Foundation of Facts

Arnold, Mo. Comprehensive Plan

Foundation of Facts Memorandum

March 2011

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Introduction

Comprehensive plans express a community's values, priorities and aspirations. They provide a 20-to-50-year vision and roadmap for a city's future. Arnold's Comprehensive Plan expresses Arnold's framework values and specific goals and policies for the environment, land use, transportation, housing, capital facilities, utilities, and other important elements for future planning.

What is the purpose and goal of Arnold's Comprehensive Plan?

For Arnold to remain economically competitive it needs a vision for how it will grow, how it will protect its natural resources, and how it will provide jobs, affordable housing and mobility. Managed well, growth can be a boon for a community, adding value to its businesses and neighborhoods and quality of life. Managed poorly, growth can result in housing prices soaring or dropping, traffic congestion, the loss of open space, and degradation of air quality. The issue of where and how Arnold should grow is an important one with the current development trend for rapid development of greenfield land in outlying locations. Greenfield development requires the installation of expensive new infrastructure systems and schools. The challenge is finding the right balance of new growth that does not come at the expense of losing the sense of place that makes the community of Arnold a desirable place to live.

The purpose of this Plan is to determine a future vision that:

- Establishes a balance of the interests and needs of the area residents, businesses, guests, and visitors
- Guides development and improvements in the area to offer a wider and more diverse range of residential and commercial development opportunities

Goals of the Plan are to:

- Create a vision for the future development in the City of Arnold
- Build consensus among area stakeholders
- Develop a strategy to create a thriving, sustainable and desirable community, which addresses land use, zoning, area identity, urban design, transportation, capital improvements, public safety and the health and vitality of the area
- Recognize and protect the character of the area

Foundation of Facts Memorandum

This Foundation of Facts Memorandum serves as an existing conditions assessment and evaluates planning and public infrastructure conditions within the study area today including: roads, traffic, land use, natural resources, potable water, sanitary sewer, storm water, and public facilities.

The Consultant Team

The members of the consultant team are:

- Patti Banks Associates (PBA), lead consultant.
- George Butler Associates (GBA)
- Applied Real Estate Analysis (AREA)
- Piper-Wind Architects, Inc

Demographic Fast Facts

The review of the demographic information for the City of Arnold is based on a combination of data from the U.S. Census, Missouri State Census Data Center, and the Missouri Economic Research and Information Center, East-West Gateway, St. Louis Chamber and Growth Association, and Applied Real Estate Analysis, Inc.

Land

- **Land Area:** The City of Arnold, Missouri comprises an area of approximately 11.5 square miles (7,373 acres). The planning study area, including the City of Arnold, comprises approximately 38 square miles.
- **Incorporation:** The City of Arnold was incorporated in 1972.
- **Developable Land:** The portion of land available for development within the City limits is 20% or 2.3 square miles (1,475 acres).

People

- **Population Trends:** The population grew 14.8% from the year of incorporation (1972) to 2000. Population growth in Arnold from 2000 to 2010 was 8.45%, with an estimated population in 2010 of 21,652. The City of Arnold remains the largest city in Jefferson County, comprising 9.65% of the County's population which is down from 2000 (10%). The increase in population in Arnold is less than that of the County which is 13% and less than the national average (9.7%).
- **Population Projections:** Population of Arnold is expected to increase 3.5% over the next 10 years to 22,435. While the County's population is expected to increase an average of 9% over the next 10 years.
- **Population Density Based on Land Area:** The population density of Arnold is 1,876 persons per square mile compared to 81 persons per square mile for Missouri overall.
- **Racial Diversity:** Arnold's population is relatively homogenous with 98% Caucasian; 1% black or African American, American Indian, Asian, Pacific Islander, or other race; and 1 % two or more races.
- **2010 Youth and Elderly Population:** Arnold's Youth (19 and under) and Elderly (65 and older) make up 38% of the population.

- **2010 Median Household Income:** In 2010, Arnold's estimated median household income was $59,350 with approximately 25% of the City's households earning between $50,000 and $75,000. This is higher than the County at 24% and the nation at 18.3%. The 2008 median income in the State of Missouri was $46,847.

- **2010 Post High School Education:** Approximately 13.2% of Arnold residents, over the age of 25, have a bachelor's degree or higher. This is under the State of Missouri average of 21%.
- **2010 Household Size:** Household size in Arnold is 2.64; this is slightly above the national average of 2.6 which is lower than that of the County at 2.77. The number of households has increased over 8% from 2000 to 2010 in the City and 13% in the County.
- **2008 Household Composition:** Slightly less than one-third of the households consist of families with children under the age of 18 years. While elderly people over 65 years comprise 24% of households. The median age of Arnold's population is 40.
- **2008 Housing Occupancy:** More than two-thirds (81%) of the housing stock in Arnold is owner-occupied.
- **Housing 2008 Single-family Vacant Properties:**
- **2008 Housing Type:** More than two-thirds (72%) of the housing stock was comprised of single-family units. Only 18% of the housing was in the form of multi-unit developments, and 10% was in mobile homes.
- **2008 Housing Age:** Thirty percent of the housing units have been built since 1990.
- **2010 Median Housing Value:** The median value for single family housing is $156,900. Greater than 2/3 of the 249 homes for sale in 2010 are priced below $200,000. Prices for to be built homes within newly developing subdivisions are priced between $200,000 and $250,000.
- **Residential Construction:** New housing unit construction made up only 6% of the County's total from 2000 to 2010.

Employment

- **2008 Total Jobs:** In 2008, Arnold was the home for 10,320 jobs, the majority (88%) of which was private sector.
- **2008 Employment in Each Area by Industry Sector:** The majority of private sector jobs in Arnold were in sales (32%), followed by management/professional (26%).
- **Where Arnold Residents Work in 2007:** A majority of Arnold residents worked outside of the City, while only 17.7% of residents worked in the City.

Implications for Development

- In the future, vacant land within the City limits will diminish and there will be less variation within the population levels.
- The City should plan for multi-unit, age restricted housing. This would allow for older people to move out and would free up existing housing for younger families
- The low income housing market indicates the need for 50-100 units of housing for households with incomes <60% of the median.
- At least 1,000 households would be eligible for the Low-Income Housing Tax Credit.

The City of Arnold, Missouri is a suburban community located in northeast Jefferson County approximately fifteen miles southwest of downtown St. Louis. Missouri. Jefferson County is one of four counties which comprise the St. Louis Metropolitan Region.

The City of Arnold is a growing community. During the past decade over 700 single family homes were constructed, which increased the city's population and number of households. We estimated that Arnold's 2010 population is approximately 21,652, which represents an 8.45 percent increase from 2000. Similarly, the number of households increased to approximately 8,202 which is an 8.63 percent increase. The City of Arnold remains the largest city in Jefferson County. In 2000, 10% of Jefferson County's population lived in Arnold. However, over the next decade, only 6% of the county's new housing units were constructed in Arnold and by 2010, the City's population was 9.65 of the county's population.

Population

Arnold population is 98 Caucasian, 1 percent is two or more races, and 1 percent is black, American Indian, Asian, Pacific Islander or another race.

Exhibit 1.
Population and Households
City of Arnold and Jefferson County

	2000	2010 (est.)	Percent Change 00–10
City of Arnold			
Population	19,965	21,652	8.45%
Households	7,550	8,202	8.63%
Persons per Household	2.64	2.64	
Jefferson County			
Population	198,099	223,909	13.03%
Households	71,499	80,834	13.06%
Persons per Household	2.77	2.77	

Sources: U.S. Census; Claritas; Missouri Economic Research and Information Center; Eats and West Gateway Council; St. Louis Chamber and Growth Association; Home Builders Association of St. Louis & Eastern Missouri
Applied Real Estate Analysis, Inc.

Over the next decade, growth in Jefferson County is expected to slow down. Although it appears that the St. Louis Metropolitan Area may have gained population over the past decade, much of the growth is occurring in St. Louis and St. Charles counties. In Jefferson County, the population in areas outside of Arnold will continue to grow faster than in Arnold. As the amount of vacant land available for development diminishes over the next 20 years, in-migration will begin to slow and, with an aging population, the ratio of births to deaths will even out and reduce the rate of natural population increase.

Exhibit 1a.
Population of Arnold Compared to U. S. Population

City of Arnold	2000	2010 est.	Percent Change 2000-2010
Population	19,965	21,652	8.45%
Households	7,550	8,202	8.63%
United States			
Population	282,171,957	309,660,929	9.7%
Households	105,480,101	114,503,898	7.9%

Sources: U.S. Census, Claritas, Applied Real Estate Analysis, Inc

Exhibit 2.
Population Growth Estimates
Arnold and Jefferson County, 2010-2020

	2010	2020	Percent Change
Arnold	21,652	22,435	3.50%
Jefferson County	223,909	244,061	9.00%

Sources: U.S. Census, Claritas, Applied Real Estate Analysis, Inc

Household Income

The City of Arnold is a mainly middle class community with a median household income of approximately $59,350. Approximately 25% percent of the City's households earn between $50,000 and $75,000.

Exhibit 3.
Household Income, City of Arnold 2010 (estimated)

	Number	Percent		
City of Arnold			*Jefferson Co*	*United States*
$Less than $14,999	478	5.8%	7.7%	13.5%
$15,000 to $24,999	662	8.1%	7.9%	11.2 %
$25,000 to $34,999	881	10.7%	10.1%	10.9%
$35,000 to $49,999	1,386	16.9%	15.8%	14.4%
$50,000 to $74,999	2,008	24.5%	24.0%	18.3%
$75,000 to $99,999	1,217	14.8%	16.4%	12.0%
$100,000 and over	1,570	19.1%	18.1%	19.7%
Total Households	8,202			
Average Household Income	$67,160		$67,400	$69,180
Median Household Income	$59,350		$58,760	$50,890

Sources U.S. Census, Claritas, Applied Real Estate Analysis, Inc.

Arnold's population is slightly older than the population of the St. Louis Metropolitan Area which, in turn, has a population that is, on average, older than that of the United States. Over 18% of the population in Arnold is age 45 to 64 in 2010. Thus over the next 20 years, there will be a significant growth number of persons over the age of 65.

Exhibit 4.
Age Distribution 2010, Arnold, St. Louis Metropolitan Area and the United States (estimated)

	Number	Percent		
City of Arnold			*St. Louis Metro*	*United States*
Age 17 and under	4,937	22.8%	23.9%	24.3%
Age 18 - 20	786	3.6%	3.9	4.5 %
Age 21 - 24	1,026	4.7%	5.2%	5.5%
Age 25 - 34	2,975	13.7%	13.3%	13.5%
Age 35 - 44	2,878	13.3%	13.2%	13.6%
Age 45 - 54	3,412	15.8%	14.1%	14.5%
Age 55 - 64	2,665	12.3%	11.6%	11.3%
Age 65 - 74	1,732	8.0%	5.1%	6.8
Age 75 - 84	935	4.3%	4.4	4.3
Age 85 and over	295	1.4%	2.1	1.8
Age 65 and over	2,962	13.7%	13.2%	12.9%

Sources U.S. Census, Claritas, Applied Real Estate Analysis, Inc.

Educational Attainment

Educational attainment for Arnold residents 25 years or older is slightly varied. The highest level of educational attainment for 37.8 percent of this group is a high school diploma or equivalent, while the highest level for 32 percent is some college or an associate degree. Approximately 13.2 percent of persons in the Arnold 25 years older have earned a bachelor's degree or higher. Overall, Arnold's residents tend to have lower educational attainment compared to the rest of Missouri. The highest level of attainment for 32.7 percent of Missouri residents is high school diploma or equivalent, while the highest for 27 percent of Missourians is some college or an associate's degree. Roughly 21 percent of Missouri residents 25 years old or older have earned a bachelor's degree or higher.

The education attainment levels coincide with the historic image of Arnold as a blue collar community. Newer residents, many of whom have arrived over the past decade, tend to be more educated and slightly more affluent than the long-time Arnold residents.

Exhibit 5.
Educational Attainment of Persons 25 Years and Over
City of Arnold

	2010 (est.)	
	Count	%
Less than 9th Grade	850	5.8%
Some High School, No Diploma	1744	11.9%
High School diploma or Equivalent	5541	37.8%
Some College, No Degree	3386	23.1%
Associate Degree	1202	8.2%
Bachelor's Degree	1539	10.5%
Graduate or Professional Degree	396	2.7%
Total	**14,659**	

Sources: U.S. Census; Claritas; Applied Real Estate Analysis, Inc.

Natural Resources

The purpose of a natural resource inventory is to create a base of information on natural communities and major topographic features present within the planning boundaries. The inventory will be used as a guide to define areas that should be designated for future development planning. With this goal in mind, the inventory is geared towards gaining a better understanding of the topographic features, watersheds and riparian (streamside) zones, and vegetative cover present.

The City of Arnold lies within the Ozark Highlands Ecoregion. This section of the ecoregion is characterized by the dissected hills of the Mississippi and Missouri Rivers and the rugged hills of the Meramec River. Local relief averages 100 to 150 feet with broad, loess covered ridges (fine grained silt sized material deposited by wind) giving way to steep slopes and broad valleys. Slopes within a majority of the City (78.3%) are 8% or less, 21.5% with slopes between 8 and 30%, and the remainder of the City having slopes greater than 30%.

Watersheds and Riparian Zones

- The Lower Meramec River Watershed encompasses the City. Rock Creek Watershed, a sub-watershed of the Joachim Creek Watershed, borders the southern end of the City. Including the City of Arnold, the Meramec River drains approximately 15% of Jefferson County.
- Stream valleys are deeply entrenched resulting in the regular exposure of bedrock. Streams are subject to flash flooding and back flooding during high river stages.
- Streambank instability is visible along streams throughout the City and the Meramec River.
- Riparian (streamside) vegetation zones vary in width and type of vegetation present throughout the City.

Floodplains and Wetlands

- Less than one-third (22%) of the land within the 11.5-square mile city limits is within the regulated 100-year floodplain. Only 3% of the City's land area is within the 500-year floodplain.
- While a majority of the floodplain (69%) consists of slopes that are 0-8%, this is only 20% of the total 0-8% slopes within the City.
- The City's Floodplain Management Ordinance identifies the area within the 100-year floodplain as an "Area of Special Flood Hazard" and provides limitations on development within this area for the purpose of promoting the health, safety, and general welfare of the public.
- Current zoning encompasses 78% of the total 100-year floodplain identified in the natural resource inventory.

- The U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) map indicates the location of most wetlands to be within the general limits of the 100- and 500-year floodplains and along streams.
- Development potential in and around streams and wetlands is limited and must not result in adverse impacts to these natural systems. Any development within the area that would impact these systems would require permits from the U.S. Army Corps of Engineers and the Missouri Department of Natural Resources.

Vegetation

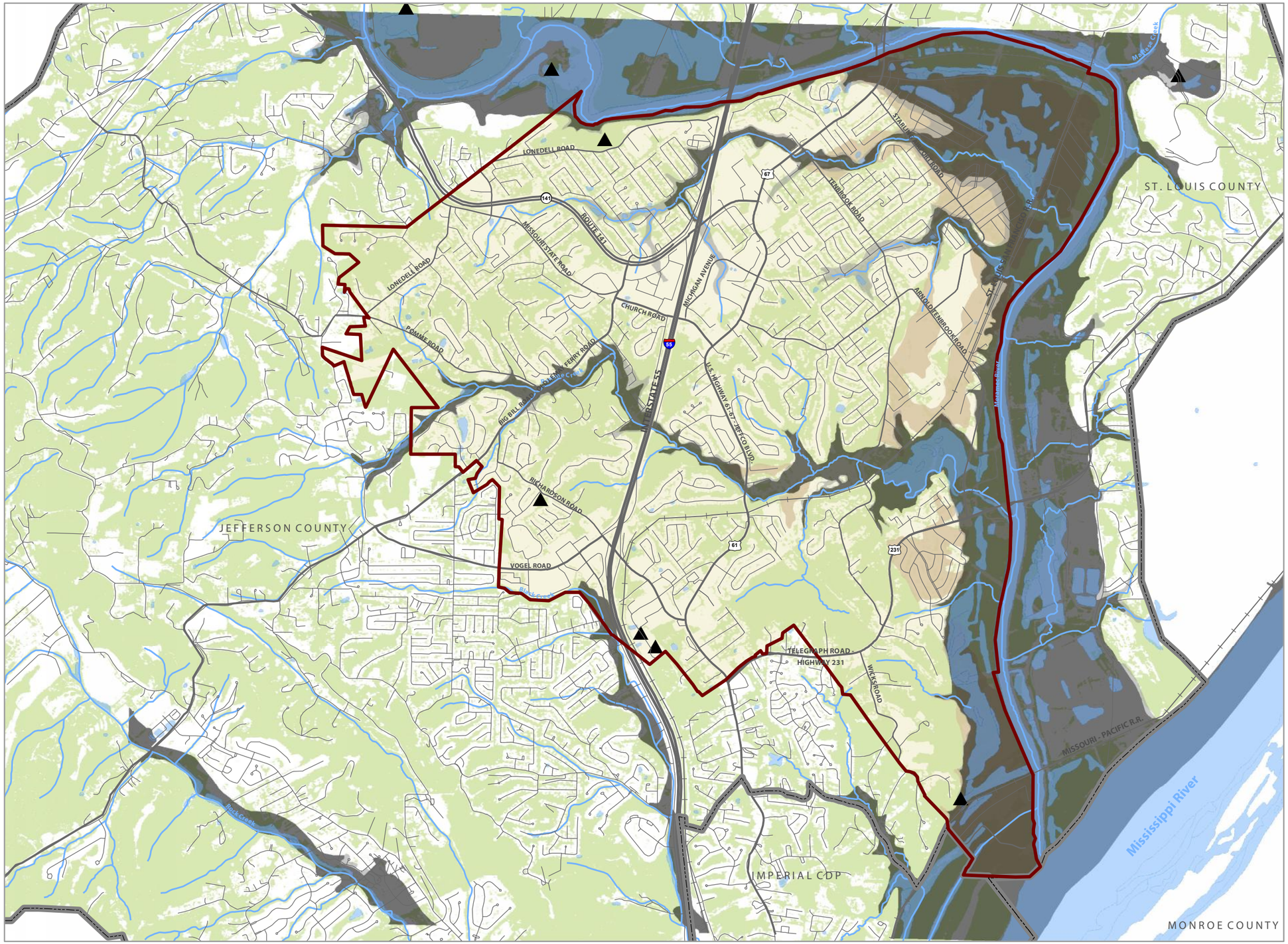
- Historically, the area was covered in oak and mixed-hardwood forest with prairie openings on uplands. Glades and sinkholes were locally abundant. Vegetation within the historic landscape predominantly fell into upland and wetland systems.
- Today, most of the rugged sections are still timbered in second-growth and mixed-oak hardwood forest. Deciduous forest accounts for 49% of the land cover within the City. Approximately two-thirds (31%) of the forest cover is outside of the floodplain and 14% of this is on slopes greater than 8%.
- The broad bottomlands and low-relief uplands have been converted to cropland, pasture, or urban development.

Landfills, Underground Storage Tanks, and Mines

- The Missouri Department of Natural Resources (MDNR) website including the MDNR Registry of Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri, were utilized to provide the following information.
- There are operating or abandoned landfills recorded within the City of Arnold or the study area.
- There are a total of 23 underground storage tanks within the City of Arnold and 5 additional tanks within the overall study area. More than half of the tanks within the City limits are associated with gas stations.
- Mining in Missouri includes mining for industrial minerals such as gravel, limestone, granite, trap rock, tar sands, clay, barite, sandstone, oil shale, sand and shale.
- There are 5 mine sites listed by the MDNR within the Arnold City limits.

Implications for Development

- Protect existing resources through incentives and ordinances.
- Minimize fragmentation of contiguous patches of vegetation, especially forests. These are of the greatest benefit providing protection for streams from stormwater runoff, wildlife habitat, and recreational amenities. Large patches of forest can assist in reducing the heat island effect of urban areas and sequester carbon thus reducing the City's carbon footprint.
- Expand riparian corridor vegetation (especially trees and shrubs) to more effectively buffer and protect stream stability and water quality.
- Maintain connectivity between resources (greenways and riparian corridors) for wildlife and recreational use.
- Consider utilizing resources near schools for "outdoor classrooms".



City of Arnold, MO

Existing Natural Resources

- City of Arnold
- City Limit
- Other Jurisdictions
- Waterbodies and Wetlands
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads
- Hydric Soils
- Deciduous Forest
- Mining

Flood Zone

- 100-Year Floodplain
- 500-Year Floodplain

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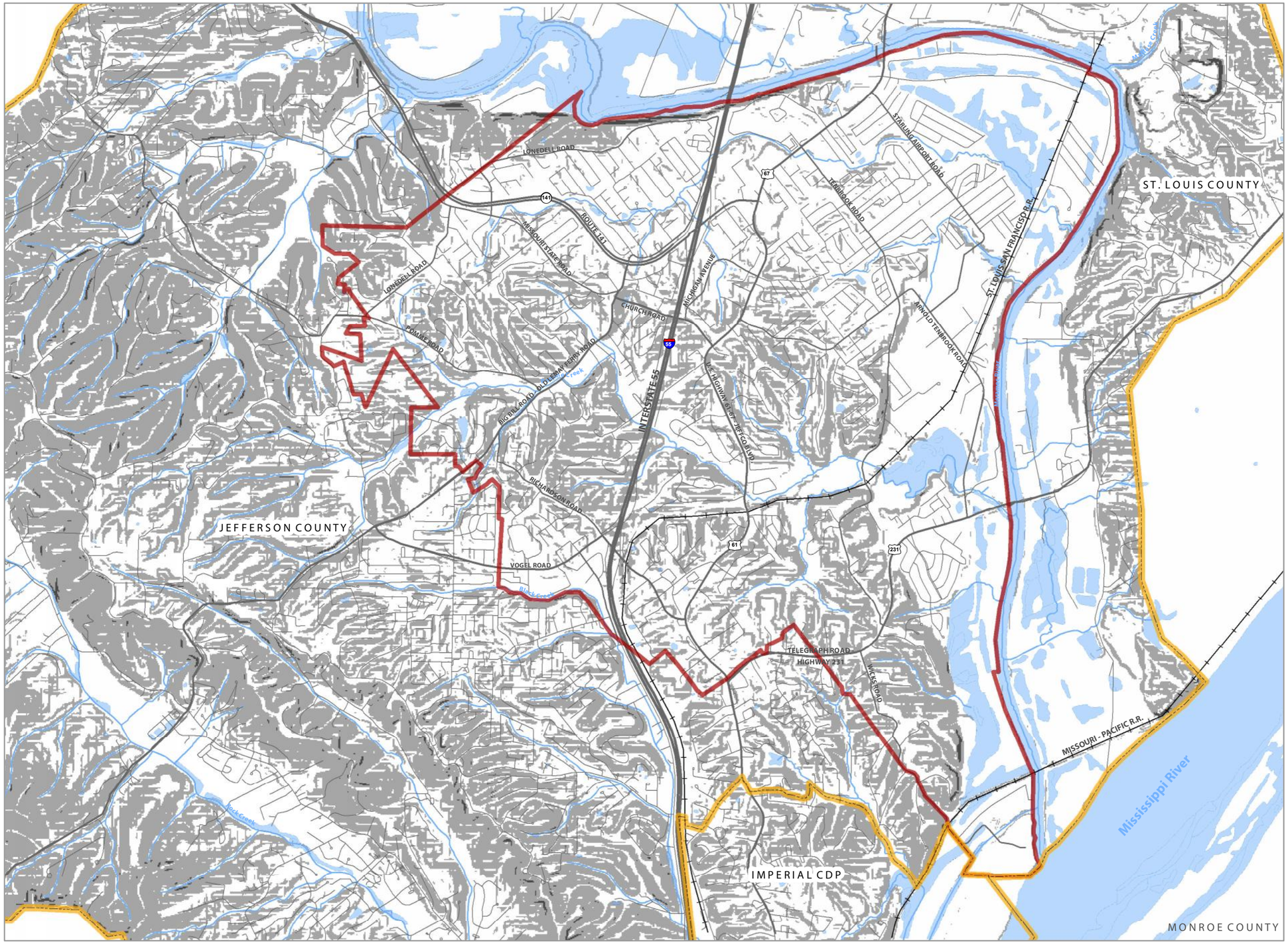

City of Arnold, MO

Existing Slopes

- City Limit
- Other Jurisdictions
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

Slopes

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- 8.330000001 - 30
- 30.00000001 - 56.75060654

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ACRES

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0 0.25 0.5 1 Miles

Parks and Open Space

- The park system for the City of Arnold comprises over 400 acres with four City owned parks, one golf course, and two State owned properties. The parks range in size from the 25 acres (Ferd B. Land and David Collins) to 121 acres (Strawberry Creek Nature Area).
- State owned land (Teszars Woods Conservation Area and Flamm City Access) provide an additional 90 acres of natural open space within the City of Arnold. Teszars Woods adjoins Flamm City, David R. Collins, and the Ziegler tract.
- Three of the four parks (Arnold, Ferd B. Lang, and Flamm City) and the golf course are all located within the 100-year floodplain.
- Ferd B. Lang is the only city park located west of I-55.
- Two private parks are located within City limits. Ronquest Field is a small neighborhood sized park (6.5 acres) owned by the Catholic Church. Arnold Authority Association Fields is a community sized park (22 acres) that is leased from the Public Water District and managed by the Arnold Athletic Association.
- Strawberry Creek Nature Area and Flamm City/Teszars Woods provide the largest blocks of natural open space within city limits, not including the Meramec Greenway. The City has partnered with the Missouri Department of Conservation for management assistance for Strawberry Creek.
- The Pomme Creek Golf Course provides over 119 acres of open space in the southeastern portion of the City. Pomme Creek flows through the golf course.

- The National Recreation and Parks Association (NPRA) classification system of 1996 serves as a recreational guideline for parkland relative to population. The system describes several categories of parks, recreational areas and open spaces, which in combination make up a unified municipal park network. There are generally three park classifications in the national standards that pertain to Arnold.

Exhibit 6

(National Standards for Parkland Area (National Recreation and Parks Association)

Park Type	Acreage	Acreage/1000 People	Existing Parks (Acres)	Park Needs (Acres)
Neighborhood	**1-10**	**1-2**	**0**	**22-43**
Community	**10-50**	**5-8**	**93**	**15-80**
District	**75-200**	**5-10**	**391**	**0**

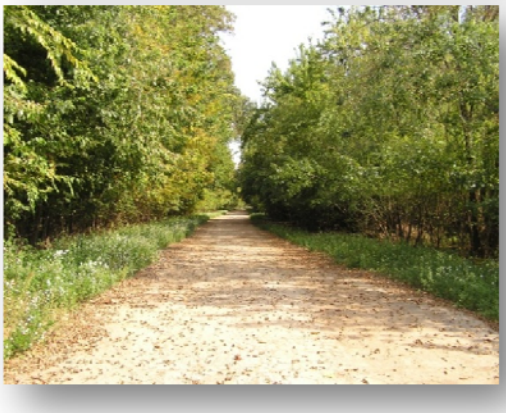
Based on an estimated 2010 population for Arnold of 21,570.

- While Flamm City and David R. Collins Parks would individually fall within the Community Parks category, their adjacency to Teszars Woods Conservation Area places the whole park complex within the district park category.
- Flamm City provides the primary point of access for boaters to the Meramec River. A secondary access point is located on the northern side of Arnold City Park, just south of the JeffCo Blvd bridge. This secondary access does not appear to be maintained with the park, as is the case with the Flamm City Access.
- Amenities within the parks generally include: shelters, picnic areas, ponds, playgrounds, athletic fields and tennis courts, parking lots, and trails.
- Arnold's Recreation Center is located on the northwestern side of the City.
- There is a notable lack of parkland on the western side of the City. Ferd B. Lang is the only park west of I-55 and by size is a community park. Neighborhood parks are absent throughout the City.
- The 425-acre Mastodon State Historic Site, owned and managed by the Missouri Department of Natural Resources, is located approximately 1.5 miles south of the City of Arnold off of I-55.

Trails and Greenways

- The "Arnold Meramec River Greenway Master Plan" (Master Plan) was adopted by the City in November 1999. The Master Plan was developed in a "continuing effort to establish the Meramec River floodplain as a public-use oriented greenway".
- The Meramec Greenway is adjacent to 8 miles of the Meramec River and comprises approximately 1,597 acres (94%) of the 1,694 acres of 100-year floodplain located within the Arnold city limits.
- The Master Plan includes close to 30 miles of trails throughout the City including: sidewalks (6 miles); loop (6 miles) and connector (10 miles) trails, and the main greenway trail (6 miles).
- The newer residential subdivisions on the western side of the City have sidewalks that assist in making the neighborhoods walkable and providing connectivity. Residential neighborhoods on the eastern side of the city generally lack sidewalks.

Implications for Development



- There is a large gap in service with regards to the amount of parkland, open space, greenways, and trails between the western and eastern sides of the City.
- A park master plan needs to be developed to identify and prioritize parkland acquisition. Neighborhood parks are the City's greatest deficiency according to national parkland recommendations.
- Consider parkland dedication requirements to assist with acquisition and/or funding.
- As infill and redevelopment occurs ensure accessibility through sidewalks and connections to trails and greenways.
- As streets are built or renovated, consider parkways or boulevards as a means of increasing open space, providing traffic calming and pedestrian access/trails, and managing stormwater runoff.

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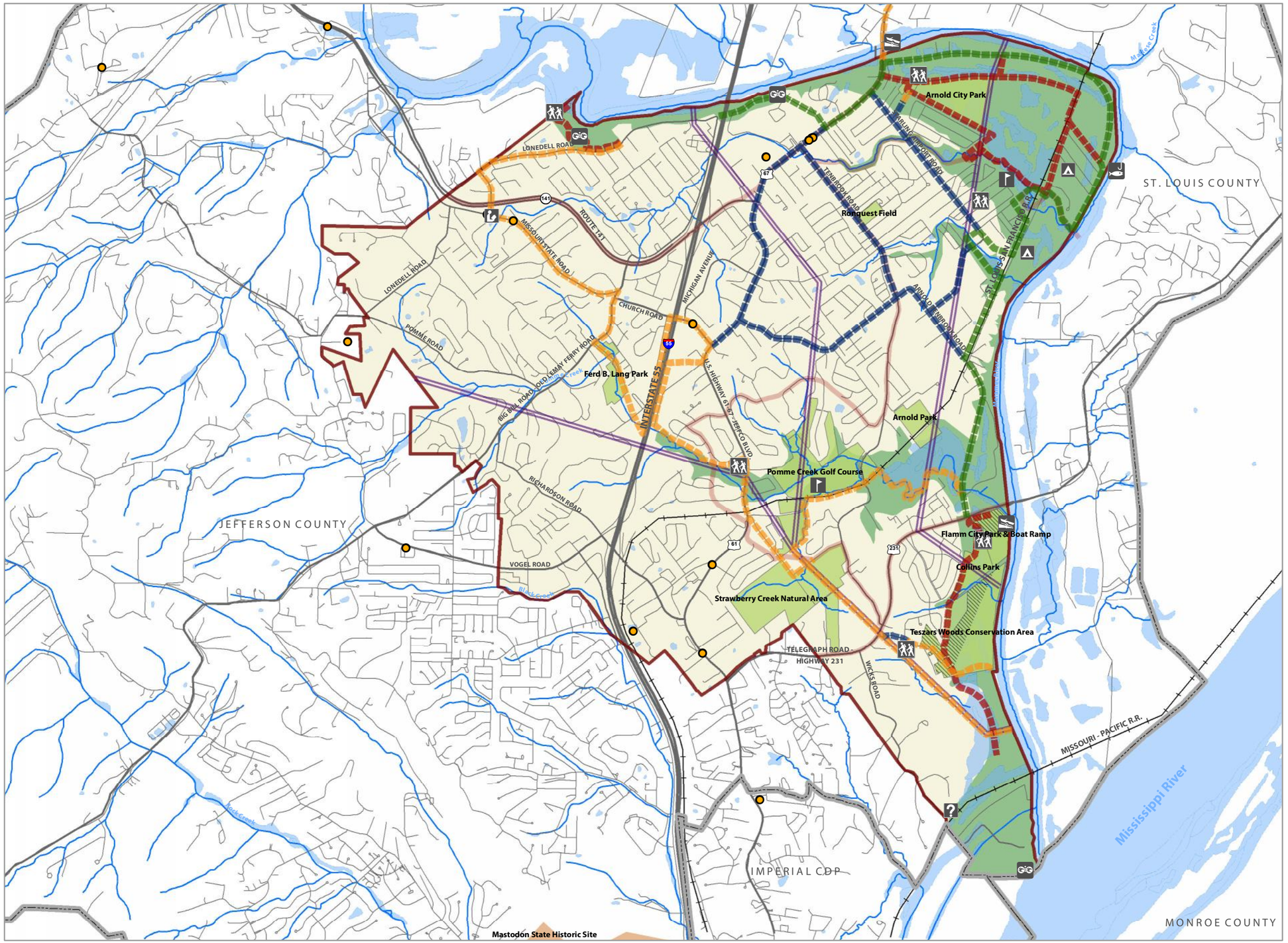


City of Arnold, MO

Existing Parks, Open Space & Greenways

- City of Arnold
- City Boundary
- Other Jurisdicitons
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads
- Schools
- Meramec Greenway
- Parks and Recreation
- Conservation Area
- DNR Lands
- Sidewalk Connector Trail
- Loop Trail
- Connector Trails
- Main Greenway Trail
- Utility Corridor
- Planning Districts

Landmarks

- Boat Ramp
- Camping Area
- Fishing Access
- Golf Course
- Information Center
- Library
- Scenic Overlook
- Trailhead

50
10
ACRES

N

0 0.25 0.5 1 Miles

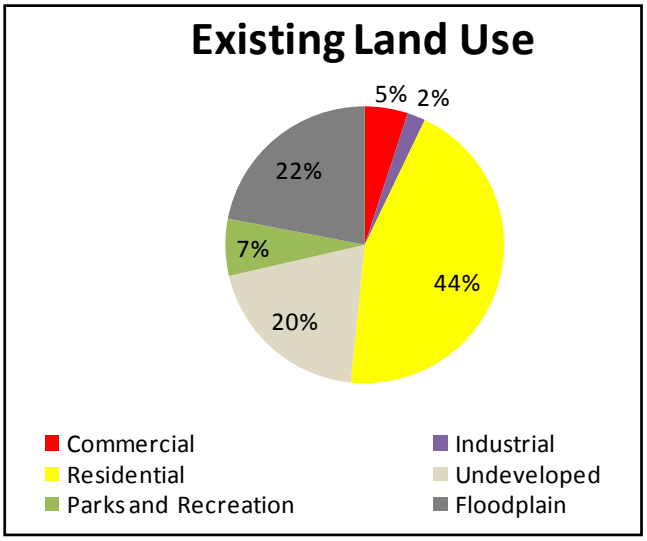
Existing Land Use

Residential uses make up almost 45% of the City. Undeveloped lands include vacant land and land set aside for the transportation network right-of-way. Vacant lands are primarily those with challenging site characteristics such as steep topography and areas within limited access to roadways.

Exhibit 7

Category	Acres	Square Miles	Percent of Total
Residential	3281.34	5.13	44.53
Floodplain	1619.15	2.53	21.96
Undeveloped	1459.41	2.28	19.80
Parks and Recreation	489.96	0.76	6.60
Commercial	368.89	0.58	5.03
Industrial	154.45	0.24	2.08
Total	7373.20	11.52	100.00

Exhibit 8



Existing Zoning

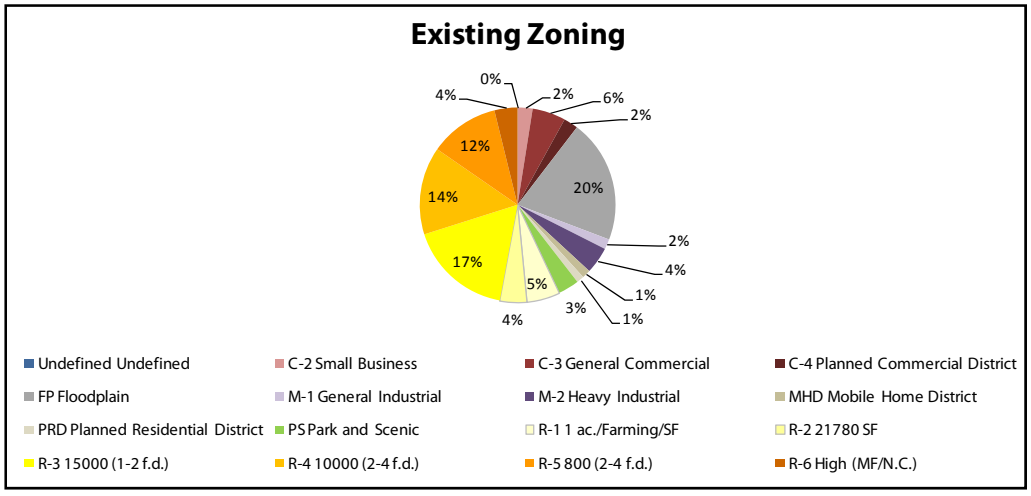
The majority or 2/3rds, (nearly 60 percent [59.63%]), of the area is zoned for residential uses. The second largest zoning category is Floodplain with slightly over 20% of the land area. Only 10 percent (10.37%) of the City is zoned commercial. The trend in recent rezoning has been toward increasing the density and intensity of uses at highway interchanges, e.g. At US-55. Existing zoning in the City is not consistent with existing land uses.

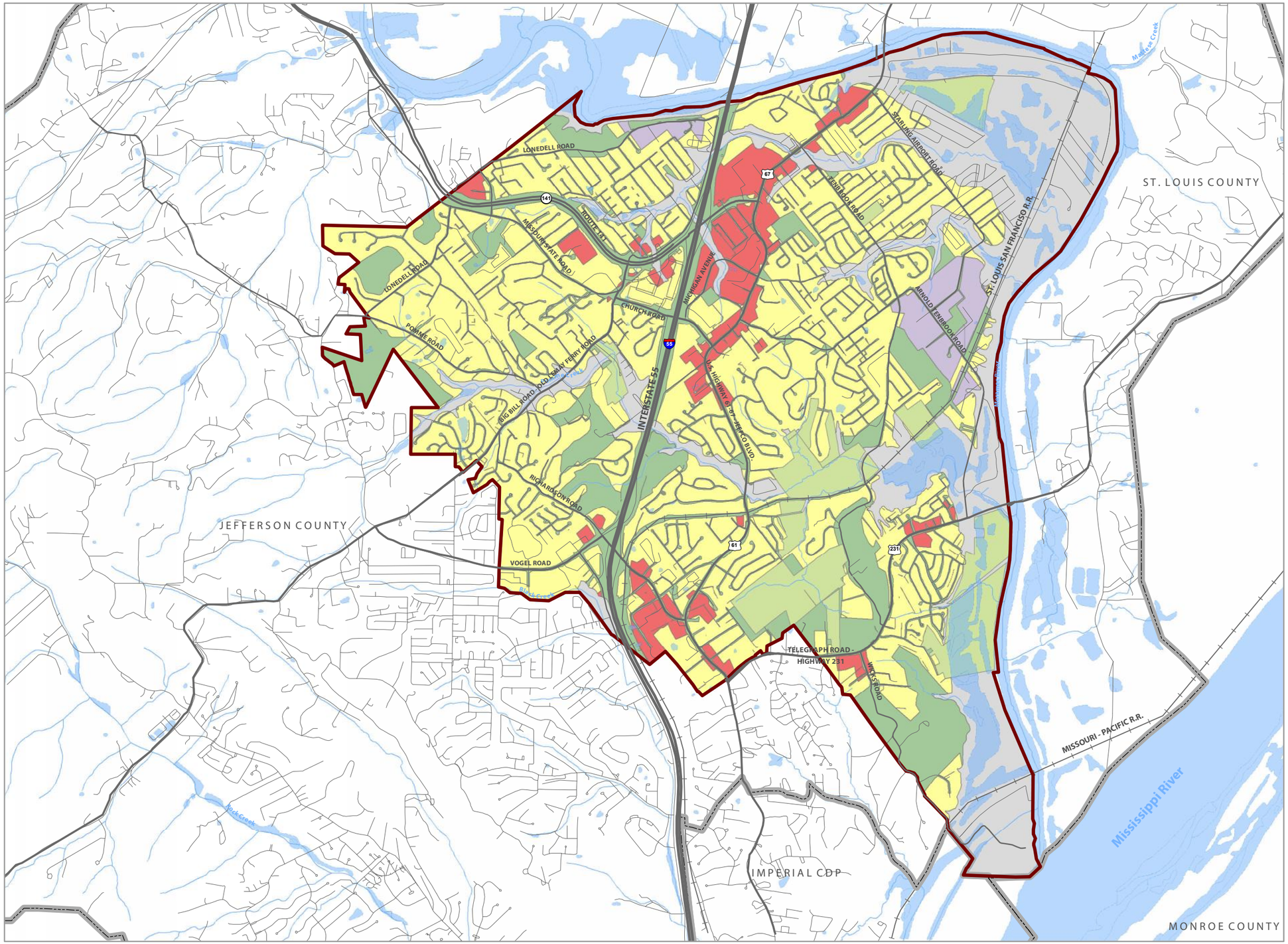
Exhibit 9

Zoning	Category	Acres	Square Miles	% of Total
Undefined	Undefined	1.72	0.00	0.03
C-2	Small Business	156.63	0.24	2.45
C-3	General Commercial	353.05	0.55	5.52
C-4	Planned Commercial District	153.25	0.24	2.40
FP	Floodplain	1302.10	2.03	20.36
M-1	General Industrial	107.81	0.17	1.69
M-2	Heavy Industrial	283.34	0.44	4.43
MHD	Mobile Home District	90.61	0.14	1.42
PRD	Planned Residential District	76.80	0.12	1.20
PS	Park and Scenic	223.38	0.35	3.49
R-1	1 ac./Farming/SF	350.61	0.55	5.48
R-2	21780 SF	286.03	0.45	4.47
R-3	15000 (1-2 f.d.)	1098.60	1.72	17.18
R-4	10000 (2-4 f.d.)	926.70	1.45	14.49
R-5	800 (2-4 f.d.)	738.34	1.15	11.55
R-6	High (MF/N.C.)	245.51	0.38	3.84
Total		**6394.48**	**9.98**	**100.00**

Note: Does not include ROW.

Exhibit 10





City of Arnold, MO

Existing Generalized Land Use

- City Limit
- Other Jurisdictions
- Parks and Recreation
- Waterbodies
- Streams
- Floodplain
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

Generalized Land Use

- Commercial
- Industrial
- Residential
- Undeveloped

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ACRES

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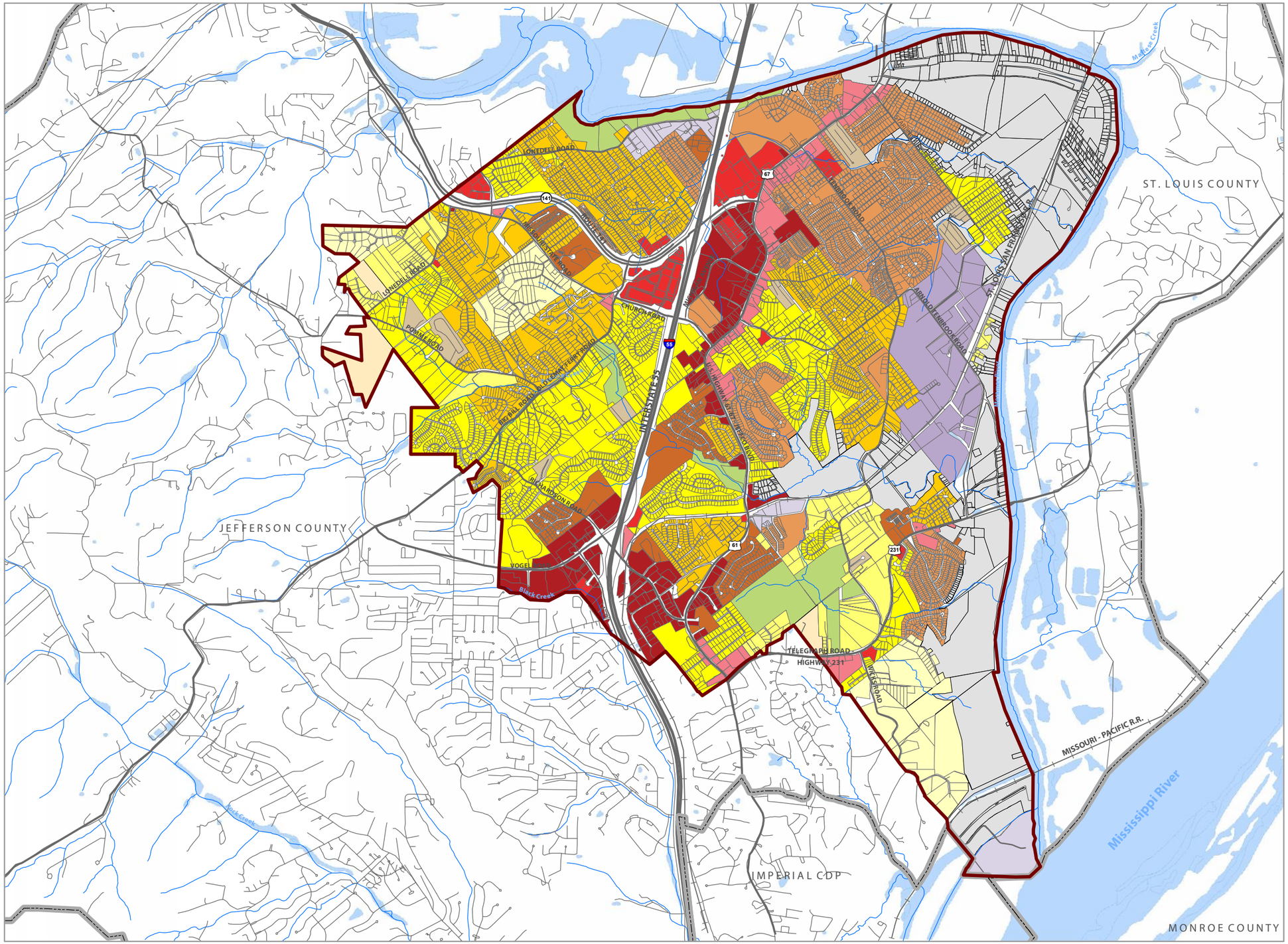

City of Arnold, MO

Existing Zoning

- City Limit
- Other Jurisdictions
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

Zoning

- M-3 Planned Industrial
- C-1 Neighborhood Commercial
- C-2 Small Business
- C-3 General Commercial
- C-4 Planned Commercial District
- FP Floodplain
- M-1 General Industrial
- M-2 Heavy Industrial
- MHD Mobile Home District
- PRD Planned Residential District
- PS Park and Scenic
- R-1 1 ac./Farming/ SF
- R-2 21780 SF
- R-3 15000 (1-2 f.d)
- R-4 10000 (2-4 f.d)
- R-5 800 (2-4 f.d)
- R-6 High (MF/ N.C.)

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ACRES

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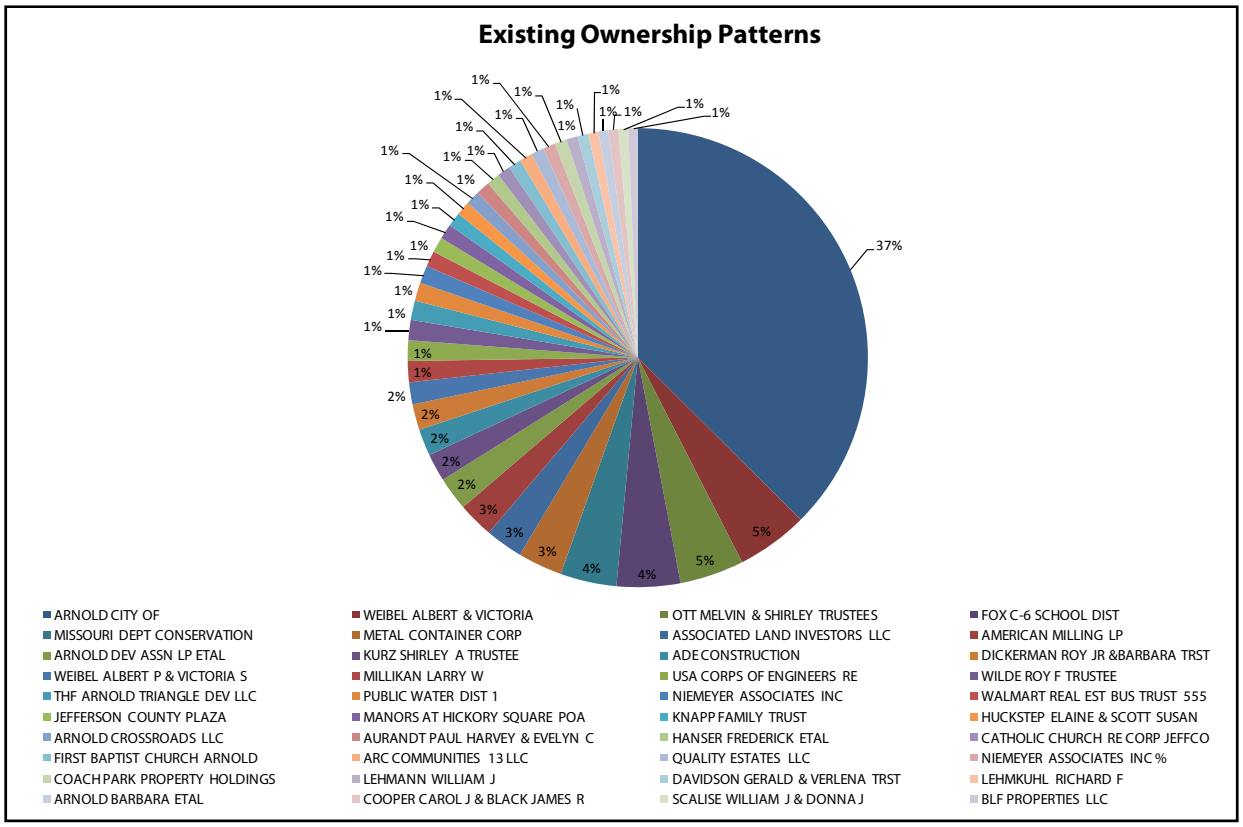
Existing Ownership Patterns

Forty different land owners own approximately 30 percent of the property in the City. Most currently serve commercial uses. The majority of the City has been fragmented into smaller individually owned parcels.

Exhibit 11

#	Owner	Acres	% City Acres	Parcels	% Parcels
1	ARNOLD CITY OF	840.11	11.39%	437	4.64%
2	WEIBEL ALBERT & VICTORIA	112.85	1.53%	8	0.08%
3	OTT MELVIN & SHIRLEY TRUSTEES	100.91	1.37%	2	0.02%
4	FOX C-6 SCHOOL DIST	100.02	1.36%	5	0.05%
5	MISSOURI DEPT CONSERVATION	88.68	1.20%	10	0.11%
6	METAL CONTAINER CORP	70.10	0.95%	1	0.01%
7	ASSOCIATED LAND INVESTORS LLC	59.15	0.80%	2	0.02%
8	AMERICAN MILLING LP	56.45	0.77%	6	0.06%
9	ARNOLD DEV ASSN LP ETAL	52.75	0.72%	3	0.03%
10	KURZ SHIRLEY A TRUSTEE	43.81	0.59%	1	0.01%
11	ADE CONSTRUCTION	42.31	0.57%	2	0.02%
12	DICKERMAN ROY JR &BARBARA TRST	40.63	0.55%	3	0.03%
13	WEIBEL ALBERT P & VICTORIA S	34.89	0.47%	3	0.03%
14	MILLIKAN LARRY W	33.34	0.45%	7	0.07%
15	USA CORPS OF ENGINEERS RE	32.27	0.44%	1	0.01%
16	WILDE ROY F TRUSTEE	31.82	0.43%	10	0.11%
17	THF ARNOLD TRIANGLE DEV LLC	30.67	0.42%	37	0.39%
18	PUBLIC WATER DIST 1	28.92	0.39%	5	0.05%
19	NIEMEYER ASSOCIATES INC	27.77	0.38%	3	0.03%
20	WALMART REAL EST BUS TRUST 555	24.88	0.34%	3	0.03%
21	JEFFERSON COUNTY PLAZA	24.34	0.33%	6	0.06%
22	MANORS AT HICKORY SQUARE POA	24.00	0.33%	5	0.05%
23	KNAPP FAMILY TRUST	22.23	0.30%	1	0.01%
24	HUCKSTEP ELAINE & SCOTT SUSAN	22.11	0.30%	8	0.08%
25	ARNOLD CROSSROADS LLC	21.95	0.30%	2	0.02%
26	AURANDT PAUL HARVEY & EVELYN C	21.85	0.30%	5	0.05%
27	HANSER FREDERICK ETAL	20.55	0.28%	4	0.04%
28	CATHOLIC CHURCH RE CORP JEFFCO	20.46	0.28%	3	0.03%
29	FIRST BAPTIST CHURCH ARNOLD	20.36	0.28%	3	0.03%
30	ARC COMMUNITIES 13 LLC	20.32	0.28%	5	0.05%
31	QUALITY ESTATES LLC	19.97	0.27%	8	0.08%
32	NIEMEYER ASSOCIATES INC %	19.37	0.26%	2	0.02%
33	COACH PARK PROPERTY HOLDINGS	19.31	0.26%	1	0.01%
34	LEHMANN WILLIAM J	17.53	0.24%	1	0.01%
35	DAVIDSON GERALD & VERLENA TRST	17.36	0.24%	1	0.01%
36	LEHMKUHL RICHARD F	16.01	0.22%	2	0.02%
37	ARNOLD BARBARA ETAL	15.77	0.21%	1	0.01%
38	COOPER CAROL J & BLACK JAMES R	15.61	0.21%	2	0.02%
39	SCALISE WILLIAM J & DONNA J	15.11	0.20%	2	0.02%
40	BLF PROPERTIES LLC	14.91	0.20%	1	0.01%
	TOTAL	**2241.43**	**30.40%**	**612**	**6.50%**

Exhibit 12


Existing Ownership Patterns
37%
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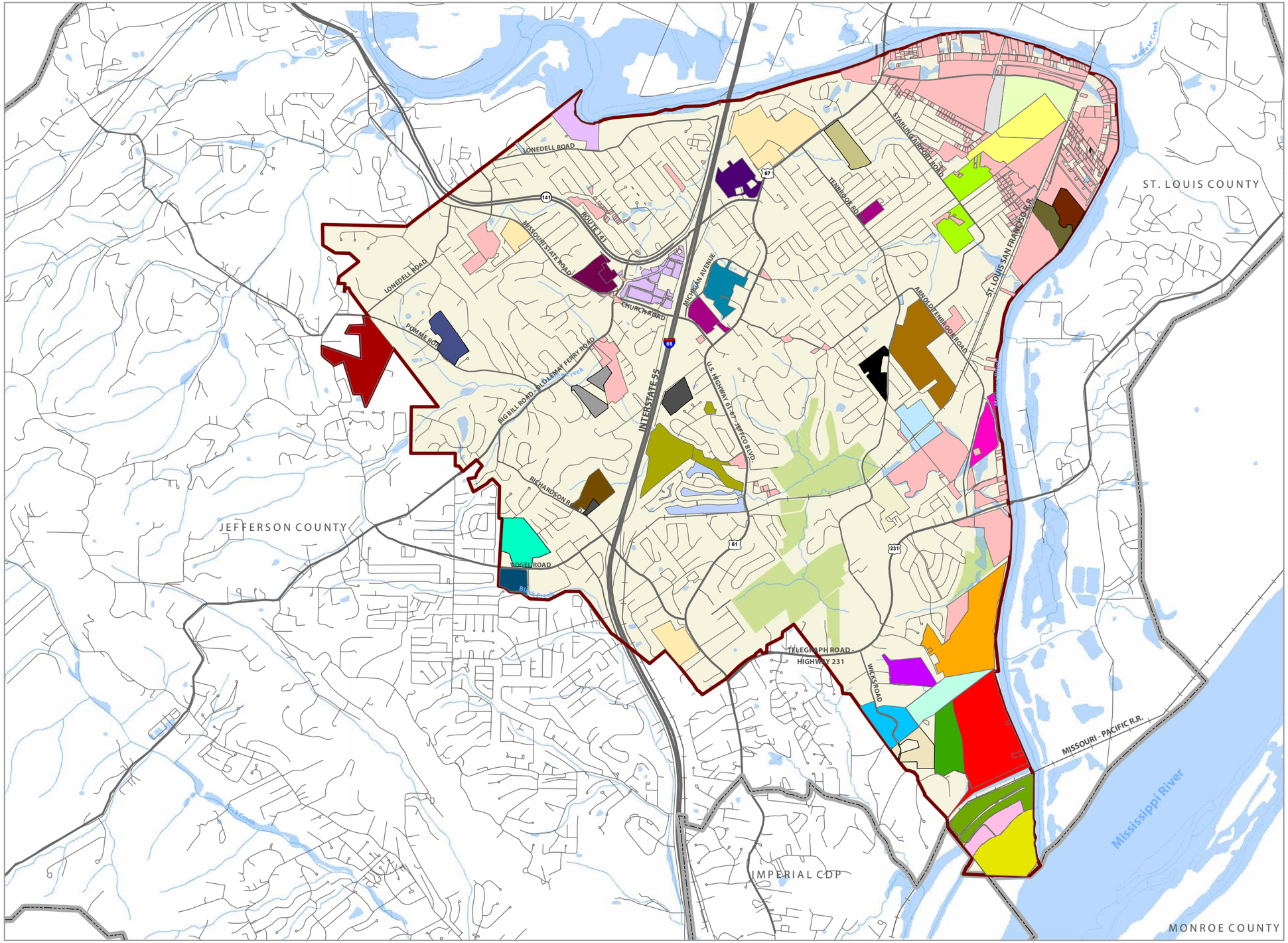
ARNOLD CITY OF
WEIBEL ALBERT & VICTORIA
OTT MELVIN & SHIRLEY TRUSTEES
FOX C-6 SCHOOL DIST
MISSOURI DEPT CONSERVATION
METAL CONTAINER CORP
ASSOCIATED LAND INVESTORS LLC
AMERICAN MILLING LP
ARNOLD DEV ASSN LP ETAL
KURZ SHIRLEY A TRUSTEE
ADE CONSTRUCTION
DICKERMAN ROY JR &BARBARA TRST
WEIBEL ALBERT P & VICTORIA S
MILLIKAN LARRY W
USA CORPS OF ENGINEERS RE
WILDE ROY F TRUSTEE
THF ARNOLD TRIANGLE DEV LLC
PUBLIC WATER DIST 1
NIEMEYER ASSOCIATES INC
WALMART REAL EST BUS TRUST 555
JEFFERSON COUNTY PLAZA
MANORS AT HICKORY SQUARE POA
KNAPP FAMILY TRUST
HUCKSTEP ELAINE & SCOTT SUSAN
ARNOLD CROSSROADS LLC
AURANDT PAUL HARVEY & EVELYN C
HANSER FREDERICK ETAL
CATHOLIC CHURCH RE CORP JEFFCO
FIRST BAPTIST CHURCH ARNOLD
ARC COMMUNITIES 13 LLC
QUALITY ESTATES LLC
NIEMEYER ASSOCIATES INC %
COACH PARK PROPERTY HOLDINGS
LEHMANN WILLIAM J
DAVIDSON GERALD & VERLENA TRST
LEHMKUHL RICHARD F
ARNOLD BARBARA ETAL
COOPER CAROL J & BLACK JAMES R
SCALISE WILLIAM J & DONNA J
BLF PROPERTIES LLC

City of Arnold, MO

Existing Ownership Patterns



- City of Arnold
- City Limit
- Other Jurisdictions
- Parks and Recreation
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

TOP 40 LANDOWNERS

- ARNOLD CITY OF
- WEIBEL ALBERT & VICTORIA
- OTT MELVIN & SHIRLEY TRUSTEES
- FOX C-6 SCHOOL DIST
- MISSOURI DEPT CONSERVATION
- METAL CONTAINER CORP
- ASSOCIATED LAND INVESTORS LLC
- AMERICAN MILLING LP
- ARNOLD DEV ASSN LP ETAL
- KURZ SHIRLEY A TRUSTEE
- ADE CONSTRUCTION
- DICKERMAN ROY JR & BARBARA TRST
- WEIBEL ALBERT P & VICTORIA S
- MILLIKAN LARRY W
- USA CORPS OF ENGINEERS RE
- WILDE ROY F
- PUBLIC WATER DIST 1
- NIEMEYER ASSOCIATES INC
- WALMART REAL EST BUS TRUST 555
- JEFFERSON COUNTY PLAZA
- MANORS AT HICKORY SQUARE POA
- KNAPP FAMILY TRUST
- HUCKSTEP ELAINE & SCOTT SUSAN
- ARNOLD CROSSROADS LLC
- AURANDT PAUL HARVEY & EVELYN C
- HANSER FREDERICK ETAL
- CATHOLIC CHURCH RE CORP JEFFCO
- FIRST BAPTIST CHURCH ARNOLD
- ARC COMMUNITIES 13 LLC
- QUALITY ESTATES LLC
- NIEMEYER ASSOCIATES INC %
- COACH PARK PROPERTY HOLDINGS
- LEHMANN WILLIAM J
- DAVIDSON GERALD & VERLENA TRST
- LEHMKUHL RICHARD F
- ARNOLD BARBARA ETAL
- COOPER CAROL J & BLACK JAMES R
- SCALISE WILLIAM J & DONNA J
- BLF PROPERTIES LLC
- THF ARNOLD TRIANGLE DEV LLC

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ACRES

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0 0.25 0.5 1 Miles

Existing Undeveloped Land

Maximum challenges to development are generally those with limited access, relatively poor location, moderate to steep slopes, irregular parcel shapes, and are more impacted by floodplains and streamways. Maximum opportunity areas with few constraints generally have good access and location, gentle slopes, good parcel size, favorable utility access, and variable vegetative cover.

As a first step, a broad conceptual analysis was conducted to evaluate the land use potential for the City by identify **existing undeveloped land**, including:

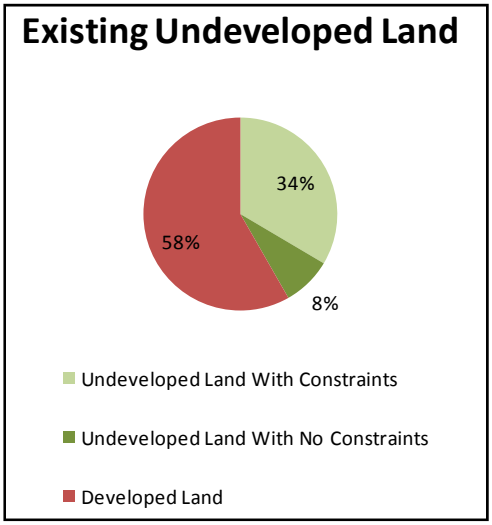
- Developed Land
- Undeveloped Land with Constraints
    - Including floodplain
    - Including transportation right of way
- Undeveloped Land with No "regulatory" Constraints

Almost 2/3rds or 58 percent of the City of Arnold includes developed lands comprised of commercial, residential, industrial, and parks & recreation lands. Undeveloped lands within the City of Arnold are uncharacteristically high, at 41 percent of the total land area, which is non-typical for most communities due to land values. Arnold, however, is rich with steep slopes and deep valleys, streamways and floodplains.

Exhibit 13

Existing Undeveloped Land	Acres
Developed Land	4294.56
Undeveloped Land With Constraints	2472.16
Undeveloped Land With No Constraints	606.41
Total	**7373.13**

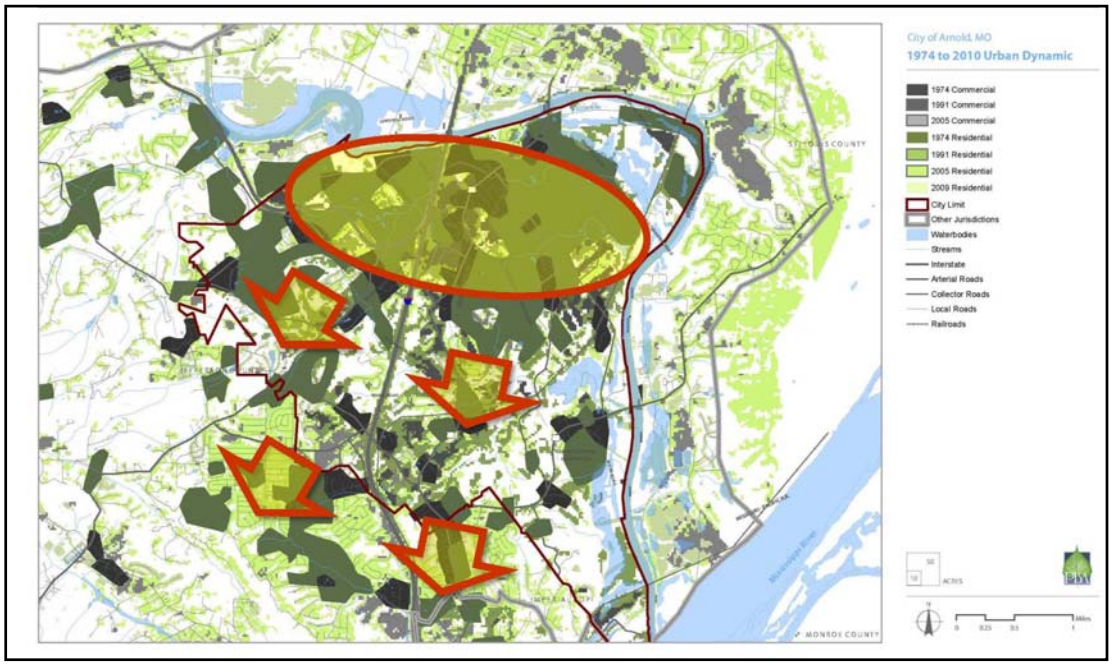
Exhibit 14



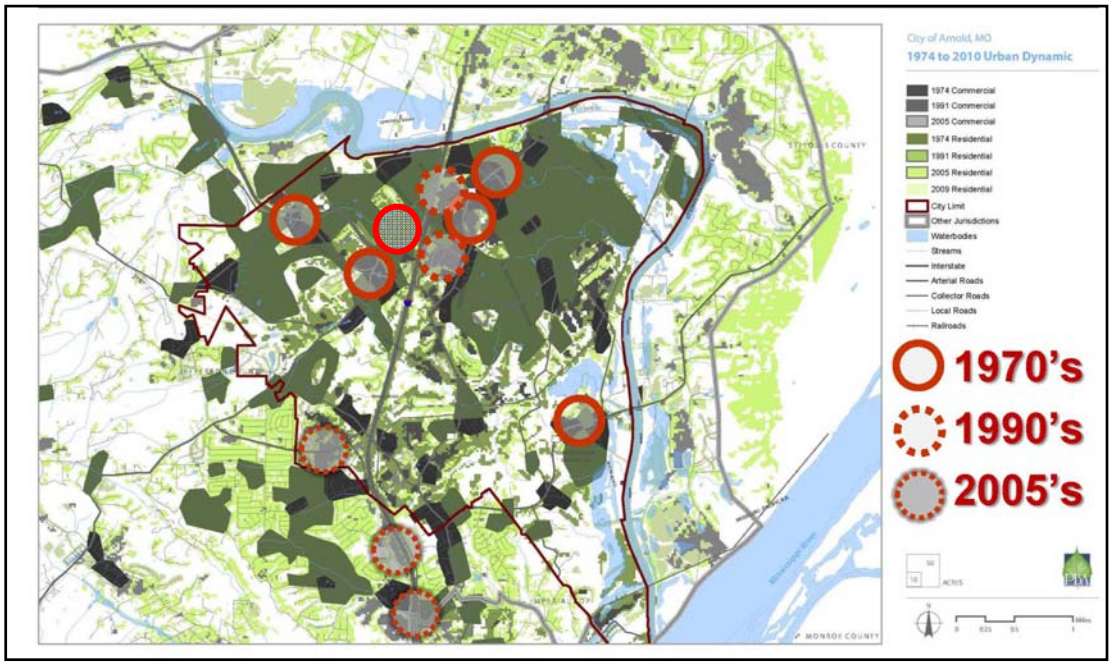
Land Consumption Trends

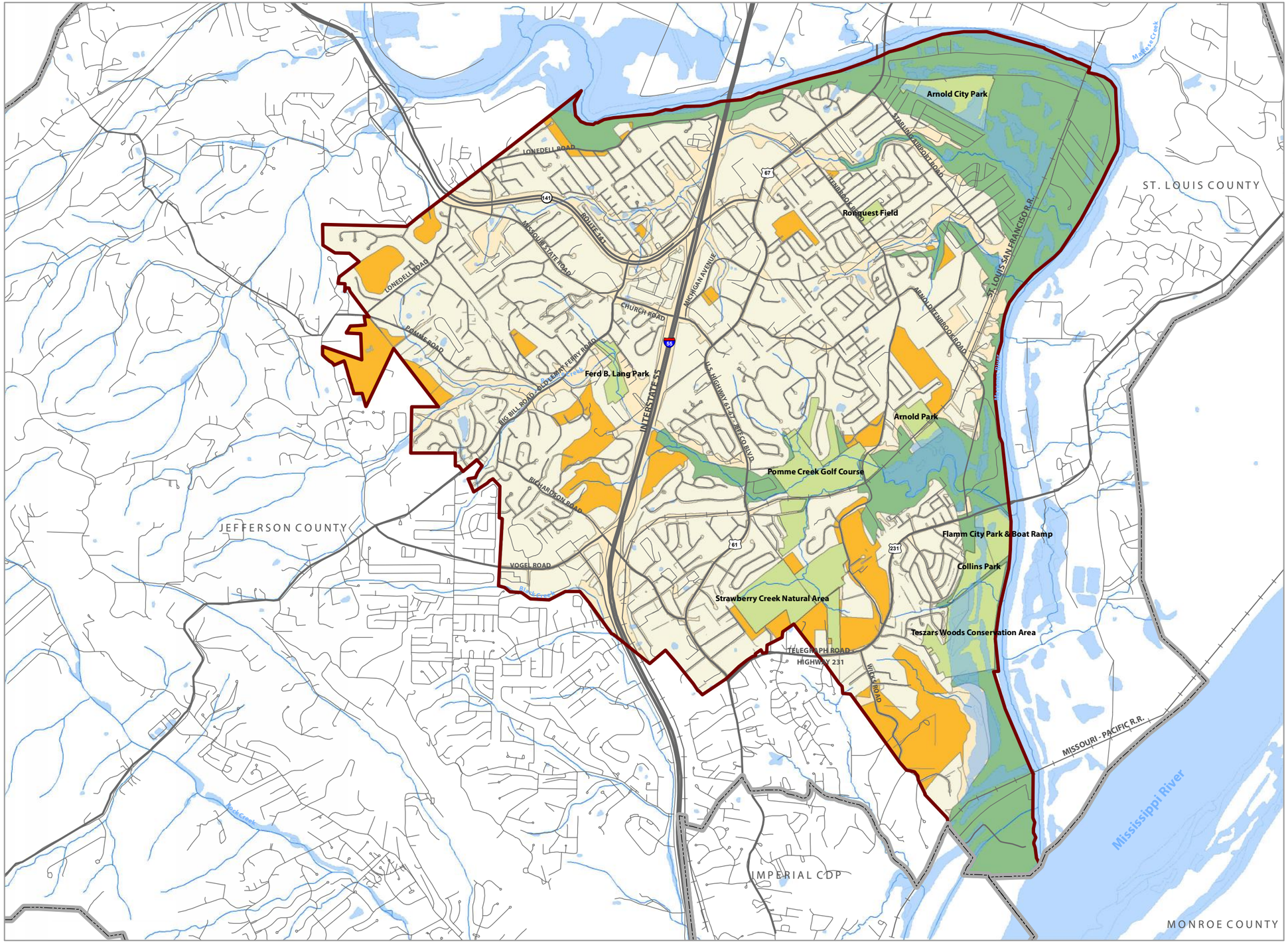
The growth dynamic in Arnold has been characterized by population growth, land consumption, and outward expansion. Much of growth of Arnold has been lower density development outside of established centers, resulting in separation of uses, greater travel times and associated traffic congestions, consumption of land and other impacts.

Residential Infill and Migration Patterns



Commercial Nodes Patterns





City of Arnold, MO

Existing Undeveloped Land

- City of Arnold
- City Limit
- Other Jurisdictions
- Parks and Recreation
- Meramec Greenway
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads
- Undeveloped Land - No Constraints
- Undeveloped Land - With Constraints
  - Floodplain
  - Transportation Right-of-Way

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ACRES

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Urban Design

Urban design is the process of shaping the urban form and focuses on "the third dimension"—the physical elements that make up a city. This is in contrast to urban planning, which traditionally focuses on the placement and heights of buildings, allowable uses, and functions. Urban design melds urban planning, architecture, and landscape architecture. It takes a holistic approach towards the physical elements of a city, though it primarily focuses on those that comprise the public realm: Parks, open space, and other places that people may gather; Streets, sidewalks, and walkways; Bridges and water bodies; Historical features; Trees and landscaping; and Lighting and signage.

The principal goal of good urban design is to elevate the human experience of the urban environment. It shapes these elements to create urban environments that are functional, attractive, comfortable, animated, stimulating, and safe.

Conclusion and Key Challenges

Generally, the major influences on the urban design of Arnold have been informal. These informal influences have included topography, cultural influences, the independent decisions of private interests, and transportation investments. The formal decisions include capital improvement decisions affecting the public realm and planning review of private development.

Key challenges include, a coherent urban design vision defining what Arnold wants the physical and public character of the city to be; and as the City embarks on the process of creating a new Comprehensive Plan, urban design offers a tool to identify the community's aim as to how Arnold will look and feel as it matures.

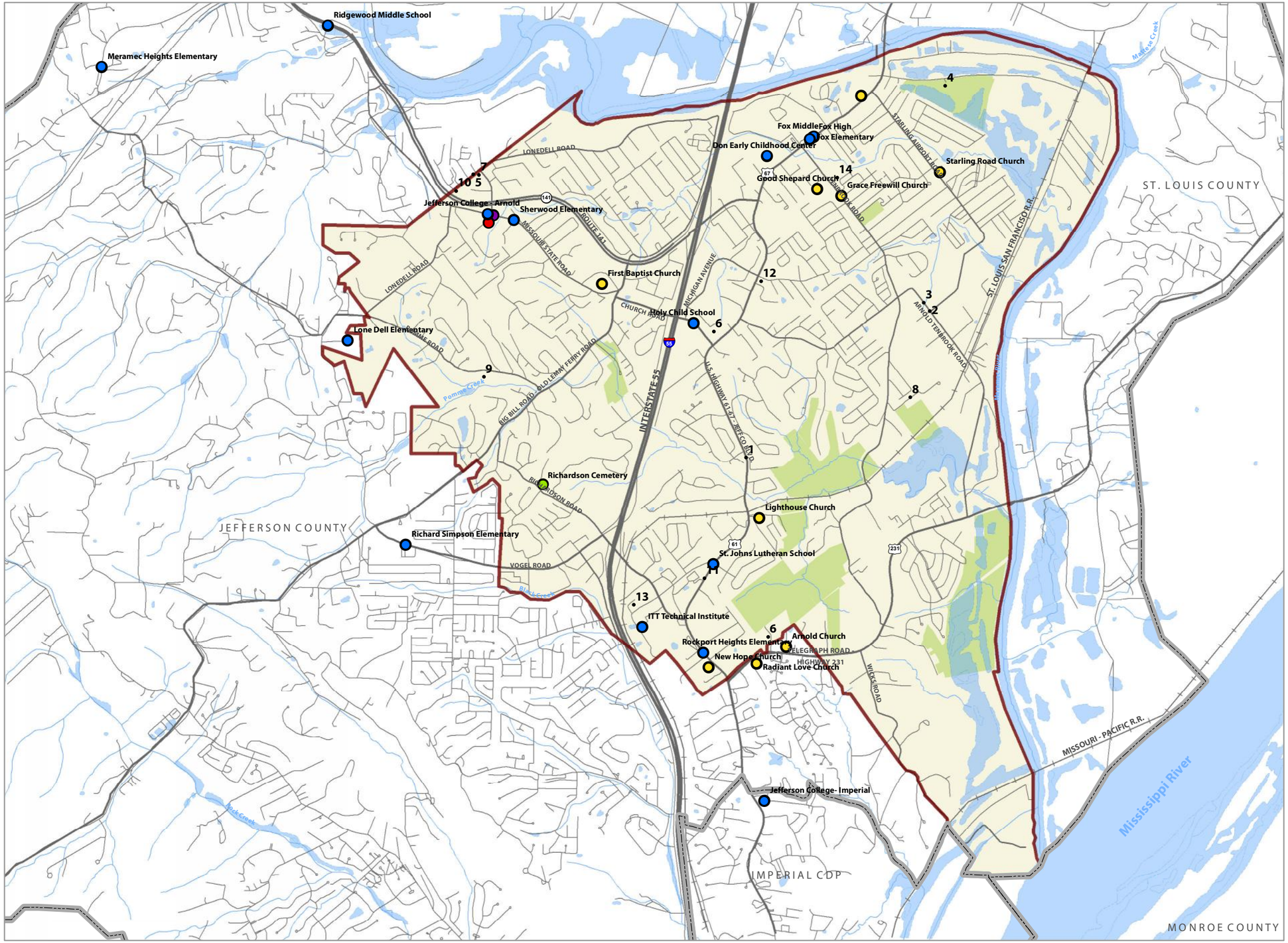
Public Facilities

The goal of mapping public facilities as part of a comprehensive planning effort is not to come up with an exhaustive list of every piece of property owned by the city government or to necessarily restrict the assessment to City owned property. Instead, the idea is to identify critical systems that have the following characteristics:

- The facility serves a community interest
- Each unit is a part of a larger system of service delivery
- It represents a substantial capital investment

Although the provision of each public service is reflected in the strategic location of buildings, location is also determined by the historic development pattern, the community served, and the income stream that is expected to support the facility. Well-designed facilities and a high level of urban services strengthen the community and represent an asset to neighborhood life. The following public facilities were identified:

- Libraries
- Police Services
- Fire Services
- Emergency Medical Services
- Municipal Buildings
- Schools
- Colleges and Universities
- Health and Human Services
- Churches and Cemeteries
- Parks and Recreation Facilities



City of Arnold, MO

Existing Public Facilities

- City of Arnold
- City Limit
- Other Jurisdictions
- Parks and Recreation
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads
- Schools
- Arnold Recreation Center
- Jefferson County Library - Arnold
- Churches
- Cemetary

Municipal Buildings and Services

1. City Hall/ Municipal Court/ Police Dept.
2. Public Works Department
3. Community Building
4. Arnold City Park/ Band Stand/ Shelters
5. Jefferson County Health Dept.
6. Rock Community Fire District
7. Rock Ambulance District
8. Public Water District No. 1
9. Jefferson County Shelter Workshop
10. Jefferson County Mental Health Dept.
11. Missouri Driverse License Office
12. Arnold Post Office
13. State of Missouri Unemployment Office
14. US Office of Social Security

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ACRES

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0 0.25 0.5 1 Miles

Housing Affordability

To develop a sense of general housing affordability in Arnold, we analyzed the prices of 249 residential units being offered for sale in the city. That analysis, which included a few apartment condominiums as well as single-family homes, indicated that housing prices in Arnold are comparatively affordable. More than two-thirds of the properties were priced below $200,000. The median asking price was $156,900. With a median household income of about $59,000, a family could afford a mortgage of about $173,000 (5.5%, 30 years). Thus, using the standard that a median income household should be able to afford a median priced house, Arnold's housing is "affordable." There were also listings for to be built houses in newer subdivisions. Most for-sale to build house were in the $200,000 - $250,000 range. Only a couple of listings were below $200,000.

We also talked with some realtors about the foreclosure problem. Locally, it appears to be fueled more by unemployment than by declining values. Exhibit 15 provides a breakdown of current asking prices for residences in Arnold.

Exhibit 15.
Distribution of Housing Prices in Arnold, December 2010.

Price Category	*Number of Units*	*Percent of Total*
Under $75,000	11	4.4%
$75,000 - $99,999	24	9.6%
$100,000 - $124,999	31	12.4%
$125,000 - $149,999	47	18.8%
$150,000 - $199,999	60	24.1%
$200,000 - $249,999	34	13.7%
$250,000 - $299,999	22	8.8%
$300,000 - $399,999	17	6.8%
$400,000 and more	3	1.2%
Total	249	
Median	**$156,900**	

Sources: Realtor.com; Applied Real Estate Analysis, Inc.

The 4% of the units on which the asking price is less than $75,000 will inevitably need additional investment to make them "livable." Most of the units priced at $100,000 or more appear to be in better condition. Without preparing a detailed market analysis, it appears that there might already be a market for about 80 to 90 units of age-restricted housing in Arnold.

Affordable Housing Need

We estimate that there may be an immediate market for 50 to 100 units of housing for households with income below 60% of the area median (an artificial construct determined by HUD) income as (AMI), adjusted for household size. The upper income limit for Low-Income Housing Tax Credit (LIHTC) housing is 60% of AMI.

Exhibit 16.
Income Limits to Qualify for Low-Income Tax Credit Housing in St. Louis MSA

Median Household Income for Family of Four = $68,300

Persons in HH	1	2	3	4	5	6
	$47,810	$54,640	$61,470	$68,300	$73,764	$79,228
60%	$26,700	$32,780	$36,890	$40,980	$44,260	$47,540
50%	$23,905	$27,320	$30,735	$34,150	$36,900	$39,650

Sources: U. S. Department of Housing and Urban Development: Applied Real Estate Analysis, Inc.

To be eligible for LIHTC housing requires the right combination of size of household and income. There are at least I,000 households in Arnold that would be eligible, no matter how many persons are in the households. Many of these may already be receiving assistance through Housing Choice Vouchers or other programs. When assessing market potential, we assume an ability to capture 5% to 10% of the potential market.

Summary

Arnold is a “mature” suburb with a diminishing amount of developable land. The community can continue growing over the next two decades by encourage redevelopment areas to be developed at greater densities than those that currently exist. Some of the commercial areas on north Jeffco Boulevard could be redeveloped as mixed-use areas with high density residential and ground floor space devoted to office and retail use. The aging population also signals the potential need for age-restricted housing. Typically, the percentage of elderly households with low- and very-low incomes is higher for persons aged 65 and over than it is for younger persons.

Neighborhood Development

Arnold is a city of neighborhoods that contribute greatly to community character and quality of life. Arnold's older neighborhoods, are characterized by their Walkability, compact character (typically smaller homes and lots), architecture and sense of place. Neighborhoods developed since the 1980's and 1990's, have been more suburban in character as Arnold expanded outwards from its core.

- **Compact Pattern**
  - Older, Walkable Compact Character
  - Typically Smaller Homes And Lots
  - Architecture And Sense Of Place

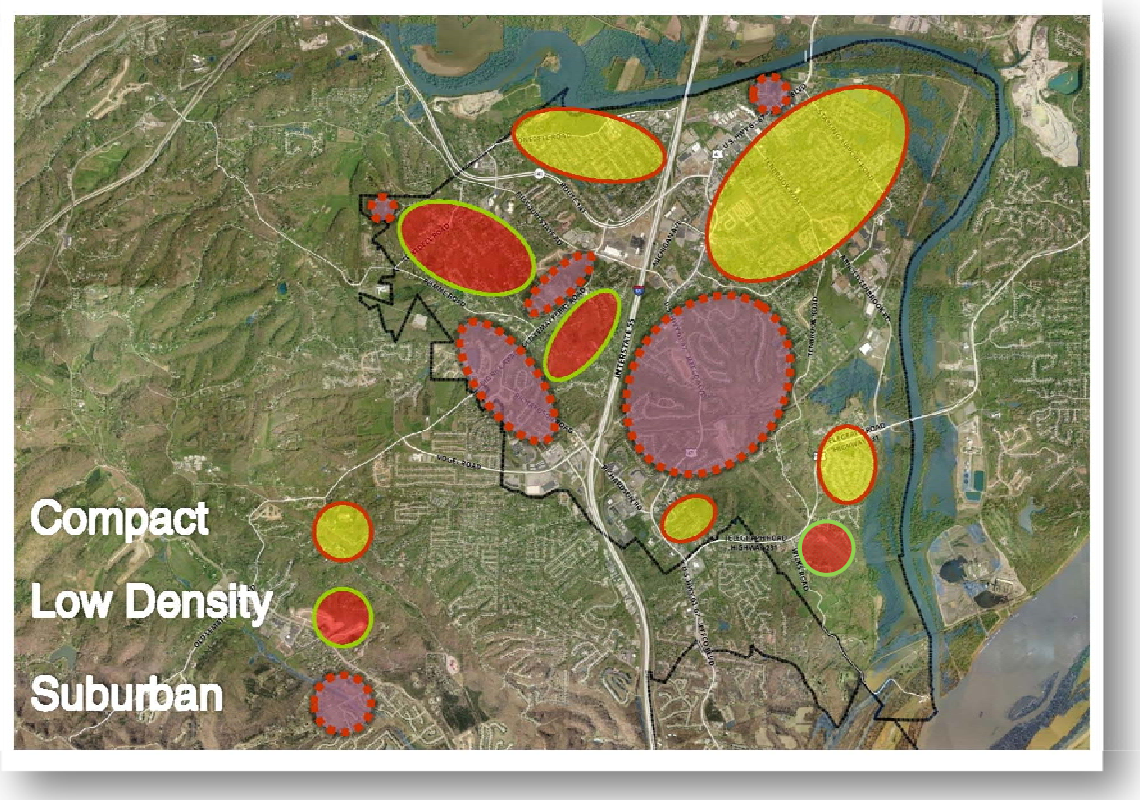
- **Low Density Pattern**
  - Vary in Age
  - Edge or Infill Developments
  - More Rural In Character

- **Suburban Pattern**
  - 1980's And 1990's
  - Suburban Character
  - Range From Isolated Pods To Subdivisions

Implications for Development

Over the next 20 years, redevelopment emphasis of older and newer neighborhoods in Arnold will need to Re-imagine & Re-invent these places by:

- Evaluating & Prioritizing Reinvestment
    - What the City will Do
    - What the Home Owner will Do
- Increasing Mobility And Connectivity
- Emphasizing Place Making And Livability



Susceptibility to Change

Susceptibility to Change is used broadly to indicate the likelihood that an area will change in the near future. The PBA team conducted a Susceptibility to Change Analysis within the **study area** using a GIS overlay analysis of a range of factors, based upon available GIS data, to provide a snapshot of the urban development potential of lands within the study area to help shape policy decisions.

Change can include:

- new development on previously undeveloped land,
- redevelopment,
- change of use, or
- Intensification of use.

Characterizing the probability of such change is useful for understanding the dynamics of growth and change in Arnold. This analysis will inform development of Comp Plan strategies and actions. Various quantitative factors, based upon available data, were compared and weighted to determine a ranking according to the degree to which land within the study area may be susceptible to change, or available and capable of being developed.

Qualitative Factors

Qualitative factors including anecdotal information about development interest of the property, etc… will be introduced by the community.

Factors included are:	**Factor**	**Change**
• **Existing natural resources & constraints (developable area),**		
o **Land Cover**		
▪ **Urban**	**10**	**Most**
▪ **Open/Scrub**	**5**	
▪ **Forest**	**1**	**Least**
o **Hydric Soil Group**	**1**	
o **Wetlands**	**1**	
o **Stream Buffer**	**1**	
• **Parks and trails (existing parks and trails),**		
o **Parks**	**10**	**Most**
o **Trails and Utility Corridors**	**5**	**Least**
• **Projected growth (existing zoning),**		
o **Commercial/Industrial**	**10**	**Most**
o **Residential**	**5**	
o **Not Zoned**	**1**	**Least**
• **Water service (existing water),**		
o **Areas currently served**	**10**	**Most**

- **No service** — **1** — **Least**

- **Sewer service (existing sewer), and**
  - **Area within ¼ mile of primary service** — **10** — **Most**
  - **Area within 1/8 mile of secondary service** — **5**
  - **No service** — **1** — **Least**

- **Road access (existing transportation network),**
  - **Areas within ½ mile interchange** — **10** — **Most**
  - **Area within 1 mile interchange** — **8**
  - **Area within ½ mile interstate** — **8**
  - **Area within ¼ mile of major road** — **6**
  - **Area within 1/8 mile of collector road** — **4**
  - **Area within 1/20 mile of local road** — **2**
  - **No road** — **1** — **Least**

Methodology

The study area was divided into .002-acre grid cells. Every cell received a normalized value for each factor between 1 and 10, with 1 being the least susceptible to change and 10 being the most susceptible to change. All factors were then added together with equal weights to produce a final susceptibility score. The series of maps show the results of each factor and the syntheses of all factors. The synthesis map totals the susceptibility scores for each cell and divides the result using logical breaks into five categories:

- **Areas with high susceptibility to change,**
- **Areas with moderately high susceptibility to change,**
- **Areas with moderate susceptibility to change,**
- **Areas with moderately low susceptibility to change, and**
- **Areas with low susceptibility to change.**

Conclusions

In general terms, the analysis reveals the following. Qualitative factors including anecdotal information about development interest of the property, etc… will be introduced by the community.

- ***High Susceptibility to Change*** - Areas most susceptible to change generally have adequate public services available and few constraints for future development.
  - Areas identified as highly susceptible to change, colored brown on the map, are the first priority for development and redevelopment.
  - These are locations where change from the existing conditions may be imminent and necessary in the immediate future.

- The highly susceptible areas on this map are almost exclusively commercial and industrial land and minimal residential, located within the City limits.
- Water and sewer services are present and the areas are adjacent to an interstate interchange. Land surface is highly impervious and there is minimal tree cover.
- Buildings may also be older single-story, in deteriorating condition, surface parking for aging "big box" structures, and aging and vacant strip and "big box" commercial buildings.
- The identified areas provide the greatest redevelopment opportunities for Corridors and Nodes throughout the city.
- Corridors or nodes can be revitalized by efficiently reusing underutilized parking fields, redeveloping the vacant and dying strip malls into mixed-use nodes throughout the City.
- In total, there are 1,139 acres (all within city limits) which are highly susceptible to change.

- ***Moderately High Susceptibility*** – Areas with moderately high susceptibility to change are similar to the highly susceptible but with a greater residential component.
  - These areas, colored in burnt orange on the map, are located within the City limits and include mostly to highly urbanized land cover with industrial, commercial, and residential development.
  - These areas are served by sewer and water and are located adjacent to an arterial or other major road.
  - These areas are the second highest priority for improvement and redevelopment. The degree to which large amounts of land is identified as highly and moderately highly susceptible to change, the brown and burnt orange colors on the map, will suggest that significant change is possible for a large portion of a particular corridor or area of the city.
  - There are 2,033 acres within city limits and 2 acres outside of the city which are moderately highly susceptible to change.

- ***Moderate Susceptibility*** – Areas moderately susceptible to change, colored in orange on the map, include positive characteristics which outweigh negative attributes and indicate that lands are likely to be developed, although the timing and type of development may be affected by negative characteristics.

- The moderate susceptibility map is primarily composed of areas with residential development that are served by water and sewer and where the land cover is mostly urbanized.
- There are 2,886 acres within the city limits and 451 acres outside the city that are in the moderate susceptibility to change category.

- ***Moderately Low Susceptibility*** – Areas with moderately low susceptibility to change, colored in light orange on the map, are generally located peripherally to areas of moderate and higher susceptibility.
  - These areas include peripheral residential development and non-forested open space that are not serviced by sewer or water but, are within a major road corridor.
  - This portion of the map contains 1,274 acres within the city and 9,728 acres outside of the city that are moderately low susceptibility.

- ***Low Susceptibility*** – Areas with low susceptibility to change are least likely to be developed due to site conditions, availability of services or other factors. These areas may contain elements that might delay or prohibit future development.
  - The light yellow areas found on this map illustrate those areas within the study area where no change, revitalization or redevelopment is expected or likely in the next 20 years.
  - This includes areas of land cover that are significantly forested and minimally urbanized. These areas are not adjacent to any road greater than a local road and are not served by sewers or water.
  - Included in this category typically are historically significant and newer buildings in excellent condition, as well as environmentally constrained land.
  - This portion of the map contains 40 acres within the City and 16,951 acres outside of City limits.

The Susceptibility to Change analysis will serve as the foundation for recommendations dealing with the location and direction of future growth and for scenario development.

City of Arnold, MO

Susceptibility to Change

Normalized Composite Factor Values

High Susceptibility

Almost exclusively commercial / industrial land with minimal residential area, highly impervious, minimal tree cover, with sewer and water service, in the City limits, adjacent to a major road intersection.

Moderately High Susceptibility

Areas with significant commercial / industrial / residential development, within City limits, with mostly to highly urbanized land-cover, served by sewer and water, and adjacent to an arterial road or greater.

Moderate Susceptibility

Areas with residential development within the City limits, served by sewer and water, of suburbanized land-cover.

Moderately Low Susceptibility

Areas with peripheral rural and suburban residential developent, forested and agricultural land-cover, within a major road corridor, but without sewer and water infrastructure.

Low Susceptibility

Areas of significant forested land-cover, minimal development, not served by sewers or water, not adjacent to any road greater than a local road, with wetlands and streams.

Legend

- City Limit
- Other Jurisdictions
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

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0 0.25 0.5 1 Miles

Economic Development Potential

The potential for generating jobs in Arnold is impacted by its geographic location relative to the office, industrial and retail markets in the St. Louis metropolitan area. Within the St. Louis Metropolitan area development trends for both office and industrial land uses is to the west of downtown St. Louis in the western extremities of St. Louis County and into the eastern portions of St. Charles County. Retail concentrations serve local populations and are scattered more generally throughout the region. Because Jefferson County's population continues to grow, Arnold is positioned to capture additional retail development in the near future.

St. Louis Regional Office Market

Major office space in the St. Louis metropolitan area is heavily concentrated in Downtown St. Louis and in the West St. Louis County. The "West County" submarket, as variously defined by brokers, generally extends in a narrow band from about Interstate 270 west to the Missouri River. Its northern Boundary is roughly Lake Street and it extends south to about Manchester Road. Approximately 60% of the region's office space is located in these two submarkets. A geographically small Mid-County submarket is centered in the vicinity of Webster Groves and Kirkwood and contains another 15% of the region's office space. By comparison, the vast South County submarket, which extends into Jefferson County, accounts for only about 6% of the region's office market. In addition, at the end of September 2010, the South county submarket had an 18.8% vacancy rate. This was compared to a 16% vacancy overall and was exceed only by Downtown's 23% vacancy.

The office market is heavily driven by proximity to executive residential areas. Historically, those areas were west of downtown in the Mid County office submarket. Newer areas have now developed in western St. Louis County and include Chesterfield and adjacent communities. By contrast, South County has generally developed with more middle income neighborhoods where the lower level corporate managers and support staff live.

Arnold's office market will continue to expand but will be focused primarily on smaller space users, geared to serving the local residents. Small accounting, legal and financial service firms are typical office space users in Arnold. Other office space demand comes from firms started by local residents (including residents of adjacent communities). These frequently include small architectural engineering firms, technology firms, and

business service firms. Medical and dental clinics also create a need of more specialized office space within smaller communities. Arnold currently has a good supply of the types of firms that create demand for office space. Most of the future demand will come from internal growth as existing firms expand. Other demand will come from new firms started by local entrepreneurs.

Development Potential. Population growth, both in Arnold and adjacent areas, will help some local firms grow and new firms started by local entrepreneurs in technology and professional services (engineering, architecture, etc.) and medical clinics will create additional demand for local office space. Most of these users will need less than 5,000 square feet. This amount of space typically can accommodate a firm with 10 to 15 employees. Many office uses can actually be accommodated in store fronts in buildings designed primarily for retail use. Thus, there is unlikely to be significant demand for multi-story office buildings.

AREA estimates that 75,000 to 100,000 square feet of additional space may be needed over the next 20 years. Office space in mixed-use developments would be suitable for capturing a significant portion of this potential demand.

Regional Industrial Market

The industrial markets are driven more by land availability and access to transportation corridors rather than proximity to types of residential uses. In St. Louis, a third of the region's industrial space is still located within the city where is has historically been located. Other industrial submarkets are concentrated along I70 from the city limits into St. Charles County. Large tracts of land are still available for industrial use in North County around the airport and in the Westport and Earth City area west of the airport. These three submarkets account for approximately 25% of the industrial space. Unlike office space for which the market is essentially west of the Mississippi River, over 10% of the region's industrial space is located in Illinois.

The South County submarket extends southwest from the St. Louis city line between the Mississippi River and a line that extends along State Route 100. At about Wildwood, Route 100 turns south but the submarket boundary continues west to the Missouri River. This vast area accounts for about 10% of the industrial space in the St. Louis region but, over have of that space is concentrated in Fenton, which is considered a separate submarket within the larger South County area. The vacancy rate in Fenton is almost 50% due to one extremely large property that is vacant. The vacancy rate in the rest of the South County area runs is only about 7%.

Arnold and other portions of the South County area will have difficulty competing with the I70 corridor to attract industrial users. Within that corridor, there are hundreds of acres of relatively flat land that can be developed quickly and inexpensively By comparison the terrain features that make Arnold an attractive location for residential development make it uneconomical to develop large, low value industrial buildings.

Development Potential. Industrial Space demand is likely to come from construction companies, heating and air conditioning firms and similar firms serving primarily a local market. Much of the existing space is already being served by these types of firms. Typically they need 5,000 to 15,000 square feet of space. Additional demand could come from local firms that grow and prosper. As an example, one of the firms in the Tenbrook Industrial Park is LMC Industries, a 65 year-old manufacturer of molded plastics and other products. It is a third-generation, family-owned business that has grown to employ more than 250 persons. While it is impossible to project this type of demand, the community should be able to accommodate it if it does develop.

We estimate that over the next 20 years, 100,000 to 200,000 thousand square feet of space might be absorbed in Arnold, assuming appropriate building sites exist. At about 40% to 50% building to land ratio, then five to 10 acres of land should be sufficient to accommodate future demand. There are at least 15 to 20 acres available in the Tenbrook Industrial Park

Retail Market Analysis

Our conservative estimates show that the City of Arnold has over 170 retail establishments. Most of the retail is concentrated in the north central area of the City, specifically along U.S. Highway 61/67 and Interstate 55. The two largest retail shopping centers are Jefferson County Plaza and Arnold's Commons. Jefferson County Plaza opened in 2000 and is located south of Vogel Drive and east of I55. This shopping center has over 300,000 square feet of retail space and features retailers such Home Depot, Target, Shoe Carnival, Once Upon A Child, Fortels Pizza Den and Sally Beauty. Arnold's Commons opened in 2008 and is located at 800-999 Arnold Commons Drive south of State Route 141 and west of I55. The 317,000 square foot center features retailers such as Lowes Home Improvement Center, Dierbergs, Office Depot, PetSmart and several restaurants.

Arnold has the largest concentration of retail space in Jefferson County. This is not surprising given the city's population, population density, position in the county, and accessibility to major roads. However, our analysis indicates that Arnold has the potential to capture additional segments of the retail market.

A close look at population and population density in Jefferson County reveals that the majority of the population is concentrated in the northeastern corner of the county in Arnold. Higher population densities also stretch along Interstate 55 in cities such as Fetus, Crystal City, Herculaneum, Peverly, Barhart, and Imperial. Our research and analysis indicate that residents of Arnold and these other cities utilize Interstate 55 to access St. Louis County where they work, shop, and dine.

Various statistics provide evidence of this movement and spending pattern. According to the 2009 Jefferson County Data Book, the highest traffic count location in Jefferson County in 2007 was at I-55 and the St. Louis County Line. The traffic count in this location was 107,290. The other high traffic counts occurred at I-55 and North of Route M and I-55 North of Festus/Crystal City. These locations had traffic counts of 82,382 and 59,818 respectively.

At the same time, the Missouri Economic Research and Information Center's (MERIC) Daytime Population Report in December 2005 indicated that Jefferson County experienced a 25.9 percent decrease in daytime population, while St. Louis County experienced an 8.1 percent increase in daytime population. These statistics reveal that many Jefferson County residents were leaving the county to work. Most of these residents were commuting into St. Louis County. At the same time, the City of Arnold experienced a 5 percent decrease in daytime population but only 17.7 percent of Arnold residents worked in Arnold. These statistics imply that although most of Arnold's residents worked elsewhere, considerable numbers of persons were commuting into Arnold to work

The MERIC also performed a Retail Trade Analysis in January 2009 that examined various retail statistics for the St. Louis Region. One of the statistics examined was the retail trade pull factor which measures the retail sales captured by a county. A retail trade pull factor larger than 1 implies that the county is either attracting retail consumers from outside counties or that the subject county's residents are spending more than the average Missouri resident. At the same time, a retail pull factor less than 1 indicates that the subject county's residents are spending more in other counties or are spending less than the average Missouri resident.

MERIC reported that the 2007 retail trade pull factor for Jefferson County was 0.65 and the factor for St. Louis County was 1.39. These statistics indicate that Jefferson County residents were spending their retail dollars in other counties and/or were spending less than the average Missouri Resident. The buying power indexes and the commuting patterns of retail costumers suggest that both explanations likely attributed to the retail trade pull factor. The buying power index measures the capability of a county's retail consumers to buy retail goods. Jefferson County's buying power index was 0.48, St. Louis County's was 0.79 and the average buying power index for Missouri was between 0.38-0.42. This

indicates even though residents in Jefferson County and St. Louis County were likely spending more than the average Missourian, St. Louis County residents were likely spending more than Jefferson County residents. However the difference in buying power between St. Louis and Jefferson County residents is not significant enough to completely account for the dramatic difference in retail trade pull between the two counties. The retail trade analysis also reported that almost 76,000 Jefferson County residents were leaving Jefferson County for retail purchases and that the retail sales for the County was 1.1 million. At the same time, St. Louis County was attracting 374,640 retail consumers and had 10.7 million in retail sales. In weighing and analyzing these numbers, we concluded that Jefferson County residents spent less than St. Louis County residents on retail goods, however, a significant number of Jefferson County residents drove to St. Louis County to purchase their retail goods.

The MERIC Retail Trade Analysis report was published in January 2009 and utilized 2006 and 2007 data. Changes in the Arnold market, especially the opening of certain retail establishments such as Arnold Commons, have changed these retail trade statistics, and have helped Arnold recapture some of the retail market that was going to St. Louis County.

***Development Potential*.** Although these developments have increased the market area's capture rate, retail dollars are still leaking out of the City of Arnold and Jefferson County to St. Louis County. Some retail dollars will always be spent outside of the local community. Local residents will drive to the South County Mall to access shops, especially clothing stores and specialty shops that do not exist in Arnold. However, the potential exist to capture more of the Jefferson County's retail dollar in Arnold

Up to 500,000 square feet of *Retail Space* might be accommodated in a combination of neighborhood convenience and specialty retail and additional retail concentrations in the vicinity of the I-55/US 141 interchange. The community is well served by big box retailers. Now it needs to add smaller stores and specialty shops. However, in addition to St. Louis County, Arnold businesses will face increasing competition from new businesses that will develop into the growing communities to the south along I-55.

The existing transportation system serving the citizens and land uses in Arnold consists of several modal components. These include:

- The roadways serving vehicular traffic consisting of automobiles, busses, and trucks, and some bicycles;
- The railroads serving primarily freight trains;
- The sidewalks and trails serving pedestrians and other bicycles.
- The water ports serving recreational boating

There is no airport in Arnold, so the closest air service must be provided through the Festus Airport located about 15 miles south of Arnold.

Roadway System

There are about 76.5 miles of roadways currently maintained by the City of Arnold. In addition, there are about 11.5 miles of highways within the City under the jurisdiction of the Missouri Department of Transportation (MoDOT). These MoDOT routes include I-55, M-141, US-61/67 (Jeffco Boulevard), and M-231 (Telegraph Road).

Functional Classification … The roadway system consists of four basic classifications of thoroughfares. The classifications are defined by the function that each road performs. The highest functional classification is the **interstate freeways**, whose primary role is to provide high speed movement of vehicles throughout the country. I-55 performs this function, as well as providing commuter service for residents of Arnold who work through the St. Louis metro area.

The next highest functional classification of roadways is the **arterial routes**. The primary role of arterial routes is to serve vehicle trips that are longer than one mile in length. The arterial routes in Arnold include limited access expressways, such as M-141, and urban roads which provide access to abutting land uses. The urban arterial routes include 2-lane roadways such as M-231 / Telegraph Road and Old Lemay Ferry Road; 4-lane roadways such as most of US-61/67 / Jeffco Boulevard; 5-lane roadways such as Church Road, Vogel Road, and Richardson Road; and some median-divided roadways such as Jeffco Boulevard and Vogel Road north and south of Richardson Road.

Collector streets are the next tier in the functional classification system. These streets collect traffic from the local residential and commercial streets and carry it to the arterial routes. Collector streets are often designed to accommodate parking and bike lanes and some direct access to homes and

businesses. Most vehicular trips on collectors should be less than one mile in length. If collector streets are designed as long continuous routes, then they often are used by motorists as high-speed arterial routes.

The final, most common functional street classification is the **local street**. This type of roadway is intended primarily to provide direct access to residential and commercial driveways. They are intended for low speed travel due to the predominance of driveway movements, parking maneuvers, and activity of pedestrians of all ages.

One thing that must be noted is that, although the functional classification of streets is defined by vehicular travel, pedestrian and bicycle travel must be also be accommodated by each of the functional classifications except interstate freeways. Sidewalks and trails and on-street lanes, as well as roadway features such as raised medians should be provided to keep our roadways from becoming barriers which restrict or even discourage pedestrian and bicycle travel between land uses and intermodal transit facilities.

The Transportation Map depicts the functional classifications and locations of the thoroughfares within the Arnold study area.

Traffic Volumes

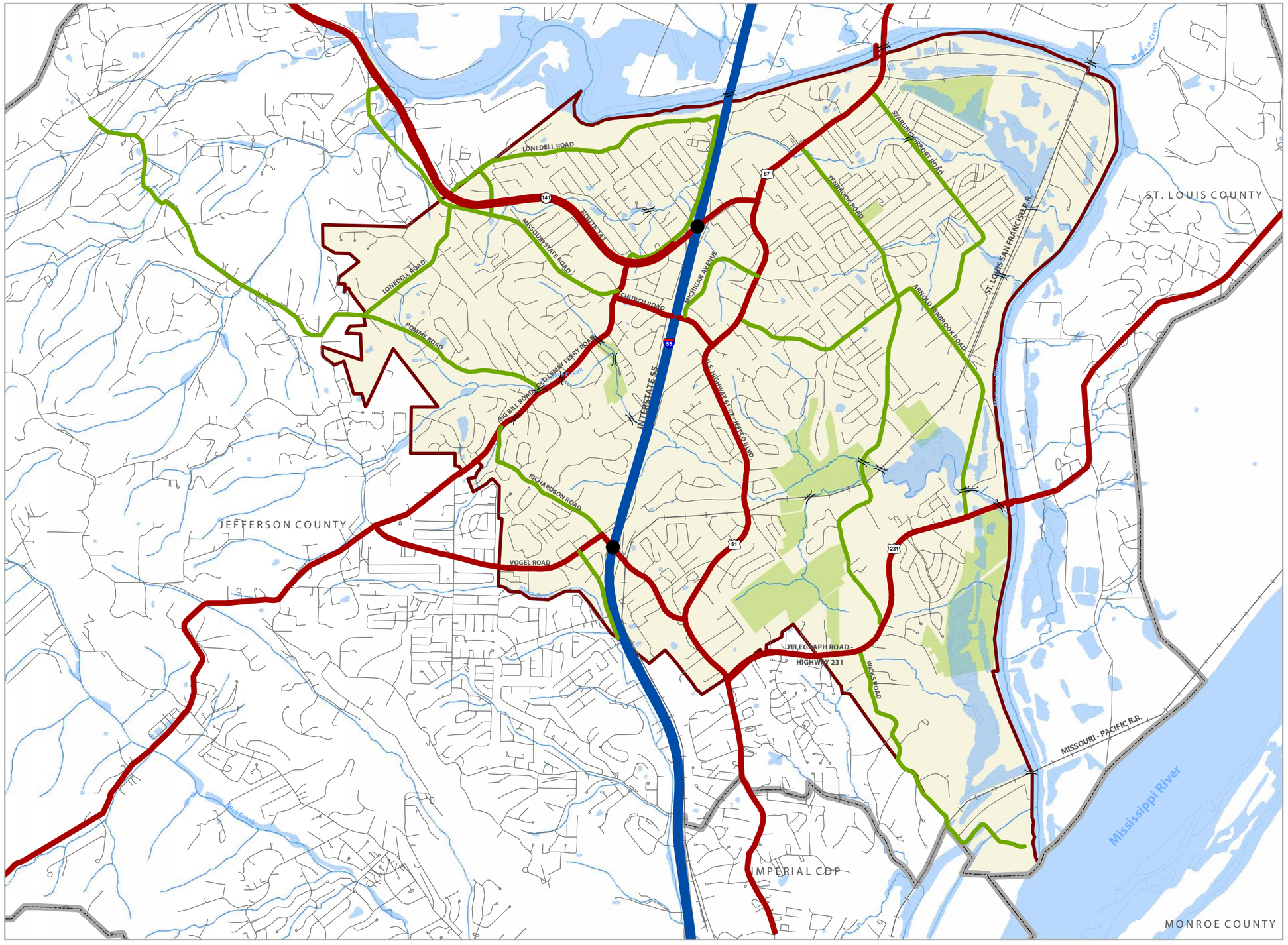
As part of this study, traffic volume data was compiled from several existing sources. These include the 2001 Arnold Comprehensive Plan, the 2008 Jefferson County Transportation Plan, and Annual MoDOT traffic count maps from 2000 through 2009. Table 17 has been prepared to list all of the available data for historical traffic volumes and Year 2020 and 2030 traffic projections. Traffic volumes and projections are listed for the major thoroughfares in the City of Arnold. As can be seen, the traffic volumes range from over 100,000 vehicles per day (VPD) on I-55 to about 2000 VPD on some city collector streets. Most local streets would be expected to be serving in the range of 200 to 1000 VPD.

Exhibit 17
Vehicular Traffic Volume Summary
Major Thoroughfares
Arnold, Missouri

Route	Location	2000	2002	2004	2006	2008	2009	2020	2030
I-55	North City Limit	94600	96400	97300	106200	106600	102900		145000
I-55	South City Limit	88300	89900	80900	81600	81900	55000		120000
M-141	East of I-55	33100			28500	27800	29200	58000	34000
M-141	West of I-55	35000			33200	32500	34200	54000	46000
US-61/67	North City Limit	18300	18600	15000	13700	13400	13000	48000	18000
US-61/67	South of M-141	21900			18000			33500	
US-61/67	at SLSFRR	20100	20400	17800	17700	17200	14900	29000	21000
US-61/67	North of M-231	22000						31600	
US-61/67	South of M-231				16400	16000	15300		
M-231	East of US-61/67	12900	13200	13600	12500	12200	11500	14000	16000
M-231	at East City Limit	6500	6600	7200	7800	7600	8100		
Church Road	North of US-61/67	11200			8500			32000	
Church Road	South of Old Lemay Ferry Road							41300	10000
Richardson Road	South of I-55	21100			29300			36100	29300
Richardson Road	South of Old Lemay Ferry Road	7500			15000			24000	18000
Old Lemay Ferry Road	West of M-141	14700			7200			36000	9000
Old Lemay Ferry Road	East of Richardson Road	13800						34900	9000
Vogel Road	West of Richardson Road				8300			40000	
Tenbrook Road	South of US-61/67	15600			10000			12000	12000
Tenbrook Road	South of Arnold Tenbrook Road	2800						5200	
Tenbrook Road	North of M-231	1700						6900	
Arnold - Tenbrook Road	South of US-61/67	4300						7600	
Arnold - Tenbrook Road	East of Tenbrook Road	5600			3900				5000
Arnold - Tenbrook Road	North of M-231	2200						9300	
Starling Airport Road	South of US-61/67	8500			5000			8500	6000
Manufacturers Drive	East of Arnold Tenbrook Road	1800						7600	
Missouri State Road	North of Old Lemay Ferry Road	9800			8600			7000	
Missouri State Road	South of Astra Way	9900						9000	12000
Pomme Road	North of Old Lemay Ferry Road	9900			2500			8000	4000
Lonedell Road	West of Missouri State Road	6700			4000			6800	5000
Wicks Road	South of M-231				2500				
West Outer Road	South of Vogel Road	9000						18000	15000

City of Arnold, MO

Existing Transportation Network



- City of Arnold
- City Boundary
- Other Jurisdictions
- Parks and Recreation
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads
- Bridge
- Interchange

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Levels of Service

Operating conditions on the City's thoroughfares are described by the Levels of Service (LOS) which can be assigned to each route segment. These LOS are determined according to methods prescribed in the Highway Capacity Manual (HCM) prepared by the Transportation Research Board of the National Research Council. The LOS of road segments are generally related to the speeds of travel and the expectations of motorists as related to the functional classification of the roadway. There are six LOS ratings named by the letters A through F. LOS A represents the best operating condition where motorists are free to adjust speeds and maneuver as necessary. LOS E is the maximum capacity of a roadway and LOS F represents the condition where traffic flow is severely congested and vehicle are often not moving, but stacked up in long queues.

In general, the capacity of an urban street can be related to the number of lanes that the roadway provides. A 2-lane street can be expected to carry up to about 12,000 VPD or about 1200 vehicles per hour (vph). A 4-lane street should be able to serve about 12,000 to 24,000 VPD. A 6-lane street should be expected to serve about 24,000 to 36,000 VPD. These general capacities are significantly affected by the number of left and right turning movements which are made to and from the particular street segment and whether there are separate left turn and right turn lanes provided for these movements.

According to the *2008 Jefferson County Transportation Plan* and a review of the current traffic volumes, it appears that most of the major thoroughfares in the City are operating at LOS C or D. A few streets such as Old Lemay Ferry Road and Tenbrook Road appear to be at or near their practical capacity (LOS E).

It should be noted that there are about 25 traffic signalized intersections in the City which also affect the LOS at these critical points and even affect the overall travel speeds and LOS of some routes such as Jeffco Boulevard (US-61/67). Only eight of these traffic signals appear to be under the jurisdiction of the City of Arnold, with the remaining 17 on Missouri State Highways. It was observed that during the peak hours many of these traffic signals appear to be operating at LOS E or F, at least for some critical movements through these intersections.

2001 Arnold Comprehensive Transportation Plan

The last City comprehensive plan included a comprehensive analysis of the City's thoroughfare system. The 2001 Arnold Comprehensive Transportation Plan included the identification and prioritization of many thoroughfare improvements, as well as pavement condition evaluations and ratings. A review of the recommended thoroughfare system improvements indicates that many have been completed and some yet remain to be implemented. The following is a listing of the recommended improvements and their implementation status:

1.	I-55 & M-141 interchange improvements	Complete
2.	Church Road widening	Complete
3.	Jeffco Blvd. & Michigan Ave. improvements	Complete
4.	Jeffco Blvd. & Richardson Road improvements	Complete
5.	Ridge Road improvements	Not Done
6.	Lemay Ferry Road widening (Intersection at Lemay Ferry Road, Church Road, and Missouri State Road improved, but widening on Lemay Ferry Road west from Church to Vogel Road is not done.)	Partial
7.	Jeffco Blvd. & Church Road improvements	Not Done
8.	Lemay Ferry Road and Church Road improvements	Not Done
9.	Michigan Ave. / Ridgecrest Road extension	Not Done
10.	Richardson Road & Richardson Square St. John's Church Road improvements	Not Done
11.	Realignment of Arnold Tenbrook Road	Completed
12.	Tenbrook Road & Telegraph Road improvements	Completed
13.	Signalization of Michigan Ave. & Church Road	Not Done
14.	Other Projects	
	a. Jeffco Bvld. Corridor Improvement Study	Not Done
	b. I-55 Sound Wall / Aesthetic Improvement Study	Not Done
	c. Raise Jeffco Blvd. out of 100-year Floodplain at bridge	Not Done
	d. Upgrade Tenbrook Road to Collector Standards	Not Done
	e. Raise Tenbrook Road out of 50-year Floodplain	Completed
	f. Upgrade Missouri State Road to Collector Standards	Not Done
	g. Upgrade Starling Airport Road to Collector Standards	Not Done
	h. Upgrade Arnold Tenbrook Road to Collector Standards	Not Done
	i. Upgrade Pomme Road to Collector Standards	Not Done
	j. Upgrade Lonedell Road to Collector Standards	Not Done
	k. Upgrade Astra Way to Collector Standards	Not Done
	l. Upgrade Wicks Road to Collector Standards	Not Done

Transit

A review of transit options in the City indicates that there is no fixed route bus service available at this time. However, the County has recently established the Countywide Jeffco Expressway, a closed loop system in Arnold. In addition, the City will be funding a bus.

Pedestrians & Bicycles

One of the chief problems identified in the 2001 Arnold Comprehensive Transportation Plan is the general lack of sidewalks and trails for pedestrians and bicycles. Recommendations were made to add sidewalks on all new streets and on existing streets as they are improved to meet standards or to increase the capacity of the routes.

Railroads

The City of Arnold is currently served by the St. Louis – San Francisco Railroad which enters the City along the east side of I-55 and then turns to cross to the east side of the City just after it crosses under Richardson Road. Most crossings of major thoroughfares are grade-separated. One notable exception is the at-grade crossing with Arnold Tenbrook Road in the industrial district of the City.

Safety History

The traffic crash record data for the City of Arnold was obtained from the State records through MoDOT. These records were obtained for the years 2005 through September, 2010. (Exhibits 18 and 19) This traffic crash data is summarized below by year and route as well as by crash severity.

The records indicate that about 30% of the crashes were recorded along I-55. Just over 25% of the crashes were reported along Jeffco Boulevard (US-61/67), which only caries about 20% as much traffic as I-55. M-141 accounts for about 17.5% of the crashes and Richardson Road recorded about 13% of the 2005 – 2010 crashes.

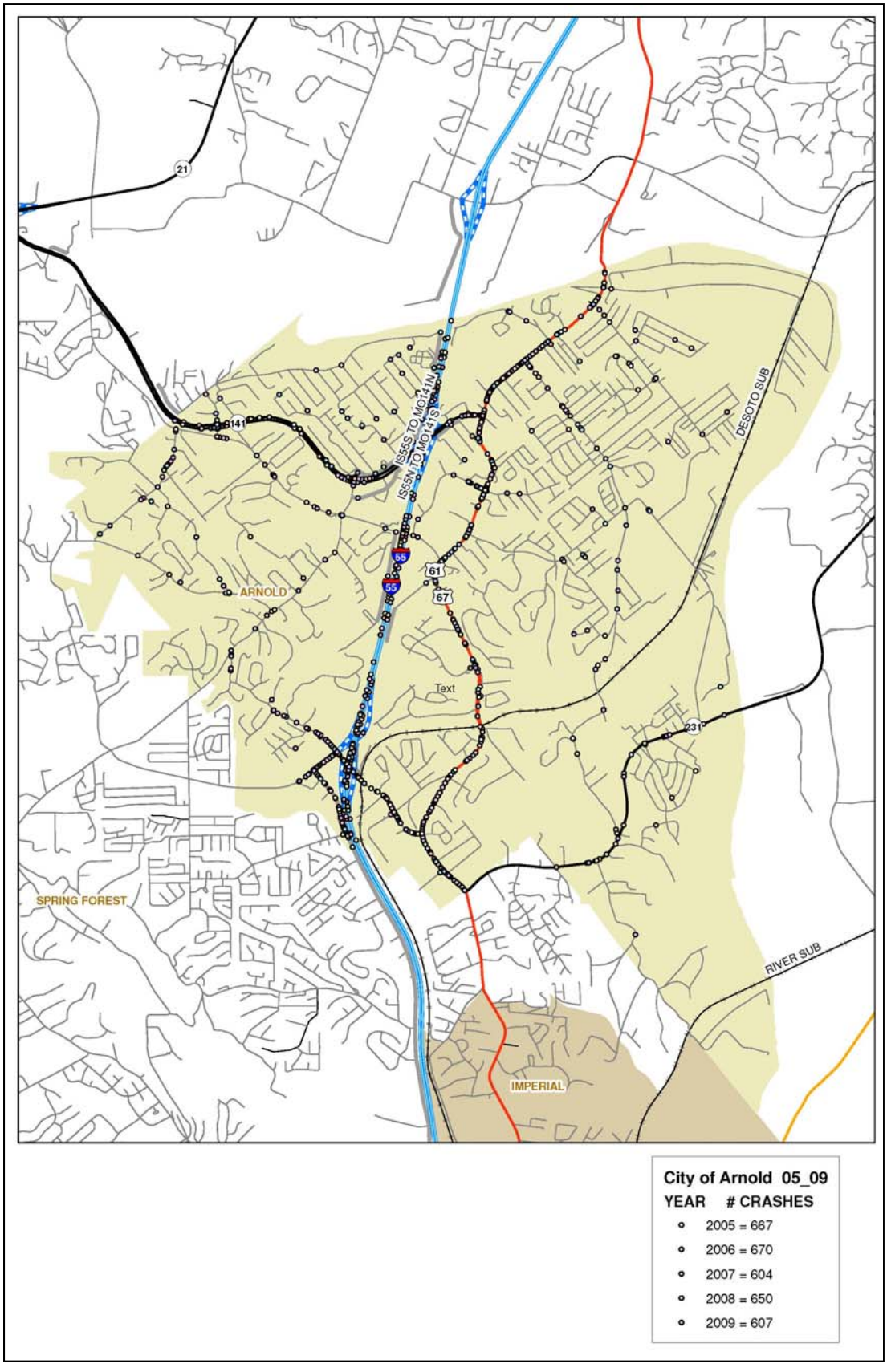
Exhibit 18
Number of Reported Crashes

Route	Total	2005	2006	2007	2008	2009	2010*
M-141	615	102	137	120	105	106	45
M-231	47	10	8	4	6	16	3
I-55	1021	207	203	159	196	177	79
US-61/67	911	185	163	169	173	146	75
Arnold Tenbrook	17	2	2	5	2	2	4
Astra Way	26	2	1	6	8	8	1
Bill Bill Blvd	24	4	7	4	3	3	3
Church Rd	21	3	2	5	2	5	4
Lonedell Rd	25	2	7	6	4	4	2
Michigan Ave	60	8	8	13	16	11	4
Missouri State Rd	26	5	2	2	9	6	2
Old Lemay Ferry Rd	15	2	2	1	3	5	2
Richardson Rd	453	102	87	72	77	84	31
Starling Airport Rd	10	4	2	1	3	0	0
Tenbrook Rd	76	19	15	13	14	8	7
Vogel Rd	13	0	0	1	1	6	5
All other routes	**147**						
Total	**3507**						

* 2010 crashes from January 1 through September 30, 2010

Exhibit 19
Number of Crashes by Severity

Fatal	**19**	**(0.5%)**
Disabling Injury	**96**	**(2.7%)**
Minor Injury	**719**	**(20.5%)**
Property Damage Only	**2673**	**(76.3%)**
Total	**3507**	


21
141
ARNOLD
IS55S TO MO141N
IS55N TO MO141S
55
61
67
Text
231
DESOTO SUB
SPRING FOREST
RIVER SUB
IMPERIAL
City of Arnold 05_09
YEAR # CRASHES
2005 = 667
2006 = 670
2007 = 604
2008 = 650
2009 = 607

Preliminary Recommendations

"Not Done" … The City should develop plans to implement most of the 2001 Arnold Comprehensive Transportation Plan recommendations that have not been done to date. (Based on reviews of conditions in the City, it is recommended that six of the recommendations not be implemented without much additional analysis.) These six are:

- **Ridge Road improvements** … This improvement does not appear feasible given the new traffic signal that has been installed on M-141 between Jeffco Blvd. and I-55; and it would direct unwanted traffic onto a section of M-141 that is very congested.

- **Michigan Ave. / Ridgecrest Road extension** … This improvement also does not appear to be feasible given the extent of the developed land uses along the Ridgecrest Road extension corridor.

- **Connect Ozark Drive to Rosedale Drive** … Given the character of these two streets with the existing residential development, this project would create unnecessary through traffic for the residents along a substandard street.

- **Complete Streets** … It is recommended that the City conduct a complete streets analysis of all major thoroughfares to determine what measures can be implemented to manage travel speeds and accommodate pedestrians and bicycles.

- **Walkability Studies**. It is recommended that the City implement a policy of requiring that "Walkability" Studies, along with typical Traffic Impact Studies, be required when all new development are considered. These Walkability Studies would identify and evaluate pedestrian paths to and from all likely destinations within ¼ to ½ mile of each development and recommend improvements that must be made as part of the development agreement to accommodate pedestrians and bicycles.

- **Access Management** … Some of the City's major thoroughfares are, or will soon be experiencing congestion related to capacity limitations. One thing that affects both the capacity and safety of thoroughfares is the type and number of access points. MoDOT has developed and adopted a set of *Access Management Guidelines* which are designed to improve safety, decrease delays, stimulate economic development, and decrease vehicle emissions.

These guidelines include recommended distances between adjacent intersections, driveways, and median breaks, as well as minimum sight distance requirements for sight distance for traffic entering and exiting side streets and driveways. It is recommended that the City consider adopting these or some similar guidelines when planning for future roadway improvements or new construction. During such thoroughfare improvement planning consideration should be given to consolidating as many access points along such route as Jeffco Blvd. (US-61/67) to improve the capacity and safety.

In many cases it appears that it will be difficult and expensive to widen thoroughfares to increase the capacity. Therefore, other measures such as access management should be encouraged to maximize the capacity of available street widths. Recognizing the difficulty of widening many thoroughfares in the City, it is important to also consider development and improvement of parallel route as well as encouraging the use of other modes of travel. This could even include the limitation of off street parking that would discourage single vehicle trips and minimize storm runoff. Share parking should be encouraged wherever possible.

- **Park & Ride** … The City currently has one large park & ride facility adjacent to the intersection of Richardson Road and Vogel Road. Other locations should be identified where park & ride operations could be implemented, including existing lots where parking activity is limited or does not take place during normal business hours.

- **Transit** … The City should also investigate the feasibility of providing or encouraging bus transit operations to serve the existing / potential park & ride lots and other generators of significant traffic flows. Such activity centers as the shopping centers, colleges, and industrial area would benefit from the availability of bus transit.

Water Supply Study Area Boundary

Within the study area boundary, there are four public potable water service providers: 1) Public Water Supply District No. 1, 2) Public Water Supply District No. 3, 3) Public Water Supply District No. 10, and 4) Consolidated Public Water Supply District C-1. The service area boundaries within City limits are shown in Exhibit A.

Water Supply

All of the water service providers obtain their water from Missouri American Water via the Meramec River Plant. Therefore, current added capacity is limited only by the ability of the Districts to modify contracts with Missouri American for additional supply.

1. **Public Water Supply District No. 1**
   Public Water Supply District No. 1 serves over ninety percent of the City of Arnold and purchases and obtains water from Missouri American Water Company via three connections: one sixteen-inch connection along US 61-67, two parallel eight-inch lines on Lonedell Road west of Interstate 55, and two parallel sixteen-inch mains just east of Interstate 55. These three connections have a total contracted supply capacity of 7.5 million gallons per day (MGD) with average daily usage of 2.5 MGD and a peak day usage of 4.5 MGD. Currently there is an adequate water supply available for the areas of undeveloped land within the study area.
2. **Public Water Supply District No. 3**
   Public Water Supply District No. 3 serves a small portion of the City of Arnold where subdivisions have been annexed into city limits. Public Water Supply District No. 3 purchases water from Missouri American Water Company. This district has no plans for expansion in the City of Arnold.
3. **Public Water Supply District No. 10**
   Public Water Supply District No. 10 purchases and obtains water from Missouri American Water Company via two parallel ten-inch lines crossing the Meramec River at Missouri State Highway 231. The district has eight percent of its customers living within the corporate limits of Arnold. Currently there is an adequate capacity of water supply available for the areas of undeveloped land within the study area.
4. **Consolidated Public Water Supply District C-1**
   Consolidated Public Water Supply District C-1 serves a small portion of the City of Arnold and purchases water from Missouri American Water Company. The district also holds four deep wells that had originally served the district for emergency purposes.

Water Storage and Distribution

1. **Public Water Supply District No. 1**
   All of this district's water mains are constructed of cast iron, ductile iron, asbestos cement, or polyvinyl chloride (PVC) pipe. Some water mains are over 50 years old. The district currently

has annual water main replacements budgeted to replace and upsize existing two-inch ductile iron water pipes. The district water mains in the study area boundary vary from two-inches to sixteen-inches in diameter.

The district currently has 2 million gallons of water storage in the distribution system. The storage facilities are adequate to meet normal and peak demands. The district currently has one 1,000,000 gallon elevated tank (located on the east side of Interstate 55) and two ground level tanks with capacities of 600,000 gallons (located on Lonedell Road) and 400,000 gallons (located on Tenbrook Road).

2. **Public Water Supply District No. 3**

   All of this district's water mains are constructed of polyvinyl chloride (PVC) pipe. Most of the water mains in the study area are about 20 years old. The district currently does not have an annual budget line item for water main replacements or capital improvements. All repairs in this district are handled as problems arise as an emergency repair. The district water mains in the study boundary area are eight-inches in diameter. The volume of water storage and amount dedicated for the City are not available from the District.

3. **Public Water Supply District No. 10**

   All of this district's water mains are constructed of cast iron and ductile iron pipe. Some water mains are over 40 years old. The district currently does not have an annual budget line item for water main replacements or capital improvements. All repairs in this district are handled as problems arise as an emergency repair. The district water mains in the study boundary area vary from six-inches to twelve-inches in diameter.

   The district currently has 1.1 million gallons of water storage in the distribution system. The storage facilities are adequate to meet normal and peak demands. The district currently has one 100,000 gallon elevated tank and a 1,000,000 gallon ground level storage tank, both of which are more than 1.5 miles from the corporate limits.

4. **Consolidated Public Water Supply District C-1**

   All of this district's water mains are constructed of polyvinyl chloride (PVC) and ductile iron pipe. Some of the water mains are over 40 years old. The district currently does not have an annual budget for water main replacements. The district water mains in the study boundary area vary from six-inches to 20-inches in diameter.

   District C-1's system consists of over 175 miles of pipelines, 4 ground storage tanks with re-pump facilities with a combined capacity of 4.2 million gallons, along with 4 elevated storage tanks with a combined capacity of 1.3 million gallons. All of the listed storage tanks and most of the water system for district C-1 are located outside of the study area.

Development Issues

The current policy of all the water service providers is that as land develops, the land developers or the adjacent property owners will bear the cost for the extension of the public water mains required to serve the developing area to meet both fire protection and domestic needs and the district then charge a tap on fee for each connection made to the system. Consequently, developers would need to consider the cost associated with the extension of public water mains in their development plans.

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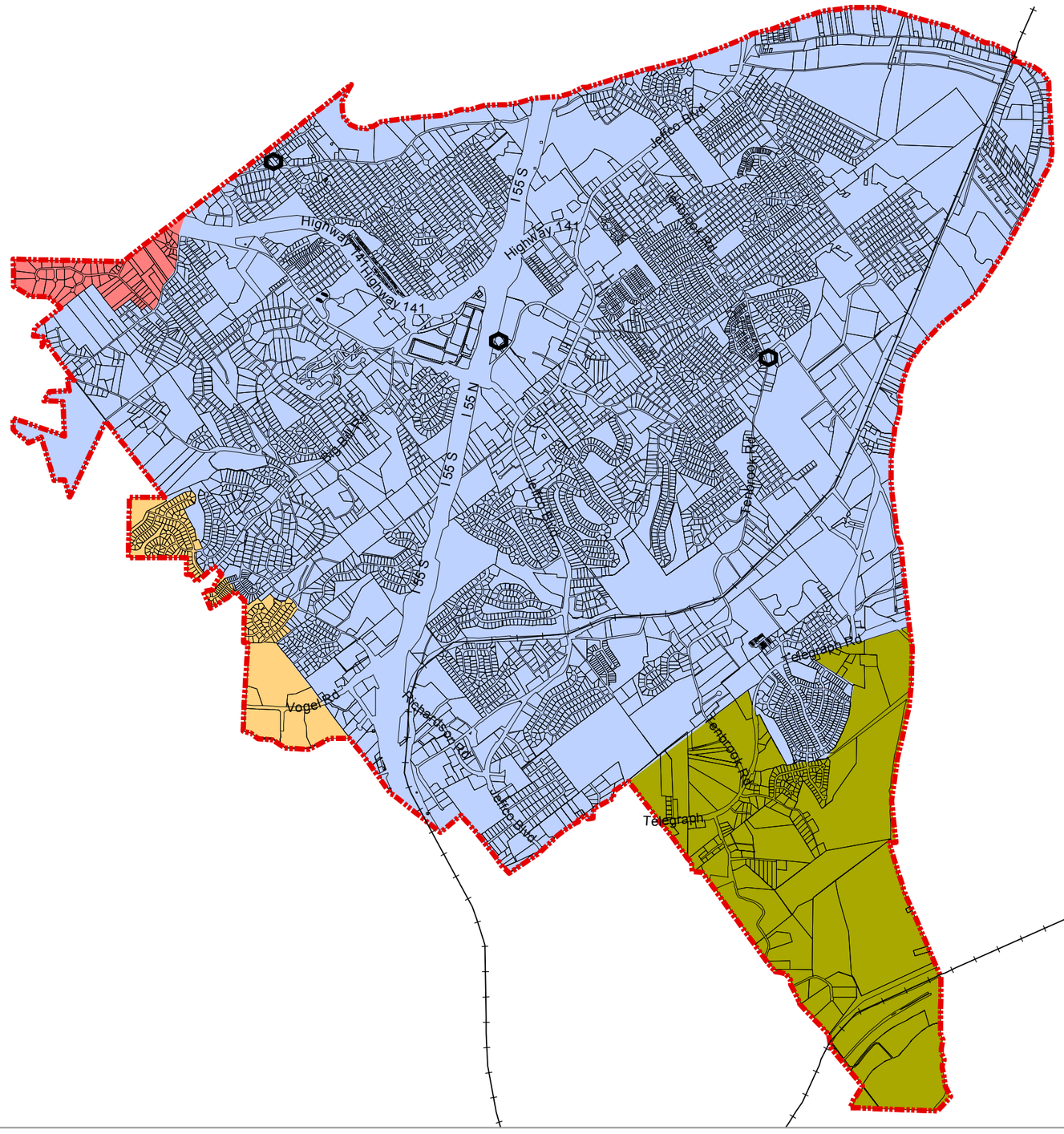
City of Arnold, MO

Water District Boundaries - Exhibit A



Legend

- City Limits
- Parcels
- Public Water Supply District #1
- Public Water Supply District #3
- Public Water Supply District #10
- Consolidated Public Water Supply District C-1
- Water Storage

GBA architects engineers

N

0 0.25 0.5 1 Miles

Stormwater Area Boundary

Located at the confluence of the Meramec and Mississippi Rivers the study area has three (3) principal drainage basins that ultimately flow to the Meramec River, which are shown on Exhibit B:

1. **Pomme Creek Watershed**
   The Pomme Creek watershed drains eastward to the Meramec River and has a drainage area of approximately 6.7 square miles. Pomme Creek is classified as a Class P Stream as listed in 10 CSR 20-7.031. A Class P stream is defined as a stream which maintains permanent flow during drought conditions. Pomme Creek has use designations for Livestock and Wildlife Watering and for the Protection of Aquatic Life and Human Health.
2. **Muddy Creek Watershed**
   The Muddy Creek watershed drains east to the Meramec River and has a drainage area of approximately 2.3 square miles. Muddy Creek is an unclassified stream.
3. **Little Muddy Creek Watershed**
   Little Muddy Creek watershed drains east to the Meramec River and has a drainage area of less than one square mile. Little Muddy Creek is an unclassified stream.

General

The City of Arnold recently completed a stormwater master plan which included directives and milestones to comply with the NPDES Phase II stormwater requirements. These requirements are to track and improve stormwater discharges by reducing stormwater runoff quantity and improving stormwater runoff quality. BMPs can improve stormwater quality by mitigating extreme pH values and assisting in the removal of sediment, petroleum base materials, biochemical oxygen demand (BOD), metals, bacteria, nutrients, toxic organic compounds and other substances that may be present in harmful concentrations. Key stormwater management issues currently facing the city include the following:

a. Provide and organize technical information (maps, studies, reports, etc.) in electronic format for quick distribution to city staff and outside professionals who will be able to use it for design and planning of stormwater improvements.
b. Provide information to the public about the NPDES Phase II stormwater requirements and educating the public on what they can do to help implement BMPs.
c. Develop data on existing stormwater facilities that can be tracked and speed up reporting requirements for regulatory agencies and provide valuable information for planning and design.
d. Continue implementing the Stormwater Management Utility Implementation Plan from the 2004 Stormwater Master Plan.
e. Continue implementing the GIS Mapping as detailed in the 2004 Stormwater Master Plan.
f. Continue implementing stormwater improvements as detailed in the 2004 Stormwater Master Plan:

1. Six Roads South – Culvert replacement and embankment lining is recommended along with regular maintenance to clear debris.
2. Web Terrace – Culvert replacement and embankment lining is recommended along with regular maintenance to clear debris.
3. Rosewood Subdivision – Replace undersized inlets along with regular maintenance to clear debris.
4. Christ Drive and Maple Meadows – New inlets and piped stormwater system conveyance be installed.

Past Flooding Events

The City of Arnold is affected by flooding from both the Mississippi and Meramec rivers. The flood plain from these two rivers encompasses approximately 1,688 acres, which is shown on Exhibit C. Major flooding occurs as a result of high water elevations on the Mississippi River which cause inundation that can cover a considerable area within the city, blocking major thoroughfares, and causing significant property damage. Flooding along the Meramec River is caused not only from Mississippi River flood events but from heavy rainfall in the Meramec River basin as well. Flood events originating on the Meramec River usually rise over a period of a few days and last for several weeks.

Flooding along Pome Creek, Muddy Creek, and Little Muddy Creek is usually a flash flood type event resulting from intense localized thunderstorms. These events usually rise quickly and only last for a few hours. The lower reaches of these creeks also experience flooding caused by high water elevations on the Meramec and Mississippi Rivers.

Significant flooding has occurred on several occasions within city limits. Recent floods of significant magnitude include the following:

- 1973, 30-year frequency, Meramec River.
- 1982, 100-year frequency, Mississippi River.
- 1993, 166-year frequency, Mississippi River.
- 1995, 50-year frequency, Meramec River and Mississippi River.

Development Issues

The current policy of the City is that as land develops, the land developers incorporate stormwater collection and detention into the site. As the City of Arnold grows and NPDES regulations change stormwater quality treatments are likely to be required in the future. The City should take a proactive approach to stormwater management by evaluating the water quality requirements of surrounding municipalities.

The floodplain management ordinance in the City severely limits new developments and buildings in the floodplain. This ordinance also limits the types of construction that can be permitted in the floodplain. Alternative land uses should be considered in these areas such as parks, trails, and athletic fields.

Another benefit to having proper management of stormwater facilities is the removal and prevention of inflow and infiltration (I&I) into the sanitary sewer system.

Summary

There are no easy solutions to stormwater management as there are many different groups involved with differing priorities. The key issue is working to together to achieve common goals. City and County officials working together for the good of residents in the area is a priority.

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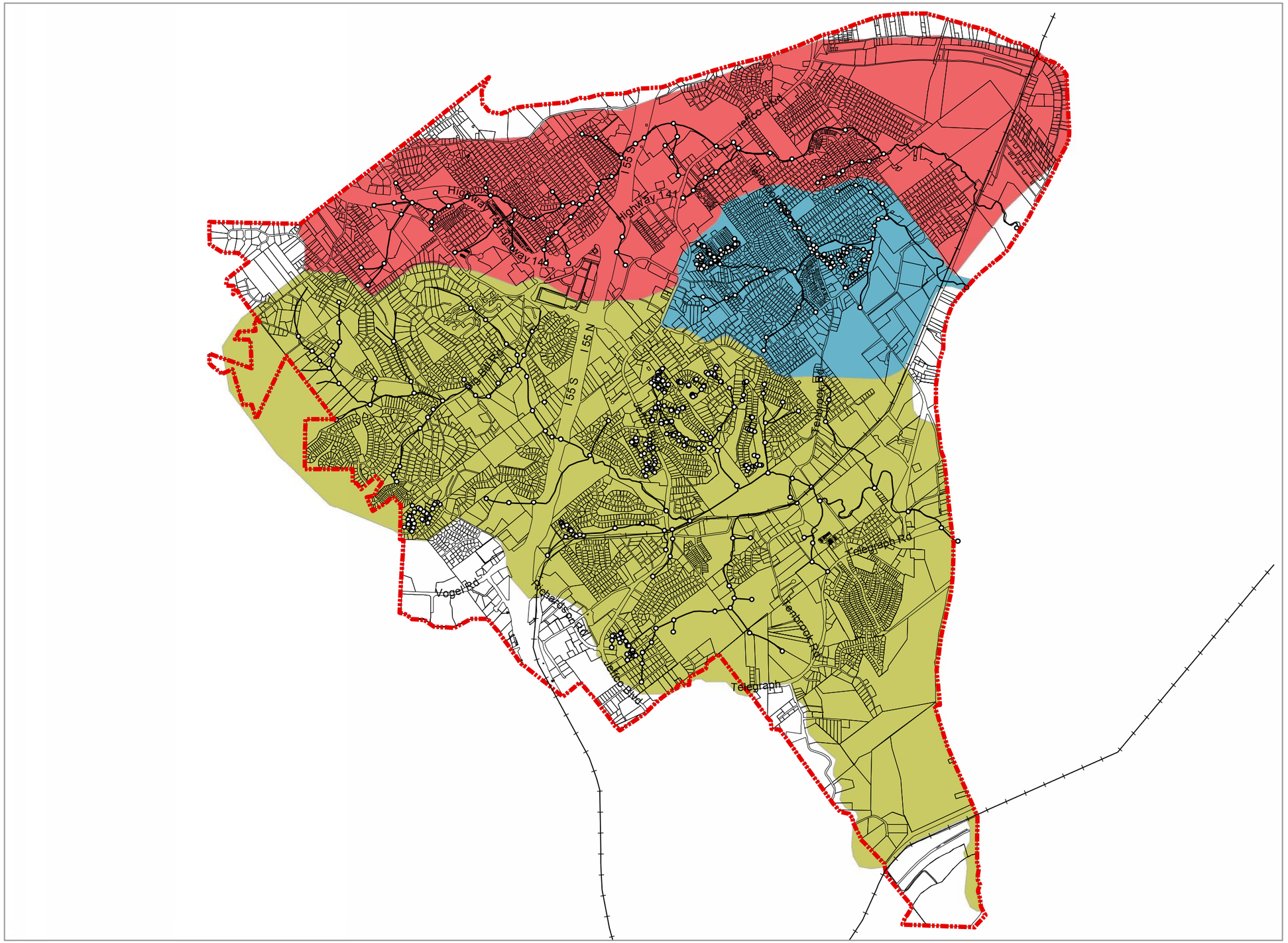
City of Arnold, MO

Water Shed Boundaries - Exhibit B



Legend

- City Limits
- Stormwater Structures
- Storm Lines
- Parcels
- Little Muddy Creek Watershed
- Muddy Creek Watershed
- Pomme Creek Watershed

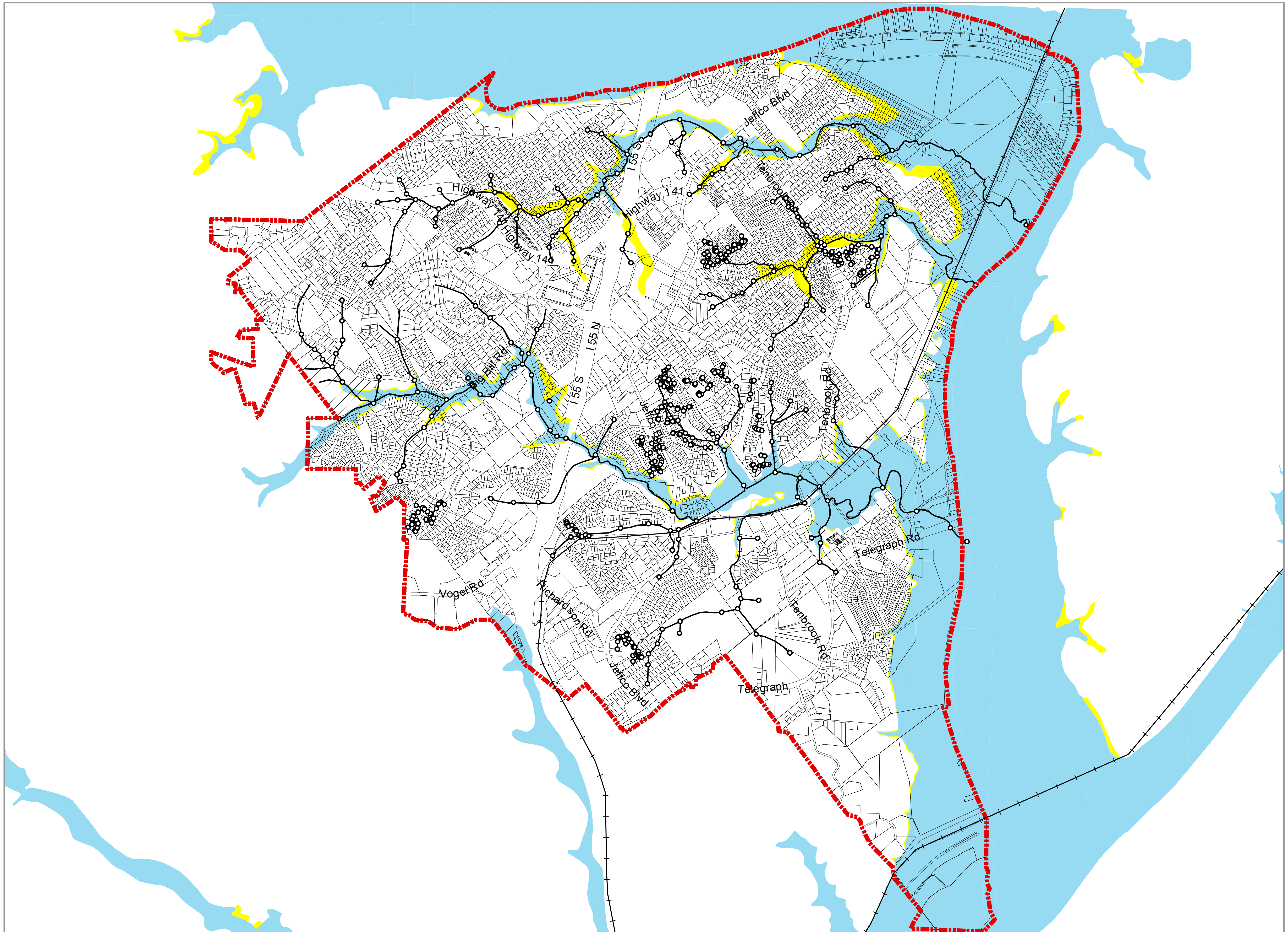
GBA architects engineers

N

0 0.25 0.5 1 Miles

City of Arnold, MO

Flood Zone Boundaries- Exhibit C



Legend

- City Limits
- Stormwater Structures
- Storm Lines
- Parcels
- 100yr Flood Zone
- 500yr Flood Zone

N

0 0.25 0.5 1 Miles

Sanitary Sewer Study Area

Prior to the incorporation of the City of Arnold, the area lacked a central sewer authority. This and rapid growth led to the construction of numerous small treatment facilities, primarily lagoons and individual residential septic tanks. Due to the resulting pollution, due to the lack of a central sewer authority, the Clean Water Commission (CWC) placed a moratorium on the issuance of sewage facility construction permits in northeast Jefferson County (inclusive of the City of Arnold) from May, 1971 to September, 1971, pending a study of the area by the CWC. In September of 1971, the CWC lifted the moratorium to permit construction of treatment facilities that serve the entire watershed or replace existing inadequate facilities. A study completed by Zurheide-Hermann, Inc. and the East West Gateway Coordinating Council in September of 1972 identified 71 known treatment facilities located within the City Limits. The result of the moratorium and subsequent treatment restrictions was a tremendous reduction in the rate of growth in the City of Arnold.

In November, 1973 the city retained the services of Horner and Shifrin, Inc. to develop alternative concepts to alleviate the multiple individual treatment facilities for the city and surrounding tributary areas. Horner and Shifrin, Inc. prepared a report that was adopted by City Council in May, 1974. In November, 1975 the voters passed a bond issue to construct a sanitary sewer collection system and an interim municipal wastewater treatment facility (the Meramec Lagoon Facility) located in St. Louis County and operated and maintained by the Metropolitan St. Louis Sewer District (MSD). In 2007, MSD completed construction of the Lower Meramec Treatment Facility (LMTF), and the city's wastewater was diverted and conveyed to this facility. The city pays MSD for treatment based on the volume of wastewater conveyed to the LMTF. Once wastewater was conveyed to MSD's LMTF, the Meramec Lagoon Facility was decommissioned.

The City of Arnold has agreed to a flow allocation of 4.5 MGD for average flow and a peak flow (based on peak day) of 18 MGD. In the first quarter of 2008 the city was billed for an average daily flow of 4.32 MGD. Therefore the city has little additional capacity prior to exceeding the existing flow allocation based on the existing MSD agreement; however MSD has significant excess capacity to treat additional flows with an amended agreement. Based on the age of the existing collection system and a peaking factor of 4.0 (peak flow (18 MGD) / average daily flow (4.5 MGD)), there is concern that the peak flow may occasionally be exceeded during wet weather events. Similar systems throughout the Midwest have peaking factors well above 4.0.

In 2008 the city retained the services of Municipal & Financial Services Group (MFSG) to prepare a Wastewater Rate Study. The study indicated the following findings:

a. Current sewer rates do not produce sufficient cash revenue to cover cash revenue requirements within the Sewer Fund for Fiscal Year 2009 or the years following. Based on projected water sales, the current rates will produce cash revenues roughly 20% less than the required cash

revenue in Fiscal Year 2009 with subsequent significant shortfalls annually over the planning period.

b. The capital expenses, in the form of annual debt service, related to the new Lower Meramec Treatment Plant is the primary reason for the current and projected shortfall in the Sewer Fund.
c. The City does not have any dedicated reserves within the Sewer Fund.
d. The City incurs costs while operating and maintaining the sewer system that do not benefit customers in the Rock Creek District.
e. A significant portion of the City's sewer collection system was installed in the 1950's and will reach its estimated useful life over the next 10 years.
f. The current residential sewer rate structure which charges all customers the same fixed amount does not allocate costs proportionately among residential customers (i.e. large residential users pay the same amount as small users).
g. The current connection fee of $2,500 for connecting to the wastewater system is set at the appropriate level to recover the cost of providing capacity to new wastewater connections.

Based on these finding, Municipal & Financial Services Group made the following recommendations:

a. City should formally establish an O&M Reserve and a Repair, Renewal and Rehabilitation Reserve for the sewer system. That the City begins contributing to the "3R" Reserve by Fiscal Year 2012 at the latest to allow the City to begin planning for the significant repairs and replacements that will be required within the collection system as it begins to reach its useful life.

b. The City charge Rock Creek customers approximately 17% less than City of Arnold customers due to the fact that the City does not provide local maintenance to lines serving these customers and because the City incurs expenses not related to serving these customers.

c. The City adopt a new rate structure that will more appropriately charge residential customers based on their contribution to the City's system and the costs they cause the City to incur. The rate structure consists of a fixed charge which includes 15,000 gallons of usage per quarter and a usage charge based on winter quarter usage for residential customers and actual usage for non-residential customers. The following table presents the current sewer rates and the recommended rates for Fiscal Year 2009.

d. We recommend that the City maintain its sewer connection fee set at $2,500 per connection.

Based on these recommendations the city has begun increasing the sewer rates in subsequent years; however, the amounts of increases have not been to the level recommended by MSFG primarily due the current economy. The city's primary funding laps is in the area of system rehabilitation and reconstruction as the original system ages.

Currently, the City of Arnold provides sanitary sewer service to approximately 8,820 customer accounts. Of these 8,820 accounts there are approximately 340 non-residential sewer accounts in the City. The 8,820 accounts also consist of providing sanitary sewer service to approximately 500 customer accounts to properties in other sanitary sewer districts. Approximately 480 of the 500 accounts are located

within the boundaries of the Rock Creek Sanitary Sewer District (RCSSD). Within the account located in the RCSSD, the city is not responsible for the maintenance of the collection system.

The majority of the sewer collection system was constructed in the 1950's through the 1970's and the system is construction of vitrified clay pipe (VCP), concrete and poly vinyl chloride (PVC) pipe. Exhibit D identifies the primary sewer lines and lift station locations. Within the study boundary area, the sanitary sewer collection system consists of approximately 242 lineal miles of sewers that range in size from 6" to 27". The sewer material consists of vitrified clay pipe (VCP), polyvinyl chloride pipe (PVC) and concrete pipe. The majority of the pipe network is VCP, approximately 51%. The collection system also has six (6) lift stations. These lift stations are identified below and have the associated pumping capacities:

Lift Station Name	Pumping Capacity
Keller	300 GPM
Twin Oaks	100 GPM
141	130 GPM
Louie	50 GPM
Rosedale	55.5 GPM
Karley	1 GPM

There are some obvious gaps in public sanitary sewer service within the study boundary area. Some of these gaps have individual residences or small subdivisions with large acre tracts that are on septic systems. Septic systems generally work fine for a period of time, but due to the presence of high water tables and restrictive soils in the area, this type of system can and often does result in significant maintenance and health issues. When the public sanitary sewers are extended, an effort is made to connect those residents on septic systems to the public sewer system. In addition, due to the steep terrain in undeveloped areas of the city several of these undeveloped areas will be costly to provide sanitary sewer service.

The city is currently under contract with the project team consisting Fribis Engineering, HDR and Trekk to perform a Sanitary Sewer Evaluation Study (SSES) for the city's sanitary sewer collection system. Work on the study began in June 2010 and is scheduled to be completed in 2012. The work consists of flow and rainfall monitoring, inflow and infiltration (I/I) investigations, GIS mapping of the system and improvement recommendations. The project team, through flow monitoring has identified approximately eight (8) sub-watersheds that have significant I/I issues. System improvement recommendations will be presented in 2012 when the SSES is completed. It is important to keep in mind that another benefit to having proper management of stormwater facilities is the removal and prevention of inflow and infiltration (I&I) into the sanitary sewer system.

Development Issues

The study area has two (2) principal watersheds consisting of the Pomme Watershed and the Muddy Creek Watershed. The Pomme Watershed encompasses the southern half of the city and the Muddy Creek consists of the northern half of the city. The Pomme and Muddy Creek Watersheds have been fully developed with the exception of relatively small pockets and unsewered existing developments that haven't been sewered due to terrain issues. The most significant issue with the development of land tracts is being able to provide public sanitary sewer service. This is due to the following:

1. Large cost to install gravity sewer mains and wastewater treatment facilities
2. Environmental issues associated with obtaining government approval for new wastewater treatment plants and/or lift stations
3. Public sentiment against constructing treatment facilities and/or lift stations near residential or commercial developments

Public funds (local) available for the design and construction of wastewater collection and treatment facilities to serve the study area are limited. State and Federal funds through the State Revolving Fund Loan program are readily available at attractive interest rates. Providing public sanitary sewer service to the study area will require a considerable amount of gravity sewers, lift stations and force mains, which will be a significant capital expenditure.

The key to development within the study area will be to obtain sufficient funding for the City to be able to install key infrastructure components such as lift stations or trunk sewers within each watershed. Another key issue to the development of the study area is the capacity of the existing sewers and treatment facility to receive more flows. Solving the infiltration and inflow problems in the existing sewer collection system is a key to maintaining sewer service for all without negative health issues, interceptor capacity issues and treatment capacity issues. If this problem remains unsolved, additional sewer flows from the developing area will need to be directed elsewhere that may include a new treatment facility.

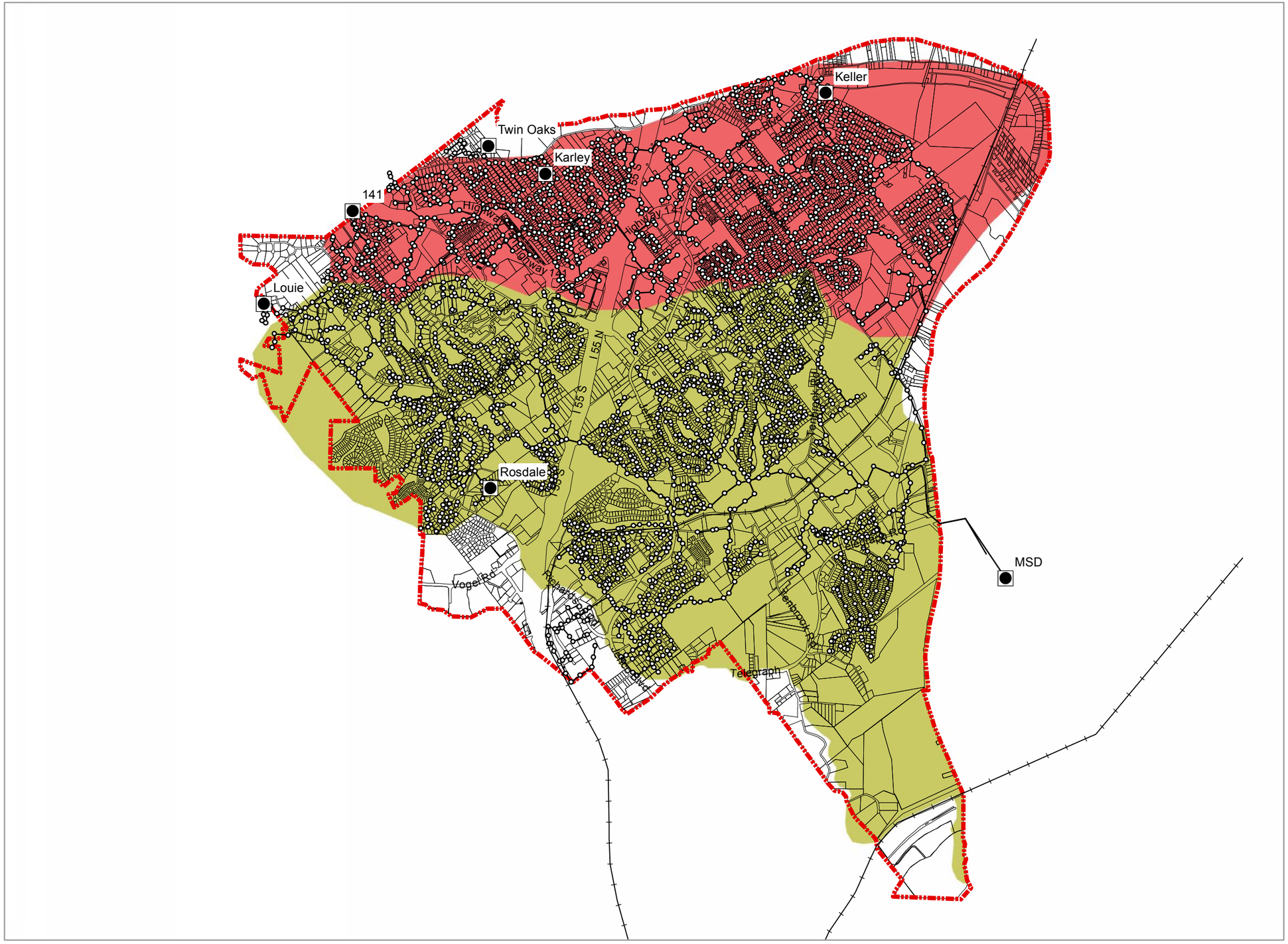
Another issue that has and will complicate matters in the study area is when development occurs sporadically throughout the watershed. When development occurs in this manner, it becomes increasingly more difficult to bring sewer service to each individual area cost effectively. If a systemic development approach from the lower to the upper parts of the watershed can be developed, the funding of wastewater collection improvements becomes easier to achieve.

Installation of gravity sewers and treatment facilities are the most preferred, desirable and cost effective means for collecting and treating wastewater flows primarily due to health issues and system maintenance. However, due to permitting constraints with federal and state agencies as well as public opinion it is very difficult to construct new wastewater treatment facilities today. The only other alternative is to install a system of gravity sewers draining to lift stations that then pump sewage through force mains to the existing treatment facility, which is expanded as necessary. This second approach to providing sanitary sewer service limits development.

Currently MSD provides sufficient treatment capacity to allow for substantial development within and surrounding the City of Arnold.

City of Arnold, MO

Sanitary Sewer System - Exhibit D



Legend

- Lift Stations
- Manhole
- Sanitary Sewer Pipe
- City Limits
- Parcels
- Muddy Creek Watershed
- Pomme Creek Watershed

GBA architects engineers

N

0 0.25 0.5 1 Miles

The following is the first draft of the "gap analysis" performed by this firm of the City of Arnold, Missouri's Code of Ordinances related to land use, infrastructure, transportation and development. This product serves as the technical memorandum outlining the relevancy of parts of the code to land use, infrastructure, transportation and development decisions in the City.

Specific Sections of the Municipal Code which were reviewed include parts of the following: Chapters 2, 5, 6, 8, 15, 17, 18, 20, 21, 23, Appendix A and Appendix B. A summary of review comments is as follows:

Governance

1. The City Management Structure, City Departments, and Commissions appear to be set up in a way to effectively manage the planning, building development review and approval process, zoning and building code review, approval and permitting process. What might be at issue is what gets reviewed and what the tools are that the reviewing body has to work with in making their reviews. (These will be commented on in more detail below).

Buildings and Building Regulations

1. For building permit, two sets of Complete Plans are required. There is no description as to what needs to be included in these Plans, other than a Plot Plan, so we are assuming the City as published guidelines / checklist that can be handed out with the permit application. The Ordinance requires all commercial and multi-family projects to be sealed by an architect *or* engineer. It is our experience that Cities have been most successful in getting the type of developments that they want be requiring an architect's seal on all building projects. This seems to preclude developers / builders from designing their own projects without appropriate professional input that then get structural framing designed by the structural engineers and stamped.
2. Single Family Residences do not need to be sealed by an architect or structural engineer. It is our experience that the most successful communities in getting the types of development that they want in their predominant residential areas require an architect's seal on single family residences, particularly if they are able to establish any overlay districts, design standards, and have design oversight in place.

Floodplain Management:

1. Discusses predominately areas within Arnold's flood plain. However, it does not include protection of watersheds and the creation of buffers of watersheds, water quality management, the use of BMP's for sustainable site development, percentage of impervious surface allowed or lot density for residential properties as a basis for open space management for flood control.
3. Flood hazard design standards: Only a one car garage allowed in residential lots within flood plain. Seems odd to allow only a single car detached garage if they are trying to promote successful developments, but there may be a reason that we cannot ascertain.

Planning

1. Establishment of Building Lines: Council establishes based on PC recommendations building setbacks within proposed major streets or public improvement plans is adopted. However, does not include for "build-to lines" or proper regulation of building facades facing right-of-way, access, pedestrian improvements. Overlay Districts coupled with design standards that actually control the appearance of the Right of Way beyond vegetation may be desired.

Streets, Sidewalks, Public Places

1. Sidewalk construction is required along arterial and collector streets. The design is controlled by Director of Public Works and includes scrutiny related to continuation through other properties for connectivity.
2. Sidewalks are required along all local roads only as identified in Comprehensive Plan of City and for all new residential subdivisions. The new Comp. Plan should probably address sidewalks and sidewalk connectivity throughout the City as this is a major problem with Arnold's plethora of cul-de-sacs and single entrance developments.

Traffic

1. Pedestrian right-of-way at cross-walks is addressed. The Comprehensive plan may want to evaluate how pedestrian priority crossings / circulation is dealt with and where.
2. There are no provisions for bike lanes in the Ordinance – the creation of or the use of Right of Way for.

Subdivisions

1. States that the subdivision regulations were developed by the Planning Commission in accordance with Comp Plan and Zoning Ordinance. They appear to have the authority to modify these regulations to be consistent with the new Comp Plan and any changes made to the Zoning Ordinance.
2. Building Lines defined as the required setback line from the property boundaries. There are no provisions for "build-to" lines, which may be desired as part of certain overlay districts as a way of create desired Right of Way aesthetics.
3. Sketch Plat Defined: it might be wise to require preliminary information regarding height, bulk and general character of a development as part of the initial sketch plat.
4. Reference to conformity to Comprehensive Plan, may want to include certain Overlay Districts, as appropriate to guide development.
5. Policy and Purpose: *"For orderly, planned, efficient, and economical development and protect character."* Don't know if the City Attorney would allow it, but would suggest that it include language such as: *"to promote and enhance the quality of life and character of the City".*
6. Commission may want to reconsider the ability to waive all of the requirements submission of all other plans except record plat when considering minor subdivisions (described as three lots or less, not requiring street or utility work).
7. Sketch Plat: *"Rough Sketch of Site Plan…"* should consider including proposed placement of all proposed structures, proposed lot density, lot coverage, existing and modified contours, bulk, height and general character of all buildings.

8. Preliminary Plat: Required to be prepared by land surveyor, as is typical. May want to consider requiring a site plan designed by registered architect, landscape architect, or urban planner that indicates general layout of all buildings, and shall include information related to bulk, height, and general design character of buildings and general site and landscape design.
9. Improvement Plans: Required to be prepared by an engineer (typically, a civil engineer). You may want to consider requiring the a landscape plan prepared by a licensed landscape architect, and include language requiring information regarding watershed protection and buffers, landscape design and tree planting, sidewalks, both pedestrian and vehicular connectivity. Also language, such as: *"Site plans shall include Best Management Practices for sustainable site design as adopted by City of Arnold…"*
10. Subdivision Public Improvement Plans are submitted for review to the Administrative Officer, reviewed by Community Development Department, other agencies as appropriate. Consider if the Planning Commission should retain design oversight of all Subdivision proposals by requiring their review in lieu of relying on Community Development Department, Building Commissioner, City Engineer or Director of Public Works.
11. The Record Plat: Prepared by land surveyor for review of PC and then City Council. Suggest the consideration of further information required as part of the record plat such as a site plan prepared by registered architect or planner, landscape improvement drawings, Design Control Guidelines for subdivision per Article III.
12. Single Family Residential Lot Design Standards: Only deals with lot size. Other Design Standards should be incorporated here. Reference any Overlay Districts that might apply.
13. Non-Residential Lot Design Standards: Reference Best Management Practices for Sustainable Site Design and Development. No maximum block lengths. Shorter blocks promote walkability and better traffic management. Consider restrictions on dead-end streets which should be avoided for walkability and connectivity reasons.
14. Recommend adding language referencing the allowance of various mixed-use types of projects.
15. Blocks and Pedestrian Ways: Allowable block length seems excessive.
16. Street Standards: Consider referencing other sections on lighting, landscaping, etc. Consider including language related to bike lanes as appropriate.
17. Lighting: Consider reference pedestrian lighting of sidewalks.
18. Landscaping: Landscape plan shall be prepared by a registered Landscape Architect. Consider also requiring this in single family residential subdivisions.
19. Add section on Buffers.

Zoning Ordinance

1. Review of the current Zoning Map suggests that Planned Residential District (PRD) and Neighborhood Commercial District (C-1) are not used.
2. Residential Zoning Districts don't necessary align with actual lot sizes of certain neighborhoods – which could make rehabilitation or infill housing difficult on what could be conceived as non-compliant lots. However, Section on Non-conforming Lots of Record seems to resolve this conflict.

3. No Overlay Districts being used to specifically guide development within any Zoning District.
4. No Design Standards for any Zoning Districts.
5. Per Ordinance, non-residential buildings seem to only require approval of a site plan by the Planning Commission. Residential buildings when a permitted use, do not (except when a Conditional Use).

6. Residential Districts General Review Comments:
   i. Establishing limitations on character is stated as a purpose, but there are no mechanisms in place for actually doing so.
   ii. Included is a provision that allows for the deviation of front yard setback requirements as long as it's consistent with adjacent existing buildings.
   iii. Residential height restriction of 35', other conditional uses 50' restriction (additional all yard setback of 1' for every 1' of ht. above 30' required).
   iv. There are no requirements for the separation of accessory structures indicated.
   v. There are no provisions that allow for accessory structures within the rear yard setback requirements for the primary structure. This makes detached garages difficult in some districts.
   vi. 2 off-street parking places are typically required per Dwelling Unit. There are no requirements for covered parking – either garages or carports.
   vii. Paved parking and drive areas required. There are not provisions that allow the use of pervious pavement. (By definition, pavement is impervious).
   viii. There is no lot density, impervious surface, garage, accessory bldg. or carriage house restrictions indicated in any residential district.
   ix. There are no exterior design standards, overlay districts, or design review requirements for single family residential lots in any residential district indicated.
   x. All conditional uses require PC review.
   xi. There are no provisions for encroachment on setback lines for architectural detail. However, this is referenced in the Supplementary District Regulations which is commented on below.

7. R-1 Residential 1 acre Lots, salient characteristics:
   i. Does not include any dwelling type other than single family, including conditional uses.
   ii. 30' front yard, 15' side and rear yard setbacks.

8. R-2 Residential ½ acre Lots, salient characteristics:
   i. Does not include any dwelling type other than single family, including conditional uses.
   ii. 25' front yard, 10' side and 15' rear yard setbacks. Side yard setback 10% if lot width 60' or less, but no less than 5'.

9. R-3 Residential 15,000 SF Lots, salient characteristics:
   i. Duplexes of at least 1,500 SF per DU allowed as a conditional use.
   ii. Required lot size for duplexes is same for single family.

iii. 25’ front yard, 8’ side and 15’ rear yard setbacks. Side yard setback 10% if lot width 60’ or less, but no less than 5’.

10. R-4 Residential 10,000 SF Lots, salient characteristics:
    i. Duplexes, three and four family DU’s allowed as conditional uses.
    ii. Required lot size for duplexes is same for single family. 3-Fam.:12,000 SF, 4-Fam.:16,000 SF.
    iii. Duplexes, three, four family DU’s not permitted within development approved for single family.
    iv. 25’ front yard, 8’ side and 15’ rear yard setbacks. Side yard setback 10% if lot width 60’ or less, but no less than 5’.

11. R-5 Residential 8,000 SF Lots, salient characteristics:
    i. Duplexes, three and four family DU’s allowed as conditional uses.
    ii. Required lot size for duplexes is same for single family. 3-Fam.:12,000 SF, 4-Fam.:16,000 SF.
    iii. Duplexes, three, four family DU’s not permitted within development approved for single family.
    iv. 25’ front yard, 8’ side and 15’ rear yard setbacks. Side yard setback 10% if lot width 60’ or less, but no less than 5’.
    v. Table of distance requirements for separation of structures / accessory structures not clear.
    vi. Includes landscaping and open space provisions.

12. R-6 High Density Multi-Family Residential, salient characteristics:
    i. Duplexes and single family allowed as permitted uses.
    ii. Three, four, and multi-family DU’s allowed as conditional uses.
    iii. Neighborhood retail allowed in Multi-family as permitted use – up to 5% of GFA.
    iv. Required lot size: Single Fam. and duplexes: 8,000 SF, 3-Fam.:12,000 SF, 4-Fam.:16,000 SF. For multifamily: 2,000 SF of lot area per DU minimum.
    v. Height restriction of 50’ (at the perimeter of structure only). Additional all yard setback of 1’ for every 2’ of ht. above 45’ at perimeter required.
    vi. 25’ front yard, 8’ side and 15’ rear yard setbacks. Side yard setback 10% if lot width 60’ or less, but no less than 5’.
    vii. Table of distance requirements for separation of structures / accessory structures not clear.
    viii. Includes landscaping and open space provisions.

13. MHP Mobile Home Park, salient characteristics:
    i. Includes residential height restriction of 25’, other conditional uses 50’ restriction.
    ii. Required Lot Size: 5,000 SF, 100’ min lot depth, 50’ min lot width.
    iii. 20’ distance required between structures.

iv. 20’ front yard setback, 8’ side yard and 15’ rear yard setbacks.
v. Special parking provision for recreational vehicles.
vi. Screening provision subject to PC approval.
vii. Includes a landscaping and open space provision.

14. Commercial Districts General Comments:
    i. Includes landscaping requirements.
    ii. There is no limit on impervious surface lot coverage, other than through open space landscaping requirements.
    iii. A 15’ wide landscaped buffer / fencing requirement between Commercial and Residential Districts are required.
    iv. Include are both off-street parking and loading requirements.
    v. Requirements that all Parking / Drives shall be paved are included.
    vi. There is a parking distance requirement from the front Right Of Way, and R / PS Districts of 15’ which must be landscaped.

15. C-1 Neighborhood Commercial, salient characteristics:
    i. Allows for neighborhood retail of up to 2,500 GSF.
    ii. Conditional uses include other neighborhood services, restaurants, etc.
    iii. Conditional uses include apartments, with restrictions.
    iv. One-story height limitation.
    v. 15,000 GSF minimum lot size.
    vi. 50’ front yard setback, 10’ side or rear yard adjacent to residential
    vii. 20% maximum lot coverage
    viii. No Filling Stations, no entertainment games.

16. C-2 Small Business Commercial, salient characteristics:
    i. Service commercial and retail of 30,000 GSF maximum.
    ii. Conditional uses include apartments, with restrictions.
    iii. Other commercial conditional uses – with provisions for ROW improvements, height limitations.
    iv. Height limitation adjacent to R District – setback increased 1’ for every 2’ of height above 30’.
    v. 18,000 SF minimum lot size and 50’ minimum lot width.
    vi. 25% maximum lot coverage, 20% max for multi-story buildings.
    vii. 10% open space requirement.
    viii. 50’ front yard setback,15’ side or rear yard adjacent to residential
    ix. Landscaping and residential buffer requirements.
    x. Includes an encroachment provision for certain architectural details.
    xi. Includes requirements for irrigation.
    xii. Includes an approved tree list.
    xiii. Exterior lighting requirements.

xiv. Site Lighting Plan required.
xv. Community Development Director approves location of access points to street ROW.
xvi. Restricts the use of Metal as primary exterior building material.

17. C-3 General Commercial, salient characteristics:
    i. General Commercial District.
    ii. Conditional uses include Apartments, with restrictions.
    iii. Height limitation of 50' max.
    iv. Height limitation adjacent to R District – setback increased 1' for every 2' of height above 30'.
    v. 50' minimum lot width.
    vi. 25% maximum lot coverage, 20% max for multi-story buildings.
    vii. 15% landscaped open space requirement.
    viii. Encourages parking behind building by allowing 20' front yard setback if all parking is behind the building by at least 6'.
    ix. Otherwise, front yard setback is 50', 15' side or rear yard adjacent to residential
    x. Includes landscaping and residential buffer requirements.
    xi. Includes encroachment provisions for certain architectural details.
    xii. Includes requirements for irrigation.
    xiii. Allows for LEED certified landscape design in lieu of irrigation.
    xiv. Includes an approved tree list.
    xv. Community Development Director approves landscape plant species along ROW and parking.
    xvi. Exterior lighting requirements.
    xvii. Site Lighting Plan required.
    xviii. Safe pedestrian circulation required.
    xix. Safe and convenient access from public or private street required (but not defined).
    xx. Community Development Director approves location of access points to street ROW.
    xxi. Restricts the use of metal as primary exterior building material.

18. C-4 Planned Commercial:
    i. Stated goal is to facilitate the establishment of combinations of developments and uses where appropriate.
    ii. Requires preliminary and final development plans, changes in zoning approved by the PC and Council.
    iii. Height Restrictions – per the particular Planned Commercial District established.
    iv. A lot area of less than an acre is only allowed if adjacent to a C or M district, or as identified as part of City Comp Plan.
    v. Setbacks to be determined per plan, 15' R District buffer between parking and/or structures, plus 1' for every 2' of height over 30'.
    vi. Maximum lot coverage 25%, 20% if multi-story.
    vii. Includes landscape and buffer requirements.

viii. Allows for shared use parking sharing up to 20%.
ix. We suggest that the Planned Commercial District application include cross section profiles showing bldg form, as well as preliminary exterior elevations, as appropriate.
x. Site contours both existing and proposed are required as part of the Application.
xi. ROW access points are required to be identified.
xii. There is no language regarding overlay districts, architectural design standards, connectivity or walk-ability requirements or build-to lines called out as requirements for Planned Commercial.

19. Industrial Districts General Comments:
    i. No screening required around open yard storage areas.
    ii. Question as to whether open storage area (any part not used for buildings, parking, loading or access-ways) needs to be landscaped.
    iii. 15' wide buffer required for adjacent R property.
    iv. Includes landscape buffer requirements.
    v. Includes off-street parking and loading requirements.
    vi. There are no exterior wall material restrictions (i.e. metal panel). Some jurisdictions restrict the use of metal panels.
    vii. There are no loading dock location restrictions (i.e. not facing street ROW). Some jurisdictions restrict the visibility of loading docks from the street ROW.

20. M-1 General Industrial, salient characteristics:
    viii. Permitted uses include manufacturing, warehousing, recreation facilities, office buildings.
    ix. Conditional uses include Restaurants, Research Labs, Mini Storage Facilities, among others.
    x. Maximum height is 50'.
    xi. No minimum lot area.
    xii. Up to 40% of lot can be used for open storage.
    xiii. 30' front yard setback. 15' min side and rear yard setback, or 25' min from any district other than industrial.
    xiv. Setback is required of an additional 1' per 2' of height above 30' adjacent to PS, AG or R District.

21. M-2 Heavy Industrial, salient characteristics:
    i. Permitted uses include heavy manufacturing and warehousing.
    ii. Conditional uses include animal processing, hazardous material processing, among others.
    iii. Maximum height is 50'.
    iv. No minimum lot area.
    v. Up to 60% of lot can be used for open storage.

vi. 30’ front yard setback. 15’ min side and rear yard setback, or 25’ min from any district other than industrial.
vii. Setback of an additional 1’ per 2’ of height above 30’ adjacent or PS, AG or R District.

22. M-3 Planned Industrial District, salient characteristics:
    i. Used For combinations of developments in group M.
    ii. Uses limited to permitted and conditional uses of all Groups M and C Districts.
    iii. Height restrictions per District’s ordinance.
    iv. Lot area is 1 acre minimum.
    v. Setbacks per District’s ordinance – compatibility to adjoining developments required.
    vi. No parking within 10’ of R District. No sure why this is not 15’ like other districts.
    vii. Required setback of an additional 1’ per 2’ of height above 30’ adjacent to R District.
    viii. References performance standards (see below).
    ix. Preliminary Development Plans: No landscape plan, massing, site sections, or exterior elevations required as part of Preliminary Development Plan submittal.
    x. Final Development Plans: Information required dictated by the PC.

23. Planned Residential Development, salient characteristics
    i. Stated purpose is to provide progressive, but controlled, creative zoning procedure in R Districts in order to permit flexibility in building types, locations and subdivision design.
    ii. Applications are to and reviewed by PC, then approved by Council.
    iii. Requirements of underlying R District for density and setbacks.
    iv. Increased density considered based on other architectural features as described.
    v. Lot size needs to be at least 5 acres.
    vi. Height limitations increased to 3 stories from 2 ½ stories, set back 1’ for each foot above 35’.
    vii. Conditions that PC may impose includes: landscaping, public space design, SF per dwelling unit, architectural character.
    viii. Includes provisions for common land.
    ix. Planning Commission Review Criteria. Does not talk about architectural character.
    x. Includes protest provisions.

24. General Height Restrictions
    i. Residential: 2 ½ stories and 35’ up to four units; 4 stories and 50’ greater than 4 units.
    ii. Non-Residential: 2 ½ stories and 35’ except as allowed by conditional use permit; 4 stories and 50’ max, except for in C-4 which can be 100’ in height.

25. Supplementary District Regulations.
    i. Accessory buildings not allowed in required yards, or within 5’ of any building. Would suggest change in R Districts to allow accessory buildings of a certain size within 5’ of rear and/or side yard property line to accommodate detached garages.
    ii. Minimum Floor Space established for Residential Units based on number of dwellings.

iii. Access to street required. Suggest expanding language to include connectivity.

iv. Residential driveways – if over 100 long, only first 50' of drive length need to be paved (remaining must dust free). Suggest language change to accommodate pervious pavement types.

v. Utility sheds less than 120 SF in R Districts, exempt from side and rear yard requirements. This should be expanded to include up to two car garages up to a certain size with design controls. Also, only up to 5' from Property Line on both side and rear yards.

vi. Need to provide a definition for "Bay Type" parking.

vii. Setbacks from arterial and collector streets: R property 35' min front bldg line; M property 50' min front bldg line.

viii. Setback encroachments allowed: max 20% of area. 2' max for eaves and architectural features. We would suggest that this get expanded to 4'-6' to allow for bay windows, porches, stoops, etc. within setbacks.

ix. Fencing: Minimum and maximum heights delineated as well as acceptable materials in each District. Chain link fencing is allowed in R districts but not allowed in C District. Fencing is not allowed in front yards. However, a 4' high max. fence may be approved in front yard by PC. Fences are allowed in one street yard on corner lots up to 10' into yard. The PC has the authority to approve higher fences.

x. Conditional Use Permits: Suggest that Arnold consider in the criteria for PC plan review the inclusion of stronger language related to visual compatibility. For instance, the Application should include exterior building elevations, character sketches, site sections and massing, etc. Appeal and protest procedures should do likewise.

26. Zoning Performance Standard Regulations
    i. For Planned Development Area (PDA) or M Districts related to noise, vibration, odor, smoke, heat, etc.
27. Administrative Enforcement
    i. Filing of Plans: Too general of language as to what is required. Would suggest more detail.
28. Definitions
    i. Suggest the inclusion of some additional terms such as: encroachment, built-to line, carriage house, shed, pervious, impervious, water-shed, LEED, sustainable site design, best management practices (BMP's), overlay district, walkability, connectivity, among others.

During Phase Four, based on the preferred comprehensive plan alternative, the gaps related to land use, preferred patterns of development, access management, design that supports all modes of transportation, and quality urban design will be analyzed. That nature of changes that should be made to the development regulations to conform to the policy direction of the Comprehensive Plan will then be identified and proposed. Building upon this first memorandum, a second memorandum will then be prepared documenting the nature of the proposed changes to the development code.

Land Capacity/Demand Environmental Vulnerability

Overview

This limited assessment examines Residential/Non-Residential Land Demand and how that compares to the Land Capacity for future development for the City of Arnold, Missouri. This assessment is the foundation for projections of the amount of land that will be needed to accommodate residential and commercial uses between now and the planning horizon of 2030 for the Arnold, Missouri Comprehensive Plan.

- The **land demand assessment** examines present and future patterns of growth for the Plan, informed by the consultant team's study of regional and local economic market forces that will likely influence future land demand.
- The **land capacity assessment** is an estimate of the amount of future new dwelling units and non-residential uses that could be developed based on the amount of currently undeveloped property.
- This assessment also includes an **environmental vulnerability assessment** to determine sensitive land within the study area that should be avoided by development. When combined with the above demand/capacity assessment, this holistic model can balance environmental and economic factors.
- The end result of the demand/capacity and the environmental assessment is a rough estimate of the **net acres** of land, or **'developable area'** that may be used for new development or redevelopment, and which will give direction to the identification of land needed for future development.

Land Demand Assessment

The following spells out the sources, assumptions and methodology for projecting land use needs for the various land uses based upon population and economic development potential within the Arnold Comprehensive Plan Area. As of March 11, 2011, only partial 2010 Census Redistricting Data was available from US Census American Fact Finder.

RESIDENTIAL LAND DEMAND

Step 1: Calculation of Population Forecasts

Source of Data

1. U.S. Census Bureau, Census 2000 and Census 2006-2008 American Community Survey 3-Year .....Estimates. 2010 Census Redistricting Data.
2. Applied Real Estate Assessment, Inc. (AREA)
3. Claritas
4. Missouri Economic Research and Information Center
5. East and West Gateway Council

6. St. Louis Chamber and Growth Association
7. Home Builders Association of St. Louis and Eastern Missouri

Methodology and Assumptions

1. Projections are based on U.S. Census Data
2. Population projections provided by AREA
3. Projections are based on 2000 Census for period 2000 to 2030
4. Assumed that Arnold's share of Jefferson County population would continue to slow, as shown by the decrease of Jefferson County's population living in Arnold (10% in 2000, 9.65% in 2010).
5. Calculated population for Jefferson County in 2030 by applying growth rate for the previous 10 year period.

Exhibit 20 shows estimates of total population located within the City of Arnold for 2000 through 2030. From 2000-2010, there was an 4.22 percent change in population. Over the next decade, growth in Jefferson County and Arnold is expected to slow down. The percent change from 2010-2020 is anticipated to be 3.5%. This same percent change was applied to 2020-2030, for a total net population change of 2,325 persons from 2000-2030.

Exhibit 20

Population Forecast					
	2000	**2010**	**2020**	**2030**	**Total**
Population Forecast	19,965	20,808	21,536	22,290	
Net Population Change		**843**	**728**	**754**	**2,325**

Step 2: Forecast of Households Based Upon Population Forecasts

Source of Data

1. U.S. Census Bureau, Census 2000 and Census 2006-2008 American Community Survey 3-Year Estimates
2. AREA
3. Claritas

Methodology and Assumptions

1. The average number of persons per household according to the 2000 Census is 2.64 people.

Exhibit 21 shows estimates of household size and change in number of households from 2010 through 2030.

Exhibit 21

Household Forecast				
	2010	**2020**	**2030**	**Total**
Net Population Change	843	728	754	2,325
Average Household Size	2.64	2.64	2.64	2.64
New Households	**319**	**276**	**286**	**881**

Step 3: Calculation of Number of Housing Units

Source of Data

1. U.S. Census Bureau, Census 2000 and Census 2006-2008 American Community Survey 3-Year Estimates
2. AREA
3. Claritas
4. City of Arnold Building Permit Activity

Methodology and Assumptions

1. Dwelling units are broken down by type into single-family, duplexes and single-family attached and multi-family.
2. The breakdown is based upon the 2000 Census for Arnold Missouri.
3. This model includes mobile homes as part of the projected new development (considered a low-density multi-family).

Exhibit 22 shows share of dwelling units by type.

Exhibit 22

Residential By Type	
	Proportion by Type
Single Family Detached	**74%**
Duplex & Single Family Attached	**6%**
Multi-Family	**20%**

Exhibit 23 shows the summary of the number of new dwelling units forecast over the period of 2010 through 2030.

Exhibit 23

Household By Dwelling Unit Type				
	2010	**2020**	**2030**	**Total**
Single Family Detached	236	204	212	652
Duplex & Single Family Attached	19	17	17	53
Multi-Family	64	55	57	176
Total Households By Dwelling Unit Type	**319**	**276**	**286**	**881**

Step 4: Calculation of Future Residential Units

Constructed and Land Acreage

Source of Data

1. U.S. Census Bureau, Census 2000 and Census 2006-2008 American Community Survey 3-Year Estimates
2. AREA
3. Claritas

Methodology and Assumptions

1. There are almost always vacant residential structures. This is the result of households relocating to another residence or speculative building on the part of residential developers exceeding actual demand.
2. The proposed number of new housing units is derived by assuming that there will be sufficient dwelling units to house the projected number of households as well as additional vacant dwelling units.
3. The single family vacancy rate was taken from the Census 2006-2008 American Community Survey 3-Year Estimates, Homeowner vacancy rate.
4. The multi-family vacancy rate was taken from the Census 2006-2008 American Community Survey 3-Year Estimates, Rental vacancy rate.
5. The duplex vacancy rate was taken from experience with other communities.

Exhibit 24 shows estimated occupancy rates.

Exhibit 24

RESIDENTIAL OCCUPANCY RATES	
	Occupancy Rates
Single Family	**98.4%**
Duplex	**84.6%**
Multi-Family	**77.3%**

Source of Data

1. City of Arnold General Ordinances of the City, Appendix B, Zoning

Exhibit 25 shows the projected density for each residential type as arrived at through review of the zoning ordinance.

Exhibit 25

Residential Density	
	Proposed Density
Single Family	**4 Units Per Acre**
Duplex	**10 Units Per Acre**
Multi-Family	**22 Units Per Acre**

Exhibit 26 summarizes the number of acres needed to accommodate the various housing types.

Exhibit 26

Residential Land Use Consumption				
	2010	**2020**	**2030**	**Total**
SINGLE FAMILY				
New Dwelling Units	236	204	212	652
Total Acres Consumed	59	51	53	163
100% @ 4 du/acre				
DUPLEX				
New Dwelling Units	19	17	17	53
Total Acres Consumed	1.9	1.7	1.7	5.3
100% @ 10 du/acre				
MULTI-FAMILY				
New Dwelling Units	64	55	57	176
Total Acres Consumed	2.9	2.5	2.6	8
100% @ 22 du/acre				
TOTAL NEW DWELLING UNITS	**319**	**276**	**286**	**881**
TOTAL ACRES CONSUMED	**63.8**	**55.2**	**57.3**	**176.3**

Summary:

A total of **881 new dwelling units** are expected between now and 2030 within the city. The predominant housing type is expected to be single-family homes (74%), duplex/single-family attached units (6%), and multi-family apartment units (20%). It is also expected that there will be more residential units constructed than actually occupied. To accommodate the projected mixture of new housing types, occupied and vacant, close to **176 acres** will be required.

Non-Residential Land Demand

The following highlights the assumptions prepared by AREA for projecting non-residenital land use needs and economic development potential within the City of Arnold. Additional supporting information can be found under the Economic Development section of this memorandum.

Arnold's Office Market

Arnold's office market will continue to expand but will be focused primarily on smaller space users, geared to serving the local residents. Small accounting, legal and financial service firms are typical office space users in Arnold. Other office space demand comes from firms started by local residents (including residents of adjacent communities). Arnold currently has a good supply of the types of firms that create

demand for office space. Most of the future demand will come from internal growth as existing firms expand. Other demand will come from new firms started by local entrepreneurs.

- ***Development Potential.***
    - Population growth, both in Arnold and adjacent areas, will help some local firms grow and new firms started by local entrepreneurs in technology and professional and medical clinics will create additional demand for local office space. Most of these users will need **less than 5,000 square feet.** This amount of space typically can accommodate a firm with 10 to 15 employees.
    - AREA estimates that **75,000 to 100,000 square feet** of additional office space may be needed over the next 20 years. Many office uses can actually be accommodated in store fronts in buildings designed primarily for retail use. Thus, there is unlikely to be significant demand for multi-story office buildings. Office space in mixed-use developments would be suitable for capturing a significant portion of this potential demand.

Arnold's Industrial Market

Arnold and other portions of the South County area will have difficulty competing with the I-70 corridor to attract industrial users. Within that corridor, there are hundreds of acres of relatively flat land that can be developed quickly and inexpensively By comparison the terrain features that make Arnold an attractive location for residential development make it uneconomical to develop large, low value industrial buildings.

- ***Development Potential.***
    - Industrial Space demand is likely to come from construction companies, heating and air conditioning firms and similar firms serving primarily a local market. Much of the existing space is already being served by these types of firms. Typically they need **5,000 to 15,000 square feet** of space. Additional demand could come from local firms that grow and prosper.
    - We estimate that over the next 20 years, **100,000 to 200,000 thousand square feet** of space might be absorbed in Arnold, assuming appropriate building sites exist. At about 40% to 50% building to land ratio, then **5 to 10 acres** of land should be sufficient to accommodate future demand. There are at least 15 to 20 acres available in the Tenbrook Industrial Park

Retail Market Analysis

Arnold has the largest concentration of retail space in Jefferson County. This is not surprising given the city's population, population density, position in the county, and accessibility to major roads. However, our analysis indicates that Arnold has the potential to capture additional segments of the retail market.

Various statistics provide evidence of this movement and spending pattern. According to the 2009 Jefferson County Data Book, the highest traffic count location in Jefferson County in 2007 was at I-55

and the St. Louis County Line. The traffic count in this location was 107,290. The other high traffic counts occurred at I-55 and North of Route M and I-55 North of Festus/Crystal City. These locations had traffic counts of 82,382 and 59,818 respectively.

At the same time, the Missouri Economic Research and Information Center's (MERIC) Daytime Population Report in December 2005 indicated that Jefferson County experienced a 25.9 percent decrease in daytime population, while St. Louis County experienced an 8.1 percent increase in daytime population. These statistics reveal that many Jefferson County residents were leaving the county to work. Most of these residents were commuting into St. Louis County. At the same time, the City of Arnold experienced a 5 percent decrease in daytime population but only 17.7 percent of Arnold residents worked in Arnold. These statistics imply that although most of Arnold's residents worked elsewhere, considerable numbers of persons were commuting into Arnold to work

- ***Development Potential*.**
    - Although these developments have increased the market area's capture rate, retail dollars are still leaking out of the City of Arnold and Jefferson County to St. Louis County.
    - Some retail dollars will always be spent outside of the local community. Local residents will drive to the South County Mall to access shops, especially clothing stores and specialty shops that do not exist in Arnold. However, the potential exist to capture more of the Jefferson County's retail dollar in Arnold.
    - Up to **500,000 square feet of *Retail Space*** might be accommodated in a combination of neighborhood convenience and specialty retail and additional retail concentrations in the vicinity of the I-55/US 141 interchange.
        - The community is well served by big box retailers. Now it needs to add smaller stores and specialty shops.

Summary:
To accommodate the projected number of acres needed to accommodate the projected Non-Residential uses, **70 acres** will be required.

Exhibit 27 summarizes the number of acres needed to accommodate projected Non-Residential needs.

Exhibit 27

Non_Residential Land Use Capacity Summary				
	2010	**2020**	**2030**	**Total**
Total Acres Consumed For Service/Office		5	5	10
Total Acres Consumed For Retail		25	25	50
Total Acres Consumed For Industrial		5	5	10
Total Acres Consumed For Non-Residential Uses		**35**	**35**	**70**

Land Capacity, Environmental Vulnerability and Developable Area Assessment

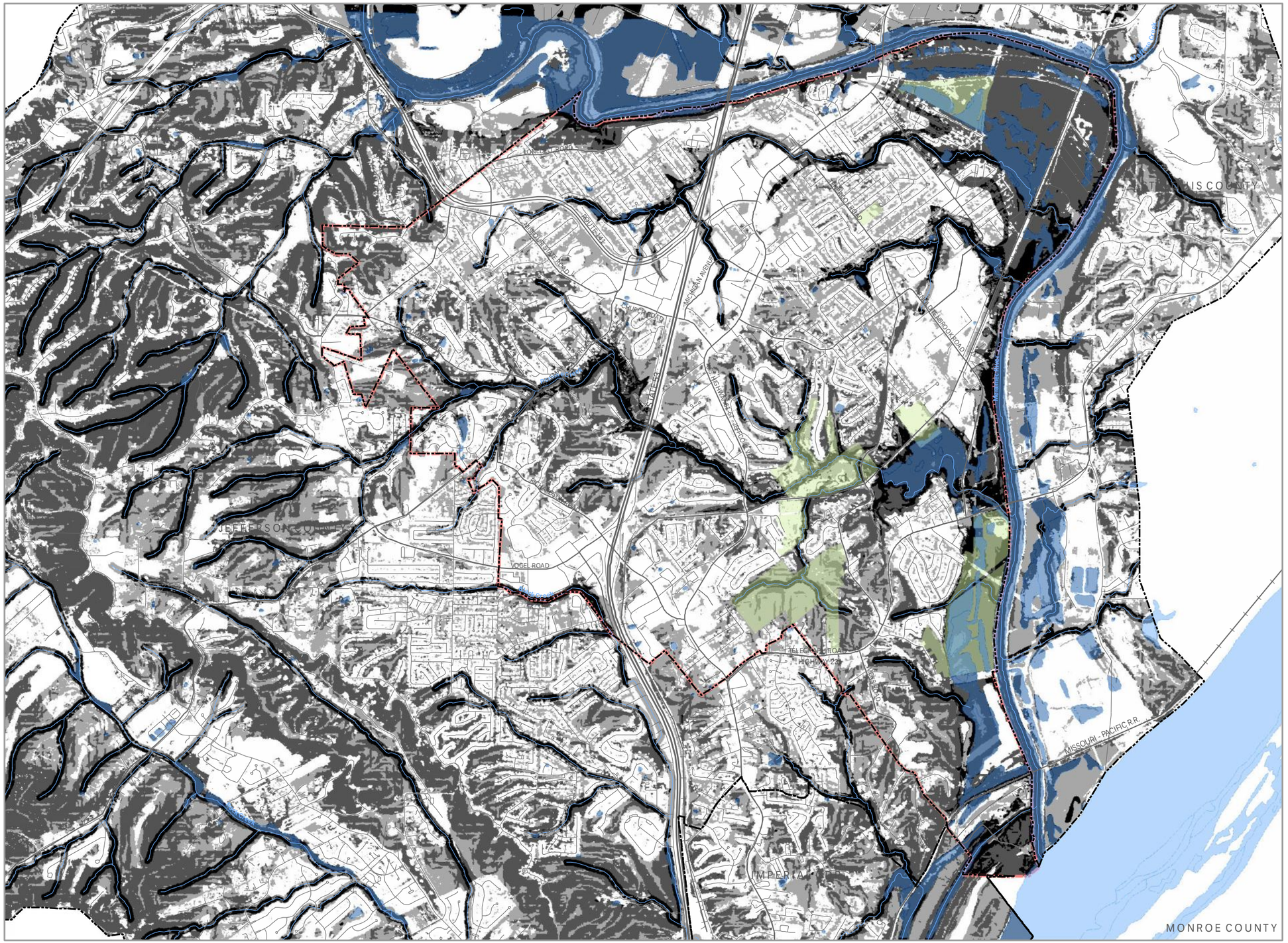
The capacity of land is a measure of how much future development the undeveloped lands of the study area can accommodate. To calculate the capacity of land in the study area, the total amount of land within the City of Arnold is 7,373 acres. But, not all of the undeveloped areas are open to development due to environmental constraints and valuable natural resources. Arnold has significant amounts of streams, floodplains, wetlands and steep slopes. Best management practice recommends eliminating these sensitive lands from future development to minimize future development cost, protect valuable recreation area, protect water quality, and provide wildlife habitat. All of the environmentally sensitive land equals 3,280 acres.

ENVIRONMENTAL VULNERABILITY

Excluded Environmental Factors = 3,280 acres

- FEMA
- Prime Farmland
- MDC Lands and Watersheds
- Slopes Greater than 15%
- Remnant Prairie
- All Road and Highway Surfaces
- All 20 Acre catchment streams or urban conveyances
- All Forested Land and Existing Urban Vegetation
- Wetlands
- Meramec Greenway and River

Exhibit 28 illustrates the environmentally sensitive lands equaling 3,280 acres.



Environmental Sensitivity Index
City of Arnold, MO

Road_Symbols

Rd_Type

- Highway
- Interstate
- Route
- City of Arnold
- Other Jurisdictions
- Parks and Recreation
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

Environmental Suitability Index

Suitability for Development

- Developable with Minimal Constraints
- Forested, Prime Farmland, Stream
- Forested, Prime Farmland, Steep Slope
- Floodzone, Forested, Steep Slope, Forested Stream Corridor

50
10
ACRES

N

0 0.25 0.5 1 Miles

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DEVELOPABLE AREA

The developable area is a composite area map including the urbanized area and all vulnerable natural resources, representing the most progressive, natural resource and conservation based strategy for defining the future land **development and redevelopment** envelope (shown in black on the map). The result is that of the total 7,373 acres within the City of Arnold, less the vulnerable natural resources of 4,093 acres, 3,280 acres are expected to be available for future development or redevelopment. Or "total developable land". These calculations were based upon visual surveys and mapping data from the City of Arnold, , U.S. Geological Service, U.S. Department of Agriculture, Natural Resources Conservation Services, and Missouri Spatial Data Information Service. (However this does include backyards and grassy lots that may already part of another "developed" property most existing paved surfaces, which may very well be prime redevelopment area, and roads.)

For planning purposes, the *Developable Area map* will serve as the initial development and redevelopment envelope for the growth of Arnold. The protection of the natural drainage ways and forested land will allow maximum area for BMP retrofit of the urban drainage system, provide visual buffers and slope stabilization consistent with the current visual character of the City, and provides more than ample developable land for future development.

Exhibit 29 shows acreage available for development or redevelopment.

Exhibit 29

Net Developable Land	
Total Acres In Study Area (City Limits)	7,373
Total Excluded Vulnerable Natural Resource Acres	4,093
Total Net Developable Acres For New Development or Redevelopment	**3,280**

Exhibit 30, on the next page, illustrates the acreage available for development or redevelopment.

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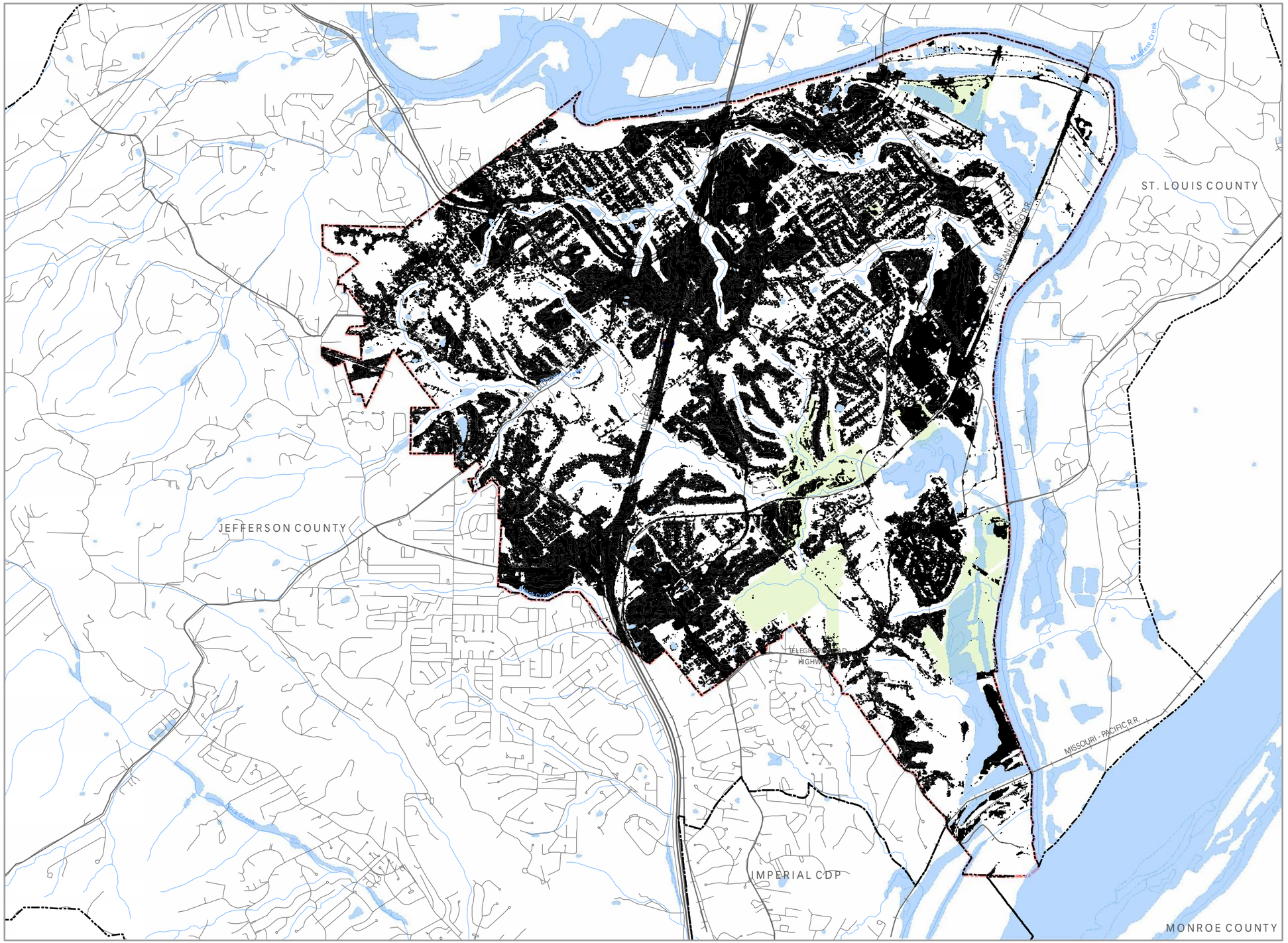

Environmental Sensitivity Index

City of Arnold, MO

3,280 Acres of Buildable Area Remains

Road_Symbols

Rd_Type

- Highway
- Interstate
- Route
- City of Arnold
- Other Jurisdictions
- Parks and Recreation
- Waterbodies
- Streams
- Interstate
- Arterial Roads
- Collector Roads
- Local Roads
- Railroads

50
10
ACRES

N

0 0.25 0.5 1 Miles

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LAND CAPACITY CONCLUSIONS

As illustrated in Exhibits 31 and 32, the total projected demand for both residential and non-residential uses combined equals **246 acres**. Land Capacity exceeds the projected demand for both residential and non-residential uses combined. Residential uses over the next 30 years are projected to need an additional 176.3 acres, while Service/Office, Retail, and Industrial are projected to need an additional 70 acres of land.

Exhibit 31

Residential Land Use Capacity Summary				
	2010	**2020**	**2030**	**Total**
Total Acres Consumed For Single Family	59	51	53	163
Total Acres Consumed For Duplex	1.9	1.7	1.7	5.3
Total Acres Consumed For Multi-family	2.9	2.5	2.6	8
Total Acres Consumed For Residential Uses	63.8	55.2	57.3	176.3

Exhibit 32

Non_Residential Land Use Capacity Summary				
	2010	**2020**	**2030**	**Total**
Total Acres Consumed For Service/Office		5	5	10
Total Acres Consumed For Retail		25	25	50
Total Acres Consumed For Industrial		5	5	10
Total Acres Consumed For Non-Residential Uses		**35**	**35**	**70**

The total amount of land available for **development or redevelopment** is estimated to be 3,280 acres as illustrated on the *Developable Areas map*. This area can be further refined by excluding the urbanized area of 1,809 acres, representing the existing impervious surface, resulting in 1,471 acres for future land for development; resulting in a more "refined net developable land" area for **new development**.

Exhibit 33 shows the refined net developable land acreage available.

Exhibit 33

Refined Net Developable Land	
Total Net Developable Acres For New Development or Redevelopment	3,280
Total Excluded Impervious Surface	1,809
Total Refined Net Developable Acres	**1,471**

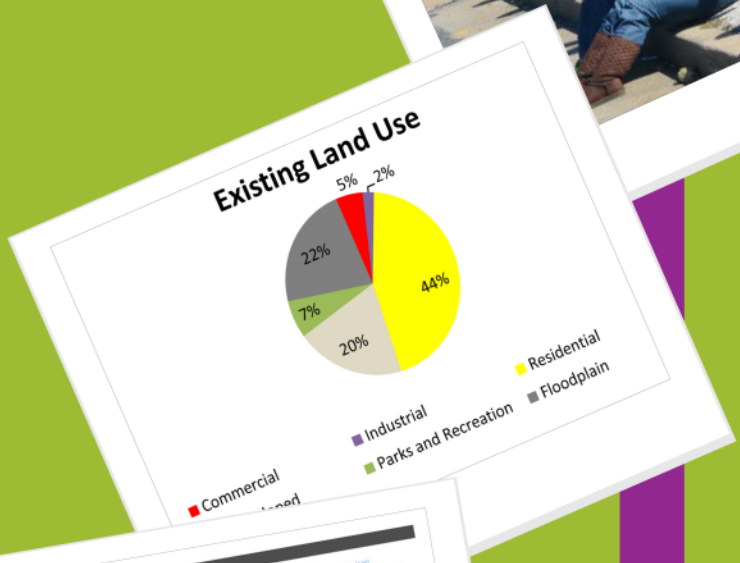
A general guide line is that a city should have, at a minimum, two times the projected demand for each dwelling unit type or land use. If the multiplier is greater than two, there is a potential for the inefficient development pattern know as “sprawl.”

Exhibit 34 illustrates that land capacity exceeds the projected demand for both residential and non-residential uses combined by 159 acres.

Exhibit 34

Net Land Capacity	
Total Refined Net Developable Acres	1,471
Total Excluded Residential/Non-Residential Demand Acres	246
Total Net Capacity Acres Remaining	**1,225**

PIPER-WIND ARCHITECTS, Inc.
Architecture, Planning, and Design



Plan Arnold, MO

Your Community, Your Plan!