BATA), is a private, non-profit public transit system operating in Brookings as a sub-grantee of the State of SD. BATA provides door-to-door demand response service available to everyone. Their fleet is accessible, and they are a Medicaid provider. This service collaborates with the local taxi systems, however, operates under the regulations provided by the Federal Government. Advance ride reservations are required in most situations. The area served is an approximate 50 mile radius around Brookings. For more information, go to:

http://www.brookingsareatransit.com

Brookings Area Transit Authority

How does Brookings compare?

Dubuque, Grand Forks, and St. Cloud all offer city-funded public transit to their citizens. Their bus systems run on fixed routes and scheduled times. While other services are offered in Brookings, Manhattan and Grand Island, there are no city-funded public transportation systems in these cities. However, Manhattan is currently working towards providing a city-funded public transit service.

Summary

An alternative form of travel is public transportation. Transportation systems offering low fares and easily accessible routes can increase ridership and lower the costs to operate the transit system. Public transit has the potential to reduce emissions and save natural resources if ridership increases. Public transportation could solve travel concerns for people of all ages and economics classes.

Indicator

Safe Travel Network - Number of collisions on the transportation network per 1,000 residents

Why is this important?

Safety should be a primary goal for any city. A safe travel network between drivers and non-drivers should be the primary focus of the city. Safe streets reduce damage to automobiles, injuries to citizens, and can reduce deaths. Transportation networks provide access and mobility through the city. Providing a safe network can result in reduced accidents between vehicles, bicycles, pedestrians, motorcycles, buses, large trucks, etc. These factors can reduce stress in residents and even provide a positive outlook for the city.

Year	Accidents	Injury Crashes
2008	835	55
2009	796	53
2010	774	66
2011	759	41
2012	639	40

Table 1 Vehicle accidents in Brookings

Source: Brookings Police Department Annual Reports (2014)

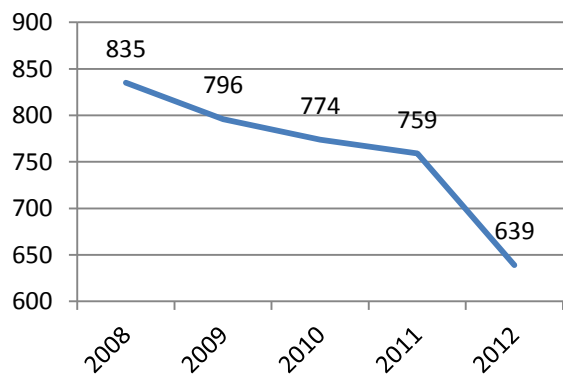


Figure 2. Number of accidents in Brookings (2008-2012)

Source: Brookings Police Department Annual Reports (2014)

How are we doing?

The number of accidents in the city of Brookings peaked in 2008 and has been decreasing since that time. The number of crashes resulting in injuries peaked in 2010, which shows no correlation between the number of accidents versus injury crashes. The injury accidents are at a low in 2012.

How does Brookings compare?

Brookings, in contrast to Dubuque, had more accidents per 1000 residents for 2008-2010. Additional comparison data is not available at the time of this writing.

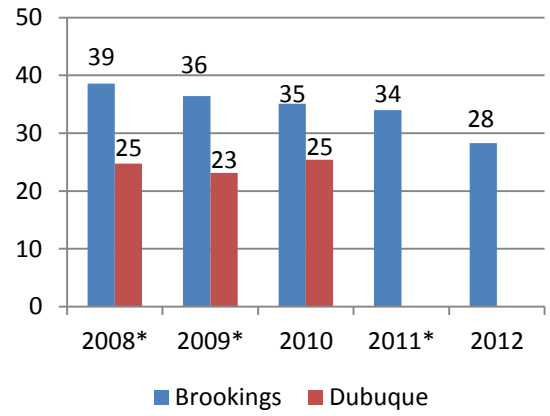


Figure 3. Number of accidents per 1,000 residents (2008-2012)

*Population data is estimated

Summary

Safe travel needs to be a high priority for the community. The number of vehicle accidents and injury crashes have decreased over the five-year period observed even with population growth. It will be important for Brookings to maintain this decline and improve safety for vehicles, bikes, and pedestrians.

Principle: Healthy Air

Sustainable Brookings values fresh air, reduced greenhouse gas emissions, and minimized health risks.

Five themes are involved in the healthy air principle: Outdoor and Indoor Air Quality, Air-To-Human Health Connection, Local Contribution to Climate Change, and Decreasing Net Pollution. The indicators measure air pollutants in the Brookings region.

In terms of outdoor air quality, the City has experienced more days in the Air Quality Index (AQI) "good" category, which is the highest and best category. Brookings has a very high household radon level, the highest of all its peers. Thus, it has a “poor" rating for this indicator. The data for annual emergency department visits for asthma is incomplete and therefore not comparable with other cities. Because Brookings does not track its carbon dioxide emissions, the rating in this category is incomplete. Brookings does not track the clean fleet indicator either, and has an "incomplete" rating here as well.

This report is a good start at determining where Brookings can focus its efforts, and the whole category of Healthy Air provides a wonderful opportunity for Brookings to excel in the future if it will start tracking its data.

EPA Air Quality Index, household radon, asthma, carbon dioxide emissions and clean fleet are the indicators developed to measure Brookings' Healthy Air. Two of the five indicators were strong, two were unknown and one showed a weakness in this principle.

Indicator

EPA Air Quality Index - Percent of monitored days with "Good" air quality

Why is this important?

Air pollution is important to limit due to its detrimental impact on human and ecological health. The World Health Organization's panel for Research on Cancer classified air pollution as a leading cause of cancer deaths.

Air Quality Index	Level of concern
0-50	Good
51-100	Moderate
101-150	Unhealthy for sensitive groups
151-500	Unhealthy
201-300	Very unhealthy
301-500	Hazardous

Table 1. EPA Air Quality Index
Source: EPA Air Quality Index (2013)

The Environmental Protection Agency (EPA) uses the Air Quality Index (AQI) as an indicator for overall air quality. The indicator calculation for a geographical area considers ground-level ozone, particle pollution, carbon monoxide, sulfur dioxide, and nitrogen dioxides. As the AQI number increases, air quality decreases. This daily AQI score provides a way monitor the number of days the area has been at or above a "good" air quality level.

How are we doing?

Between the year 2007 and 2012, Brookings has seen its percentage of "good" air quality days stay above 85%. The year with the highest "good" days occurred in 2008 with 95%. In 2011, the percentage was at 94% of monitored days, but fell to 85% of monitored days in 2012.

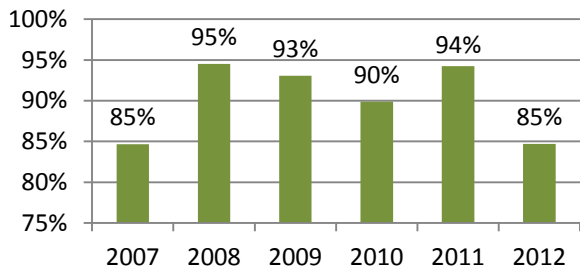


Figure1. Percent of Monitored Days with "Good" Air Quality in Brookings
Source: EPA AQS Data Mart (2013)

Air pollutants in Brookings mainly include particulate matter and ozone. Particulate matter can come from a variety of sources including industrial pollution or blowing chaff or soil. Main sources of ground-level ozone include automobile exhaust, power plants and manufacturing processes (EPA).

How does Brookings Compare?

In 2012, Brookings air quality level was greater than Dubuque, Grand Forks, and Saint Cloud by 2% or more good air quality days. However, Brookings was behind Grand Island and Manhattan by at least 1%. All peer cities have very similar percentages of monitored days with "good" air quality.

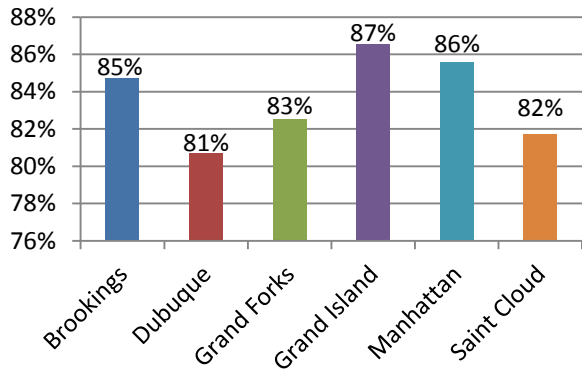


Figure 2. Percent of Monitored Days with "Good" Air Quality in 2012
Source: EPA AQS Data Mart (2013)

Summary

Implementing planning practices that increase the City's walkability, such as mixed use and bike lanes will lead to more "good" air quality days by reducing traffic.

Indicator

Household Radon - Percent of homes tested for radon above 4 picocuries per liter (pCi/L)

Why is this important?

Radon is a radioactive, colorless, odorless, and tasteless gas. It comes from the radioactive decay of natural deposits of uranium throughout the earth's crust. As radon gases are inhaled, they can alter the cells in the lungs. These alterations can increase the risk of lung cancer. Radon is the second leading cause of lung cancer after smoking. An estimated 14,000 people die of radon related lung cancer each year.

The amount of radon in a building is dependent upon several factors. These factors include the underlying geology, pathways into the building, and the ventilation rate.

With increasing concentrations of uranium in the underlying soil, concentrations of radon also increase. Radon is transported to buildings more easily through permeable soils, and the dangerous gas can be pulled into buildings due to pressure differences between the ground and the building.

Radon can enter the building through cracks in the foundation, utility penetrations, sumps, and floor drains. Finally, poorly ventilated spaces can build up concentrations of radon, so proper ventilation can decrease health risks.

To monitor radon levels in a building, there are readily available, easy-to-use, inexpensive home test kits that are from local retailers and from online vendors.

How are we doing?

About two-thirds of households in Brookings contain unsafe radon levels, above 4 pCi/L. The high incidence of radon in Brookings is the result of underlying geology, which is naturally rich in radon-emitting materials.

How does Brookings Compare?

Brookings has the highest rate of unsafe levels of household radon in comparison to its peer cities. The average national indoor radon level is 1.3 pCi/L. The average indoor radon levels of Brookings County, as determined by radon test results from Air Chek, Inc, is 7 pCi/L, which is considerably higher than the national average.

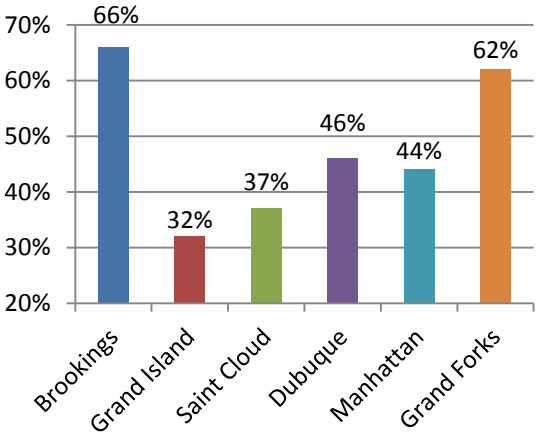


Figure 1. Percent of Households tested with Radon above 4 picocuries per Liter (pCi/L) (2012)

Source: www.radon.info (2014)

Summary

A large proportion of Brookings households contain dangerous levels of radon. Although radon levels are driven by factors beyond our control, education and awareness as well as testing and mitigation are of the utmost importance. For more information about radon and testing procedures, please go to the South Dakota Department of Environment & Natural Resources, https://denr.sd.gov/des/aq/aarad.aspx or call 1-800-SOS-RADON.

Indicator

Asthma - Annual emergency room (ER) visits for asthma (%/capita)

Why is this important?

Asthma is a chronic disease in the airways of the lungs and affects how air is let in and out of the lungs. Symptoms of asthma include coughing, wheezing, shortness of breath, and/or chest tightness. Having asthma can have a big effect on the quality of life of a person within a city.

A family history of allergies or asthma makes it more likely for a person to develop asthma. A number of studies reported associations between air-pollution (i.e. dust, gases, fumes, etc.) and asthma. Tracking ER visits for asthma can have a direct association with the EPA's Air Quality Index.

There is no cure for asthma. It can only be treated by medication and learning to avoid things that can trigger asthma symptoms.

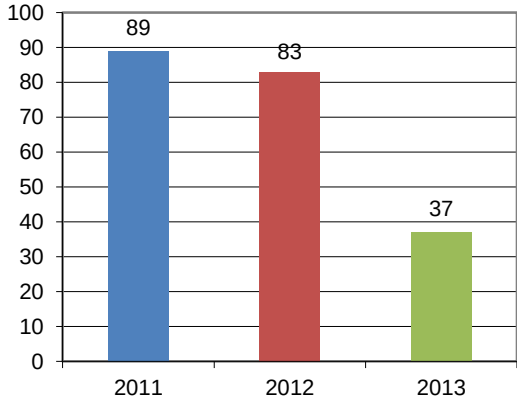


Figure 1. Number of ER visits related to Asthma in the past three years. (2011-2013)

Source: Brookings Health System (2013)

How are we doing?

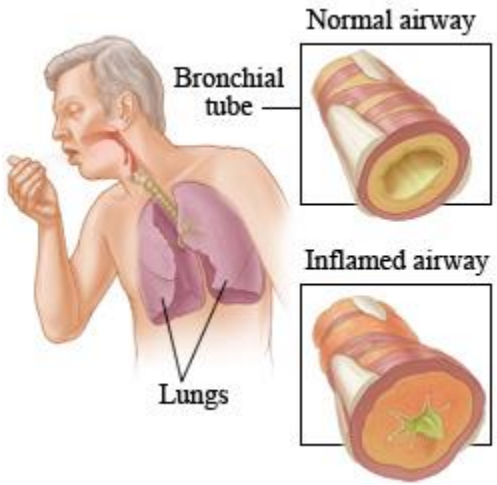
The number of visits to the ER for asthma has declined in Brookings from 89 in 2011 to 37 in 2013.

How does Brookings compare?

No comparable data is available at this time.

Summary

Emergency room visits due to asthma in Brookings have been on the decline in the past three years.



Indicator

Carbon Dioxide Emissions - Annual carbon dioxide-equivalent emissions in tons

Why is this important?

The greenhouse effect occurs as greenhouse gases (GHGs) in the Earth's atmosphere absorb heat, which delays the release of heat into space, a process that helps regulate temperatures needed for life processes. Yet, when emissions of GHGs such as carbon dioxide (CO_2) increase, the greenhouse effect is enhanced, leading to even more warming of Earth. The added warming has led to a variety of changes around the world, including disrupted ecosystems, rising sea levels, spreading of diseases, and displaced populations.

Carbon dioxide (CO_2) is one of the main GHGs emitted into the atmosphere through human activities, primarily from burning fossil fuels for energy, transportation, and through the waste stream. Tracking CO_2 emissions allows communities to identify and monitor emission sources, so they are better prepared to pinpoint opportunities to reduce GHG emissions.

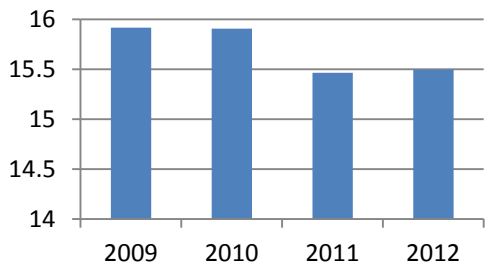


Figure 1. Brookings' annual carbon emissions per capita (MT eCO2)
Source: US Census Bureau, Brookings Carbon Emissions Calculator

How are we doing?

Energy used for electricity generation and natural gas for heating homes comprise the two main sources of GHGs in Brookings. Much of Brookings' electricity comes from renewable sources, lowering emissions, but these emissions could be significantly decreased by reducing our reliance on coal, which is also a major component of the category, "Market-Other." See the renewable energy indicator for the Brookings' sources of purchased electricity.

Transportation emissions are primarily generated by commuting to school or work and from fuel used by the City fleet.

Waste makes up a significant proportion of the City's emissions because the category includes the life cycle of materials.

How does Brookings Compare?

GHG emissions are generally measured by converting all GHGs into CO_2 equivalents (eCO_2). As shown in Figure 1, Brookings' per capita emissions have generally decreased since 2009. Brookings also falls well below the US average household emissions and among the lowest among the peer communities (Figure 2), likely due to the high proportion of hydroelectric energy in Brookings' purchased electricity mix.

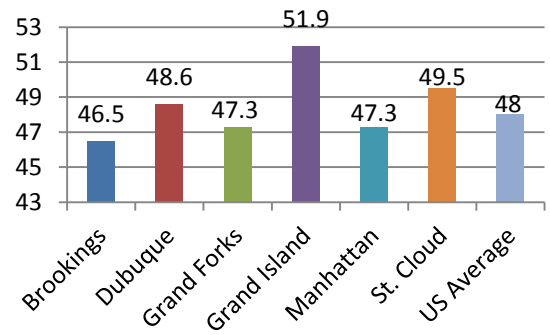


Figure 2. Average Household Emissions (MT eCO2)
Source: Univ of CA, Berkeley – Carbon Footprint Calculator

Summary

Brookings has seen a slight reduction in its per capita CO_2 emissions recently. Further reductions can be achieved through greater efficiency to decrease energy demands, mixed use planning, and by reducing waste.

Indicator

Clean Fleet - Percent of municipal vehicles meeting local efficiency standards

Why is this important?

Fuel efficient vehicles provide a variety of benefits to municipalities, both financially and environmentally. These vehicles can save money on fuel, reduce greenhouse gas emissions, and improve overall energy efficiency, which all serve to increase a city's sustainability.

The most fuel efficient vehicles do not come with traditional fossil-fuel combustion engines. New technologies have developed fully electric vehicles and vehicles that run on a combination of electricity and gasoline, known as hybrids.

Another way to reduce consumption of fossil fuels is by purchasing vehicles that rely on non-fossil based fuels for their combustion engines such as bio-diesel and ethanol-based gasoline. These two fuels rely on processing plants for conversion into fuel, which can be an energy demanding process. In addition, fuel cell vehicles use compressed hydrogen and other vehicles can run on compressed natural gas, which is still a fossil fuel, but generates fewer emissions.

The increase in demand for vehicles that use alternate forms of energy has reduced the costs and increased the varieties available. This indicator measures the efficiency of a city's fleet of vehicles, which gives an indication of the level of contribution of city vehicles to greenhouse gas emissions. A city with a highly efficient fleet saves money and reduces emissions.

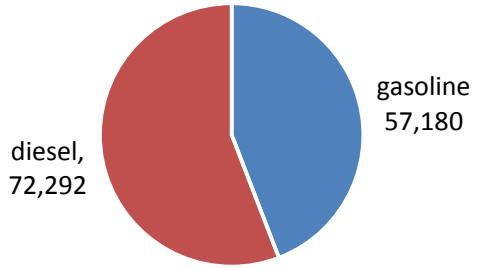


Figure 1. Gallons of fuel used by City fleet vehicles in 2012. Includes public transportation (BATA vehicles), but does not include Brookings Municipal Utilities fleet.

How are we doing?

The City of Brookings has not established efficiency standards for city vehicles. Therefore, no data on percent of vehicles meeting efficiency standards could be provided for this indicator. Data was available for number of gallons of gasoline and diesel fuels for the year 2012, which can provide a baseline for future study (Figure 1).

How does Brookings Compare?

Since 2006, the City of Dubuque has continually added alternative-fuel vehicles and more fuel efficient vehicles to its fleet. Because of this, a significant proportion of fuel used by their fleet is non-fossil based. Since 2008, the cities of St. Cloud and Grand Forks have been working to right-size and upgrade their city fleets to maximize fuel efficiency. Other comparison cities do not appear to have established policies regarding efficiency of fleet vehicles. By this measure, Brookings sits among the bottom half of peer cities due to its lack of efficiency standards for fleet vehicles.

Summary

The City of Brookings does not require efficiency standards over and above the federal guidelines, unlike three of its peer cities. Providing fuel efficient vehicles can reduce fuel costs and will reduce greenhouse gases associated with fleet vehicles.

http://forestry.about.com/od/treephysiology/tp/tree_value.htm

Principle: Clean Water

Sustainable Brookings values water as a source of life and seeks to preserve and manage it in all forms.

Sustainable water sources are essential for the health of a vital community and ecosystem. Various contaminants need to be monitored to ensure that safe drinking and recreational water supplies are still usable by future generations. Wastewater discharge needs to be monitored in order to maintain water quality that is safe for all uses, including recreation and biological preservation.

Impaired stream segments, bacterial concentration, chloride concentration, drinking water contamination, and wastewater discharged are the indicators developed to measure Brookings' clean water. These indicators reveal Brookings is strong in two of the five indicators: drinking water contamination and waste water discharge. Impaired streams, chloride concentration and bacterial concentration were all weak areas.

Indicator

Impaired Stream Segments - miles of impaired streams as a percent of EPA-assessed miles within the county

Why is this important?

A water body is considered impaired when pollutants exceed established limits. Pollutant levels are monitored by the State to ensure that the waters maintain their beneficial uses. Beneficial uses, established by the State, can include activities such as recreation or ecosystem functions, such as maintaining fish populations. A water body is listed as impaired until water analysis demonstrates that pollutants have fallen below designated limits.

How are we doing?

Out of a total of 1,397 miles of rivers, creeks and streams in Brookings County, most are not impaired. However, Six Mile Creek, the only stream or river that passes through Brookings, continues to be impaired due to high levels of *E.coli*. The Big Sioux River segment that passes through the county is on and off the impaired list due to high sediment loads.

Figure 1. Big Sioux River at the USGS gauging station approximately 8 miles south of Brookings.
Source: East Dakota Water Development District

Miles of Impaired Stream Segments
(% are based on 1,397 miles of rivers, creeks and streams in Brookings County)

2013: 3.31% miles impaired

- Six Mile Creek had approximately 46. 3 of its 61.31 miles considered impaired for *limited contact recreation*. This segment flows from about two miles north of White, SD, at the confluence with the Big Sioux River, to about five miles southwest of Brookings. 'As the crow flies' it would be roughly 20 miles.

2012: 3.39% miles impaired

- Six Mile Creek (Big Sioux River to Oak Lake Township); 47.31 miles impaired for *limited contact recreation.*

2010: 7.75% miles impaired

- Big Sioux River (Brookings to Brookings/Moody County line); about 15 miles impaired for *warm water semi-permanent fish life.*
- Six Mile Creek (Big Sioux River to Oak Lake Township); 47.31 miles impaired for *limited contact recreation.*
- North Deer Creek (Six Mile Creek to Highway 77); 46 miles impaired for *limited contact recreation.*

Summary

The only stream passing through the city limits is impaired due to high *E.coli* concentrations. However, most of the streams in the county are not impaired.

Indicator

Bacterial Concentration – Highest assessed average Escherichia coli (E. coli) concentration within Brookings

Why is this important?

Many types of the bacterium *(E. coli)* commonly live in the digestive systems of humans and animals, most of which are harmless. When *E. coli* is detected in surface or drinking water supplies, it is a strong indication that the water has been contaminated with animal waste or sewage, which contains many types of disease-causing organisms.

In urban environments, a major contributor to *E. coli* is sanitary sewer overflows or pet waste, which can wash into storm sewers and waterways. Becoming infected with *E. coli* can cause severe illness, even acute kidney failure. Although an infection can be life threatening, usually the illness resolves within a few days.

As a response to the Federal Clean Water Act, passed in 1972, the State of South Dakota developed water quality standards, "to ensure the beneficial uses, such as swimming and fishing, were protected" (SD DENR). These "beneficial uses" consider both natural functions (such as maintaining fish populations) and human uses (such as recreation). To ensure that each beneficial use is protected requires that specific water quality standards be met.

Sources of coliform bacteria.
Source: American Water Resources Association (graphic by Cielo Rios)

How are we doing?

Six Mile Creek, the only significant surface water body within Brookings' city limits, is designated with several beneficial uses, including limited contact recreation and warm water marginal fish life propagation. These uses mean there are established limits on certain water quality standards, including E. coli concentrations.

In 2010, Six Mile Creek significantly exceeded recommended *E. coli* levels and was subsequently added to the South Dakota Department of Environmental and Natural Resources (DENR) Impaired Stream list. In reaction to this, the creek was regularly monitored in 2012 by the DENR and East Dakota Water Development District (EDWDD).

The study revealed a continuing problem, detecting *E. coli* levels both in upstream and downstream locations relative to the City, with the highest downstream level detected at 6,870 colonies per 100mL, well above the single sample limit of 1,178 colonies per 100mL. However, the average reading at the downstream site of 610 colonies falls just below 630 colonies per 100mL, the established limit for the geometric mean for limited contact recreation. This means that limited contact recreation is not advisable in Six Mile Creek.

Summary

As the only surface water within Brookings, it will be important to address sources of *E. coli* contamination in Six Mile Creek to regain our ability to use the creek for recreation and to encourage and maintain a healthy ecosystem.

Indicator

Chloride Concentration - Highest average chloride concentration in city surface waters (mg/L)

Why is this important?

Chlorides in city surface waters are related to deicing chemicals on roadways, wastewater and septic-system discharge, recycling of chloride from drinking water, inorganic fertilizers, and leachate from landfills and salt storage areas. The EPA chronic limit for chloride in surface water of 235 milligrams per liter ensures that aquatic life is not negatively impacted. A concentration that is chronically higher than this limit will lead to ecosystem disturbance and decreased resiliency.

Road salt constitutes a large proportion of chlorides in urban environments.

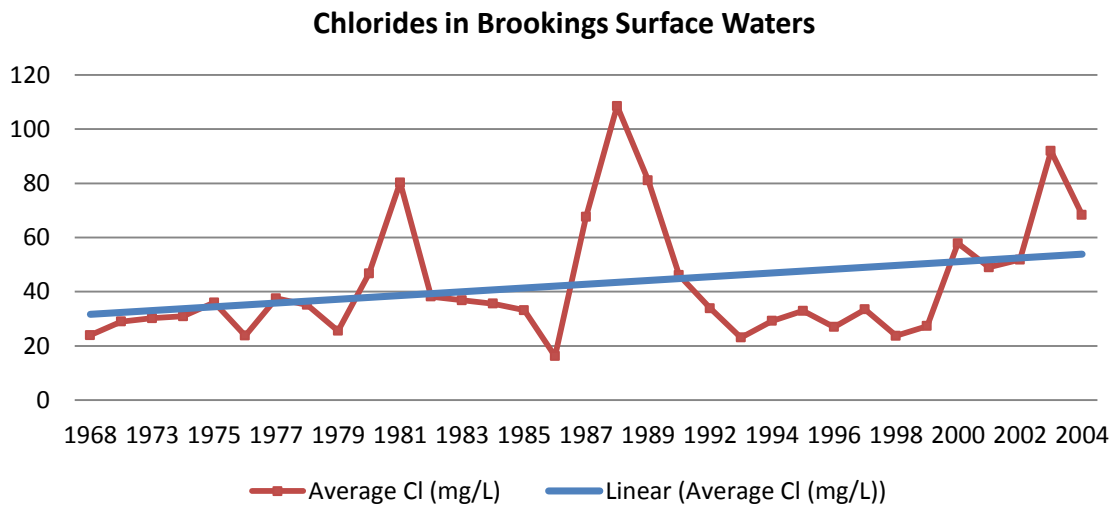


Figure 1. Chloride concentrations in surface water at nearby USGS stream gaging stations.

How are we doing?

At stream gauging stations near Brookings, chloride levels have fluctuated through time (Figure 2). The fluctuations are likely the result of inconsistent application of road salt and variation in fertilizer application rates, for instance. The overall trend shows increasing concentrations over time.

A USGS analysis concluded that more roads equated to higher road salt rates and, therefore, higher chloride concentrations. As Brookings has grown, we have used more road salt, which has made its way into surface waters. Even with the increasing trend, the average chloride concentrations are well below the recommended limit.

How does Brookings Compare?

Comparison data is unavailable at this time.

Summary

Even though chloride concentrations are lower than recommended. The increased concentrations will have an impact on the water passing through Brookings.

Indicator

Drinking Water Contamination - Number of EPA health-based, public drinking water violations from local ground or surface water sources

Why is this important?

Drinking water that contains contaminants can have dangerous effects on health. Access to clean and plentiful water is central to maintaining community vitality. Depending on the quality of the water source, municipal water usually undergoes an enormous number of treatment processes to minimize or eliminate harmful chemicals, pathogens, and sediments. On occasion, contaminants may enter the water supply, which can be harmful to the local population.

The EPA monitors all public drinking water supplies to ensure adherence to regulations set in place that monitor maximum contaminant levels (MCLs), treatment techniques, and the accuracy of the reporting and monitoring system.

Municipal systems are regularly monitored, including testing throughout the supply chain, so that problems can be quickly identified and addressed.

How are we doing?

The City of Brookings' drinking water supply originates from two sections of the Big Sioux aquifer, located to the east and north of the City. In short, the aquifer provides readily accessible, quality water. However, in areas where the aquifer is closer to the surface, it is more susceptible to surface contamination, especially from certain land use practices. To protect our groundwater quality, Brookings County implemented an Aquifer Protection ordinance to safeguard this valuable resource.

Brookings municipal water has not been cited for any EPA violations or deficiencies in the past five years. Historically, Brookings has had very few EPA violations.

How does Brookings compare?

Along with Brookings, the cities of Manhattan, Grand Island, and Grand Forks have had no water infractions in the past five years. The record of violations may be generally due to groundwater versus surface water sources, which tend to contain some contaminants.

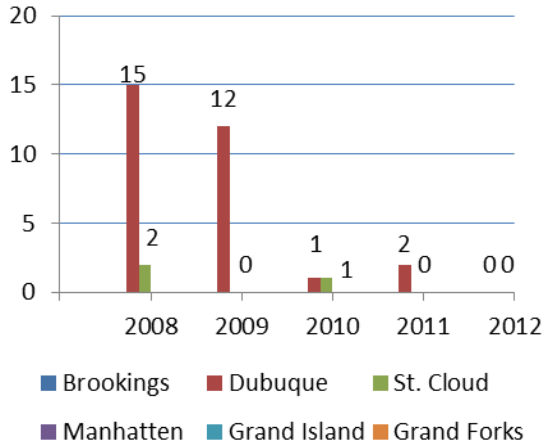


Figure 1. Number of EPA drinking water violations in peer communities, 2008-2012.
Source: U.S. EPA (2014)

Summary

Brookings has a reliable, high quality supply of groundwater from the Big Sioux Aquifer, under protection at the county level.

Indicator

Wastewater Discharged - Gallons of wastewater discharged from sanitary sewer overflows

Why is this important?

Wastewater treatment removes harmful items such as pathogens and toxins from water before it is released into rivers and streams. Most of the time, this discharged wastewater adheres to strict water quality guidelines so that it does not damage the function of the natural water system.

Occasionally there is an event, such as an intense rainstorm or broken sewer pipe which can lead to unintended overflows from the sanitary sewer. When such an overflow occurs, untreated water can enter the city, which can expose the population to untreated sewage. Overflows also can lead to untreated wastewater entering a waterway, which can hinder its normal functions, such as supporting fish populations.

For these reasons, building and maintaining appropriate wastewater handling mechanisms at the city and county levels are important for the wellbeing of our community.

How are we doing?

Wastewater quality and quantity are regularly monitored. Brookings wastewater treatment facility has a sanitary sewer flow equalization system in place to handle high flow events. However, when sanitary sewer overflows do occur, protocols are in place to report the event to the Department of Environment and Natural Resources and to mitigate any impacts of the overflow as soon as possible.

According to Brookings Municipal Utilities (BMU), only four overflows have occurred in Brookings since 2011, two in 2011 from large storm events that temporarily overwhelmed the system and two from construction site bypass pump failures in 2013 (BMU).

How does Brookings Compare?

Compared to Dubuque, Brookings experiences fewer sanitary sewer overflows. However, recent upgrades to Dubuque's system resulted in significantly fewer incidents.

Summary

Brookings wastewater treatment processes and discharge usually fall within state water quantity and quality guidelines. Increases in extreme snowmelt and precipitation events can lead to increased sanitary sewer overflows. With flood events projected to increase in frequency and volume, consideration of continued improvement of the wastewater system is warranted.

Principle: Native Plants and Animals

The City of Brookings will foster a current ecologically sound socio-economic environment that does not compromise development in the future.

For the last decade, Brookings experienced substantial economic growth. Rural areas have also seen landscape changes as a result of the expansion of livestock and crop production. Our complex economic and ecological interchange needs to be properly balanced in two main areas, Native Plants and Animals. Within these areas, the diversity of urban trees, use of fertilizers and chemicals on municipal lands, and diversity of local birds will help assess the ecosystem health.

Overall, the City of Brookings Parks District has been proactive in monitoring and removing trees susceptible to Dutch elm disease and has taken an active approach in planting more diverse trees within the city to improve resiliency and habitat.

Urban forest, municipal chemical use, bird count, and prairie and wetlands indicators have been developed to measure Brookings' Native Plants and Animals.

Indicator

Urban Forest - Diversity of tree species

Why is this important?

Trees play a valuable role for humans and the environment. Beyond providing shade and sheltering homes from the wind, they also reduce noise pollution by muffling traffic and other urban sounds. A 12 degree Fahrenheit temperature difference has been reported in cities where there are trees versus where there are not any trees. Shade from the trees reduces the air conditioning demand in the summer. Protection from the wind in the winter reduces heating demand on homes. Trees clean the air and soil by absorbing dangerous chemicals/pollutants. Widespread root systems of trees reduce soil erosion by holding the soil and slowing the wind. A variety of trees encourages a wider range of birds.

Diversification of tree species is important to reduce the risk of a catastrophic loss of our urban forest in Brookings from diseases or pests such as Dutch elm disease and emerald ash borer. Overplanting of a single species increases a city's vulnerability to losing a substantial portion of its trees.

Using care to plant a variety of tree species will produce a stable urban forest for citizens to enjoy in future generations.

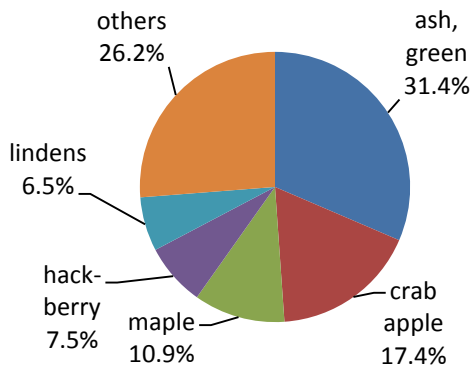


Figure 1. Percentage of tree species in Brookings (2013)
Source: Brookings Park and Rec Dept. (2013)

How are we doing?

Brookings has been monitoring the tree species to reduce an overabundance of one species (spp). The top three species are Green Ash, 31.4%; Crabapple spp, 17.4%; and Maple spp, 10.9%. The other species in Brookings are: Hackberry, Linden, Honey Locust, American Elm, Silver Maple, Oak, Elm spp, Black Walnut, Colorado Spruce, Bur Oak, Lilac spp, Siberian Elm, Mt. Ash, White Spruce, Ohio BuckEye, and others.

How does Brookings compare?

Data for Dubuque indicated three species: Ash, Maple, and Honey Locust each made up more than 10% of the total tree population. Brookings was comparable to Dubuque in that it also had three species Ash, Crabapple, and Maple each making up more than 10% of the total stock.

Summary

The Brookings tree population is rather diversified. There are only two tree species which make up a high percentage of the total tree population. Brookings Park and Recreation Department is actively monitoring trees in the community to maintain the health and longevity of all trees.

Indicator

Municipal Chemical Use - Municipal use of fertilizers, pesticide, herbicide and fungicide in pounds (lbs./ac)

Why is this important?

The over application of chemicals can have serious environmental and health related impacts. For example, nitrates and phosphates from excess fertilizer runoff into water bodies can cause eutrophication where nutrient concentrations in water increase rapidly, promoting excessive algal growth. Algal death and decomposition depletes oxygen levels in water, causing death of other organisms such as fish.

Consuming water polluted with certain chemicals can also be harmful to humans. For example, excess nitrates in drinking water can cause acute and chronic health problems in humans. Exposure to certain herbicides can disrupt normal body functions and some have been linked to Parkinson's disease and cancer.

Chemicals used as fertilizers, pesticides, herbicides, and fungicides can be organic or inorganic. Inorganic fertilizers are manufactured from non-renewable resources. Natural organic fertilizers are made from natural, renewable waste products. They are slow release, require soil bacterial action to convert organic matter usable by plants, and don't readily leach into surface and groundwater supplies.

How are we doing?

Brookings' Parks, Recreation & Forestry Department maintains 274 acres of parks and public grounds, the majority of which consists of school ballparks and the Edgebrook Golf Course. The Department anticipates the use of about 430 gallons of herbicides and 30,000 pounds of fertilizers across all public grounds annually, but this varies greatly due to weather conditions.

Figure 1 shows the general proportions of fertilizers and herbicides used. These rates translate to 2.25 gallons of herbicide and 140 lbs of fertilizer per acre for the golf course and 0.83 gallons of herbicide and 75.8 lbs of fertilizer per acre for ballparks.

How does Brookings Compare?

Rates of fertilizer application noted in Dubuque's indicator report are similar to what is reported above for Brookings. By contrast, Dubuque is using phosphorous-free fertilizers and has created a new position with the title Natural Resources and Sustainable Practices Specialist, who is expected to monitor and improve strategies for management of parks.

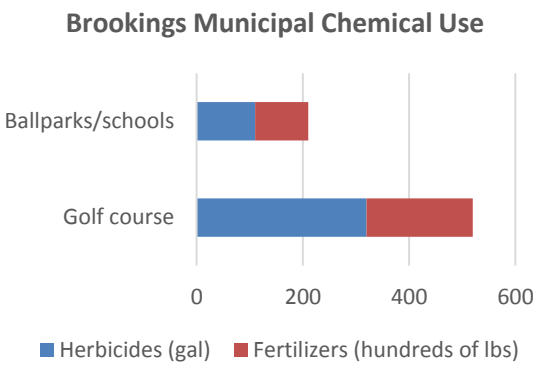


Figure 1. Estimated annual chemical totals used on primary areas of school ballparks and the Edgebrook Golf Course.
Source: Brookings Parks, Recreation & Forestry Department.

Summary

Brookings' Parks, Recreation & Forestry workers take into consideration weather and soil conditions when applying chemicals to reduce adverse impacts. Residents as well as City maintenance crews can reduce the amounts of chemical applications by spot spraying when possible, splitting treatments to one half the application rate twice as often, and by using slow release fertilizers and less toxic chemicals.

Indicator

Bird Count - Annual local bird counts

Why is this important?

Birds are a good indicator of environmental health. They are also important for the connection of humans to nature. By monitoring the abundance of species in annual bird counts, this indicator provides a measure of the overall environmental health of the area. This bio-indicator serves as a leading indicator to habitat loss, pollution, and disease. Monitoring this indicator will also help keep track of the more sensitive species movements.

Birds serve many purposes in the environment including insect and rodent control, the dispersal of seeds, and as a source of food for the predators. Humans also find enjoyment in observing and listening to birds.

How are we doing?

The bird count in Brookings from year to year is relatively consistent. The Audubon Society Christmas bird count provides the number of bird species reported annually, including the species type, total bird numbers, and other variables such as weather, date, and number of participants in the bird count. Between 2007 and 2011 the average count was 44.2 species of birds. The highest count during this five year period was 47 species in 2011.

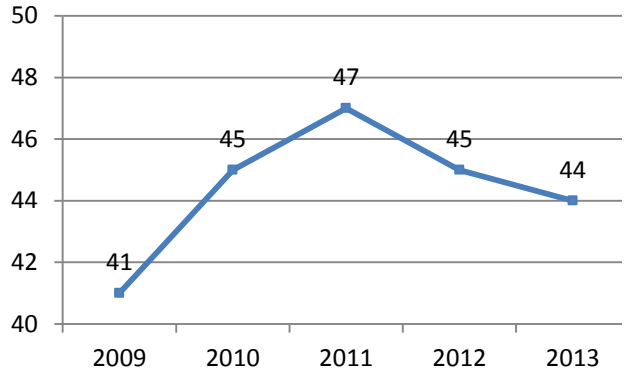


Figure 1. Total reported bird species, Brookings Christmas bird count (2013)
Source: Audubon Society (2014)

How does Brookings compare?

Brookings 2012 count is a little above the five year average of 44.2 species as are all the other communities.

Manhattan and Grand Island did not have any results on the Audubon website.

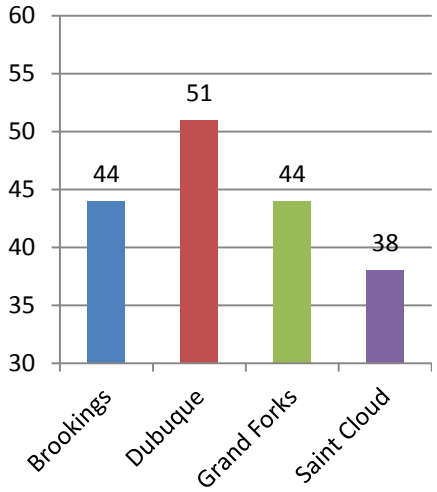


Figure 2: Total reported bird species, for comparison Cities (2013)
Source: Audubon Society (2014)

Summary

Brookings showed a slight drop in 2012 and 2013 from a peak of 47 species in 2011. While the 2013 count in Brookings is lower than Dubuque, it was equal to Grand Forks it is slightly higher than Saint Cloud. It will be important for Brookings to monitor the long-term trends in the species count. Changes in the count and migratory patterns will occur as changes occur in the climate and environment.

Indicator

Prairie and Wetlands - Acres of established and restored prairies and wetlands (percentage)

Why is this important?

Eastern South Dakota (SD) is part of the Prairie Pothole Region, which was created by receding glaciers. Wetlands once covered about 2.7 million acres in SD, but due to increased agricultural and urban development less than 1.8 million acres of wetlands still exist in SD. An estimated 20,000 acres of unprotected wetlands are lost from the Prairie Pothole Region each year. Wetlands serve many critical roles in our eco-system, including recreation, wildlife habitat, water quality regulation, and flood attenuation.

Wetlands are used for hunting, fishing, trapping, boating, swimming, bird and mammal watching, photography, and nature study. Nearly $2.5 million was spent by more than 3,200 pheasant hunters in Brookings County in 2012. Much of the pheasant habitat in the region is found in wetland ecosystems.

The Prairie Pothole Region contains the most critical waterfowl breeding habitat remaining in North America; almost 70% of the 10-12 million waterfowl in North America nest in this region. SD often ranks first in duck production within the lower 48 states. Approximately 138 species of birds are known to use the Prairie Pothole wetlands, among the most productive wildlife habitat found in the Dakotas.

Most of the endangered species in the U.S. are dependent on wetlands for their survival. Of the 10 federally-listed species in SD, eight rely on wetland habitats at some point during their life cycle, including the Bald Eagle and Peregrine Falcon. Only about 300 Whooping Cranes remain due to the reduction and removal of wetland ecosystems.

Endangered plants, like the Western Prairie Fringed Orchid, are now only found in small, isolated communities in nearby states. The main reason for the disappearance of this orchid in SD is loss of habitat, so wetland conservation and restoration would help ensure the survival of this orchid and more.

Wetlands also function as sediment traps and regulators of nutrient loss. Nutrients, primarily nitrogen and phosphorous, are absorbed and held within wetlands. By processing nutrients, suspended matter, and other pollutants, wetlands help purify water. Both natural and man-made wetlands are effective low-tech waste water treatment facilities.

How are we doing?

From 2008-2012, 731,000 acres of wetlands in SD, ND, and MN were converted to row crop production areas, accounting for 39% of all wetland loss in the U.S. during this time period. In Brookings County, about 4,000 acres of wetlands were converted to cropland from 2008-2012. This translates to a loss of 9.4% of the wetlands or wetland buffer zones in the county.

Summary

Wetlands serve many critical roles in our local economy and eco-system. Although some protective measures are currently in place, many wetland environments in Brookings County have been lost to agricultural or urban development.

It is worth noting that SD Game, Fish, & Parks will provide up to 100% cost share for wetland restoration projects, including removal of tile or plugging drainage ditches.

Because of their high economic and natural value, both locally and nationally, it is important to restore lost and conserve existing wetlands.

Interpreting the Sustainability Scorecard

Each indicator was evaluated first on the trend of Brookings five year data then on how Brookings compared to the peer communities. Below is a summary of the Brookings Benchmark indicators. The score is not to determine a level of sustainability but rather it is a representation of how Brookings has been performing and how it relates to the peer communities.

18 Strengths
16 Neutrals
13 Weaknesses
9 Unknown
56 Total indicators

The method utilized by the project weights Brookings trends and community comparisons equally to maintain objectivity. If Brookings did poorly on the five year trend but did better in the community comparison it rated neutral. If the Brookings trend was stable and did better than the other cities on an indicator then it received a strength rating.

Each indicator is only one small piece of a large picture therefor; indicator results should be evaluated in relation to each other as many elements are interconnected. An indicator many have a weak score, but when interpreted with another indicator it may be less of a concern.

Scores included comparison to peer cities. The peer cities were selected based on similarities such as size, college, economic, industries, and demographics to Brookings. A different set of peer communities could change the indicator results.

	Indicator	Score	Page
Regional Economy	Growth in (GDP) per Capita	Unknown	10
	Net Job Growth	Strength	11
	Unemployment Rate	Strength	12
	Economic Section Diversity	Neutral	13
	Poverty	Weakness	14
	Gender Wage Gap	Strength	15
	Debt Burden per Capita	Neutral	16
	Interest Rate on Municipal Bonds	Strength	17
Smart Energy	Energy Assistance	Neutral	19
	Household Energy Use	Neutral	20
	Renewable Energy Use	Strength	21
	Energy Savings	Unknown	23
Smart Resource Use	Total Water Consumption	Strength	25
	Groundwater Conservation	Neutral	26
	Trash/Refuse Generation	Neutral	27
	Sustainable Materials Management	Strength	28
	Hazardous Materials	Unknown	29

Brookings Benchmarks Sustainability Score Card

	Indicator	Score	Page
Community Design	Complete Streets	Strength	31
	Mixed Land Use	Weakness	32
	Quantity of open space	Neutral	34
	Access to Open Space	Unknown	35
	Historic Preservation	Strength	36
	Urban Density	Neutral	37
Green Buildings	Green Standards	Strength	39
	Affordable Housing	Weakness	40
	Safe Housing	Unknown	41
Healthy Local Food	Proximity to healthy foods	Weakness	43
	Community Gardens	Strength	44
	Farmers Market Attendance	Strength	45
	Local foods purchases	Unknown	46
	Healthy Diets	Weakness	47
	Obesity	Weakness	48
Community Knowledge	Volunteerism	Unknown	50
	Voter Participation	Weakness	51
	3rd Grade Reading Proficiency	Neutral	52
	Sustainability Knowledge	Unknown	53
	Arts & Cultural festivals or events	Strength	54

	Indicator	Score	Page
Reasonable Mobility	True Housing Affordability	Weakness	56
	Vehicle Miles Traveled	Strength	57
	Walkable Neighborhoods	Neutral	58
	Public Transit Ridership	Neutral	59
	Safe Travel Network	Neutral	60
Healthy Air	EPA Air Quality Index	Neutral	62
	Household Radon	Weakness	63
	Asthma	Strength	64
	Carbon Dioxide Emissions	Neutral	65
	Clean Fleet	Weakness	66
Clean Water	Impaired Stream Segments	Weakness	68
	Bacterial Concentration	Weakness	69
	Chloride Concentration	Weakness	70
	Drinking Water Contamination	Strength	71
	Wastewater Discharged	Strength	72
Native Plants & Animals	Urban Forest	Strength	74
	Municipal Chemical Use	Neutral	75
	Bird Count	Neutral	76
	Prairie and Wetlands	Unknown	77

Conclusions

Sustainability is described as stewardship, economic prosperity and social justice (Pearsall & Pieree, 2010). Terms commonly used in conjunction with sustainability are green or quality of life. City governments have been concerned about the health and welfare of city residents since the late 1800's as the overall vitality of a city is dependent on prosperous citizens. Indicators are simply a measurement. Sustainable city indicators are a complex collection of individual quantitative measurements that provide an assessment of a city's quality of life. The task of selecting a set of indicators for this project was a daunting process but was simplified in using Dubuque's sustainable indicator model as the base. Brookings Sustainability Council analyzed 56 indicators which were broken down into 11 principles. The project was not intended to determine a level of sustainability but rather to gain a perspective on how the Brookings community is doing in relation to itself over the past five years and how it compares to a set of peer communities. A look at the project scorecard shows Brookings is doing reasonably well as 18 indicators were rated as a strength. A strength indicates Brookings is improving and/or it out performed the peer cities. Thirteen of the indicators received a neutral rating, meaning Brookings showed little change in recent years and/or performed about the same as peer cities. Sixteen of the indicators showed a weakness, Brookings performance declined over recent years or the comparison communities out performed Brookings. An unknown score was assigned to 9 of the indicators due to lack of sufficient data for a complete analysis. Approximately a third of the indicators showed Brookings is performing well in relation to sustainable practices.

Strengths

All principle areas documented at least one strength. The principle area with greatest number of strengths is regional economy: net job growth, unemployment rate, gender wage gap and interest on municipal bonds stood out as community priorities in this principle.

Weakness

Eight out of the 11 principle areas had weakness identified, which included: Regional Economy, Community Design, Green Buildings, Healthy Local Food, Community Knowledge, Reasonable Mobility, Healthy Air and Clean Water. These areas could use further exploration and/or consideration.

Improving Sustainability

Brookings proved its interest in being a sustainable community in 2011 when it created the Sustainability Council. The results of this report provide insight in multiple areas which impact the community. This information can be used to maintain the high quality of the strengths identified while improving the area of weakness to make Brookings an even better place for people to live.

The purpose of this project was to provide insight and knowledge to the community on multiple areas which impact residents every day. In so doing a perspective of the community's sustainability was also achieved as it relates to this particular sustainable model. Individual indicators provide valuable information but when indicators are analyzed and compared to each other added insight can be gained. This information can be used to supplement other city data and analysis. City leaders can use the information to explore different approaches and to maintain the quality of life that already exists for Brookings residents and visitors.

Conclusions

The indicators can be utilized by the City of Brookings to establish goals: target levels for select indicators could be used to emphasize critical areas where improvement is desired. Targets can also be established to help maintain strong areas. This report is intended to be a living document where data is updated on a regular interval, two to three years, to monitor community changes.

Development of a sustainable community is not the sole responsibility of the city government as individual citizens also make an impact. Residents should be encouraged to discuss the information collected in this document and explore ways to be more sustainable. The information can be used by residents to better understand the community of which they are a member. This information can be used to help citizens make small personal improvements, which will multiply and have a positive impact on the future of Brookings.

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http://www.citypopulation

Gross Domestic Product
Bureau of Economic Analysis:
http://www.bea.gov/iTable/iTable.cfm?ReqID=70&step=1#
SD Dept. of Revenue 2014.
http://www.state.sd.us/drr2/businesstax/statistics/2012/June/FY12CountybySIC.pdf

Net Job Growth
Labor Market Information Center, SD Department of Labor and Regulation:
https://apps.sd.gov/applications/ld54lmicinfo/labor/LFLISTPUBM.ASP

U. S. Bureau of Labor Statistics:
http://data.bls.gov/cgi-bin/dsrv?

Minnesota Department of Health:
http://www.health.state.mn.us/divs/eh/hazardous/lightrail/employment.html

Unemployment Rate
U. S. Bureau of Labor Statistics:
http://data.bls.gov/cgi-bin/dsrv?la

Labor Market Information Center, SD Department of Labor and Regulation:
https://apps.sd.gov/applications/ld54lmicinfo/labor/LFLISTPUBM.ASP

Economic Section Diversity
U. S. Bureau of Labor Statistics:
http://data.bls.gov/cgi-bin/dsrv?en

Poverty
U.S. Department of Commerce, United States Census Bureau:
http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_3YR_S1701&prodType=table

Gender Wage Gap
U.S. Department of Commerce, United States Census Bureau:
http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

Debt Burden per capita
Brookings City

Dubuque Sustainability Progress Report 2012.

City of Brookings

U.S. Department of Commerce, United States Census Bureau:
http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

Household Hazardous Waste
Brookings Regional Landfill:
http://www.cityofbrookings.org/index.aspx?NID=255

EPA: Cleaning up electronic waste:
http://www.epa.gov/oita/toxics/ewaste/index.html

Household hazardous waste programs: Cities of Brookings, Dubuque, Manhattan, Grand Island, and Grand Forks

Quantity of Open Space
The Health Benefits of Parks:
http://cloud.tpl.org/pubs/benefits_HealthBenefitsReport.pdf, a report by The Trust for Public Land (2009).

Chart data from Cities of Brookings, Dubuque, Manhattan, Grand Island, and Grand Forks

Access to Open Space
Economic benefits quote from The Trust for Public Land website:
http://www.tpl.org/node/79542 accessed 4/30/14.

Will Rogers quote available in the 1999 report, Economic Benefits of Parks and Open Space:
http://www.tpl.org/sites/default/files/clou

d.tpl.org/pubs/benfits_EconBenef_Parks_OpenSpaceL.pdf by The Trust for Public Land.

Proximity to health foods

USDA Economic Research Service: http://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx#.U2EciFdTbqM Food Access Research Atlas

Volunteer Hours

Helpguide.org: http://www.helpguide.org/life/volunteer_opportunities_benefits_volunteering.htm

Vehicle Miles Traveled

USDOT: Road Pricing Defined: https://www.fhwa.dot.gov/ipd/revenue/road_pricing/defined/vmt.htm

EPA: Sources of Greenhouse Gas Emissions: http://www.epa.gov/climatechange/ghgemissions/sources/transportation.html

EPA: On the Road – Environmental Impacts of Transportation: http://www.epa.gov/epahome/trans.htm

US Census Bureau and WNYC: Average commute times http://project.wnyc.org/commute-times-us/embed.html#5.00/42.000/-89.500 (used zip code with greatest proportion of population for each city with multiple zip codes)

SDDOT: 2012 VMT: http://www.sddot.com/transportation/highways/traffic/docs/VMTAllvehicles.pdf

Third Grade Reading

http://doe.sd.gov/reportcard/index.aspx

http://www.education-consumers.org/national.htm

Clean Fleet

EPA Clean Vehicle Guide : http://www.epa.gov/greenvehicle/about/index.htm

Fuel data for the chart compiled based on information provided by managers at the Brookings Street Department, Brookings Landfill, and from the Brookings Area Transit Authority. Although requested, no data was received for fleet vehicles associated with Brookings Municipal Utilities.

Dubuque Indicators report

City of St. Cloud Greensteps: http://greenstep.pca.state.mn.us/cityInfo_pdf.cfm?ctu_code=2396483

City of Grand Forks Action Plan : http://www.grandforksgov.com/Reports/Draft%20G3%20Grand%20Forks%20Action%20Plan%20%28OCT%2008%29.pdf

Mixed Use

Forsyth et al (2008) (not mine – TJ)

Cervero and Kockelman (1997) (not mine – TJ)

Brookings Zoning map: http://www.cityofbrookings.org/DocumentCenter/Home/View/291

Mixed uses were calculated using a similar methodology as reported in the Dubuque report. However, since we did not have access to a detailed Land Use map including building footprints, the Brookings Zoning map was used. Using the zoning codes, all residential categories counted as one use (exception: Residential Business (RB) counted as an additional use); all industrial categories counted as one use; and agriculture was counted as one use. The business categories such as B-1 Central business, B-2 Medium business, B-2A Professional office business, B-3 Heavy business, B-4 Highway business, and B-5 Planned research & business district each were counted as one use to account for the variety of services offered, from retail to entertainment (categories in Dubuque's analysis). Finally, the Planned Development

District (PDD) was counted as one use based on the assumption that a new retail, service, or other entity would be added at these sites.

Household Energy

Residential Energy Consumption*: Brookings Municipal Utilities

*Data for Figure 1 does not include apartments billed as non-residential since these are on one electric meter, so actual residential use would be higher considering these households.

Energy Information Administration: http://www.eia.gov/state/seds/seds-data-complete.cfm?sid=US#Consumption

Cool Climate Carbon Calculator: source:%20https://coolclimate.berkeley.edu/carboncalculator

Trash/Refuse Generation

Household waste statistics: EPA

Population based on U.S. Census

Brookings waste statistics: Brookings Landfill

Dubuque waste statistics: 2012 Dubuque Sustainability Report

Sustainable Materials Management

U.S. EPA, Annual report 2012.
Brookings Landfill Annual Report 2012.

Renewable Energy Use

EPA: Renewable Energy : http://www.epa.gov/statelocalclimate/state/topics/renewable.html (definition and benefits)

Edison Electric Institute: Regional Fuel Mix : http://www.eei.org/issuesandpolicy/generation/fueldiversity/Documents/map_fuel_diversity.pdf (West North Central)

Brookings Municipal Utilities: http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCsQFjAA&url=http%3A%2F%2Fwww.brookingsutilities.com%2F&ei=VZVqU674MKLcyQHlwYGwBQ&usg=AFQjCNGjq30Jj8v0t9axCdN3_uRFOh8ppw&sig2=KBbMiOHIxNUboN8nlc5aVw&bvm=bv.66111022,d.aWc: Fuel mix

Safe Travel Network

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Municipal Chemical Use

Eutrophication, in Art, H.W., ed., *A Dictionary of Ecology and Environmental Science* (1st ed.): New York, NY. Henry Holt and Company, p. 196.

Herbicide health effects: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638204/ : Gillam, C. 2013. Heavy Use of Herbicide Roundup Linked to Health Dangers – U.S. Study. London. (Last accessed 4 May 2014)

Data for chart from Pete Colson, Brookings Parks, Recreation & Forestry Department

Chloride Concentration

USGS Report: http://pubs.usgs.gov/sir/2009/5086/pdf/sir2009-5086.pdf : Chloride in Groundwater and Surface Water in Areas Underlain by the Glacial Aquifer System, Northern United States