

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

## Demographic Profile

### Suburban Pressures

Monongalia County has experienced steady moderate growth over the past decade while many comparable metropolitan areas have seen their growth remain stagnant or even decline. This continuous increase in residential and commercial development can be attributed to a wide variety of factors, including the presence of West Virginia University, the proximity of the county to the Pittsburgh metropolitan area, the excellent transportation network, corporate relocations, and the overall superb quality of life experienced by Monongalia County residents. Like so many other communities, Monongalia County is experiencing the outward development pressures of the central city. The continued development of the city of Morgantown has introduced growth pressures into the Planning Districts of Monongalia County including West Run and Stewartstown. National trends of suburban growth and development can be applied to the Morgantown metro area as well, including lower property taxes, available land for new development, and the desire of families to live in a more rural, relaxed environment.

### Growth Trends

In 1920, 33,618 people lived in Monongalia County. By 1970, the county population had increased to over 63,714 people, and the latest results from Census 2010 indicate that Monongalia County now has close to 96,189 residents (*Table A1*). Between 1930 and 1970 the population was relatively stable, with significant growth beginning after World War II and increasing steadily between 1980 and 2010. This growth can be partially attributed to the growth of West Virginia University and the continued development of State and Federal offices in the area as well as one of the strongest economies in the entire United States. The July 2012 Strategic Plan for the Morgantown Area Economic Partnership and Monongalia County Development Authority provides much more detailed information illustrating the impacts of a strong economy on the growth of Monongalia County.

**Table A1: Population Forecasts for Monongalia County  
1920 - 2040**

Area	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2015	2020	2030	2040
Monongalia County	33,618	50,083	51,252	60,797	55,617	63,714	75,024	75,509	81,866	96,189	103,351	110,512	124,835	139,158

Sources: US Census, Years 2015-2040 straight line projection

### Building Permits

In most developed areas of the United States, building permits reflect the population growth in

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

recent years. Requiring developers to submit their projects to standards of development allow government offices to help ensure safe living and working conditions for residents and visitors. There is no building permit process in Monongalia County at this time, so using permit recordings as a metric of growth is not possible at this time.

## Population Growth in West Virginia

Table A2 shows that Monongalia County was relatively alone in the population trends it has experienced over the past decades. In comparison to neighboring West Virginia and Pennsylvania counties, Monongalia County has been positive and stable in its population growth.

**Table A2: Population Trends in North Central West Virginia  
1920 - 2010**

Area	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	% Change 1920 - 2010
Monongalia County	33,618	50,083	51,252	60,797	55,617	63,714	75,024	75,509	81,866	96,189	186%
Preston County	27,996	29,043	30,416	31,399	27,233	25,455	30,460	29,037	29,334	33,520	20%
Marion County	54,571	66,655	68,683	71,521	63,717	61,356	65,789	57,249	56,598	56,418	3%
Harrison County	74,793	78,567	82,911	85,296	77,856	73,028	77,710	69,371	68,652	69,099	-8%
Greene County	30,804	41,767	44,671	45,394	39,424	36,090	40,476	39,550	40,672	38,686	26%
Fayette County	188,104	198,542	200,999	189,899	169,340	154,667	159,417	145,351	148,644	136,606	-27%

Starting in 1970, Monongalia County's population began its steady climb in numbers to almost 100,000 people in 2010. Preston County has remained steady in population – much of that stability can be attributed to it being a bedroom community to Monongalia County. Every other county in the region has experienced declines in population from highs in the 1960s and 1970s.

Although not a true indicator of growth, the percent change in population shown in Table A2 gives a general indication of the extent to which each of the jurisdictions has grown over the past 90 years. There is a wide variety of growth in evidence within this small group of counties – Monongalia County has grown 186% in comparison to Fayette County declining 27%. Monongalia County's positive population increase roughly equates to 2.1% per year. Once again, the strength of the economy in Monongalia County has been a key factor in maintaining its positive growth trends.

## Age and Gender

The population of Monongalia County is proportionately equal between females and males, with the largest portion of the population in the age group between 20 and 50 years of age.

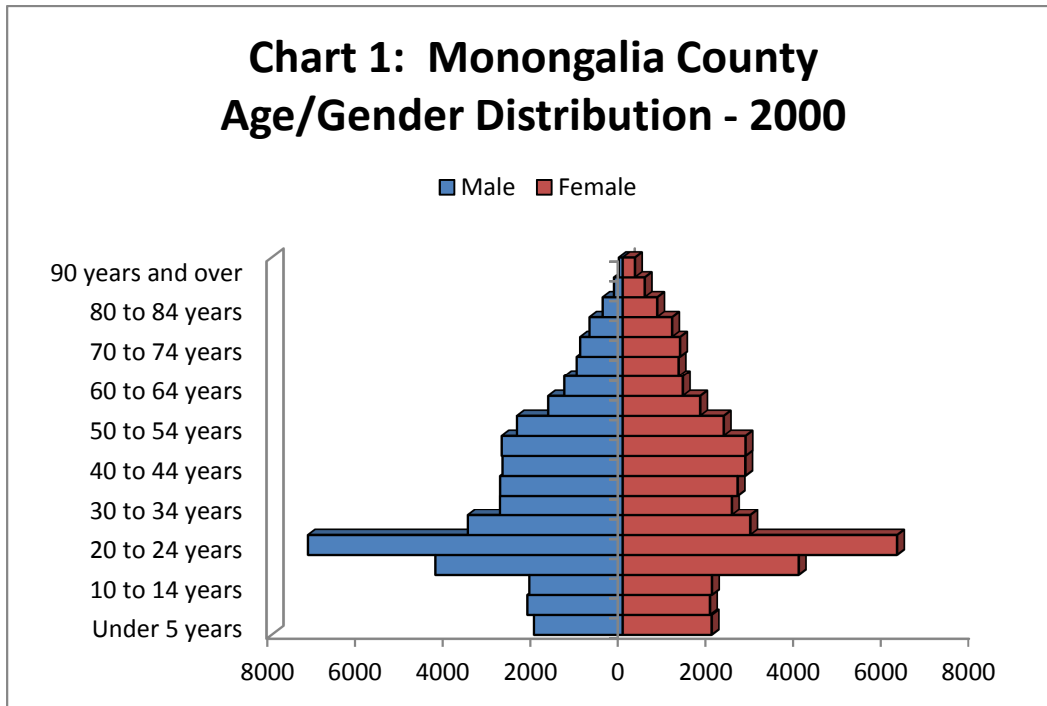
# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

As evidenced in Chart 1 through Chart 2, this group began the 00's in the post-college age range and is progressing upward in the pyramid to the 2010 level.

An obvious outlier exists in the county with the presence of a student-age population that does not transition over the years. There are a large number of student housing developments in the county that continually have turnover with residents of the same age group.

As the charts progress, the trend in population can be seen shifting from the young family dominated population of the last decade to a more evenly distributed pyramid among older age groups. From 2000 to 2010, the groups from 30 years to 85+ years have all seen growth, while the groups from birth to 20 have seen a stable transition. The number of children in Monongalia County has remained constant over the past decade and the older population has increased.



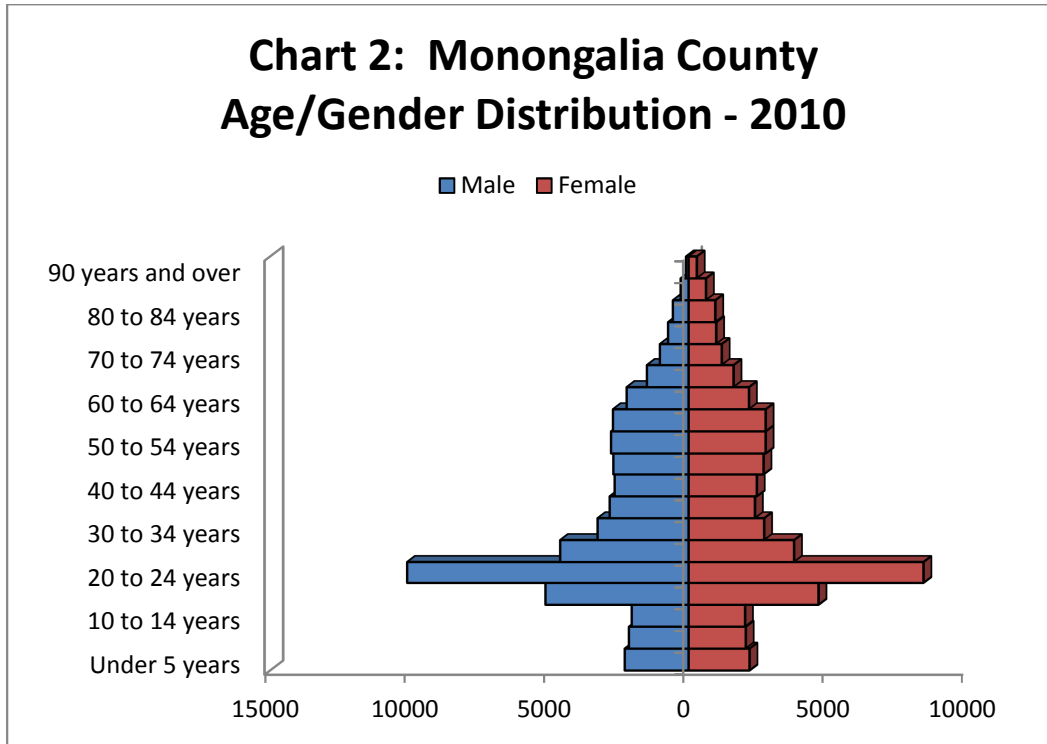
These trends, especially the increase in the older population groups, can be expected to grow in the coming years based on national population trends and increases in life expectancy over the past thirty years.

The Monongalia County Board of Education has released projections for Monongalia Schools through the 2017 school year as part of the 2010 Comprehensive Educational Facilities Plan. Elementary school populations are expected to grow from roughly 4,740 in 2009-10 to 5,295 in 2017. Middle school populations are expected to increase from 1,738 in 2009-10 to 2,322 in

Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck  
Planning Districts: Monongalia County, West Virginia

February 6, 2013

2017. High school populations are expected to decrease from 3,137 in 2009-10 to 2,951 in 2006-07.



# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

## Income Characteristics

**Table A3: Per Capita Income  
1990 - 2009**

Year	Monongalia County	West Virginia	U.S.
1990	\$ 15,426	\$ 14,436	\$ 17,004
1991	\$ 16,185	\$ 15,086	\$ 17,532
1992	\$ 17,647	\$ 16,081	\$ 18,436
1993	\$ 17,715	\$ 16,549	\$ 18,909
1994	\$ 18,659	\$ 17,269	\$ 19,678
1995	\$ 19,160	\$ 17,817	\$ 20,470
1996	\$ 19,819	\$ 18,567	\$ 21,355
1997	\$ 20,251	\$ 19,373	\$ 22,255
1998	\$ 21,396	\$ 20,472	\$ 23,534
1999	\$ 22,257	\$ 21,049	\$ 24,356
2000	\$ 23,821	\$ 22,174	\$ 25,946
2001	\$ 26,182	\$ 23,611	\$ 26,816
2002	\$ 27,280	\$ 24,384	\$ 27,816
2003	\$ 27,733	\$ 24,912	\$ 28,827
2004	\$ 28,651	\$ 25,786	\$ 30,312
2005	\$ 29,933	\$ 26,685	\$ 31,343
2006	\$ 32,477	\$ 28,697	\$ 33,183
2007	\$ 34,975	\$ 29,870	\$ 34,550
2008	\$ 36,084	\$ 31,522	\$ 36,200
2009	\$ 36,767	\$ 32,080	\$ 35,115

Monongalia County has been above West Virginia in per capita income for the last few decades, but has only surpassed the United States average in the last five years. *Table A3* shows the data on per capita income from 1990-2009. The disparity between the groups has widened recently. In 1990, there was a 6.6% difference between Monongalia County and West Virginia per capita income. By 2009, that difference had grown to 13.6%. Much of this disparity can be attributed to the multiplier effect of having West Virginia University and related services and facilities in Monongalia County.

As of 2009, Monongalia ranked 19<sup>th</sup> highest in the state for median household income compared to 20<sup>th</sup> for Preston County, 24<sup>th</sup> for Marion County, and 9<sup>th</sup> for Harrison County. The percent difference between Monongalia County and West Virginia in 2010 was 10% and between Monongalia County and the United States was -17%.

**Table A4: Median Household Income  
1989 - 2010**

Year	Monongalia County	Preston County	Marion County	Harrison County	Greene County	Fayette County
1989	25,021	21,268	22,174	21,908	21,205	20,030
1995	30,502	24,930	26,567	26,644	25,880	24,075
2000	31,215	29,223	30,059	32,483	31,232	29,240
2005	32,487	31,770	31,715	35,690	32,541	31,153
2010	42,247	42,529	38,856	40,441	41,927	35,442

Small Area Income and Poverty Estimates, US Census Bureau

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

## Employment Characteristics

Monongalia County has experienced steady growth in employment over the past fifteen years. From 1995 to 2010, private employment has increased from 26,317 to 39,656, or almost 51% (Table A5). Government employment has remained steady due in large part to the stability of West Virginia University, a major employer for the entire state of West Virginia.

**Table A5: Employment Type for Monongalia County  
2001-2010**

Employment Type	2010	2005	2000	1995
Total full-time and part-time employment	51,627	46,939	41,222	39,098
Private employment	39,656	34,119	28,797	26,317
Natural Resources and Mining	742	448	765	1,876
Construction	3,107	2,121	1,534	1,549
Manufacturing	3,354	2,876	2,573	2,645
Trade, Transportation, and Utilities	7,446	6,894	9,858	9,340
Information	635	540		
Financial Activities	1,350	1,434	1,255	1,370
Professional and Business Services	4,846	4,087		
Education and Health Services	11,446	10,163		
Leisure and Hospitality	5,992	4,737		
Other Services	1,480	1,267	13,577	11,413
Government	11,217	12,347	11,630	10,905

Workforce West Virginia Wage Data

The majority of employment in Monongalia County has been in the education and health service industry, through West Virginia University and private healthcare, and in trade, transportation and utilities. These industries account for nearly 37% of all employment. Another telling statistic is that construction has increased 101% over the past fifteen years. While recent trends have included temporary spikes in employment due to construction at sites like Longview and Fort Martin, these increases indicate that new growth is a major factor in the county and looks to remain so for years.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

**Table A6: Labor Force and Unemployment  
2001-2011**

Year	Monongalia County			Unemployment Rate		
	Labor Force	Employed	Unemployed	Monongalia County	West Virginia	U.S.
2001	41,473	39,848	1,625	3.9	5.2	4.7
2002	41,534	39,721	1,813	4.4	5.9	5.8
2003	42,673	40,841	1,832	4.3	6.0	6.0
2004	43,433	41,801	1,632	3.8	5.3	5.5
2005	44,904	43,335	1,569	3.5	4.9	5.1
2006	46,425	44,956	1,469	3.2	4.5	4.6
2007	47,706	46,340	1,366	2.9	4.2	4.6
2008	48,154	46,855	1,299	2.7	4.2	5.8
2009	48,809	46,658	2,151	4.4	7.7	9.3
2010	48,828	46,125	2,703	5.5	9.1	9.6
2011	48,645	45,940	2,705	5.1	8.4	

Bureau of Labor Statistics

The economic conditions of the past few years have been extremely kind to employment needs in Monongalia County (*Table A6*) relative to the rest of the country. Unemployment rates have been below five percent from 2001 to 2009 and below six percent the last two years. Monongalia County is well below the averages for West Virginia and the United States over the past ten years. The high state and national unemployment rates the last three years are roughly double that of Monongalia County.

Major employers in Monongalia County for 2011 are shown in *Table A7*. These agencies contribute a significant amount to the tax base of the county in addition to providing employment opportunities for Monongalia County residents. West Virginia University is currently the leading employer in the county. In support of the employment characteristics in *Table A5*, three of the top ten employers in Monongalia County are in the education industry.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

**Table A7: Monongalia County Largest Employers  
March 2011**

Monongalia County	
Rank	Company Name
1	West Virginia University
2	West Virginia University Hospitals
3	Mylan Pharmaceuticals, Inc.
4	Monongalia County Board of Education
5	Monongalia General Hospital
6	West Virginia University Medical Corporation
7	Teletch Customer Care Management (WV), Inc.
8	Wal-Mart Associates, Inc.
9	The Kroger Company
10	Gabriel Brothers, Inc.

Workforce West Virginia



# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

## Natural Resources

### River and Stream Corridors

Monongalia County is blessed with plentiful river and stream corridor resources. Situated between the Appalachian Plateau physiographic province to the west and the Allegheny Mountain province to the east, the physiographic nature of Monongalia County is characterized by the features you would find in both provinces. As seen in *Figure A-1: Basemap*, the integral water features of the county are the Monongahela River and the Cheat River, dissecting the county from south to north. The western part of the county is drained by Dents Run and Scotts Run and the eastern part of the county is drained by West Run and Deckers Creek. The Army Corps of Engineers dammed the Cheat River in 1925 to serve the needs of a hydroelectric generating facility at Lake Lynn. Cheat Lake is now a regional recreation destination and is a bedroom community to Morgantown.

The surface drainage in the county is good overall, with a dendritic and irregularly branched pattern. Streams flow typically in an east-west fashion and empty into the rivers or Cheat Lake. Between these streams and creeks, the land ranges from sloping lowlands, typically flood plain areas near the Monongahela River to rolling, moderately sloped uplands to steep and hilly land into which streams and creeks have cut into the upland Allegheny Front .

### Floodprone Lands

Floodprone lands, in which the expectancy of the land to flood on an annual basis is greater than 50%, are shown on Figure A-2, Floodprone Land. The majority of these areas are along the Monongahela River and Cheat Lake, and most of this land is undevelopable. There are also floodprone lands along most of the major creeks, and should be strongly considered when assessing development potential of a parcel in these areas. Many of these lands fall inside the boundaries of the four planning districts and need to be considered when assessing development potential.

### Physiographic Relief

A relief map of the county is shown in Figure A-3, Physiographic Relief. The highest point in the county is roughly 2,560 feet above sea level and is located in the northeast corner of the county, near the intersection of Sand Springs Road (CR 69/1) and CR 2/3. The majority of uplands in the county are located in the eastern part of the county and range in elevation from about 1,250 feet to 2,560 feet above sea level. The lowest point in the county is roughly 800 feet above sea level and is in the central part of the county, near the Monongahela River. Flood plains and stream

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

beds make up the lower elevations shown on the relief map.

Slopes for Monongalia County are shown in Figure A-4, Steep & Moderate Slopes. In this figure, slopes are shown as moderate (between 15% and 25%), and steep (greater than 25%). Development should be discouraged for areas with steep slopes and questioned for areas with moderate slopes, due to the added cost of development to ensure that the integrity of the site is maintained. **Within the planning districts, 18,660 acres (or 50.4%) are considered to be moderate or steeply sloped.**

## Soil Suitability Profile

In addition to topographic relief and drainage, soil characteristics are a vital component of the physical qualities of land in Monongalia County. The developer or planner is confronted with problems created by extensive areas characterized by limited soil qualities for most land uses in Monongalia County. Potential development sites must have an analysis of soil conditions to determine the physical carrying capacity of the land. These considerations will eventually extend into areas of community facilities, public investment and public services which might appear to be far removed from traditional land use planning concepts. Soil characteristics are perhaps the most important consideration in determining the capability of the land to support development. This is due to specific soil types that have inherent characteristics such as poor permeability and percolation. These factors limit the capacity to support certain types of use and the intensity of that use. Furthermore, these factors, depending upon their severity, demand that various improvements be made in order to increase the land's capacity for development. This may mean only simple shaping of the surface to allow better run off or complete removal and replacement of soil. Obviously, not only the use intended for a particular site, but the intensity of use affects the level of improvement required. For example, an apartment complex would require more substantial and costly modifications in areas where soils have a low potential for development than would the construction of a single family dwelling unit.

Monongalia County encompasses 360 square miles and is composed of twenty-five different soil associations. The ten soil associations which are most prevalent in Monongalia County are as follows: Gilpin-Culleoka-Upshur which makes up about 20.4% of the County, Culleoka-Westmoreland which is found in 18.9% of the County, Clarksburg which makes up 8.6% of the County, Dekalb which accounts for about 8.4%, Gilpin which makes up about 6.2%, Westmoreland which is found in 5.4% of the County, Dormont and Guernsey which makes up about 5.3% of the County, Buchanan and Ernest which makes up 2.9% of the land area, Lily which makes up about 2.2% of the County and Gilpin-Culleoka which is found in 2.2% of the land area. For a detailed description and discussion of these soil associations plus detailed soil maps, refer to the Soil Survey of Monongalia County, West Virginia, July, 1982, prepared by the US Department of Agriculture.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

## Soil Conditions and Development Potential

In considering the capability of soils to support septic tanks, some soils are classified as having somewhat limited capabilities; while most (40%) have very limited capabilities. Engineering modifications can be carried out which will increase the capacity of some soils to support septic tank drainfields. However, specific soil conditions should be studied when evaluating development proposals for specific sites.

The overriding danger of residential development with septic tanks in areas with severe soil limitations is disease. The soil characteristics restrict the dilution of effluent drainage by causing surface pooling due to the content of the soil. If this leads to contamination of water supplies, it could result in the occurrence of typhoid, dysentery, hepatitis, staph, salmonella and sugella in epidemic proportions. Contamination of water supplies created by a malfunctioning waste disposal unit can have serious implications. The dangers are real and should be closely monitored. The role played by soils in choosing building site locations and sanitary facilities is extremely significant and should be a vital part of the local land use planning program.

*Figure A-5, Soil Limitations*, provides a general description of the soil conditions of Monongalia County. Of the County's 230,438 total acres, only about 24,345 acres or 10.6% are capable of supporting intensive residential development with physical modifications. **In the four planning districts, 13.5% of land (4,986 ac) is not rated for hindrance to future high density development, 33.6% of land (12,438 ac) is considered somewhat limited, and 51% of land (18,843 ac) is considered very limited for supporting higher density development.**

In order to support high density development, these areas would require water and sewer systems. Septic tanks would require some modifications in these areas for lower densities. Figure A-5 does provide a guide for future land use considerations in determining those areas which can support higher density development, medium and low density and those areas from a soils standpoint which are not generally suitable for development. Thus, Figure A-5 is instrumental in presenting soils information which will be considered in developing a future land use map for Monongalia County.

Obviously, the soil conditions of Monongalia County will influence land and land development costs. In most cases, these costs will be passed on to the purchaser, thus hindering the development of sound housing at an affordable price to middle income people. Also soils and slopes will impact on drainage systems required in new developments. This will result in additional engineering costs which will be added to the price of new homes. Thus, areas which have the physical carrying capacity to support higher densities should be indicated on a future land use map of the County. These areas could be developed in a manner which would spread the development cost over a large number of units and result in lower cost to the homeowner.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

Since only a small amount of low limitation soils exists in Monongalia County, a comprehensive management program of these areas is essential. It is in the best interest of the County that these prime development areas be utilized to provide needed housing and commercial and industrial growth consistent with local goals and objectives identified in this Comprehensive District Plan.

## Forest Resources

Monongalia's forests are one of its most important natural resources. Planning that will set guidelines to maintain a viable forest resource is essential to insuring a quality environment for Monongalia County residents. Our forests provide a very functional asset to our community. Their importance to our community ecologically, economically, and socially should be emphasized.

Ecologically, woodlands help maintain good water quality. Forests filter and trap sediments and absorb pollutants from overload runoff and subsurface flow. Woodlands act as natural buffers along the Monongahela River, its major tributaries, and smaller perennial and intermittent streams by preventing excess nutrients, like nitrogen and phosphorus, from entering and polluting our waterways. Tree roots help maintain clean ground water and trapping harmful pollutants. Forests provide essential ecosystems for a variety of plants and animals. They provide food, shelter, cover, nesting and bedding areas for a wide variety of wildlife. The forests of Monongalia County play an important economic role in the community, but also contribute value for hunting, recreation, tourism, air quality, water quality, and aesthetic benefits, which play an enormous role in our economy.

Socially, trees and wooded areas provide a pleasant environment for Monongalia County residents to live and work. They help promote public health and safety through the reduction of noise, air, water and visual pollution. Trees help moderate air temperature and artificial glare, break up large expanses of impervious surfaces and screen unpleasant or distracting views. Trees and woodland areas have been essential to promoting and preserving the appearance, the economic value, and the lifestyles and traditions that have existed in Monongalia County for decades.

*Figure A-6, Existing Land Use / Land Cover*, shows the existing land cover for Monongalia County and the primary cover at this time are forests. The outlying parts of the county host the most forested land, while the central part of the county holds more agriculture land and is seeing the pressures of development, as evidenced in the urbanized land.

## Agricultural Resources

Monongalia County is indeed fortunate to have such beautiful farmland within its boundaries. Farmland, however, has been changing in character and use over recent years.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

---

February 6, 2013

From 2002 to 2007, farm numbers have decreased, with the 2007 Agricultural Census showing only 457 farms averaging 130 acres in size. The 2002 Agricultural Census shows 478 farms averaging 126 acres and going back to the 1964 Agricultural Census, shows 916 farms averaging 109.5 acres - this supports the general decline in family-operated farms to larger consolidated farms. In 1964 there were 100,293 acres recorded for agricultural use, while in 2007 there were only 59,257 acres recorded. This decrease in acreage devoted to agriculture in the past few decades is due mainly to abandonment of some farm operations and the resulting subdivision and development for non-farm purposes.

Agriculture will remain important for the local economy for years to come. Emphasis needs to be placed on preservation of valuable agricultural areas to protect these areas from undesirable development. It is not in the best interest of Monongalia County for agricultural land areas to continue to decline as a percentage of total land area as has been the case in the recent past. Prime agricultural land is valuable as a natural resource and, as previously discussed, important for stabilizing the local economy. *Figure A-7, Prime Agricultural Land*, indicates those areas which are considered prime agricultural land in Monongalia County. **Within the boundaries of the four planning districts, 2.3% (864 ac) are considered prime farmland, 29.1% (10,790 ac) are farmland of statewide importance, and the remainder is not prime farmland.** These areas can be preserved by identifying those areas in Monongalia County designated to be the future growth centers for the County. Intense development and higher density growth should be directed to those major villages in an effort to economically provide public services and protect the valuable agricultural land areas and the rural atmosphere of Monongalia County.

## Mineral Resources in Monongalia County

Monongalia County lies along the eastern flank of the great Appalachian Basin or geo-syncline. Although the county lies near the axis and on the eastern structural slope of this basin, the area is transversed in a northeast-southwest direction by a number of minor geologic folds, the most important of which are listed below. More detailed descriptions can be found in the County Reports for Marion, Monongalia, and Taylor Counties by Hennen and Reger, 1913.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

**Table A8: Geology**

Anticlines	Synclines
Amity	Robinson
Bellevernon (Waynesburg)	Waynesburg
Wolf Summit	Whiteley
Mooreville (Brownsville)	Shinnston
Indiana (Fayette)	Lambert
Chestnut Ridge (Dulany)	Connellsville (Uniontown)
Hiram	Ligonier (Elliottsville)
	Evansville

## Coal

Mining operations are alive and well in Monongalia County. The West Virginia Office of Miner’s Health Safety and Training reported in their Fiscal Year 2010 Annual Report that 9,473,572 tons of coal was mined for the year. Out of that total, 789,972 tons resulted from surface mining and 8,683,600 tons resulted from underground mining operations. For FY 2010, there were four companies operating underground mining operations at five mines. Those underground mining operations employed 1,198 employees, while surface mining operations employed 123 employees.

Figure A-8, *Coal, Oil, and Gas Resources*, identifies those areas of Monongalia County that contain coal, oil, and gas deposits. Other areas may also have these resources but are not disturbed at this time. **Within the planning district boundaries, there are 1,183 acres claimed by surface mining and 3,854 acres claimed by underground mining. No data is available to determine how many of the mining operations in the study area are still in operation or if they have been abandoned. Some areas, like the area under the Mileground, are obviously abandoned at this time.**

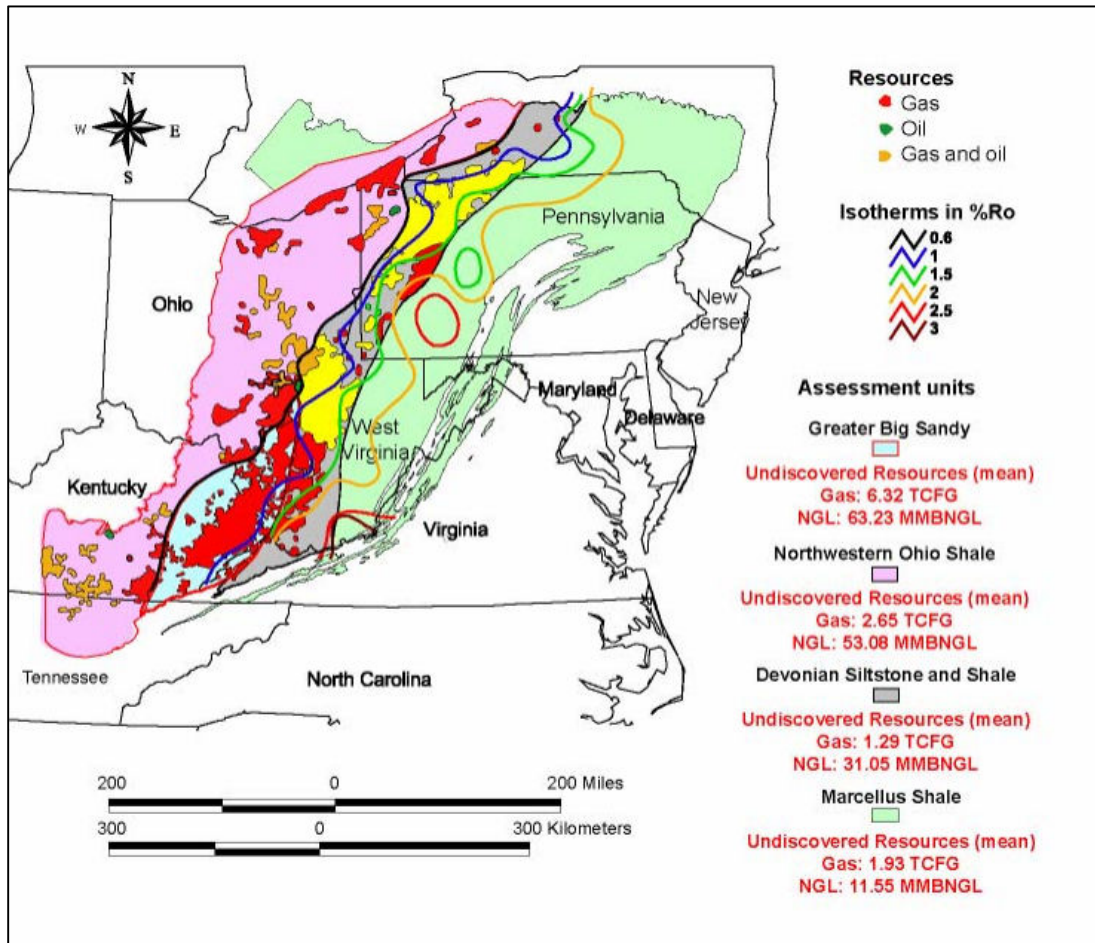
## Oil & Natural Gas

The U.S. Geological Survey (USGS) indicates that the Marcellus shale may have a mean undiscovered natural gas resource potential of nearly 2 tcf. Considering the total extent of Devonian/Ohio basin shales (which include the Marcellus formation), an estimated 12 tcf may be present, although not all of it may be economically recoverable (*Figure A-9*). The USGS estimate, however, is considerably lower than a 2008 “conservative” estimate of over 500 tcf made by geoscience professors Terry Engelder (Pennsylvania State University) and Gary Lash (State University of New York). The two professors believe that there could be at least 50 tcf of gas technically recoverable from the Marcellus formation.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

**Figure A-9: Devonian Shale Undiscovered Resources**



Source: USGS Open File Report 2005-1268

Statoil assumes that each well drilled in the Marcellus may have an average estimated ultimate recovery (EUR) of 3.1 bcf. The EUR per well will depend on the length of the horizontal well drilled, the number of fractures in the well, and the quality of the shale. Statoil assumes that each horizontal well would measure 3,000 feet in length with 6 hydraulic fractures intervals in each well. An average well might produce for upwards of 60 years.

The Department of Energy, through Lewin and Associates (1983), Kuuskraa and Wicks (1984), and Kuuskraa and others (1985), estimates that there could be upwards of 400 MMCF per well recovery in much of central West Virginia, including Monongalia County (see *Figure A-10*).

According to the Congressional Research Service, in 2007, the northeast region consumed roughly 4 tcf of natural gas. New York led the region in consumption with over 1.19 tcf. The United States as a whole consumed more than 23 tcf. The region produced roughly 580 bcf of natural gas from some 113,000 operating gas wells. **Pennsylvania and West Virginia combined made up nearly 89% of the production, with New York and Virginia making up the balance. Within the study**

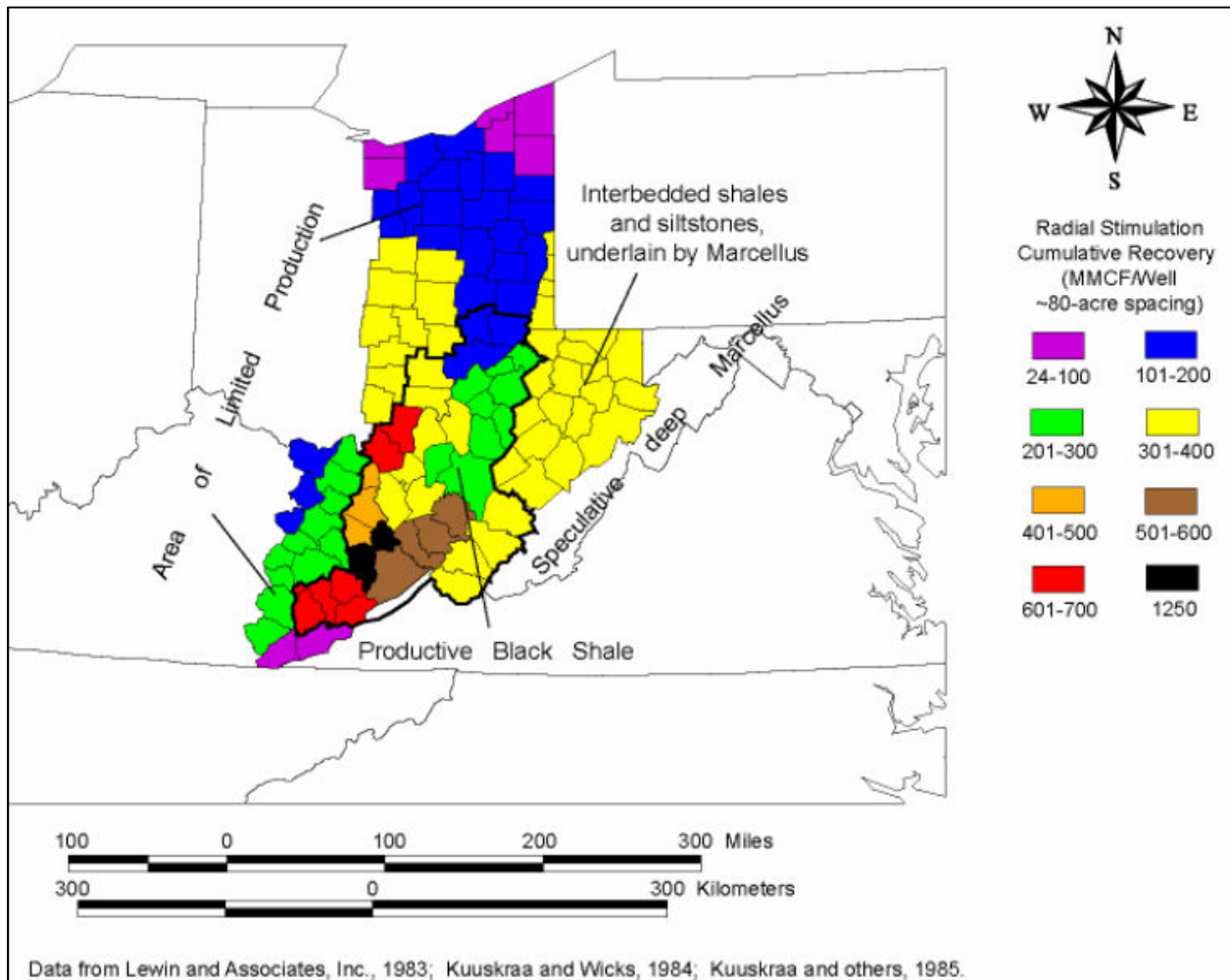
# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

area, there were 31 sites that were fractured for gas or other deposit, according to Figure A-10. Another 45 wells of other types existed at that time.

In summary, the region consumes about seven times as much natural gas as it currently produces. The 50-tcf gas, estimated by Engelder and Lash as technically recoverable from the Marcellus

**Figure A-10: Per Well Estimates of Technically Recoverable Gas**



Source: USGS Open File Report 2005-1268

shale, would be sufficient to supply the region for 13 years at the current rate of consumption. Taking the entire 513-tcf resource-potential into account and assuming that recovery methods would improve might extend the supply further.

The above resource areas need to be identified in the context of residential and commercial development. These resources are important for the long term economic development of the County, but also may pose health risks to residential and commercial areas. Future growth scenarios should be developed with the inclusion of these resources.



# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

## Environmental Protection Areas

These areas consist of floodplains, moderate and steep slopes (over 15% gradient), poor soils and unique vegetation and wildlife habitat. For the most part, these soils are poorly drained and susceptible to extreme expansion and contraction; therefore, they would have severe restrictions for building. Emphasis should be placed on preservation of these areas in their natural state, set aside for parks or cultivated as farmland. Although limited residential development could be allowed in some of these areas, its extent should be greatly restricted. Development within the floodplain is prohibited by law and it should be left either in the natural state or utilized for agricultural and recreational pursuits. These areas are ideally suited for linear parks to include pedestrian, bridle and bike trails which could link villages and other activity centers.

Since valley and ridge landforms comprise the drainage systems for the county, vegetation stripped from these areas makes them susceptible to erosion. Also, these woodland areas provide habitat for wildlife; therefore, development of these areas should be limited. Effective management of these areas should be encouraged to protect the natural quality of the County.

*Figure A-11, Map of Potential Conservation Lands*, shows the location of environmental protection areas and prime agricultural areas. This map and the underlying geographic information system (GIS) data should be used by planning staff in making recommendations for development proposals. These areas should be protected from development due to their fragile environmental quality and value for agricultural production.

## Existing Land Use

The rural character of Monongalia County has been the single most important factor in people's appreciation for this land, and the retention of this character is one of the most important goals of this plan.

With the inception of the four planning districts, a village concept has been the impetus in shaping development that supports the county goals of preserving open space and retaining rural character. In the ideal village concept, new development is directed towards established villages and away from rural and agricultural lands. The effect is that the county retains rural land and establishes villages where services may be provided to residents at a lower cost (due to concentrated infrastructure).

*Figure A-6, Existing Land Use / Land Cover*, and *Figure A-12, National Land Cover Data*, shows the patterns of development that have taken place up until 2006 in Monongalia County (Data descriptions for the land cover data are listed below. Take note of the location of the four established Planning Districts and their relationship to developed lands. Also note that the Mon Fayette Expressway was not yet completed when the data was assembled.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

---

February 6, 2013

**Open Water** - All areas of open water; typically 25 percent or greater cover of water (per pixel).

**Low Intensity Residential** - Includes areas with a mixture of constructed materials and vegetation. Constructed materials account for 30-80 percent of the cover. Vegetation may account for 20 to 70 percent of the cover. These areas most commonly include single-family housing units. Population densities will be lower than in high intensity residential areas.

**High Intensity Residential** - Includes highly developed areas where people reside in high numbers. Examples include apartment complexes and row houses. Vegetation accounts for less than 20 percent of the cover. Constructed materials account for 80 to 100 percent of the cover.

**Commercial/Industrial/Transportation** - Includes infrastructure (e.g. roads, railroads, etc.) and all highly developed areas not classified as High Intensity Residential.

**Bare Rock/Sand/Clay** - Perennially barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, beaches, and other accumulations of earthen material.

**Quarries/Strip Mines/Gravel Pits** - Areas of extractive mining activities with significant surface expression.

**Transitional** - Areas of sparse vegetative cover (less than 25 percent of cover) that are dynamically changing from one land cover to another, often because of land use activities. Examples include forest clear cuts, a transition phase between forest and agricultural land, the temporary clearing of vegetation, and changes due to natural causes (e.g. fire, flood, etc.).

**Deciduous Forest** - Areas dominated by trees where 75 percent or more of the tree species shed foliage simultaneously in response to seasonal change.

**Evergreen Forest** - Areas dominated by trees where 75 percent or more of the tree species maintain their leaves all year. Canopy is never without green foliage.

**Mixed Forest** - Areas dominated by trees where neither deciduous nor evergreen species represent more than 75 percent of the cover present.

**Shrubland** - Areas dominated by shrubs; shrub canopy accounts for 25-100 percent of the cover. Shrub cover is generally greater than 25 percent when tree cover is less than 25 percent. Shrub cover may be less than 25 percent in cases when the cover of other life forms (e.g.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

---

February 6, 2013

herbaceous or tree) is less than 25 percent and shrubs cover exceeds the cover of the other life forms.

**Orchards/Vineyards/Other** - Orchards, vineyards, and other areas planted or maintained for the production of fruits, nuts, berries, or ornamentals.

**Grasslands/Herbaceous** - Areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25 percent, but exceeds the combined cover of the woody species present. These areas are not subject to intensive management, but they are often utilized for grazing.

**Pasture/Hay** - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops.

**Row Crops** - Areas used for the production of crops, such as corn, soybeans, vegetables, tobacco, and cotton.

**Small Grains** - Areas used for the production of graminoid crops such as wheat, barley, oats, and rice.

**Fallow** - Areas used for the production of crops that are temporarily barren or with sparse vegetative cover as a result of being tilled in a management practice that incorporates prescribed alternation between cropping and tillage.

**Urban/Recreational Grasses** - Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.

**Woody Wetlands** - Areas where forest or shrubland vegetation accounts for 25-100 percent of the cover and the soil or substrate is periodically saturated with or covered with water.

**Emergent Herbaceous Wetlands** - Areas where perennial herbaceous vegetation accounts for 75-100 percent of the cover and the soil or substrate is periodically saturated with or covered with water.

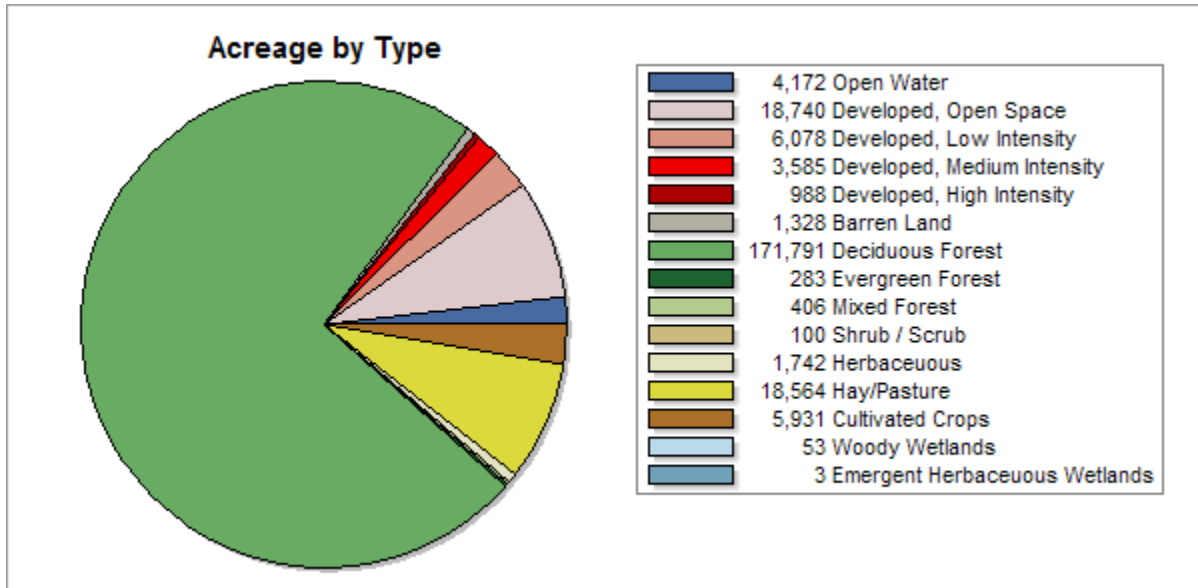
As shown in *Figure A-9* and in *Table A9*, the county is still mostly rural and has land left that is well-suited to agriculture and forestry operations. Patterns that are evident from the National Land Cover Data are that the western portion of the county is still mostly undeveloped and largely suited to forestry and agriculture operations. The eastern portion of the county is more suited to agriculture operations such as pastureland and crops, although significant development pressures have converted a large amount of agricultural land to development. It is also evident

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

February 6, 2013

from the figure that development pressures in the eastern part of the county are beginning to effect the preservation of open space and important environmental features. Note in the

**Table A-9: National Land Cover Data for Monongalia County**



Existing Land Use map that the amount of urbanized land that exists already outside of the planning districts outnumbers the amount that is inside the districts.

## Community Facilities

Community facilities and services consist of any building, space or service that is open to use by the general public, including government buildings, schools, libraries, fire/rescue stations, law enforcement facilities and medical facilities and services, welfare services, parks and open spaces, and public utilities.

The cultural facilities of a county furnish the most valuable resource to its citizens. When used to their full potential, they create an enlightened and aware population.

Cultural facilities such as theaters, museums and libraries provide citizens of a county with exposure to interesting, entertaining and creative activities. The availability of these activities can increase enjoyment of the citizen's leisure time.

## Administrative Facilities and Staff

As the population of the County grows, more staff and consequently more office space may be needed. This may necessitate the development of additional space for county staff in the near future.

The county is currently considering a number of different options for future expansion of county

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

offices. The expansion of the sheriff's office to the new building on the corner of Walnut Street and University Avenue has aided in relieving congested office spaces in the courthouse.

## Educational Facilities

Enrollment, program offerings, and age and condition of buildings are major factors influencing educational facility needs. Other factors such as location, shifting and growing population, and business and industrial development also play an important role in determining these needs.

Monongalia County has experienced steady enrollment growth, with the most significant increases coming at the elementary level. However, it is conceivable that additional elementary capacity will be required in the foreseeable future. Most recent estimates from the 2010 Monongalia County Schools Comprehensive Educational Facilities Plan (CEFP) indicate an enrollment increase of approximately 595 elementary students over the next five years.

The long-term capacity needs for middle and high school resulting from increases in elementary enrollment have been addressed through the construction of a new University High School, completed in the fall of 2008, and opening of Mountaineer Middle School at the site of the former UHS. The CEFP indicates 57 additional middle school students and 186 less high school students over the next five years.

It is essential that the Capital Improvements Program for the school division reflect not only new construction, but the need to appropriately maintain facilities in terms of roof replacement, HVAC replacement, etc.

## Recreation

It is now being recognized that the services provided by the Board of Park and Recreation Commissioners (BOPARC) is essential to the quality of life, to community health, and to economic prosperity of Monongalia County residents. The value and services provided by BOPARC extend far beyond the traditional image of playground and athletic fields. BOPARC provides comprehensive year-round programs for both youth and adults to include sports, games, tournaments, leisure skill classes, fitness, arts and crafts, cultural opportunities, recreational classes, special events and social trips.

In addition to BOPARC programming, there are a number of volunteer-run sports leagues around the county that draw large numbers of participants on a daily basis. As these programs continue, the County should be aware of the transportation impacts of these leagues on the neighboring residential communities and improve those facilities where the network does not meet the demands of the system.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

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February 6, 2013

## Facilities

As Monongalia County's population grows, the need for recreational facilities will grow with it. Although there is not a shortage of parkland and public open space areas in the County with the development of Mylan Park, serious study and consideration should be given to the acquisition and development of park and open space to serve the needs of all County residents in the future. To assure a high quality of life in the county, provisions will have to be made to develop parks and recreational facilities at a pace that is comparable to the rate of growth.

Although it is common knowledge that budgets are tight, we are presented with the opportunity to do some long range planning around our current and future recreational needs. A Master Plan consisting of a comprehensive needs assessment and an inventory and analysis of natural resources should be completed to facilitate proper planning. Without this plan, the County will only grow to be more deficient in its responsibility to provide for the recreational needs of the citizens.

## Housing

The demand for housing in Monongalia County will continue to increase in the future. With urban development pressures growing and increases in commercial and industrial uses in and around Monongalia County, it is essential that the County plan now for the efficient and orderly arrangement of housing and provide for the housing needs of the future population.

Working closely with local developers and housing providers, County staff should consider innovative measures to guide development to those areas with existing utility services and transportation infrastructure.

## Water and Sewer

The Morgantown Utility Board is a municipally owned and operated utility providing potable water, sanitary sewer, and stormwater services to the City of Morgantown and portions of Monongalia County. This service area includes the municipalities of Westover, Star City, Granville, the facilities of West Virginia University, and surrounding unincorporated areas (see Figure A-13: Water and Wastewater Services). The system includes direct water service to 23,945 connections and direct sewer service to approximately 18,302 service connections. The Utility Board also provides bulk water sales to approximately 7,000 customer accounts and bulk sewerage treatment for surrounding districts. The MUB stormwater system serves 13,655 customers.

Utility Board facilities are valued at over \$93 million. This includes a main wastewater treatment plant in Star City, a wastewater treatment plant at Cheat Lake, and a water treatment plant in Morgantown. In addition, approximately 340 miles of water distribution lines, 271 miles of sewerage collection lines, and 225 miles of storm system lines are located throughout the system.

# Existing Conditions for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia

---

February 6, 2013

## Waste Water

The Morgantown Utility Board (MUB) sanitary system serves 15,456 customers. Sewer system facilities include 238.5 miles of pipelines, a 12 million gallon per day (MGD) wastewater treatment plant (WWTP) at Star City, 13 lift stations, and 40 combined sewer outfalls (CSOs). A \$6.5 million upgrade to the WWTP was completed in 2008. This project included the addition of a third secondary clarifier (resulting in a revised plant capacity of 12 MGD), the replacement and update the belt filter presses, and SCADA system. The project was the first of several proposed in MUB's long-term control plan (LTCP). The LTCP proposes improvements that will cost \$77 million (in 2001 dollars), over the next 20 years. An update to the LTCP was completed in 2009, that identified and prioritized additional long and short term wastewater plant and system improvements.

MUB owns and operates a second, and separate sanitary sewer system in the Cheat Lake area of Monongalia County. The Cheat Lake sanitary sewer system serves 2,032 customers. Sewer system facilities there include 48.2 miles of pipelines, a 750,000 gallon per day (GPD) wastewater treatment plant (WWTP), and 19 lift stations. The Cheat Lake system contains no combined sewers. The WWTP, lift stations, and major interceptors and force mains were constructed in 2000 at a cost of \$10 million. Growth and demand for expanded utility services is generally strong throughout the MUB service area and particularly so in the Cheat Lake area.

## Water

The Morgantown Utility Board water system serves 23,330 customers. Water system facilities include 345.5 miles of pipelines, a 14 million gallon per day (MGD) water treatment plant, 15 booster pumping stations, and 34 water storage tanks with a combined volume of 16.0 million gallons. Recent upgrades to the water treatment plant have included replacement of the electrical switch gear, addition of a 10 MGD high service pump, and installation of a radio-based SCADA (supervisory control and data acquisition) system. These improvements were completed in 2004 at a cost of \$3.8 million. A three year long project to design and construct an upgrade of the WTP will be completed in 2012. That project will replace the existing Monongahela River intake structure, add a membrane filtration process, expand clear well storage, and update/improve the various chemical feed systems. The improved plant will have an immediate capacity of 17 MGD, and will be expandable to 24 MGD.