



## Greene County, Missouri

Municipal Separate Storm Sewer System (MS4)

Permit # MO-R040014

Permit Re-Application May 14, 2013



## Storm Water Management Plan

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WATER PROTECTION PROGRAM

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## **STORMWATER MANAGEMENT PROGRAM**

### **INTRODUCTION**

It is the intention of Greene County to comply with all aspects of the Phase 2 stormwater regulations. Greene County already has programs and regulations which provide many aspects of the six minimum control measures which are set forth in the general permit. Greene County has a long history of protecting our water resources long before being required to do so by the MS4 program. For instance, Greene County has had a program in place for construction site stormwater runoff control since 1991 which addresses sites down to one acre in size. On the other hand, the County does not currently have the staff or funding resources to provide completely for post-construction operation and maintenance of stormwater BMPs. With the sunset of the 1/8 cent parks and soils sales tax on June 31, 2012 Greene County's stormwater program faces an uncertain future. A citizen task force, assembled by the City of Springfield and the County, met from October 2012 to April 2013 to determine the priorities and objectives in our stormwater program and how best to fund those priorities.

In order to fully comply with the terms of the permit, it is our intention in this submittal to:

1. review our existing program
2. update our SWMP document, and
3. identify areas where new or additional programs or requirements will be needed to satisfy any new permit requirements.

Any new regulations or requirements will require the consideration and approval of the County Commission, and other County boards, such as the Planning & Zoning Board or Building Commission, as applicable. Public notice will be given and public hearings held as required by State statute.

In the following sections we will list the SWMP requirements of the general permit, provide a description of the County's current programs and identify additional activities or requirements which will be needed to comply with the terms of the general permit.

## GENERAL PERMIT REQUIREMENTS FOR SWMP

### 10 CSR 20-6.200 (5)(A) Application Requirements for Small MS4's

#### Special Conditions

##### 3.1.1.1

Some of the storm water discharge from the regulated urbanized areas of Greene County does enter water bodies that are on the 303(d) list of impaired waters. These water bodies include the James River, Pearson Creek, Wilson's Creek, and McDaniel Lake.

##### 3.1.1.2

At the present time only the James River and McDaniel Lake have a TMDL that has been approved by the EPA. At this time only the James River is within the urbanized area boundaries subject to MS4 permit compliance. The TMDL's based on stormwater runoff volume for Pearson and Wilson's Creeks that were issued and approved by EPA in January 2011 have been vacated by the EPA in response to a legal challenge by the City of Springfield. Part of the agreement was that EPA would consult with the City of Springfield (and hopefully Greene County as well) to collectively craft a reasonable, achievable TMDL based on local data. Phosphorus is the nutrient of concern for the James River with 64% of the phosphorus loading coming from municipal wastewater treatment facilities (the City of Springfield's Southwest Treatment Plant installed phosphorus removal technology in 2001) which are independently permitted and regulated. The remaining load is attributed to agricultural and urban runoff and sediment loading. We'll be working with other small MS4s in these watersheds to coordinate efforts to continue monitoring at several sites for water quality parameters measured by the TMDLS over the next five year permit period in an attempt to assess compliance with TMDL limits. This cooperative monitoring effort among five cities and two counties has been in place since 2008.

##### 3.1.2

The pollutant of concern identified in the EPA approved TMDL for the James River is excess nutrient loads of phosphorus and nitrogen. Greene County feels that the measures already in place for construction site runoff control, discussed in Section 4.2.4, are effective in reducing the non point loading of phosphorus from our small MS4. Phosphorus adsorbed onto colloidal soil surfaces can be released to waterways when sediment leaves a construction site. Our construction site runoff control regulations are an important component in TMDL compliance. As a result of the Fulbright Spring Protection Study completed in 1996, Greene County adopted requirements for permanent structural post-construction water quality BMPs in the Fulbright Spring and Pearson Creek watersheds. Requirements for these BMPs are included in Section 115 of the Stormwater Design Standards. In January 2006 the County Commission voted to

extend the post-construction water quality BMP requirements to all watersheds in Greene County (See Planning Board Case 1625, Appendix I). These BMPs are designed to allow more settling of suspended loads in stormwater and to increase hold times within detention structures to increase infiltration, all of which helps reduce the amount of sediment which is a major source of phosphorus.

There are many actions that we would like to be able to take to be able to reduce nutrient loading in the James River, but are limited in our ability to do so. There is sometimes a difference between what is required by regulations and what is the most effective and responsible course of action to improve water quality. Research by Missouri State University shows that stream bank erosion contributes .052 lbs of phosphorus per cubic foot of fine grained material that is eroded into the stream (OEWRI, 2007). Most of the non-point load of sediment bound phosphorus is coming from outside the MS4 regulated boundary via stream bank erosion. It is therefore our long range goal to engage with landowners in the watershed (specifically agricultural producers) to improve practices such as increasing stream buffers, livestock exclusion, etc. We already partner with the Watershed Committee of the Ozarks and the James River Basin Partnership (as discussed in Section 4.2.1) for education of landowners in the watershed about these types of practices. However, to see significant implementation of these conservation practices the education must be coupled with incentives which will require a permanent and significant source of revenue. Until that revenue is secured we will have to limit our efforts to education of landowners both within and outside the MS4 regulated area. Structural streambank stabilization projects, although they would be effective in reducing sediment bound nutrients, cost over \$200 per foot (Dove et. al., 2008) and are therefore outside the realm of budgetary possibility without a significant and permanent increase in the program's revenue source.

The County supports and partners with the James River Basin Partnership (see Section 4.2.1) on their lawn soil testing program to help property owners determine the fertilizer needs of their lawns to prevent over fertilization and subsequent runoff of excess nutrients.

#### 3.1.3.1

The James River TMDL is for a pollutant that has been found in stormwater discharges from our MS4.

#### 3.1.3.2

The James River TMDL does not have a numeric WLA or LA. The target is a daily in-stream limit on nutrient concentration (0.075 mg/L for Phosphorus and 1.5 mg/L for Nitrogen) throughout the watershed. The WLA and LA were determined by multiplying the target nutrient concentration by the discharge of the flow duration curves.

### 3.1.3.3

The TMDL does address flow regimes that are likely to occur during stormwater discharges.

### 3.1.3.4

The County, in cooperation with 6 other area MS4 communities, contracts with the Ozarks Environmental Water Resources Institute (OEWRI) to perform first-flush water quality monitoring on tributaries of the James River. This monitoring program was implemented in 2008 and data collection began in 2009 to monitor the discharge of nutrients from the regulated MS4s into the James River.

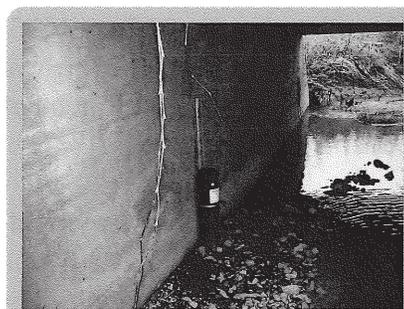
### 3.1.3.5

The combination of structural and non-structural measures below are currently implemented to reduce runoff pollution including nutrients.

- Zoning Regulations Article IV, Sections 25, 27 and 28 (Appendix B)
- Subdivision Regulations Article IV Section 10 and Article V Section 6 (Appendix C)
- Zoning Regulations Article IV Section 33, Urban Services Area Policy (Appendix B)
- Floodplain Management Regulations: Zoning Regulations Article 21 (Appendix B)
- Stormwater Design Standards Section 115 (Appendix D)
- Education efforts by the Watershed Committee of the Ozarks and James River Basin Partnership (as described in Section 4.2.1)

### 3.1.3.6

Greene County, in cooperation with 6 other area MS4 communities, contracts with the Ozarks Environmental Water Resources Institute (OEWRI) to perform first-flush water quality monitoring on tributaries of the James River during storm events. The intergovernmental agreement can be found in Appendix A. All monitoring results have been included in the annual reports since data collection commenced. See Appendix A for an example of the data reporting sheets. Greene County's monitoring program includes storm event sampling of at least 4 storm events per year at 8 in-stream sites and base flow sampling once per year at 3 or 4 sites depending on flow (most streams in the region, including most of our sampled streams, are classified as losing streams and do not have perennial flow). This monitoring regimen is required to assess compliance with waste load allocations (WLA's) for total nitrogen and total phosphorus found in the James River TMDL. The County contracts with the Ozarks Environmental Water Resources Institute (OEWRI) at Missouri state university for sample



**Figure 1: TMDL first-flush sampler at Farmer's Branch**

#### Sampling Methods

A modified version of *in situ* water samplers used by the United States Geological Survey is used in channels where applicable.

Analysis is performed for six water quality parameters; total nitrogen (TN), total phosphorus (TP), chloride, specific conductivity, pH, and total suspended solids (TSS).

collection and laboratory analysis. These 6 municipalities all signed an intergovernmental agreement (IGA) for the cooperative collection and sharing of storm water quality data allowing for the identification of storm water quality trends on a watershed basis and not solely within jurisdictions (Appendix A). Although this gives us an idea of the stormwater contributions of nutrients from these tributaries it does not give us an idea of the daily in-stream nutrient concentrations in the James River. It would take a daily sample of nutrient concentrations upstream and downstream of the MS4 boundaries to accurately determine compliance with the TMDL limits. The first flush storm event samples are not representative of storm water contributions over the entire storm event. Rather than an event mean concentration, the first flush samples are taken as one way to try to assess potential stormwater runoff influences on in-stream water quality conditions. The number of samples that can be collected per event is limited by the intensity and duration of the event, the spatial distribution of the rainfall event as well as the size and characteristics of the watershed. Most storm events do not distribute rainfall across the monitored watersheds such that all samplers are submerged in the same rain event for a particular date.

#### **Storm Event and Base Flow Data**

This is the fourth year of data collection since sampling began in 2009. With such a short record of data from only eight sites and a limited number of rain events the sample size has been very small. This has made it difficult to obtain results that are statistically significant. With four years of data collected it is possible to draw some tentative conclusions about general trends in the data, but it will take a longer sampling record to be able to verify the significance of the conclusions.

#### **Nitrogen and Phosphorus**

Figures 2 and 3 show the geometric means of TN and TP first flush and baseflow data since monitoring began in 2009. When the data from all sites is combined there is little correlation among TN, TP and TSS (Figure 5 and Table 1). Although the logarithmic scale used in figure 5 allows for ease of visually communicating wide ranging data sets, the resultant coefficient of determination ( $R^2$ ) of 0.44 is not only far higher than indicated by the Pearson Correlation Coefficient (table 1), but is not high enough for statistical significance. However, on an individual basis, some sites do show a stronger relationship among TN, TP and TSS. Pearson Creek, Workman Branch, and Turner Creek show a strong relationship between TSS and TN, although not TP. Turner Creek had the highest measured TN concentration (7.96 mg/L) in the spring and the highest geometric mean of all TN samples. Since this is a mostly agricultural watershed (only 3.3% of the watersheds land use can be classified as urbanized) it could be the result of fertilizer coming into the MS4 from agricultural activities or from eroding stream bank material. This event also had extremely high TSS in one event (8496 mg/L) and is the only site to have a statistically significant correlation between TN and TSS. The James River Tributary, Ward Branch, and Workman Branch show a moderate correlation between TSS and TP. Since

TP is typically much lower in baseflow samples it is likely that the source of the TP is suspended load during storm events. In Ward Branch up to 36% of phosphorus loading has been shown to be from bank erosion (OEWR, 2007). Farmer's Branch has shown to have by far the highest TP concentrations in an individual storm event (up to 1.54 mg/L). These high concentrations for one individual storm event did not result in this site having the highest geometric mean concentration and showed no correlation of TP to TSS. Spikes in TP concentrations have been recorded in both fall and spring which would coincide with the application of fertilizer on the two golf courses immediately above the sampling location. The identification of the golf courses as a major source of nutrients can allow a more focused approach to reducing nutrient loads. Turner Creek has the highest geometric mean concentration of TP for samples from 2009-2012, nearly double that of any other site. TP was moderately correlated with TSS at Turner Creek ( $R=0.64$ ). This site also has the highest mean TN concentrations and the highest mean TSS concentrations. The Turner Creek Watershed is only 3.3% urbanized, making either stream bank erosion or agricultural activity the most likely source of TP.

### **Total Suspended Solids**

Figure 4 shows the geometric mean for first flush and baseflow TSS data collected since 2009. Figure 5 and Table 1 show the lack of a significant relationship between TSS and TP or TN.

### **Chloride and Specific Conductivity**

Chloride sample results ranged from 1.57 to 50.39 mg/L which is well below the chloride criterion of 860 mg/L for protection of aquatic life. These levels are not a concern. Specific conductivity is correlated with chloride concentrations, but baseflow measures do not differ significantly from stormflow.

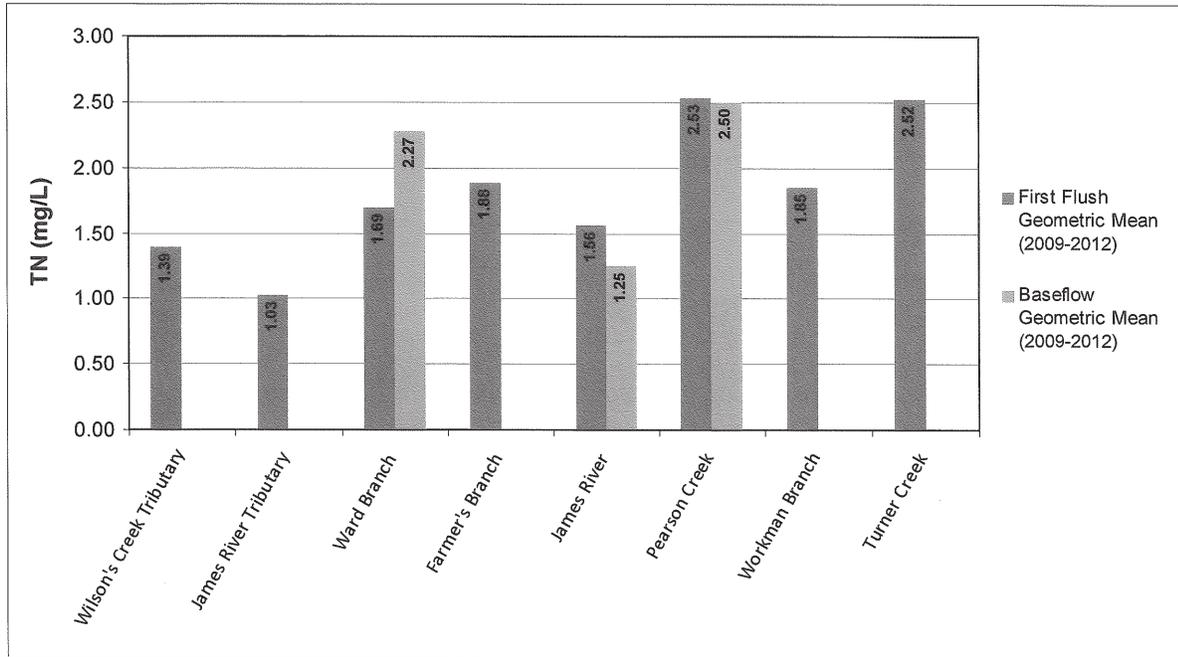


FIGURE 2: TOTAL NITROGEN

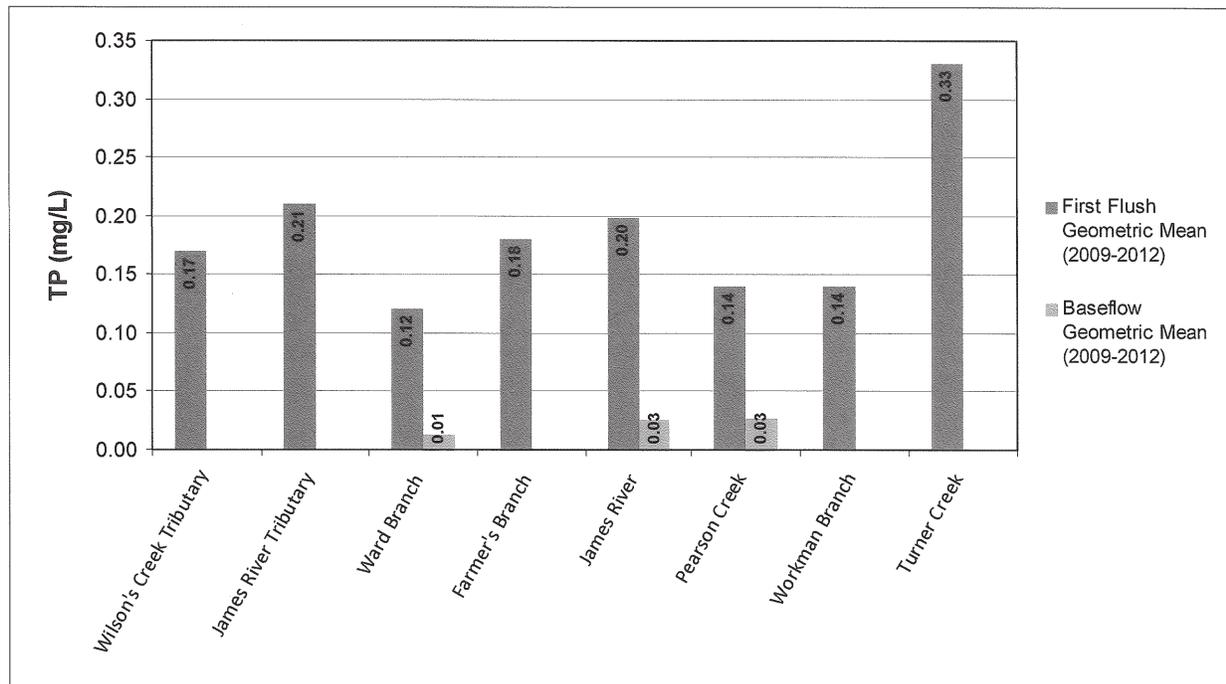


FIGURE 3: TOTAL PHOSPHORUS

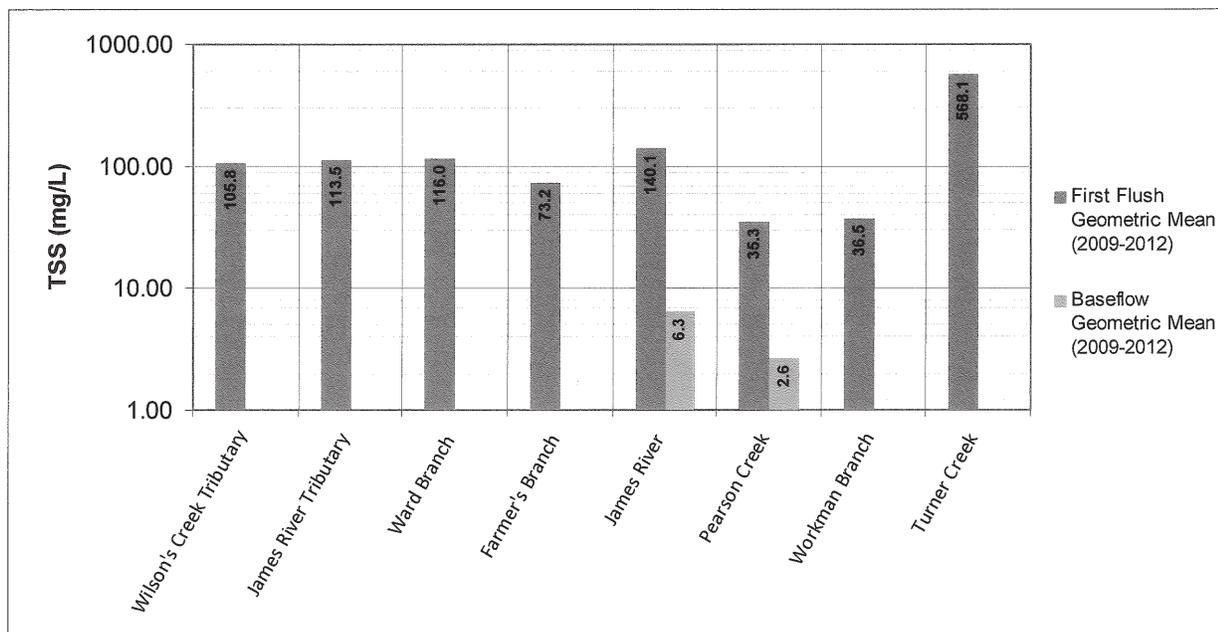


FIGURE 4: TOTAL SUSPENDED SOLIDS

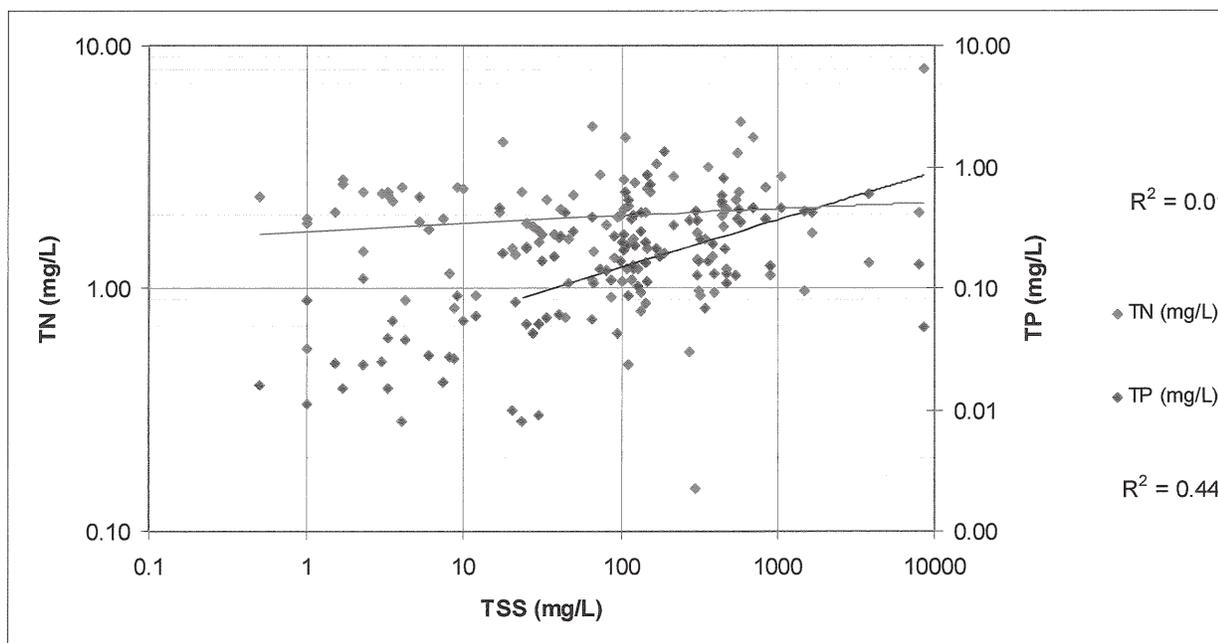


FIGURE 5: TN AND TP V. TSS FOR 2009-2012 FIRST FLUSH SAMPLES

	<i>TN</i>	<i>TP</i>	<i>Cl</i>	<i>SC</i>	<i>pH</i>	<i>TSS</i>
TN	1					
TP	0.05	1				
Cl	-0.07	0.17	1			
SC	0.17	-0.08	0.03	1		
pH	0.00	-0.11	0.00	-0.21	1	
TSS	0.38	0.06	0.28	-0.08	-0.04	1

TABLE 1: PEARSON CORRELATION COEFFICIENT (R) FOR ALL SAMPLES (2009-2012)

### 3.1.3.7

Determination of need for more controls cannot yet be made from the data that has been collected. However, as part of the TMDL process for Pearson and Wilson's Creeks we are examining historical water quality data available from EPA and local sources to identify priority pollutants in those watersheds. Once those priority pollutants are identified the steps taken to address pollutants in these watersheds are expected to have a positive benefit to nutrient concentrations in the James River as well. Extra sampling will be conducted in the spring and fall of 2013 on Pearson and Wilson's Creeks for pollutant identification. Historical data analysis should be completed in 2013 and a data gap analysis conducted to identify areas where more sampling is needed to identify a priority pollutant. Greene County plans to partner with the City of Springfield to work as closely as possible with EPA on the development of new TMDL's for these two streams. Our data gap analysis is part of a larger effort to supply EPA with as much data as possible so that the resulting TMDLs can be effectively targeted at the specific pollutants identified by the data, which are causing the stream impairment. By utilizing all available data, identifying a suitable reference stream and identifying the impairing pollutants we hope to participate with EPA to develop a TMDL that will be a workable plan for improving the health of both Pearson and Wilson's Creeks.

<b>Planned Activity</b>	<b>Target Completion Date</b>
Historical Data Analysis	2013
Data Gap Analysis	2013
Reference Stream Identification	2013
Additional Data Collection (as needed)	2013-2014
Priority Pollutant Identification	2014
Action Plan	2014

## ***Minimum Control Measures:***

### **4.2.1.1 Public Education and Outreach**

The permittee shall implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps the public can take to reduce pollutants in storm water runoff.

#### 4.2.1.1.1

Greene County's public education strategy is aimed at addressing as many urban stormwater pollutants as possible through the program described in sections 4.2.1.1.2 through 4.2.1.1.6. These pollutants include, but are not limited to nutrients, bacteria, sediment, solid waste, and household chemicals.

Even before being required to do so by the MS4 permit, Greene County has been active in efforts to educate the public on their contribution to stormwater pollution and what steps they can take to improve our water resources. From the inception of both organizations Greene County has helped partially fund both the Watershed Committee of the Ozarks (WCO) and the James River Basin Partnership (JRBP). Both of these organizations were formed with the mission of informing the public about water resources and how to protect them. Greene County's cooperation with these two organizations is the main vehicle utilized to inform the public about storm water issues. Additionally, Greene County also recognizes that the school kids of today will be the policy and decision makers of tomorrow. Therefore we have made it a priority to financially support Project WET (Water Education for Teachers) to help educate school children about how important it is to protect water resources for the future.

#### 4.2.1.1.2

The target audience for our storm water education is very diverse. Through the Watershed Committee of the Ozarks, school children are taught about the need to protect water quality since they will be managing storm water in the future. By educating school children, homeowners, engineers, developers, and contractors we hope to improve the quality of not just storm water, but all our water resources. The JRBP focuses many efforts on the rural sections of the James River watershed with landowner partnerships focused on conservation easements and riparian buffers. Project WET focuses on helping teachers incorporate water quality protection into their daily classroom curriculum.

#### 4.2.1.1.3

Public education is essential in elevating the level of understanding and awareness which results in changed attitudes and habits which can have a direct impact on water quality. All the regulation in the world will be of no avail if people, especially the kids in school who will make

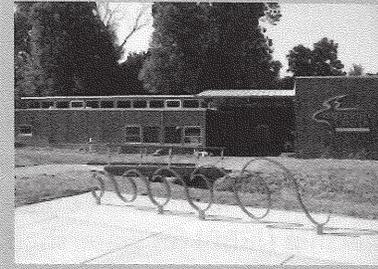
policy decisions tomorrow, do not know of the importance of protecting our water resources. Greene County's strategy to incorporate public education into our storm water management program relies heavily on partnering with and supporting existing education/advocacy groups such as the Watershed Committee of the Ozarks, James River Basin Partnership, Ozark Greenways, Project WET (Water Education for Teachers), and Show Me Yards & Neighborhoods. Greene County can best utilize our limited fiscal and human resources by financially supporting these groups whose sole focus is increasing public awareness of water quality and quantity issues confronting our community.

The watershed organizations that we support provide education programs and information of higher quality and greater quantity than Greene County could do alone.

### **Watershed Committee of the Ozarks**

Greene County has been able to sustain our annual support of the Watershed Committee of the Ozarks (WCO). Although Greene County's general revenue contributions were not renewed after having been cut out of the budget in 2010 we have been able to sustain our contribution from the 1/8 cent parks and stormwater tax. In 2011 Greene County contributed \$93,528 to the WCO for direct watershed education programs and for construction of the C.W. Titus Watershed Center which houses the WCO's new Watershed Center Coordinator whose role is to facilitate educational opportunities for students and the public both on site and in other settings. Greene County's budgeted contribution to the WCO for 2012 is \$81,028 for educational programs and building contribution for the Watershed Center. (Budget information for budget years 2008-2012 can be found in Appendix E). Some of the activities conducted by the WCO this year include:

- 39 field trips at the Watershed Center for 1,600 Springfield area students (K-college).
- 8 educational booths at community and professional events
- 31 classroom lessons and educational activities (students and professionals)
- Fellows Lake Clean Up
- 13 Brochures and Publications
- 18 Interpretive signs at the Watershed Center on topics including rain gardens, pervious paving, stream monitoring, lakeside biology, and watershed functioning.



**Figure 6: The Watershed Center at Valley Water Mill**

#### **The Watershed Center**

Many years of hard work by WCO staff culminated in the opening of the C.W. Titus Watershed Education Center at Valley Water Mill Park on July 22, 2011. The Watershed Center building is a LEED Gold Certified structure that will house WCO staff and provide a central facility for education and park events. It is the showpiece of Valley Water Mill Park which serves as an educational destination for students and the public to learn about watershed protection, water quality, ecology, and storm water best management strategies. The park features a spring, caves, a lake, and trails all with interpretive signs for water education.

A full list of the Watershed Committee's activities and publications can be found at <http://www.watershedcommittee.org/>

### James River Basin Partnership

As concerns over water quality in Table Rock Lake grew in the 1990's Greene County joined other counties and cities in the James River watershed in the formation of the James River Basin Partnership. Greene County also provides \$5,000 annually to the James River Basin Partnership (JRBP) for watershed education and projects within the James River watershed including their urban soil test, septic tank pump out and rain garden programs. Greene County also partners with The City of Springfield and JRBP in providing a rebate incentive program for rain barrel purchases at certain stores in the area. Last year Greene County paid \$328 for the rebate program and has budgeted \$1,500 for 2012. The JRBP's activities last year included:

- 111 septic tank pump outs for onsite wastewater treatment system maintenance.
- 25 soil tests and nutrient management plans for homeowner's lawns
- 70 rain barrel rebates issued for rain barrel purchases
- Clean up of 6.5 miles of the James River removed 200 tires and 6 tons of trash
- Over 5,000 people attended the annual Dam Jam after the James River Rescue clean up
- 10 watershed festivals educating 2,300 5<sup>th</sup> graders about water quality protection
- 11 Brochures available for distribution

A more extensive listing of the JRBP's activities and programs are detailed at <http://www.jamesriverbasin.com/>

### Project WET (Water Education for Teachers)

In cooperation with the City of Springfield, and WCO, Greene County contributes \$10,000 annually to fund the Project WET State Coordinator to educate elementary and middle school students on how they can help improve water quality. The state Coordinator also helps teachers integrate water education into their regular classroom lessons. Instilling an awareness of the importance of



Figure 7: WCO/ Project WET field trip at Valley Water Mill



Figure 8: Class at Valley Water Mill Onsite Wastewater Training Center

**Public Education and Outreach**  
Greene County provides financial and other support to our partner organizations to educate the public about protecting our water resources.

water quality in the lives of young students is one of the most important and effective ways we can protect water quality for the future. The Project WET State Coordinator cooperates closely with the WCO Education Coordinator to conduct field trips and classroom lessons and with the JRBP to facilitate the watershed festivals for 5<sup>th</sup> graders. More information on Project WET can be found at <http://projectwet.missouristate.edu/>

### Onsite Wastewater Training Center at Valley Water Mill

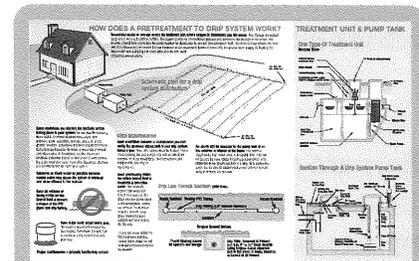
The On-Site-Wastewater training center provides a hand's on-outdoor classroom for instructing onsite wastewater treatment system installers as well as the general public on correct installation and maintenance of different on-site wastewater systems. This educational center helps ensure the proper installation and maintenance of on site wastewater systems. Classes focus on soil suitability, pretreatment systems, and proper installation of different types of systems. Proper installation and maintenance of these systems is the first step in ensuring that untreated sewage effluent does not reach our waterways either as surface runoff or in groundwater that recharges the areas many springs. Since the training center was completed in early 2008 there have been 22 training sessions held with a total of more than 500 installers and home owners attending. Greene County, in cooperation with the WCO, has also redesigned and reprinted the septic system maintenance educational brochures that are given to every homeowner when a septic system is installed, repaired, or expanded. These brochures are particularly effective when given to homeowners who have experienced a failure of their septic system and must have it repaired (see available brochures in Appendix E).

#### 4.2.1.1.4

Programs mentioned above such as the JRBP's annual River Rescue and the Watershed Committee's Watershed Center will help fulfill this permit requirement.

#### 4.2.1.1.5

These programs utilize brochures, pamphlets, educational workshops, speaking presentations, and media advertisements to get the message out to the public. The Watershed Committee's classroom education efforts have reached thousands of students, as have the JRBP's septic pump-out and lawn testing programs. The Watershed Committee's new Watershed Center at Valley Water Mill has already proven to be a valuable tool in educating thousands of children through field trips. Both organizations have outstanding websites that can reach people 24 hours a day. The number of people reached via website visits is difficult to quantify, but adds



**Figure 9: On-site System Handout for Homeowners**

#### Onsite Wastewater Systems

Any work performed on an onsite wastewater system is inspected by Greene County staff. The homeowner is provided with a brochure of maintenance information that is specific to their type of wastewater system.

significantly to the total number of people reached. The JRBP alone averages about 1,000 website hits per month.

#### 4.2.1.1.6

There are no means to quantitatively measure the direct impact of public education on discharge of pollutants. However, every person reached who does even a small thing to improve water quality will have an impact on the discharge of pollutants and this can be an indirect measure of the success of the educational efforts.

Appendix E includes information on the material which has been developed.

#### **4.2.2 Public Involvement/ Participation**

The permittee shall implement a public involvement/participation program that complies with State and local public notice requirements and involve the public in the development and oversight of the SWMP, policies and procedures.

##### **4.2.2.1.1**

For the purpose of this program, public involvement and participation are activities intended to seek public input, comment, or approval for stormwater related matters such as zoning hearings and voter initiatives. Water quality and protection of water resources are very important to the citizens of Greene County. Zoning hearings for new and re-development projects typically are attended by many members of the public who voice their concerns about the potential impacts on water quality. The Public is also encouraged to attend the Watershed Committee's monthly meetings to provide input, ideas and information on watershed issues. There are numerous ways for the public to get involved as volunteers with various organizations supported by Greene County. The James River Basin Partnership's annual River Rescue cleans many tons of trash out of part of the James River and their adopt-a-highway prevents solid waste from entering our stream. The Watershed Committee of the Ozarks logged 800 volunteer hours last year from citizens helping with education and maintenance at the Watershed Center.

Greene County follows all public notice requirements found in the applicable state statutes. All ordinances that have been passed as part of compliance with the County's NPDES permit have been posted for public notice with hearings held for public input before being adopted into the Greene County Zoning Regulations and signed by the County Commission. The County's sediment and erosion control regulations, post construction water quality treatment requirements, and illicit discharge ordinance are the foundation of all of Greene County's efforts to improve water quality. Greene County adopted sediment and erosion control ordinances for construction sites on January 22, 1991 as a part of the County zoning regulations (Article IV Section 27 in Appendix B). The County also adopted post construction ordinances such as Article IV Section 25 which require any new development to provide storm water detention to limit post-construction peak discharges to the pre-construction rate and Article IV Section 10 Part 7 of the Subdivision Regulations (Appendix C) and Article XXIV of the Greene County Zoning Regulations (Appendix B) which require permanent BMP operation and maintenance in perpetuity. All these ordinances that satisfy the conditions of this permit were subject to public notice requirements and adopted after publicized zoning hearings open to public input. All went through public hearings before the Planning and Zoning Board with the required public notice period before being adopted. Greene County has always previously relied on our prohibitions against trash and dumping (Article IV, Section 35 of the Greene County Zoning Regulations) as the regulatory umbrella covering storm drains. However, in September 2012 the County added a specific ordinance prohibiting the discharge of pollutants

into the County's stormwater conveyance system. The new ordinance is modeled after Boone County Missouri. See Appendix I for a copy of the ordinance added to Article IV, Section 25 of the Greene County Zoning Regulations. The new ordinance was first placed on public notice in June, allowing more than 60 days of public notice along with two planning board hearings that are open to the public. Staff also regularly attend the Home Builders Association (HBA) monthly meetings, and seek input from the Developers Input and Information Group (DIGG) for any proposed policy or regulation change.

#### 4.2.2.1.2

Like the County's public education program we rely heavily on the non-profit organizations that we support financially to involve the public in service events such as river clean ups, swimming events, lawn and garden shows, urban creek tours and volunteer opportunities. See Appendix E for a list of activities conducted by our partner agencies that provide opportunities for public involvement. These activities target all ages, socioeconomic classes, races, and genders.

#### 4.2.2.1.3-4.2.2.1.4

The opportunities for public involvement include the formal public comment periods for new ordinances, and zoning hearings listed above. Likewise the non-profit water quality organizations such as the Watershed Committee of the Ozarks and James River Basin Partnership provide opportunities for stream clean ups, lake trash pick ups, and monthly meetings in which the average citizen can get involved in protecting our water resources. The WCO provides opportunities for citizens to volunteer through their adopt-a-spring program which monitors water quality of various area springs (see Appendix F for an example of data collected). Students from Missouri State University's Citizenship and Service Learning program as well as many local citizens volunteer labor for various projects and field trips at the Watershed Center. County staff also hold quarterly meetings with the Springfield Home Builders Association to receive input from the building community on County activities and upcoming regulatory changes. Likewise, County staff attend the meetings of DIIG (Developers Input and Information Group) as well as the Contractor's Association.

Each regulated MS4 community is responsible for establishing a funding source sufficient to provide the revenues necessary for permit compliance activities. Thus it is funding of the stormwater program that becomes the keystone to enabling compliance with all the minimum control measures found in the MS4 stormwater permit. Establishing a reliable funding source is the most important activity that a community must undertake as part of their stormwater program to allow compliance with all six MCM's; it is the most important area of the stormwater program to get input from community members. In 2007 voters approved a 1/4 cent county wide parks and stormwater sales tax, with 1/8 cent used to fund stormwater program activities and for capital improvement projects in waterways of the Springfield/Greene County Parks system. The 1/8 cent portion of this sales tax had a five year

sunset provision and was not placed on the ballot for renewal and collections ended in July 2012. Since finding a funding source is the most important part of permit compliance Greene County, in cooperation with the City of Springfield (a Phase 1 MS4 community) assembled a Stormwater Management Task Force to give input on the County's and City's stormwater funding priorities. The task force members represented a wide cross section of stakeholder's in stormwater program implementation. The members represented the development community, engineers, large and small business owners, water quality organizations, universities, and general citizens. The broad goal of the task force was to give citizen input on how the municipalities should fund their respective stormwater programs including MS4 permit compliance. They also were tasked with setting funding priorities for how the stormwater programs should be focused, with flood control, water quality, and infrastructure replacement being the broad categories of consideration. The specific charge of the task force was to answer the following:

1. What principles should guide the community stormwater management programs?
2. What investments should be made in stormwater management?
  - a. What amount of capital investment should be made over what time period?
  - b. Should a permanent dedicated source of funding be implemented for required programs and maintenance?
  - c. Should the capital funding source have a sunset and specific projects identified?
  - d. What type of maintenance program should be implemented?
  - e. Should water quality programs be developed to comply with regulations, or exceed standards?
3. How should we prioritize capital investments made?
4. What source(s) of funding are desired?
5. What level of funding is desired?
6. How should we explain the issues and task force recommendations to the community?



**Figure 10: Stormwater Task Force Meeting**

**Stormwater Funding Task Force**  
The Springfield Greene County Stormwater Funding Task Force was convened to provide input to the City of Springfield and Greene County on what the community believes should be the priorities of the stormwater program and how to best fund those priorities.

The group met monthly from October through April to answer the questions presented above. A copy of all meeting materials and the task force's final report can be found in Appendix F and at <http://www.springfieldmo.gov/taskforce/stormwater/index.html>. The task force recommended that the Springfield and Greene County stormwater programs be prioritized to:

1. Reduce the risk of injury/death caused by flooding events
2. Protect water quality and help our community comply with mandates
3. Create multiple benefits with stormwater investments
4. Reduce property damage caused by flooding events
5. Make sure the system we have in place to manage stormwater is in good repair by investing in proactive infrastructure repair and replacement (lifecycle)

The task force recommended a 1/10 cent permanent sales tax to fund ongoing operations and permit mandates coupled with a 1/8 cent 7 year sunset tax for flood control, water quality improvement and capital improvement projects.

As mentioned above, in 2011 the Greene County Commission decided not to place the 1/8 cent Parks and Stormwater sales tax on the ballot for renewal. Passed in 2007 the sales tax funded most ongoing operations of the stormwater programs for the County. In May of 2011 the Greene County Commission was deliberating whether to place the renewal on the ballot or not. In order to make an informed decision the Commission sought input from the public through a survey of likely voters conducted by Opinion Research Specialists, LLC of Springfield, MO. The results of this survey showed that voters were not supportive of a renewal of the existing sales tax that included funding for parks. The issue was therefore not placed on the ballot. Appendix F contains a copy of the survey results.

#### 4.2.2.1.5

There is no means to quantitatively measure the direct impact public involvement has on discharge of pollutants, but we can gage the public interest and passion by their participation in the opportunities available to be involved. Participation in Lake and River clean up provide a small picture of quantifiable impacts as do volunteer hours and attendance at monthly meetings. Participation in these types of activities is tracked by the non-profit organizations supported by the County. Likewise, attendance in planning board and zoning hearings gives an approximate measure of the public's level of involvement in the various elements of the stormwater program.

### **4.2.3 Illicit Discharge Detection and Elimination**

Develop, implement, and enforce a program to detect and eliminate illicit discharges (as defined in 10 CSR 20-6.200) into the permittee's regulated small MS4;

#### **4.2.3.1.1**

Greene County has developed a very detailed map of the storm water management system. This map shows the location of all inlets, pipes and outlets of storm systems in the regulated MS4 as well as the portions of unincorporated Greene County that do not fall under MS4 regulation. The map also contains the locations and names of all waters of the State and their tributaries, including those that receive stormwater discharge from the MS4. The stormwater system map was built in, and is accessed through ESRI's ArcMap GIS program. To develop the map, the locations of all components of the stormwater system (detention basins, pipes, inlets, open swales, junction boxes, culverts, and bridges) were field verified by County cartography staff. Pipe diameters were catalogued to enable query by size. The stormwater system is just one of many layers accessible in the County GIS system allowing for the simultaneous viewing of other infrastructure or natural features that can influence the stormwater system. The GIS map of the stormwater management system is updated in several ways. As plans for new developments are approved the final plans are digitized and the stormwater improvements for each individual project are added to the overall system map. Additionally, as errors and omissions in the map are discovered through the routine maintenance or inspection the corrections are forwarded to the GIS technician who can then update the map. Hard copies of the illicit discharge outfalls/screening locations and map are included in Appendix G.

#### **4.2.3.1.2**

Greene County prohibits illicit discharges to the stormwater system through an ordinance in Article IV, Section 25 of the Greene County Zoning Regulations. Greene County has always previously relied on our prohibitions against trash and dumping (Article IV, Section 35 of the Greene County Zoning Regulations) as the regulatory umbrella covering storm drains. However in 2012 we have added a specific ordinance prohibiting the discharge of pollutants into the County's stormwater conveyance system. The new ordinance is modeled after Boone County Missouri. See Appendix G for a copy of the ordinance added to Article IV, Section 25 of the Greene County Zoning Regulations.

#### **4.2.3.1.3 – 4.2.3.1.3.4**

All stormwater outfalls (as defined in 10 CSR20-6.200 (1)(C) 12) have been previously mapped and identified as screening locations. 95 outfalls have been identified and are screened at



**Figure 11: Outfall screening location**

#### **Dry Weather Screening**

Greene County has identified 95 major outfalls that meet the definition found in 10 CSR 20-6.200. These outfalls are screened for evidence of illicit discharges at least once a year following a period of at least 72 hours with no measureable precipitation.

least once every calendar year for illicit discharges. Screening procedures are as follows:

1. In order to meet the criteria of “dry weather screening”, inspections are to take place no sooner than 72 hours following the most recent rain event.
2. Inspection information must include outfall number, date of inspection, and if any discharge was found.
3. If discharge is found, a sample is to be collected and sent to City Utilities for chlorine and/or fluoride analysis to determine if the source is a leaking or broken drinking water line.
4. If the water sample is negative for drinking water indicators then the inspector is to follow the discharge toward the source as far as legally possible.
5. If no source can be found the inspector will consult with the Stormwater Engineer on how to proceed.

The greatest potential non-stormwater discharge is wastewater from residences, businesses and industry since not every property in the county or even within the urbanized boundary is served with sanitary sewer (Aley and Thomson, 1984, Aley and Thomson, 2002). Greene County takes a number of steps to locate and eliminate discharges of wastewater especially from failing on-site wastewater treatment (OSWWT) systems. Although most OSWWT system failures are not within the urbanized area boundaries, they are illicit discharges that pollute our surface and/or groundwater and are treated accordingly. Illicit discharges also include illegal dumping, discharge and disposal of liquid and solid waste into any storm water conveyance structure. Every new structure is inspected by Greene County Environmental staff to verify that sanitary sewer connection is made to the proper main and not to a stormwater conveyance system. Two wastewater inspectors are on staff to evaluate and inspect all new OSWWT systems that are installed in the county to ensure that they are designed and installed in accordance with the standards set forth in the Greene County Regulations and Standards for On-Site Wastewater Systems. A copy of these regulations is included in Appendix G. On-site wastewater program activities include:

1. Review of soils reports and design plans for new and replacement OSWWT systems
2. Inspect installation of all new and replacement OSWWT systems  
Education and certifications for OSWWT system installers (see Section 4.2.1.1.3 on page 12 of this report) Installers of OSWWT systems must obtain a biennial certification from the County. A written examination is required for certification. The County provides annual certification training classes for OSWWT system installers.
3. Facilitate the formation of new sewer districts
4. Inspect all new connections to sanitary sewer
5. Investigate failing OSWWT systems (failure being defines as the discharge of raw effluent to the ground surface or to groundwater or effluent backing up into the structure) and ensure the proper repair of the failing OSWWT system.
6. Investigation of illegally installed OSWWT systems

Greene County requires the submission of a detailed soils report and system design prior to construction of any new or repaired OSWWT system. In the last 5 years the OSWWT system component of our illicit discharge program has consisted of 580 inspections conducted on newly installed OSWWT systems. Greene County wastewater inspectors also coordinate the formation of sewer districts to organize neighborhoods that are currently utilizing inadequate OSWWT systems and connect them to sanitary sewer. In the last five years a total of 108 lots have been formed into three sewer districts that have been designed, built and constructed. Inspections were conducted on 993 new home connections to sanitary sewer in the last five years, most were for newly constructed homes. The wastewater inspectors also investigate failures of OSWWT systems and enforce the regulations requiring the repair of any failing system. In the last five years 312 OSWWT systems that were failing in some degree were repaired and brought up to current standard. The OSWWT program has been very effective in reducing the effluent pollution potential and protecting our water resources, especially to groundwater, since construction standards were put into effect in 1993 (Aley and Thomson, 2002).

**OSWWT Systems**

Greene County inspects all new and repaired OSWWT systems, failing OSWWT systems, and new connections to sanitary sewer to protect surface and groundwater.



**Figure 12: Inspection of a new OSWWT system installation**



**Figure 13: Inspection of a failing OSWWT system**

**4.2.3.1.3.5**

For purposes of permit compliance we view the Public Education and Outreach (MCM #1) program to fulfill the requirements of this section. Greene County is currently in the process of re-designing the County’s webpage. One of the changes to be included is a citizen reporting page where citizens will be able to report stormwater pollution and illicit dumping into the storm system as well as drainage and flooding issues. This is expected to be complete within the 2013 calendar year. Another will be an annual training program for Building Inspectors and Greene County Highway Department staff who drive around the county teaching them to recognize and report illicit discharges.

<b>Planned Activity</b>	<b>Target Completion Date</b>
Include public input page to Greene County’s website	2013
Training of Building Inspectors and Highway Department staff	Annually

#### 4.2.3.1.3.6

There is no direct means of quantifying the success of all components of the illicit discharge detection and elimination program. We cannot quantify the pollutant load reduction from IDDE activities either in surface or groundwater. However, the optical brightener detection work by Aley and Thomson (2002) give us strong evidence that at least Greene County's OSWWT system program is successful in reducing the amount of sewage effluent reaching our shallow groundwater aquifer. The numbers of homes taken off OSWWT systems and connected to sewer, as well as the number of failing OSWWT systems that have been repaired to current standards also provides an indirect measure of the success of this MCM.

#### 4.2.3.1.4

None of the discharges described in this paragraph are known to be a significant contributor of pollutants. We do not propose to implement any additional programs for these discharges.

#### 4.2.3.1.5

No such list has been deemed necessary and no local controls or conditions have been placed on occasional incidental non-stormwater discharges.

#### 4.2.3.1.6

Article IV, Section 25, of the Greene County Zoning Regulations (Appendix B) prohibit the discharge of pollutants from industrial and commercial activities into the stormwater management system.

#### **4.2.4 Construction Site Storm Water Runoff Control**

The permittee shall develop, implement, and enforce a program to reduce pollutants in any storm water runoff to their regulated small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre shall be included in the program if that construction activity is part of a larger common plan of development or sales that would disturb one acre or more. The permittee's program shall include the development and implementation of, at a minimum:

##### **4.2.4.1.1 - 4.2.4.1.1.3**

Article IV, Section 27 of the Greene County Zoning Regulations provides the local regulatory framework that governs land disturbance activities in Greene County. Section 114 of the Greene County Stormwater design standards provides greater detail on requirements that construction site operators must follow to comply with County regulations. Copies of Article IV, Section 27 of the Greene County Zoning Regulations and Section 114 of the Storm Water Design Standards are included in Appendices B and D respectively.

All non-agricultural land disturbance activities in Greene County require a Greene County grading permit regardless of area disturbed. The county can use discretion in waiving this requirement for sites disturbing less than one acre that do not pose a threat to a stream, sinkhole, spring or other sensitive natural feature. Before a grading permit is issued for any construction project the operator must submit the following documents to the Greene County Resource Management Department, Environmental Section:

1. Application for a Greene County Grading Permit (See Appendix H)
2. A grading and sediment and erosion control plan as part of their SWPPP
3. Completed SWPPP form (see the Greene County SWPPP Template in Appendix H)
4. A security bond in the amount of \$1,000 per disturbed acre deposited with the Greene County Treasurer's office for re-vegetation and BMP installation. The bond is returned once final stabilization has been approved.
5. For sites disturbing more than one acre, a copy of the State Land Disturbance Permit

##### **4.2.4.1.2**

All sites, regardless of size are required to employ appropriate structural and/or non-structural BMPs to control the discharge of sediment. Beginning in 2011 Greene County revised our SWPPP to better reflect the EPA SWPPP template. In order to comply with the SWPPP all permit holders must control non sediment pollutants on the development site and keep records of self inspection (see inspection checklist in Appendix H).

#### 4.2.4.1.3

All new developments are required to submit plans to the Greene County Resource Management Department for review. Plans are reviewed for compliance with all stormwater design standards including sediment and erosion control, and water quality consideration requirements. SWPPPs are reviewed for all new construction projects in the County. See Section 114.3.2 and 114.5.2 – 114.5.5 of the Storm Water Design Standards in Appendix D. See also the Sediment and Erosion Control Regulation included in Article IV Section 27 of the Zoning Regulations (Appendix B). All site plans are reviewed by the Assistant Stormwater Engineer. The sediment and erosion control plan and SWPPP are reviewed by either the Assistant Stormwater Engineer or one of the staff water quality specialists. See Section 103 of the Storm Water Design Standards in Appendix D for submittal requirements that provide an inspection guideline for plan review.

#### 4.2.4.1.4

Before any proposed development can submit a preliminary plat they must present their proposal to the Greene County Zoning Board at a public hearing. Zoning hearings are posted 15 days in advance and adjoining landowners are contacted by personal courtesy letter. The hearings are a forum for the public to express their sentiment for, or against the proposed development. As required by Missouri Revised Statutes Chapter 64 the Greene County Zoning Board is required to hold public meetings when considering preliminary plat approval.

#### 4.2.4.1.5

Before construction may begin all developers and contractors must have a pre-construction conference with the Greene County Highway Department and Environmental Section as required in Section 101.12 of the Storm Water Design Standards. Once a grading permit has been issued there are two stormwater inspectors on staff who perform site inspections to ensure compliance with the SWPPP. Site inspections are documented by photographs and/or a completed inspection checklist. The Greene County Land Disturbance Inspection Checklist is also available on-line for contractors to use for their weekly self inspections. See Appendix H for a copy of the inspection checklist used for inspection and self inspection of land disturbance sites. All sites are inspected on a routine basis therefore no prioritization is required.



**Figure 14: Construction Site BMPs**

**Construction Site Runoff Control**  
All construction projects in Greene County are required to submit plans for review prior to commencing land disturbance activities. All land disturbance sites are regularly inspected by county staff for compliance with the submitted SWPPP. Violations are addressed in a variety of ways including stop-work orders, halting building inspections, withholding certificates of occupancy, and/or civil penalties

#### 4.2.4.1.6

When deficiencies are noticed during site inspections, or a complaint is received from the public, an inspector from the Resource Management Department contacts the site construction superintendent, or property owner. In almost all cases, the contractor corrects the problem after the first verbal notification. In cases where the contractor fails to take corrective action within the 7 days allowed, grading and building construction are stopped via a stop-work-order until corrections are made. Because the building inspectors are part of the same department we can work closely with them to halt building inspections on projects that do not correct SWPPP violations within a timely manner. This action nearly always elicits immediate actions on the part of the contractor to come into compliance. Because of our ability to halt building inspections and deny building permits, it is very rare not to achieve compliance at this level for residential and commercial developments. Greene County also has the option to cash the security bond and use the funds to stabilize the site, but that is viewed as a last resort and has yet to be utilized. Any land disturbance violation observed by staff or reported by a citizen in the county outside the MS4 urbanized boundary, is also investigated and if necessary, corrective action is taken. Penalties and civil enforcement for non-compliance with County sediment and erosion control regulations are detailed in Subsection F of Article IV, Section 27 (see Appendix B).

#### 4.2.4.1.7

Even though there is no way to directly measure the water quality improvement of stormwater on a watershed scale that is directly related to the construction site runoff management program, there are indirect measures of how effective the program is. The success of this minimum control measure in reducing potential water pollution can be measured indirectly by the following criterion. In the last 5 years there have been:

- 96 grading permits issued with an average of 41 active permitted sites at any one time
- 92 grading permits closed through successful final stabilization
- 2500 land disturbance site inspections by Greene County staff
- 54 notice of violation letters, stop work notices, or other formal corrective action

In 2010 when EPA was still proposing numeric effluent limits from construction sites of 280 NTU's Greene County purchased a turbidity meter in preparation to meet the proposed limits. Since the EPA has stayed the implementation of the numeric effluent turbidity limits and is proposing only non-numeric limits in the latest Federal Register (March 20, 2013, Docket Number EPA HQ OW 2010 0884) the need for complying with a numeric limit no longer exists, but the turbidity measure from a single site can be compared to the previously proposed 280 NTU benchmark. As such, even though it's not a regulatory measure, construction site discharge turbidity can be used as a proximal measure of BMP effectiveness on an individual site. On sites where visual inspection leaves some doubt as to BMP effectiveness, a turbidity

reading can be taken to provide a reference measure to evaluate if additional BMPs might be needed.

#### **4.2.5 Post - Construction Storm Water Management in new Development and Redevelopment**

Develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the permittee's regulated small MS4.

##### **4.2.5.1.1**

All new developments in Greene County are required in Article IV Section 25 of the Zoning Regulations (Appendix B) to provide storm water detention to limit post-construction peak discharges to the pre-construction rate or lower in an effort to mimic as closely as possible the pre-development hydrology of the site. Section 112.5 of the Greene County Storm Water Design Standards gives detailed requirements for design storm discharge computations (See Appendix D). Discharge rates may not increase for the post development condition and computations must be submitted for the 50%, 10%, and 1% AEP (annual exceedance probability) storm to verify that this condition is met (See Section 112.5.3 in Appendix D). Storm Water Design Standards Section 115.2 gives general design guidelines that recognize that the best pollutant reduction is to reduce the volume of runoff via practices such as minimization of DCIA (directly connected impervious area), and use of softer engineering practices such as vegetated swales and vegetated filters.

In addition to providing flood control, Section 115.4.1 specifies the required water quality treatment volume for all new developments and re-developments as the first ½ inch from DCIA or 1 inch in 24 hours, whichever volume is greater. For Springfield/Greene County the 90<sup>th</sup> percentile rainfall event defined as 1.0 inch of rainfall in Section 115.2.4. All permanent detention basins built in Greene County must provide outlet restriction sufficient to detain the required water quality volume and release it over a period of no less than 40 hours and no more than 72 hours as specified in Section 115.4.5 of the Greene County Storm Water Design Standards. This allows for some infiltration as well as greatly increased settlement of suspended solids and sediment borne pollutants.

Section 115 also encourages (without requiring) minimization of directly connected impervious area, maximization of hold time, utilizing a "treatment train" approach by utilizing BMP's in series, and maximizing contact with vegetation through

#### **Post-Construction Storm Water Management**

All new and redevelopment projects in Greene County are required to provide flood storage volume and restrict discharges to pre-development conditions as an attempt to mimic pre-development discharges. Basins must also utilize an outlet structure that allows for extended hold times of the first 1 inch of rainfall (90<sup>th</sup> percentile design storm) from the site.



**Figure 15: Extended dry detention basin with 40-72 hour hold time**

vegetated filter strips and grass swales. Section 115 of the Greene County Storm Water Design Standards was originally written to apply to the Pearson Creek watershed and the recharge area of Fulbright Spring, both drinking water sources for the Springfield/Greene County community. In 2006 the Greene County Commission expanded the requirements in Section 115 to all watersheds and all developments in the County (See Planning Board Case NO. 1625, January 3, 2006 in Appendix I).

#### 4.2.5.1.2

See the Greene County Storm Water Design Standards Sections 112 and 115 in Appendix D as described above in section 4.2.5.1.1. See also Article IV, Section 25 of the Greene County Planning and Zoning Regulations in Appendix B.

#### 4.2.5.1.3

At present the County only provides operation and maintenance for permanent stormwater facilities located on County road right-of-way. Operation and maintenance for permanent stormwater facilities located on private property are the responsibility of the property owner. For commonly owned private facilities, the Subdivision Regulations include requirements for formation of homeowners' or property owners' association and mandatory collection of dues to provide for operation and maintenance. Covenants including the formation of the association must be approved by the County Counselor prior to recording of the subdivision plat. All permanent BMPs are required to be located within one single lot where maintenance is the property owner's responsibility, or in dedicated common space where maintenance is the responsibility of the homeowner's association. Article IV Section 10 Part 7 of the Subdivision Regulations (Appendix C) and Article XXIV of the Greene County Zoning Regulations (Appendix B) address permanent BMP operation and maintenance. See also Section 112.4 of the Storm Water Design Standards in Appendix D. To more adequately address the long term operation and maintenance of permanent storm water BMPs Greene County is investigating long term funding options to enable the county to play a larger role in storm water system maintenance. See Section 4.2.2.1.3-4.2.2.1.4 on page 18 of this SWMP document.

#### 4.2.5.1.4

Specific priority areas for this program include:

Enforcement of sinkhole use restrictions found in Article IV, Section 28 of the Greene County Planning and Zoning Regulations and in Section 107 of the Greene County Storm Water Design Standards (Appendices B and D respectively). These regulations prohibit the filling of sinkholes, trash dumping and pollution within sinkholes, grading of sinkholes, wastewater treatment systems, and most construction within sinkholes. Sinkholes are the natural conduits by which surface runoff reaches the shallow Springfield Plateau Aquifer which feeds our many springs that supply water to our streams. By keeping the sinkholes undisturbed we are preserving the

existing hydrology of the sinkholes by allowing storm runoff to maintain its present flow paths. These regulations also protect the water quality of our shallow groundwater and the streams that depend on springs for much of their baseflow.

Greene County is taking steps to encourage the use of infiltration and stormwater volume reduction in low impact development by continuing to support the Habitat for Humanity development at Legacy Trails. Greene County is helping establish and maintain the infiltration basins and native landscape plantings at Legacy Trails, the first, and so far, only LID residential development in Southwest Missouri. Greene County staff has been actively involved in making that project a success through yearly financial contributions, landscape committee coordination as well as design services. Legacy Trails Phase 1 was constructed in 2006 and utilizes infiltration basins and reduced impervious area to reduce runoff from the site. Infrastructure for Phase 2 was begun in January 2012. Phase 2 utilizes four infiltration/bio-retention basins as the stormwater best management practice to reduce total runoff volume as well as two extended dry detention basins for large storm event flood control. Greene County engineering staff provided design services for both phases 1 and 2. Legacy Trails serves as a demonstration of LID practices to educate developers, designers, and the public on the feasibility of successfully implementing LID techniques on a residential development in this area. The project has proven to be very successful at mimicking the pre-development hydrology of the project as there is no discharge from the 95<sup>th</sup> percentile storm event (1.5 inches in 24 hours). This project is also an excellent training example for engineers to show that infiltration is possible and can work well depending on the soils present on the site. Without consideration of the soils and underlying geology, there is an increase in sinkhole collapse potential (see the above discussion on sinkhole protection).

#### 4.2.5.1.5

Article IV, Section 33 of the Greene County Zoning Regulations (Appendix B) spells out the urban services policy which is designed to direct growth to specific areas of the County. The urban services policy directs intense dense urban growth into a band around the City of Springfield where they can be served by gravity flow sanitary sewer. This policy prevents the

#### Sinkhole Use Restrictions

Sinkholes are a natural conduit for stormwater from the surface to directly reach groundwater in karst areas with little to no treatment from the soil. Greene County's sinkhole regulations help prevent pollution of the groundwater by protecting the quality of surface water entering the sinkhole.



Figure 16: Trash filled sinkhole collapse



Figure 17: Stable, protected sinkhole depression

proliferation of on-site wastewater treatment systems on small lots thus protecting groundwater quality.

Articles VI through XIII of the Greene County Zoning Regulations (Appendix B) specify the minimum lot size that can be formed without being connected to public sanitary sewer. In Greene County, newly created lots must be 3 acres or more before on-site wastewater systems are allowed. This policy prevents on-site wastewater treatment systems on lots that are too small to support their use. This policy prevents concentrations of new on-site wastewater systems that have the potential to leak effluent into the groundwater or surface water systems.

Other non-structural BMP's in Greene County's program include:

- Zoning Regulations Article IV Sections 25, 27 and 28 (Appendix B)
  - Section 25 requires storm water detention for any new development
  - Section 27 regulates sediment and erosion control on new developments
  - Section 28 sets specific restrictions on development activities in sinkholes
- Subdivision Regulations Article V Section 6 (Appendix C)
  - Requires storm water detention, erosion control, and storm water BMPs
- Floodplain Management Regulations: Zoning Regulations Article 21 (Appendix B)
  - Prevents development of any kind from the floodway, and sets strict limits on floodplain encroachment in the absence of a stream buffer ordinance.
- Stormwater Design Standards Section 115 (Appendix D) encourages (but does not require):
  - minimization of directly connected impervious area
  - maximization of hold time
  - utilizing a “treatment train” approach by utilizing BMP's in series
  - maximizing contact with vegetation through vegetated filter strips and grass swales

#### Legacy Trails L I D

Legacy Trails is a residential subdivision developed by Habitat for Humanity that utilizes the natural soil structure to infiltrate stormwater runoff. Using infiltration/bio-retention basins runoff from the 95<sup>th</sup> percentile storm (1.5 inches in 24 hours) is retained and infiltrated on site thus reducing runoff volume. Legacy Trails also utilizes native vegetation to improve infiltration.



Figure 18: Legacy Trails bioretention basin



Figure 19: One day later

#### 4.2.5.1.6

Infiltration practices that utilize infiltration basins, and grassed swales are in use and demonstrated at the Legacy Trails subdivision as discussed in section 4.2.5.1.4 on page 30 of this SWMP document.

A green roof was installed on the roof of the newly constructed Public Safety Center (PSC) which serves as the new Springfield/Greene County Emergency Operations Center and 911 call center. The funds for installation were part of an appropriations grant that was procured by Senator Roy Blunt.

#### 4.2.5.1.7

The measurable goals of the post construction storm water management program element are spelled out in the EPA approved TMDL for the James River. The TMDLs for Pearson Creek and Wilson Creek have been withdrawn by EPA and are in the redevelopment process. These watershed planning documents set the measurable target goals. Greene County is using Legacy Trails as a model for complying with the volume reduction requirements and has contracted with the Ozarks Environmental Resources Water Institute (OEWRI) for first flush water quality monitoring to comply with the nutrient load allocations in the James River TMDL. The current results and analysis of this monitoring effort are found in the Monitoring Program Summary section of this report document beginning on page four. There is currently no way to objectively measure the collective reduction in pollutant loads resulting from the above best management practices. The James River TMDL monitoring, although some trends can be identified, does not have a sufficiently large data set to draw conclusions yet.

### Schedule of Implementation

Although the provision of operation and maintenance for drainage facilities off of County road right-of-way is permitted by State statute the County does not currently have the financial or staffing resources to provide this service. If Greene County is to assume maintenance duties for private stormwater infrastructure a source of additional revenue will be needed. Through the Stormwater Management Task Force (see section 4.2.2.1.3 on page #18 of this SWMP) Greene County is also investigating long term funding options to enable the county to play a larger role in storm water system maintenance.

#### Green Roof

The Greene County Public Safety Center (PSC) was completed in 2012 to house the County's Emergency Management and 911 Operations Centers. Part of the construction funding included a \$500,000 grant procurement from Senator Roy Blunt. The PSC was designed to withstand a direct hit from an EF5 tornado so no structural strengthening of the building was required to account for the added weight of the green roof.



Figure 20: PSC upper green roof cells installation



Figure 21: PSC green roof weed removal

Although we have mapped our system and have a GIS based inventory of all permanent BMPs in the County we do not have the staff or legal authority to inspect all the existing BMP's. If permanent funding is procured it will allow the County to pursue development of an ordinance that requires self inspection and reporting of maintenance for privately owned BMPs.

<b>Planned Activity</b>	<b>Target Completion Date</b>
Water Quality Plan Review	Ongoing
James River TMDL Monitoring	Ongoing

#### **4.2.6 Pollution Prevention/Good Housekeeping for Municipal Operations**

Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations;

“Municipal” operations for Greene County include two functions:

- The Greene County Highway Department is responsible for all aspects of road maintenance in unincorporated Greene County on 1,500 miles of paved road. Maintenance responsibilities include paving, culvert and bridge installation, street sweeping, snow removal, mowing and spraying along County right of way and maintenance of stormwater infrastructure located within the right of way. The Highway Department is also responsible for maintaining the fleet of vehicles owned by the County including operation of a fueling station and a vehicle washing facility. Greene County does not own or operate any other facilities such as concrete or asphalt plants. County Highway Department operations are located on a central yard that is 14 acres in size located at 2065 N. Clifton Ave.
- Operation of buildings and grounds on the main county campus is provided by the Building Operations Section of the Resource Management Department. Building Operations provides all maintenance, repair and custodial services needed for the 9 buildings located on the 19 acre Greene County governmental campus.

Both the County Highway Department and the Resource Management Department are under direct control of the Greene County Commission. Park facilities in Greene County are operated by the Springfield-Greene County Park Board, which functions as a department of the City of Springfield. The Highway Department facility and governmental campus constitute the only developed property owned by the County. All other property is undeveloped green space thus it does not contain potential pollution sources from operational activities.

##### **4.2.6.1.1**

The County Highway Department presently manages the following programs for operation and maintenance:

#### **Salt Storage**

The Greene County Highway Department utilizes two salt storage facilities for ice melting operations. There is a covered storage facility utilized jointly by the City of Springfield and Greene County located on Kaufman Road southwest of Springfield. An additional 1,300 tons of salt are also stored at the Highway Department facility located at 2065 N. Clifton Ave. in a covered barn protected from exposure to rainfall and runoff. Any runoff leaving the area will flow into the detention basin on the northwest corner of the facility to allow for settling and clean up before entering the City’s stormwater system. Calcium Chloride is stored in above-

ground containers and located at the Highway Department's Clifton Ave. facility.

Equipment Washing

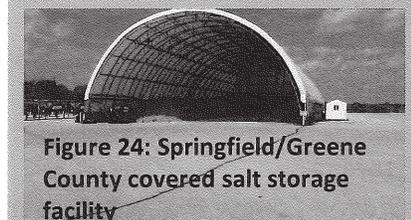
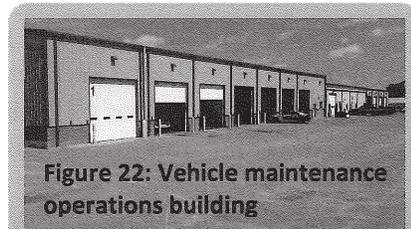
Trucks, and heavy equipment are washed at the Highway Department Complex. Products such as EC-510 Citrus Solvent are utilized in place of petroleum or chlorinated solvent products. A new truck washing facility was built in 2004. All wash water from the vehicle wash at the Highway Department facility first enters a buried concrete separator tank with baffles for separation of floatable and settleable pollutants from the wash water. Effluent water is then sent into the Springfield sanitary sewer system and is not discharged into any stormwater conveyance system. Separated solids are periodically cleaned out (usually necessary once per year) and disposed of at the landfill.

Vehicle Fleet Maintenance

All vehicle maintenance is performed in covered garages. In 2011 Greene County completed construction of two new maintenance buildings with a total of 14 repair bays. All waste oil from vehicle maintenance operations is collected and pumped into a 1,000 gallon double walled storage tank and then purchased by a recycling company every two weeks on average. Last year 4,180 gallons of waste oil was collected for recycling. Likewise anti-freeze is collected for recycling. Machine parts are washed in hot baths with EC-510 Citrus Solvent after which the wash water enters the sanitary sewer system. Anti-freeze which is used in heavy equipment tires for weight is of the R/V environmental type. Storage of any product involving an MSDS, (material safety data sheet) is reported on Tier Two annual reports by the Safety Division (included in Appendix J).

Fuel Storage Facility

Under new EPA guidelines the Greene County Highway Department's old fuel storage facility was closed. On December 01, 1998 new FRP Clad Steel storage UST, (underground storage tanks) were installed and meet EPA 1998 upgrade. The fuel system services all County vehicles. The new fuel system is automated with safety controls, example: if an employee accidentally departs the fuel facility without properly removing the filler nozzle and the nozzle breaks off, the fuel system will shut down.



### Herbicides and Chemicals

The Greene County Highway Department retains two currently certified herbicide applicators. All herbicides, pesticides and other liquid chemicals are stored in a covered, locked, fire resistant cabinet protected from exposure to storm water runoff. When chemicals are mixed, the containers are triple-rinsed into the receiving tank. Empty containers are taken to the landfill. It is Highway Department policy not to spray herbicides within 150 feet of any standing water body or stream. Floor-Dry, granular clay based, absorbent material is kept on hand at several stations around the facility for clean up of accidental spills of chemicals or fuel.

### County Road and Special Projects

All land disturbance projects performed by or under contract to Greene County follow the same pollution prevention steps as are required for private developments. All projects are covered under Greene County's State Land Disturbance Permit MOR1000040. A SWPPP is developed for each project along with a sediment and erosion control plan to include in the SWPPP. All projects have a full-time inspector who is responsible for ensuring BMPs installation, inspection, recordkeeping and other elements of SWPPP compliance. SWPPPs are reviewed and a Greene County grading permit is issued for each municipal project just as with private projects.

### Street Sweeping and Trash Removal

All residential streets in the County (the bulk of those located in the regulated MS4 urbanized area) are routinely swept to reduce trash and floatables from entering the storm water system. All swept material is taken to the landfill. Each street is swept on a rotation that takes about four to six weeks. Trash from the sweepers is emptied daily into a dump truck and hauled to the landfill for proper disposal. Any trash found in roadside ditches is also collected and hauled to the landfill by highway department crews. Roadside Trash is also bagged by county jail inmate crews and collected by the highway department for transport to the landfill. Any hazardous materials, barrels or oil based materials are removed by a hazardous waste contractor. Street sweeping and trash collection activities remove approximately 280 tons of trash from County streets each year.

### Storm Water Runoff

Water flows from south to north across 14 acres at the Greene County Highway Department Complex. Water is directed into two detention basins at the northwest and northeast end of the Highway Department complex. Overflow diverts into the City of Springfield storm water system.

### Pug Mill Operation

The Greene County Highway Department operates a cold mix asphalt plant for road repair and improvement. The operation runs mostly in the summer months and is located on Conco

properties just east of Willard, Missouri. Trucks prior to being loaded use a release agent for asphalt material, trade name React S. The chemical is sprayed on dump beds. Safety Division has addressed concern on the use of React S. Oil at the site is trucked in and no oil is stored at the Greene County Highway Department facility at 2065 North Clifton, Springfield, Missouri. The operation of the pug mill is being phased out and is seldom in operation.

#### 4.2.6.1.2

The Highway Department is already doing the things necessary to prevent stormwater pollution but documentation and formalized standard operating procedures for pollution prevention has been lacking. In order to better comply with the permit requirements Highway Department staff are working with the Resource Management Department on documenting the procedures they already follow to prevent stormwater pollution. Development and documentation of inspection procedures and operating procedures needs to be developed. The same is true for the Building Operations section of the Resource Management Department. Building operations has maintenance and custodial responsibility for all buildings on the Greene County Campus. They therefore store, use, and dispose of a wide variety of cleaning solvents and other chemicals. Developing and documenting standard operating procedures (SOPs) and inspection procedures will need to be done for permit compliance.

#### 4.2.6.1.3

Please see section 4.2.6.1.1 for full description of pollution discharge control activities for municipal operations

#### 4.2.6.1.4

All hazardous substances stored on site are included in the Tier 2 reports submitted to SEMA (see Appendix J) and local emergency responders and are handled in accordance with applicable state and federal laws.

#### 4.2.6.1.5

Greene County's street sweeping and trash removal program fulfill this permit requirement. See section 4.2.6.1.1 for a detailed description of these activities. Documenting the SOP's for the collection and disposal of solid waste, including floatables is an action item for this permit cycle.

#### 4.2.6.1.6

All flood management projects are reviewed by the Storm Water Engineer to ensure consideration of water quality impacts.

#### 4.2.6.1.7

Training will be an integral part of SOP development and dissemination. Like any entity with

separate departments, coordination and communication between the Highway Department and Resource Management Department is crucial to compliance with the permit conditions and training sessions are an integral part of that effort. It is our goal to perform at least one stormwater training for the appropriate Highway Department crews and crew leaders. We also plan to produce training materials that can be used for stormwater refresher education during short training “Tailgate Talks” that are conducted routinely by the Highway Department crew leaders.

Action Items	Target Completion Date
SOP development for the following:	
1. Salt storage, application, and spill prevention	2013
2. Chemical spill prevention and clean up procedures	2013
3. Waste oil storage and handling	2013
4. Herbicide storage, application, and disposal	2013
5. Street sweeping procedures	2013
6. Solid waste disposal	2013
Develop inspection procedures for the above SOPs	2013
Conduct training sessions for Highway Department and Building Operations team members	At least annually

#### 4.2.6.1.8

Although it’s not really possible to quantify the reduction in stormwater pollution that is directly attributable to the good housekeeping procedures, the success can be measured in tons of trash, gallons of recycled oil etc that are properly disposed of that does not make it to the County’s stormwater system.

#### 4.3

As noted in section 4.2.1.1 and 4.2.2, most of the activities included in Public Education and Outreach and Public Involvement and Participation are cooperative efforts between the City of Springfield, Greene County, and other organizations. These activities are also a part of the Phase 1 MS4 permit for the City of Springfield. Though it is not the intention of Greene County to apply as a co-permittee with the City of Springfield, we do work closely with them in developing similar programs and to coordinate the activities required by our respective permits.

#### 4.4

The SWMP will be reviewed and updated annually in conjunction with preparation for the annual report.

## **5 Monitoring, Record Keeping and Reporting**

### 5.1

Greene County has an intergovernmental agreement with all other area regulated MS4 communities to perform coordinated monitoring for compliance with the James River TMDL. Monitoring is performed by the Ozarks Environmental Water Resources Institute at Missouri State University under contract to Greene County. See section 3.1.2 for a detailed description of monitoring procedures.

### 5.2

Records of all permits and inspection reports are kept on file for the requisite time period in the offices of the Greene County Resource Management Department and are available for public inspection upon request during normal business hours.

Copies of the general permit will be kept on file and will be available for inspection by the public as required in the general permit

### 5.3

Annual reports will be submitted as required.

The annual report will be prepared and submitted to the Director of the Department of Natural Resources by July 28<sup>th</sup> of each calendar year. In accordance with the requirements of the general permit the annual report will contain the following:

- status of compliance with permit conditions
- assessment of the appropriateness of identified best management practices
- progress toward achieving measurable goals for each of the six minimum control measures
- progress toward the statutory goal of reducing the discharge of pollutants to the maximum extent practicable
- results of information collected and analyzed including monitoring data, if any
- a summary of stormwater activities which are planned during the next reporting cycle, including an implementation schedule
- any changes in identified measurable goals that apply to the program elements

## REFERENCES

- Aley, Thomas and Thomson, Kenneth C., Hydrogeologic Mapping of Unincorporated Greene County, Missouri to Identify Areas where Sinkhole Flooding and Serious Groundwater Contamination Could Result from Land Development, Greene County Sewer District, Springfield, MO, 1981.
- Aley, Thomas and Thomson, Kenneth C., Septic Fields and the Protection of Groundwater Quality in Greene County, Missouri. Final Report, Ozarks Underground Laboratory, Protem, MO, 1984.
- Aley, Thomas and Thomson, Kenneth C., A Study of Septic Field Performance and Recharge Area Delineations for Twelve Spring Systems, Greene County, Missouri, Protem, MO, 2002.
- Bullard, L., Water Resources of Greene County, Watershed Committee of the Ozarks, Springfield, MO, 1997.
- Dove, Eric; Johnson, Kasi; and Keener, Matt, The Value of Protecting Ozark Streams An Economic Evaluation of Stream Bank Stability for Phosphorus Reduction, Springfield, MO, 2008.
- Emmett, Leo F. et al, Water Resources and Geology of the Springfield Area, Missouri, Missouri Division of Geology and Land Survey, Water Resources Report No. 34, Rolla, MO, 1978.
- Hayes, William C., Urban Development in a Karst Terrain - Springfield, Missouri, City of Springfield, Missouri, 1977.
- Ozarks Environmental Water Resources Institute, Pre-Construction Report for the Ward Branch Stream Restoration Project, Springfield, MO, 2007.
- Thomson, Kenneth C., Ph.D., Geology of Greene County, Missouri, Watershed Management Coordinating Committee, Springfield, Missouri, 1986.
- Vandike, James E., Delineation of Recharge Areas for Seven Ozark Cavefish (*Amblyopsis rosae*) Sites in the Springfield Plateau of Southwestern Missouri, Missouri Division of Geology and Land Survey, Water Resources Program, Rolla, MO, 1989.

Waite, Loyd A. and Thomson, Kenneth C., Development, Description, and Application of a Geographic Information System Data Base for Water Resources in Karst Terrain in Greene County, Missouri, U.S. Geological Survey, Water Resources Investigations Report 93-4154, Rolla, MO. 1993.

Wright Water Engineers, Fulbright Spring Protection Study, Watershed Committee of the Ozarks, Springfield, Missouri, 1995.

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## APPENDICES

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- Sample laboratory Quality Assurance signature pages (TN and TP)

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- <http://www.watershedcommittee.org/>
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- <http://projectwet.missouristate.edu/>

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- Greene County Regulations and Standards for On-Site Wastewater Systems  
[http://www.greencountymo.org/file/resource management/env\\_ows\\_regulations.pdf](http://www.greencountymo.org/file/resource%20management/env_ows_regulations.pdf)

## **APPENDIX H: Construction Site Storm Water Runoff Control Program**

- Grading Permit Application  
[http://www.greenecountymo.org/file/resource\\_management/env\\_grading\\_permit\\_app.pdf](http://www.greenecountymo.org/file/resource_management/env_grading_permit_app.pdf)
- SWPPP Template  
[http://www.greenecountymo.org/file/resource\\_management/env\\_swppp.doc](http://www.greenecountymo.org/file/resource_management/env_swppp.doc)
- Inspection Checklist

## **APPENDIX I: Post Construction Storm Water Management**

- Planning Board Case No. 1625

## **APPENDIX J: Pollution Prevention/Good Housekeeping**

- Tier 2 Data Sheets



## **APPENDIX A: TMDL Monitoring Program**

- Memorandum of Understanding (MOU) for area regulated MS4s
- Sample water quality monitoring data sheet
- Sample laboratory Quality Assurance signature pages (TN and TP)

*Copy  
original sent to  
Municipal Dept 6  
4/4/08*

**MEMORANDUM OF UNDERSTANDING**  
**AND**  
**COOPERATIVE AGREEMENT**

This **Memorandum of Understanding and Cooperative Agreement** (hereinafter "MOU") made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2008, by and between CHRISTIAN COUNTY, MISSOURI (hereinafter referred to as "Christian County"), GREENE COUNTY, MISSOURI, (hereinafter referred to as "Greene County"), the CITY OF BATTLEFIELD, MISSOURI (hereinafter referred to as "Battlefield"), the CITY OF NIXA, MISSOURI (hereinafter referred to as "Nixa"), the CITY OF OZARK, MISSOURI (hereinafter referred to as "Ozark"), , the CITY OF REPUBLIC, MISSOURI (hereinafter referred to as "Republic"), and the CITY OF SPRINGFIELD, MISSOURI (hereinafter referred to as "Springfield").

**WHEREAS**, each of the parties to this MOU are required by the Federal Water Pollution Control Act (Public Law 92-500, 92<sup>nd</sup> Congress, as amended), and the Missouri Clean Water Law (Chapter 644, RSMo., as amended) to secure and obtain permits from Municipal Separate Storm Sewer Systems (MS4), under the National Pollutant Discharge Elimination System (NPDES); and

**WHEREAS**, the water quality in the James River has been designated as "impaired" for designated beneficial uses to due to excessive levels of nutrients, to wit: Nitrogen and Phosphorus; and

**WHEREAS**, the Total Maximum Daily Load (TMDL) has been established by the Missouri Department of Natural Resources-Missouri Clean Water Commission for discharge of nutrients into the James River from MS4's; and

**WHEREAS**, monitoring and testing of storm water discharge is required by the MS4 permits for comparison to the TMDL; and

**WHEREAS**, the water quality management, monitoring and testing may more effectively and efficiently be coordinated through the various communities participating in this MOU; and

**WHEREAS**, the Missouri Department of Natural Resources-Missouri Clean Water Commission has agreed to allow the parties to this MOU to cooperate and work together in an overall coordinated monitoring and testing program of the James River within their respective boundaries in order to obtain the above permits; and

**WHEREAS**, through this MOU, the data derived from the monitoring and testing program may more effectively be achieved, shared and stored in a single location; and

**WHEREAS**, Ozarks Environmental and Water Resources Institute (OEWRI) has been established by and through Missouri State University for the purpose of furthering

water quality protection efforts in Southwest Missouri by providing water quality monitoring and testing services; and

**WHEREAS**, OEWRI has established an annual fee and charge for providing the monitoring and testing for each sampling site and which charge shall be the same for each participating community; and

**WHEREAS**, Springfield is able to provide, through its own facilities, monitoring and testing storm water discharges into James River within the corporate boundaries of the City of Springfield; and

**WHEREAS**, the parties to this MOU desire to confirm, agree and provide their cooperative efforts as set forth herein.

**NOW, THEREFORE, THE PARTIES HEREBY MUTUALLY COVENANT AND AGREE AS FOLLOWS:**

1. Each party to this MOU shall adopt a coordinated monitoring and testing plan prepared by OEWRI, a copy of which is attached as Exhibit "A".
2. Each party, other than Springfield, shall enter into an agreement with OEWRI, a copy of the form is attached hereto and marked Exhibit "B" to provide for storm water monitoring and testing within the boundaries of each participating community. Such agreement with OEWRI shall designate the fee or cost for the monitoring at each site within their respective jurisdictions. The sites to be monitored are designated on the attached map and marked Exhibit "C".
3. Each party participating in this MOU agrees that the data collected from the monitoring site shall be kept, stored, archived and maintained by OEWRI and shall be made available to the State of Missouri Department of Natural Resources-Missouri Clean Water Commission and the parties.
4. Springfield shall conduct its own testing required by this MOU and shall provide copies of the results of the tests to OEWRI for inclusion within OEWRI database for this project.

**IN WITNESS WHEREOF**, the parties have executed this MOU the day and year first above written.

**CHRISTIAN COUNTY, MISSOURI**

John Grubaugh  
John Grubaugh  
Presiding Commissioner

Tom Huff  
Tom Huff  
Commissioner Eastern District

William Barnett  
William Barnett  
Commissioner Western District

**ATTEST:**

Kay Brown  
County Clerk

**AUDITOR CERTIFICATION**

I certify that the expenditure contemplated by this document is within the purpose of the appropriation to which it is to be charged and that there is an unencumbered balance of anticipated revenue appropriated for payment of same.

Susan 'Sam' Yarnell  
Auditor Certification

**APPROVED AS TO FORM:**

[Signature]  
Christian County Counselor

**GREENE COUNTY, MISSOURI**

David L. Coonrod  
David L. Coonrod  
Presiding Commissioner

Harold Bengsch  
Harold Bengsch  
Commissioner 1st District

Roseann Bentley  
Roseann Bentley  
Commissioner 2nd District

**ATTEST:**

[Signature]  
County Clerk

**AUDITOR CERTIFICATION**

I certify that the expenditure contemplated by this document is within the purpose of the appropriation to which it is to be charged and that there is an unencumbered balance of anticipated revenue appropriated for payment of same.

Cindy A. Stew 9/25/2009  
Auditor Certification

**APPROVED AS TO FORM:**

[Signature]  
Greene County Counselor

*Memorandum of Understanding and Cooperative Agreement  
OEWRI, et al*

CITY OF BATTLEFIELD, MISSOURI

By: *Judy Stainback*  
Wudy Stainback, Mayor

ATTEST:

By: *Susan R. Diehl*  
Susan Diehl, City Clerk

# Municipal Separate Storm Sewer System Phase II Monitoring Report

## Seasonal Sampling – Annual Reporting

### PART I: FACILITY INFORMATION

<b>Greene County</b>	Owner Address: Greene County 940 Boonville Ave Springfield, MO 65802	Facility Contact: Timothy Davis Title: Water Quality Field Operations Manager Phone: 417-868-4147	Report Submitted By (printed):
MOR040014 Greene County MS4 Sampling			Report Submitted By (signature):
			Date:

### PART II: MONITORING INFORMATION

This report is for water samples collected during:	Summer	Fall	Winter	Spring
Samples Collected By: Ozarks Environmental and Water Resources Institute (OEWRI)	Phone: 417-836-3197	Analyses Performed by (LAB): OEWRI	Phone: 417-836-3197	

### PART III: ANALYTICAL RESULTS

Sample Information	Site ID	GC-1	GC-2	GC-3	GC-5	GC-6	GC-7	GC-9	GC-10	Analysis Date	OEWRI SOP
	Date	NA	NA	NA	3-10-13	NA	NA	NA	NA		
Time	NA	NA	NA	NA	12:50	NA	NA	NA	NA		
Parameter	Unit										
Rainfall*	Inches	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge*	CFS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Nitrogen	mg/L	NA	NA	NA	1.22	NA	NA	NA	NA	03-31-13	3020R01 TotalN
Total Phosphorus	mg/L	NA	NA	NA	0.117	NA	NA	NA	NA	03-31-13	3010R01 TotalP
Chloride	mg/L	NA	NA	NA	13.6	NA	NA	NA	NA	03-23-13	YSI Chloride
Specific Conductivity	mS/m	NA	NA	NA	26.5	NA	NA	NA	NA	03-18-13	Eureka Snapshot
pH	units	NA	NA	NA	7.6	NA	NA	NA	NA	03-18-13	Eureka Snapshot
Total Suspended Solids	mg/L	NA	NA	NA	95.3	NA	NA	NA	NA	03-14-13	TSSolids

\* Parameters provided for USGS gage sites only.  
 \*\* Sample volume inadequate for parameter analysis.

Tyler Smith  
 phone: 836-3136  
 email: Smith001@MissouriState.edu

To: Timothy Davis  
 Greene County  
 MSA Sampling  
 RE: Greene County Data

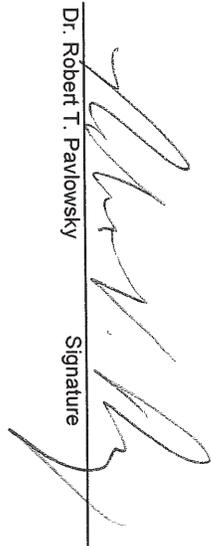
**Laboratory Testing Results**  
**Total Nitrogen (mg/l)**  
 First Flush

Sample ID	Collection	Received	Analysis	Analyst	TN conc	OEWRI SOP	QC Check	QA/QC Mng	Detection Limit	Laboratory	Replicate	Laboratory
(code)	(date)	(date)	(date)	(initials)	(mg/l)	(code)	(date)	(initials)	(≤0.1 mg/l)	(mg/l)	(%)	(%)
GC5	3/10/2013	3/10/2013	3/31/2013	JH	1.22	3020R02	4/1/2013	TS	0.08	(≤0.1 mg/l preferred) -0.005	(±20% required) -3.0	(100 ±20% required) 101.2

Verification of Quality Control:

 Signature  
 Tyler J. Smith Date 4/1/13

Final check and approved for release by:

 Signature  
 Dr. Robert T. Pavlowsky Date 4-1-13



Missouri State University  
 Ozarks Environmental and Water Resources Institute  
 Tyler Smith  
 phone: 836-3136  
 email: Smith001@MissouriState.edu

To: Timothy Davis  
 Greene County  
 MS4 Sampling  
 RE: Greene County Data

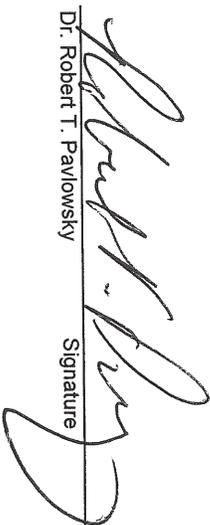
**Laboratory Testing Results**  
 Total Phosphorus (mg/l)  
 First Flush

Sample ID	Collection	Received	Analysis	Analyst	TP conc	OEWRRI SOP	QC Check	QA/QC Mngl	Detection Limit	Laboratory Reagent Blank	Replicate (%)	Laboratory Spike (%)
(code)	(date)	(date)	(date)	(initials)	(mg/l)	(code)	(date)	(initials)	(≤ 0.005 mg/l)	(mg/l) (≤ 0.005 mg/l preferred)	(±20% required)	(100 ±20% required)
GC-5	3/10/2013	3/10/2013	3/31/2013	JH	0.117	3010R02	4/1/2013	TS	0.005	0.001	-0.5	99.5

Verification of Quality Control:

 4/1/13  
 Tyler J. Smith Signature Date

Final check and approved for release by:

 4-1-13  
 Dr. Robert T. Pavlowsky Signature Date

2

## APPENDIX B: Greene County Zoning Regulations

- Article IV, Section 25: Storm Water Runoff
- Article IV, Section 27: Sediment and Erosion Control Regulations
- Article IV, Section 28: Sinkhole Use Standards
- Article IV, Section 33: The Urban Services Area  
[http://www.greenecountymo.org/file/resource\\_management/regs/artiv.pdf](http://www.greenecountymo.org/file/resource_management/regs/artiv.pdf)
- Article VI: A-R Agricultural-Residential District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artvi.pdf](http://www.greenecountymo.org/file/resource_management/regs/artvi.pdf)
- Article VII: RR-1 Rural Residence District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artvii.pdf](http://www.greenecountymo.org/file/resource_management/regs/artvii.pdf)
- Article VIII: MH-1 Manufactured Home (Mobile Home) Park or Subdivision District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artviii.pdf](http://www.greenecountymo.org/file/resource_management/regs/artviii.pdf)
- Article IX: UR-1 Urban Residence District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artix.pdf](http://www.greenecountymo.org/file/resource_management/regs/artix.pdf)
- Article X: R-1 Suburban Residence District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artx.pdf](http://www.greenecountymo.org/file/resource_management/regs/artx.pdf)
- Article XI: R-2 One and Two Family Residence District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artxi.pdf](http://www.greenecountymo.org/file/resource_management/regs/artxi.pdf)
- Article XII: R-3 Multi-Family Residence District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artxii.pdf](http://www.greenecountymo.org/file/resource_management/regs/artxii.pdf)
- Article XIII: R-4 Multi-Family Residence District  
[http://www.greenecountymo.org/file/resource\\_management/regs/artxiii.pdf](http://www.greenecountymo.org/file/resource_management/regs/artxiii.pdf)
- Article XXI: Floodplain Management Ordinance  
[http://www.greenecountymo.org/file/resource\\_management/regs/artxxi.pdf](http://www.greenecountymo.org/file/resource_management/regs/artxxi.pdf)
- Article XXIV: Common Open Space and Common Improvement Regulations  
[http://www.greenecountymo.org/file/resource\\_management/regs/artxxiv.pdf](http://www.greenecountymo.org/file/resource_management/regs/artxxiv.pdf)

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## **APPENDIX C: Greene County Missouri Subdivision Regulations**

- Article IV, Section 10: Final Plat Approval  
[http://www.greenecountymo.org/file/resource\\_management/sub\\_regs/subart4.pdf](http://www.greenecountymo.org/file/resource_management/sub_regs/subart4.pdf)
- Article V, Section 6: Storm Drainage  
[http://www.greenecountymo.org/file/resource\\_management/sub\\_regs/subart5.pdf](http://www.greenecountymo.org/file/resource_management/sub_regs/subart5.pdf)

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## APPENDIX D: Greene County Stormwater Design Standards

- Section 103: Drawings and Calculations  
[http://www.greenecountymo.org/file/resource\\_management/sw\\_regs/sw-103.pdf](http://www.greenecountymo.org/file/resource_management/sw_regs/sw-103.pdf)
- Section 107: Sinkholes and Karst Features  
[http://www.greenecountymo.org/file/resource\\_management/sw\\_regs/sw-107.pdf](http://www.greenecountymo.org/file/resource_management/sw_regs/sw-107.pdf)
- Section 112: Detention Facilities for Flood Control  
[http://www.greenecountymo.org/file/resource\\_management/sw\\_regs/sw-112.pdf](http://www.greenecountymo.org/file/resource_management/sw_regs/sw-112.pdf)
- Section 114: Erosion and Sediment Control  
[http://www.greenecountymo.org/file/resource\\_management/sw\\_regs/sw-114.pdf](http://www.greenecountymo.org/file/resource_management/sw_regs/sw-114.pdf)
- Section 115: Water Quality Protection  
[http://www.greenecountymo.org/file/resource\\_management/sw\\_regs/sw-115.pdf](http://www.greenecountymo.org/file/resource_management/sw_regs/sw-115.pdf)

5



County of **GREENE** State of Missouri

GREENE COUNTY COMMISSION  
RESOURCE MANAGEMENT DEPARTMENT  
ENVIRONMENTAL SECTION

JIM VIEBROCK  
Presiding Commissioner

HAROLD BENGSCHE  
Commissioner 1st District

ROSEANN BENTLEY  
Commissioner 2nd District

940 Boonville Avenue  
SPRINGFIELD MO, 65802  
(417) 868-4147  
Fax (417) 868-4163

KEVIN R. BARNES, PE  
Stormwater Engineer

November, 2011

Dear Resident:

We would like to remind you of two very important systems that provide you with drinking water and wastewater treatment: your well and on-site wastewater system. These systems require proper protection and maintenance to ensure that your family has safe drinking water and that wastewater generated by your home is treated and disposed of in a manner which is not detrimental to your family or the environment.

We have enclosed educational brochures with information pertaining to your well and on-site wastewater system. Please take a moment to familiarize yourself with these systems and their proper maintenance to ensure that they are managed to provide years of service to you and your family. If you have additional questions or need further information, please contact one of our Water Quality Specialists at 868-4147.

Sincerely,

Kevin R. Barnes, P.E.  
Greene County Stormwater Engineer

## APPENDIX E: Public Education & Outreach Materials

### *Non Profit Partnership Organizations*

- <http://www.watershedcommittee.org/>
- <http://www.jamesriverbasin.com/>
- <http://projectwet.missouristate.edu/>

### *Handouts and Brochures*

- Save Our Ozarks Water Quality
- How to Make a Rain Barrel
- Be Part of the Solution! Help keep our Ozarks waterways clean for future generations
- Legacy Trails Low Impact Development
- Sinkholes
- Quality Development and Stormwater Runoff
- Springs: Early Warning Systems for our Groundwater
- How to Protect Your Well
- Sinkholes, Inlets for the Underground Water System
- Water Protection at Home
- Designing a Rain Garden
- Example letter for on-site wastewater treatment system owner
- Maintaining Your On-Site Wastewater Treatment System
- Maintaining Your Pump to Gravity System
- Maintaining Your Wastewater Lagoon System
- Maintaining Your Onsite Wastewater Drip System
- Maintaining Your Low Pressure Pipe System

### *Informational Signage*

- The Watershed Connection
- Lakeside Learning Station
- Gabion Basket Walls
- Healthy Water: Healthy People
- Level Spreader Trenches
- Native Vegetation
- Outlet Protection
- Pervious Pavement
- Springside Learning Station
- Stormwater 101
- Stream Health and Monitoring
- Beyond the Basin
- Bio-swale
- Detention Basin

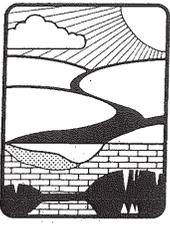
- Forests and Watersheds
- Rain Garden

*Watershed Committee of the Ozarks Annual Reports*

- 2008
- 2009
- 2010
- 2011
- 2012

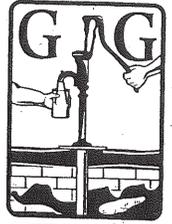
*Greene County MS4 Budget Information*

- 2008
- 2009
- 2010
- 2011
- 2012



Watershed  
Committee  
of the Ozarks

# HOW TO PROTECT YOUR WELL



GREENE COUNTY  
GROUNDWATER  
GUARDIAN

**Y**our family's health depends on a safe, reliable source of water for drinking, bathing and other needs. Your well is also valuable because it represents a large financial investment. These are two very good reasons for protecting your well.

*How can you protect both your well's water quality and your investment? Here are some common-sense, effective things you can do:*

Find out what kind of well installation you have (see box). Below-ground (pit) installations are more easily contaminated. Having a well casing that sticks up above ground level will help prevent surface water pollution. If your well is in a pit or otherwise below ground, it is important to prevent water from standing over the seal at the top of the well.

Find out how old your well is. Older wells are more subject to problems, especially because they may only be cased to a shallow depth. More rigid well construction standards have been in effect since 1987.

Check your well casing and seal to be sure there are no cracks or holes in the casing and no open holes in the seal. A screened vent pipe should extend up out of a sanitary seal installation (see box) to prevent a vacuum from forming inside the well when the pump kicks on. A vacuum can suck contamination into the well.

If you must create a possible pollution source on your property, be sure to place it as far as possible from the well. Minimum separation distances are: septic tank - 50 feet; septic drain (absorption) fields, manure

pits, livestock/poultry yards, cesspools, unplugged abandoned wells - 100 feet; bulk fuel storage, chemical storage, lagoons - 300 feet.

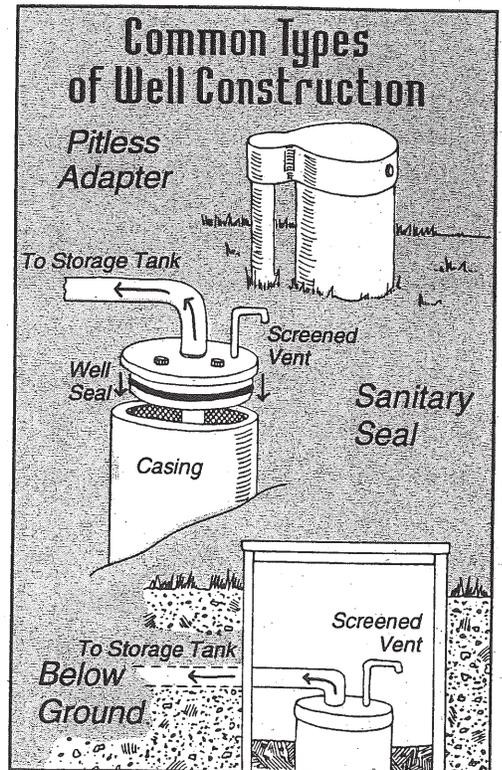
Never store materials like pesticides, gasoline, or pool chemicals in your well house or near a well. Many wells have been contaminated by spills or leaks of such materials.

Be careful to prevent back-siphonage (see circle on back). Never leave hoses submerged in wash basins, stock tanks, or swimming pools.



Have your well tested for coliform bacteria and nitrates at least yearly. Keep a record of these tests which screen for possible pollution.

If your well gets cloudy or tastes different after a rain, or if the (over)



quality changes suddenly anytime, it could be a sign of pollution. Get your well tested as soon as possible.

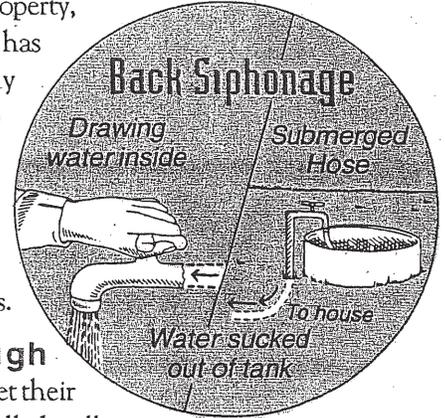
**Before hiring** someone to drill a new well, ask friends and neighbors to recommend a driller. Only hire a driller who is state-permitted and make sure your well receives a state

**COLIFORM bacteria** are commonly found in warm-blooded animals, in soil and on vegetation. Their presence in a well may indicate that contaminated water has seeped into the well.

**NITRATES** are chemicals found in fertilizers, sewage and animal waste. Nitrates are especially hazardous to infants. The Public Health Service recommends that drinking water contain no coliform bacteria and 10 parts per million or less of nitrates.

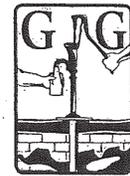
certification number. Attach the certification tag securely to the well.

**If you have** an abandoned well on your property, make sure it has been properly sealed to keep it from polluting your current well, or those of your neighbors.



**Although** most people get their water from drilled wells, some homes use hand-dug wells, cisterns, or springs.

These water sources are easily contaminated and require special protection measures. Call your local health department for more information.

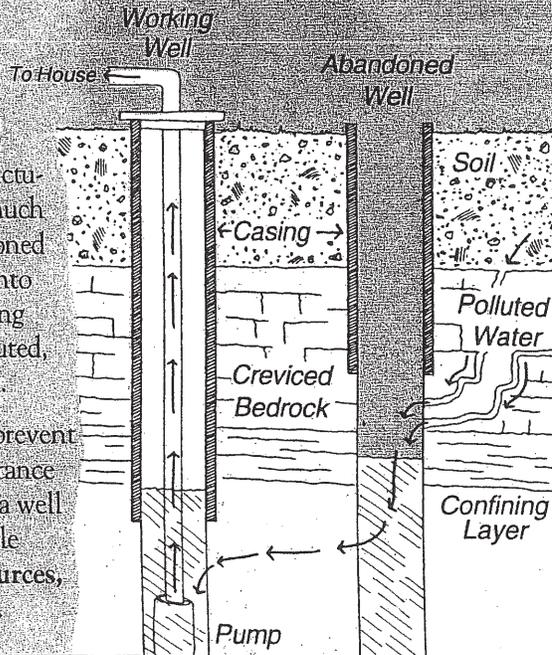


Groundwater Guardian is a program created by the National Groundwater Foundation to recognize and assist communities which are actively protecting groundwater resources.

## Abandoned Wells (The Hidden Danger)

**Abandoned wells** received attention and notoriety a few years ago when little Jessica McClure got stuck in a well shaft in Texas. Actually, the most common well safety hazard is much less obvious. The open borehole of an abandoned well can easily allow contamination to flow into groundwater aquifers. These deep water-bearing layers of rock are our water supply. Once polluted, they are difficult, or even impossible, to clean.

Abandoned wells must be properly sealed to prevent such pollution. In some cases, cost-share assistance is available to homeowners who want to seal a well on their property. Technical advice is available from Missouri Department of Natural Resources, Southwest Regional Office, 417-891-4300.



The Watershed Committee of the Ozarks is a not-for-profit citizen advisory group dedicated to the protection of drinking water sources in the Springfield area.



Watershed  
Committee  
of the Ozarks

320 N. Main  
Springfield, MO  
65806-1018

417-866-1127

Other publications available from the Watershed Committee

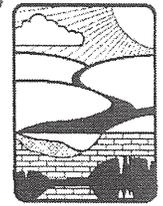
Watershed News-Quarterly newsletter (free)

Ozark Water Cycle-A brochure discussing the proper design, installation and maintenance of septic tank systems (free)

Sinkholes-Inlets to the Groundwater System-How to recognize sinkholes, how they function, and how they affect groundwater (free)

Water Protection at Home-What you can do to prevent water pollution at home and in your community (free)

# SINKHOLES, INLETS FOR THE UNDERGROUND WATER SYSTEM



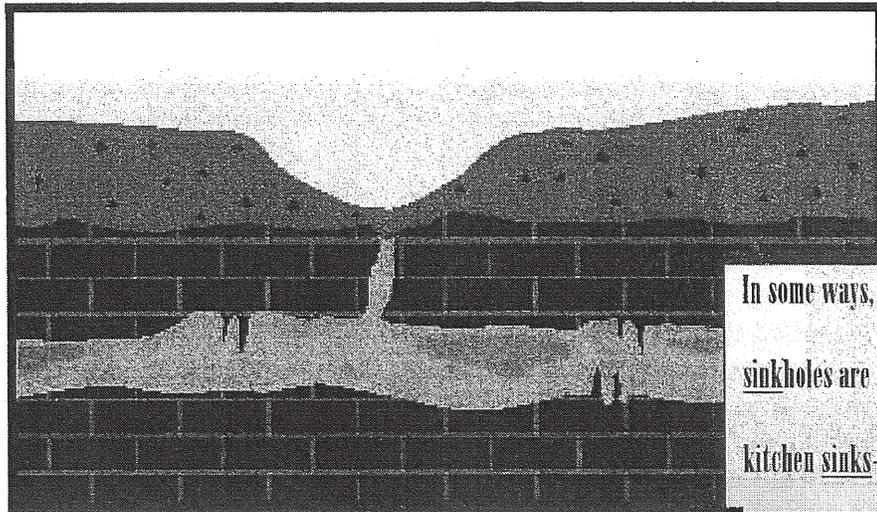
Watershed  
Committee  
of the Ozarks

**S**inkholes are prominent features of karst terrain. Karst landscapes form where the bedrock is mostly limestone or dolomite, as it is in much of the Ozarks. These rocks will dissolve in downward percolating rainwater that has become slightly acidic

from contact with carbon dioxide in the soil. (The carbon dioxide comes from soil organisms breathing, just like we do.) Over thousands of years, rainwater flowing through cracks and crevices in the bedrock enlarges

then to form an underground network of pipes called conduits. Soil sinks into the flared ends of these conduits near the ground surface, forming sinkholes. Sinkholes can also form suddenly when a portion of a cave roof collapses. Sinkholes come in various shapes and sizes, but they share this common feature—they serve as inlets for the underground drainage system. This drainage system produces other familiar features of karst—springs, caves and “losing streams”—streams that lose some or all of their flow directly into the groundwater system.

There are thousands of sinkholes in the Ozarks. Over 2,500 sinkholes have been identified in Greene county alone. In the eastern Ozarks, large sinkholes have wetlands developed on their floors, with distinct and unique species of plants. In southwest Missouri, there are some very



In some ways,

sinkholes are like

kitchen sinks.

sinkholes are basins

that will hold water,

but only for a short

time.

large, deep sinkholes, such as Devil's Den in Webster county and the Avin sink near Nixa.

In some ways, sinkholes are like kitchen sinks—they are basins that will hold water, but usually for only a short time. The water finds its way to the drain (conduit), then flows through the underground drainage system toward the outlet, often a spring. Some of this water may also seep down into the deeper groundwater. But unlike a kitchen sink, sinkholes continue to grow in size as they funnel more and more of the surface runoff into themselves, dissolving more of the underlying bedrock.

**Do you have a sinkhole on your property?** Sinkholes vary so greatly in size and shape, it is sometimes hard to recognize them. Some sinkholes are acres in size; others are as small as a few feet across. Some are shallow, saucer-shaped depressions; others are funnel-shaped, with very steep sides. There may or may not be a well developed swallow-hole, or eye, in the bottom of a sinkhole, indicating the actual opening into the conduit system. Often sinkholes in our area can be spotted by the presence of a circular grove of trees growing in the middle of a pasture. *Any depression* in the ground, in the Ozarks, should be treated as if it were a sinkhole.

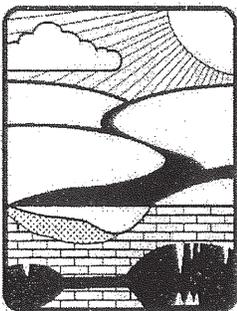
**Because sinkholes drain rapidly, and because they have a direct connection with our groundwater (and often our drinking water), we need to be careful what goes into them.** Sinkholes are terrible places to dump trash, for instance. Waste oil or other chemicals could be flushed directly into the groundwater, where they could easily pollute a spring or someone's drinking water well. Sinkholes are bad places to build sewage lagoons or to install septic tanks. In fact, the best thing to do with sinkholes is to leave them alone.

If you must build a home or other building in an area that drains to a sinkhole, leave a vegetated buffer area around the sinkhole to filter out sediment and pollutants that might wash off of lawns, driveways, or parking lots. Be very careful about applying fertilizers or pesticides in yards that might be flushed into a sinkhole with the next rain.

**Sinkholes are natural drainage points for our groundwater system, so should not be filled.** If a sinkhole is plugged, water will not drain properly and will run off onto adjacent property, possibly causing flooding. Water that has been replenishing our groundwater supplies will now be diverted away as surface runoff. There are appropriate ways that collapsed sinkholes, if they present hazardous conditions, can be filled so that the natural drainage abilities are maintained. For information on how to properly fill sinkholes, contact the Watershed Committee office.

**Sinkholes are natural and interesting features of our karst landscape.** They are also an essential part of our groundwater system. To keep Ozark springs and groundwater clean, we must protect sinkholes from pollution. Springs sustain the flow of Ozarks rivers, especially in dry times, so polluted spring water could affect fishing and swimming in our streams and lakes. Pollution in sinkholes can even threaten our health by showing up in our drinking water. For all of these reasons, we need to keep a watchful eye on our local sinkholes and make sure that the runoff flowing into them is as clean as possible.

**What goes into a sinkhole, may come out in our taps.** By recognizing sinkholes for what they are, and respecting them for what they do, we have an opportunity to see that our groundwater, streams, springs, and lakes will be clean enough for future generations to use and enjoy.



Watershed  
Committee  
of the Ozarks

320 N. Main  
Springfield,  
Missouri 65802  
417-866-1127

Website—[www.watershedcommittee.org](http://www.watershedcommittee.org)

*The Watershed Committee of the Ozarks is a not-for-profit citizens advisory group dedicated to the protection of drinking water sources in the Springfield area.*

*Other publications available from the Watershed Committee:*

**Watershed News**—Quarterly newsletter (free)

**Maintaining Your Septic System**—A brochure discussing the proper design, installation and maintenance of septic tank systems (free)

**Springs**—Early warning systems for our groundwater (free)

**Water Protection At Home**—What you can do to prevent water pollution in your community (free)

# Designing a Rain Garden

at least 10 feet from the foundation

gentle slope

Depression 6-12 inches deep

6 inch from



- Determine the size of your rain garden** by estimating your roof area or driveway square footage. The garden should be about one-third the size of the area providing runoff.
- Choose a spot** at least 10 feet away from your foundation, and down slope from your downspout, stump pump outlets, or other runoff source.
- Dig a shallow, flat-bottomed hole** with gradually sloping sides. The average depth of a rain garden is 6-12". Have a spot located in your landscape for excavated materials or build a bench on the downside of your rain garden. You may want to test your soil's pH, as wildflowers grow best in soil with a pH level between 5.5-7.5. Call 1-800-DIG-RITE before you dig.
- Test the overflow pattern.** Fill the excavated area with water and observe the overflow to ensure it flows away from buildings.
- Direct your runoff** into your rain garden if necessary by digging a shallow channel or using drainage.
- Plant!** Mix your amendments in the bottom of the garden (if you are using them). Place the plants at the appropriate spacing, then check your arrangement before digging holes and planting. Enhance the texture and color of adjacent plants and make any design adjustments. **MULCH! add a 3-inch layer of mulch.** If you add mulch before planting, simply move it aside when edging holes, or after planting, place mulch loosely around plants. Unretarded shredded hardwood is best as it won't float out of your garden, but any mulch is acceptable.

- **Percolation Test**  
Test your soil to calculate how much water will infiltrate in 24 hours.
  1. Dig a 12" deep hole.
  2. Fill with water. Let saturate for an hour.
  3. Refill hole. Mark water level.
  4. Measure water level after 1, 2, & 4 hours.
  5. Calculate how much will infiltrate in 24 hours.
- **Fix Your Soil**  
If the composition of the soil does not allow for proper drainage (see Percolation test) you may need to fix it. Excavate to raise the desired depth. Then fill the bottom half with the amendment material. You can mix material right in your garden.
  - 50% sand
  - 25% topsoil
  - 25% organic matter.
- **Maintain your rain garden:**
  - Water your newly-planted rain garden during its first growing season.
  - Weed regularly for the first year.
  - Remove any dead stems or seed heads that do not appeal to you.
  - Evaluate your rain garden each year. Fill any holes with the addition of other appropriate native plant species.
  - To keep your garden looking neat, maintain its boundary by edging and mowing. Consider edging the rain garden with natural stone on the downhill side. Avoid using a raised edge treatment where water flows into the rain garden.
  - In early spring, cut back the dormant vegetation to stimulate new growth. Leave the plants standing throughout the winter for visual interest. Many of the native grasses look especially attractive during this time of year.
  - Do not spread or spray down fertilizers too close to your rain garden. When native plants are fertilized, especially with nitrogen, they tend to grow too tall to hold themselves upright. Fertilizing can stimulate weed growth and create competition for the native plants.

**What size garden?** Divide the runoff area by 3 to obtain the rain garden size (200-316.6 or 67 sq. ft) or fit the garden to your space.

**How many plants?** Your garden size, divided by 2.25 for plants spaced 18" apart, (67 divided by 2.25 = 29.7). Round to 30. So 30 plants are needed for the 67 sq. ft garden in our example.

**Use same calculation to add a rain garden to any drainage area!**

**How to figure the amount of space and number of plants you'll need how much water?** Define your runoff area (e.g. 200 sq. ft. of roof or driveway).

**What size garden?** Divide the runoff area by 3 to obtain the rain garden size (200-316.6 or 67 sq. ft) or fit the garden to your space.

**How many plants?** Your garden size, divided by 2.25 for plants spaced 18" apart, (67 divided by 2.25 = 29.7). Round to 30. So 30 plants are needed for the 67 sq. ft garden in our example.

**Use same calculation to add a rain garden to any drainage area!**

**What About Mosquitoes?** Stormwater runoff entering your rain garden should disappear within 24-48 hours of a rain event. Mosquitoes need at least a week of standing water to complete their life cycle. A poorly maintained bird bath or rain gutter is a more likely breeding ground. In time, your rain garden will become its own ecosystem, attracting hungry bats, dragonflies and other predators of the mosquito, thus naturally controlling them from your area.

For more information about rain gardens, rain barrels, and other ways you can help with local efforts to keep water clean, visit: [www.springfieldmo.gov/stormwater](http://www.springfieldmo.gov/stormwater) • [www.watershedcommittee.org](http://www.watershedcommittee.org)



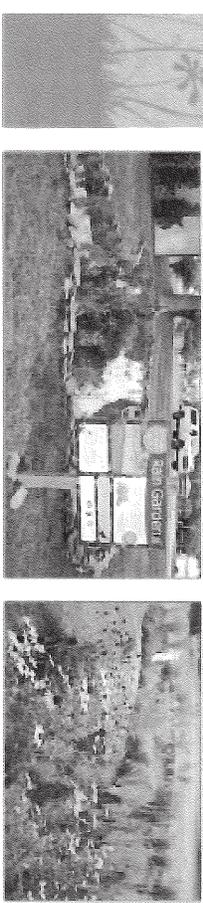
## Protect Your Watershed with a beautiful rain garden

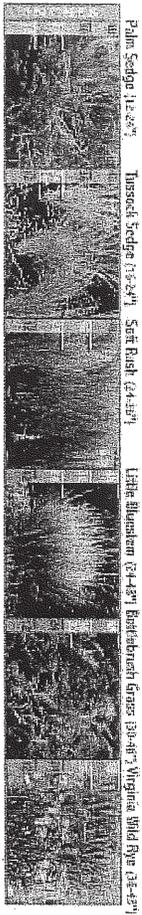
### What is a Rain Garden?

Rain gardens are shallow depressions filled with native plants designed to catch and absorb storm water runoff from roofs, streets, parking lots and other areas. Storm water runoff can negatively impact our watersheds by increasing erosion and contributing harmful pollutants picked up from yards, streets, and parking lots. Rain gardens help reduce these negative impacts and recharge the groundwater aquifer by utilizing storm water runoff as a resource rather than channeling it to storm drains which lead directly to area creeks, rivers and lakes. Water that is caught in a rain garden either infiltrates into the ground, is taken up by plant roots, or evaporates into the air. Native plants are a good choice for rain gardens because they are adapted to our local growing conditions. They have massive root systems that keep soil from eroding, help water soak into the ground, and keep the plants alive during droughts. Native plants are also a vital component in our local web of life as they provide food and shelter to insects including pollinators.

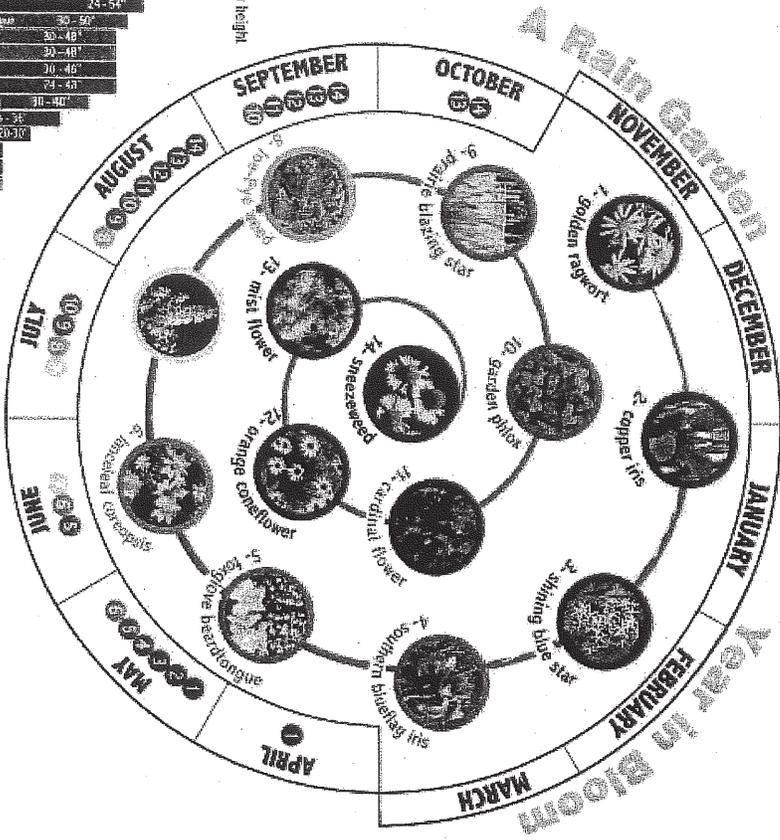
### Local Rain Garden Demonstration Projects:

- For more information and photos: [www.springfieldmo.gov/stormwater](http://www.springfieldmo.gov/stormwater)
1. Springfield-CGreene County Library Center, 4653 S. Campbell Ave.
  2. Roseacre Neighborhood, 1100 Black S. Weller Ave.
  3. First Lutheran University Church, 2334 E. Bartfield Rd.
  4. Watershed Center 2490 E Valley Water Mill Rd
  5. Community Foundation of the Ozarks, 425 E. Trailways S.
  6. Huracé Mann Elementary, 3743 S. Broadway Ave.
  7. Rutledge Wilson Community Farm Park, 3825 W. Farm Rd. 146
  8. Cruse Dong Park, Grand and Kansas Express.
  9. Ozark 4-H Building, Finley River Park
  10. Park Hill Subdivision, Missa
  11. Bartfield City Hall, 534 S. Tower Drive

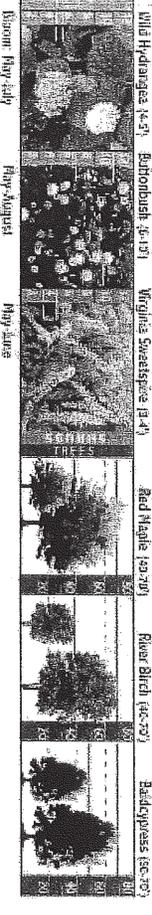




Palm Sedge (11-24") Tussock Sedge (11-24") Soft Rush (21-31") Little Bluestem (24-42") Burchbush Grass (30-48") Virginia Wild Rye (21-42")



Color bars correspond to calendar colors.

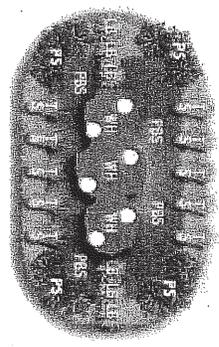


Wild Hydrangea (4-5") Burchbush (6-11") Virginia Sweetspire (1-4") Red Maple (10-20") River Birch (6-20") Blackgum (10-20")

**Rain Garden Ideas**

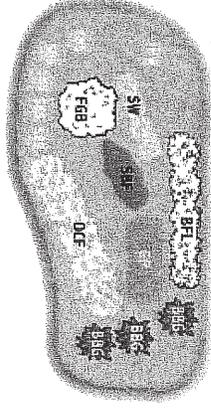
This design features mainly grasses mixed with flowering plants in white and purple. Grasses work well to show the flow of water where it enters the garden. Colors correspond to bloom.

- P5 = Palm Sedge
- P85 = Prairie Blazing Star
- L85 = Little Bluestem
- NH = Wild Hydrangea
- T5 = Tussock Sedge



This design features a colorful mix of plants that bloom from May through October. Colors correspond to bloom.

- GP = Garden Phlox
- OCF = Orange Coneflower
- SGB = Southern Blue Flag
- SBS = Shining Blue Star
- SW = Sneezeweed
- BFL = Burchbush Lily
- BBG = Burchbush Grass
- FBG = Foxglove
- BOA = Beardtongue
- JPW = Joe Pye Weed



**PLAN**

**Plant height & blooming.** Place taller plants in the middle for a rain garden that is viewed from all sides, or place in the back if your garden is along a fence. Think about when blooms appear. Consider a variety of plants that bloom throughout the growing season. Use the worksheet to sketch your ideas including the garden's size and shape, plant selection, placement and quantity, rock, or any other design features. Scale 1/2" = 1'

# The Watershed Connection



## What is a watershed?

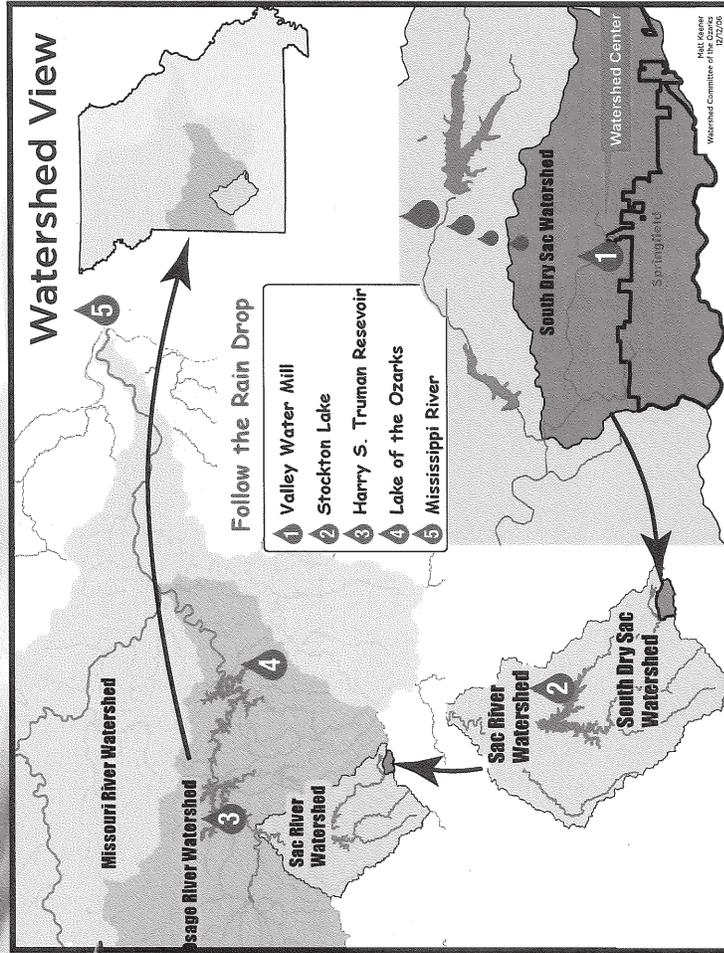
A watershed is an area of land that drains to a body of water. We all live in a watershed, and we rely on watersheds for our water supply.

## What is your watershed address?

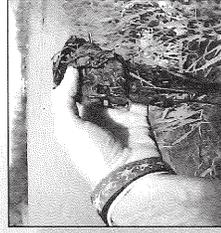
Watersheds can be described from very small to very large, like your address. For example, you live at a street number, in a zip code, in a state, in a country. The South Dry Sac watershed, inside the Osage River watershed, inside the Missouri River watershed, inside the Mississippi River watershed.

## You are connected to your watershed

We rely on our watershed(s) for recreation like boating and fishing, agriculture, wildlife habitat, and even our drinking water supply! What people do in the watershed directly affects the health of the streams and lakes the watershed flows into.

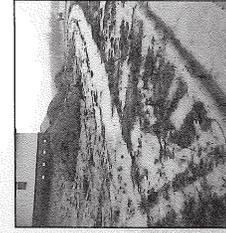


**In what ways do humans impact watersheds, lakes and streams? Here are the big three human impacts in the watershed and their effect on waterways:**



**Nutrients** come from animal waste, human sewage, and fertilizer runoff. A direct effect of nutrients is increased algae growth, which can lead to fish kills and taste and odor problems in drinking water.

**Bacteria** often come from animal waste and human sewage. Bacteria must be removed from drinking water by disinfection, and pose risks to recreational users of streams and lakes. Sewage treatment plants, septic tanks, livestock, and pet waste are common sources of bacteria such as *E. coli*, *Cryptosporidium* and *Giardia*.



**Sediment** in streams comes from erosion. Sediment clogs reservoirs, damages stream habitat, and is costly to remove from drinking water. Erosion accelerates when plants and trees are removed.

## Watershed view

On the map above find the rain drop labeled (1) and your location here in this watershed. The green area is the South Dry Sac watershed; all of the runoff in this area flows to the South Dry Sac, the stream in front of you. Follow clockwise to (2), and notice the South Dry Sac flows into the larger Sac River watershed. Stockton Lake is in the Sac River watershed. The Sac River watershed is

part of the larger Osage River watershed containing Truman Lake (3) and Lake of the Ozarks (4). The Osage River flows to the Missouri River and The Missouri River flows into the Mississippi River (5).



## Did You Know?

Did you know the water underneath us flows, too? However, it may flow very differently than the streams above.

# Lakeside Learning Station

## Water Treatment Process

### Source

Springfield relies on roughly 80% surface water resources (lakes and rivers), and 20% groundwater resources (wells and spring). Fellows Lake, McDaniel Lake, Stockton Lake, the James River and Fulbright Spring, provide water to City Utilities. Both Fellows and McDaniel Lakes can be supplemented with water from Stockton Lake. City Utilities works in conjunction with the Watershed Committee of the Ozarks to preserve and protect our watersheds. A watershed is the land that drains to a body of water—like our lakes and streams. Our lakes and streams are only as clean as their watersheds!

### Treatment

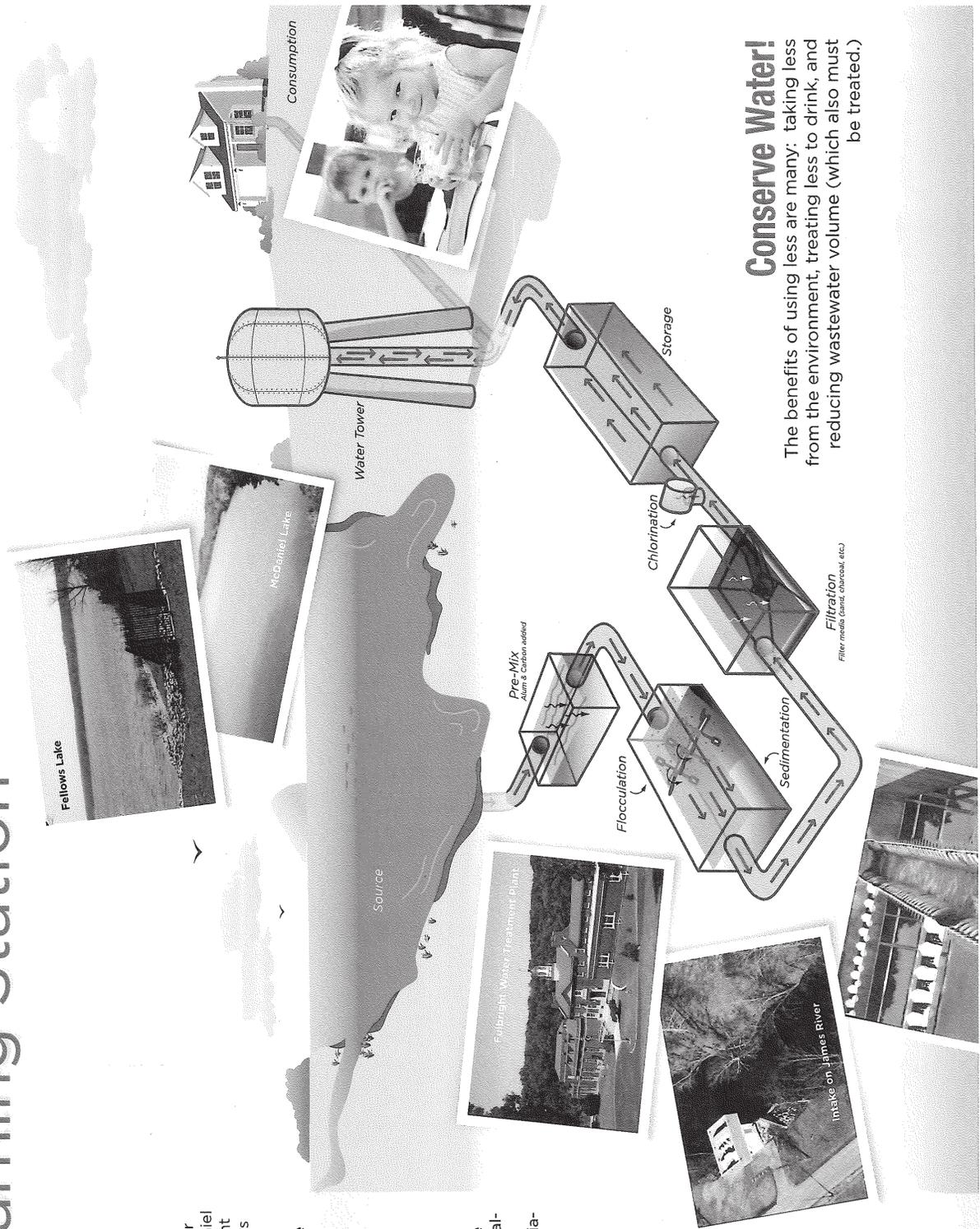
Water from the sources listed above must be treated to achieve high quality drinking water. The source water or "raw" water goes through a specialized process at either Fulbright (northwest) or Blackman Treatment plant (southeast). See the diagram to learn more...

### Distribution

Treated water is pumped into elevated tanks or "water towers," which provides pressure to the network of pipes leading to businesses and residence all over the city. There are more than 1,000 miles of pipe, and that delivers an average of 32 million gallons a water a day to CU customers.

### Tap

Have a glass of clean, safe drinking water! City Utilities' Blackman and Fulbright Water Treatment Plants provide a higher quality of water than what is required by federal regulations.

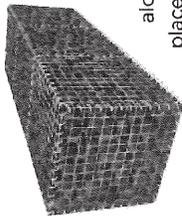


## Conserve Water!

The benefits of using less are many: taking less from the environment, treating less to drink, and reducing wastewater volume (which also must be treated.)

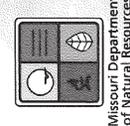
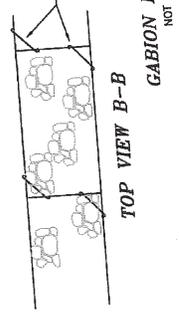
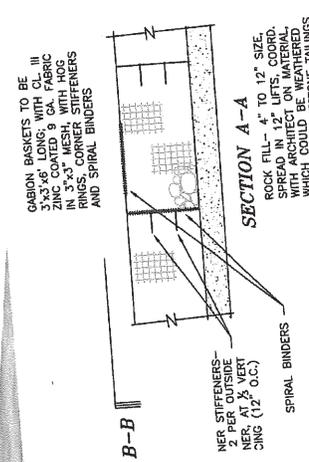
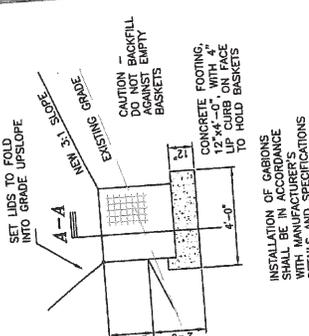
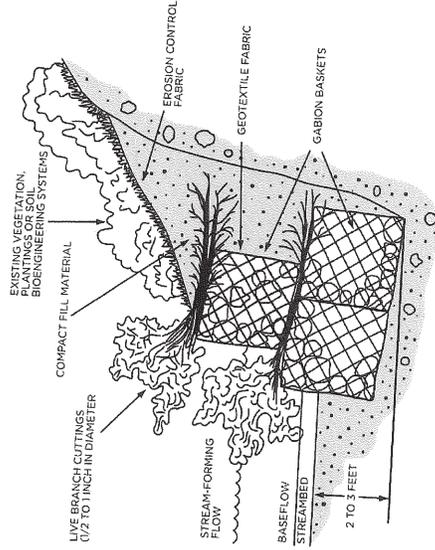
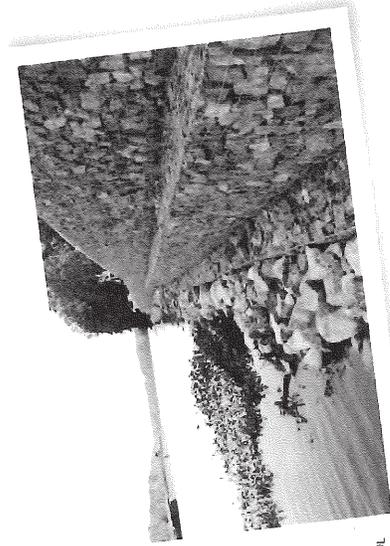
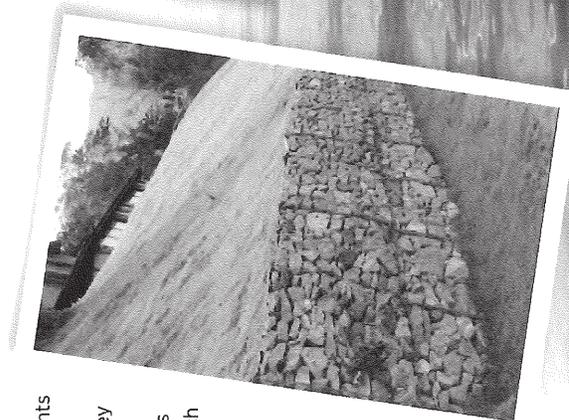
# Gabion Basket Walls

Gabion basket walls are an **alternative to concrete** or concrete block walls for creating a vertical drop in slope lines. They are simple wire cages, about the size of a rectangular hay bale. Once a base footing is built, the baskets are set along it and connected by wire clips. Rock fill is placed within each basket and the basket is sealed shut.



## Some Benefits

Gabion walls allow for rock fragments excavated from a project site to be used in an architectural manner. They also allow stormwater to percolate through the wall—water often pools or runs behind concrete walls, which can create problems. Gabion walls can even be vegetated by “live-staking” through the rock strata into the soil behind (see diagram).

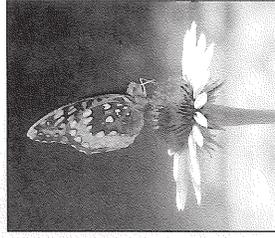


WATERSHED CENTER  
Missouri Department of Natural Resources

GABION BASKET WALL  
NOT TO SCALE

You Are Here

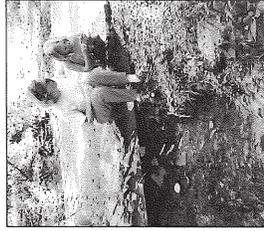
# Healthy Water: Healthy People



**Greenways** are linear parks that preserve undeveloped ribbons of natural habitat, usually through urban areas. Greenways typically follow stream corridors or abandoned railroad rights-of-way. Hard surfaced paths with minimal grades provides access for walkers, runners, bicyclists, in-line skaters, wheelchairs and baby strollers.

The **Ozark Greenways** linear parks have many benefits to our community. Greenways are good for the environment, good for the wildlife that depend on the streams, and good for people who drink water (that's all of us!).

Healthy **riparian zones**, natural vegetated areas along streams, reduce erosion by allowing flood waters to spread out and slow down. The vegetation acts as a buffer to trap sediment and filter runoff. Thus, water quality improves, and flood damage decreases. Greenway trails and natural streams are *designed* to flood.



## Healthy Water

### Greenways...

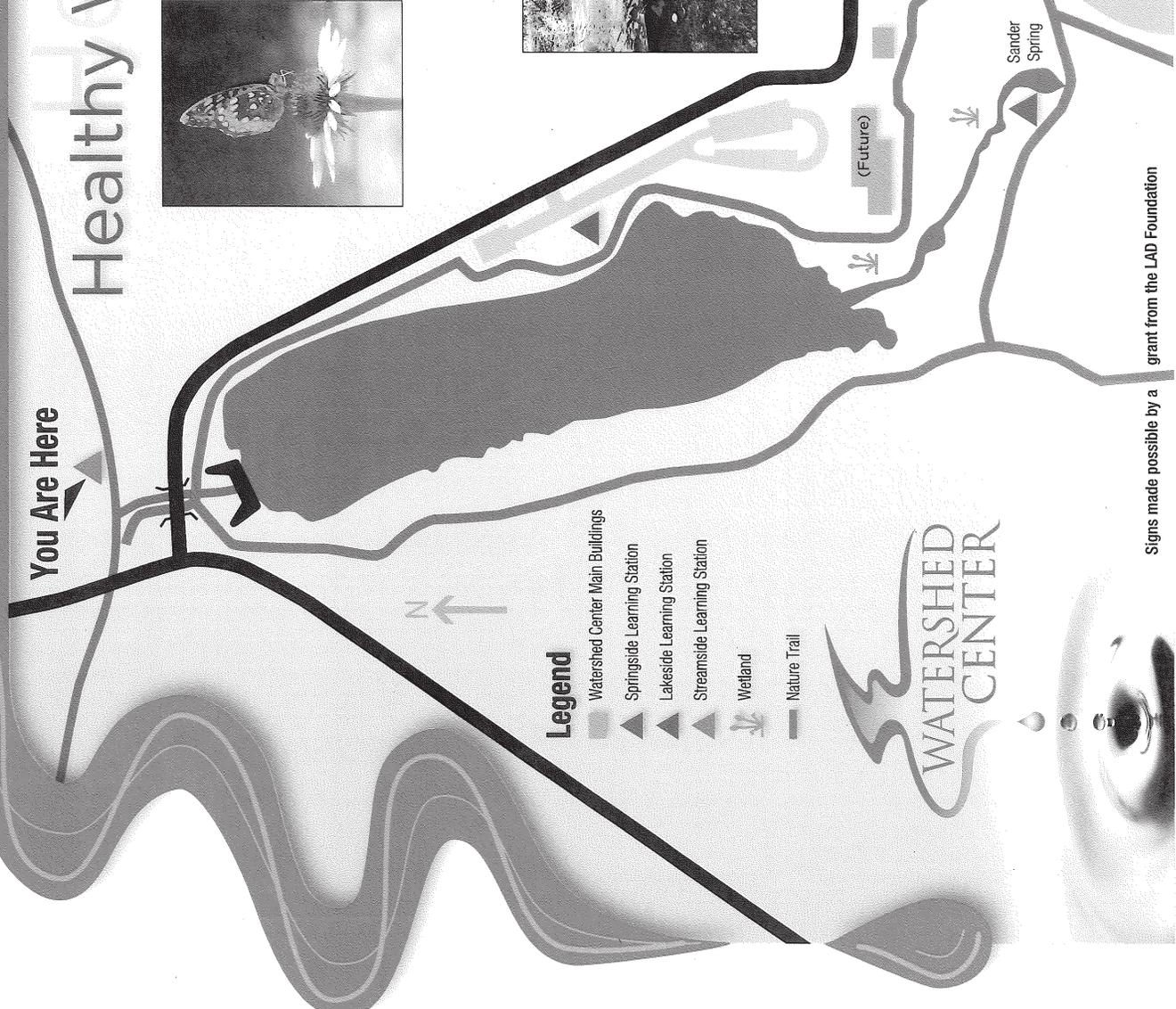
- Provide habitat for wildlife and serve as islands of nature in urban areas
- Reduce flood damage to the environment
- Improve water quality in our community and for downstream



## Healthy People

### Greenways...

- Promote family-oriented recreation, fitness and alternative transportation in a safe setting
- Encourage fitness and wellness through exercise
- Improve the water quality for our drinking water supply
- Provide access for wildlife viewing opportunities



## Legend

- Watershed Center Main Buildings
- ▲ Springside Learning Station
- ▲ Lakeside Learning Station
- ▲ Streamside Learning Station
- ⬇ Wetland
- Nature Trail



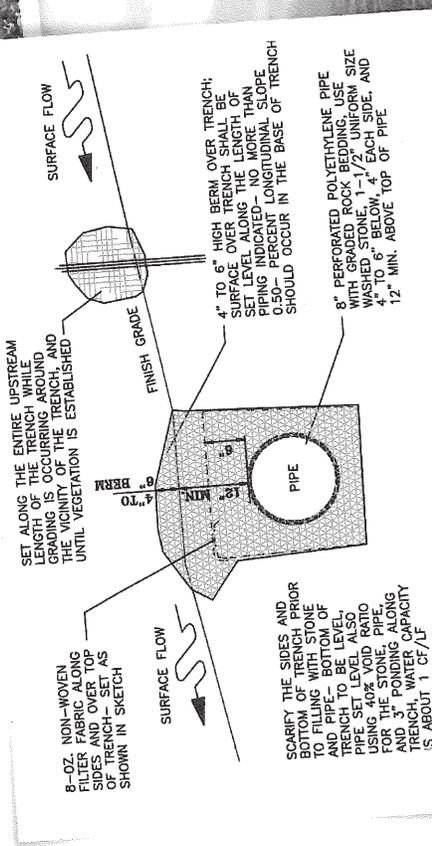
Signs made possible by a grant from the LAD Foundation

# Level Spreader Trenches

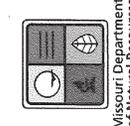
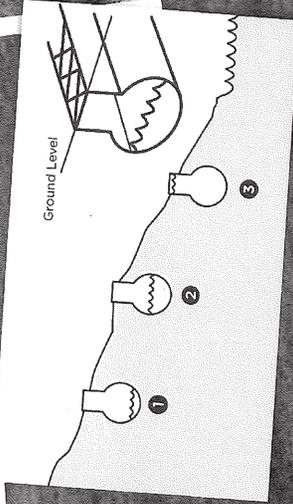
Level Spreader trenches, or infiltration trenches, are devices which intercept and disperse the "first flush" of stormwater runoff. They are typically constructed of like-graded rock, (rock of the same size), pipe, and synthetic fabric. The piping used in the trench provides more storage volume for the trench, and is not usually provided a "daylight" point of discharge. Trenches can promote filtration, then infiltration of runoff into the ground. The permeability of the existing soil around the trench determines how effective infiltration will be.

Level Spreaders are used adjacent to parking areas and streets, where runoff would otherwise be collected into a storm drain inlet and pipe system. The length of trench is based on the size of drainage area upstream, and volume of the first-flush from a rainfall event. This is known as the "water quality" volume.

While the filter rock is extended to the surface of the ground, over time the rock surface is covered by vegetation. As long as the surface is not filled with sediment, the porosity of the trench remains effective, even when covered in vegetation.



LEVEL SPREADER TRENCH



WATERSHED CENTER  
Missouri Department of Natural Resources

# Native Vegetation

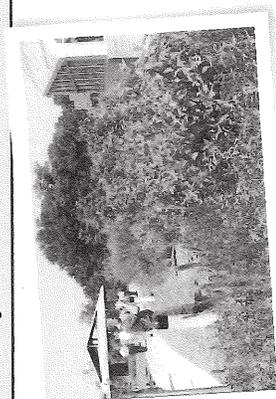
Imagine filling your garden with beautiful plants that *require little or no irrigation, fertilizer or tending*. It turns out that **native plants**, though overlooked by landscapers for decades, can provide an aesthetic garden with great **practical benefits and uses**:

## Benefits of Native Plants

- Adapted to natural, local, environmental conditions
- Require little or no irrigation once established
- Many are long lasting perennials
- Resistant to pests
- Deep roots aid water infiltration, and reduce runoff
- Provide habitat for wildlife; especially butterflies and hummingbirds
- Help stop erosion
- Absorb pollutants like sediment and excess nutrients (fertilizer)
- Winter hardy and drought tolerant
- Help create biodiversity!

## Ways to Use Native Plants

Massed together within defined garden borders
In traditional gardens with non-native plants
In foundation plantings
As a focal point in the landscape
In containers
In transition zones between lawn and areas farther from the house
To improve wildlife habitat
In shrub rows and for windbreaks
In wet areas such as water gardens, bogs and ponds
In areas prone to erosion
Anywhere you would consider using non-native plants!



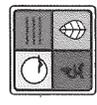
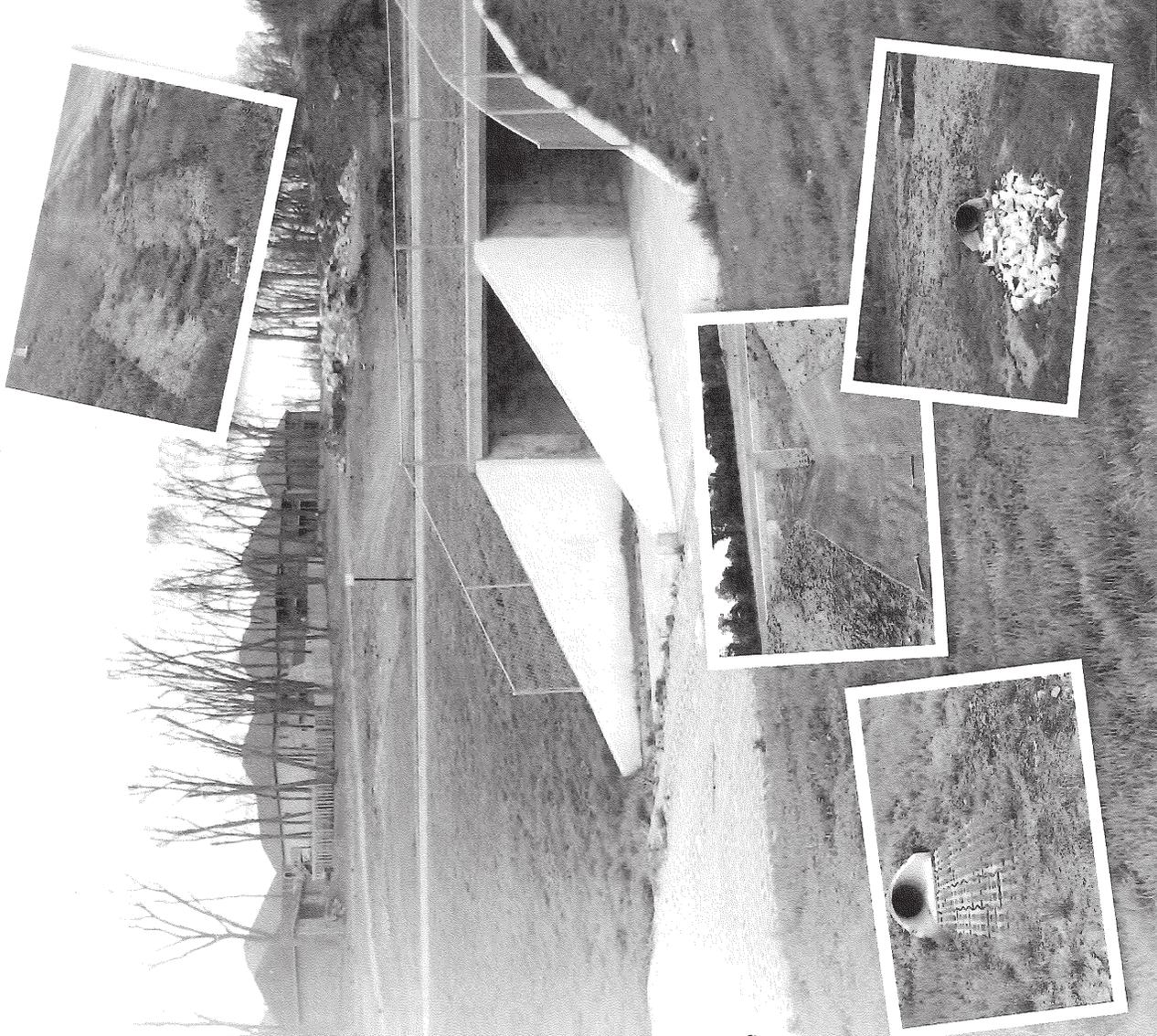
# Outlet Protection

Stormwater in drainage ways often has too much scouring power for vegetation to withstand. Outlet protection helps keep soil and vegetation in high flow areas from washing away.

## Let's get technical

Outlet Protection should be constructed at the daylight ends of stormwater drainage pipes. Discharge flows from collected runoff create higher velocities, which cause erosion of most species of grass. The width and length of protection provided is a function of discharge rate and velocity of flow from the pipe. Protection is also provided upstream of the pipe culvert, to reduce the tendency for "head-cutting" into the upper channel caused by the turbulence of water in a channel trying to enter the inlet end of the pipe.

Numerous products are available for use in outlet protection. Rock, turf-reinforcement mat, concrete, concrete block, even mat-reinforced sod can be used, depending on circumstances. Drop spillways and energy dissipation cells are sometimes used to break up the flow and reduce velocity so that grassed conveyances can be used downstream. Some block spillways contain cells which retain soil and can be vegetated with grass cover, nearly covering the block portion. Typical flow velocities from storm drainage pipes exceed 10-15 feet per second, where good grass can only withstand sustained velocities of 3-4 feet per second.



Missouri Department of Natural Resources



# Pervious Pavement

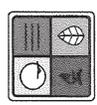
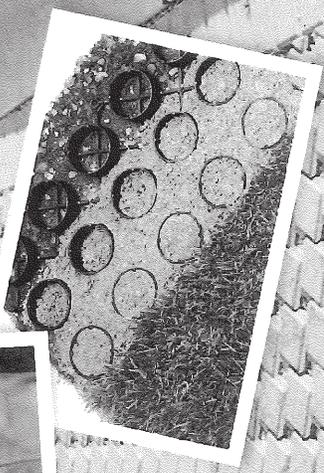
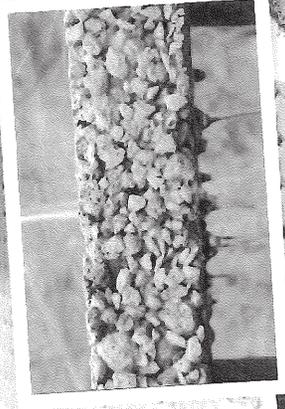
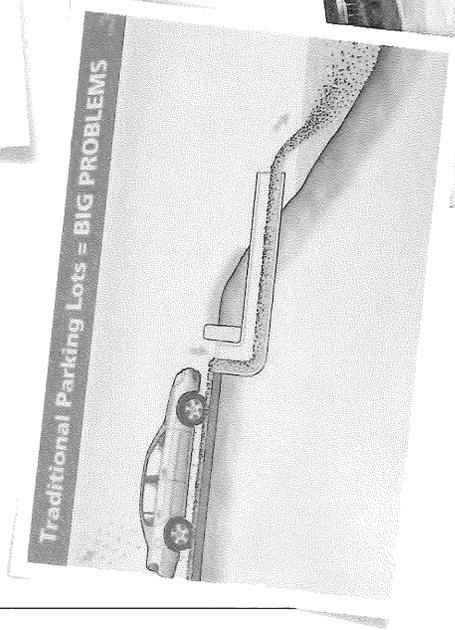
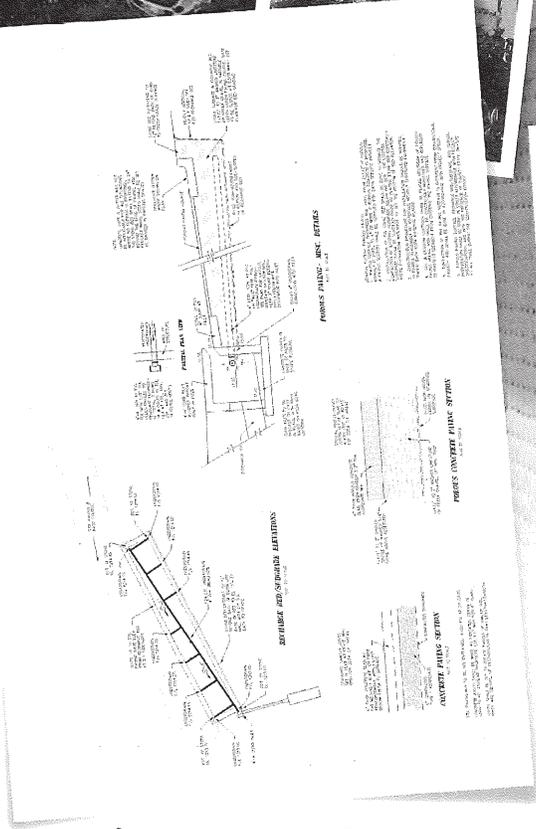
## Can water flow through pavement?

The answer is "yes" and "no". For the traditional pavement we use for roads, sidewalks, parking lots and driveways, the answer is "no." Water runs off these **impervious** surfaces. About **35%** of the land surface in Springfield is impervious! Water on pavement cannot soak in or disperse as it would in a field or forest, creating some disadvantages:

- Runoff from pavement creates the need for **costly infrastructure** like storm drains and storm sewers
- Water from pavement can be **HOT**, low in oxygen, and harmful to stream life
- Pavement **absorbs heat**, making cities hotter than surrounding areas
- Water from pavement can carry **contaminants** like litter, oil, salt, and chemicals to streams and lakes

## How it works

**Pervious pavement** transfers surface flow of stormwater into the pavement, then disperses the water **into** the ground. Pervious Pavement is beneficial to the environment, and a useful alternative to traditional pavement in some situations like **parking stalls, sidewalks, driveways, and walking trails**. Stormwater storage beds within the stone base below the paving can be utilized to **reduce or replace some surface detention basins**.

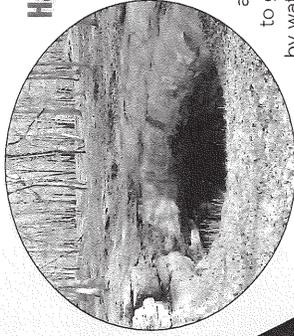


Missouri Department of Natural Resources



# Springside Learning Station

## Have you ever heard of a sinkhole?



If you are from the Ozarks, most likely you have. The term **Karst Topography** describes natural features like sinkholes, caves, springs and losing streams (lose flow to groundwater) that are shaped by water in the limestone bedrock.

## How it happens...

Rainwater soaking down through the soil becomes slightly acidic. Over time, this acidic water dissolves the limestone bedrock, making it porous, much like a sponge. Water entering the ground flows through these openings in the limestone many feet or miles before resurfacing. Sander Spring, at the base of the limestone bluff in front of you, is an example of a spring where groundwater resurfaces.

## Can human activities on the surface affect springs?

Absolutely. Using too much groundwater can cause springs to dry, and pollution from the surface can enter the groundwater and come out in springs. The ground doesn't necessarily "purify" water contaminants.



As you walk the trails you will see other karst features formed in the limestone bedrock.

## Legend

- Watershed Center Main Buildings
- Springside Learning Station
- Lakeside Learning Station
- Streamside Learning Station
- Wetland
- Nature Trail

## Test Your Knowledge



- A. Do you know how researchers trace the flow of groundwater?
- B. Can you guess how many gallons of water come out of this spring on an average day?
- C. What is the average temperature of water from a spring in Missouri?

Answers: A) They put dye in the water and see where it ends up.  
B) From 4 to 22 million gallons a day (depending on the season).  
C) 58 degrees Fahrenheit.

You Are Here

Sander Spring

(Future)



Signs made possible by a grant from the LAD Foundation

WATERSHED CENTER

# Stormwater 101

## What Is Stormwater?

It's the runoff from rainwater and snowmelt. Rooftops, parking lots, streets and other impervious surfaces prevent stormwater from soaking into the ground as it does in vegetated or wooded areas. In Springfield, 35% of the landscape is impervious. This means more runoff, moving very fast. As water flows over parking lots and streets, there is very little to slow it down. The increased speed of the water means that it can erode the streambank, and do more damage to our streams.

## Why is Stormwater Management Important?

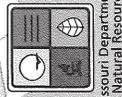
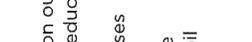
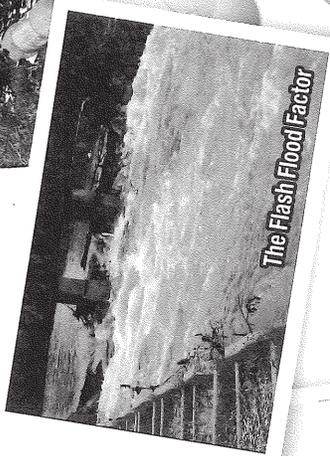
Good stormwater management is important to reduce flooding but also to protect our waterways from pollution. Stormwater carries all kinds of **pollution**, such as fertilizers and pesticides from yards, motor oil from leaking cars, bacteria from animal waste, and dirt from construction sites. Many people assume that stormwater goes to a water treatment plant. Not so! Stormwater drains directly to our rivers and lakes.

We often can see **litter** floating by in stormwater, but many other types of pollution we can't see. This nonpoint source pollution is a **bigger problem** than the factories and sewage treatment plants that we often think of as "polluters."

## What You Can Do...

**Anything we do on the landscape** (in our yards, at our businesses, on our streets), can impact our waterways. Try these simple steps to help reduce stormwater pollution:

- **Fertilize responsibly.** Get a soil test first. Over-fertilizing increases chemicals in our streams and lakes and wastes money.
- **Recycle used motor oil.** The oil from one oil change can pollute 1 million gallons of fresh water. Most local retailers will recycle oil free of charge. Also, regularly inspect your vehicle for leaks.
- **Recycle household chemicals.** Keep these items out of the environment by taking them to the City of Springfield's Household Chemical Collection Center.
- **Reduce water runoff from your home.** Connect your downspouts to a rain barrel and use it to water your plants. Construct a rain garden to catch runoff and enhance your lawn.
- **Report pollution.** Things to watch for include dumping motor oil, chemicals, trash, or yardwaste, and dirt from construction sites.
- **Pick up after your pets.** Pet waste can pollute area waterways with bacteria and nutrients. Pick up your pet's waste when walking, at the park, and in your yard.
- **Recycle yard waste.** Compost it or take it to your local yard waste recycling facility. It is illegal to dispose of yardwaste in streets or storm drains.
- **Wash responsibly.** If washing your vehicle at home, do so in a grassy area to prevent runoff of the wash water. Commercial washing activities must comply with City regulations.



# Stream Health and Monitoring

Ozark Streams are wonderfully diverse, with many unique life forms. A stream food web begins with plants that gather the energy from the sun. Millions of tiny plants called diatoms and algae live on the surface of the rocks, often causing a brownish, slippery surface.

The microscopic plants feed other animals such as algae-eating fish and **macroinvertebrates**, (meaning organisms without backbones that you can see), such as crayfish, clams, and aquatic insects.

Ozark streams provide habitats for over 40 species of fish, making our streams more diverse than most other freshwater ecosystems in the United States.

## Common Missouri Macroinvertebrates



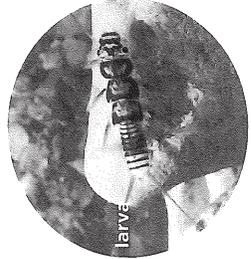
Caddisfly larva



Damselfly larva



Crayfish adult



Stonefly larva

Water Quality is very important to all life. There are different ways people can check the health and water quality of a stream, such as **chemical and biological monitoring**.



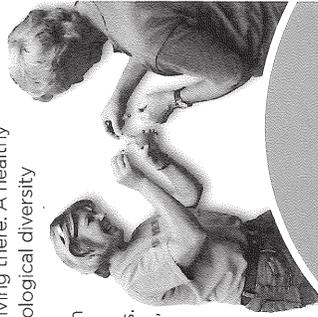
## Chemical Monitoring

Chemical monitoring helps us measure qualities of the water like temperature, pH, dissolved oxygen, and levels of nutrients like nitrogen and phosphorus. Bacteria levels can also be tested.



## Biological Monitoring

We can learn about the stream's health by studying the organisms living there. A healthy stream will have more biological diversity and pollution sensitive organisms than a stream suffering from pollution or other harmful impacts. Plant, macroinvertebrate, and fish communities can be used for biological monitoring to check the stream's health.



## How can you become involved?

Join active local volunteer groups such as Stream Team, Adopt-A-Stream, and Adopt-A-Spring. For more information, check the Watershed Committee of the Ozarks website at [www.watershedcommittee.org](http://www.watershedcommittee.org).

Help out for Clean Water

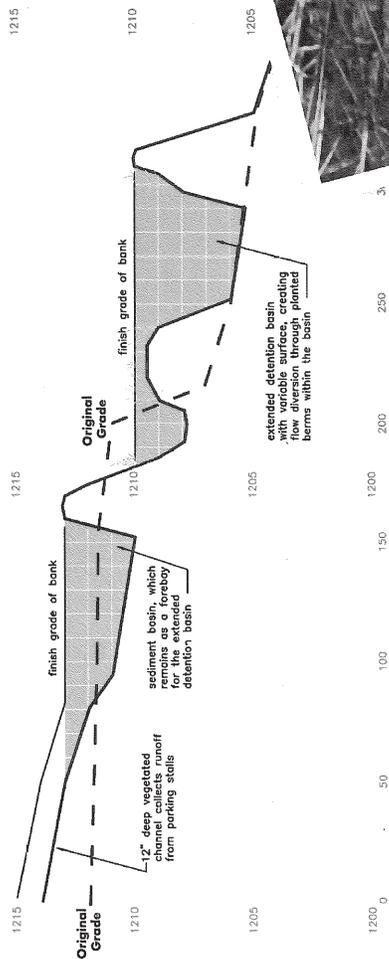
Get Involved!

Become Involved!

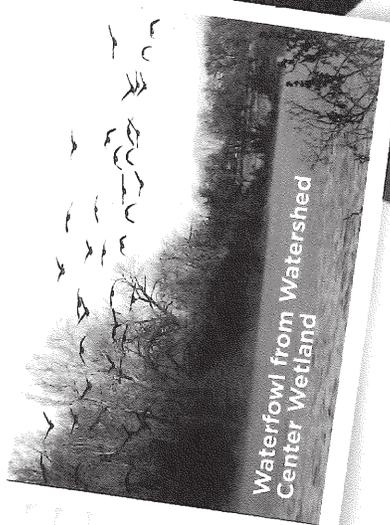
Photos courtesy of Missouri Stream Team

# Beyond the Basin...

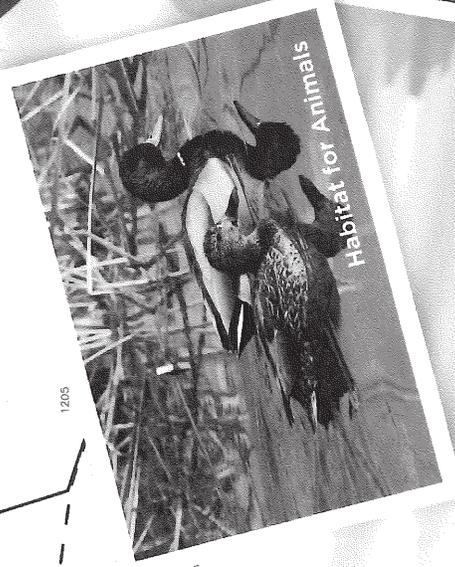
**Constructed Wetlands** can also be used to control stormwater discharge from a site. Careful construction of a basin with variable depths and contouring can promote the growth of wetland plants. These plants add a biologic filter for the stormwater, as well as a habitat for birds, insects and small aquatic life. These basins are not well suited for all locations, since there is need for enough contributing watershed area to provide a "water balance" over the dry summer periods.



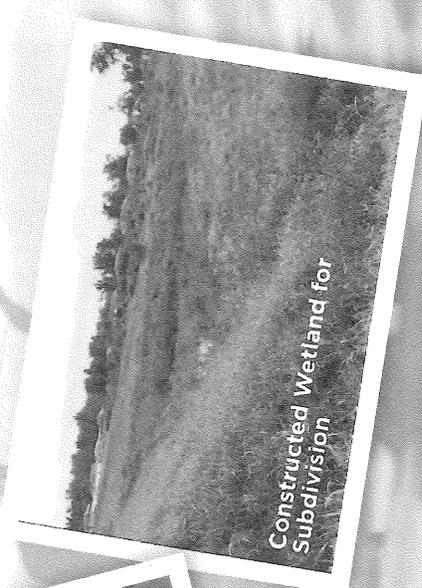
*Section Through Collection Channel and Basins*



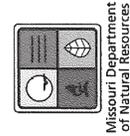
**Waterfowl from Watershed Center Wetland**



**Habitat for Animals**



**Constructed Wetland for Subdivision**



Missouri Department of Natural Resources



# Bio-swale

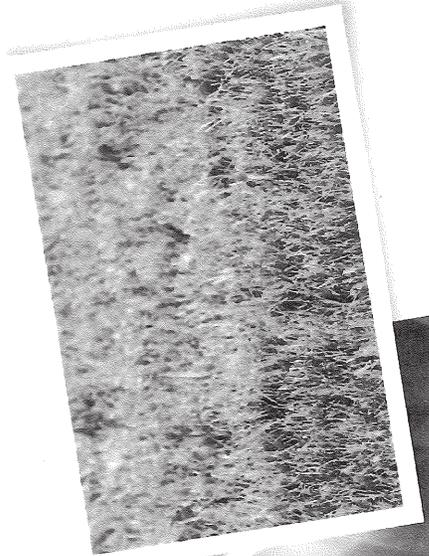
Bio-swales are vegetated channels or depressions. But, don't confuse a bio-swale with a grassy ditch! Bio-swales are best management practices (BMP's) that use native vegetation such as prairie grasses and shrubs to improve the quality of stormwater from paved areas.

## How they work

Bio-swales are, in effect, mini water quality basins. They collect and disperse stormwater. Native plants in the swale help filter sediment, remove chemicals (especially fertilizer), and help the soil absorb water. Under-drains may be installed as overflow devices, which inter-connect depressions set in series, as would be found within islands of parking areas.

## Mowed Grass Doesn't Cut it

Fescue grass is better than no grass for erosion. But native plants absorb more pollutants and have stronger and deeper roots than fescue does.



Missouri Department  
of Natural Resources

# Detention Basin

Do the pictures on this sign look familiar? You see **detention basins** all over town. The purpose of a detention basin is simple: to **reduce flooding** by storing and slowly releasing water. Some basins have added design features to improve water quality by **trapping sediment**.

## Why do we have Detention Basins?

Local regulations state that flow rate (measured in cubic-feet per second) for land development cannot exceed the calculated flow rate for the undeveloped site. It's a challenge—even a yard with grass and landscaping generates more stormwater than undeveloped "natural" sites. In addition, runoff, especially the "first flush," can carry a suite of pollutants from bacteria to toxins.

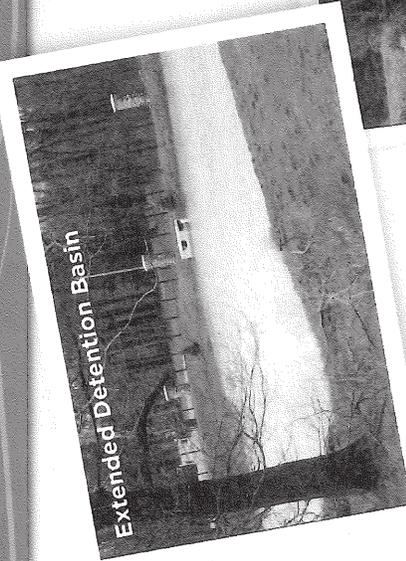
## What features of a basin can help improve Water Quality?

**Extended Detention Basins:** Designed to collect the runoff from smaller, more frequent rainfall events and release the runoff over a longer period of time.

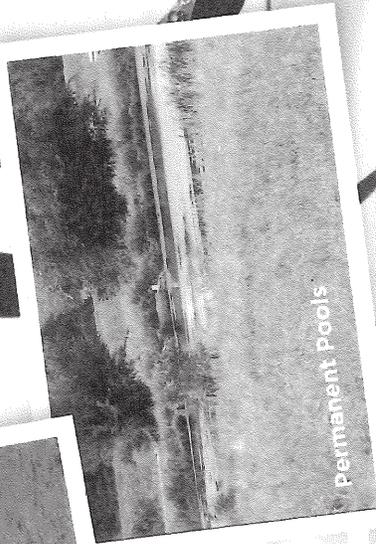
**Permanent Pools:** Provides water quality benefits as the influent (or in-flow) water mixes with the permanent pool water and most of the sediment deposits remain in the permanent pool zone.

**Forebays:** Forebays are like a smaller entrance basin within a larger detention basin. Forebays provide pre-treatment by allowing coarse sediment particles to settle out before entering the basin and typically enhance performance and longevity of the larger basin.

**Water Quality Device:** An outfall device, typically consisting of a perforated plate or pipe, which regulates how much water exits the basin. The arrangement and numbers of drain holes are calculated to regulate the holding time of the water, thereby allowing the settlement of sediment inside the basin.



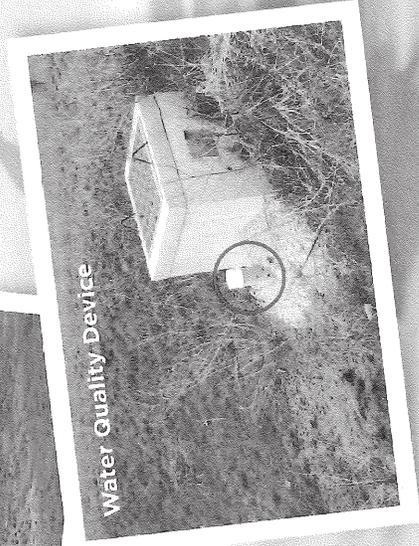
Extended Detention Basin



Permanent Pools



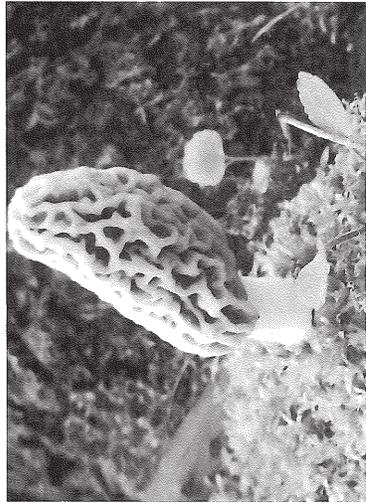
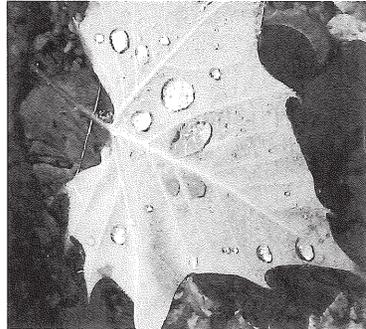
Forebays



Water Quality Device

# Forests and Watersheds

*You can no more disconnect a forest from it's watershed than a tree from it's roots*



Forests are a critical part of the clean water picture. Healthy forests act as a filter, and a sponge, helping to remove impurities and control runoff. The canopy intercepts rainfall, absorbing the erosive energy of rain. Roots bind the soil, further preventing erosion, and assist water absorption into the ground. Trees also provide shade to cool waters (which improves oxygen levels), and leaves that wash into streams provide the major energy (food) source for a stream ecosystems. Healthy forests mean healthy waterways.



Made possible by a grant from the LAD Foundation.

Photos: Katie Kesovich



# Rain Garden

Runoff carries pollutants & rain gardens are a solution!



## What is stormwater?

- Stormwater is **rainfall runoff** that flows over urban impervious surfaces like streets, parking lots and roof tops. Stormwater can pick up pollutants like automotive fluids, pet wastes and chemicals from yard care and flow into a storm drain or **directly into lakes, streams and rivers.**
- Anything that enters the storm drain system is discharged **untreated** into water bodies we use for swimming, fishing and drinking water.
- The EPA now considers stormwater pollution to be one of the **most significant sources of contamination** to our nation's water bodies and streams.

## Did you know storm drain runoff does not get treated?

## How to treat stormwater

- This specially designed rain garden **catches stormwater runoff** from the adjacent street to reduce runoff into nearby Valley Water Mill Lake.
- The leaves, roots and stems of these native plants will **absorb, store and break down potential pollutants** in the stormwater like heavy metals, nutrients, oils and greases.

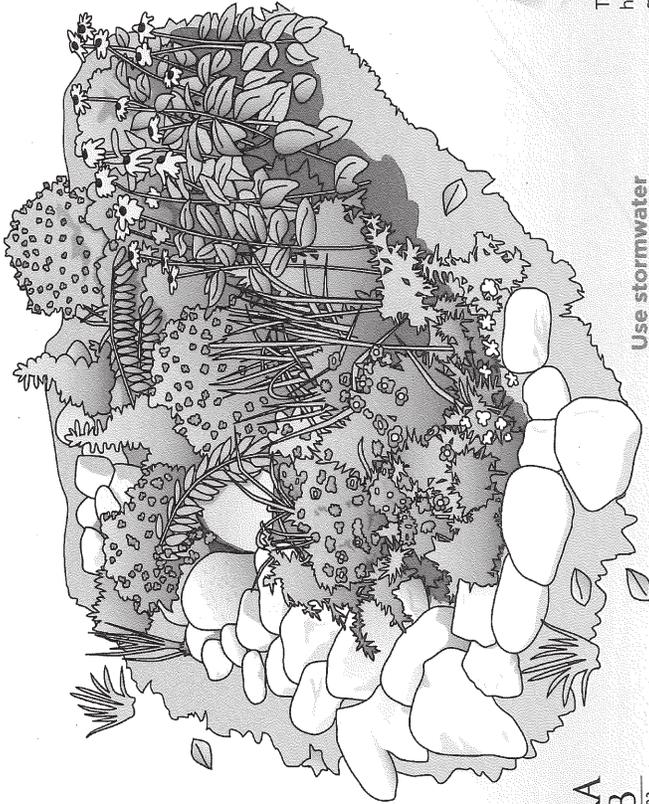


For more information on rain gardens, please visit our website at [www.watershedcommittee.org](http://www.watershedcommittee.org)

Labor: Donated by: BG Service Solutions, Advanced Lawn & Missouri Wildflowers

## What is a rain garden?

- A rain garden is a **shallow, constructed depression** that is planted with **deep-rooted native plants** and grasses. It is located to receive runoff from hard surfaces such as a roof, driveway, street or parking lot.
- Rain gardens slow down the rush of water from these hard surfaces, hold the water for a short period of time and allow it to naturally **infiltrate** into the ground. Rain gardens will reduce drainage and **flooding problems, keep pollutants** out of nearby streams, rivers and lakes, and bring **beauty** and wildlife to the landscape.
- There are two kinds of rain gardens: **wet and dry.** The wet rain garden holds water almost all of the time. The rain garden at Valley Water Mill is a dry rain garden and most water is absorbed within 48 hours.



Use stormwater as a resource!

## Why use native plants?

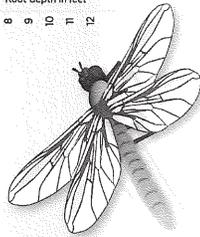
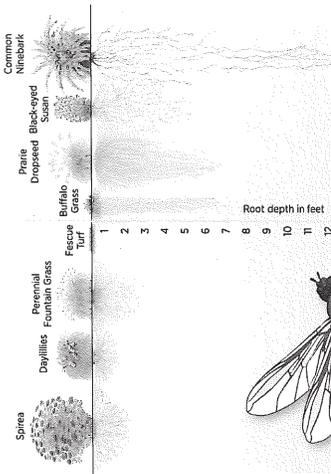
- Native plants are desirable landscape plants because they have evolved and adapted to the local climate, soils and rainfall conditions. They attract wildlife and help restore bio-diversity. **They are hardy!**
- Other benefits of native plants include **deep root systems** that help water infiltrate the soil. Native plants require little or no special care after becoming established and generally do not need additional chemical inputs like fertilizers or insecticides, which can contribute to stormwater pollution.

## Non-Natives

Spruce  
Daylilies  
Perennial Fountain Grass

## Natives

Ornitho Black-eyed Susan  
Buffalo Grass  
Rescue Turf

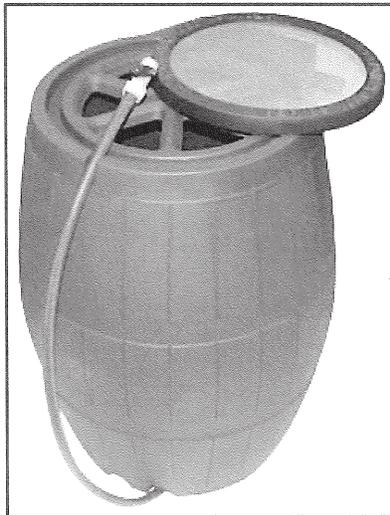


## Do rain gardens attract mosquitoes?

The water in a dry rain garden should be absorbed within 48 hours...too soon for mosquito larvae to hatch. The wet rain garden is a diverse biological network, complete with dragonflies, frogs, minnows, beetles and other aquatic life that consume mosquito larvae as well as the mature adult mosquito.



# Save it FROM a Rainy Day Help Us Fill 1,000 Barrels



Tandem  
Diverter Kit

Pre-Made  
Barrel



## Pre-Made Barrel: Purchase at Wickman's Gardens 1345 S. Fort, Springfield

Program price = \$100

Instant rebate = \$25 (Greene County Residents)

Rebated Price = \$75

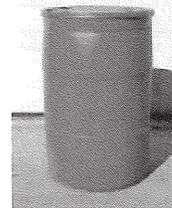
## 2-barrel Kit: Purchase at Habitat ReStore 2410 S. Scenic, Springfield

Comes with Rain Reserve tandem diverter kit and two barrels similar to blue barrel shown at right (can be painted).

Program price = \$140

Instant rebate = \$25x2 barrels (Greene County Residents)

Rebated Price = \$90



For more information about the barrels, visit [www.jamesriverbasin.com](http://www.jamesriverbasin.com) or call 836-6183.

### Rain Barrel FAQs

- Why use a rain barrel?** A roof size of 1,000 sq. ft. will generate approximately 600 gallons of water from a 1-inch rainfall. Collecting and using this water conserves public and private water supplies, and reduces pollution, flooding, and erosion in local waterways by reducing storm water runoff.
- How do I use the water collected in the barrel?** Fill your watering can or use a regular hose or soaker hose to water indoor and outdoor potted plants and landscaped areas, clean off gardening tools, wash your car, and for other non-potable uses.
- Will the barrel be a source of mosquitoes?** A mosquito dunk can be placed in the barrel to prevent mosquitoes from breeding. These products are non-toxic, inexpensive, and widely-available at local lawn & garden centers.

\$25 instant rebate per barrel provided by:  
(limit 4 per household)





## BECOME AN ADVOCATE—MAKE CLEAN WATER A PERSONAL GOAL

Follow the suggestions listed on the poster and participate in community-wide efforts to safeguard our water resources.

• Support local efforts to

clean-up and protect our streams and rivers. Hundreds of Missourians have joined the Stream Team Program, designed to give citizens the

opportunity to make positive contributions to the environment.

• Learn more about local water supplies and sewage treatment facilities. Vote to upgrade these facilities to keep our drinking water supplies safe and prevent pollution of our lakes and streams.



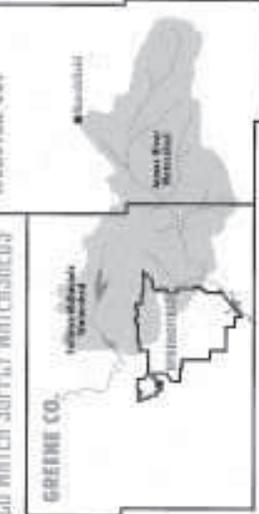
economic growth, and even the beauty of the Ozarks depends upon each of us consciously practicing pollution prevention in our communities.

### SPRINGFIELD WATER SUPPLY WATERSHEDS

GREENE CO.



WEBSTER CO.



**For more information:**

- **Hazardous Materials and Safety Alternatives**  
Call: The Household Hazardous Waste Project (417-889-4000)
- **Water Conserving Plumbing Fixtures and Water Efficient Gardening**  
Call: City Utilities of Springfield (417-831-8320)
- **Yard Composting**  
Call: City of Springfield Recycling Division (417-864-1904)
- **Missouri Stream Team Program**  
Stream Team Coordinator, Missouri Department of Conservation (334-751-4115)

The Watershed Committee of the Ozarks is a not-for-profit citizens advisory group dedicated to the protection of drinking water sources in the Springfield area.

Other publications available from the Watershed Committee:

- **Watershed Nexus**—Quarterly newsletter (free)
- **Ozark Water Cycle**—A brochure discussing the proper design, installation and maintenance of septic tank systems (free)
- **Sinkholes—Index to the Groundwater System**—Flow to recharge sinkholes, how they function, and how they affect groundwater (free)

Watershed Committee of the Ozarks

320 N. Main  
Springfield, MO  
65805-1015  
417-866-1127  
Fax: 417-866-1918  
email: watershed@data.com



Watershed Committee of the Ozarks

## WATER PROTECTION AT HOME

WHAT YOU CAN DO TO PREVENT WATER POLLUTION IN YOUR COMMUNITY

In the Ozarks, we enjoy an abundance of clean water for fishing, swimming, boating, and for drinking water supplies. It's easy to assume that there will always be enough clean water. However, if we do not carefully protect our water resources, the day will come when clean water in the Ozarks is just a memory.

### WATER POLLUTION HAS COME TO THE OZARKS

No longer can we take our beautiful lakes, rivers, and clean drinking water for granted. The threat of unclean

water is real. Thirty to fifty percent of the household water

wells in Ozark counties are contaminated with coliform bacteria. Boil orders for community water supplies are becoming more commonplace. The Missouri Department of Health warns us that some of the fish in our rivers and lakes are contaminated with chloridane—a persistent pesticide. High bacterial levels at many of our recreational areas prevent safe swimming and water activities. And these problems could get worse as more and more people move to the Ozarks.

### NON-POINT POLLUTION

While government regulations control most pollution from point sources such as municipal sewage plants, industries, and even large dairies and feedlots, it is your

responsibility to monitor the pollution that originates at your home. This non-point source pollution that flushes from yards, gardens, driveways, and septic tanks causes water quality problems just as surely as point source pollution. In order for water protection to be successful, every citizen must join the fight to prevent water pollution at home. The inside

of this fact sheet is a poster which is designed to help you become more aware of ways that you can protect water quality. Post it at home where it will serve as a handy reference for all members of your family. Take action now to prevent pollution!



The threat of unclean water is real. The Missouri Department of Health warns us that some of the fish in our rivers and lakes are contaminated with chloridane—a persistent pesticide.



# How to Reduce Polluted Runoff

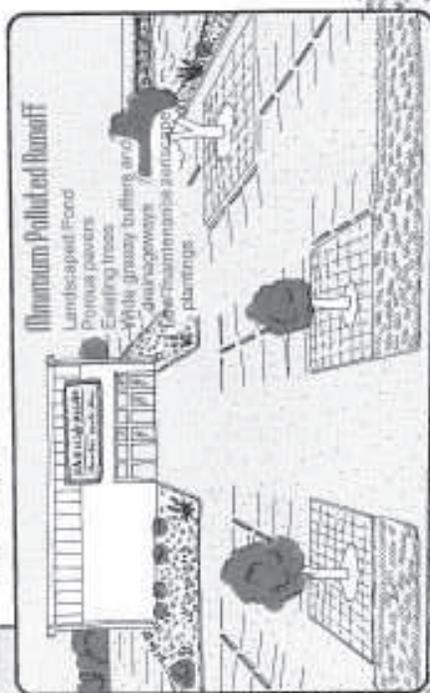
To maintain our high quality of life and beautiful environment in a time of rapid growth, we must properly manage urban stormwater runoff.

## State-of-the-Art Site Planning

- Make complying with regulations an easier light.
- Avoid expensive retrofit when regulations tighten.
- Increase stability and property value.
- Minimize liability for damage to others.
- Help community and environment by reducing polluted runoff.

### Maximum Polluted Runoff

- Entire site paved
- Other runoff to concrete
- Paved manageways to streams



### Preserve Ponds and wetlands

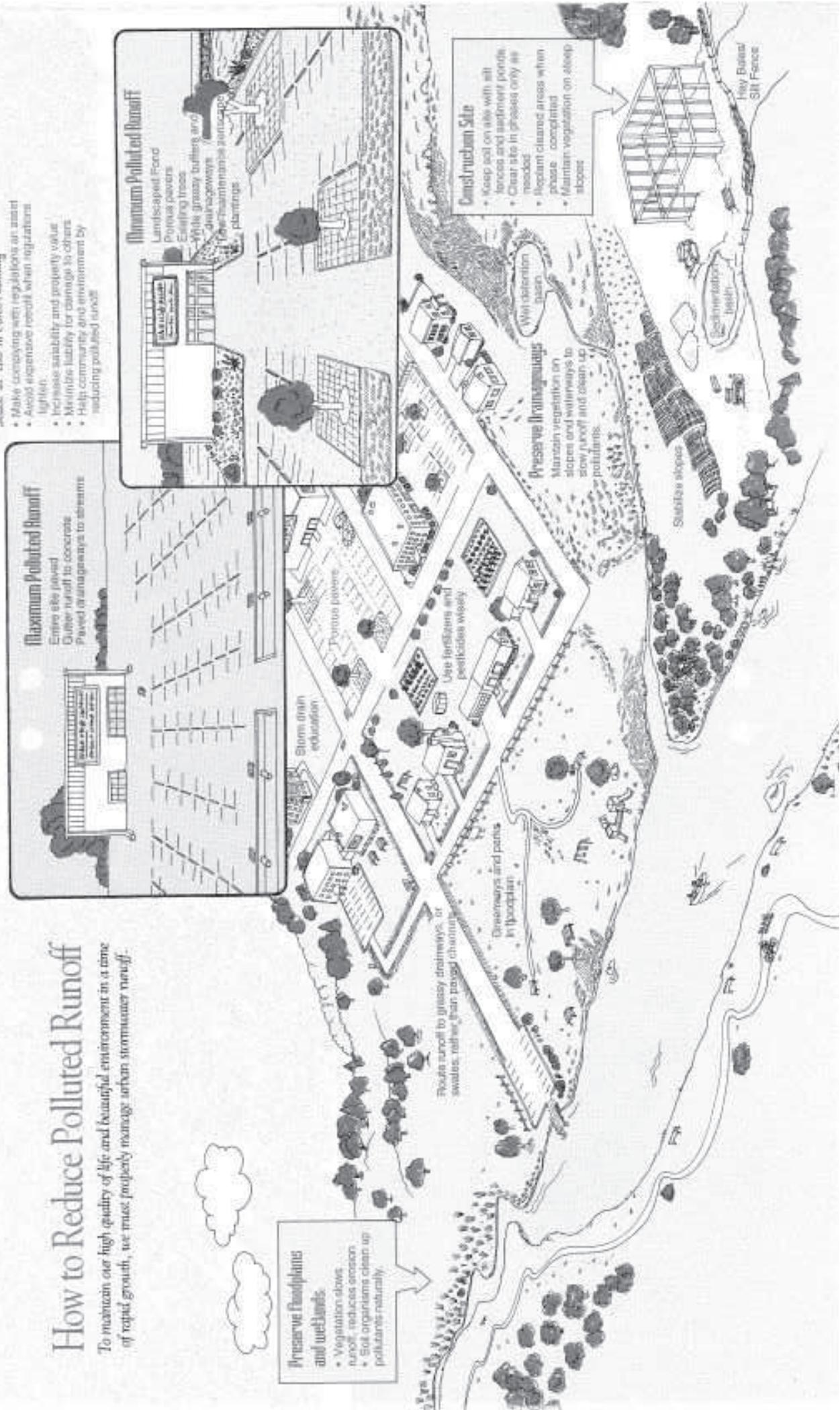
- Vegetation slows runoff, reduces erosion
- Soil organisms clean up pollutants naturally

**Construction Site**

- Keep soil on site with all fences and sediment ponds
- Clear site in phases only as needed
- Flooded cleared areas when phase completed
- Maintain vegetation on steep slopes

### Preserve Drainage Ways

- Maintain vegetation on slopes and waterways to slow runoff and clean up pollutants

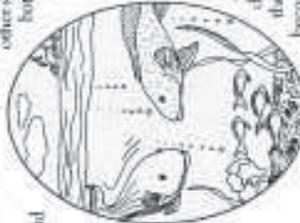


# Why We Need to Manage Urban Runoff

**P**revention is the best cure: In the Ozarks, many streams have already been damaged by urban runoff. It is critical that we plan new developments to minimize the negative effects of runoff.

## Changes in Water Flow

Traditional urban development paid little attention to the amount of impervious surfaces such as roads, streets and parking lots. Rain runs rapidly off these surfaces, turning city streets into raging torrents that cause erosion and damage property. Because the ground no longer absorbs and soaks water, urban streams dry up in summer. These extreme changes in flow hurt stream organisms and cause significant environmental damage.



## What Does This Mean To You?

We all pay for property damages resulting from floods. We could get sick from contaminated drinking water or from swimming in bacteria-laden streams. Toxic chemicals in runoff can build up in the food chain, including game fish. Fish will disappear when urban runoff depletes their food source or lakes and rivers become choked with algae and silt.

spreading their toxic effluents. The six city drainages, including sink holes, increasing community flooding problems. It keeps native aquatic plants from getting the sunlight they need, and smother's fish eggs and other small creatures that live on stream bottoms.

## Increased Pollution

Roads wash toxic chemicals, bacteria and silt from urban surfaces. Uncontrolled runoff causes sewage treatment plants to overflow directly into waterways. Fertilizers encourage the growth of slimy algae and oil forms visible scum. Even beer is a pollutant. Runoff from hot pavement can make streams unbearably warm for creatures in the stream.

## Sediment

Basic construction areas allow large amounts of fine soil, or sediment, to erode away. Other pollutants often attach to sediment particles, and can be transported far downstream in floods.

The Watershed Committee of the Ozarks is a not-for-profit citizen advisory group dedicated to the protection of drinking water sources in the Springfield area.



Watershed Committee of the Ozarks  
 101 W. Bremer  
 Springfield  
 Missouri 65802  
 417-866-1127

Other publications available from the Watershed Committee:  
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 Ozark Water Cycle-A brochure discussing the proper design, installation and maintenance of septic tank systems (free)  
 Sinkholes-Index to the Greenwater System-How to recognize sinkholes, how they function, and how they affect groundwater (free)  
 Water Protection at Home-What you can do to prevent water pollution at home and in your community (free)



Watershed Committee of the Ozarks

# QUALITY DEVELOPMENT AND STORMWATER RUNOFF

## WHAT YOU CAN DO TO REDUCE FLOODING, EROSION AND POLLUTION

### Quality Development Controls Runoff

Evermore recognizes the signs of high quality development: solid construction, efficient design, desirable finishes, attractive landscaping. In the 1990s, good stormwater management practices have been added to the list.

Already, any development of five acres or more is subject to storm regulations. Individual communities are also regulating storm-water runoff in order to reduce both

pollution and flooding problems. Private builders and designers are discovering that the cost of controlling stormwater runoff can be offset by increased value, stability, and aesthetic appeal of their properties. And the trade-off

community benefits from reduced pollution, erosion and flooding.

Well-designed runoff controls can be aesthetically pleasing and often satisfy local requirements for green spaces. There are many affordable ways to reduce harmful stormwater runoff, make your living or working environment more pleasant and enhance property values, all at the same time!

### What You Can Do At Home

- Direct gutterdownspout to grassy areas instead of pavement.
- Use fertilizers wisely. Have soils tested to determine proper amount.
- Keep pesticide use to a minimum. Use least toxic alternatives.
- Maintain vegetation on steep slopes to keep soil in place.

### How to Reduce Runoff Problems

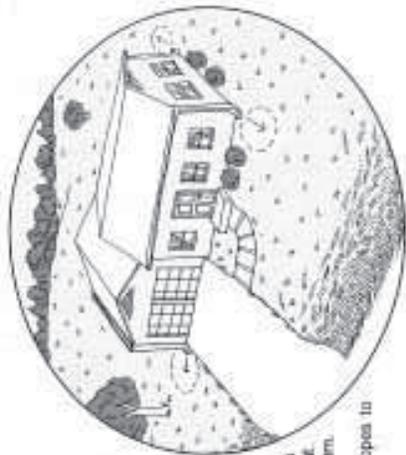
Best Management Practices (BMPs) can help reduce flooding, erosion and pollution. These practices apply to residential, commercial and industrial settings.

- Preserve natural vegetation in floodplains and drainageways to slow runoff and filter out pollutants.
- Slow runoff by collecting water in detention basins, allowing soil and pollutants to settle out.
- Keep soil on site during construction by using silt fences, hay bales and soil retention basins.
- Mulch and re-seed areas of exposed soil as soon as possible to reduce erosion.
- Direct downspouts and pavement runoff through grassy drainageways, or scales, rather than onto paved or concrete surfaces.

**Common Runoff Pollutants**

- Heavy metals (lead, copper, zinc, chromium) from gasoline, tires, corroded metal, paint, wood preservatives, and motor oil.
- Pesticides and fertilizers from yards, foundations and garages.
- Bacteria from sewage and animal wastes.
- Soil sediments from construction sites, bare stream banks, home landscaping, and steep exposed slopes.

Source for additional information on BMPs on the back page.

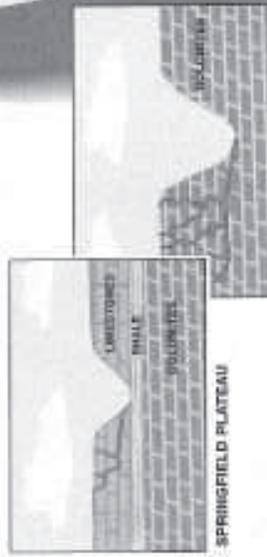


Turn the page to see how to control polluted runoff in your environment.

# ANATOMY OF A SPRING

## Spring Flow

The flow of springs is directly tied to precipitation in the recharge area. The amount of flow can even be used to estimate the size of the recharge area. Big springs have big recharge areas. Springs draining the Springfield Plateau are typically smaller than those in the Salem Plateau of the Central Ozarks with its thicker layers of porous bedrock.



## Diffuse versus Discrete Flow

Diffuse flow is water moving slowly through small cracks and holes in bedrock. Diffuse flow springs respond slowly to rainfall and may just get cloudy after heavy rains. Discrete flow is more massive, moving through large cracks and surface features such as sinkholes and losing streams. Springs dominated by discrete flow are flashier, rising rapidly in response to rainstorms, and often getting "mucky". Most springs have both kinds of flow in their recharge areas, but many springs are dominated by one or the other type of flow.

## Springs As Barometers

Springs gather flow from relatively large land areas, concentrating it at a single point the extent of pollution and human activity. Therefore, springs are sensitive indicators and efficient, inexpensive (compared to monitoring wells) sites for monitoring the health of the shallow groundwater. It is very important that we know what is happening to this shallow groundwater—because eventually it will affect the deeper groundwaters that most rural wells tap for their drinking water supplies.

## Losing Streams

Surface streams that leak all or part of their flow directly into groundwater are said to be "losing." As with sinkholes, any surface pollution entering a losing stream has rapid access to groundwater.

**Dry Stream Bed**  
**Swallow Hole**

## Dye Tracing

Any material small enough to pass through a spring's internal plumbing system could be used as a tracer. Normally, dyes are used (in small concentrations) to link injection points (for example, a sinkhole) where the dye is introduced, to the point of dye recovery, often a spring. When several injection points are traced to the same spring, we begin to get a picture of the size and shape of a spring's recharge area.

## Sinkholes

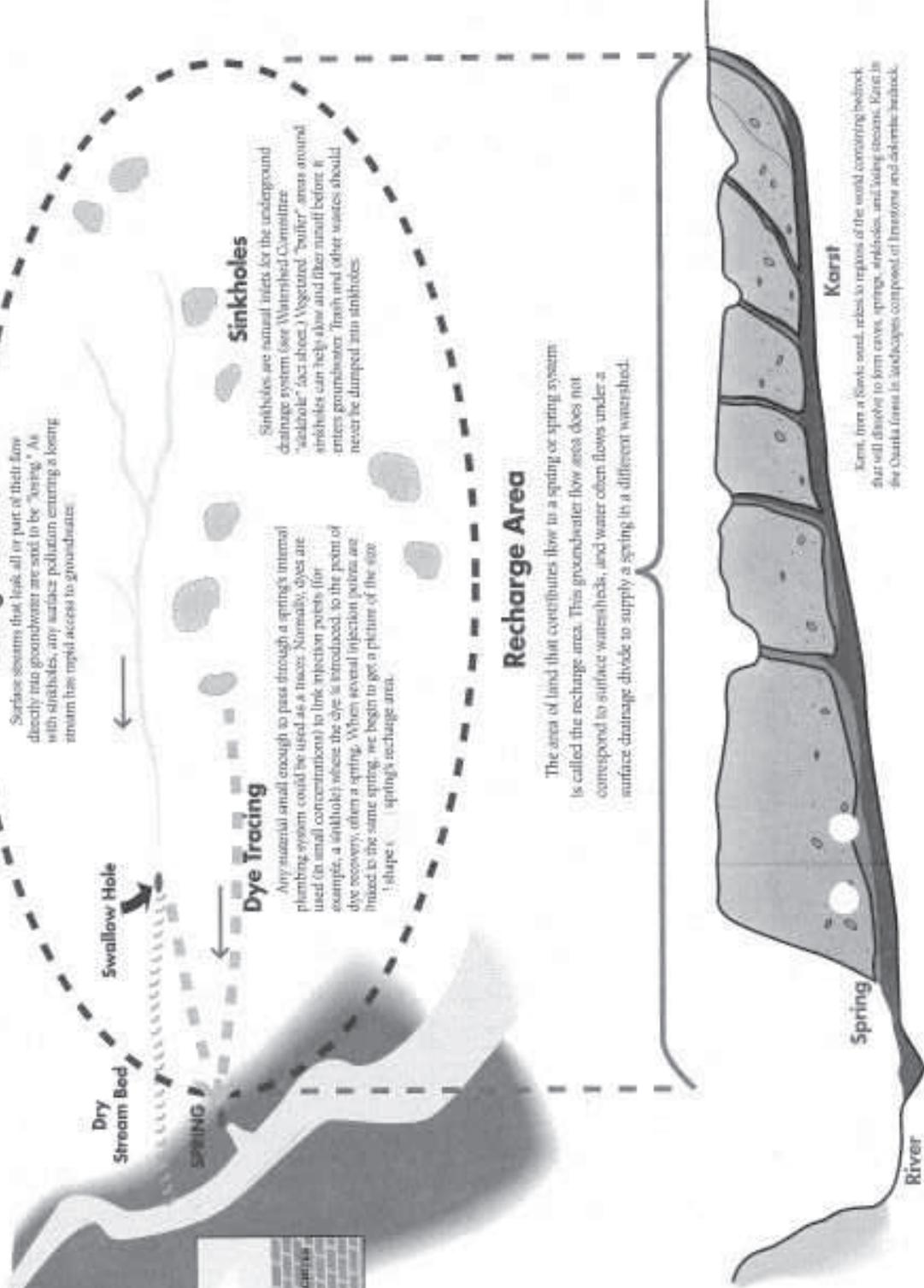
Sinkholes are natural inlets for the underground drainage system (see Watershed Committee "sinkhole" fact sheet.) Vegetated "buffer" areas around sinkholes can help slow and filter runoff before it enters groundwater. Trash and other wastes should never be dumped into sinkholes.

## Recharge Area

The area of land that contributes flow to a spring or spring system is called the recharge area. This groundwater flow area does not correspond to surface watershed, and water often flows under a surface drainage divide to supply a spring in a different watershed.

## Karst

Karst, from a Slovak word, refers to regions of the world containing bedrock that will dissolve to form caves, springs, sinkholes, and losing streams. Karst in the Ozark area is bedrock composed of limestone and dolomite bedrock.



## Spring Pollution

Because of the "open" nature of spring recharge areas, it is easy for surface pollution to find its way into springs. Any pollution that is dumped or drains into a sinkhole, for example, can directly impact water quality at springs.

Septic tanks in poor, rocky, Ozark soils can leak untreated sewage into the shallow groundwater leading to springs. Spills of gasoline or other chemicals can flow into surface streams, sink into groundwater in leach sections of the stream to reappear at a spring. Even urban runoff flowing into sinkholes can negatively impact stream groundwater quality.

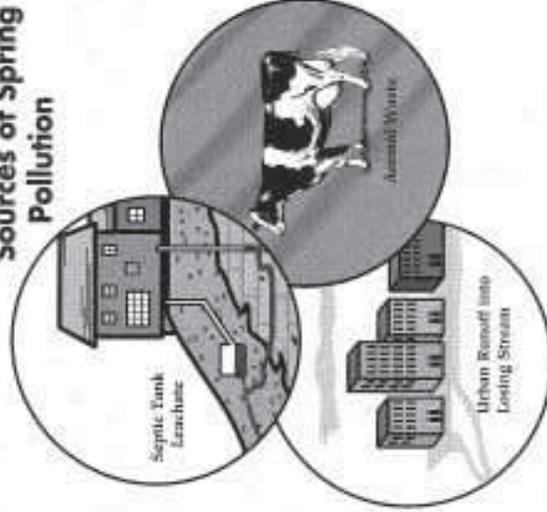
## Springs as Drinking Water Supplies

Because springs are so vulnerable to pollution, Health Departments recommend against their use as drinking water sources without treatment. It is especially important that treatment methods kill bacteria and human pathogens.

## How Many Springs Are There?

There are thousands of springs in the Ozarks. The actual number is hard to define because some "springs" might more appropriately be called "seeps"—they flow only during wet weather, and may be very small. There are hundreds of named springs in Greene County, but thousands that flow during wet periods.

## Sources of Spring Pollution



## Spring Houses

Before refrigerators, or ice-boxes, springs served as natural refrigeration. Because springs remain near the average annual temperature of an area (about 50° F in the Ozarks), they will keep perishables cool.

This cooling effect is enhanced by building an enclosing structure (the spring house.) The spring house ebon reflects the distinctive architecture of a homestead.



The Watershed Committee of the Ozarks is a not-for-profit citizens advisory group dedicated to the protection of drinking water sources in the Springfield area.

Other publications available from the Watershed Committee: Watershed News-Quarterly newsletter (free)

**Maintaining Your Septic System**-Proper maintenance protects your family's health, saves you money, and guards area water quality (free)

**Sinkholes** link to the Groundwater System—How to recognize sinkholes, how they function, and how they affect groundwater (free)

**Quality Development and Stormwater Runoff**-What you can do to reduce flooding, erosion and pollution (free)

**How To Protect Your Well**-Your family's health depends on a safe, reliable source of drinking water... (free)



Watershed  
Committee  
of the Ozarks

# Springs Early Warning Systems for our Groundwater

**S**prings—natural wonders, mysterious, even mystical. How often people have paused to refresh, and wonder—where does all this water come from? How did it get here? But while our forefathers had an imperfect knowledge of basic hydrology, they did not question the absolute purity of spring water. How could a substance offered up in such bounty by Mother Earth be otherwise?

Today, we understand a lot more about springs—their origins, how they work, and we know that springs are, in fact, easily polluted—that the crystal clear, cold water may harbor unseen pollutants—bacteria and chemicals that could make us sick.

## Springs are important natural resources.

This fact sheet is not intended to diminish our sense of wonder about springs. Instead, it is meant to increase our appreciation of them—to illustrate their values and explain why we need to protect them. Springs can tell us a lot about the health of our environment. They serve as sensitive barometers—telling us when our activities on the land surface are polluting groundwater. Springs replenish and sustain Ozark streams and lakes during times that, without springs, such water bodies would be bone-dry. And springs are ultimately connected to the deeper groundwater system—the one that thousands of Ozark residents depend on for their drinking water supplies.



Stoney Spring and Natural Arch, Greene County  
Photograph courtesy The library Museum for Springfield Greene County



Jiluff Spring, Ozark, Christian County  
Photograph courtesy Christian County Historical Society



McKernell Spring, Greene County ca. 1892  
Photograph courtesy Springfield-Greene County Public Library



Spring served as retirement sites for many Ozark communities—such as Springfield and Ozark. Unfortunately, their temperature is maintained in the fact that one of them is the state home for road "spring" in their names.



Watershed  
Committee  
of the Ozarks

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417-866-1127  
Fax: 417-866-1918  
email: watershed@cciaa.com



# Maintaining Your Onsite Wastewater Treatment System

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**Have water wells tested every year.** The Health Department provides free or low-cost testing. Remember, the well that is closest to your *Irishweary* water treatment system is usually your own.

## Handling Prescription Drugs

Do flush your prescription drugs down the toilet or drain unless the label or accompanying patient information specifically instructs you to do so.

For more information, talk to your health care provider, your pharmacist or HSC.

## U.S. Food and Drug Administration

[www.fda.gov/ohrt](http://www.fda.gov/ohrt)

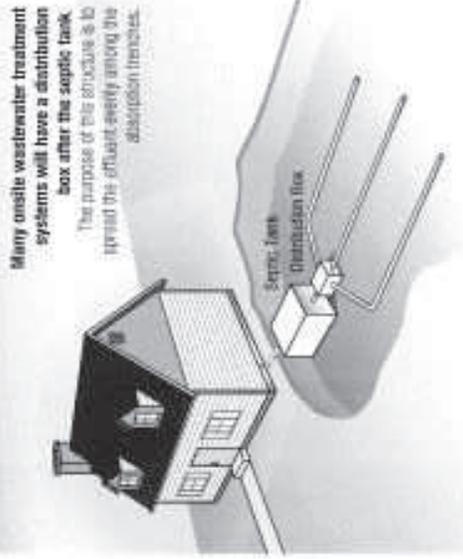
## U.S. Environmental Protection Agency

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[www.WhiteHouseDrugPolicy.gov/substances/pdrprescrip\\_disposal.pdf](http://www.WhiteHouseDrugPolicy.gov/substances/pdrprescrip_disposal.pdf)

Figure 4

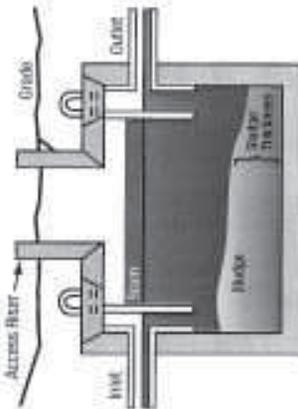


## Distribution Box maintenance

Generally, over time solids build up in the distribution box and inhibit even distribution of effluent to all the trenches causing overloading of trenches and possibly trench failure that can result in effluent pooling to the ground surface. To prevent this problem, clean the distribution device and clear it out on an annual basis. To make this easier an access tier or manhole can be installed over the distribution box.

Figure 5

When the tank is pumped out make sure your contractor uses the manhole located in the center of the tank and the inspection port. Make sure that both the inputs and solids in the tank are pumped completely out. Do not waste or divert the tank after having it pumped. Also, it is not necessary to "start" your system with biological or chemical additives after it has been pumped.



## Clean Out

Do not allow unnecessary water, including roof and foundation drains, away from the distribution laterals.

**Inspect** the system regularly. Check for signs of failure, such as odors, slow drainage, or standing water in the yard.

**Flush** the system with water to help break up any clogs.

**Use** the system properly. Avoid pouring chemicals down the drains and avoid using too much water.

**Monitor** the system for signs of failure, such as odors, slow drainage, or standing water in the yard.

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## MAINTAINING YOUR ONSITE WASTEWATER SYSTEM

### DO

- Do** obtain necessary permits from Greene County Resource Management Department, (417-868-4015), or the appropriate local agency, before making any repairs.
- Do** use professional certified installers.
- Do** have your septic tank inspected annually.
- Do** keep your septic tank accessible for inspections and pumping. Install ladders if necessary.
- Do** keep a detailed record of repairs, pumpings, inspections, permits issues, and other maintenance activities.
- Do** conserve water to avoid overloading the system. Repair any leaky faucets or toilets.
- Do** divert other sources of water, like roof drains, house footing drains, and sump pumps away from the lateral field.
- Do** establish and maintain a good stand of grass over the lateral field.
- Do** have your well tested annually (contact your local health department).

### IF YOU HAVE PROBLEMS

Even with the best maintenance some systems will eventually have problems. Call the Greene County Resource Management Department 868-4147 for advice on ways to address these problems.

#### National Average Water Use



Source: American Water Works Association Research Foundation, "National End Users of Water" 1987.

200 N. Meigs  
Springfield, MO  
65705-1018  
417-868-1177

WATERSHED CENTER  
A Clean Water for Life

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### DON'T

- Don't** go down into a septic tank.
- Don't** allow anyone to drive or park over any part of the system.
- Don't** plant anything over or near the lateral fields except grass. Even roots from nearby trees or shrubs may clog any damage the drain lines.
- Don't** use your septic system as a trash can. Plastics, cat box litter, cigarette filters, condoms, tampons, sanitary napkins, paper towels and facial tissues should not be disposed of in your toilets. These items quickly fill your septic tank with solids, decrease efficiency, and will require you to pump out the tank more frequently. They could also clog the sewer line to the septic tank, causing wastewater to back up into your home.
- Don't** dig in your lateral field or build anything over it, and don't cover the lateral field with a hard surface such as concrete or asphalt.
- Don't** pour into drains: septic tank additives, chemical drain openers, paint, varnishes, thinners, waste oil, antiseptics, solvents, pesticides, pharmaceuticals, oil, fat, grease, and other organic chemicals.
- Don't** allow backwash from your home water softener to enter the septic system.

One of the best things you can do for your septic system is to reduce the amount of water flowing into it. This is especially important if the soil on your lot does not readily absorb water.

A typical family of four uses 250-300 gallons of water every day. You can reduce this figure with simple conservation measures:

- Repair leaking faucets or running toilets
- Use clothes and dish washers only when full
- Reduce length of showers and lower water level in baths
- Turn off untreated water when washing hands and brushing teeth.
- Install water saver fittings in toilets and shower heads.
- Install a low-flush bidet or toilet dam.

Use front loading high efficiency washing machine

#### Greene County Resource Management Department

960 Southville  
Springfield, MO 65802  
417-868-4147

Portions of the information contained in this fact sheet

addressed through the National Small Flows, Cladhouse, West Virginia University, Morgantown, WV 26520-6064

## MAINTAINING YOUR ONSITE WASTEWATER TREATMENT SYSTEM

Proper maintenance protects your family's health, saves you money, and guards area water quality.



### WHY MAINTAIN YOUR ONSITE WASTEWATER TREATMENT SYSTEM?

Onsite Wastewater Treatment Systems (OWTS), commonly known as septic systems, like houses and cars, require periodic maintenance. This is especially true in the Ozarks, where soils are often thin and rocky and may allow partially treated sewage to leak directly into groundwater supplies (see Figure 1). Although this problem is being addressed today with better site evaluations and designs, there are thousands of OWTS systems already in use in the Ozarks. Owners of these systems may claim to have never had problems, even though no maintenance has been done in many years. It is these very systems that may in fact be contributing to the unseen pollution in groundwater.

Figure 1



By following the routine maintenance tips in this fact sheet, you will protect the life of your OWTS, prevent groundwater pollution and surface effluent, and protect your property values. Compared with the cost and time of repairing or replacing your system, the effort and expense of annual maintenance is minimal.

### HOW DOES AN ONSITE WASTEWATER TREATMENT SYSTEM WORK?

Sewage from the home first goes into a septic tank—a large, watertight chamber made of concrete, fiberglass, or plastic with baffles or tees at the inlet and outlets. Inside the septic tank, anaerobic oxygen-seeking bacteria partially break down the sewage. There will always be a portion of the solids which the bacteria cannot digest and these remain in the tank as sludge and scum (see Figure 2).

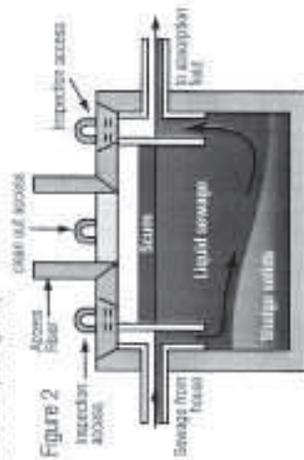


Figure 2

After leaving the septic tank, sewage effluent enters the soil absorption (lateral) field. The soil absorption field is a network of pipes laid in trenches dug into the soil and surrounded by gravel. Perforations in the pipe allow the sewage to drain through the gravel into the soil (see Figure 3). Where the majority of the actual treatment occurs. The absorption field is where filtration and aerobic (oxygen-using) bacteria remove the remaining impurities (germs and chemicals) before the wastewater returns to groundwater.

# Maintaining Your Septic Tank System

Septic tanks are designed to accumulate solids for several years under normal conditions. As solids fill up the tank, wastewater has less time to settle properly and solid particles flow into the absorption field. If the tank is not periodically pumped out, less solid entering the absorption field will clog it to the point that a new field may be needed. There are three factors which determine how often a septic tank must be pumped:

1. Size or capacity of the tank.
2. The number of people in the household or how much water flows through the system.
3. The volume of the solids in your waste. If you have a garbage disposal, the extra solids make it necessary to pump out the septic tank more frequently.

Table 1 gives the suggested pumping frequencies based on tank size and number of people in the household.

**Some chemicals can destroy the bacterial action taking place in your system.** Do not pour the following down drains: chemical drain cleaners, septic tank additives, paint, varnishes, thinners, waste oil, photographic solutions, acetone and other organic chemicals. Call University Enterprises to locate a household chemical collection center. In Springfield, call the Household Chemical Collection Center at 824-2000. If used according to the label directions, most other household cleaners and chemicals will not harm your system.

**Excess water use can lead to early system failure.** Up to 50 gallons of water are discharged into your septic system with each load of laundry. If several loads are done in one day, it can put considerable stress on your system. A better practice is to space out your laundry washing throughout the week.

CLEAN OUT INSPECTION PORT

Direct all unnecessary water, including roof and bathroom drains, away from the distribution laterals.



**Have water wells tested every year.** The Health Department provides low-cost testing. Furthermore, the well that is closest to your system is usually your own.

**Protect your pump and drainfield by maintaining your effluent filter.** Septic tanks are designed to retain solids that accumulate over time. It is important that the solids are retained in the septic tank and not released to the pump, tank or absorption field. Wastewater treatment system pumps are designed to pump liquid only and can be damaged or clogged if not protected. If solids are present to the absorption field, the effluent can become clogged to the point replacement of the entire absorption field is necessary. Replacement of pumps and absorption fields can be very expensive.

Septic tank effluent filters provide a relatively inexpensive means of protecting pumps and preventing damage. They are usually installed at the outlet of the septic tank and should be cleaned a minimum of once a year. The filter can be retrieved for cleaning through an access port on top of the septic tank.

**CAUTION:** Contact with bacteria from a septic tank can cause severe illness so hire a professional or take extra precautions when cleaning the effluent filter.

Table 1 HOUSEHOLD SIZE (number of people)

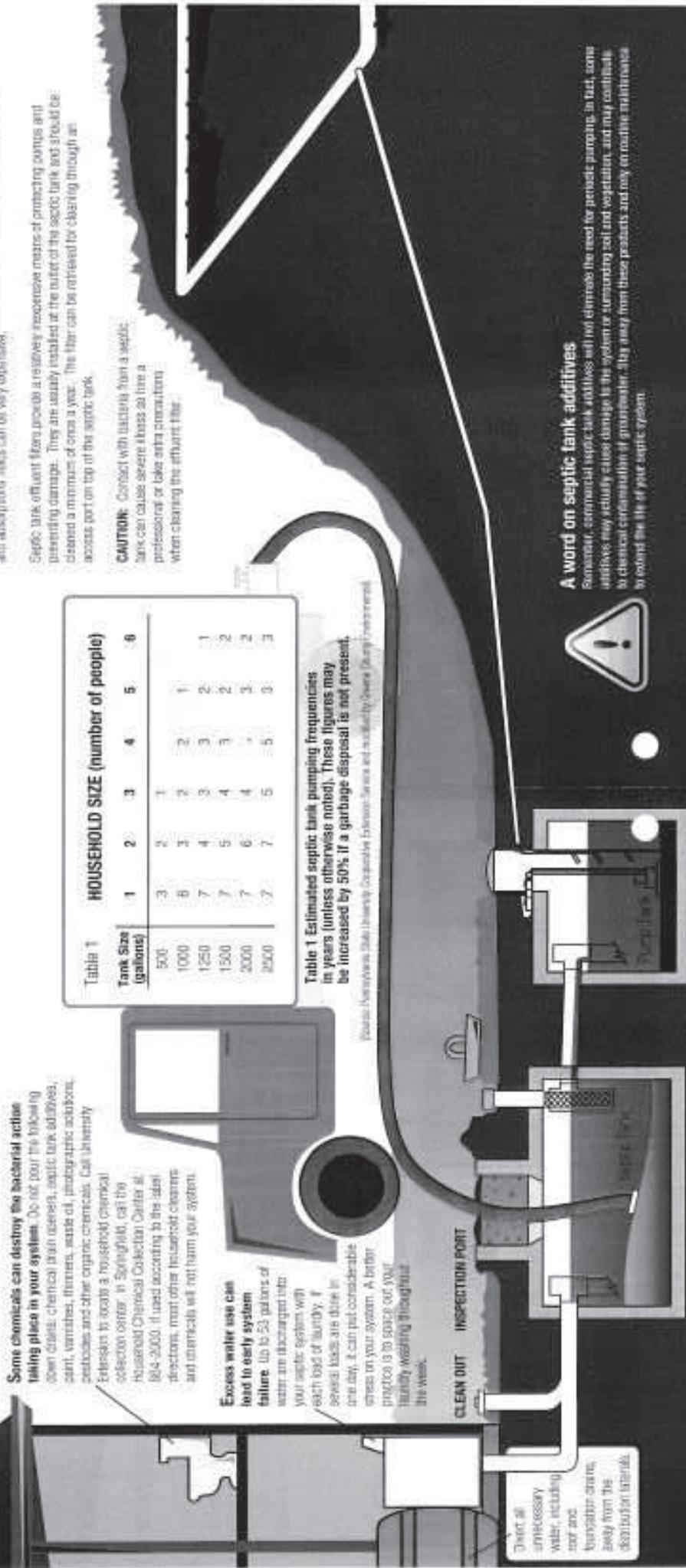
Tank Size (gallons)	1	2	3	4	5	6
500	3	2	1			
1000	6	3	2	1		
1250	7	4	3	2	1	
1500	7	5	4	3	2	1
2000	7	6	4	3	2	1
2500	7	7	5	4	3	2

Table 1 Estimated septic tank pumping frequencies in years (unless otherwise noted). These figures may be increased by 50% if a garbage disposal is not present.

Source: University of Utah, Utah State University Cooperative Extension Service and modified by University Enterprises.

## A word on septic tank additives

Sometimes, commercial septic tank additives will not eliminate the need for periodic pumping. In fact, some additives may actually cause damage to the system or surrounding soil and vegetation, and may contribute to chemical contamination of groundwater. Stay away from these products and rely on routine maintenance to extend the life of your septic system.



## MAINTAINING YOUR SEPTIC SYSTEM

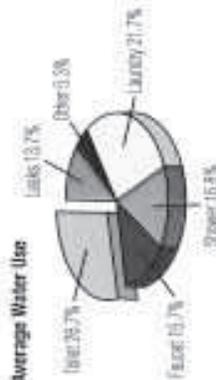
### DO

- Do obtain necessary permits from Greene County Resource Management Department, (417-868-4015), or the appropriate local agency, before making any repairs.
- Do use professional certified installers.
- Do have your septic tank inspected annually.
- Do HIRE YOUR SEPTIC TANK ACCESSOR or INSPECTORS and pumping local firms if necessary.
- Do keep a detailed record of repairs, pumpings, inspections, permits issued, and other maintenance activities.
- Do conserve water to avoid overloading the system. Repair any leaky faucets or toilets.
- Do divert other sources of water. Use roof drains, house footing drains, and sump pumps away from the lateral field.
- Do establish and maintain a good stand of grass over the lateral field.
- Do have your well tested annually (contact your local health department).

### IF YOU HAVE PROBLEMS

Even with the best maintenance some systems will eventually have problems. Call the Greene County Resource Management Department 868-4147 for advice on ways to address these problems.

#### National Average Water Use



Source: American Water Works Association Research Foundation, "National End Use of Water" 1987.

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### DON'T

- Don't go down into a septic tank.
- Don't allow anyone to drive or park over any part of the system.
- Don't pour tea, oil, and grease into your system.
- Don't plant anything over or near the lateral fields except grass. Even roots from nearby trees or shrubs may clog and damage the drain lines.
- Don't use your septic system as a trash can. Plastics, cat box liner, cigarette filters, condoms, tampons, sanitary napkins, paper towels and facial tissues should not be disposed of in your toilet. These items quickly fill your septic tank with solids, decrease efficiency, and will require you to pump out the tank more frequently. They could also clog the sewer line to the septic tank, causing wastewater to back-up into your home.
- Don't dig in your lateral field or build anything over it, and don't cover the lateral field with a hard surface such as concrete or asphalt.
- Don't pour into drains: septic tank additives, chemical drain cleaners, paint, varnishes, bleaches, acids or photographic solutions, pesticides, oils, grease, and other organic chemicals.
- Don't allow backwash from your home water softener to enter the septic system.

One of the best things you can do for your Pump to Gravity System is to reduce the amount of water being into it. This is especially important if a Pump to Gravity System was required because of your site or soil limitations.

- A typical family of four uses 250-300 gallons of water every day. You can reduce this figure with simple conservation measures:
  - Repair leaking faucets or running toilets.
  - Use clothes and dish washers only when full.
  - Reduce length of showers and lower water level in tubs.
  - Turn off untreated water when washing hands and brushing teeth.
  - Install water saving fittings in faucets and shower heads.
  - Install a low-flow toilet or toilet dam.
  - Install water efficient front loading washing machine or appliances.

#### Greene County Resource Management Department

940 Boonville  
Springfield, MO 65807  
417-868-4147

2652105-6064

## MAINTAINING YOUR PUMP TO GRAVITY SYSTEM



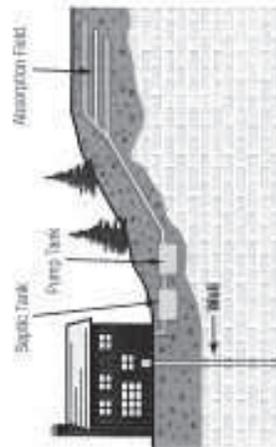
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### WHY MAINTAIN YOUR SYSTEM

Septic tank systems, like houses and cars, require periodic maintenance. This is especially true in the Ozarks, where soils are often thin and rocky and may allow sanitary wastes to seep to leak directly into ground water supplies (see Figure 1). Although the problem is being addressed today with better site evaluations and designs, there are thousands of septic systems already in use in the Ozarks. Owners of these systems may claim to have never had problems, even though no maintenance has been done for many years. If it is these very systems that may in fact be contributing to the unseen pollution of ground water.

Figure 1  
Pump to Gravity Septic System

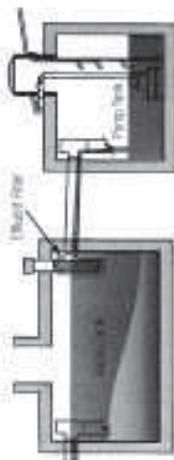


By following the routine maintenance tips in this fact sheet, you will prolong the life of your septic system, prevent ground water pollution and surfacing effluent, and protect your property values. Compared with the cost and expense of repairing or replacing your system, the effort and expense of annual maintenance is minimal.

### HOW DOES A PUMP TO GRAVITY SEPTIC SYSTEM WORK?

Sewage from the home first goes into a septic tank—a large, watertight chamber made of concrete, fiberglass, or plastic with baffles or feet at the inlet and outlet. Inside the septic tank, anaerobic (oxygen-absent) bacteria partially break down the sewage. There is always a portion of the solids which the bacteria cannot digest and these remain in the tank as sludge and scum (see Figure 2).

Figure 2  
Schematic Plan for a Pump to Gravity



After leaving the septic tank, effluent (a clear liquid sewage) enters into a pump chamber, which is then pumped to the absorption field via a mainline. The soil absorption field is a network of pipes laid in trenches dug into the soil and surrounded by gravel. Particles in the pipe allow the sewage to drain through the gravel into the soil, where the majority of the actual treatment occurs. The absorption field is where filtration and aerobic (oxygen) bacteria remove the remaining inorganic (germs and chemicals) before the wastewater returns to groundwater.

## How Does A Lagoon System Work?

A lagoon system consists of two components: a septic tank and a small aerated pond with a uniform 3-foot depth. A septic tank is a large, airtight, corrosion-resistant, buried container that receives raw sewage from the plumbing drains of the home. In it, solids are accelerated out of the raw sewage and are partially digested by anaerobic (oxygen-hating) bacteria. After primary treatment in the septic tank, liquid effluent flows to the lagoon through a water-tight pipe and discharges near the center of the lagoon bottom. Here the wastewater is further processed by aerobic (oxygen-loving) bacteria. Depending on weather conditions, the lagoon may discharge excess liquid, which must be disposed of on the property from which it originates. A grassed area surrounding the lagoon takes up these liquids, minimizing the potential for ground or surface water pollution.

## Sizing The Septic Tank and Lagoon

Septic tanks come in rectangular, oval or round shapes. The shape of the tank has little to do with its performance, but tank size is important. The retention capacity allows time for solids to properly separate from the liquids before the liquids pass into the lagoon. The minimum tank size is based on the number of bedrooms in the dwelling. If the dwelling has a hot tub or whirlpool, it is wise to add one bedroom of capacity for each of these fixtures present.

Minimum tank sizes will be adequate to handle all household wastes, including water from the toilet and kitchen drains, referred to as blackwater, and water from the bathtub, shower, sinks and laundry, which is called graywater. Larger tanks allow longer intervals between tank clean-out operations.

Lagoon size is determined by the number of bedrooms in the dwelling, but it should have a minimum water surface area of at least 440 square feet per bedroom or 900 square feet, whichever is greater, at a 3-foot operating level. When a properly sized septic tank exceeds the lagoon, the lagoon water surface area may be reduced by up to 20 percent if approved by the regulatory agency.

If properly designed, installed and maintained, a lagoon system can effectively treat household wastewater for many years.

## Site Selection

Lagoons may be used where there are significant limitations related to groundwater and the soils are known to be impermeable. Many soils in Missouri have a high clay content, making them ideal construction materials for a lagoon. Some soils in southern and south central Missouri contain a dense soil layer called a fragipan, underlain by extremely porous, cherty gravel and/or fractured bedrock. Like extra care in these soils not to breach the fragipan, or lagoon leakage could easily contaminate regional groundwater.

The process that takes place in a lagoon is a natural one, with microscopic plants and animals coexisting and dependent on each other. Lagoons should be located in open areas to allow sunlight and wind to provide oxygen for further treatment.



Errant or unwanted vegetation (trees, bushes, brush) around your onsite wastewater lagoon stabilization pond is vital to the performance of the system. Vegetation roots can penetrate the pond's seal and cause leakage and contamination.

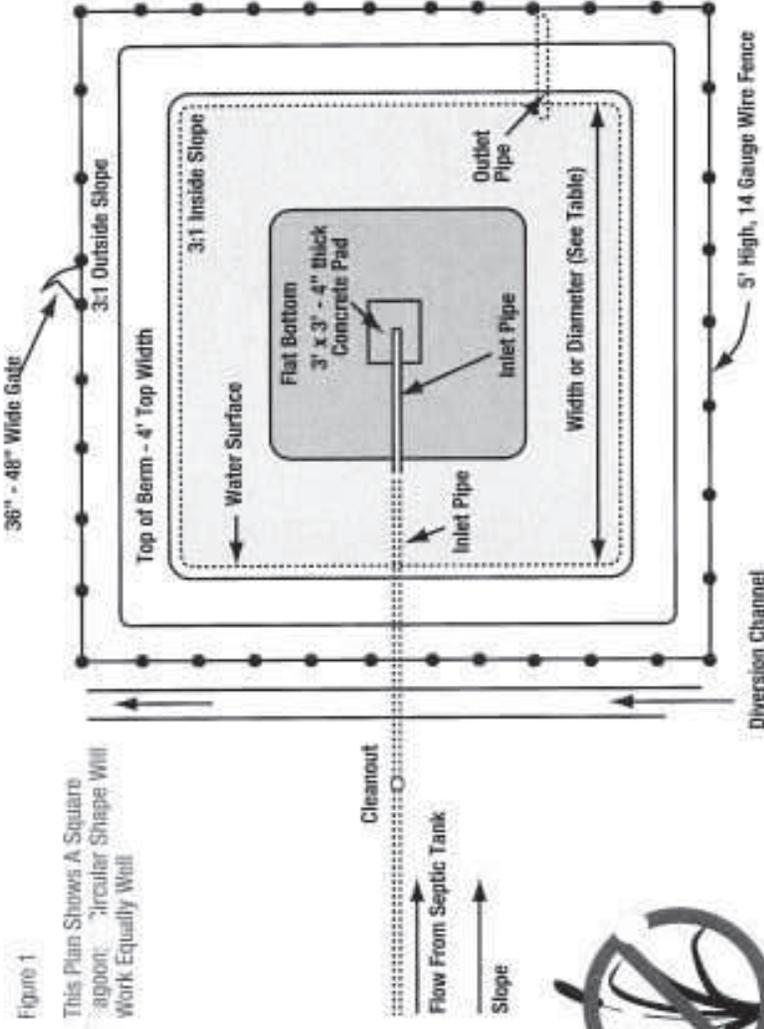


Figure 1  
This Plan Shows A Square Lagoon. Circular Shape Will Work Equally Well

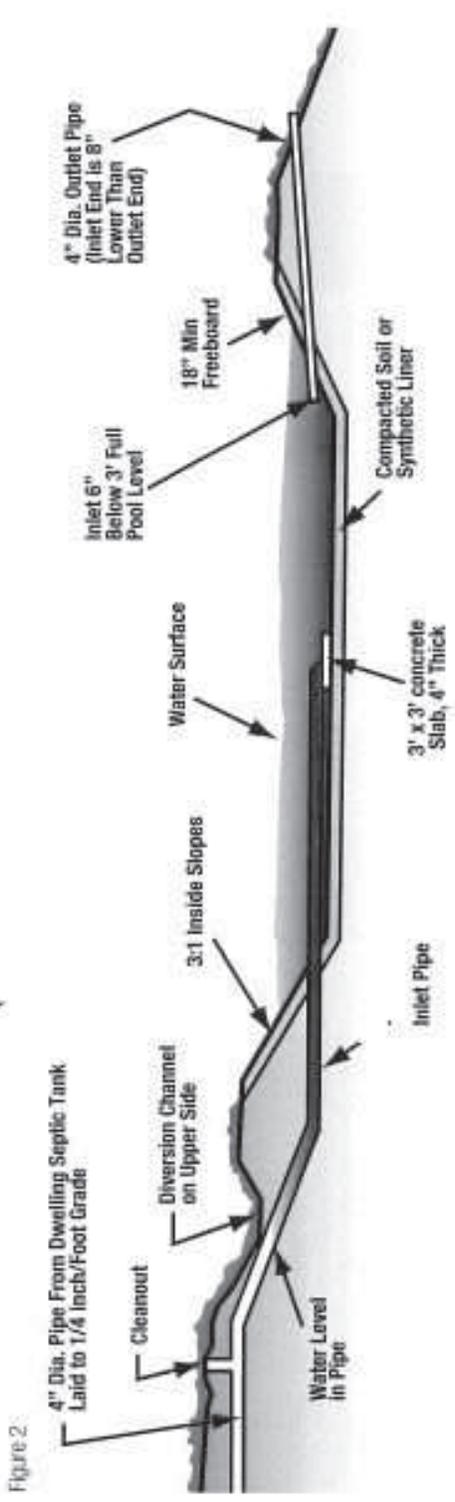
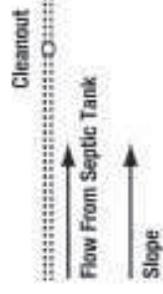


Figure 2  
4" Dia. Pipe From Dwelling Septic Tank Laid to 1/4 Inch/Foot Grade

**MAINTAINING YOUR ONSITE WASTEWATER TREATMENT SYSTEM**

**DO**

- Do** obtain necessary permits from the appropriate local agency before doing any construction or repairs.
- Do** use professional certified installers when needed.
- Do** keep your septic tank accessible for pumping and adjustment. Install risers if necessary. The covers should be locked or of sufficient weight to prevent a child from sitting them.
- Do** have your septic tank inspected annually and tank pumped out every 2 to 3 years by a professional contractor.
- Do** keep a detailed record of repairs, pumping, inspections, permits issued and other maintenance activities.
- Do** conserve water to avoid overloading the system. Repair dripping faucets and leaking toilets, avoid long showers, and run washing machines and dishwashers only when full. Use water-saving faucets in faucets, showers, heads and toilets.
- Do** divert other sources of water like roof drains, house hooding drains, and sump pump outlets, and driveway and garage wash water from the lagoon system. Use curbs, drains, trenches, overtopped entrances, storming wells, etc. to divert water.
- Do** use either hazardous household chemicals to an approved hazardous waste collection center for disposal. Use bleach, disinfectants and a drain and toilet bowl cleaners sparingly and in accordance with product labels.
- Do** remove vegetation growing in lagoon. Trees, shrubs, cattails, and weeds reduces the capacity of the lagoon which can reduce quality of treatment.
- Do** maintain a 5' high fence around lagoon.

**DON'T**

- Don't** pour paint into a septic tank for any reason. Toxic paints in the tank can be explosive and can cause asphyxiation.
- Don't** allow anyone to drive or park over any part of the system.
- Don't** allow the overflow from the lagoon to leave your property, even during wet weather. A grass cover will not only prevent erosion, but will help absorb excess water.
- Don't** plant trees or shrubbery near the lagoon. This could cause shading, siltage buildup and increased odor levels. Decaying vegetation can lead to acids in lagoon harm and promote beam rot.
- Don't** make oil or grease additions to your lagoon system without obtaining the necessary permits.
- Don't** pour into drains any grease, cooking fat, chemical drain cleaners, paint, varnishes, solvents, tools, waste oil, photographic solutions, pesticides, pharmaceuticals or other organic chemicals. These materials can upset the bacterial action in the septic tank or lagoon and pollute groundwater.
- Don't** use your tank for trash as a trash can. Keep out coffee grounds, bones, cigarette butts, disposable diapers, feminine hygiene products, paper towels, facial tissues and other materials that decompose very slowly.
- Don't** use any more or yeast additives to the septic tank or lagoon in hopes of increasing bacterial action. None have been proven beneficial and some actually cause damage to soil and vegetation and may pollute groundwater.

**IF YOU HAVE CHILDREN**

Even with the best maintenance some systems will eventually have problems. Call the Greene County Resource Management Department 868-4147 for advice on ways to address these problems.

**National Average Water Use**



Source: American Water Works Association Research Foundation, "Residential Use of Water" 1997

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**Greene County Resource Management Department**  
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**MAINTAINING YOUR ONSITE WASTEWATER LAGOON SYSTEM**

*Proper maintenance protects your family's health, saves you money, and guards area water quality*

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**WHY A LAGOON SYSTEM FOR YOUR PROPERTY?**



Many building sites are unsuitable for conventional septic tank systems because of a high water table, shallow depth to rock, heavy clay content, or restrictive layers in the soil.

A properly sized lagoon system can overcome these limitations because it permits treatment of effluent in the most cost-effective method.

**WHY MAINTAIN YOUR SYSTEM**

The first and most important reason to maintain your system is to protect the health of your family, your community and the environment. Untreated wastewater from a failing system can contaminate nearby wells, groundwater, and drinking water sources.

Significant health risks include hepatitis A, diarrhea, salmonella, giardiasis, tetanus, hookworm, cholera, dysentery, typhoid fever, and staphylococcal infections.

The second reason is money. Failing systems are expensive to repair or replace, and poor maintenance is a common cause of premature system failure. Routine preventive maintenance costs very little compared to a system replacement. For example, a system inspection and maintenance, including pumping the tanks, costs from \$150-\$300. In contrast, replacing a failing system with a new one typically costs from \$4,500 to \$20,000, assuming you have enough property to install the replacement system. In addition, property values may drop when a system fails.

The third reason is lack of alternatives. A lagoon system was selected for your building location because of some limiting factors to the soil or space constraints. You need to care for the system to keep it operating because there may not be any other legal and healthy ways to handle sewage at your location.



**MAINTAINING YOUR ONSITE WASTEWATER DRIP SYSTEM**

**DO**

- Do** obtain necessary permits from Greene County Resource Management Department, (417-888-4015), or the appropriate local agency, before making any repairs.
- Do** use professional certified installers when needed.
- Do** have your site system maintained bi-annually by a professional.
- Do** have your septic tank pumped out as needed.
- Do** keep your septic tank and pump chamber accessible for inspections and pumping. Install insect if necessary.
- Do** call a professional whenever the alarm sounds or you observe effluent surfacing over the lateral lines.
- Do** keep a detailed record of repairs, pumpings, inspections, permits issued, and other maintenance activities.
- Do** conserve water to avoid overloading the system. Repair any leaky faucets or toilets.
- Do** divert other sources of water, like roof drains, house flooding drains, and sump pumps away from the drip system.
- Do** establish and maintain a good stand of grass over the lateral field.

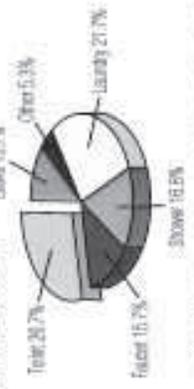
**DON'T**

- Don't** go down into a septic tank or pump chamber.
- Don't** allow anyone to drive or park over any part of the system.
- Don't** plant anything over or near the lateral fields except grass. Even mops from nearby trees or shrubs may clog and damage the drain lines.
- Don't** dig in your lateral field or build anything over it, and don't cover the lateral field with a hard surface such as concrete or asphalt.
- Don't** pour into drains: septic tank additives, chemical drain cleaners, paint, varnishes, thinners, waste oil, photographic solutions, pesticides, pharmaceuticals, and other organic chemicals. Minimize garbage disposal use.
- Don't** make or allow repairs to your system without obtaining the necessary permits.
- Don't** use your toilet for trash disposal.
- Don't** allow backwash from your home water softener to enter the septic system.
- Don't** ignore or silence an alarm. Call your maintenance provider or a certified installer immediately.

**IF YOU HAVE PROBLEMS**

Even with the best maintenance some systems will eventually have problems. Call the Greene County Resource Management Department 888-4147 for advice on ways to address these problems.

**National Average Water Use**



Source: American Water Works Association Research Foundation, "National End Use of Water" (1997)

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**MAINTAINING YOUR ONSITE WASTEWATER DRIP SYSTEM**



*Proper maintenance protects your family's health, saves you money, and guards area water quality!*

**WHY MAINTAIN YOUR SYSTEM**

The first and most important reason to maintain your system is to protect the health of your family, your community and the environment. Unheated wastewater from a bathing system can contaminate nearby wells, groundwater, and drinking water sources.

Significant health risks include hepatitis A, diarrhea, salmonella, giardiasis, listeria, hookworm, cryptosporidium, leptospirosis, and shigella/bacterial infections.

The second reason is money. Failing systems are expensive to repair or replace, and poor maintenance is a common cause of premature system failure. Routine preventive maintenance costs very little compared to a system replacement. For example, a system inspection and maintenance, including pumping the tanks, costs from \$150-300. In contrast, replacing a failing system with a new one typically costs from \$15,000 to \$30,000, assuming you have enough property to install the replacement system. In addition, property values may drop when a system fails.

The third reason is lack of alternatives. A drip system is best specified for your building location because of some limiting factors in the soil or space constraints. You need to care for the system to keep it operating because there may not be any other legal and healthy ways to handle sewage at your location.

The fourth reason is to keep household toilets flushing. Unlike a conventional septic system that continues to operate at a less effective level, an inoperable or unmaintained drip system will stop functioning entirely. You may not be able to flush toilets and drains may back up if the system is not properly maintained.

**WHY A PRETREATMENT TO DRIP SYSTEM FOR YOUR PROPERTY?**



Many building sites are unsuitable for conventional septic tank systems because of a high water table, shallow depth to rock, heavy clay content, or restrictive layers in the soil. Other factors include available space and minimum separation distances from lines including sinkholes and wells.

A properly maintained drip system can overcome these limitations because:

1. It permits drip lines to be placed at a shallow depth, in the best available soil.
2. It can distribute the effluent uniformly throughout the drain field at a slow rate.
3. It allows the soil to rest between dosing cycles.
4. It requires the effluent to be treated before it enters the soil.
5. It allows a smaller absorption field or footprint.

These factors help maintain aerobic (oxygen rich) conditions in the soil for adequate treatment of the effluent before it reaches ground or surface waters.

## HOW DOES A LOW PRESSURE PIPE SYSTEM WORK?

Household waste enters the septic tank where heavy solids settle out to form a layer of sludge on the bottom. Grease and light solids float to the top forming a layer of scum. The liquid, partially treated effluent flows from the tank into the pump chamber for distribution to the lateral lines.

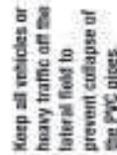
When the effluent rises high enough to trigger the float switch, the pump turns on, pushing the liquid through the supply line to the narrow trenches. Under low pressure, effluent flows through holes in the laterals and into the gravel-filled trenches. It soaks into the soil where bacteria finish treatment.

The float switch is set to turn on the pump two to four times every day. The rest periods in between allow soil bacteria to get the oxygen they need to process the effluent. If the pump or water level controls do not work properly, the rising effluent sets off an alarm, notifying you of the problem. The control panel, which includes an alarm and light, will be located near your home or system.

## MAINTAINING THE KEY COMPONENTS OF A LOW PRESSURE PIPE SYSTEM

**Some chemicals can destroy the bacterial action taking place in your system. Do not pour the following down drains: chemical drain openers, septic tank additives, paint, varnishes, thinners, waste oil, photographic solutions, pesticides and pharmaceuticals, and other organic chemicals.** Call University Extension to locate a household chemical collection center. In Springfield, call the Household Chemical Collection Center at 864-2000. If used according to the label directions, most other household cleansers and chemicals will not harm your system.

**Conservate as much water as possible because excess water may cause the system to overflow and force effluent to the surface.**



Keep all vehicles or heavy traffic off the lateral field to prevent collapse of the PVC pipes.



Have water wells tested every year. The health department provides low cost testing. Remember, the well that is closest to a low pressure pipe treatment system is usually your own.

### Handling Prescription Drugs

Do not flush prescription drugs down the toilet or drain unless the label or accompanying patient information specifically instructs you to do so.

For more information, talk to your health care provider, your pharmacist or visit:

- U.S. Food and Drug Administration  
[www.fda.gov/drugs](http://www.fda.gov/drugs) and search "disposal"
- U.S. Environmental Protection Agency  
[www.epa.gov/3act](http://www.epa.gov/3act)

**Federal Guidelines on Disposal of Prescription Drugs**  
[www.tetra-hydro.org/PDFs/guidelines\\_for\\_disposal\\_of\\_prescription\\_drugs.pdf](http://www.tetra-hydro.org/PDFs/guidelines_for_disposal_of_prescription_drugs.pdf)

Inspect the pump chamber every time you leave the septic tank pumped or if the high water alarm sounds. If any sludge or scum are visible, have the tank pumped out. If these particles pass through the pump, they may clog the lateral lines or seal. Any of these conditions can lead to complete system failure and a costly repair.

Have a certified installer perform the following maintenance annually:

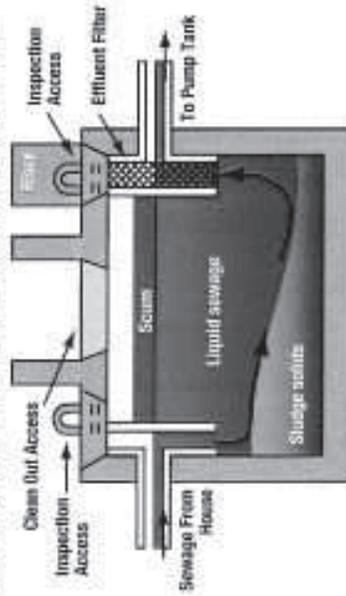
1. Flush lines
2. Adjust pressure
3. Check filters
4. Check operation of pumps, alarms, and float switches
5. Check water tank solids accumulation for need of pumpout

Seed and mulch the entire lateral field to establish a protective cover. This prevents erosion and keeps the lateral field covered. The grass also transpires water to the atmosphere, removing some of the moisture from the system.

Fill any low areas within the field to prevent ponding. Excess water keeps the soil from naturally cleansing the next season. Do not ignore the alarm.

## SEPTIC TANK

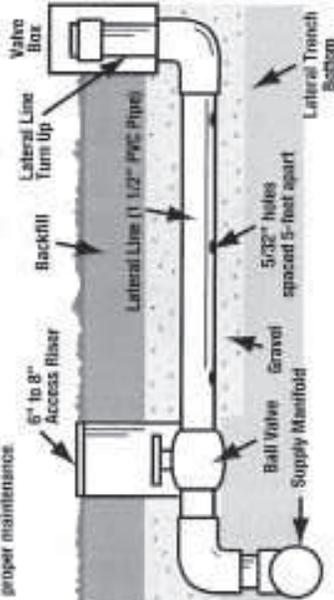
Use a septic service to pump accumulated sludge and scum from the septic tank every 2-5 years. Natural bacteria break down part of the material, but not all.



**CAUTION!** Do not use septic tank additives with a low pressure pipe system. They allow partially broken down solids to be held in suspension and transported into the pump tank. This can cause a nasty gelatin-like substance to form in the pump tank, ruining the pump and clogging the lateral lines.

## LATERAL INSTALLATION (detail)

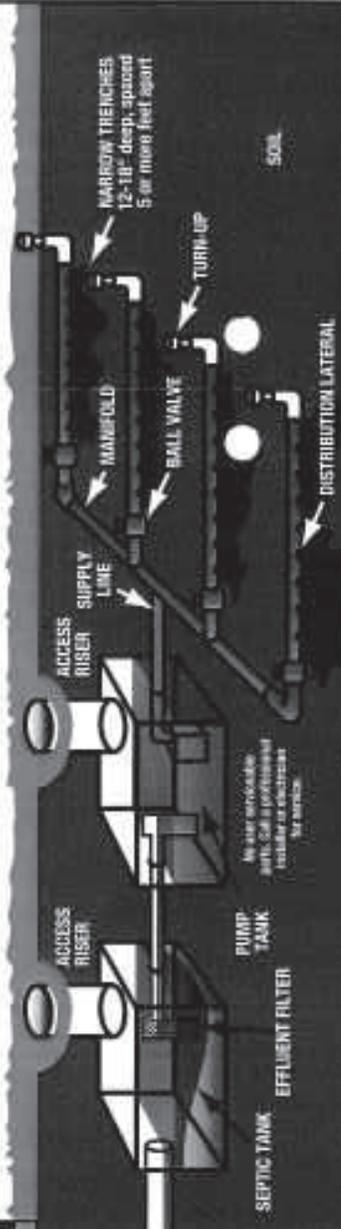
These shallow, pressure-dosed self-absorption systems require proper maintenance



### WARNING

Use the buddy system when inspecting a septic tank or pump tank. Never allow anyone to inspect a septic tank alone or go down into a septic tank or pump tank. Toxic gases are produced by the natural treatment processes in septic tanks and can kill in minutes.

Divert all unnecessary water, including laundry, roof and foundation drains, away from the distribution laterals.



## MAINTAINING YOUR LOW PRESSURE PIPE SYSTEM

### DO

- Do obtain necessary permits from Greene County Resource Management Department, (417-868-4015), or the appropriate local agency, before making any repairs.
- Do use professional certified installers when needed.
- Do have your low pressure pipe system inspected and maintained annually.
- Do have your septic tank pumped out every 2-5 years.
- Do keep your septic tank and pump tank accessible for inspections and pumping. Install risers if necessary.
- Do call a professional whenever the alarm sounds or you observe effluent surfacing over the lateral lines.
- Do keep a detailed record of repairs, pumpings, inspections, permits issued, and other maintenance activities.
- Do conserve water to avoid overloading the system. Repair any leaky faucets or toilets.
- Do divert other sources of water. Use roof drains, house footing drains, and sump pumps away from the LP system.
- Do relax and maintain a good stand of grass over the lateral field and keep it mowed.

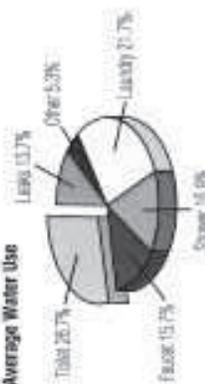
### DON'T

- Don't go down into a septic tank or pump tank.
- Don't allow anyone to drive or park over any part of the system.
- Don't plant anything over or near the lateral fields except grass. Even roots from nearby trees or shrubs may clog and damage the drain lines.
- Don't dig in your lateral field or build anything over it, and don't cover the lateral field with a hard surface such as concrete or asphalt.
- Don't pour into drains: septic tank additives, chemical drain cleaners, paint, varnishes, thinners, waste oil, photographic solutions, pesticides, pharmaceuticals and other organic chemicals. Maximize garbage disposal use.
- Don't make or allow repairs to your system without obtaining the necessary permits.
- Don't use your toilet for trash disposal.
- Don't allow backwash from your frame water softener to enter the septic system.

### IF YOU HAVE PROBLEMS

Even with the best maintenance some systems will eventually have problems. Call the Greene County Resource Management Department 868-4147 for advice on ways to address these problems.

#### National Average Water Use



Source: American Water Works Association Research Foundation, "Residential End Uses of Water" 1997.

Jan K. Minn  
Springfield, MO  
65805-1018  
417.868.1117

Production of this fact sheet partially paid for by  
**Environmental Resources Coalition**

Portions of the information contained in this fact sheet obtained through the National Small Flow Clearinghouse, West Virginia University, Morgantown, WV 26506-8064

**Greene County Resource Management Department**  
940 Booneville  
Springfield, MO 65802  
417-868-4147

## MAINTAINING YOUR LOW PRESSURE PIPE SYSTEM

Proper maintenance protects your family's health, saves you money, and protects your water quality.



Greene County  
Resource  
Management



#### The fourth reason is to keep household toilets flushing.

Unlike a conventional septic system that continues to operate at a less effective level, an installed low pressure pipe system will stop functioning entirely. You may not be able to flush toilets and drains may back up if the system is not properly maintained.

#### WHY A LOW PRESSURE PIPE SYSTEM FOR YOUR PROPERTY?

Many building sites are unsuitable for conventional septic tank systems because of a high water table, shallow depth to rock, heavy clay content, restrictive layers in the soil, or limited available space.

A properly maintained low pressure pipe system can overcome these limitations because:

1. It permits lateral trenches to be placed at a shallower depth, in the best available soil.
2. It can distribute the effluent uniformly throughout the drain field.
3. Smaller absorption fields or footprints.
4. It allows the soil to self-treat when using oxygen.

These factors help maintain aerobic (oxygen rich) conditions in the soil for adequate treatment of the effluent before it reaches the groundwater.

#### WHY MAINTAIN YOUR SYSTEM

The first and most important reason to maintain your system is to protect the health of your family, your community and the environment.

Untreated wastewater from a failing system can contaminate nearby wells, groundwater, and drinking water sources.

Significant health risks include hepatitis A, diarrhea, salmonella, giardiasis, trichina, hookworm, cholera, typhoid, typhoid fever, and streptococcal infections.

**The second reason is money.** Failing systems are expensive to repair or replace, and poor maintenance is a common cause of premature system failure. Routine preventive maintenance costs very little compared to a system replacement. For example, a system inspection, including pumping the tanks, costs from \$150 to \$300. In contrast, replacing a failing system with a new one typically costs from \$4,500 to \$20,000, assuming you have enough property to install the replacement system. In addition, property values may drop when a system fails.

**The third reason is lack of alternatives.** A low pressure pipe system was searched for your building location because of some limiting factor in the soil and/or limited available space. You need to care for the system to keep it operating because there may not be any other legal and healthy ways to handle sewage at an location.

One of the best things you can do for your septic system is to reduce the amount of water flowing into it. This is especially important if the soil on your lot does not readily absorb waste.

A typical family of four uses 250-300 gallons of water every day.

You can reduce this figure with simple conservation measures.

- Repair leaking faucets or running toilets.
- Use clothes and dish washers only when full.
- Reduce length of showers and lower water level in baths.
- Turn off unneeded water when washing hands and brushing teeth.
- Install water saving fittings in faucets and shower heads.
- Install a low-flush toilet or toilet dam.
- Use front loading/high efficiency washing machine.



## 2008 Annual Report Education Outreach

### Year at a Glance (see notes)

Number served	6,000+
Students Visiting Watershed Center	1,800
Watershed Event bookings:	89
OWTC uses	4
Media Releases:	4
Interpretive Signs Created:	16
New Publications	5?

Notes: The number served reported should be considered minimum number; it does not account for visitors using information on the website, interpretive signage, or visitors that gather information from the various "booth" displays at other events, etc. Students visiting the Watershed Center were rounded to the nearest 100. The most successful program in getting students to the Watershed Center was the Wonders of Watersheds program, with about 1400 fifth grade participants. "Watershed Event Bookings" are the events we attended, including both events we organized, and events we partnered on. This averages an event every 2.8 working days. Details to other topics are covered in "highlights" below.

### Highlights

#### **Media Releases**

The Watershed Center had four excellent media releases in 2008. Missy Shelton with KSMU radio (NPR), did a two part segment about the Watershed Center, environmental education, and Climate Change. The National Audubon Society sent a videographer to record the Together Green event at the Watershed Center to be used as a national showcase for the Together Green project and available on the web. And finally, Mike Kromrey was interviewed on KOLR 10 about the Onsite Wastewater Training Center.

#### **Publications**

- Community Onsite Wastewater and Stormwater Booklet
- The Value of Protecting Missouri Streams (Matt Keener and Olson and Associates)
- A Historied Creek, by Loring Bullard. Missouri Resources Magazine
- Watershed of Information, by Victoria Lovejoy Missouri Resources Magazine
- How to Build a Rainbarrel By WCO and JRBP (was this 2008??)

#### **Signs (Interpretive)**

These interpretive signs were created in 2008 to augment passive learning opportunities at the Watershed Center, and are posted on the Watershed Center Website.

- Beyond the Basin
- Bio-Swale Sign
- Detention Basin
- Forests and Watersheds

- Forest Management
- Gabion Basket Wall
- Lakeside Biology
- Level Spreader Trench
- Native Vegetation
- Outlet Protection
- Pervious Pavement
- Rain Garden
- Site Construction
- Stormwater 101
- Water Treatment Process
- Welcome to Onsite Wastewater Training Center

### **WOW, WDU, and WOW School!**

Wonders of Watersheds (**WOW**) brought over 1,400 fifth grade students from local schools to the Watershed Center. A grant from the Community Foundation of the Ozarks and partnership with Wonders of Wildlife and Springfield Greene County Parks allowed students to learn about the life within and functions of their drinking watershed.

Wonders Down Under (**WDU**) was a successful program from 2007 that brought back by popular demand. Ninety-two area fifth grade students toured Gibbony Cave, visited the steam trailer and saw live animals, learning about the importance of clean water above and below the ground.

The Wonders of Wildlife National Outdoor Recreation and Conservation School (**WOW School**) teaches participants how to enjoy a wide range of outdoor recreation activities while practicing personal safety and outdoor responsibility. Each course includes an outdoor skill, conservation, safety, and ethics component. WCO participated in two WOW Schools in 2008, making beginner stream ecology available for the 261 participants (about 30 of which attended).

### **WOLF**

Over the last year, the Wonders of the Ozarks Learning Facility (**WOLF school**) has developed into an outstanding resource for our local youth. During my four interactions with the WOLF school during the fall semester, I noticed that the students are **more motivated and excited about school than with any other class, public or private, that I have ever seen.** Without a doubt, students are getting positive, meaningful life experiences while receiving their education. The teachers, Susan Dyle and Rebecca Ziegler, have taken the challenge of this innovative program in stride, and they have been the catalyst for making the WOLF school work.

As a non-formal educator with the Watershed Committee of the Ozarks, I often find bringing the message of clean water to public school students a challenge. We can tailor lessons for any subject, and any learning expectations (MIG's, GLE's, etc.), but still face barriers in bringing our resources to students. The flexibility of the WOLF school

curriculum and the ability to take more field trips allows community resources like the Conservation Department, Master Naturalists, and Watershed Committee to be more involved with the students and teachers.

The world will face increasingly complex and drastic environmental challenges, and the WOLF program will help produce the informed citizens and leaders we will need to face those challenges. Thank you for making the Wonders of the Ozarks Learning Facility a reality, and please continue your support. Attached is a copy of the Watershed Committee Newsletter with an article about a priceless experience the WOLF students had on a field trip at the Watershed Center.

### **Watershed Festivals**

The James River Basin Partnership holds Watershed Festivals every year, and WCO is a strong supporter. In 2008 we pledged volunteer(s) or staff to every Festival held, and ran about 1,500 regional fifth graders through an intense day of fun and water education.

### **Stormwater for Professionals**

Watershed Committee partnered with the City of Springfield's Stormwater Services Division on the educational workshops about the new Stormwater Design Criteria Manual and Erosion Control guidelines. We have provided help in editing the manuals, workshop setup, and publicizing events using our email list serve, as well as attending and helping with the workshops.

Another cooperative project has been the Stormwater 101 interpretive sign, designed to be placed at the Watershed Center, and other points of stormwater interest in town (like Jordan Creek). Another suite of interpretive signs was produced for the **Stormwater Demonstration Area** at the Watershed Center (a component of the COWS grant). The Watershed Center will have about ten best management practices (like pervious concrete, bioswales, raingardens, etc.) demonstrated in a small area, and each BMP will have interpretive signage. In the future, the Site and Center will accommodate stormwater training classes.

### **Together Green**

Together Green is designed to involve citizens in creating a brighter, healthier future. It is a dynamic and innovative Audubon program funded by Toyota that aims to provide inspiration, leadership and opportunities that inspire people everywhere to take action at home, in their communities and beyond to improve the health of our environment.

The Watershed Center partnered with the Greater Ozarks Audubon, Springfield Conservation Nature Center, and The Springfield Plateau Master Naturalist to conduct two major Together Green volunteer events. The first event had over 150 volunteers, and was professionally filmed for The National Audubon website. Volunteers collected biological data and worked on various projects around the Watershed Center, donating over 500 hours of volunteer work in one day! The second event produced over 20 nesting boxes to improve the bird habitat at the Watershed Center.

### **Community Onsite Wastewater and Stormwater Project (COWS)**

The Community Onsite Wastewater and Stormwater Project is now complete. The Missouri Department of Natural Resources awarded this grant to the Watershed Committee of the Ozarks. A Section 319 Nonpoint Source Implementation Grant provided the total project award of **\$185,750**. The nonfederal matching support in the amount of **\$123,900** was provided through The Watershed Committee of the Ozarks and its partners for a total project cost of **\$309,650**. The grant period was from June 1, 2004 through July 31, 2008. **All the milestones were completed**, and **95%** of the Federal funding was spent.

### **Onsite Wastewater Training Center (OWTC)**

The OWTC serves as an outdoor classroom for onsite wastewater installers. The COWS grant and Water Quality Improvement Project have helped fund the collaborative project of Greene County and WCO. In 2008, four classes of installers, and over 100 homeowners attended education and demonstration events at the OWTC.

### **Groundwater Guardian**

Groundwater Guardian (GG) encourages communities of all types (cities, counties, watersheds, etc.) to begin and enhance groundwater education and protection activities. Groundwater Guardian supports communities in their efforts and recognizes their achievements. Watershed Committee *helped achieve Groundwater Guardian status for Greene County for the thirteenth consecutive year.*

### **Groundwater Green Site**

The Watershed Center was accepted by the Groundwater Foundation and the only regional, registered to date. The Groundwater Guardian (GG) Green Site program recognizes good stewards of groundwater by encouraging managers of highly-managed green spaces (golf courses, ball fields, education campuses, parks, etc.) to implement, measure, and document their groundwater-friendly practices related to chemical use, water use, pollution prevention, water quality, and environmental stewardship.

### **Little Bridge**

The "little bridge" at the Watershed Center was a big project. The stream that flows into the lake posed a major barrier to hikers and students in times of high water. With the help of Greene County, a motivated Boy Scout, and the North Side Rotary our bridge is almost complete! The Jon Williams original design spans 29 feet and is about 9 feet over the stream bed in the center.

### **Missouri Environmental Education Association (MEEA)**

MEEA's mission is to provide innovative professional development and networking opportunities for Missouri's Environmental Educators, both for teachers in the classroom and for educators in agencies and organizations, to help them help Missourians become more environmentally responsible. WCO is a long time supporter of MEEA, and in 2008 Mike Kromrey was elected as a board member for the organization. For the first time ever, the MEEA annual conference will be in the Springfield Area in 2009, and we will help make it a huge success.

### **Forestry Learning Station**

The Learning Station is located just off the Doline Loop trail, on the edge of a pronounced sinkhole in the upland forest. A grant from the LAD foundation and volunteers organized by Dave Sturdevant built Leopold Benches for the spot. The **benches can accomidate a solitary hiker or a whole class**. To add to the experience, three interpretive signs titled Forests and Watersheds, Forest Management, and Forest Ecosystems accompany the Benches.

### **YMCA Summer Odyssey**

Watershed Committee partnered with the Ozarks Regional YMCA to bring Summer Odyssey program participants for an afternoon of learning about water. Students ranged in age form Kindergarten to sixth grade. **Three Hundred and Fifty students** toured the Watershed Center learning about water and water conservation.

### **Show Me Yards and Neighborhoods**

2008 started the planning for a serious round of Show-Me Yards & Neighborhoods (SMYN) in 2009. SMYN is an educational program designed to raise awareness about the role urban storm water runoff plays in the water quality of nearby streams, creeks, rivers, and lakes. Through voluntary educational activities, SMY&N offers environmentally responsible alternatives to traditional lawn care and construction practices that contribute to the runoff of contaminants and excess nutrients. SMY&N also recognizes and commends individuals and professionals who put the SMY&N techniques into practice - homeowners can earn an attractive yard sign and professionals can become certified. Choose Environmental Excellence, the City of Springfield, Greene County, Greene County Soil and Water Conservation District, and MU Extension and WCO partner on the project.

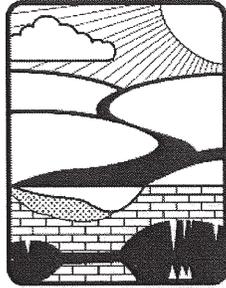
### **Adopt a Spring**

Adopt a Spring is a volunteer water quality monitoring program. Trained volunteers collect water samples from the major springs with public access in Greene County Quarterly.



Date	Event	Age Bracket	Number	Se	Minutes per lesson
13-Jan	Show me yards	professional	60	all day	
27-Jan	enviroscape training	adult volunteers	12	30	6
5-Feb	MSU Panel on Children/Nature/edu	college	45	60	45
6-Feb-09	MNRC P and Streams (Matt)	professional	25	30	12.5
9-Feb	Big Bros and Sisters at IC	5th and college	16	45	12
11-Feb	Watershed Festival Christian	5th			0
12-Feb	Watershed Festival Christian	5th			0
18-Feb	Watershed Festival Christian	5th			0
19-Feb	Watershed Festival Christian	5th			0
20-Feb	Watershed Festival Christian	5th			0
23-Feb	Big Bros and Sisters at IC	5th and college	16		0
24-Feb	owtc DHSS	professional	?		
2-Mar	Reed Middle School at VWM	7th	6	60	6
3-Mar	Watershed Festival Stone	5th			0
3-Mar	Pipkin MS at VWM	6th, 7th	26	120	52
9-Mar	McBride	4th	23	15	5.75
9-Mar	Reed Middle School at VWM	7th	6		0
11-Mar	Taney Watershed Festival				0
12-Mar	Taney Watershed Festival				0
16-Mar	McBride	4th	23	120	46
16-Mar	summit prep school	middle	12		0
18-Mar	Math honors society presentation	high school/parents	35	20	11.66667
26-Mar	Show me yards	professional	60	25	25
1-Apr	CHS jordan creek lesson	high school	4		0
7-Apr	Pipkin MS at VWM	6th	140	120	280
9-Apr	Holland school	1st	40	120	80
14-Apr	Drury architect education	college	6	20	2
15-Apr	schwitzer methodist earth day water	1st throught 5th	30	20	10
17-Apr	Studie Middle School WC FT	8th	120	120	240
21-Apr	Sequiota school	3rd	65	120	130
23-Apr	Geo Cache JC educaton	retired	2	120	4
25-Apr	Wow school	all ages	15	180	45
28-Apr	Bailey Alt. School	highschool	40	40	26.66667
29-Apr	Jeffries students go to work visit	3rd	22	20	7.333333
may 2-3	Artsfest				0
5-Apr	Watershed Center Watershed Fest	5th	100	180	300
12-May	Jeffries students go to work visit	3rd	22	60	22
14-May	Girl Scouts	Brownies and Parents	8	30	4
21-May	Bois D'Arc event w/ Hickory Hills	5th	75		0
27-May	Cherokee Mega Field Trip	7th	112	120	224
30-May	Together Green Event	all ages			0
10-Jun	Truman Summer School	5th and 2nd	18	60	18
13-Jun	River Rescue Stream Trailer	All ages	30		0
15-Jun	Stockton Summer School	5th--8th	60	140	140
22-Jun	Highlandville school	2nd grade	30	160	80
22-Jun	Missouri Geography Alliance	teachers	20	75	25
24-Jun	Volunteer training	College	3	120	6
29-Jun	Wanda Grey E scape	2nd grade 2 classes	34	30 each	
30-Jun	Field Elementary E scape	4th	20	30	10
Total:			1381		1875.917





# Watershed Committee of the Ozarks, Inc.

## 2009 Annual Report

Watershed Committee Sponsors:



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## **Executive Summary**

Like most governmental and non-governmental agencies and organizations, the Watershed Committee suffered considerable financial stress in 2009. Most of our operational support comes from the Committee's three founding sponsors, the city of Springfield, Greene County and City Utilities of Springfield. Each of these sponsors had their own financial difficulties, so we could not expect the levels of funding from them that we have enjoyed in the past. Just the same, we have tried to stay focused on our water quality mission and maintain those programs that have been proven successful in support of our mission for the last twenty-five years.

Like other non-governmental entities, we have looked to supplement our financial portfolio by seeking grants, partnerships, foundation funding, workplace giving and other means. But the hard financial times have also increased competition for funding from these same kinds of sources. Obviously, we cannot hold it against other organizations for also seeking additional sources of revenue.

In spite of this situation, we have moved ahead with plans to build the main education building at the Watershed Center. At the end of 2009, we had enough in cash and pledges to complete the project as it was reconfigured earlier in the year, with a smaller building that would still provide public meeting spaces and meet the intended LEED energy and water efficiency criteria. But procuring financing for projects like the Watershed Center has also become more challenging due to the changed economic climate. In any event, we hope to make the arrangements and begin construction on this last major piece of the Watershed Center project in 2010, with a goal of opening it to the public in the spring or summer of 2011.

Whether you are a City Councilperson, City Utilities Board Member, Greene County Commissioner, an employee of one of our sponsors, or simply an interested citizen, we hope that you will find this annual report helpful. Please contact us if you have questions, concerns, suggestions or ideas about our services or how they could be improved. Our goal, as always, is to protect the sources of public drinking water for our community. Since 1984, we have not wavered in pursuit of that mission.

*Loring Bullard, Executive Director*

## 2009 Board Members

William H. Cheek, Chair; Leslie Carrier, Vice Chair; Robin Melton, Secretary; Ted Hillmer, Stuart Murr, Michael Bridges

## 2009 Staff

Loring Bullard, Executive Director; Matt Keener, Operations Manager; Kelly Guenther, Office Manager; Mike Kromrey, Education & Outreach Coordinator; Stacey Armstrong, Projects Coordinator; Kyle Kosovich, Projects Assistant



Pictured from left to right 2009 Staff

Kyle Kosovich, Stacey Armstrong, Loring Bullard, Mike Kromrey, Matt Keener, Kelly Guenther



Watershed Committee of the Ozarks, Inc.

320 North Main Avenue

Springfield, MO 65806

(417) 866-1127

(417) 866-1918 (fax)

[www.watershedcommittee.org](http://www.watershedcommittee.org)

Office Hours:

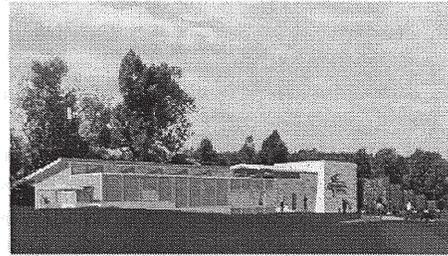
Monday-Friday

8 a.m. to 5 p.m.

## Watershed Committee Highlights

### Watershed Center Project

Significant work occurred at Valley Water Mill in 2009 in anticipation of completing the final major piece of the project, the main education center building in the southeast part of the Park. Given the financial conditions, the Watershed Committee began working with the architect in early 2009 to reduce the building footprint, while at the same time keeping all of the LEED and water demonstration features intact. The smaller building meant that the offices of the Watershed Committee would remain downtown. The new building at the Watershed Center would contain three work stations, along with a large public meeting room, small catering kitchen, reception area and restrooms.



View from Parking looking Southwest  
THE WATERSHED CENTER

Grading work for the building pad and site runoff features was completed in 2009 and the area reseeded. The pad was built large enough to accommodate the larger building, as originally planned. The Watershed Committee also installed 19 wells on the site for the ground-source heating and cooling system, with enough capacity to serve the eventual larger building. The well field and loop system was constructed using \$50,000 in grant funding from the Environmental Improvement and Energy Resources Authority, an arm of DNR set up to fund innovative and energy efficient projects.

After the completion of construction drawings for the education building in the fall of 2009, the Watershed Committee advertised for bids. Bids were opened publicly in late October 2009. It is our hope that construction can begin by the spring of 2010, and that the building will be completed and open for public use by the spring or summer of 2011.

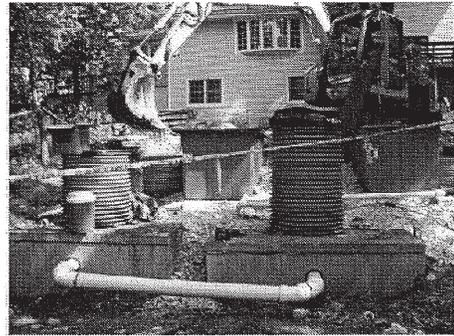
### Federal Grant Wrap-Up

Early in the history of the Watershed Center project, the Watershed Committee received federal assistance in the amount of nearly \$1.5 million through the help of Senator Bond. This funding was not for “bricks and mortar,” but instead helped to fund educational features and programs, site investigations, architectural services and other non-building related activities on the Valley Water Mill site. The project was extended twice, but the funding finally expired in September 2008 and the final report for the grant was produced in early 2009.

The report contains an overview of the Watershed Center project and in successive sections provides details about Project Management, Site Assessments, Design Services, Technology and Office Support, Laboratory and Monitoring Services, Business Plan Development, Demonstration Projects and Education and Outreach. The final report was submitted to EPA, which had oversight of the grant. If you would like to see the report, or receive a copy, please contact the Watershed Committee at 866-1127.

## **Water Quality Improvement Project (WQIP)**

The Springfield-Branson On-Site Remediation Project is entering its final year. Funding was awarded through the Water Quality Improvement Project in May 2006 to improve and protect water quality while enhancing economic development for municipalities, agriculture, and tourism. The Watershed Committee of the Ozarks teamed up with Table Rock Lake Water Quality, Inc. to demonstrate the remediation of wastewater systems that were failing to groundwater. The project also provided educational opportunities to landowners and wastewater installers on advanced treatment technologies.



Thirty-five site visits and evaluations have been completed, leading to the installation of fourteen on-site wastewater systems. An additional two systems are scheduled to be installed in the summer of 2010. An extension of the grant will focus on utilizing these remediation projects as demonstration sites. The Valley Water Mill Onsite Training Center will be used for five workshops to train and educate home and business owners and wastewater professionals about advanced wastewater treatment and maintenance. The funding awarded throughout this five year project, including the extension, totaled \$486,664.

## **WQIP: Professional Travel and Development**

In May 2009, Watershed Committee of the Ozarks staff attended the 5<sup>th</sup> national Conference on Non-point Source and Stormwater Outreach in Portland, Oregon. This week-long conference focused on education for the public, industry, and policy makers in the areas of stormwater, wastewater, water conservation and water quality. It provided an excellent opportunity for WCO staff to meet and learn from other water professionals across the country. The WQIP grant provided funding to attend the Conference. The information obtained there will be used to develop WQIP workshops and demonstration projects in southwest Missouri.

## **WQIP: H2Ozarks Video Premier**

A short film about clean water in the Ozarks, called H2Ozarks, premiered at the Moxie Theatre April 23, 2009. The event was free and open to the public. This half-hour film focuses on water quality efforts in southwest Missouri accomplished through the Water Quality Improvement Project (WQIP). The project was managed by Environmental Resources Coalition and included participation by several area watershed groups, including Elk River Watershed Improvement Association, James River Basin Partnership, Watershed Committee of the Ozarks, Table Rock Lake Water Quality Inc., Shoal Creek Watershed Improvement Group, and Upper White River Basin Foundation. Funding for the project was made possible by Senator Kit Bond and former Senator Jim Talent.

## **Onsite Wastewater Training Center (OWTC)**

This Training Center serves as an outdoor classroom for onsite wastewater installers. The Community Onsite Wastewater and Stormwater 319 grant (COWS) and Water Quality Improvement Project (WQIP) helped to fund this collaborative project between Greene County and the Watershed Committee. In 2009, five installer classes and one soil science class used the facility, and a public service video for onsite wastewater education was filmed at the site.

## **Trail Improvements**

### **Waterfowl Viewing Blind**

With the help of the Greater Ozarks Audubon Society and Greene County, the Watershed Center now has a well positioned waterfowl viewing blind in the wetland near Valley Water Mill Lake. The blind is camouflaged and has two viewing ports allowing for wildlife watching, photography, or a shady place to rest along the trail. We are thankful for the donated labor and funding that brought this project to completion.

### **Trail Monument**

The Watershed Committee installed the Kelley-Stokes memorial bridge monument in July 2009. This handsome monument is made of limestone from the historic Phenix Quarry, matching the stones used at the Streamside Learning Station. The monument bears the message: *“Good water quality is not just a gift from our fathers, but a debt we owe to our children and grandchildren.”*



### **Wayfinding**

The wayfinding project will help people explore the Watershed Center site. Stacey Armstrong developed a new map of the facility and each trail, or section of trail, is now distinguished by colored trail markers corresponding to colors on the map. Plans for a comprehensive kiosk and Watershed Center Guide Book have been developed and will be produced in 2010.

### **Trail Extension**

In 2009, the WCO completed a section of trail that connects the main loop trail to the Streamside Learning station. This was accomplished using a product called GravelPave, which allows for both pedestrian and wheel-chair use on a semi-hard but pervious surface. An educational display was placed into the ground showing the different layers of the GravelPave system. In addition, two stream crossings were repaired after the flooding in 2008 caused serious damage to them.



## **Water Quality**

### **Dye Trace Research**

Greene County, in partnership with the Watershed Committee of the Ozarks, investigated groundwater hydrology in the Rogersville area. The studies were undertaken due to high levels of bacteria in a few citizen's drinking water wells. WCO conducted the laboratory analysis of tracer recovery packets using the Hitachi F-2500 spectrofluometer. Wavelength synchronous scans were utilized to look for traces of fluorescein dye, which was released in the sinkhole next to Rogersville School. The results will be used for educational purposes and to assist future groundwater research.

Sample Collection Dates: 10/08/2009-12/03/2009

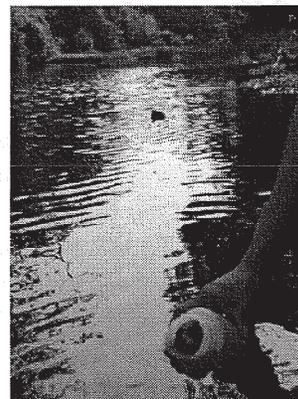
Total Number of Sample Sites: 31

Total Number of Tracer Charcoal Packs recovered: 556

Total Number of Samples ran in Laboratory: 278

### **Springfield-Greene County Health Department Sampling**

The Watershed Committee partnered with the Springfield-Greene County Health Department during the summer months in 2009 to collect bacteria samples in local stream swimming holes throughout Greene County. The samples were collected once a week from May through September. The results are posted on the Health Department website for public access.



### **Adopt a Spring**

Adopt a Spring is a volunteer water quality monitoring program. In this on-going project, trained volunteers collect quarterly water samples from major springs with public access in Greene County. In 2010, we focused on eight springs, collecting twenty-six samples during the year.

### **Watershed Management Plan**

In November, the WCO submitted its final draft of the Upper Little Sac Management Plan to the Missouri DNR. The plan is intended to help stakeholders understand watershed issues and make better management decisions. It is a non-regulatory document, portraying the watershed characteristics and water quality, actions that are presently being taken to maintain water quality, and actions that are needed to improve water quality. All best management practices suggested to stakeholders are purely voluntary. It is the residents in the watershed who have the ability to improve water quality, whether on city, county, public or private properties.

The plan is intended to be ever-changing and dynamic, just as the river and its watershed. Plans made at this time may not meet the challenges that arise in the future. If major changes occur in the watershed or in the water quality of the Little Sac River, then the plan will need to be revised to compensate for those changes. Otherwise, it should be re-visited every 5-8 years to evaluate the effectiveness of management measures and the perceptions of the people within the watershed.

## Education and Outreach

	<u>Quantity</u>	<u># Individuals</u>
Students Visiting Watershed Center		1,600
Watershed Event bookings:	82	
K-12 Education events		4,324
Website hits		10,000
Onsite Wastewater Training Center uses	5	
<b>Total Number Reached</b>	<b>87</b>	<b>15,924</b>

### Highlights

#### **Media Releases**

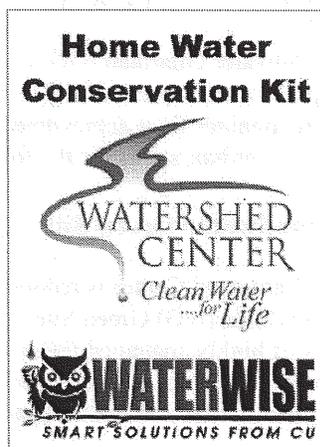
The Watershed Committee enjoyed excellent media spotlights in 2009. KSMU'S Erika Brame covered the Watershed Committee's 25th Anniversary in a story titled, *After 25 years, Watershed Committee Still Educating Public*. Ozarks First.Com and the Springfield News-Leader also covered our 25th Anniversary event.

#### **Publications**

*The Value of Protecting Ozarks Streams: An Economic Evaluation of Stream Bank Stability for Phosphorous Reduction* by Eric Dove, Kasi Johnson and Matt Keener  
Missouri Resources Winter 2009 *Watershed of Information* article by Victoria Lovejoy featuring the Onsite Wastewater Training Center

#### **A Partnership for Water Conservation**

Drury University, City Utilities of Springfield and the Watershed Committee of the Ozarks have teamed up for a multi-step water conservation initiative on the Drury Campus. Through grant funding, the Watershed Committee purchased a large quantity of water conserving devices including sink aerators, low flow shower heads, leak detecting tablets, and shower timers. Over the summer, 600 showerheads and sink aerators were installed in buildings on Drury Campus and the same number of shower timers and tablets were dispersed to the students. WCO hosted a booth at Drury's new student involvement fair on August 24th to recruit volunteers and promote water conservation. To help tell this story and see how effective the programs are, Drury and CU will be working to record how much water we are saving. We are looking forward to making a difference and measuring it!



## **Education and Outreach cont.-**

### **YMCA Summer Odyssey**

The Ozarks Regional YMCA helped a lot of kids experience the Ozarks at the Watershed Center this summer through their "Summer Odyssey" program. Summer Odyssey is similar to the "day camps" based out of schools throughout Springfield. During field trips students experience nature while learning important, age appropriate information about water. In spite of some cancellations due to weather, two hundred and thirty students toured the Watershed Center, where they learned about water and water conservation.



### **Missouri Environmental Education Association (MEEA)**

MEEA's mission is to provide innovative professional development and networking opportunities for Missouri's Environmental Educators, both for teachers in the classroom as well as non-formal educators. WCO is a long time supporter of MEEA. This year two notable events occurred: First, the annual MEEA conference was held in Ozark, Missouri and a wide range of educational sessions occurred over the two day event; second, MEEA board member and WCO staffer Mike Kromrey was voted president-elect for the coming year.

### **Show Me Yards and Neighborhoods**

Show Me Yards and Neighborhoods is an educational program designed to raise awareness about the effects of runoff and yard care activities on nearby streams, creeks, rivers, and lakes. SMY&N offers environmentally responsible alternatives to traditional lawn care and construction practices contributing to the runoff of contaminants and excess nutrients. The program also recognizes individuals and professionals who put the SMY&N techniques into practice. Homeowners can earn an attractive yard sign and professionals can become certified. Choose Environmental Excellence, the city of Springfield, Greene County, Greene County Soil and Water Conservation District, MU Extension and the WCO are partners on the project.

### **Groundwater Guardian**

Groundwater Guardian (GG) encourages communities of all types (cities, counties, watersheds, etc) to support groundwater education and protection activities. Guardian supports communities in their efforts and recognizes their achievements. The Watershed Committee helped Greene County achieve Groundwater Guardian status for the fourteenth consecutive year.

### **Groundwater Green Site**

The Watershed Center is recognized as a "Green Site" by the Groundwater Foundation. The Groundwater Guardian (GG) Green Site program recognizes good stewards of groundwater by encouraging managers of highly-managed green spaces (golf courses, ball fields, education campuses, parks, etc) to implement, measure, and document their groundwater-friendly practices related to chemical use, water use, pollution prevention, water quality, and environmental stewardship.

## **Education and Outreach cont.-**

### **WOW**

The Wonders of Wildlife National Outdoor Recreation and Conservation School (WOW School) teaches participants how to enjoy a wide range of outdoor recreation activities while practicing personal safety and outdoor responsibility. Each course includes an outdoor skill, conservation, safety and ethics component. WCO participated in two WOW Schools in 2009, offering beginner stream ecology for participants.

### **WOLF**

Students in the 2008 class of WOLF (Wonders of Outdoors Learning Facility) school have more than gotten their feet wet with watershed education. In fact, it has been full immersion. Students have been to the Watershed Center to do water monitoring and to Bull Creek to learn about riparian areas, stream life, and snorkeling. The stream trailer model visited them at their school. It is a pleasure to be involved with the students and teachers of WOLF.

### **Freewheelin' Friday**

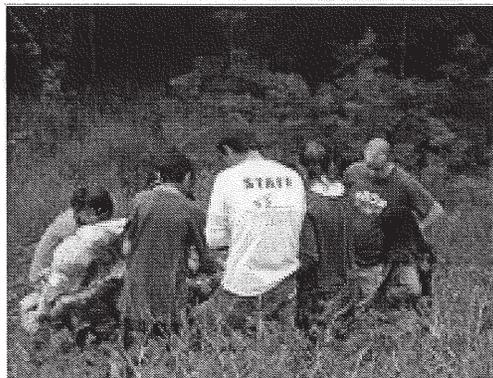
This is a yearly event to help teachers explore the field trip resources available in the Springfield and Greene County area. This year the Watershed Center was a stop on the field trip and approximately twenty teachers learned about what the Center has to offer.

### **Watershed Festivals**

The James River Basin Partnership holds Watershed Festivals every year, and WCO is a strong partner and supporter. In 2009, we pledged volunteers and/or staff to every Festival, where about 2,100 regional fifth graders experienced an intense day of fun and water education.

### **Greene County Watershed Festival**

The Greene County Watershed Festival was held at Valley Water Mill Park on May 5th and marked the first event of our 25th Anniversary celebration series. About a hundred 5th grade students came out to learn about water resources. Volunteers ran four demonstrations: a macro invertebrate exploration station; a groundwater flow model; the Enviroscope model; and a walking tour of the watershed and green building features at the park. Watershed Festivals are a great tool for reaching a lot of students at one time, but they take careful planning and preparation. The Watershed Committee, James River Basin Partnership, Project WET, and the Community Foundation of the Ozarks collaborated to make this event a success.



## **Education and Outreach cont.-**

### **Volunteering**

We could not do what we do at the Watershed Committee without volunteers. The Watershed Committee volunteer Board has dedicated countless hours to furthering our organization. Volunteers from Springfield Public Schools, OTC, MSU, and Drury have done everything from picking up trash to shoveling mulch to laying sections of pervious sidewalk at the Watershed Center. Greene County Resource Management staff lent a great deal of time, tools, and expertise to the Onsite Training Center and nearly every other project at the Watershed Center. We have had Stream Team and Adopt-a-Spring members monitoring the water quality of local waterways, and the City's Adopt-A-Stream program helped remove mountains of trash. Each semester we are fortunate to involve MSU students through the Citizenship and Service-Learning Program (CASL). Greater Ozarks Audubon helped us finance the waterfowl viewing blind, placed bird houses around the Watershed Center, and involved us in their Together Green events. The local Springfield Plateau of the Missouri Master Naturalists continued their involvement with the Watershed Center in 2009. We have been blessed by donations of time, talent and treasure and would like to humbly thank all of our volunteers.

### **Students at the Watershed Center in 2009**



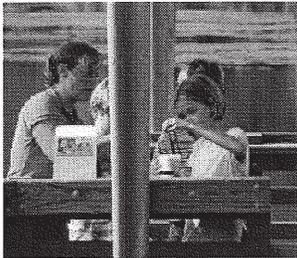
## Special Events

### 25th Anniversary

The Watershed Committee celebrated a major milestone in 2009—twenty-five years of protecting the communities water supplies! About 300 people came to Valley Water Mill on a warm fall day to have lunch under the big tent, take part in fun and educational activities around the site, and watch or participate in canoe races on the lake. At the end of the celebration, current and former Board Members of the Watershed Committee cut and served a commemorative cake.

Many dignitaries provided reflections during the event, including Greene County's Presiding Commissioner, Dave Coonrod (first Director of the Watershed Committee and also Emcee for the canoe race); Representative Bob Dixon; Springfield's Mayor Jim O'Neal; John Twitty, General Manager of City Utilities of Springfield; Bob Belote, Assistant Director of the Springfield-Greene County Parks Department; Watershed Center Architect Tim Rosenbury; and William H. Cheek, 2009 Chair of the Watershed Committee Board. After the celebration, some of the major donors for the Watershed Center (including Titus Foundation, O&S Trucking, 3-M Foundation, Springfield Underground and Jeanette Unsell) posed for pictures with their "big checks."

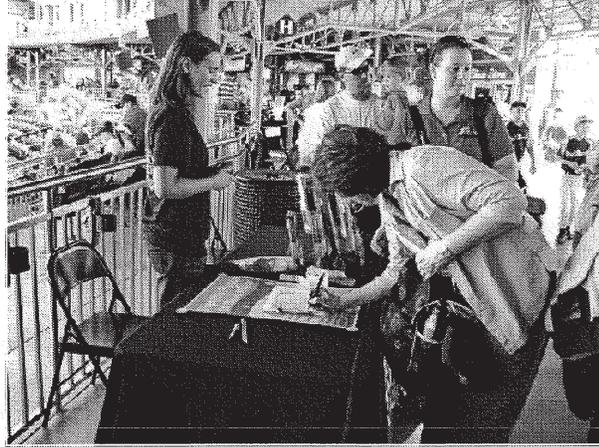
The Watershed Committee Board and Staff had a lot of help from volunteers at the event. Without them, in fact, it would have been impossible to keep 300 people fed and entertained and happy for a whole afternoon! Thank you to everyone who helped, and who attended, to make our 25th Anniversary a fun as well as a meaningful milestone.



## Special Events cont.-

### **Clean Water Day with Springfield Cardinals**

Springfield Cardinals and the Watershed Committee promoted clean water education and conservation at the 2nd Annual Clean Water Day at Hammons Field on Friday, August 21, 2009. The event was announced during two public radio interviews with WCO staff. The event focused on the importance of water conservation in the Ozarks and how to keep our drinking water clean. WCO hosted a booth by the entrance of the ballpark where patrons could sign up to take the “water savers pledge” and receive a Home Water Conservation Kit,

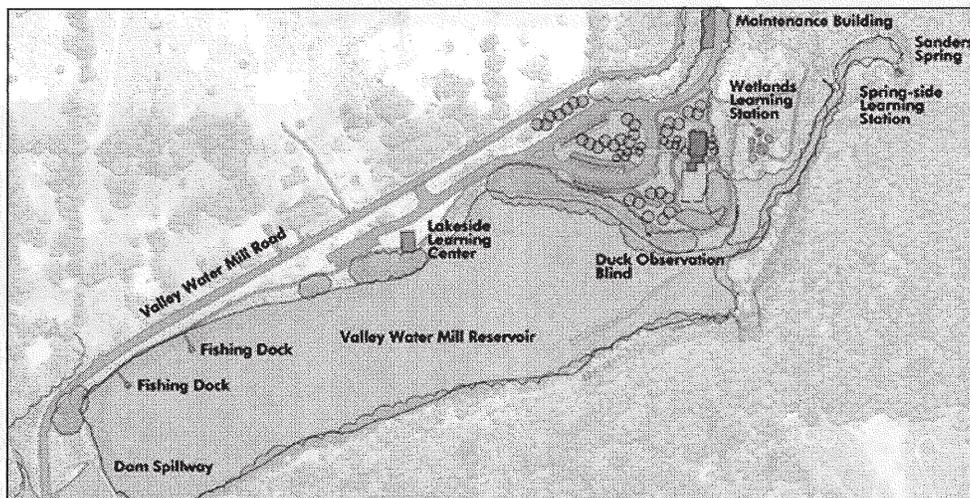


containing a low-flow showerhead, sink aerator, five minute shower timer and a dye tablet to check for toilet leaks. There was water trivia on the big screen, signage displayed in the stadium and a variety of water conservation materials available to the public.

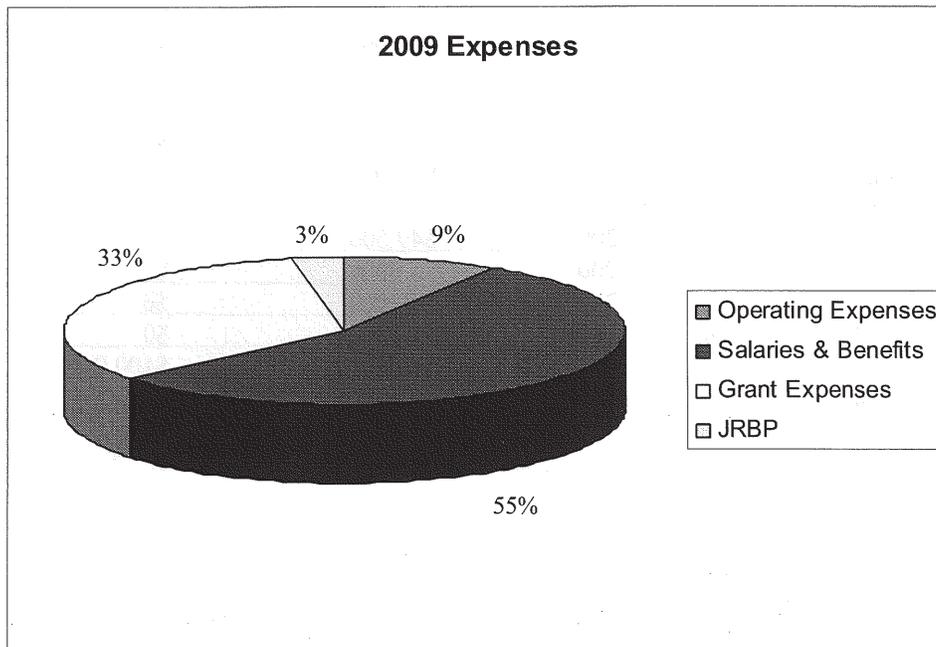
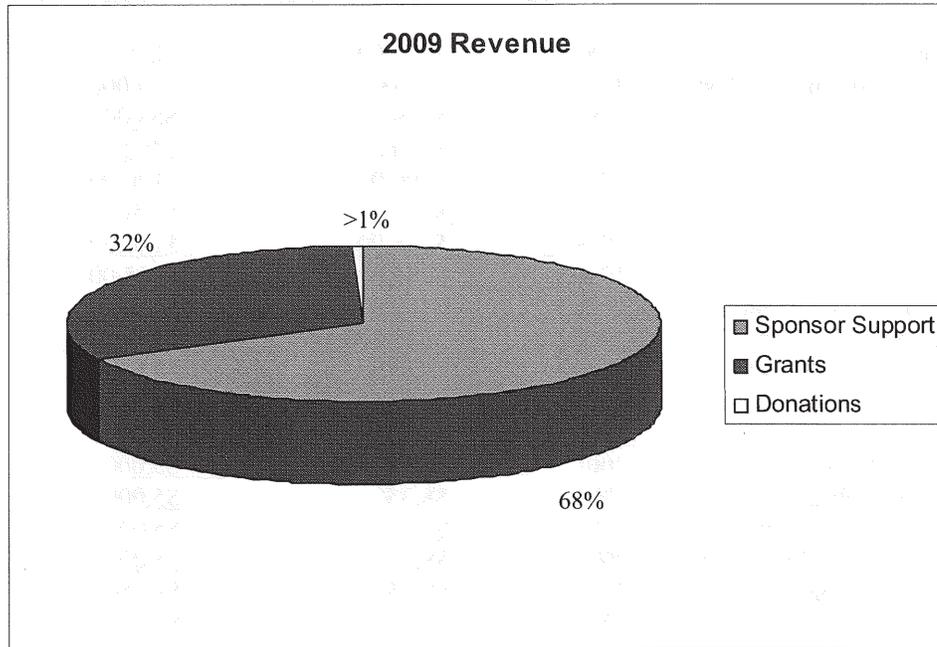
### **OSI Trail Summit**

In October, twenty-seven volunteers took on the rain and cool weather to learn about land stewardship and trail building skills. This training took place on the Watershed Center’s nature trails and was offered by the Outdoor Stewardship Institute, and underwritten by the Department of Natural Resources-Division of State Parks. This was some great training and we encourage park resources professional involved with trail planning, design, construction and maintenance to seek this kind of training in the future. Volunteers came from as far away as Denver, Colorado.

### **Valley Water Mill Park**



## 2009 Revenue and Expenses



## Grant Activity

Grant Project	Date initiated	Total Grant	Non-Local Funds
Greene County GIS Project	1988	\$325,000	\$235,500
Fullbright Spring Monitoring System	1989	\$40,000	\$20,000
Fellows-McDaniel Lakes 319 Project	1992	\$119,000	\$63,000
McDaniel Lake Remediation Project	1993	\$66,621	\$40,500
Fullbright Spring 319 Project	1996	\$190,000	\$100,000
Splash Exhibit for Discovery Center	1997	\$6,800	\$3,500
Little Sac River Pollution Study	1999	\$145,000	\$140,000
Discovery Center Project	1999	\$205,000	\$125,000
Adopt-A-Spring Volunteer Initiative	2000	\$12,000	\$4,900
Little Sac Restoration 319 Project	2000	\$625,000	\$343,500
Show-Me Yards & Neighborhoods	2000	\$8,475	\$4,975
Valley Water Mill 319 Project	2001	\$920,838	\$480,000
Cause Marketing for Clean Water	2001	\$8,334	\$5,000
Radio Promotion White River Basin	2001	\$8,334	\$5,000
Show-Me Yards & Neighborhoods II	2002	\$8,350	\$5,000
Time to Come Clean Awareness	2002	\$8,334	\$5,000
Show-Me Yards & Neighborhoods Tips	2002	\$8,334	\$5,000
Recreational Trails Program	2003	\$84,500	\$42,500
Jordan Creek Education Event	2003	\$2,315	\$0
Science Based Field Trip Grant	2003	\$4,000	\$0
Watershed Center	2003	\$447,000	\$447,000
Watershed Center	2004	\$994,600	\$994,600
Community On-Site	2006	\$309,650	\$185,750
Water Quality Improvement Grant	2006	\$400,000	\$400,000
LAD	2006	\$5,000	\$0
CFO Streamside Learning Station	2006	\$20,000	\$0
CFO Wetland/Curricula Grant	2006	\$22,288	\$0
LAD Interpretive Signage	2007	\$3,500	\$0
Rotary Service Grant	2007	\$500	\$0
Rotary Service Grant-Southeast	2007	\$1,000	\$0
Corporate Agency Partnership Program-			
Fishing Piers	2007	\$49,500	\$0
LAD Forestry Learning Station	2007	\$5,000	\$0
CFO Fishing Piers Grant	2007	\$30,000	\$0
Watershed Mgmt Planning Grant	2007	\$15,000	\$0
MO Recreational Trails Grant	2007	\$142,000	\$100,000
Rotary Service Grant-Southeast	2008	\$4,500	\$0
<b>Total</b>		<b>\$5,245,773</b>	<b>\$3,755,725</b>

## Educaton/Outreach Events 2009

Date	Event	Age Bracket	Number Served	Minutes per lesson	At Watershed Center?
13-Jan	Show me yards	professional	60	all day	n
27-Jan	enviroscape training	adult volunteers	12		30 n
5-Feb	MSU Panel on Children/Nature/edu	college	45		60 n
6-Feb-09	MNRC P and Streams (Matt)	professional	25		30 n
9-Feb	Big Bros and Sisters at IC	5th and college	16		45 n
11-Feb	Watershed Festival Christian	5th			n
12-Feb	Watershed Festival Christian	5th			n
18-Feb	Watershed Festival Christian	5th			n
19-Feb	Watershed Festival Christian	5th			n
20-Feb	Watershed Festival Christian	5th			n
23-Feb	Big Bros and Sisters at IC	5th and college	16		n
3-Mar	Watershed Festival Stone	5th			n
9-Mar	McBride	4th	23		15 n
11-Mar	Taney Watershed Festival				n
12-Mar	Taney Watershed Festival				n
16-Mar	McBride	4th	23		120 n
16-Mar	summit prep school	middle	12		n
18-Mar	Math honors society presentation	high school/parents	35		20 n
26-Mar	Show me yards	professional	60		25 n
1-Apr	CHS jordan creek lesson	high school	4		n
9-Apr	Holland school	1st	40		120 n
14-Apr	Drury architect education	college	6		20 n
15-Apr	schwitzer methodist earth day water	1st through 5th	30		20 n
21-Apr	Sequiota school	3rd	65		120 n
23-Apr	Geo Cache JC educaton	retired	2		120 n
25-Apr	Wow school	all ages	15		180 n
29-Apr	Jeffries students go to work visit	3rd	22		20 n
may 2-3	Artsfest				n
21-May	Bois D'Arc event w/ Hickory Hills	5th	75		n
30-May	Together Green Event	all ages			n
10-Jun	Truman Summer School	5th and 2nd	18		60 n
13-Jun	River Rescue Stream Trailer	All ages	30		n
22-Jun	Missouri Geography Alliance	teachers	20		75 n
24-Jun	Volunteer training	College	3		120 n
29-Jun	Wanda Grey E scape	2nd grade 2 classes	34	30 each	n

30-Jun Field Elementary E scape	4th	20	30 n
25-Aug Drury Student involvement fair	college	45	5 n
16-Sep MSU volunteer fair	college	10	n
24-Sep wolf school stream trailer	5th	50	n
2-Oct Teacher Workshop	teachers	6	60 n
7-Oct Erosion Sediment control training	engineers/contractors	151 6hrs	n
8-Oct Show Me Yards	homeowners	88	20 n
13-Oct MSU pre service teacher class	college	16	25 n
29-Oct Lake of the Ozarks Watershed orgs.	citizens	25	25 n
18-Nov MSU sustainability expo	students, faculty, citizens booth	8 hours	n
24-Feb owfc DHSS	professional ?		y
2-Mar Reed Middle School at VWM	7th	6	60 y
3-Mar Pipkin MS at VWM	6th, 7th	26	120 y
9-Mar Reed Middle School at VWM	7th	6	y
7-Apr Pipkin MS at VWM	6th	140	120 y
17-Apr Studie Middle School WC FT	8th	120	120 y
28-Apr Bailey Alt. School	highschool	40	40 y
5-Apr Watershed Center Watershed Fest	5th	100	180 y
12-May Jeffries students go to work visit	3rd	22	60 y
14-May Girl Scouts	Brownies and Parents	8	30 y
27-May Cherokee Mega Field Trip	7th	112	120 y
15-Jun Stockton Summer School	5th--8th	60	140 y
22-Jun Highlandville school	2nd grade	30	160 y
14-Jul Church group vol and ed project	middle	12	120 y
14-Jul ymca summer odyssey	1st through 5th	40	90 y
16-Jul ymca summer odyssey	1st through 5th	70 90x2	y
20-Jul Republic Parks and YMCA	1st through 5th	100	y
22-Jul Onsite Wastewater Class Greene Co.	professional	18	60 y
23-Jul ymca summer odyssey	1st through 5th	20	90 y
7-Aug Free Wheelin Friday	teachers	17	30 y
24-Aug Drury University Alpha class	college freshman	24	120 y
27-Aug OWTC JRBP TRLWQ meeting	professional/citizens	32	y
1-Sep Home school program	6th through 9th	25	y
10-Sep wolf school Steam Ecology	5th	50	25 y
12-Sep WCO 25th anniversary	all ages	275	y
23-Sep Purdy High School	upper high school	23	120 y
24-Sep Stream Team Training	adult volunteers	5	120 y

25-Sep Eugene Field Elm	67	120 y
30-Sep Drury alpha env class	16	100 y
7-Oct Erosion Sediment Training	89	6 hrs
20-Oct master naturalist training	3	240 y
22-Oct APA tour of Watershed	8	20 y
3-Nov Drury Env. Science Class at Watershed Cenl	28	120 y
5-Nov Study Middle School, Service at WC	13	180 y
20-Nov OTC Turf Management group Vol at WC	14	240 y
1-Dec Miller High School visit Watershed Center	13	120 y
8-Dec OTC Students for awarness of natural env. college		
10-Dec Greene County Septic installer training		

2734

WOW School	310	30
Watershed Festivals	2,100	700
YMCA		
Onsite Wastewater Training Center		

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## 2010 Annual Report Education, Outreach, and Volunteer

### Year at a Glance

Participants at the Watershed Center	2100
Event bookings	95
Watershed Center field trips	53
Stream trailer outings	5
Volunteer hours logged	606
Booths at community events	7
Jordan Creek tours	7
Onsite Wastewater Training Center events	4
Website hits	11,936

### Community Leadership and Involvement

Employees of the Watershed Committee of the Ozarks are encouraged to be involved in the community and seek leadership development opportunities.

In 2010, Matt Keener completed the Greater Ozark Leadership Development (GOLD) program offered through Missouri State University. The mission of the program is to increase civic leadership capacity in Southwest Missouri by developing civic engagement, regional awareness, community development, and economic growth in Southwest Missouri. Matt was able to secure scholarship funding for this endeavor thanks to the Springfield Chamber of Commerce.

The Watershed Committee Board reviewed information regarding coal tar pavement sealants and signed a letter to City Council encouraging action to reduce its use in our community.

Mike Kromrey finished his second year as chairman of the Springfield Greene County Environmental Advisory Board, and was elected president of the Missouri Environmental Education Association. He also served as the WCO representative on the MSU Sustainability Advisory Committee, Environmental Collaborative, Interpreters Coalition, and Professional Science Masters Program Advisory Board at MSU.

### Educational Partnerships

WCO has many partners in education. The **Ozarks Regional YMCA** helped a lot of kids experience the Ozarks at the Watershed Center this summer through their "Summer Odyssey" program. Summer Odyssey is similar to a day camp based out of schools throughout Springfield. Many of these locations came to the Watershed Center for a field trip where the students experienced nature while learning important, age appropriate information about water. This year **three hundred and forty-three** spent and educational day at the Watershed Center, a 33% increase over 2009.

WCO partnered with the **Springfield-Greene County Library District** for their “Make a Splash” summer reading program. The program included a story, hands on activity, and even live macro-invertebrates which were the main characters of the story. Five programs were presented at various libraries, and one program at the Watershed Center that included a visit from the Book Mobile. About 117 children participated.

We also helped out with the **Wonders of Wildlife** 4<sup>th</sup> annual National Outdoor Recreation and Conservation School (WOW School) at Ritter Springs Park. WOW School is about providing outdoor hands-on experience based learning such as outdoor skills, activities, safety, conservation, and ethics—Watershed staff taught a hands on lesson about stream ecology and water conservation.

Nature Unleashed One notable change this year was **Springfield Public Schools** adoption of the Missouri Department of Conservation’s “Nature Unleashed” science curriculum for fourth graders. The curriculum requires a field trip and focuses on the local environment—the Watershed Center is a perfect location to meet the needs of nature unleashed.

In 2010, WCO pledged our support for the **James River Basin Partnership** and the excellent series of **Watershed Festivals** they hold by pledging one volunteer for each festival. Schools from Nixa Inman, Clever, Chadwick, Sparta, Nixa Main, Billings, Ozark, Hurley, Galena, Crane, Monett, Shell Knob, Cassville, Hollister, Branson, Forsyth, Kirbyville, Taneyville participated, totaling **2117 students**. And last but not least, WCO works closely with the **City of Springfield** and **Greene County** to provide Stormwater and Onsite Wastewater education, detailed in Stormwater and Onsite Wastewater Training Center sections of this report.

## **Groundwater**

The Watershed Committee of the Ozarks proved to be an important local resource when the water quality issues surfaced in the Rogersville area. Along with Greene County, WCO provided resources and expertise to research groundwater well contamination. WCO also continued participation with the Groundwater Foundation. Through the Groundwater Foundation, Greene County was recognized for the 15<sup>th</sup> consecutive year as a **Groundwater Guardian Community**. In addition, the Watershed Center is has achieved **Groundwater Green Site** standing. The Groundwater Foundation also provides educational resources and a national network of communities working to improve groundwater quality.

## **Monthly Meetings**

A long standing community service the Watershed Committee provides is the Monthly Meeting. The first Friday of each month community members from the private, public, non-profit and academic sectors gather to for a presentation on a water related issue, regional and agency updates, and networking opportunities. This year WCO hosted eleven presentations attended by 419 people:

- “PAH’s: A Prevalent Threat to Water Quality and Human Health” by Tommy Bieker, Springfield Greene County Advisory Board
- “The City of Springfield’s Commitment to Water Quality” by Ed Malter, Sanitary Services Superintendent, Springfield Public Works

- “What About that E-Coli at the Lake of the Ozarks” by Donna Swall, Executive Director, Lake of the Ozarks Watershed Alliance
- “What Research Says About Environmental Education” by Jan Weaver, Director of the MU Environmental Studies Program, University of Missouri
- “Haiti Disaster Relief: Drinking Water, Roddy Rogers, City Utilities
- “Geology of Greene County” by Jerry Vineyard
- “Re-Engineering the Missouri River for Ecosystem Recovery, by Robert Jacobson, Research Hydrologist, US Geological Survey
- “James River Basin Partnership Update” by Joe Pitts, Executive Director, JRBP
- “Current and Future Directions for Bacterial Monitoring in Surface Waters” by John Schumacher, US Geological Survey
- “Investing in the Protection of Water Quality for Future Generations” by Ed Malter, Springfield Public Works
- “IRWP? Who are you? Click...” by Dr. Delia Haak, Executive Director, Illinois River Watershed Partnership

### **Onsite Wastewater Training Center (OWTC)**

This was a year of improvements and events at the Onsite Wastewater Training Center. With help from the onsite wastewater experts at Greene County, we completed a distribution box display, improved the existing systems and added an attractive split rail fence and native shrubs to delineate the parking area from the demonstrations. The maintenance staff from the Springfield Greene County Park Board helped keep the site mowed and looking sharp, and the Water Quality Improvement Project Grant from the Environmental Resources Coalition provided funding for the improvements. **Four classes** were held at the OWTC, attended by about **130 people**.

### **Publications**

Loring Bullard published two new essays: “Missouri Springs: Power, Purity and Promise” and “Source to Tap: A History of Missouri’s Public Water Supplies” which are posted on the Watershed website. Loring also helped create a Do It Yourself Rain Garden booklet, which was a cooperative partnership with JRPB, MDC, and the City of Springfield. A lot of effort was put into two upcoming publications regarding the Geology of Greene County and an Interpreters Guide to the Watershed Center, which should be released in 2011.

### **Stormwater**

WCO serves as an important partner with the City of Springfield to provide stormwater education and outreach required for the MS4 permit. Nearly all of our outreach events include basic education about stormwater: understanding what a watershed is, what the common pollutants in runoff are, the differences between point source and non-point source pollution, and the effects of impervious surfaces are keystones of our education and outreach efforts. Specifically, this year we started selling rainwater harvesting equipment, led Jordan Creek Tours, provided sediment and erosion control training for local professionals, and did demonstrations with the “Enviroscape” and “Stream Trailer” watershed models. In addition, WCO applied for million dollar stormwater improvement 319 grant.

The Watershed Center project, which started construction this year, is an important stormwater education tool. The Watershed Center will exhibit stormwater Best Management Practices (BMP's), Low Impact Development (LID), rainwater harvesting, and green building and design, all of which improve the stormwater volume and quality on the site. Interpretive signage will explain the techniques, and the site will be open for tours and classes. (See below for this year's activities...)

### **Watershed Center Field Trips**

This year about 53 field trips were conducted at the Watershed Center, in spite of a flurry of construction activities. Groups ranging from Elementary Schools to local Universities participated in place-based water education at the site. One notable change this year was Springfield Public Schools adoption of the Missouri Department of Conservation's "Nature Unleashed" science curriculum for fourth graders. The curriculum requires a field trip and focuses on the local environment—the Watershed Center is a perfect location to meet the needs of nature unleashed. In all, about 2146 people used the Watershed Center for educational purposes, an **increase of 24%** from 2009.

### **Watershed Center Site Projects**

The construction of the Watershed Center was an obvious site improvement, but lots of other projects also occurred this year. Springfield Plateau Chapter Master Naturalist members Bob and Barb Kipfer, and Mort Shirts made timber stand improvements according to our Forest Stewardship Management Plan written by MDC.

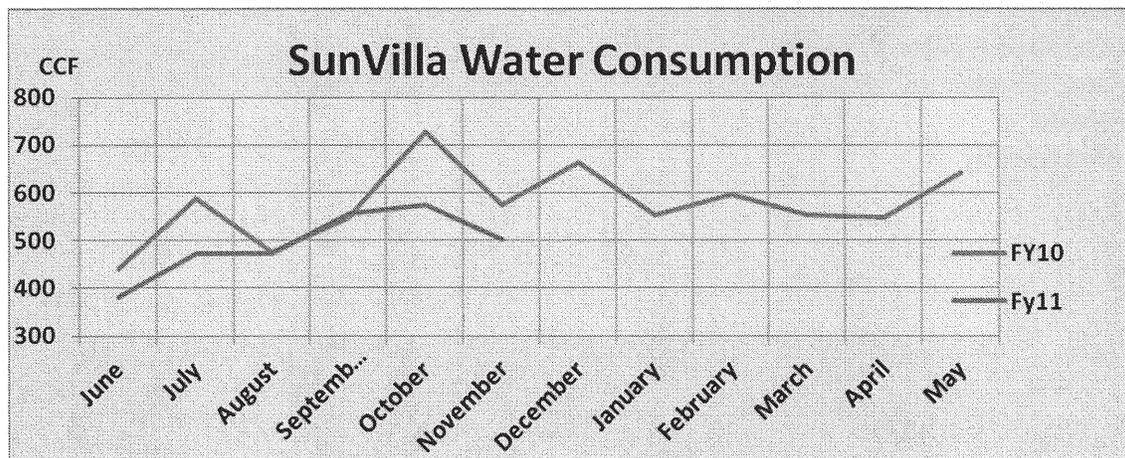
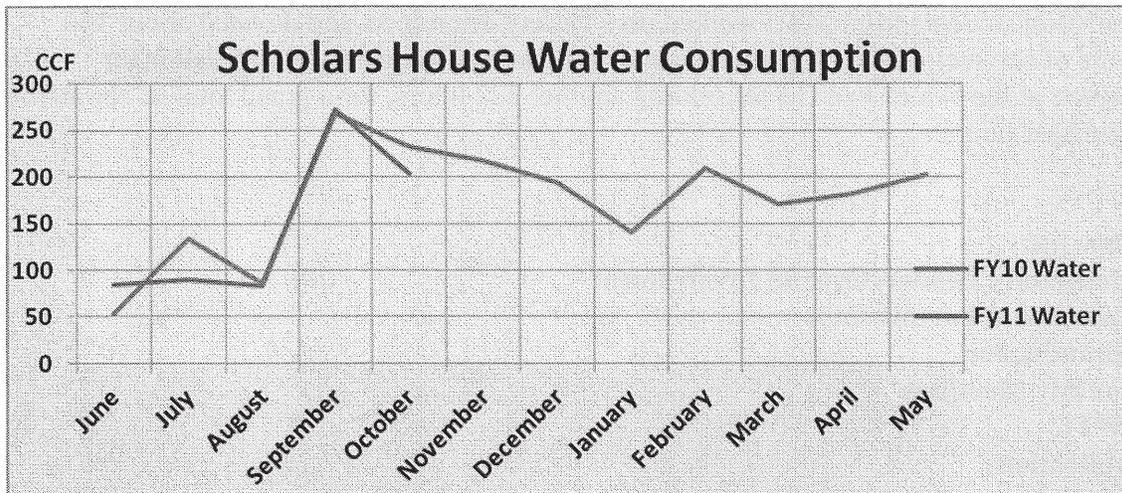
Greene County helped with two major projects at the site. One was a substantial bank armoring project to ensure the little bridge piers are not compromised by stream bank erosion. Greene County also helped with the construction of our central wayfinding kiosk. The kiosk is located next to the parking lot at the Lakeside Learning Station. It was built with trees removed from the Watershed Center site as part of the Forest Stewardship project, and contains information about the site, a site map, and current events board.

Several trail work and trash clean up days were hosted with a variety of volunteers and volunteer groups. WCO staff experimented with different methods of algae control/harvesting on Valley Water Mill Lake, including developing prototypes of the algae harvester 1000 and 2000 models. However, this was not one of the more successful projects of the year.

2010 was a big year for tree planting. WCO helped MDC on two riparian plantings: one at the Equestrian Center where 2.4 acres were planted with 750 native trees and shrubs, and one at Lost Hill Park where 5.5 acres were planted with 600 native trees and shrubs. About 110 volunteers helped on these two plantings. WCO staff also coordinated a volunteer tree planting day at the Watershed Center to implement phase one of our planting plan.

### **Water Savers**

Missouri State University (MSU), City Utilities (CU), and the Watershed Committee of the Ozarks (WCO) teamed up for a multi-step water conservation initiative on the MSU campus, similar to the one conducted at Drury in 2009. Through grant funding WCO purchased a large quantity of water conserving devices including sink aerators, low flow showerheads, leak detecting tablets, and shower timers. These devices were installed in residence halls Sunvilla Towers and Scholars House over the summer. MSU student Erin Murray facilitated this initiative as her Citizen and Service Learning Project and it has been a success. The graphs below are showing a measurable difference in overall water consumption:



Website

Our website, <http://www.watershedcommittee.org/>, had a big year. Regular updates on the building project and our blog, as well as our online resources brought 11,936 hits or a 16% increase from 2009.

### **Volunteering**

Volunteers graciously donated their time and talent to further the Mission of Watershed Committee of the Ozarks. **Board Members** provide time and expertise to guide our organization and donated an estimated 150 hours to the Watershed Committee this year. **Adopt-A-Spring** volunteers monitored the major springs in Greene County quarterly to assess water quality, and donated about 144 hours. **Citizenship and Service Learning** students from MSU worked on a variety of projects and donated about 140 hours of service. **Citizens, groups and organizations** frequently donate labor for projects at the Watershed Center, adding another 322 hours, for a grand total of about **756 volunteer hours!**

Topic list:

**Community Leadership and Involvement**

**Educational Partnerships**

**Groundwater**

**Monthly Meetings**

**OWTC**

**Publications**

**Stormwater**

**Watershed Center Field Trips**

**Watershed Center Projects**

**Water Savers**

**Website**

**Volunteering**

## Educaton/Outreach Events 2010

Date	School/group	Topic	Age Bracket	Number Served	Minutes per lesson
1/12/2010	Holland Elm	Water Conservation/Watershed	K-5	35	20
27-Jan	Sherwood Elm	Stormwater/Water Animals	4th	45	25
27-Jan	MSU	Volunteer Fair	college	?	
2-Feb	volunteers	Envirosap and Marble Table Training	adult	6	25
2-Mar	Pipken	Service and learning	4th	25	120
3-Mar	SPS	Water and Water conservation	Teachers	30	20
15-Mar	Mcbride	Water field trip, 5 stations	4th	115	120
16-Mar	WOLF	Maps, Watersheds, Wetlands, forests	5th	50	120
20-Mar	MSU faculty	Sustainability workshop	proff	13	60
25-Mar	MSU AG students	Drop in bucket, ag practices	college	25	35
30-Mar	MSU	Intro to Geology Watersheds and Karst	college	25	120
10-Apr	Boy Scouts	Soil and Water Conservation	13-16	8	6 hours
12-Apr	Phelps	Kaleidoscope (career day)	1-5th	60	25
13-Apr	Drury	Water and Sustainability	college	35	100
13-Apr	Fair Grove	Watersheds, Karst, & aquatic habitats	high school	8	75
17-Apr	public	Stream Trailer at Jordan Park event	all	?	
20-Apr	Hickory Hills	Watershed tour	7th	150	120
21-Apr	IC (Catholic)	Stream Trailer at Jordan Park event	5th?	60	25
22-Apr	Rountree Elm	Watersheds and Water Conservation	4th	44	120
22-Apr	MSU	Watersheds and Water Conservation	college	30	120
25-Apr	Church	Info table Schweitzer picnic	all	?	3hrs
May 3-6	Phelps	Watershed Center/Stream Team	1-8th grade	100	
6-May	Hickory Hills	Watershed Center Tour		56	
8-May	public	C street green event	all	?	
10-May	Phelps	Stream Team at Fasnigh		16	2 hrs
10-May	Rountree Elm	Watershed Center Tour	4th	44	2hrs
11-May	Lebanon	Watershed Center tour	6th	95	2hrs
12-May	Phelps	Stream Team at Fasnigh	7th	25	2 hrs
14-May	Deleware Elm	School Visit	3rd	22	1hrs
14-May	St. Joseph's	Family education event	families	15	1.5
18-May	public	WQIP Onsite WW workshop	adult	12	
19-May	Pleasant View	Watershed Center Field Trip	4th	49	2hrs
24-May	Volunteers	Volunteer Training at WC	college	2	2
28-May	Home school	Watershed Center tour	5th-8th	16	2
7-Jun	public	Making a Splash Library Program	youth	10	

9-Jun St. Elizabeth	VBS service project at Watershed Cent.	5th-8th	60 2hrs	
11-Jun SPS (summer)	How does your garden grow--Water Cons.	2nd and 3rd	13 30 min	
12-Jun River Rescue	Stream Trailer demo at Dam Jam	public		?
14-Jun YMCA	Summer Odyssey Watershed Center Field	1st--4th	60	
17-Jun SPS (summer)	Mcgregor Chemistry Capers (Water)	5th	10	30
18-Jun public	Making a Splash Library Program	youth	24	
21-Jun YMCA	Summer Odyssey at the Watershed Cen	1st-4th	49	
21-Jun SPS (summer)	Weaver Elm how does your garden...	2nd and 3rd	15	30
23-Jun Discovery Center	Watershed 101 tour at VWM	5th-8th	6 3hrs	
24-Jun GLADE	Water monitoring and current issues	high school	12 4 hours	
25-Jun Wilson's Creek	Watershed 101 tour and volunteer work	high school	5 3hours	
28-Jun SPS (summer)	How does your garden grow--Water Cons.	3rd-4th	13	30
28-Jun YMCA	Summer Odyssey	K-5	89 90 min	
1-Jul Library	Making a Splash Library Program	public	20	45
6-Jul Master Naturalist	Jordan Creek Tour	Adult	30 120min	
8-Jul Library	Making a Splash Library Program	public	50	30
12-Jul YMCA	Summer Odyssey	K-5	85	90
13-Jul Drury	Summer Survivor camp JC tour	high school	15	120
13-Jul Library	Making a Splash Library Program	public	33	30
14-Jul MSU	Camp Bear, Water unit	middle school	12	60
15-Jul Univ H babtist	Summer Camp	middle school	14	120
17-Jul Waste Water	Training at OWTC	professionals	70 4hrs	
19-Jul Drury	Summer Survivor camp Watershed tour	high school	14	120
19-Jul YMCA	Summer Odyssey	k-5	60 1hour each	
21-Jul Discovery Center	Summer Program	K-3	15	30
5-Aug S. Haven Bab	Volunteer project	high school	4	120
23-Aug Drury	Jordan Creek Clean up	college	22	120
1-Sep Drury	Drury New Student Fair Booth	college		120
3-Sep WOLF	WC tour and stream monitoring	5th	50	150
7-Sep OTC	WC scav. Hunt and Stream Team	high school/co	24	150
11-Sep Landowners	Bull Creek Watershed Assn. Stream T	adult	30 4 hrs	
13-Sep WOLF	Stream Trailer demo	5th	50	30
14-Sep MSU	Water--Social Problems class	college	35	50
15-Sep msu	water--Restaurant mgt class	college	40	50
16-Sep Americorps	WC and OWTC tour	adult	8	120
17-Sep WOLF	Bull Creek Stream Ecology	5th	50 20 min (4X)	
21-Sep Installers	OWTC installer training	professionals	30 ?	

23-Sep Rotary	N. Side Rotary social at WC	professionals	20	
24-Sep Field Elm	Watershed Center Field Trip	4th	75	120
28-Sep OWTC	OWTC homeowner workshop	adult	22	120
12-Oct Glendale	Water Quality lesson	highschool sci	90	90
14-Oct Parkview	Water monitoring 101	highschool sci	30 all day	
14-Oct OM paddlers	Jordan Creek Tour	adult	15	
19-Oct WOLF	Water Treatment	5th	50	
20-Oct MSU	Jordan Creek Tour	college	34	
25-Oct OTC	Watershed Center Tour	college	21	90
27-Oct MSU	Sustainability Showcase at MSU	Table Display, ?		
28-Oct educators	Outdoor education workshop at WC	nonformal edu	13	120
29-Oct Truman Elm.	Nature Unleashed at VWM	4th graders	54	180
2-Nov York Elm	Nature Unleashed at VWM	4th	45 3 hours	
2-Nov WOLF	Map and Compass day	5th	50	120
2-Nov Drury	Sustainable Solutions Class	college	31	120
8-Nov Health Dept	Jordan Creek Tour	professionals	8	120
12-Nov City Mgt team	Jordan Creek Tour	professionals	12	120
16-Nov Stockton	Streamside monitoring	high school	12	60
17-Nov Summit Prep	Volunteer Day tree planting	middle and hig	20	120
17-Nov cowden elm	Nature Unleashed at VWM	4th	50 3 hours	
18-Nov Tri State				
19-Nov Science Fair	HS science fair at Drury	Highschool	30	1
8-Dec professionals	Sediment and Erosion Workshop	local professio	38 3 hrs	
22-Dec Greenwood	Aquifer Lesson	8-10th grade	2	60
		Total	3055	

WATERSHED CENTER

2-Mar Pipken	Service and learning	4th	25	120
15-Mar Mcbride	Water field trip, 5 stations	4th	115	120
16-Mar WOLF	Maps, Watersheds, Wetlands, forests	5th	50	120
30-Mar MSU	Intro to Geology Watersheds and Karst	college	25	120
13-Apr Drury	Water and Sustainability	college	35	100
13-Apr Fair Grove	Watersheds, Karst, & aquatic habitats	high school	8	75

17-Apr public	Stream Trailer at Jordan Park event	all	?	
20-Apr Hickory Hills	Watershed tour	7th	150	120
21-Apr IC (Catholic)	Stream Trailer at Jordan Park event	5th?	60	25
22-Apr Rountree Elm	Watersheds and Water Conservation	4th	44	120
22-Apr MSU	Watersheds and Water Conservation	college	30	120
May 3-6 Phelps	Watershed Center/Stream Team	1-8th grade	100	
6-May Hickory Hills	Watershed Center Tour		56	
10-May Rountree Elm	Watershed Center Tour	4th and 4%	44	2hrs
11-May Lebanon	Watershed Center tour	6th	95	2hrs
14-May St. Joseph's	Family education event	families	15	1.5
19-May Pleasant View	Watershed Center Field Trip	4th	49	2hrs
24-May Volunteers	Volunteer Training at WC	college	2	2
28-May Home school	Watershed Center tour	5th-8th	16	2
9-Jun St. Elizabeth	VBS service project at Watershed Cent.	5th-8th	60	2hrs
14-Jun YMCA	Summer Odyssey Watershed Center Field	1st-4th	60	
18-Jun public	Making a Splash Library Program	youth	24	
21-Jun YMCA	Summer Odyssey at the Watershed Cen	1st-4th	49	
21-Jun SPS (summer)	Weaver Elm how does your garden...	2nd and 3rd	15	30
23-Jun Discovery Center	Watershed 101 tour at VWM	5th-8th	6	3hrs
24-Jun GLADE	Water monitoring and current issues	high school	12	4 hours
25-Jun Wilson's Creek	Watershed 101 tour and volunteer work	high school	5	3hours
28-Jun YMCA	Summer Odyssey	K-5	89	90 min
1-Jul Library	Making a Splash Library Program	public	20	45
12-Jul YMCA	Summer Odyssey	K-5	85	90
15-Jul Univ H baptist	Summer Camp	middle school	14	120
17-Jul Waste Water	Training at OWTC	professionals	70	4hrs
19-Jul Drury	Summer Survivor camp	high school	14	120
19-Jul YMCA	Summer Odyssey	k-5	60	1 hour each
5-Aug S. Haven Bab	Volunteer project	high school	4	120
3-Sep WOLF	WC tour and stream monitoring	5th	50	150
7-Sep OTC	WC scav. Hunt and Stream Team	high school/co	24	150
16-Sep Americorps	WC and OWTC tour	adult	8	120
21-Sep Installers	OWTC installer training	professionals	30	?
24-Sep Field Elm	Watershed Center Field Trip	4th	75	120
28-Sep OWTC	OWTC homeowner workshop	adult	22	120
12-Oct Glendale	Water Quality lesson	highschool sci	90	90
14-Oct Parkview	Water monitoring 101	highschool sci	30	all day

14-Oct OM paddlers	Jordan Creek Tour	adult	15	
25-Oct OTC	Watershed Center Tour	college	21	90
27-Oct MSU	Sustainability Showcase at MSU	Table Display, ?		
28-Oct educators	Outdoor education workshop at WC	nonformal edu	13	120
29-Oct Truman Elm.	Nature Unleashed at VWM	4th graders	54	180
2-Nov York Elm	Nature Unleashed at VWM	4th	45	3 hours
2-Nov WOLF	Map and Compass day	5th	50	120
2-Nov Drury	Sustainable Solutions Class	college	31	120
16-Nov Stockton	Streamside monitoring	high school	12	60
17-Nov Summit Prep	Volunteer Day tree planting	middle and hig	20	120
17-Nov cowden elm	Nature Unleashed at VWM	4th	50	3 hours
	<b>Total</b>		<b>2146</b>	

**JORDAN CREEK TOUR NUMBERS**

6-Jul Master Naturalist	Jordan Creek Tour	Adult	30	120min
13-Jul Drury	Summer Survivor camp JC tour	high school	15	120
23-Aug Drury	Jordan Creek Clean up	college	22	120
14-Oct OM paddlers	Jordan Creek Tour	adult	15	
20-Oct MSU	Jordan Creek Tour	college	34	
8-Nov Health Dept	Jordan Creek Tour	professionals	8	120
12-Nov City Mgt team	Jordan Creek Tour	professionals	12	120
	<b>Total:</b>		<b>136</b>	

**STREAM TRAILER USES**

17-Apr public	Stream Trailer at Jordan Park event	all	?	
21-Apr IC (Catholic)	Stream Trailer at Jordan Park event	5th?	60	25
12-Jun River Rescue	Stream Trailer demo at Dam Jam	public	?	
11-Sep Landowners	Bull Creek Watershed Assn. Stream T	adult	30	4 hrs
13-Sep WOLF	Stream Trailer demo	5th	50	30
	<b>Total:</b>		<b>140</b>	

**ONSITE WASTEWATER TRAINING CENTER**

17-Jul Waste Water	Training at OWTC	professionals	70	4hrs
16-Sep Americorps	WC and OWTC tour	adult	8	
21-Sep Installers	OWTC installer training	professionals	30	?
28-Sep OWTC	OWTC homeowner workshop	adult	22	120
	<b>Total</b>		<b>130</b>	

**VOLUNTEER PROJECTS**

2-Mar Pipken	Service and learning	4th	25	120
9-Jun St. Elizabeth	VBS service project at Watershed Cent.	5th-8th	60 2hrs	
25-Jun Wilson's Creek	Watershed 101 tour and volunteer work	high school	5 3hours	
5-Aug S. Haven Bab	Volunteer project	high school	4	120
23-Aug Drury	Jordan Creek Clean up	college	22	120
17-Nov Summit Prep	Volunteer Day tree planting	middle and hig	20	120
	<b>Total:</b>		<b>136</b>	

**WATERSHED FESTIVALS**

**BOOTHS AT COMMUNITY EVENTS**

27-Jan MSU	Volunteer Fair	college	?	
17-Apr public	Stream Trailer at Jordan Park event	all	?	
25-Apr Church	Info table Schweitzer picnic	all	?	3hrs
8-May public	C street green event	all	?	
12-Jun River Rescue	Stream Trailer demo at Dam Jam	public	?	
1-Sep Drury	Drury New Student Fair Booth	college	?	120
27-Oct MSU	Sustainability Showcase at MSU	Table Display, ?		

**YMCA Summer Odyssey**

14-Jun YMCA	Summer Odyssey Watershed Center Field 1st--4th		60	
21-Jun YMCA	Summer Odyssey at the Watershed Cen1st-4th		49	
28-Jun YMCA	Summer Odyssey	K-5	89	
12-Jul YMCA	Summer Odyssey	K-5	85	
19-Jul YMCA	Summer Odyssey	k-5	60	
			<b>343</b>	

**Monthly Meeting Attendance**

January	cancelled	
February		51
March		45
April		37
May		33
June		67
July		30

August  
September  
October  
November  
December

27  
35  
26  
35  
33  
419



## 2011 Annual Report Education, Outreach, and Volunteer

### Year at a Glance

Participants at the Watershed Center	1600
Event bookings	87
Watershed Center field trips	39
Stream trailer outings	1
Volunteer hours logged	800
Booths at community events	6
Jordan Creek tours	6
Onsite Wastewater Training Center events	8

### Community Leadership and Involvement

Employees of the Watershed Committee of the Ozarks are encouraged to be involved in the community and seek leadership development opportunities. Stacy Armstrong is enrolled in the Go Lead program at MSU titled "Next Generation Leaders." Stacey is also serving on the City Stormwater Management Task Force that was formed in the fall although the process has been held up due to the EPA lawsuit.

Kelly Gunther and Mike Kromrey started GO LEAD training at MSU titled "Nonprofit Leadership in the 21<sup>st</sup> Century." The leadership training will consist of eight, half day classes. The Community Foundation of the Ozarks awarded a scholarship to the Watershed Committee to pay the cost of one participant.

Mike Kromrey served as president of the Missouri Environmental Education Association. He served as the WCO representative on the MSU Sustainability Advisory Committee, Environmental Collaborative, Interpreters Coalition, and Professional Science Masters Program Advisory Board at MSU. He also received the Springfield/Greene County Environmental Advisory Board's 2011 Choose Environmental Excellence Award, attended the Missouri Water Summit, and the Sustaining the Blue Planet Global Conference on Water Education.

### Educational Partnerships

The Watershed Center and Drury University are partners in education, and in 2011 many Drury students got to tour the Watershed Center. Dr. Sean Terry's resource management class, however, took it to the next level. Throughout the fall semester, students participated in environmental assessments and ultimately worked on management plans for many different aspects of the Watershed Center.

In 2011, WCO pledged our support for the **James River Basin Partnership** and the excellent series of **Watershed Festivals** they hold by pledging one volunteer for each festival. Schools from Nixa Inman, Clever, Chadwick, Sparta, Nixa Main, Billings, Ozark, Hurley, Galena, Crane, Monett, Shell Knob, Cassville, Hollister, Branson, Forsyth, Kirbyville, Taneyville participated. And last but not least, WCO works closely

with the **City of Springfield** and **Greene County** to provide Stormwater and Onsite Wastewater education, detailed in Stormwater and Onsite Wastewater Training Center sections of this report.

### **Groundwater**

The Watershed Committee of the Ozarks proved to be an important local resource when the water quality issues surfaced in the Rogersville area. Along with Greene County, WCO provided resources and expertise to research groundwater well contamination. WCO also continued participation with the Groundwater Foundation. Through the Groundwater Foundation, Greene County was recognized for the 15<sup>th</sup> consecutive year as a **Groundwater Guardian Community**. In addition, the Watershed Center is has achieved **Groundwater Green Site** standing. The Groundwater Foundation also provides educational resources and a national network of communities working to improve groundwater quality.

### **Monthly Meetings**

A long standing community service the Watershed Committee provides is the Monthly Meeting. The first Friday of each month community members from the private, public, non-profit and academic sectors gather to for a presentation on a water related issue, regional and agency updates, and networking opportunities.

### **Onsite Wastewater Training Center (OWTC)**

This was a year of improvements and events at the Onsite Wastewater Training Center. With help from the onsite wastewater experts at Greene County, improved upon our old displays and added a now composting toilet demonstration. The maintenance staff from the Springfield Greene County Park Board helped keep the site mowed and looking sharp, and the Water Quality Improvement Project Grant from the Environmental Resources Coalition provided funding for the improvements. Eight trainings and workshops were held at the OWTC in 2011

### **Publications**

WCO printed three interpretive signs for the C. W. Titus Education facility regarding the “green” aspects of the building.

Gargoyle Country: the Inspiring Geology of Springfield and Greene County by Jerry Vineyard was published by Watershed Press.

The Interpreters Guide to the Watershed Center was completed and is now available on our website and limited copies are available in print. Loring Bullard worked diligently on, and nearly completed a local rainwater harvesting manual.

### **Stormwater**

WCO serves as an important partner with the City of Springfield to provide stormwater education and outreach to meet the mandated requirements of the MS4 permit. Nearly all of our outreach events include basic education about stormwater: understanding what a watershed is, what the common pollutants in runoff are, the differences between point source and non-point source pollution, and the effects of impervious surfaces are

keystones of our education and outreach efforts. Specifically, this year we started selling rainwater harvesting equipment, led Jordan Creek Tours, provided sediment and erosion control training for local professionals, and did demonstrations with the “Enviroscape” and “Stream Trailer” watershed models.

The Watershed Center project, which was completed this year, is an important stormwater education tool. The Watershed Center will exhibit stormwater Best Management Practices (BMP’s), Low Impact Development (LID), rainwater harvesting, and green building and design, all of which improve the stormwater volume and quality on the site. Interpretive signage will explain the techniques, and the site will be open for tours and classes. (See below for this year’s activities...)

### **Watershed Center Field Trips**

This year about 39 field trips were conducted at the Watershed Center, in spite of a flurry of construction activities. Groups ranging from Elementary Schools to local Universities participated in place-based water education at the site. One notable change this year was Springfield Public Schools adoption of the Missouri Department of Conservation’s “Nature Unleashed” science curriculum for fourth graders. The curriculum requires a field trip and focuses on the local environment—the Watershed Center is a perfect location to meet the needs of nature unleashed. In all, about **1626** people used the Watershed Center for educational purposes, a **decrease of 25%** from 2010.

### **Watershed Center Site Projects**

The completion of the Watershed Center was an obvious site improvement, but lots of other projects also occurred this year. Springfield Plateau Chapter Master Naturalist members Bob and Barb Kipfer, and Mort Shirts continued to make timber stand improvements according to our Forest Stewardship Management Plan written by MDC. Master Naturalist Terri Leigh Baird spearheaded the planting of the rain garden in front of the Watershed Center, and Smiling Sun Landscaping donated labor and plants. Greene County helped with many site construction projects, including the work on the trails grant project, entrance bridge, pervious parking and overall site grading. Several trail work and trash clean up days were hosted with a variety of volunteers and volunteer groups. And several many volunteers helped plant the trees and native landscaping on the Watershed Center site.

### **Water Savers**

Missouri State University (MSU), City Utilities (CU), and the Watershed Committee of the Ozarks (WCO) teamed up to encourage water conservation on the Drury and MSU campuses for the past several years. This year, Watershed Committee volunteer Erin Murray continued this project at MSU. Earlier in her college career, she helped persuade fellow students and student government to create a fund for sustainability projects on campus. In 2011, Erin was able use the program she helped design by applying for and receiving funding to continue the Water Savers project at MSU. Residence Halls on Campus including Kentwood Hall, Hammons House, Hutchens House, Woods House, Blair-Shannon House, Freudenberger House, and Wells House were retrofitted with sink aerators, and low flow shower heads, and students will be given shower timers. MSU

will continue to track water savings, but we estimate the total project will **save over 2 million gallons of water per year**. Way to go Erin!

### **Website**

Our website, <http://www.watershedcommittee.org/>, had another big year. Office Manager Kelly Gunther, along with her husband Mike Guenther, began a complete overhaul that has dramatically improved its organization and aesthetics.

### **Volunteering**

Volunteers graciously donated their time and talent to further the Mission of Watershed Committee of the Ozarks. **Board Members** provide time and expertise to guide our organization and donated an estimated 300 hours to the Watershed Committee this year.

In 2011, we participated in a new program with the JP Morgan Chase Foundation. The Chase foundation individual volunteer grant program allows active employees or retirees to request a **grant** for an eligible charitable or **nonprofit organization**. This year, Nicole Boucher participated in the program and reported 75 hours of service for which the Watershed Committee will receive seven-hundred and fifty dollars.

WCO Partnered with MDC and Greenways on a major riparian planting in the Little Sac Watershed. The recently acquired Springfield Green County Parks property will be a linear park that will nearly connect the Little Sac Bike trails and Ritter Springs to Lost Hill Park. For this project we had about 40 volunteers and planted about 900 native seedlings.

**Adopt-A-Spring** volunteers monitored the major springs in Greene County quarterly to assess water quality, and donated about 92 hours. **Citizenship and Service Learning** students from MSU worked on a variety of projects and donated about 60 hours of service. **Citizens, groups and organizations** frequently donate labor for projects at the Watershed Center, adding another 320 hours, for a grand total of about **830 volunteer hours!**

## Education/Outreach Events 2011

Date	School/group	Topic	Age	Number Served	Minutes per lesson
1/26/2011	MSU	Volunteer Fair Booth	college	30ish	
2/8/2011	Christian County	Watershed Festival	5th		
2/9/2011	Christian County	Watershed Festival	5th		
2/10/2011	Christian County	Watershed Festival	5th		
2/16/2011	Christian County	Watershed Festival	5th		
2/17/2011	Christian County	Watershed Festival	5th		
3/1/2011	Pipkin	Service	7th	20	120
3/2/2011	Stone County	Watershed Festival	5th		
3/2/2011	Stone County	Watershed Festival	5th		
3/6/2011	Public	Fellows Lake Clean up			
3/10/2011	Barry County	Watershed Festival	5th		
3/15/2011	MSU	WET for GRY 228	college	25	30
3/17/2011	Robberson	Watersheds, Habitats	5th	34	120
3/22/2011	Taney County	Watershed Festival	5th		
3/23/2011	Taney County	Watershed Festival	5th		
3/30/2011	Summit Prep	Science Fair	upper	12	120
3/30/2011	MSU	Drinking water, Nonprofits	college	9	60
3/31/2011	Drury	Watershed Center Tour	college	25	120
4/1/2011	MSU	Ecopalooza Booth	college	?	4 hours
4/5/2011	Public	Booth at Mother nature's chld	adult	?	
4/7/2011	MSU	Watershed Center Tour	college	11	120
4/12/2011	Fair Grove	Watershed Center Tour	7th and 8th	6	120
4/13/2011	Media	Media Fun Shop	adult		60
4/14/2011	City Staff	Jordan Box Tour	professional	15	120
4/16/2011	Ozarks Green BC	Booth at Festival	public		4 hours
4/16/2011	WOW School	Watersheds and Nature	family	15	120
4/19/2011	Hickory Hills	Field Trip	7th	90	120
4/20/2011	Hickory Hills	Field Trip	5th	55	120
4/20/2011	Phelps	Kaleidoscope	1-5th	48	25
4/22/2011	OTC	Earth Day Event booth and talk	college	?	
3-May	City Council/Staff	Council Luncheon	professional	25	90
5/3/2011	Phelps School	Steam Team	8th	3	90
5/4/2011	Phelps School	Steam Team	8th	2	90
5/6/2011	Portland Elementary	WC tour/Nature Unleashed	4th	44	120
5/12/2011	Rountree Elementary	WC tour/Nature Unleashed	4th	46	120
5/13/2011	Immaculate Concept.	WC Tour and Stations	4th	45	120
5/18/2011	Holland	WC Tour, Nature Unleashed	4th	45	120
5/18/2011	Sherwood	Classroom Crawdads	3rd	44	two 40 min. sessions

5/19/2011	Deleware	Classroom Crawdads	3rd	21		45
6/8/2011	Homeschool	cubscout stream team	assorted	20		90
6/23/2011	GLADE	Water testing, volunteer projects	highschool	14	4 hours	
6/24/2011	Cub Scouts	Watershed Center Tour	all ages	25		120
7/1/2011	Wilson's Creek Interns	Watershed Center Tour	highschool	4		120
14-Jul	Bolivar YMCA summer	Children's programs	elementary	60		120
22-Jul	WC ribbon cutting	wc ribbon cutting	professional	130		60
23-Jul	Public	WC open house	family		5 hrs	40
5-Aug	Local Teachers	Freewheelin Friday	teachers	20		30
8-Aug	YMCA	Water Conservation	k-5	95		15
9-Aug	YMCA	Water Conservation	K-5	30		15
August 12-14	Wilson's Creek	Reenactment Booth	public	45		
26-Aug	CHAOS homeschool	Watershed Center Tour	K-8	30		120
31-Aug	Drury	Volunteer Fair Booth	college	10		
2-Sep	Drury	Architecture class JC tour	college	20		120
6-Sep	Methodist Church	WCO and Water Conservation	seniors	8		30
7-Sep	WOLF	Water sampling	5th	50		150
16-Sep	Sustaining the Blue plane	Presentation about WCO	professional	8		45
21-Sep	WOLF	Watersheds and Riparina areas	5th	50		30
24-Sep	Master Naturalist	Aquatic Training	adult	23		120
26-Sep	Drury	Watershed Center Tour	college	50		120
26-27 sep	Nixa HS	Watershed tour and monitoring	highschool	54		180
27-Sep	OTC	WC Tour for Env. Stewardship	college	20		90
28-Sep	MSU Env Sociology	Jordan Box Tour	college	20		90
30-Sep	Field Elm	Watershed Center Tour/stations	4th	75		120
30-Sep		Jordan Box Tour	middle sch			
4-Oct	Willard Intermediate	Enviroscape and talk	middle sch	23		40
10-Oct	MSU	Water Conservation	college	20		40
11-Oct	Parkview HS	JC tour and WC tour	highschool	25	all day	
11-Oct	Drury	JC tour and WC tour	college	6		120
13-Oct	OTC Middle College	WC tour	highschool	18		180
19-Oct	MSU	Sustainability day	college		half day	
21-Oct	WOLF	Water Treatment	5th	48		20
24-Oct	Sherwood	Nature Unleashed at WC	4th	45		120
25-Oct	York Elm	Nature Unleashed at WC	4th	25		120
25-Oct	Drury	Watershed Center Tour	College	20		150
26-Oct	Girl Scouts	Watershed Center Tour	5th grade	12		90
28-Oct	McGregor Elm	Nature Unleashed at WC	4th grade	48		120
2-Nov	Envirothon	SW regional Envirothon Comp	highschool	95	all day	
3-Nov	MSU	Environmental Lit honors class	college	18		30

10-Nov WOLF school	Stream Trailer	5th	48	20
16-Nov Truman Elm	Nature Unleashed at WC	4th	47	150
21-Nov Master Naturalist	Presentation about WCO	adult	60	30
29-Nov Wolf school	Field Trip, maps, watersheds	5th	49	120
30-Nov YMCA Teen program	Water conservation	5th	10	45
9-Dec Retirement party	Lorings Party at the WC	adult	100	120
12-Dec Master Naturalist	Meeting and Xmas party	adult	70	120
23-Dec Carson Mitchel	X-mas party	adult	30	rental

3/1/2011 Pipkin	Service	7th	20	120
3/17/2011 Robberson	Watersheds, Habitats	5th	34	120
3/31/2011 Drury	Watershed Center Tour	college	25	120
4/7/2011 MSU	Watershed Center Tour	college	11	120
4/12/2011 Fair Grove	Watershed Center Tour	7th and 8th	6	120
4/13/2011 Media	Media Fun Shop	adult		60
4/19/2011 Hickory Hills	Field Trip	7th	90	120
4/20/2011 Hickory Hills	Field Trip	5th	55	120
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5-Aug Local Teachers	Freewheelin Friday	teachers	20	30
26-Aug CHAOS homeschool	Watershed Center Tour	K-8	30	120
7-Sep WOLF	Water sampling	5th	50	150
24-Sep Master Naturalist	Aquatic Training	adult	23	120
26-Sep Drury	Watershed Center Tour	college	50	120
26-27 sep Nixa HS	Watershed tour and monitoring	highschool	54	180
27-Sep OTC	WC Tour for Env. Stewardship	college	20	90
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13-Oct OTC Middle College	WC tour	highschool	18	180
24-Oct Sherwood	Nature Unleashed at WC	4th	45	120
25-Oct York Elm	Nature Unleashed at WC	4th	25	120

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9-Dec Retirement party	Lorings Party at the WC	adult	100	120
12-Dec Master Naturalist	Meeting and Xmas party	adult	70	120
23-Dec Carson Mitchel	X-mas party	adult	30 rental	
3-May City Council/Staff	Council Luncheon	professional	25	90

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Cover photo: WCO Staff and Volunteers cleaning up Valley Water Mill Lake at the Watershed Center

Below: The cool blue flow from Sanders Spring along the trails at the Watershed Center



## **BOARD OF DIRECTORS**

Keran Lemons, Chair

Dan Hoy, Vice Chair

Michael Bridges, Secretary

Scott Bratcher

Bridget Dierks

Stuart Murr

## **STAFF**

Mike Kromrey, Executive Director

Stacey Armstrong, Projects Manager

Kelly Guenther, Business Manger

Rob Hunt, Watershed Center Coordinator

## **OUR MISSION**

To sustain and improve the water resources of Springfield and Greene County through education and effective management of the region's watersheds

## **OUR SPONSORS**

City Utilities of Springfield

Greene County

City of Springfield

## **OUR PARTNERS**

Drury University

Greene County Soil and Water Conservation District

Master Naturalists

Missouri Department of Conservation

Missouri State University

Project WET (Water Education for Teachers)

Springfield-Greene County Park Board

This report covers our fiscal year: January 1-December 31, 2012

## Dear Friends,

The Watershed Committee of the Ozarks (WCO) began a new chapter in 2012. We settled into the new Watershed Center, hired a new director, created a new strategic plan, accepted new staff duties, welcomed three new board members, designed a new logo, made a new format for our annual report....we even began a new long-term fund which will serve as an endowment with the purpose and hope of making the WCO more sustainable and resilient. This is a lot of “new” for an organization 29 years old. In light of the many changes we are embracing, and the fact that few founding members are now associated with the Watershed Committee, now is an important time to remember why we were created and what our role is in the community.

Thirty years ago, the Watershed Task Force was assembled out of concern for the drinking water supply. The group foresaw the community’s growth would threaten the very water it depended on if a thoughtful, balanced approach was not taken. One of the recommendations of the task force was to form a group—the Watershed Committee of the Ozarks—to protect our drinking water resources. Twenty-nine years later, the WCO has proven to be one of our community’s best ideas. The same stressors to our water supply that were present then are present now, and the mission of the WCO remains vital, relevant, and important. The powerful three-way partnership between the City, the County, and City Utilities still accomplishes valuable funding leverage, cooperation, and efficiency.

Look at this report! Our work over the past year illustrates that our foundation remains firmly planted in our original charge and mission, while we embrace the present and prepare for the future. It is an honor to be a part of this team, and I am looking forward to the challenges and opportunities of the year to come.



Kind Regards,

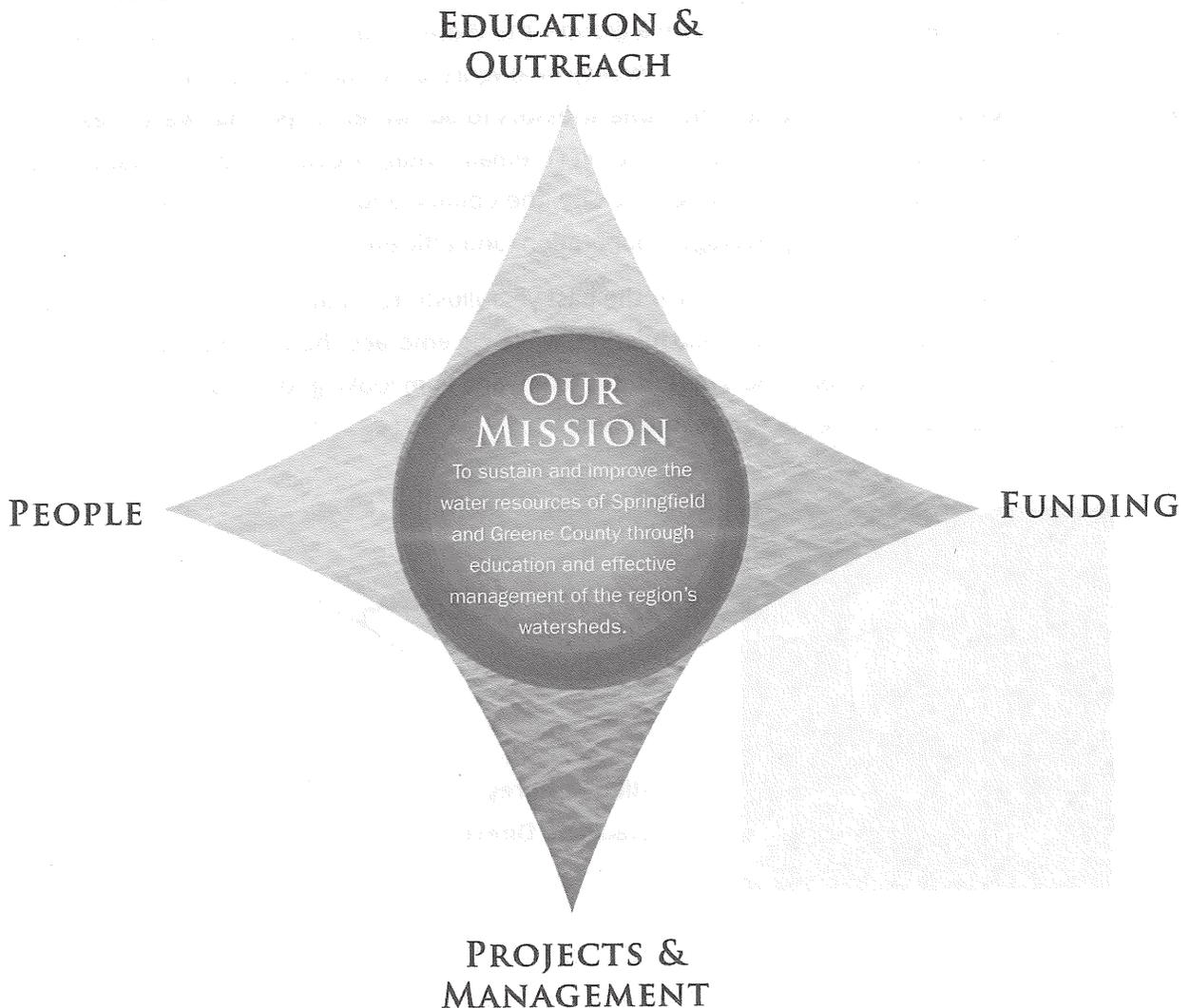
A handwritten signature in cursive script that reads "Mike Kromrey". The signature is written in dark ink and has a fluid, personal feel.

**Mike Kromrey**  
Executive Director

# Preface

At the Watershed Committee, our mission focuses the organization and directs the work that we do. However, the work of watershed protection is complex. This became apparent at our August retreat when the board and staff embarked on the process of updating our strategic plan. During the meeting we found ourselves momentarily stymied in pages of goals, objectives and strategies that comprise our work. In an “aha moment”, a creative solution rose to the surface. A compass, with four cardinal directions, succinctly fits our organization.

Our north and south represent education and outreach and projects and management. These directions are the real work of water protection. East and west represent funding and people. These are the resources necessary to accomplish the work. In the center of the compass, the place from which everything radiates outward, is our mission. The accomplishments of 2012 contained in this report are organized in this manner, so our compass can be your guide. Please take joy in these accomplishments because none of this could happen, or is even possible, without supporters like you.





# Education and Outreach

**Education and Outreach** are at the core of our mission. In order to protect our resources, citizens must understand where our water comes from, what can negatively affect our resources, and what actions citizens take to protect them. We strive to connect kindergarteners through engineers with the information they need to help keep our water clean and plentiful.

Pictured: Students on a field trip at the Watershed Center

## Website and Media

The biggest change in our website in 2012 was a major increase in **blog** activity. The blog is updated several times each week, and everyone from the staff participates. Along with normal posts, WCO has started a "Water Wednesday" weekly post that provides thought provoking insight into water conservation, protection, and education.

In addition to our blog, WCO has been active in social media. The **Facebook** page, <http://www.facebook.com/WatershedCommitteeoftheOzarks>, is updated an average of 4 times a week with shared posts, articles, and pictures from the Watershed Center. Plans to increase volume to the **YouTube** account have begun with the purchase of a High Definition camcorder and an idea for interpretive videos that demonstrate features of the Watershed Center. Last year was a good year for increasing the web presence of WCO, and 2013 promises to hold even more online promotion of clean water, our sponsors, and our organization.

## Watershed Center Field Trips

This year we hosted **41 water quality field trips** at the Watershed Center. The age of participants ranged from kindergarten to adult, and topics covered stormwater, karst topography, stream ecology, forest ecology, and anything in between. During one trip in particular, students sampled water from Jordan Creek and toured the culvert in the morning, and sampled the South Dry Sac and toured the Watershed Center in the afternoon. It was a fantastic illustration of the impacts of urbanization to a stream habitat.



## Onsite Wastewater Training Center (OWTC)

The OWTC saw a lot of use this year. Training and recertification courses occurred throughout the year, organized by Greene County and Missouri Small Flows. Springfield-Greene County Parks Board was instrumental in the maintenance of the site and it looked great for each session. In 2010, three acres of the site were converted to native prairie for the water quality, maintenance, and habitat benefits it would provide. During the drought of 2012, the prairie flourished, and volunteers and staff aided by removing some invasive species.

## Drought Response

The summer of 2012 was one of the hottest and driest on record for Missouri and the Nation. The storage capacity of our water supply plummeted to within a couple of percentage points of triggering mandatory water conservation efforts. The combination of citizen action, transferring water from Stockton Lake, and timely rain helped the community narrowly avoid these mandatory measures. During the drought, WCO fielded numerous calls and interviews from local news media about various water related topics, held a drought forum at our Monthly Meeting, and encouraged water conservation through our Water Savers project, website, and social media outlets.

## Medicine Take Back Event

The Community Partnership of the Ozarks in cooperation with the National DEA Medication Take Back held the Springfield Area Medicine Take Back Event on April 28, 2012. The Watershed Committee assisted by providing local water quality information to participants of the event. This event collected over 900 pounds of expired or unused prescriptions! Proper disposal (not flushing!) of these medications helps to prevent possible misuse while also keeping them from harming our drinking water supply.

## Water Savers

The Water Savers program gives local residents the equipment and education they need to conserve water. This year, we added toilet tank displacement bags to the usual sink aerators, low-flow shower heads, leak testing kits, and shower timers. Participants can select the items they can use and place them in a Watershed Center tote. The staff went out on a couple of occasions to distribute the kits to the public as a trial run. We plan to be prepared, especially if the drought persists, to distribute many of these kits in return for a donation that will help keep the program sustainable.

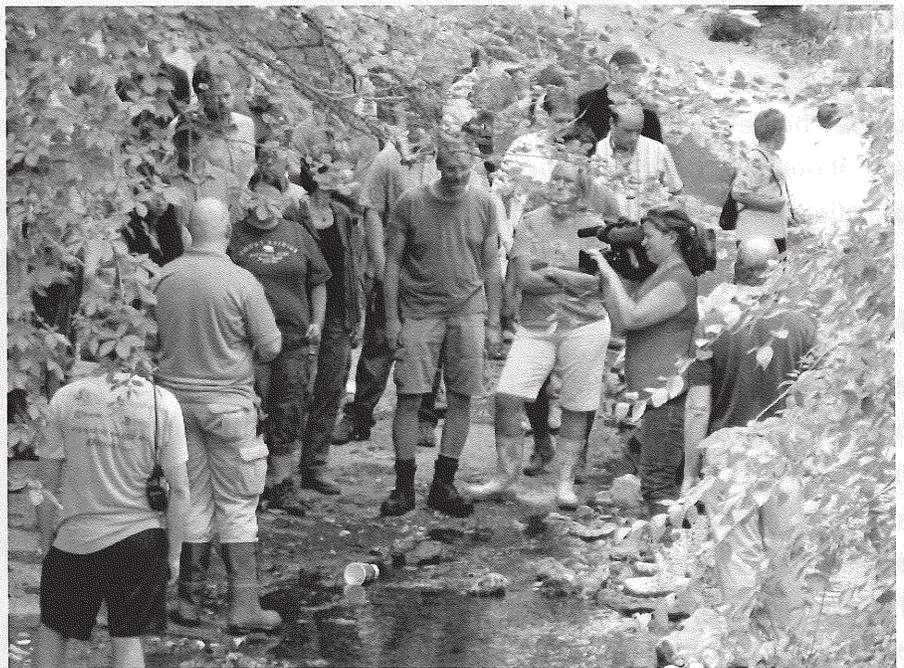


## Stormwater

With the opening of the Watershed Center, WCO was able to be even more effective at educating the public about Stormwater. This section of water education is especially important due to our partnership with the City of Springfield and Greene County. Through our outreach and education, we help the city maintain its MS4 permit with the Environmental Protection Agency, in an effort to ensure the stormwater that leaves Springfield meets standards set by the EPA. While every field trip held at the Watershed Center contains some element of stormwater discussion, there are several ways in which we focus on this subject. Our Enviroscape model demonstrates how non-point source pollution can enter a body of water untreated, the Stream Trailer shows students the effects of changing a river's course, altering its banks, or introducing different types of pollution to its waters, and the many best management practices around the site provide excellent examples of what we can do to protect our water.

**Jordan Creek Tours** are an effective outreach tool for educating citizens about stormwater. Participants have the opportunity to go through the Jordan Creek Culvert underneath the streets of downtown Springfield, guided by Watershed Staff. Participants can see storm drains connecting directly to the creek. This tour always leaves a powerful impression on our visitors, and we have had a sharp increase in request for tours and television coverage of our tours this year.

KY3 News Reporter, Linda Russell, covered a summer Jordan Creek Tour and interviewed Watershed Center Coordinator Rob Hunt and City Storm Water Engineer Todd Wagner



## Educational Partnerships

Partnerships and collaboration with local colleges and universities have continued to grow. Classes from **Ozarks Technical Community College**, have come out to do everything from a tour of our LEED Gold C.W. Titus Education Facility to sampling the South Dry Sac Creek for macroinvertebrates. **Missouri State University** sent Biology and Geology classes out to hike our trails and we even had Abbe Ehlers's Food and Beverage class visit on several occasions to learn about the application of green practices in the Hospitality and Restaurant field. Students from **Drury University** volunteered and used the Watershed Center for various research projects.



In April, WCO had the opportunity to team up with the **Discovery Center** of Springfield during their Earth Day celebration. As in years past, we were also able to partner with the **James River**

**Basin Partnership** during their Watershed Festivals, talking to kids from the James River Watershed about stormwater and pollution. During the **Green Leadership Academy for Diverse Ecosystems, or GLADE**, Rob Hunt spent some time on the creek and the lake with a very gifted group of future leaders.

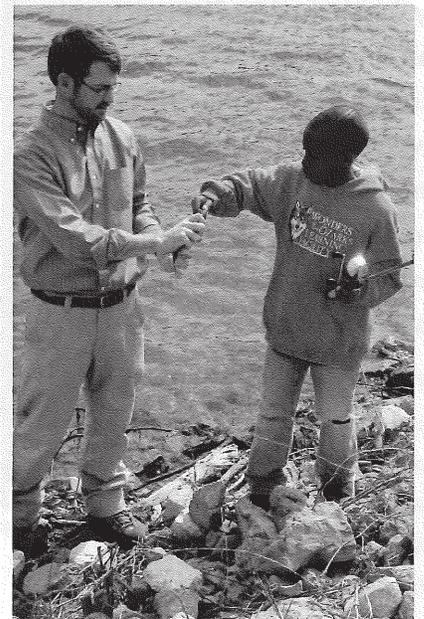
At the Watershed Center, WCO has been able to team up with the **City of Springfield, Greene County, Missouri Department of Conservation, and Missouri Small Flows** to provide training on wastewater and stormwater, as detailed in the Onsite Wastewater Treatment Center and Stormwater.

A new program from 2012 was the Environmental Education, or EE, Blitz. This event brought over one hundred home school students from around the state to the **Springfield Conservation Nature Center** to learn about all of the great education and field trip opportunities in Springfield. In March 2013, we have the privilege of hosting the second installment of the EE Blitz at the Watershed Center!

### Fishing

Fishing at Valley Water Mill Lake kicked off on March 7, 2012 with the students from the Wonders of the Ozarks Learning Facility, better known as WOLF. Since the first day of fishing, many bass, bluegill, catfish, and crappie have been harvested from the lake. Fish populations are monitored and maintained by the Missouri Department of Conservation. The last sampling showed strong populations of bass and bluegill.

Executive Director, Mike Kromrey, helping a WOLF student

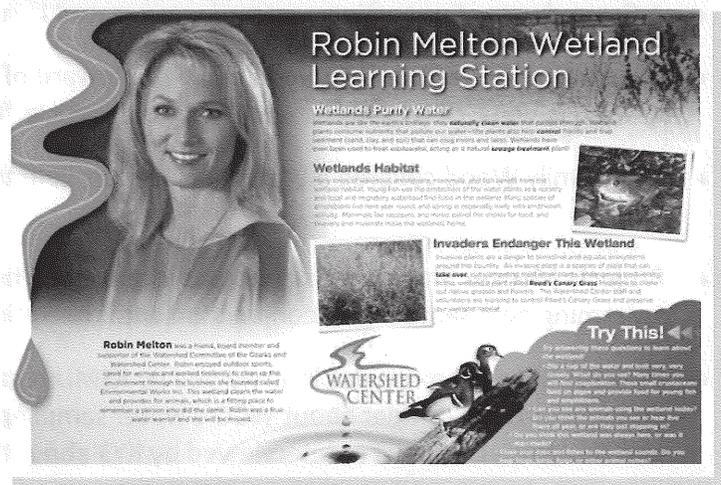


## Monthly Meetings

Every first Friday of the month, the WCO continues our long tradition of gathering community stakeholders together to learn about water related topics. In spite of 7:30 am meeting time, over 500 attended in 2012. The meetings also serve as a networking opportunity, and a time for participants to share announcements and upcoming events. These meetings are truly a great tradition of the Watershed Committee, and we are thankful to all our participants and presenters. Our topics for 2012 were:

- ◆ **January:** *"Watershed 101"* by Mike Kromrey, Education and Outreach Coordinator, Watershed Committee of the Ozarks
- ◆ **February:** *"Securing Our Water Future"* by Gail Melgren, Executive Director, Tri-State Water Resource Coalition and Roddy Rogers, Board of Directors President, City Utilities Water Distribution Manager
- ◆ **March:** *"Ozarks Water Watch Update"* by David Casaletto, Executive Director, Ozarks Water Watch
- ◆ **April:** *"What's Green in Branson?"* by Mona Menezes, Environmental Specialist, City of Branson
- ◆ **May:** *"Overview of Missouri Master Naturalists"* by Jennifer Ailor and Bob Kipfer
- ◆ **June:** *"Sustainability at Missouri State University"* by Dr. Tammy Jahnke
- ◆ **July:** *"Missouri Stream Team Watershed Coalition: A Statewide Mission"* by Holly Neill, Director
- ◆ **August:** *"Jordan Creek Renewal Project"* by Todd Wagner, Principal Stormwater Engineer, City of Springfield
- ◆ **September:** *"Drought Panel and Discussion"* with Roddy Rogers-City Utilities, Bob Pavlowsky-OEWRI at MSU, Mark Green-National Weather Service, Moderated by Gail Melgren
- ◆ **October:** *"Watershed Committee Staff Update"* by Mike Kromrey, Executive Director, Rob Hunt, Watershed Center Coordinator/WCO and Wetland Learning Station Dedication/Remembrance of Robin Melton
- ◆ **November:** *"TMDL Solved with TREE"* by Eric Dove, Olsson Associates
- ◆ **December:** *"PAHs in Springfield Sediments"* Todd Wagner, P.E. Principal Storm Water Engineer, City of Springfield and Carrie Lamb, Water Quality Coordinator, City of Springfield

After our October Monthly Meeting, the WCO Board and staff, along with friends, coworkers and family of Robin Melton spent some time remembering her. The Wetland Learning Station was dedicated in her honor, and we unveiled an interpretive sign for the Wetland Learning Station with a picture of Robin.



## Year at a glance-Education and Outreach

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<b>Participants Visiting Watershed center</b>	<b>1605</b>
Event Bookings	53 (Excluding Field Trips)
Watershed Center Field Trips	41
Volunteer Hours Logged	1629
Booths at Community Events	7
Jordan Creek Tours	11
Onsite Wastewater Training Center uses	5
Events in C. W. Titus Education Facility	67
Blog Posts	92

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### **New Publications** (available on our website, downtown office and C.W. Titus Education Facility)

Five new onsite wastewater **fact sheets** were created in partnership with Greene County Resource Management and funded by the WQIP project:

- ◆ Maintaining your Onsite Wastewater Treatment System
- ◆ Maintaining your Onsite Wastewater Drip System
- ◆ Maintaining your Onsite Pump to Gravity System
- ◆ Maintaining your Onsite Wastewater Lagoon System
- ◆ Maintaining your Low Pressure Pipe System

Three **new brochures** were created for the Watershed Center:

- ◆ The Watershed Center at Valley Water Mill Park
- ◆ Rental Information
- ◆ Being Green: Green features of the Watershed Center and practical tips you can apply at home or work

Several **other publications, interviews, and presentations**, a few of which are listed here:

- ◆ A Groundwater Connection postcard was created in response to the drought
- ◆ Mike Kromrey's article "Everyone can be a steward of streams" was published in the Springfield-News Leader as Voice of the Day as was Rob Hunt's article "Ozark Vacations"
- ◆ KY3's Emily Wood covered a Watershed Center field trip and KY3's Linda Russell covered a Jordan Creek Tour
- ◆ Projects Manger Stacey Armstrong was interviewed by KSPR 33 about WCO's involvement with local swimming hole sampling, in conjunction with the Springfield-Greene County Health Department
- ◆ Director Mike Kromrey was interviewed by KSMU regarding Ozarks Water Watch Week, by the Springfield-News-Leader about WCO's water sampling program, by KY3 regarding the drought, and he and Dr. Janice Green were interviewed by KY3 about their seminar "Are we loving the Ozarks to death"



# Projects and Management

**Projects and Management** is where the rubber meets the road. Source water protection, watershed management plans, stormwater best management practices, and policy recommendations are water protection techniques important to all members of our community. Support from our sponsors allows us to operate and apply for additional resources to fund projects that improve our communities water resources.

Pictured: Rain garden at Doling Park

## **Water Quality Improvement Project (WQIP) Final Report**

The Water Quality Improvement Project was a federal grant initiated in May 2006 to improve and protect water quality while enhancing economic development for municipalities, agriculture, and tourism. Throughout the five and half years since the initiation of the grant several important water quality projects have been implemented in Southwest Missouri. The completed projects include the remediation of **sixteen onsite wastewater systems that were failing to groundwater, seven educational onsite wastewater trainings, and installation of public low-flow outdoor restroom facilities at the C.W. Titus Watershed Education Facility.** The grant total award amount over the six year project timeframe was \$636,664. The WQIP grant was completed on March 30, 2012 and a final report can be found at <http://watershedcommittee.org/our-publications/>.

## Conservation Innovation Grant

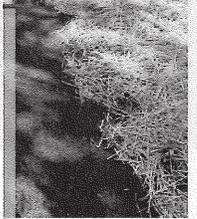
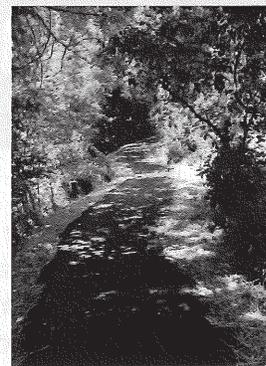
The USDA Conservation Innovation Grant provides \$100,000 (which includes 50% local match) to help two local farms install innovative farming practices to **produce food more sustainably and help control stormwater runoff**. The project will also hold field days and create resources to encourage these practices on other local farms. In 2012, the grant was extended to allow the farmers enough time to make use of the available funding. Some of the innovative practices installed so far include vermicomposting, water and energy conservation practices, and one of the first Chinese High Tunnels in North America!



Chinese High Tunnel being built at Millsap Farm

## DNR Trails Grant Wrap Up

The Watershed Committee received a Recreational Trails Grant from the Missouri Department of Natural Resources in March 2011. The purpose of this grant was to construct **1,550 ft. of hard surface trail (pictured) connecting the existing Lakeside Learning Station to the newly constructed C.W. Titus Education Facility**. The grant also provided money to aid in construction of a trailhead and parking lot for the Education Facility. Total project costs are estimated at \$143,090, with \$85,000 of the amount coming from the federal grant and the remaining coming from local matching funds. This project extends the hard surface trails at the Watershed Center to just over 3,000 feet and provides greater access for disabled patrons.

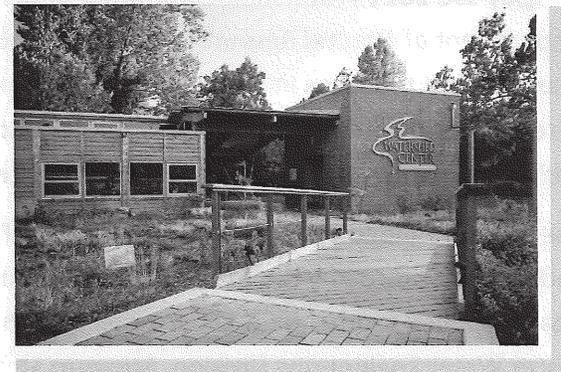


## High-Efficiency Toilet Project

Watershed Committee of the Ozarks (WCO) received a grant from the Community Foundation of the Ozarks to increase the number of **high-efficiency toilets** that City Utilities (CU) provided to **low income people**. The project marks a continued effort to help customers use water more efficiently. With this program, a customer who has received assistance through the federally funded Low Income Home Energy Assistance Program (LIHEAP) and is a CU water customer, may qualify to have up to three High-Efficiency Toilets installed in their residence at no cost to them. Both low-income homeowners and renters qualify (with approval from the property owner). CU sorts the qualifying customers from the highest to lowest monthly water users. For the highest water users in this category, CU's Water Technicians from the Water Operations area conduct a comprehensive water audit in the home prior to toilet replacement. This allows additional leaks to be identified and repaired if possible, along with the installation of new showerheads and faucet aerators. In addition to conserving water, this project can lower the water bills for people who can use the assistance the most.

## Watershed Center Site Projects

Since the completion of the C.W. Titus Education Facility, the Watershed Center has been full of new projects in various stages of completion. A **vegetable garden was planted under the living wall structure**; a wire lattice on a metal frame designed to support vines and channel rainwater down the plants into the soil. Other plantings occurred on the lake itself. Sarah Davis and Sonny Decker from the City of Springfield held a small workshop for WCO staff and volunteers on the construction of **floating wetlands**. The raft-like garden beds allow the roots of wetland plants to grow into the water, removing excess nutrients and creating habitat for aquatic organisms. A few more were constructed throughout the year with promising results. While there are still some kinks to be worked out, these floating gardens are an attractive way to filter our water here at the park.



To increase visitor usage, we were able to **install a paved pathway** from the C.W. Titus facility to the Lakeside Pavilion, creating a paved or boardwalk trail along one entire side of the lake. And, just within the last couple of months, a new **retaining wall**, donated by Eroco, has been built along the east side of the parking lot near the education facility and the post for our entrance sign has been installed, with the entrance sign coming along very soon!



Vegetable garden planted under living wall



Making Floating Wetlands



Completed Floating Wetlands being put into Valley Water Mill Lake

Trailhead of pathway that leads from the C.W. Titus Education Facility parking lot to the Lakeside Pavilion

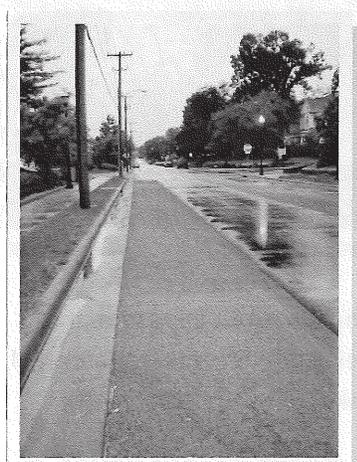
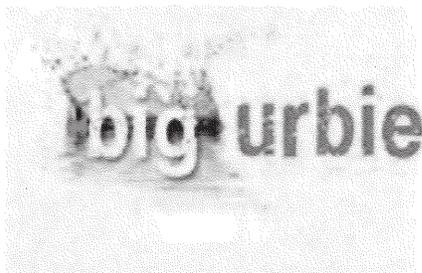


## 319 Nonpoint Source Implementation Grant: Springfield-Greene County Urban Watershed Stewardship Project (The Big Urbie)

On May 1st, 2011 Watershed Committee of the Ozarks was awarded federal funding through the Missouri Department of Natural Resources Nonpoint Source Implementation (319) Grant to apply stormwater best management practices in Springfield and Greene County. The project includes installation of numerous “green” stormwater management practices, monitoring of their effectiveness at reducing and treating pollutants commonly found in urban stormwater runoff, and educating the public about stormwater.

The grant is funded by the U.S. Environmental Protection Agency under Section 319 of the Clean Water Act, and is administered by the Missouri Department of Natural Resources. The Watershed Committee of the Ozarks applied for the grant in partnership with the City of Springfield’s Department of Public Works Storm Water Engineering Division, Missouri State University’s Ozarks Environmental and Water Resources Institute, Greene County Resource Management, James River Basin Partnership, Missouri Project WET, and Ozark Greenways. **The grant requires a match of funds and in-kind services that bring the total value of the project to more than \$1.6 million.**

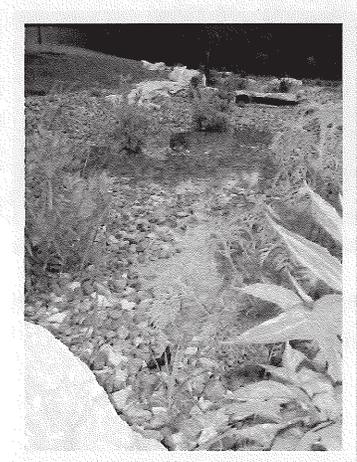
The Section 319 grant will implement stormwater practices that reduce and treat runoff from streets, buildings and parking lots, thereby protecting area streams, lakes, and springs. The improvements will be implemented at homes, businesses, schools, and community parks located in the South Creek, Fasnicht Creek, Jordan Creek, and Pea Ridge Creek watersheds. The grant will **also monitor the water quality** before and after the improvements are built. This will allow local experts to measure the effectiveness of these natural solutions for reducing, absorbing, and treating stormwater runoff. More information and updates can be found at [www.bigurbie.org](http://www.bigurbie.org)



Walnut Streetscape Pervious Pavement



Native Tree Planting in Jordan Creek Riparian Corridor

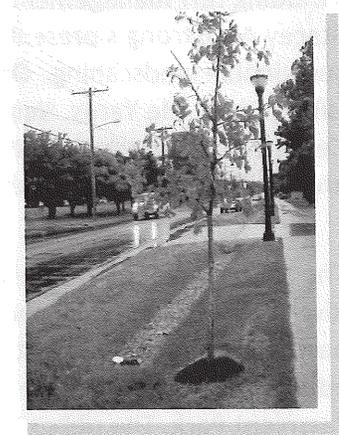


Rain Garden at Doling Park

## Big Urbie-Stormwater Quality Improvement Projects

During the 2012 calendar year, several stormwater quality projects were completed including riparian corridor improvements, infiltration swales, rain gardens and pre-water quality monitoring data collection for detention basin retrofits. In April 2012 the Watershed Committee partnered with the City of Springfield Storm Water Services and Ozark Greenways to **plant 20 native trees in the Jordan Creek riparian corridor** between Main Avenue and Grant Street Bridge. These trees will help filter and remove stormwater runoff before entering into the creek.

The City of Springfield Storm Water Services partnered with the Big Urbie grant on several stormwater best management practices (BMPs) during the year including the **installment of pervious pavement and infiltration swales with street trees as part of the Walnut Streetscape project** from John Q. Hammons Parkway to Kimbrough (picture on right). During the Doling Park Lake and Waterway Improvements, a rain garden and wetland were constructed to reduce and filter runoff draining into Doling Lake. Also during the renovation of the City's Environmental Resource Center building, **a cistern was installed to harvest rainwater from the roof for landscape irrigation**. A floating wetland was constructed at Valley Water Mill Lake to remove excess nutrients from the lake. Project planning with Springfield Public Schools (SPS) was also started for stormwater improvements projects at Robberson and Boyd Elementary Schools.



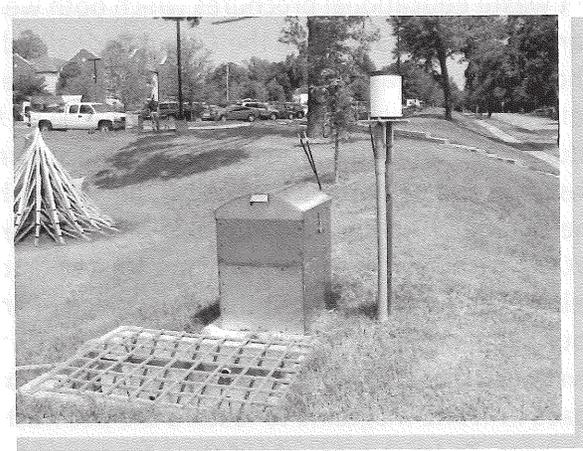
Walnut Streetscape Infiltration Trench

An **automatic sampler was installed in detention basins at MSU and Drury** to monitor the flow and water quality entering and leaving the basin prior to it being retrofitted. Monitoring is being conducted by Ozarks Environmental Water Resources Institute (OEWRI) at Missouri State University throughout the grant to determine the effectiveness of these BMP practices at reducing the volume of runoff and improving water quality.

Missouri Department of Conservation (MDC) partnered with Watershed Committee and the Missouri State Darr Agricultural Center to select **290 native seedlings to plant along the South Creek corridor**. MDC helped to provide advice on what species would be suitable for the site conditions and the Missouri State Students will help with planting the seedlings in the spring. The Big Urbie Jordan Creek Clean-up was held on October 13th with over 130 MSU students volunteering a total of 390 hours. They removed 50 large trash bags of trash out of Jordan Creek. The trash bags can contain about 25 pounds of trash so we estimate that about 1,250 pounds of trash was collected and removed from the creek.



Boyd Elementary before stormwater Improvements

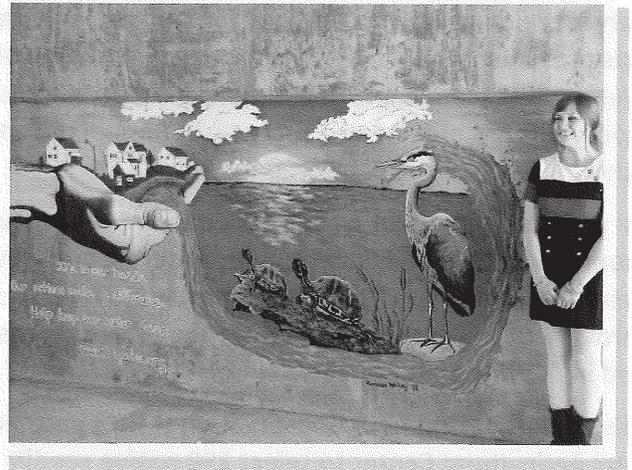


Water quality auto sampler and Rain Gauge at Drury

## Big Urbie-Stormwater Education

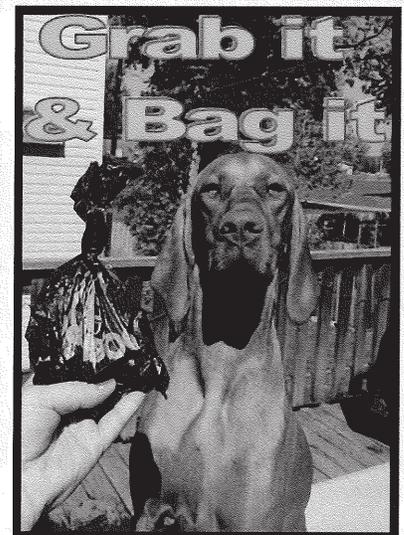
During the 2012 calendar year, several stormwater education events and materials were completed including the Big Urbie stormwater survey and PSAs for low impact development (LID) practices on KSMU radio station. The Show-Me Yards and Neighbors and the Professional Grounds Management Society hosted a free “Sustainable Landscape Professionals Workshop” in partnership with the grant on February 7, 2012 with 108 people in attendance. The workshop provided practical information on sustainable techniques including turf management, rain gardens, rain barrels, native plants and nonpoint source pollution including Stacey Armstrong’s presentation on the Big Urbie Grant and the connection between water quality and sustainable landscaping. On Aug. 28th the Big Urbie grant partnered with James River Basin Partnership’s (JRBP) Show Me Yards, Neighborhoods, Farms and Ranches homeowner workshop at the Darr Agricultural Center. At the workshop Stacey Armstrong presented on the Big Urbie grant and the cost-share funds that are available for LID practices.

The Watershed Committee of the Ozarks, Ozarks Technical Community College, Ozark Greenways, James River Basin Partnership, and the City of Springfield partnered on the Fasnicht Creek **stormwater education mural** along the Ozark Greenways trail in Fasnicht Park. The ribbon cutting and unveiling for mural was held on May 15th in conjunction with the Springfield-Greene County Parks Improvements. Ozarks Technical Community College Fine Arts student, Karsse Wilkey (pictured) designed and painted the mural as part of an educational component of a Big Urbie Stormwater Grant. The mural is a reminder that our actions make a difference and every person can help keep our water clean.



Stacey Armstrong presented on the Big Urbie grant at the 319 Water Summit in Branson on June 13<sup>th</sup> and also attended the Shaw Greener Stormwater Conference in St. Louis on June 19<sup>th</sup> to learn about green stormwater projects in the St. Louis metro area. These conferences provided useful BMP maintenance information that will be applied to local Big Urbie projects.

**Educational materials** created for the grant this year included LID and pet waste educational brochures which both were created in partnership with JRBP and the City of Springfield. The Pet Waste photo contest was held on the Big Urbie website which encouraged pet owners to submit a photo of their dog to be featured on an educational brochure. The pet waste educational brochure was designed and completed in time for the September 22nd DogFest and the October 20th Pets and Pumpkins. During these events JRBP and WCO gave away the educational pet waste postcards (pictured) to help educate owners about the importance of grabbing and bagging your pet waste. TAME magazine partnered with the Big Urbie grant to give away these postcards with 3,000 donated bags along with ad space in TAME magazine to feature the pet waste educational message. To learn more about the progress of the Big Urbie grant, visit [www.bigurbie.org](http://www.bigurbie.org).



## Springfield-Greene County Health Department Sampling

WCO assisted Springfield-Greene County Health Department with collecting their **weekly bacteria samples in streams that are public swimming locations** during the summer months. After the samples are analyzed the E.Coli and Total Coliform results are posted on the Health Department's webpage the following day for the public to access. Samples were collected from May 1<sup>st</sup> till September 4<sup>th</sup>, 2012 and results can be found at <http://health.springfieldmo.gov>.

### Asher Creek Sampling

The WCO is partnering with the Greene County Soil and Water Conservation District (GCSWD) to conduct the water quality sampling component for the Asher Creek 319 Project. WCO and the GCSWD have the common objective of encouraging the responsible use of our natural resources and the **protection of critical drinking water supplies in the Little Sac River Watershed**. WCO Field Technician David Chiles is collecting the water quality grab-samples and flow measurements, downloading stage logger data, and delivering the samples to Ozarks Environmental Water Resources Institute for analysis.

The Asher Creek watershed is a sub-basin of the Little Sac Watershed in Greene and Polk Counties. The Little Sac River Watershed includes Fellows Lake, McDaniel Lake, and Stockton Lake and makes up the majority of the City of Springfield's public drinking water supply. In 1998, the Little Sac River was placed on the 303d list for bacterial contamination, for which a TMDL for Fecal Coliform was approved in 2006. The WCO conducted water quality field work in the Asher Creek Watershed sampling primarily for bacteria, from 2003 until 2007. In 2006, City Utilities of Springfield conducted sampling for total phosphorus, total nitrogen, bacteria and other constituents in an effort to further identify the problem. In 2009, in a joint effort between the WCO and GCSWCD, the **nine element Upper Little Sac Watershed Management plan** was developed which includes the Asher Creek sub-basin. In the Upper Little Sac Watershed Plan data from several previous studies, including the Little Sac River TMDL and the Little Sac River Data Gap Analysis identified several priority sub-watersheds. Sampling data from four locations on Asher Creek indicated high levels of impairment in this relatively small sub-basin with higher than 125cfu/100mL geomean of E.coli bacteria. Because of the elevated bacteria levels, the Asher Creek Basin was identified as a priority area for BMP implementation and restoration in the Upper Little Sac Watershed Plan.

The primary goal of the Asher Creek water quality monitoring effort is to quantify the load level of the measured impairments in the watershed (pre-implementation). Up until this point no extended, weekly water quality monitoring effort has been conducted in this watershed. The secondary goal of the monitoring effort is to measure the effectiveness of the project's proposed BMPs.

### Greene County Dye Traces

WCO partnered with the Greene County Resource Management to investigate hydrology and groundwater concerns. In fall 2012 a dye trace from a sinkhole filled with trash and debris in Greene County was traced to Fulbright Spring, which is part of the public drinking water supply for the City of Springfield. The trash in that sinkhole was then removed providing a direct improvement in the water quality. This dye trace and others like it have been instrumental in understanding the unique connections our surface water has with our groundwater and provides a beneficial tool for source water protection.

WCO also partnered with the City of Springfield Storm Water Services to perform a **dye trace at Doling Park** (pictured) on June 7th to find the leak in the wall of the lake. The dye trace was successful and helped to pinpoint the location of the leak which prevented the need to fix the entire wall of the lake which would have cost more than \$30K.





# People

The Watershed Committee of the Ozarks is **People**—people who are dedicated to protecting our water resources now and for the future. Our board, staff, sponsors, volunteers, partners, and supporters are a group of dedicated and dynamic individuals who make our mission possible. This chapter is about those people.

Pictured: Presentation of the LEED Plaque for the C.W. Titus Education Facility

## Staff Development

Kelly Guenther, Stacey Armstrong, and Rob Hunt attended a conference at Drury University for non-profit organizations. The staff had the opportunity to learn about many aspects of non-profit business with topics ranging from social media to communicating with board members. This conference served as a valuable networking tool for many of the local non-profits in Springfield. Staff also attended the Annual Tri-State Water Conference.

Rob Hunt has been representing the Watershed Committee of the Ozarks as part of the Interpreters Coalition, Environmental Collaborative, and as part of the Association of Missouri Interpreters (AMI) he was able to attend a late summer week-long workshop where he sharpened his skills as an educator and interpreter.

## Staff Cont.-

The Stormwater Management Task Force, through a facilitated process, is working to provide valuable community input, representation and collaboration in developing guiding principles, priorities, policies and funding options for managing stormwater issues in Springfield and Greene County. This task force includes 30 representatives from various stakeholder groups, including WCO Projects Manger, Stacey Armstrong. The first Stormwater Management Task Force was held at the C.W. Titus Education Facility October 25, 2012. Stacey also attends Greene County Area Resource Team meetings to stay informed on proposed development and zoning changes in our drinking watershed. All staff have been able to attend the Learning Community non-profit consulting classes offered by Applegate Consulting—an opportunity made possible by the Community Foundation of the Ozarks, and Mike Kromrey has been involved with many groups including the Our Missouri Water advisory committee, the MSU Sustainability advisory committee, the Professional Science Masters program advisory board, and others.

## WCO Board Member Changes

The board of the Watershed Committee of the Ozarks has welcomed three new members in the last few months. Dan Hoy, the Facilities Manager for Bass Pro Shops, started in November as a City appointee, filling the seat of the late Robin Melton. Bridget Dierks with the Community Foundation of the Ozarks, and Scott Bratcher with Marlin are filling at-large positions, formerly held by Bill Cheek and Leslie Carrier. Our former board members were a great asset and will be missed, but we are fortunate to have such dynamic and talented new board members to provide leadership for years to come.

## Staff Changes

In October of 2011, long time Watershed Employee and Operations Manager Matthew Keener left WCO for a new job. In December 2011, Loring Bullard retired after 22 years as the Executive Director. This left Stacey Armstrong, Kelly Gunther, and Mike Kromrey in their roles of Project Coordinator, Office Manager, and Education/Outreach Coordinator to begin 2012. In January 2012, the Board of WCO hired Mike Kromrey as the new Executive Director; he started on January 30th, 2012.

In order to adapt to these staff changes, fill vacancies, and restructure so that WCO could effectively carry out its' mission within the parameters of the budget, the board voted to remain as a four person staff. Job duties were combined and staff titles were changed to reflect increased responsibilities. Kelly became the Business Manager, Stacey became the Projects Manager, and Rob Hunt started as Watershed Center Coordinator on April 11, 2012. The competence and passion of this small group of water warriors is evidenced by accomplishments of 2012 outlined in this report!



Pictured from left to right:

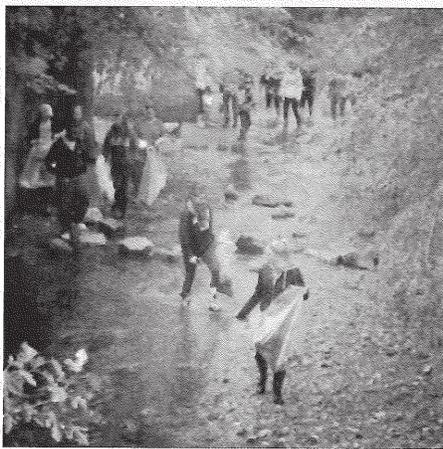
Stacey Armstrong, Rob Hunt, Mike Kromrey, Kelly Guenther

## Volunteering

We had a record year for volunteer efforts at WCO with **2236 volunteer hours** on the books. It is a very special service we are able to provide thanks to the help of our volunteers. Our successes in cleanups, field trips, and other big events are due to the wonderful dedication of a large community of volunteers. If you are interested in being a part of what we do, you can contact Rob Hunt directly at [rob@watershedcommittee.org](mailto:rob@watershedcommittee.org), or use our website to find more information. Our volunteers help to promote clean water by educating students who visit the Watershed Center on field trips, and by working on cleanup projects and riparian restoration.

We owe a **special thanks to our Board members**, who volunteer about 300 hours each year, helping us with major decisions, Monthly Meetings, and guiding us as we move forward with a new facility and a new staff.

During the past summer, the Watershed Center had four part-time interns working at the site. Amber Lee, Ryan Slanczka, and Brent Stock joined us from Missouri State University, and Josh Parish came down from Northwest Missouri State University in Maryville, Missouri. Among many day to day projects, they were able to build two wood duck houses, one bat house, make a visitor survey, and worked on eradicating the invasive species problem on our site. They were truly a treat to have along for the summer months. Pictured: Ryan, Amber, Rob Hunt and Josh



2012 was a busy year for cleanups as well. In the spring and fall, we led cleanups on Jordan Creek. The fall cleanup alone brought together over one-hundred and thirty MSU fraternity and sorority members, a handful of our die-hard volunteers and help from Kellie Herman at James River Basin Partnership. We gathered over fifty big bags of trash, broken PVC pipe, broomsticks, a shopping cart, and just about anything else you could imagine. The City of Springfield provided a bunch of bags and hauled the trash away.

Pictured: College students picking up trash in Jordan Creek

Thank you to the many volunteers who came out to help with the 41 school field trips booked at the Watershed Center in 2012. We were so popular our field trips even made the news!

Ky3's Emily Wood covered a summer field trip at the Watershed Center and showed off a small turtle she found!



## Volunteering Cont.-

Our volunteers also had the chance to get on the water this year. In late summer, about 30 people showed up to clean Valley Water Mill Lake here at the Watershed Center. Melvin Johnson from Outdoor Initiatives brought kayaks, canoes, and even a few paddleboards to help us grab that hard-to-reach trash. The weather was perfect and Matt Boehner even grilled lunch for all afterwards. In the fall, our crew was not so lucky with the weather, but we still had fun. On a rainy and chilly September morning, a dozen or so volunteers gathered on the banks of Fellows Lake to provide some much needed love for our drinking water reservoir. A special thanks is owed to marina operators Pam and Paul Price and MDC for logistics and equipment support. Pictured: Brent Stock, Matt Boehner, Rob Hunt, Sonny Decker and Sarah Davis at the Fellows Lake clean-up

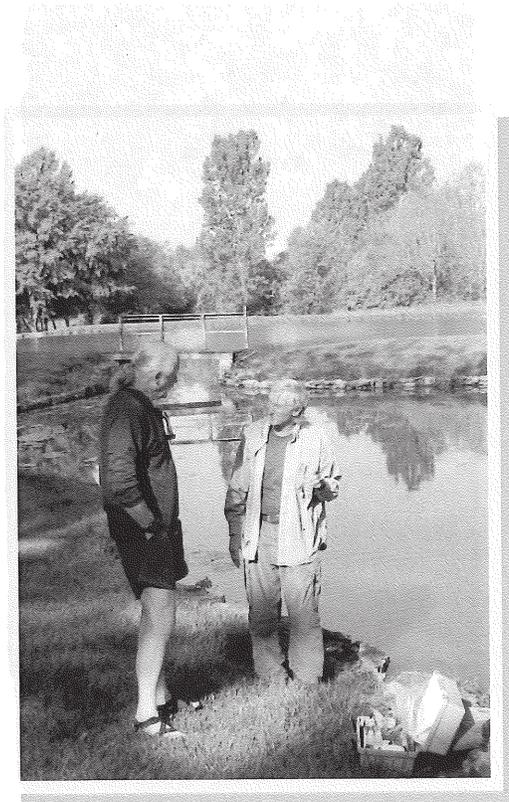


A big thanks to the Evangel University students who came out to the Watershed Center on Make a Difference Day and assisted Rob Hunt for a day of long neglected chores. Without the help of those volunteers, many tasks would have remained on the "to-do" list for far too long.

## Adopt-A-Spring

Adopt-A-Spring is a volunteer water quality monitoring program. Since the program began over six years ago, trained volunteers have collected quarterly water samples from many of the major springs in Greene County. Over the years, this program has assimilated a large data set that can help locate groundwater problems and track changes over time. The results of the nitrogen, phosphorous, and bacteria tests are kept on a spreadsheet and can be easily shared with interested parties.

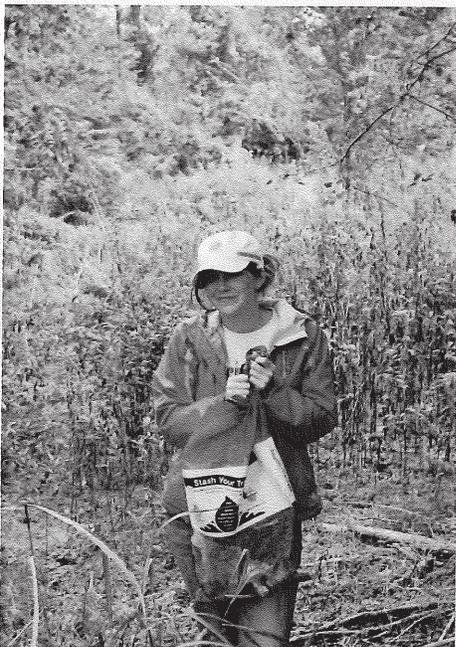
Pictured: Bob Ranney explaining the AAS program



## Volunteer Profile: Former Volunteer Erin Murray on the Importance of her WCO Experience

Through volunteering with the Watershed Committee of the Ozarks, I had the unique opportunity to both develop valuable skills and put them into action. I began volunteering during my sophomore year as an undergraduate biology student, and initially learned both biological and chemical methods for monitoring water quality. Later on, I was able to lead field trips and share this expertise along with the value of protecting our area's water with visiting students. Over the course of two years, I worked with the Watershed Committee to develop a pilot water conservation project for Missouri State University, and finally implement low-flow shower heads, sink aerators, and shower timers in all residence halls on campus.

My involvement with the Watershed Committee increased my appreciation and enthusiasm for water resources, and led me to seek out courses, research projects, and extra-curricular involvement at Missouri State that emphasized water processes. Additionally, as a volunteer I had the opportunity to help edit an environmental plan for the city of Springfield and network with regional environmental leaders, a level of community involvement that undergraduate students rarely achieve. These experiences had such a positive impact on me that I chose to pursue a master's degree in hydrologic sciences, where I am currently researching climate change and water resource impacts on agriculture at Boise State University. The mentoring and skill-sets that I achieved as a volunteer at the Watershed Committee have been crucial to my success in graduate school, and I anticipate a future career and lifelong passion dedicated to the protection of water resources.



Erin volunteering with WCO on a stream clean up

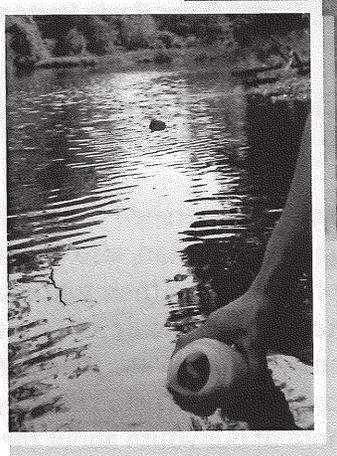
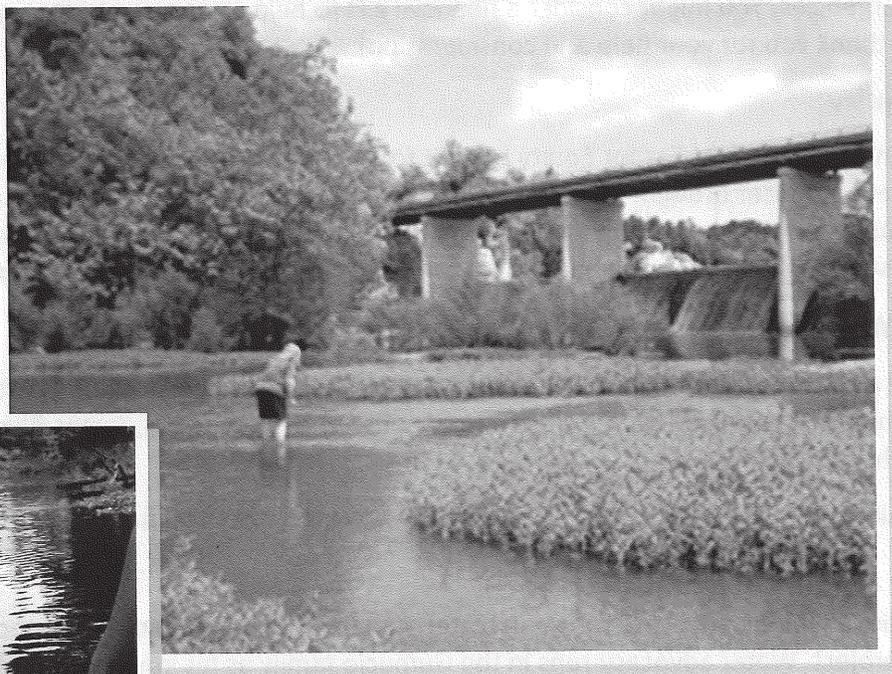


Erin doing research in the Rain Forest of Costa Rica

## Volunteer Profile: Nicole Boucher

We would be remiss if we did not say a **special thank you to Nicole Boucher** who has put in an astounding **196 hours of volunteer work in one calendar year**. She is certainly our go-to for any type of project. Whether she is leading field trips, taking water samples along a test site, or washing windows, Nicole works diligently, fueled by an obvious passion for clean water. Nicole is currently a student at Missouri State University working on a degree in Wildlife Biology. Nicole has been volunteering with us for a year and a half.

When asked about her experiences with WCO, Nicole said, "The opportunity to volunteer here has been an amazing experience. Not only have I had the chance to learn many new and exciting things, but I have also been able to give back to my community while doing so. Last summer I was given the opportunity to help collect water samples to be tested for bacteria levels. The Health Department posts the results on their website. It was fun to work on a project that provides such a wonderful service for the public. I also love to help with field trips. I believe the best way to make a change is through education. The Watershed Committee is a wonderful organization that I am honored to be a part of." We are certainly honored to have her helping teach the community about clean water.



Nicole collecting water samples

# Funding

**Funding** is necessary to accomplish the work of protecting our water. Our sponsors, City Utilities, Greene County, and the City of Springfield provide our core operational funding. This three-way agreement is a powerful fund leveraging mechanism for each sponsor. Grants, donations, and in-kind contributions are also vital to advancing our mission. As an example, the Watershed Center project was made possible by \$659,222 in private funds.

## Long Term Fund

At the Watershed Committee, we continue to successfully leverage funds, create partnerships and receive grants, but to help ensure we can continue our work in the community over the long-term, we are striving to become more financially resilient. Recently, the Watershed Committee of the Ozarks began a drive to develop a Long Term Fund, with the assistance of the Community Foundation of the Ozarks. The Fund will be treated as an endowment, with the added benefit of being unrestricted so it can be accessed in the case of dire emergencies. You might consider a financial gift to help us ensure our legacy of water protection and education, thank you for your help and consideration!

## Eat for Equity

The Friday night (July 13th) Eat for Equity benefit for the Watershed Committee was fresh and fun. The avant-garde fundraiser brought about 75 people together to eat, drink, and network in low-key, Rountree Neighborhood style. Co-hosts Will Chiles and Ashley Filmore, along with their professional chef friends, put together a summer feast that was bar none. I can still taste the cantaloupe mint sorbet!

## Earth on Your Plate

The second Annual Earth On Your Plate event was held April 17th. Participating restaurants contributed up to 10% of their sales on Tuesday, April 17th to benefit Ozark Greenways, James River Basin Partnership and the Watershed Committee.

## Tristan Gumucio Donates a Year's Worth of Saved Coins to the WCO, Follows Grandfather's Example

Rey Gumucio, a lifelong advocate for clean water, generously donated to the Watershed Center Capital Campaign project. Water advocacy runs in the Gumucio family as his grandson, Tristan, also understands the importance of our water supplies and the Watershed Committee is honored to have their support. Tristan, saved coins for one year so he too could donate to the Watershed Center. Tristan and Rey attended the Watershed Committee June 1st Monthly Meeting and both made donations to the Watershed Center. Executive Director Mike Kromrey humbly accepted the donations and commended Tristan on his year long effort. Tristan's donation will aid the Watershed Center in educating more of our youth about the importance of water and the natural environment.

# Our Generous Donors

Aaron Scott

William H. and Maret Cheek

Gail Emrie

DeDe Vest

Bridget and Andy Dierks

EROCO

Dave and Mary Sturdevant

Michelle Miller

Will Chiles

Cina Canada

Jennifer Edwards

Ryan Fitzpatrick

Greater Ozarks Audubon Society

JP Morgan Chase

Mike and Mary Chiles

Jodie Adams

Patricia Kay Parker Estate

Wright Water Engineers

Loring and Carol Bullard

David Filbeck

David Chiles

The Kitchen

Laurel Bryant

David Coonrod

Brian Moody

Aaron Scott

Satstore USA

Keran Lemons

Michael Guenther

Danny Tavares

Jon Williams

Walmart Foundation

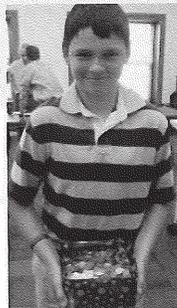
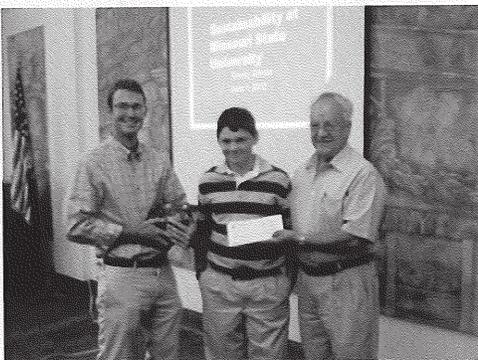
Reflects donations and in-kind services received from January 1, 2012 - December 31, 2012



Pictured Left:  
Eroco donating living retaining wall



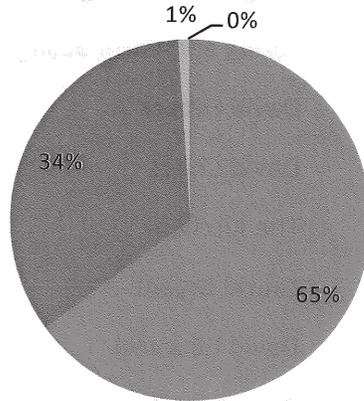
People enjoying great food and company at the Eat for Equity fundraiser



Rey and Tristan Gumucio (grandfather and grandson) giving generous support to the Watershed Committee

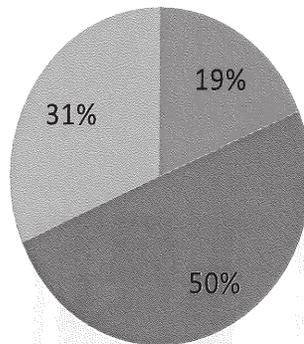
## WCO 2012 Revenue

- Sponsor Support
- Grants
- Program Revenue/Ed. Outreach
- Watershed Center Rental



## WCO 2012 Expenses

- Operating Expenses
- Salaries & Benefits
- Grant Expenses



## C. W. Titus Education Facility Donors

3M Foundation	Greater Ozarks Audubon Society	Mr. & Mrs. Reynaldo J. Gumucio
ARIA Foundation	Greene County	Mr. & Mrs. Charles Bachus
Barbara J. Lucks & Gregg J. Larsen	J.D. Slaughter	Neal & Newman, LLP
BKD Foundation	Jan Horton	O & S Trucking
BNSF Foundation	Jeanette Unsell	Palmerton & Parrish, Inc.
Brenda Putman	Jennifer Jones	Patricia Kay Parker Estate
Bruce & Jo Ann Martin	Jodie Adams	Patricia Rea & James E. Jackson
C.W. Titus Foundation	John Black	Paul & Judy McCune
Calvin & Barbara Armstrong	John & Brooke Griesemer	Positronic Industries, Inc.
Carney Cove Boat Dock Association	John & Culah Nixon	Robert & Cynthia Davies
Charles & Mary Beth O'Reilly	John & Jean Twitty	Ron & Leslie Carrier
City Utilities of Springfield	Jon & Becky Treadway	Rosalie Wooten-O'Reilly
Community Foundation of the Ozarks	Jonina & Keith Buterbaugh	Ruth O. Kelley
CONCO	Jonathan & Karen Jones	Sara Garretson
D-4 Investments	KRAFT Foods	Sara Lampe
Dan & Margy Chiles	Kyle McClure	Scott Miller
Dave & Mary Sturdevant	LAD Foundation	Shane Webb
David & Christine Rauch	Larry & Dr. Nancy O'Reilly	Sharon Faulkner
David & Gloria Roling	Leonard & Kay Million	SMC Packaging Group
David & Kathleen Hutchison	Liberty Bank	Springfield Plateau Grotto
David O'Reilly	Lisa Turner	Springfield Rotary Club
DeDe Vest	Lois & Cleo Hanson	Springfield Underground
Derek Martin	Loring & Carol Bullard	Steak N Shake
Dickerson Park Zoo	Mark & Sharon Gott	Steve Owens
Doug & Rae Nickell	Marla Calico	Stuart Wetzel
Dr. Duane Addleman	Matt & Sara Keener	Sunbelt Environmental Services
Dr. Sally Hubbard	Meeks	Ted & Cathie Gearing
Duane & Anita McConnell	Megan & Sean Terry	Ted & Rachel Hillmer
EIERA	Michael & Jan Wooten	Terry & Jeannene Whaley
Environmental Works	Michael & Kelly Guenther	Todd & Betty Parnell
Erin & Amy Austin	Mike Finch	UMB Bank
Erin Hutchison	Mike & Ann Howell	US Bank
Fred & Jean Palmerton	Mike & Mary Chiles	Wal-Mart Foundation
Gail Emrie	Mike & Mary Kromrey	Wild Horse Development
Gary & Marti Buckley	Mike Jungers	William & Maret E. Cheek
Gayle Harper	Mona Menezes	Wright Water Engineers
Great Southern Bank	Mr. & Mrs. Ross Ausburn	

These reflect donations received from the years 2005-2012

## Grant Activity

<b>Grant Project</b>	<b>Date initiated</b>	<b>Total Grant</b>	<b>Non-Local Funds</b>
Greene County GIS Project	1988	\$325,000	\$235,500
Fulbright Spring Monitoring System	1989	\$40,000	\$20,000
Fellows-McDaniel Lakes 319 Project	1992	\$119,000	\$63,000
McDaniel Lake Remediation Project	1993	\$66,621	\$40,500
Fulbright Spring 319 Project	1996	\$190,000	\$100,000
Splash Exhibit for Discovery Center	1997	\$6,800	\$3,500
Little Sac River Pollution Study	1999	\$145,000	\$140,000
Discovery Center Project	1999	\$205,000	\$125,000
Adopt-A-Spring Volunteer Initiative	2000	\$12,000	\$4,900
Little Sac Restoration 319 Project	2000	\$625,000	\$343,500
Show-Me Yards & Neighborhoods	2000	\$8,475	\$4,975
Valley Water Mill 319 Project	2001	\$920,838	\$480,000
Cause Marketing for Clean Water	2001	\$8,334	\$5,000
Radio Promotion White River Basin	2001	\$8,334	\$5,000
Show-Me Yards & Neighborhoods II	2002	\$8,350	\$5,000
Time to Come Clean Awareness	2002	\$8,334	\$5,000
Show-Me Yards & Neighborhoods Tips	2002	\$8,334	\$5,000
Recreational Trails Program	2003	\$84,500	\$42,500
Jordan Creek Education Event	2003	\$2,315	\$0
Science Based Field Trip Grant	2003	\$4,000	\$0
Watershed Center	2003	\$447,000	\$447,000
Watershed Center	2004	\$994,600	\$994,600
Community On-Site	2006	\$309,650	\$185,750
Water Quality Improvement Grant	2006	\$400,000	\$400,000
LAD	2006	\$5,000	\$0
CFO Streamside Learning Station	2006	\$20,000	\$0
CFO Wetland/Curricula Grant	2006	\$22,288	\$0
LAD Interpretive Signage	2007	\$3,500	\$0
Rotary Service Grant	2007	\$500	\$0
Rotary Service Grant-Southeast	2007	\$1,000	\$0
<u>Corporate Agency Partnership Program-</u>			
Fishing Piers	2007	\$49,500	\$0
LAD Forestry Learning Station	2007	\$5,000	\$0
CFO Fishing Piers Grant	2007	\$30,000	\$0

## Grant Activity Cont.-

<u>Grant Project</u>	<u>Date initiated</u>	<u>Total Grant</u>	<u>Non-Local Funds</u>
Watershed Mgmt Planning Grant	2007	\$15,000	\$0
MO Recreational Trails Grant	2007	\$142,000	\$100,000
Rotary Service Grant-Southeast	2008	\$4,500	\$0
USDA-NRCS GIG Grant	2010	\$80,000	\$50,000
Missouri Solid Waste Mgmt. District O Grant	2010	\$46,350	\$46,350
LAD Foundation	2010	\$4,000	\$4,000
DNR 319 Nonpoint Source Grant	2011	\$1,684,900	\$ 684,900
DNR Recreational Trails Grant	2011	\$ 143,090	\$85,000
<u>Community Foundation of the Ozarks Endowment</u>			
Grant	2012	\$ 1,000	\$0
<u>Community Foundation of the Ozarks Community</u>			
Response Challenge Grant	2012	\$6,000	\$0
<b>Total</b>		<b>\$7,068,023</b>	<b>\$5,625,975</b>

## SPONSOR SUPORT

<u>Organization</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>
City of Springfield	\$ 38,850	\$ 14,050	\$ 15,000	\$ 20,000	\$ 20,000
City Utilities of Springfield	\$185,700	\$188,100	\$150,000	\$181,840	\$188,000
Greene County	\$ 61,000	\$ 60,800	\$ 15,000	\$ 15,000	\$ 15,000

## For Every Dollar

Keeping our water resources clean and plentiful is the right thing to do for many reasons. Clean water is vital to our personal growth, our community's growth, and our economic growth. Legally, Springfield and Greene County are held accountable for the quality of the water leaving our domain. It is difficult to put a price tag on these important things, but we do know that in the world of water resources an ounce of prevention is truly worth a pound of cure—local demonstrations of this abound.

Another truism of local water protection is that the Watershed Committee of the Ozarks is a very good investment of our sponsors' (citizens') funds. The three-way agreement of our sponsors leverages every dollar spent by each individual organization from the beginning. This basic operational funding allows WCO to operate and also seek other financial resources for water protection. Even if you ONLY look at the outside dollars brought in by the WCO for water protection, which excludes many efficiencies and benefits the WCO provides, every dollar that the City, County, and City Utilities has invested in the past 5 years resulted in an **\$18.25, \$11.81, and \$2.20 return on investment respectively.**



WATERSHED  
COMMITTEE  
OF THE OZARKS



2012 Annual Report

**MS4 2008 EXPENDITURES**

Funding	Invoice #	LEGACY TRAILS --Low Impact Development		Expenditures
GC Gen Rev	3/12/2008	03/12/08	8" Filter Soxx	\$ 850.50
GC Gen Rev	3/3/2008	03/31/08	Town & Country Landscaping	\$ 1,450.00
GC Gen Rev	4/15/2008	04/15/08	Greene County Extension - Soil Test	\$ 20.00
GC Gen Rev	83125	04/16/08	Buffalo Grass	\$ 600.00
GC Gen Rev	19743	04/23/08	Landscape Fabris Pins	\$ 10.65
GC Gen Rev	5/1/2008	05/01/08	SO-MO - poultry netting for sod installation	\$ 92.69
GC Gen Rev	5/6/2008	05/06/08	Brad Davis - sod/delivery for LID	\$ 650.00
Env. Parks	6/27/2008	06/27/08	Habitat for Humanity - service/supplies for LID	\$ 14,092.05
Env. Parks	7/22/2008	07/22/08	Town & Country Landscaping	\$ 2,190.00
Env. Parks	8/21/2008	08/21/08	Town & Country Landscaping	\$ 1,575.00
Env. Parks	1230864	09/02/08	MO Wildflowers Nursery - plants	\$ 924.00
Env. Parks	9/12/2008	09/12/08	Town & Country Landscaping	\$ 1,890.00
Env. Parks	9208	09/26/08	Critsite Construction Products, Belton, MO - trees	\$ 1,267.50
Env. Parks	001	09/10/08	Habitat for Humanity (Conco) - Gravel	\$ 203.06
Env. Parks	3882	10/02/08	Eroco - Silt Soxx	\$ 601.25
Env. Parks	0251012-IN	09/15/08	SGF Blueprint - stake flags/spray paint	\$ 14.61
Env. Parks	8/15/2008	08/15/08	Jon Williams - Materials for Day of Caring	\$ 94.25
Env. Parks	10/21/2008	10/21/08	Town & Country Landscaping	\$ 1,507.50
Env. Parks	399	10/28/08	McDaniel Exc. - Installation of SDR Pipe	\$ 1,782.12
Env. Parks	12115	11/21/08	Tim Smith - Lowe's - Tools	\$ 85.31
			<i>Subtotal</i>	\$ 29,900.49
	<b>Invoice #</b>	<b>MSU James River MS4/TMDL Monitoring Plan</b>		
Env. Parks	2427	11/17/08	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
			<i>Subtotal</i>	\$ 4,000.00
	<b>Invoice #</b>	<b>JAMES RIVER BASIN PARTNERSHIP (JRBP)</b>		
Env. Parks	4	07/01/08	Rain Barrels	\$ 550.00
Env. Parks	20	01/09/08	Rain Barrels	\$ 165.00
Env. Parks	22	01/11/08	Rain Barrels	\$ 40.00
Env. Parks	31	03/03/08	Rain Barrels	\$ 90.00
Env. Parks	34	04/28/08	Rain Barrels	\$ 340.00
Env. Parks	47	09/17/08	Rain Barrels	\$ 360.00
Env. Parks	42	09/19/08	Rain Barrels	\$ 495.00
Env. Parks	20	09/19/08	Rain Barrels	\$ 635.00
Env. Parks	16	07/17/08	Edu. & Water Qlty. Outreach (semi-annual pmt.)	\$ 2,500.00
Env. Parks	55	10/31/08	Edu. & Water Qlty. Outreach (semi-annual pmt.)	\$ 2,500.00
GC Gen Rev	56	11/04/08	Edu. & Water Qlty. Outreach	\$ 5,000.00
Env. Parks	59	12/15/08	Rain Barrels	\$ 125.00
			<i>Subtotal</i>	\$ 12,800.00
	<b>Invoice #</b>	<b>WATERSHED COMMITTEE OF THE OZARKS (WCO)</b>		
GC Gen Rev	GC-9/WCO3	04/15/08	WCO - S. Dry Sac Streamgage	\$ 1,200.00
GC Gen Rev	5	05/14/08	Water Education (annual pmt.)	\$ 25,000.00
Env. Parks	299	07/15/08	WCO - S. Dry Sac Streamgage	\$ 600.00
			<i>Subtotal</i>	\$ 25,600.00
	<b>Invoice #</b>	<b>PROJECT WET (Water Education for Teachers)</b>		
Env. Parks	NM101	10/23/12	Project WET (annual pmt.)	\$ 10,000.00
			<i>Subtotal</i>	\$ 10,000.00
	<b>Invoice #</b>	<b>PARTNERSHIP FOR SUSTAINABILITY</b>		
GC Gen Rev	PS-0909	3/3/2008	Project for sustainability	\$ 10,000.00
			<i>Subtotal</i>	\$ 10,000.00
		<b>EMPLOYEES</b>		
GC Gen Rev		thru 2008	Tim Davis, salary/benefits	\$ 54,854.00
Env. Parks		thru 2008	Jim Vandiver, salary/benefits	\$ 57,617.00
GC Gen Rev		thru 2008	Jon Williams, salary/benefits	\$ 74,020.00
			<i>Subtotal</i>	\$ 186,491.00
			<b>Total YTD</b>	\$ 278,791.49



**MS4 2009 EXPENDITURES**

<b>Funding</b>	<b>Invoice #</b>	<b>LEGACY TRAILS --Low Impact Development</b>		<b>Expenditures</b>
Env. Parks	12053	03/05/09	Willow Green Gardens & Tree Farm	\$ 190.00
Env. Parks	2/27/2009	03/05/09	Town & Country Landscaping	\$ 1,076.16
Env. Parks	4346	03/18/09	GC Ext. Office - Soil Test @Legacy Trails	\$ 20.00
Env. Parks	4/3/2009	04/07/09	Town & Country Landscaping	\$ 1,394.68
Env. Parks	6/2/2009	06/02/09	Town & Country Landscaping	\$ 1,001.49
Env. Parks	0039084-IN	06/02/09	Tulsa Grass & Sod Farm -Buffalo Grass	\$ 200.00
Env. Parks	498	06/17/09	McDaniel Excavating - Detention Repair	\$ 2,501.97
Env. Parks	7/1/2009	07/16/09	Town & Country Landscaping	\$ 2,545.00
Env. Parks	8/11/2009	08/19/09	Town & Country Landscaping	\$ 1,800.00
Env. Parks	9/8/2009	09/14/09	Town & Country Landscaping	\$ 1,615.00
Env. Parks	10/9/2009	10/09/09	Town & Country Landscaping	\$ 1,356.00
Env. Parks	11/5/2009	11/16/09	Town & Country Landscaping	\$ 961.50
			<i>Subtotal</i>	\$ 14,661.80
	<b>Invoice #</b>	<b>MSU James River MS4/TMDL Monitoring Plan</b>		
Env. Parks	2617	02/12/09	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	2841	05/05/09	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	3121	08/05/09	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	3316	12/31/09	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
			<i>Subtotal</i>	\$ 16,000.00
	<b>Invoice #</b>	<b>JAMES RIVER BASIN PARTNERSHIP (JRBP)</b>		
Env. Parks	74	06/10/09	Rain Barrels	\$ 1,636.00
GC Gen Rev	87	08/07/09	Operational Support	\$ 4,750.00
Env. Parks	91	08/13/09	Operational Support	\$ 5,000.00
Env. Parks	99	11/10/09	Rain Barrels	\$ 455.00
			<i>Subtotal</i>	\$ 11,841.00
	<b>Invoice #</b>	<b>WATERSHED COMMITTEE OF THE OZARKS (WCO)</b>		
Env. Parks	319	04/07/09	S. Dry Sac River Streamgage (quarterly pmt. --Fall '08/Winter'09)	\$ 1,666.66
Env. Parks	325	07/20/09	Public Education/Outreach Program Services	\$ 25,000.00
Env. Parks	328	07/23/09	S. Dry Sac River Streamgage	\$ 833.33
Env. Parks	331	08/05/09	Public Education/Outreach Program Services for 2008	\$ 50,000.00
Env. Parks	332	08/05/09	Public Education/Outreach Program Services for 2009	\$ 50,000.00
Env. Parks	9/22/2009	09/30/09	Erosion/Sediment Control Training	\$ 1,450.00
Env. Parks	337	11/03/09	S. Dry Sac River Streamgage	\$ 833.33
			<i>Subtotal</i>	\$ 129,783.32
	<b>Invoice #</b>	<b>PROJECT WET (Water Education for Teachers)</b>		
Env. Parks	3223	10/22/09	Aquatic Education Specialist Position	\$ 10,000.00
			<i>Subtotal</i>	\$ 10,000.00
	<b>Invoice #</b>	<b>PARTNERSHIP FOR SUSTAINABILITY</b>		
Env. Parks	PS-009	01/30/09	Project for Sustainability	\$ 10,000.00
			<i>Subtotal</i>	\$ 10,000.00
		<b>EMPLOYEES</b>		
GC Gen Rev		thru 2009	Tim Davis, salary/benefits	\$ 54,854.00
Env. Parks		thru 2009	Jim Vandiver, salary/benefits	\$ 57,617.00
Env. Parks		thru 2009	Jon Williams, 1/2 salary/benefits	\$ 37,010.00
			<i>Subtotal</i>	\$ 149,481.00

**TOTAL YTD \$ 341,767.12**



**MS4 2010 EXPENDITURES**

<b>Funding</b>	<b>Invoice #</b>	<b>LEGACY TRAILS --Low Impact Development</b>		<b>Expenditures to Date</b>
Env. Parks	1/20/2010	01/20/10	Missouri Natives - landscaping	\$ 600.00
Env. Parks	4/5/2010	04/05/10	Missouri Natives - landscaping	\$ 1,297.50
Env. Parks	38639	04/20/10	Gardening Supplies	\$ 57.41
Env. Parks	5/1/2010	05/12/10	Missouri Natives - landscaping	\$ 2,310.00
Env. Parks	10/24/1913	05/18/10	Greene County Extension - soil test	\$ 10.00
Env. Parks	6/1/2010	06/09/10	Missouri Natives - landscaping	\$ 982.50
Env. Parks	7/1/2010	07/01/10	Missouri Natives - landscaping	\$ 1,424.50
Env. Parks	4444	07/13/10	Missouri Natives - landscaping	\$ 33.54
Env. Parks	8/1/2010	08/05/10	Missouri Natives - landscaping	\$ 1,687.50
Env. Parks	9/3/2010	09/10/10	Missouri Natives - landscaping	\$ 1,372.50
Env. Parks	10/4/2010	10/12/10	Missouri Natives - landscaping	\$ 1,445.00
Env. Parks	12/1/2010	12/09/10	Missouri Natives - landscaping	\$ 2,095.00
Env. Parks	12/31/2010	12/31/10	Missouri Natives - landscaping	\$ 450.00
			<i>Subtotal</i>	\$ 13,765.45
	<b>Invoice #</b>	<b>MSU James River MS4/TMDL Monitoring Plan</b>		
Env. Parks	3321	01/22/10	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	3321B	04/19/10	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	3892	09/03/10	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	4050	12/02/10	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
			<i>Subtotal</i>	\$ 16,000.00
	<b>Invoice #</b>	<b>JAMES RIVER BASIN PARTNERSHIP (JRBP)</b>		
Env. Parks	105	07/19/10	Rain Barrel Rebate Project	\$ 955.00
Env. Parks	110	10/19/10	Annual Support - Public Ed./Outreach Prog.	\$ 5,000.00
Env. Parks	116	11/08/10	Rain Barrel Rebate Project	\$ 140.00
			<i>Subtotal</i>	\$ 6,095.00
	<b>Invoice #</b>	<b>WATERSHED COMMITTEE OF THE OZARK (WCO)</b>		
Env. Parks	2/10/2010	02/26/10	Funding Support	\$ 15,000.00
	318	03/18/10	S. Dry Sac Streamgage	\$ 866.68
Env. Parks	348	05/03/10	S. Dry Sac Streamgage	\$ 866.66
Env. Parks	355	07/12/10	Public Ed./Outreach Prog.	\$ 25,000.00
	3	10/13/10	Public Ed./Outreach Prog.	\$ 50,000.00
	352	07/12/10	S. Dry Sac Streamgage	\$ 866.66
	359	09/08/10	S. Dry Sac Streamgage	\$ 866.66
			<i>Subtotal</i>	\$ 93,466.66
	<b>Invoice #</b>	<b>PROJECT WET (Water Education for Teachers)</b>		
Env. Parks	4086	12/20/10	Aquatic Education Specialists Position	\$ 10,000.00
			<i>Subtotal</i>	\$ 10,000.00
	<b>Invoice #</b>	<b>PARTNERSHIP FOR SUSTAINABILITY</b>		
Env. Parks	PS-1009	02/24/10	Project for sustainability (amt. reduced by Part. For Sust. '10	\$ 1,000.00
			<i>Subtotal</i>	\$ 1,000.00
		<b>EMPLOYEES</b>		
GC Gen. Rev.		thru 2010	Tim Davis, salary/benefits	\$ 54,854.00
Env. Parks		thru 2010	Jim Vandiver, salary/benefits	\$ 57,617.00
Env. Parks		thru 2010	Jon Williams, 1/2 salary/benefits	\$ 37,010.00
			<i>Subtotal</i>	\$ 149,481.00
<b>TOTAL YTD</b>				<b>\$ 289,808.11</b>



**MS4 2011 EXPENDITURES**

<b>Funding</b>	<b>Invoice #</b>	<b>LEGACY TRAILS --Low Impact Development</b>		<b>Expenditures to Date</b>
Env. Parks	5/4/2011	05/04/11	Missouri Natives, LLC - landscaping	\$ 1,372.50
Env. Parks	6/1/2011	06/01/11	Missouri Natives, LLC - landscaping	\$ 1,518.00
Env. Parks	7/1/2011	07/01/11	Missouri Natives, LLC - landscaping	\$ 1,395.00
Env. Parks	8/2/2011	08/02/11	Missouri Natives, LLC - landscaping	\$ 1,350.00
Env. Parks	9/2/2011	09/02/11	Missouri Natives, LLC - landscaping	\$ 1,545.00
Env. Parks	11/7/2011	11/07/11	Missouri Natives, LLC - landscaping	\$ 832.50
Env. Parks	12/4/2011	12/04/11	Missouri Natives, LLC - landscaping	\$ 1,080.00
Env. Parks	12/27/2011	12/27/11	Missouri Natives, LLC - landscaping	\$ 585.00
			<i>Subtotal</i>	\$ 9,678.00
	<b>Invoice #</b>	<b>MSU James River MS4/TMDL Monitoring Plan</b>		
Env. Parks	4201	02/23/11	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	4387	05/20/11	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	4650	08/12/11	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 4,000.00
Env. Parks	4857	12/07/11	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 5,000.00
			<i>Subtotal</i>	\$ 17,000.00
	<b>Invoice #</b>	<b>JAMES RIVER BASIN PARTNERSHIP (JRBP)</b>		
Env. Parks	124	06/21/11	Rain Barrel Rebate Project	\$ 328.00
Env. Parks	135	11/08/11	Annual Support - Public Ed./Outreach Prog.	\$ 5,000.00
			<i>Subtotal</i>	\$ 5,328.00
	<b>Invoice #</b>	<b>WATERSHED COMMITTEE OF THE OZARKS (WCO)</b>		
Env. Parks	371	02/10/11	S. Dry Sac Streamgage	\$ 883.33
Env. Parks	373	03/24/11	Annual Funding Support	\$ 15,000.00
Env. Parks	375	04/21/11	S. Dry Sac Streamgage	\$ 878.33
Env. Parks	1/16/1901	07/05/11	Public Ed./Outreach Prog.	\$ 25,000.00
Env. Parks	4	07/15/11	Public Ed./Outreach Prog.	\$ 50,000.00
Env. Parks	385	07/26/11	S. Dry Sac Streamgage	\$ 883.33
Env. Parks	391	09/30/11	S. Dry Sac Streamgage	\$ 883.33
			<i>Subtotal</i>	\$ 93,528.32
	<b>Invoice #</b>	<b>PROJECT WET (Water Education for Teachers)</b>		
Env. Parks	4316	04/21/11	Annual Support - Public Ed./Outreach Prog.	\$ 10,000.00
			<i>Subtotal</i>	\$ 20,000.00
	<b>Invoice #</b>	<b>PARTNERSHIP FOR SUSTAINABILITY</b>		
Env. Parks	PS-1109	04/06/11	Project for Sustainability	\$ 2,500.00
			<i>Subtotal</i>	\$ 2,500.00
		<b>EMPLOYEES</b>		
GC Gen. Rev.			Tim Davis, salary/benefits	\$ 54,854.00
Env. Parks			Jim Vandiver, salary/benefits	\$ 57,617.00
Env. Parks			Jon Williams, 1/2 salary/benefits	\$ 37,010.00
			<i>Subtotal</i>	\$ 149,481.00
<b>TOTAL YTD</b>				<b>\$ 297,515.32</b>



**MS4 2012 EXPENDITURES**

Funding	Invoice #	LEGACY TRAILS --Low Impact Development		Expenditures to Date
Env. Parks	Budgeted		Landscape Maintenance	\$ 14,000.00
			<i>Subtotal</i>	\$ 14,000.00
	Invoice #	<b>MSU James River MS4/TMDL Monitoring Plan</b>		
Env. Parks	5001a	02/24/12	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 5,000.00
Env. Parks	5159	05/25/12	MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 5,000.00
Env. Parks	Budgeted		MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 5,000.00
Env. Parks	Budgeted		MSU - JR MS4/TMDL Monitoring (quarterly pmt.)	\$ 5,000.00
			<i>Subtotal</i>	\$ 20,000.00
	Invoice #	<b>JAMES RIVER BASIN PARTNERSHIP (JRBP)</b>		
Env. Parks	Budgeted		Rain Barrel Rebate Project	\$ 1,500.00
Env. Parks	Budgeted		Annual Support - Public Ed./Outreach Prog.	\$ 5,000.00
			<i>Subtotal</i>	\$ 6,500.00
	Invoice #	<b>WATERSHED COMMITTEE OF THE OZARKS (WCO)</b>		
Env. Parks	Budgeted	07/12/12	Public Ed./Outreach Prog.	\$ 12,500.00
Env. Parks	Budgeted	07/12/12	Public Ed./Outreach Prog.	\$ 50,000.00
Env. Parks	399	02/08/12	Annual Funding Support	\$ 15,000.00
Env. Parks	403	02/21/12	S. Dry Sac Streamgage	\$ 883.34
Env. Parks	405	05/01/12	S. Dry Sac Streamgage	\$ 883.33
Env. Parks	Budgeted		S. Dry Sac Streamgage	\$ 883.33
Env. Parks	Budgeted		S. Dry Sac Streamgage	\$ 878.33
			<i>Subtotal</i>	\$ 81,028.33
	Invoice #	<b>PROJECT WET (Water Education for Teachers)</b>		
Env. Parks	Budgeted		Aquatic Education Specialist	\$ 10,000.00
			<i>Subtotal</i>	\$ 10,000.00
	Invoice #	<b>PARTNERSHIP FOR SUSTAINABILITY</b>		
Env. Parks	Budgeted	07/10/12	Project for Sustainability	\$ 2,500.00
			<i>Subtotal</i>	\$ 2,500.00
		<b>EMPLOYEES</b>		
GC Gen. Rev.			Tim Davis, salary/benefits	\$ 54,854.00
Env. Parks			Jim Vandiver, salary/benefits	\$ 57,617.00
Env. Parks			Jon Williams, 1/2 salary/benefits	\$ 37,010.00
			<i>Subtotal</i>	\$ 149,481.00
			<b>TOTAL YTD</b>	<b>\$ 283,509.33</b>

Revised 07/12/12



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## **APPENDIX F: Public Involvement/Participation Materials**

- Stormwater Task Force Meeting Materials
- May 2011 Likely Voter Public Opinion Survey
- Adopt-a-Spring information
- Rain Barrel Order Form



# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force Meeting



**Date:** Thursday, October 25, 2012  
5:00 to 7:00 p.m.

**Location:** Watershed Center  
2450 E. Valley Water Mill Road  
Springfield, Missouri 65803

*Map to meeting  
site on page 2*

### Meeting purposes:

- Orient Task Force members regarding their role, process, and issues to be addressed.
- Provide background on:
  - What is stormwater management and why is it important to our community?
  - How did we fund the stormwater management programs in the past?
  - What was accomplished with the investment made?
  - What are the current and future needs?

## AGENDA

5:00 p.m.	Welcome & Introductions	Greg Burris, City of Springfield Tim Smith, Greene County
5:10 p.m.	Task Force Orientation	Sheila Shockey, Shockey Consulting
5:20 p.m.	What is stormwater management?	Carrie Lamb, City of Springfield
5:45 p.m.	How was stormwater management funded in the past?	Sheila Shockey
5:55 p.m.	What was accomplished with the investments made?	Kevin Barnes, Greene County
6:15 p.m.	What are the current and future needs?	Todd Wagner, City of Springfield
6:50 p.m.	Next steps	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
6:00 p.m.	Adjourn	

In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's Office at 864-1443 at least three days prior to the scheduled meeting.

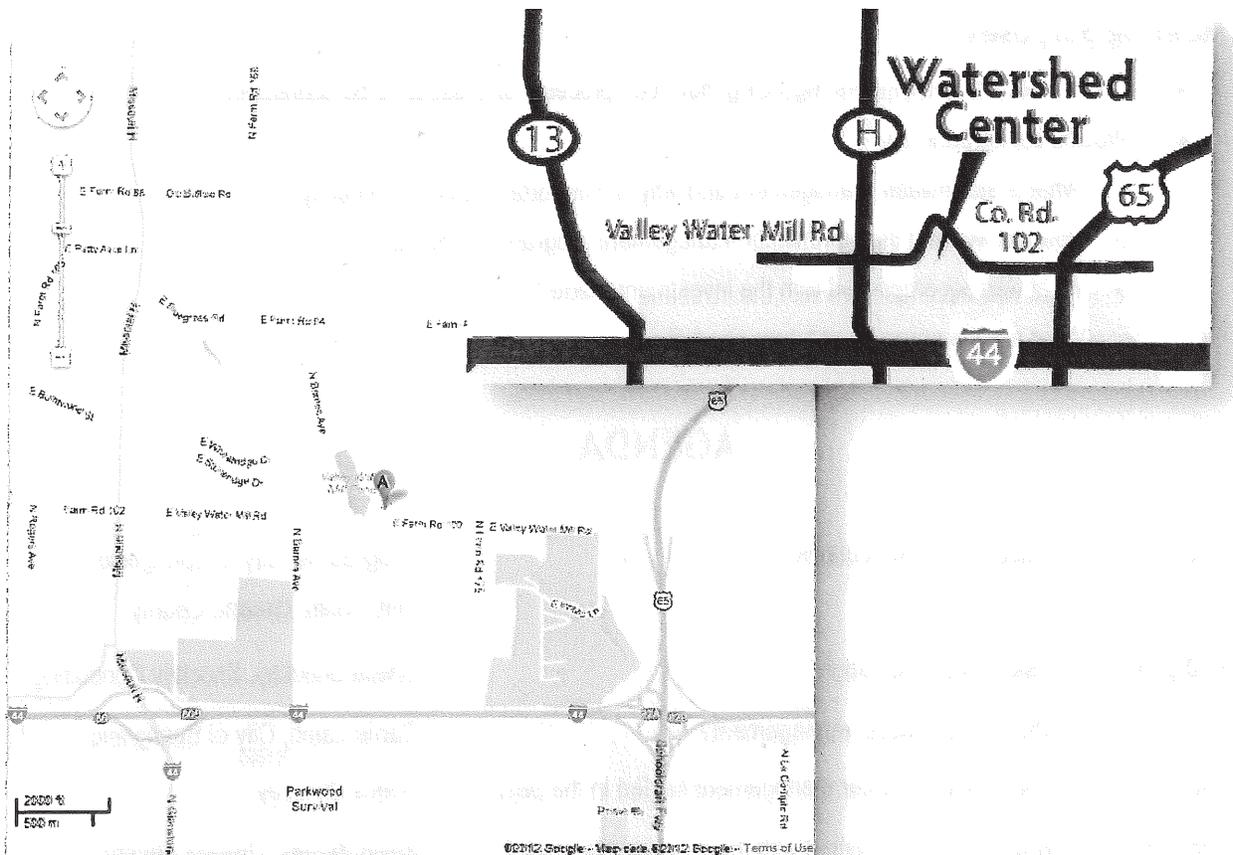
**Handouts:**

- 1. Task Force Guide for Members pages 3-6
- 2. Stormwater Management 101 pages 7-27
- 3. Recorded Subdivisions Southwest Greene County by Decade page 28
- 4. Stormwater Projects Map page 29

**Meeting Site:**

Watershed Center  
2450 E. Valley Water Mill Road  
Springfield, MO 65802

**For assistance call (417) 864-1901 or (417) 818-6091**



**Directions:**

Go north of I-44 on Glenstone to Valley Water Mill Road. Turn right onto Valley Water Mill Road. Travel east to the "T" at Barnes Avenue and turn left. Go north on Barnes Avenue and turn right onto Farm Road 102, next to Valley Water Mill dam. As you drive along Valley Water Mill Lake, turn right into the driveway and follow it to the Watershed Center.

Go north on U.S. 65. North of I-44 take the first exit for Valley Water Mill Road or Farm Road 102. Turn left onto Farm Road 102. Travel west and immediately after the road takes a sharp turn to the right, take the next left into the driveway for the Watershed Center.

# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force

### Guide for Members

Thank you for agreeing to serve on the Stormwater Management Task Force. As a member of the Task Force, your input will help guide decision-making regarding stormwater management for Springfield and Greene County, Missouri. This guide document is designed to help you be an effective participant in this important community effort.

#### Task Force Purpose

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Springfield and Greene County have experienced stormwater water quality and quantity issues in the past. Property damage and inundated roadways have resulted from stormwater runoff. Both entities must make additional investments in its stormwater system to continue meeting regulatory requirements and to protect water quality. The Stormwater Management Task Force will help shape the work of both agencies in the future by developing a set of recommendations for both governing bodies to consider. To assist with the process, the project team will prepare the following information for the Task Force:

1. What is stormwater management and why is it important to our community?
2. How did we fund the stormwater management programs in the past?
3. What was accomplished with the investment made?
4. What are the current and future needs?
5. What are the potential funding sources?

Through a facilitated process, the Task Force will answer the following questions in their recommendations:

1. What principles should guide the community stormwater management programs?
2. What investments should be made in stormwater management?
  - a. What amount of capital investment should be made over what time period?
  - b. Should a permanent dedicated source of funding be implemented for required programs and maintenance?
  - c. Should the capital funding source have a sunset and specific projects identified?
  - d. What type of maintenance program should be implemented?
  - e. Should water quality programs be developed to comply with regulations or exceed standards?
3. How should we prioritize capital investments made?
4. What source(s) of funding are desired?

5. What level of funding is desired?
6. How should we explain the issues and task force recommendations to the community?

The Task Force will provide the County Commissioners and the Mayor/City Council written recommendations regarding these questions.

## Task Force Membership

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The Stormwater Management Task Force is a working group that includes representatives from various stakeholder groups, including:

- Citizen representation for each City council zone
- Environmental Groups or Organizations
- Business and Industry
- Development
- Engineering and Financial experts
- Citizens that have experienced flood damage
- Institutional Interests (i.e. schools, hospitals)
- County citizens

While the Task Force membership was designed to reflect a balance of interests, you are encouraged to think about all sides of the issues. To facilitate such thinking, the Task Force meetings will be structured to provide an opportunity for deliberation on all topics with the goal of developing a shared understanding of the issues and alternatives to aid in better decision making.

## Task Force Commitment

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The Stormwater Management Task Force will meet approximately eight times from October 2012 through April 2013. Meetings will be held approximately every three weeks except during the holiday season for up to two hours.

Proposed meeting dates are Thursdays from 5:00 to 7:00 p.m. on:

- |                |                |
|----------------|----------------|
| 1. October 25  | 5. February 7  |
| 2. November 15 | 6. February 28 |
| 3. December 13 | 7. March 21    |
| 4. January 17  | 8. April 4     |

## Roles and Responsibilities

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### Task Force

- Provides a community-wide view from the stakeholder perspective;
- Develops an understanding of issues and provides constructive feedback on information presented;
- Develops guiding principles that serve as a foundation for decision making related to the community's stormwater management programs;
- Provides recommendations to the Mayor/City Council and County Commissioners;
- Advises project team and staff on stakeholder outreach; and
- Serves as a resource for the project team for stakeholder outreach activities.

### Task Force Support Team

- Frames the problem;
- Identifies potential solutions;
- Evaluates potential solutions based on agreed upon criteria;
- Collaborates with the Stormwater Management Task Force, stakeholder groups and the general public;
- Develops final recommendations document for consideration of the Task Force;
- Builds a partnership with the media so to educate and involve the public; and
- Implements the stakeholder engagement plan.

### Mayor/City Council/County Commission

The County Commission and Mayor/City Council will ultimately make the decisions regarding funding, programs and policies to improve the community's stormwater management.

## Effective Participation Tips

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As a member of the Stormwater Management Task Force, you are being asked to:

- Share information and provide feedback about information collected by the Project Team;
- Provide input to the Project Team about potential options; and
- Assist the Project Team by sharing information with your neighbors and supporting the final recommendations.

To be an effective participant, it is important to read materials in advance of meetings, come to the meeting ready to ask questions and participate in all discussions.

You will be provided a meeting calendar, including all meeting dates and locations so you can plan your schedule. Agendas and background information will be provided in advance of meetings. And, the Project Team is always available to answer questions and explain anything that you don't understand or isn't clear.

At the meetings, we ask that you follow these simple ground rules:

- Share your best thinking;
- Share and explore differences;
- Agree to disagree, but don't be disagreeable;
- Be respectful of other's perspectives by listening first for understanding and then speaking so that your perspective is understood; and
- Think about what is best for your entire community beyond your own interests.

## Contacts

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Please contact the Project Team whenever you have questions or concerns.

- City Project Team contact  
Todd Wagner, PE, Principal Stormwater Engineer, City of Springfield, Missouri  
[twagner@springfieldmo.gov](mailto:twagner@springfieldmo.gov)  
(417) 864-1932
- County Project Team contact  
Kevin R. Barnes, PE, Greene County Stormwater Engineer  
[kbarnes@greencountymo.org](mailto:kbarnes@greencountymo.org)  
(417) 868-4147
- Media inquiries  
Cora Scott, Public Information Officer  
[cscott@springfieldmo.gov](mailto:cscott@springfieldmo.gov)  
(417) 864-1119
- Project Team contact  
Sheila Shockey, Shockey Consulting Services  
[Sheila@shockeyconsulting.com](mailto:Sheila@shockeyconsulting.com)  
(913) 515-4365

# City of Springfield - Greene County, Missouri

## Stormwater Management 101

### INTRODUCTION

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The City of Springfield and Greene County have invested time, energy, talents, and money to provide a safe, healthy, and quality community for their citizens. A September 1993 flood raised the need for improved stormwater management to the forefront of community planning. Managing stormwater runoff in our growing community continues to be challenging - to control flooding, protect property and public safety, to improve and protect our water resources, and to maintain compliance with federal and state requirements.

The City of Springfield and Greene County are convening a community task force to provide input and recommendations on how the City and County should continue to address its stormwater management issues, including aging infrastructure, flood control, and water quality. Effective stormwater management is vital to the community's health and economy, and to maintaining the City's and County's compliance with federal and state stormwater regulations.

The Task Force is charged with providing recommendations for the following:

1. What principles should guide the community stormwater management programs?
2. What investments should be made in stormwater management?
  - a. What amount of capital investment should be made over what time period?
  - b. Should a permanent dedicated source of funding be implemented for required programs and maintenance?
  - c. Should the capital funding source have a sunset and specific projects identified?
  - d. What type of maintenance programs should be implemented?
  - e. Should water quality programs be developed to comply with regulations or exceed standards?
3. How should we prioritize capital investments made?
4. What source(s) of funding are desired?
5. What level of funding is desired?
6. How should we explain the issues and task force recommendations to the community?

The Task Force will provide the County Commissioners and the Mayor/City Council written recommendations regarding these questions.

A series of questions and answers are presented in this document to the Task Force as background for their work:

- What is stormwater?
- What is a watershed?
- Why is good stormwater management important to our community?
- Has stormwater been a problem in our community?
- Who and what causes the problems associated with poor stormwater management?
- What was accomplished with the investment made in stormwater management in the past?
- How were these stormwater management investments funded?
- What are current and future program needs?
- What are the potential funding sources?

## BACKGROUND

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### What is stormwater?

**Stormwater** is runoff water that results from precipitation events. It may also be used to apply to water that originates with snowmelt that enters the stormwater system. Stormwater that does not soak into the ground or evaporate becomes surface runoff. Stormwater runoff either flows directly into surface waterways or is channeled into the storm system, which eventually discharges to receiving waters, such as area creeks, streams, rivers and lakes. The stormwater system is separate from the wastewater system. Stormwater typically receives little or no treatment prior to entering receiving waters.

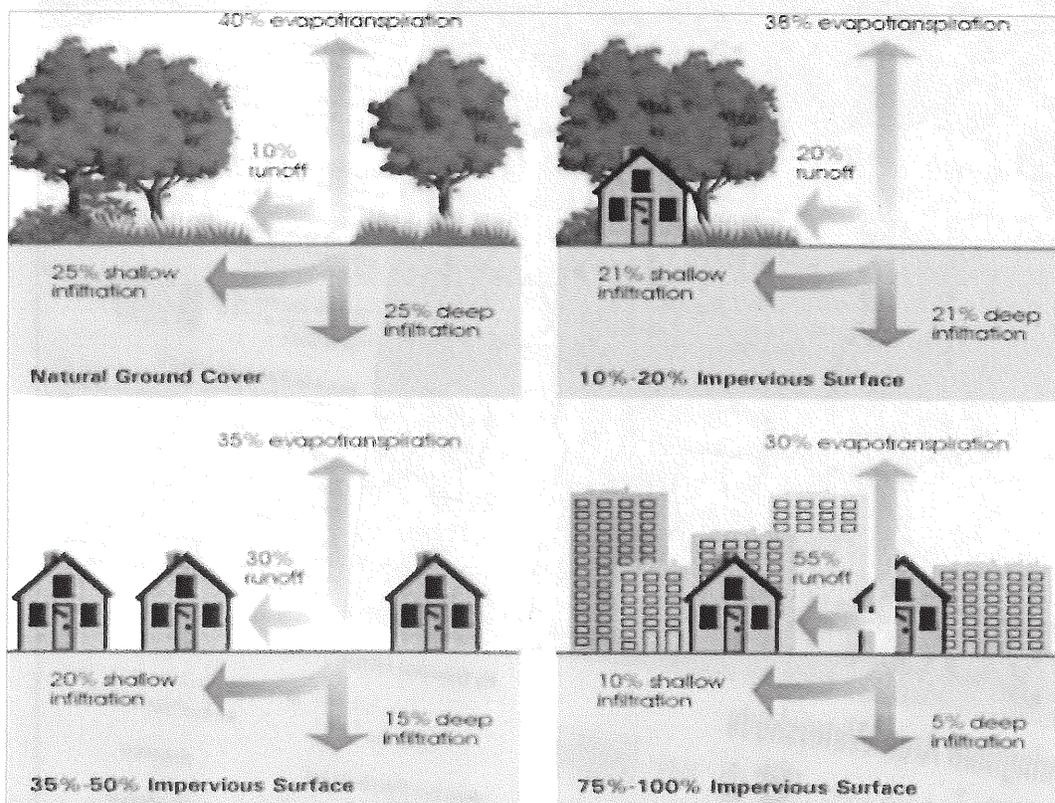
Stormwater is of concern for two main issues: one related to the increased volume and timing of runoff water, which can result in flood-related damage to property and receiving water bodies, and the other related to potential contaminants that the water is carrying (water pollution).

Stormwater management is the planning, design, construction, operation and maintenance of a system to infiltrate or evaporate rainwater before it becomes runoff, or to convey, store, treat and release rainwater after it becomes runoff. Stormwater management in an urban setting is particularly challenging, due to several factors, including:

1. Buildings and parking lots create hard or impervious surfaces that can dramatically increase the amount of stormwater that does not soak in, and results in stormwater runoff.
2. Human activities, such as the use of vehicles and fertilizers, and industrial activities can create sources of pollutants that are carried to our lakes, rivers and streams by stormwater runoff.
3. Buildings in the natural drainage ways are subject to flood damage.
4. Roadways are often designed to carry stormwater runoff. Sometimes too much stormwater floods the streets or overtops a bridge making travel dangerous.

Before development of the land, the majority of precipitation would soak into the ground (infiltration) or evaporate into the air (evapotranspiration). This is called the natural hydrologic process. **Figure 1** illustrates how urbanization can significantly impact the natural hydrologic processes of shallow and deep infiltration, evapotranspiration and runoff. As the land is developed, harder (impervious) surface in form of streets, sidewalks, roofs, and driveways are causing more stormwater to runoff rather than soak in or evaporate. Sometimes, this can be as much as five times the amount of runoff in a natural environment. The effect of these changes typically results in flood damage to property and flooded roadways causing safety issues for the public. It can also result in more pollution being carried to area lakes, rivers and streams. More stormwater runoff can cause stream bank channel and bank erosion, loss of trees and vegetation along rivers, polluted water resources and loss of aquatic life habitat.

**Figure 1. Illustration of How Urbanization Effects Natural Hydrologic Processes**



The karst geology in southwest Missouri which is evident in our many caves, springs and sinkholes, complicates the interaction between runoff, shallow groundwater and deep groundwater. Karst geology can provide direct conduits for surface runoff to reach springs and groundwater more quickly than through normal infiltration through soil. This could result in pollution of our natural springs.

### What is a watershed?

The degree of flooding or water quality degradation along a waterway is typically related to the condition of the watershed. A watershed is the land that stormwater runs across to a common point such as a lake, river or stream. Watershed boundaries are formed by the natural topography of the land and are rarely modified significantly by human activity. **Figure 2** shows the major watersheds in the urban service area of



## Why is good stormwater management important to our community?

Excessive stormwater can be a menace to a community if it is not managed properly. Some of the obvious negative impacts are public health and safety issues, damage to property, devaluation of property and neighborhoods, degradation of waterways and riparian habitat and negative impacts to our regional economy. Good stormwater management practices can address the potential negative impacts and convert stormwater runoff into a public asset through development of attractive recreational spaces central around quality water resources. The result can be both an improvement in quality of life in the community and improved economic development opportunities.

Not only must stormwater quality be protected for public health and our regional economy, it is also regulated through implementation of the federal Clean Water Act (CWA). Federal and state regulations specify what communities must do in an effort to minimize the potential negative impacts of stormwater runoff on the quality of waterways. Non-compliance with federal and state rules can result in costly legal actions against the City or County. Typical pollutants from land areas can be picked up and carried by stormwater runoff into area streams, rivers, and lakes include oil, grease, and antifreeze from vehicles; heavy metals from tires and brake linings; sediment from construction sites; nutrients from fertilizers and pesticides applied to lawns and crops; bacteria from animals (dogs, geese, horses, cattle); chemicals found in air pollution; and litter.

Sound stormwater management provides numerous benefits to the community. These benefits include, but are not limited to, the following:

- Increased public safety by reducing flooding of streets and private property;
- Increased public safety by ensuring that stormwater infrastructure is structurally sound and not prone to failures;
- Enhanced environmental quality, including protection of area streams, rivers, lakes and drinking water sources;
- Opportunities for greenways and multi-use recreation areas;
- Enhanced local recreation and tourism economy;
- Reduction of potable water usage through rainwater collection and reuse;
- Reduced cost of wastewater treatment by keeping stormwater and wastewater system separated;
- Improved air quality;
- Reduced risk of regulatory action against the City and County;
- Reduced urban heat island; and
- Improved wildlife habitat.

## Has stormwater been a problem in our community?

Historic flood events in the community have defined Springfield's and Greene County's stormwater management programs during much of the past twenty years. Defining events include the following.

- **September 1993:** The community experienced a flooding event from 8.5 inches of rain over 30 hours. The Ferguson sinkhole (south of Battlefield and between Kansas and Campbell Avenues) filled quickly and did not drain for several days. Many other sinkholes in the City and County filled and major rivers like the James experienced major flooding. Because the rain was more gradual over a longer period of time, flooding on smaller tributaries in Springfield was minor. This flood resulted in voter passage of the first Level Property Tax Stormwater Bond Issue.
- **July 2000:** The community experienced 6-8 inches of rainfall in 3-6 hours over much of the City and south of the City in the County, causing severe flash flooding on all tributary streams. Just south of the City in Shadowwood Subdivision, homes were severely damaged and even pushed off the foundations. As a result, a property buyout in the Shadowwood subdivision in Greene County was initiated to prevent a similar occurrence in the future. This flood resulted in voter passage of additional bonds funded by the Level Property Tax. These bonds were passed in 1995 - \$14 million; 1999 - \$14 million; 2001 - \$15 million; and 2004 - \$13 million.
- **July 2001:** The community experienced 4-5 inches of rainfall in one hour on a small area near Republic Road and Scenic Avenue causing severe flash flooding in Hidden Valley Subdivision just outside the City. A project to buy out properties and construct improvements was initiated in 2007 and continued over several years. This project was funded with Parks and Stormwater sales tax.

Fortunately, no lives were lost during these flooding events.



Figure 3. 1993 Flood at Ferguson Sinkhole



Figure 4. 2000 Flood at Chestnut Expressway near OTC



Figure 5. 2000 Flood in Shadowood Subdivision. Note missing wall on damaged home.



Figure 6. 2001 Flood in Hidden Valley Estates Subdivision. Note water level on sliding glass door.

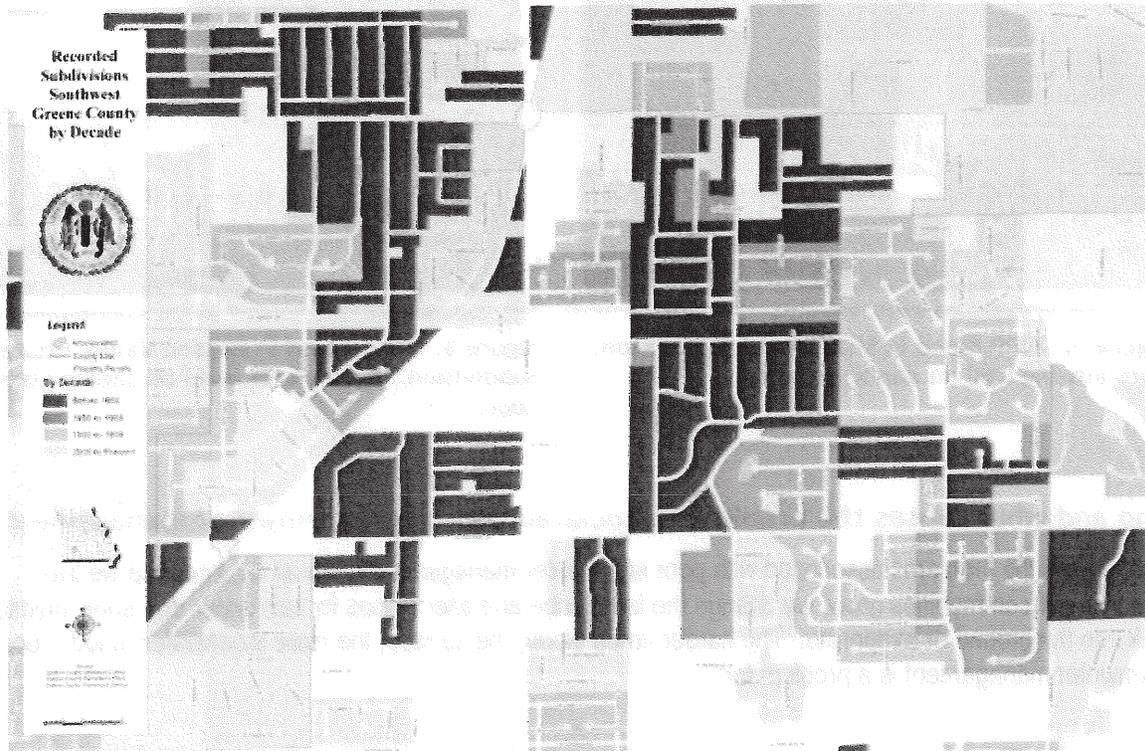
### Who and what causes the problems associated with poor stormwater management?

Who causes the problems associated with poor stormwater management? We all do, because we live here. As our communities grow, we change the landscape and alter places for rain water and snow melt to soak into the ground or evaporate. The harder (impervious) the surface, the more stormwater runoff. Poor stormwater management is a problem for:

- People who live or work in flood prone areas;
- People who drive during rain events on flood prone streets;
- People who need emergency services during rain events;
- Everyone who cares about the quality of water resources in the Ozarks.

An example of how the landscape changes over time is illustrated in the development map for southwestern Greene County, from before 1980 to the present (see **Figure 7**). The subdivisions developed in the 1980's and prior have little or no stormwater infrastructure (dark brown color). The subdivisions developed in the 1990s (tan color) are better but the only subdivisions meeting the current standards are those developed after 2000 (yellow color).

Figure 7. Recorded Subdivisions Southwest Greene County by Decade



### What was accomplished with the investment made in stormwater management in the past?

The focus of much of the stormwater program in the past 15 – 20 years, by the City of Springfield and Greene County, was correcting issues that caused flooding, while in the last 5-10 years the focus has begun to shift more toward water quality multi-purpose projects.

#### City of Springfield:

The City has completed approximately 100 significant projects over this period. The City has also completed over \$10 million in voluntary buyout of flood-prone properties to stop the cycle of repeated flooding. Some example projects the community has completed include:

- ✓ Erie Sinkhole to Ferguson Sinkhole Flood Buyout and Stormwater Improvements (south of Battlefield Road and west of Campbell Avenue)
- ✓ North Branch of Jordan Creek multi-purpose “daylighting” project for flooding and water quality and trail development (near National Avenue and Division Street)
- ✓ Floodplain buy-out program: approximately 150 properties
- ✓ Fasnicht, Sequiota and Doling Park renovations for flooding, infrastructure and water quality improvements

A map of projects completed to-date and their locations are attached (see page 29).

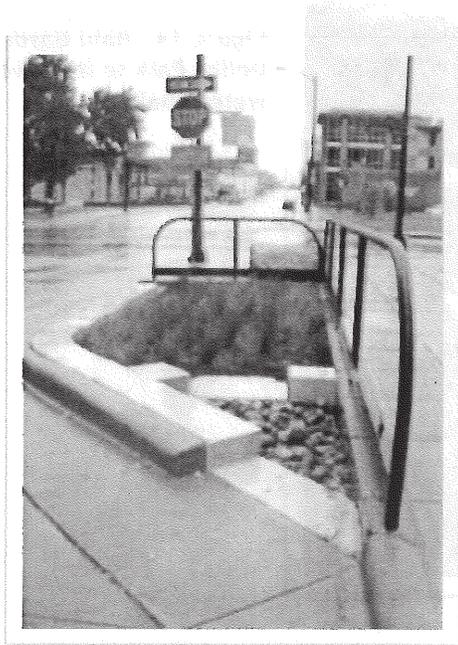
The City's website [www.springfieldmo.gov/stormwater](http://www.springfieldmo.gov/stormwater) (click on Projects & Studies), provides descriptions and pictures of the numerous investments made over the past two decades. A few are illustrated below, as examples of the investments made to improve water quality and build assets for the community.



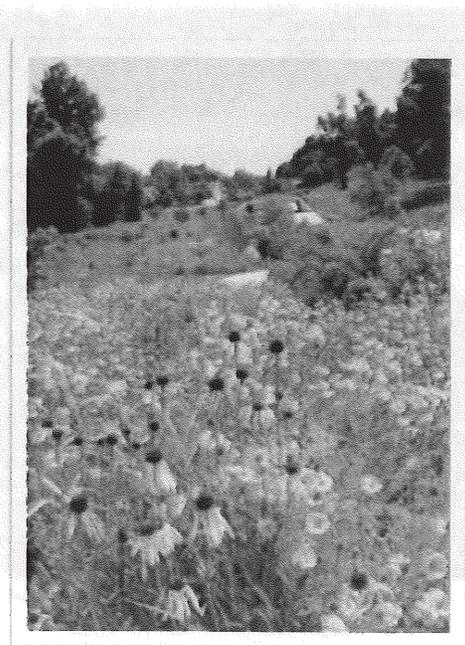
**Figure 8.** South Family Y Regional Detention greatly reduced downstream flooding in 2000, near Glenstone Avenue and Republic Road



**Figure 9.** Erie Sinkhole to Ferguson Sinkhole Flood Buyout and Stormwater Improvements, south of Battlefield Road and west of Campbell Avenue



**Figure 10.** Rain Garden at the Downtown Square



**Figure 11.** North Branch of Jordan Daylighting Project, near National Avenue and Division Street



**Figure 12. Fasnicht Park Stream Stabilization and Historical Preservation**



**Figure 13. Rain Garden Pilot Project**



**Figure 14. Rain Garden at Doling Park to improve lake water quality**

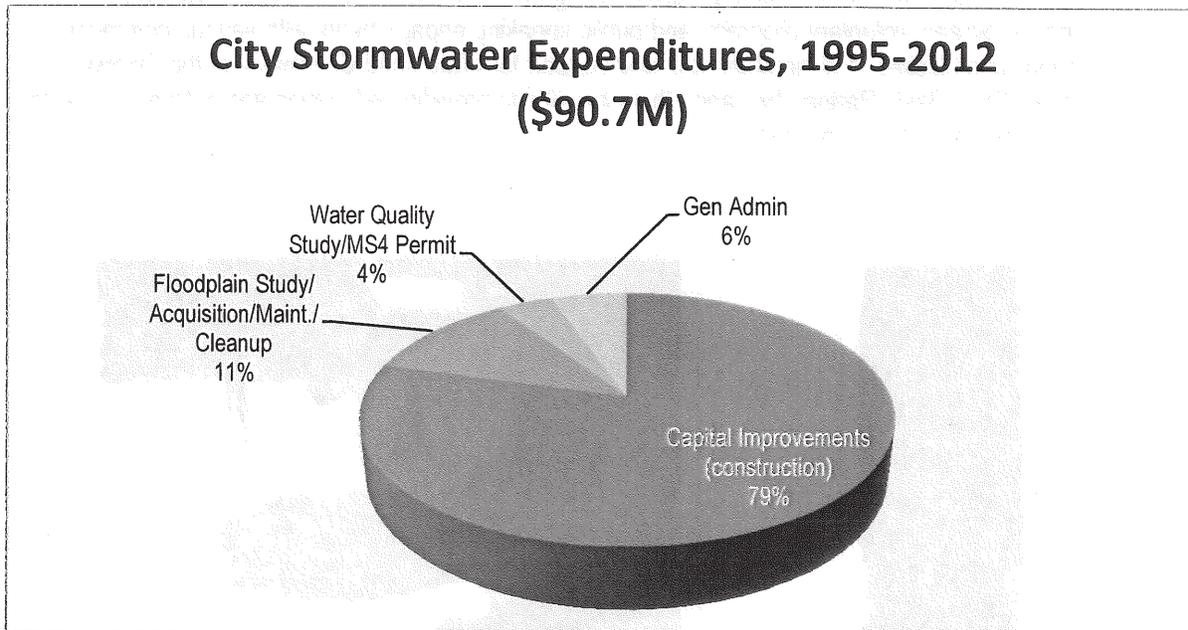
Springfield has invested \$71.8 million into stormwater capital improvement projects in the past 18 years, since the 1993 flood. The City has invested over \$10 million in the Voluntary Flood Buyout Program to stop the cycle of flooding of flood prone properties and reclaim the floodplain for public recreational use. Since the City received its state stormwater permit in 2001, it has spent \$300,000 to \$400,000 per year, for a total of \$3,577,000, on permit requirements that address water quality issues, including public education, water quality monitoring, pollution investigations, permitting and inspecting

construction sites for erosion and sediment control, and other activities. A summary of how public funds have been spent in Springfield is provided in **Table 1** and **Figure 15**.

**Table 1. City of Springfield, Missouri Stormwater Program Expenditure Breakdown**

Capital Improvements (construction)	\$71,811,000
Floodplain Study/Acquisition/Maintenance/Cleanup	\$10,349,000
Water Quality Study/MS4 Permit	\$3,577,000
General Administration	\$5,000,000
<b>TOTAL</b>	<b>\$90,737,000</b>

**Figure 15. City of Springfield, Stormwater Expenditures**



**Greene County, Missouri:**

Greene County has spent \$4.4 million on the purchase of flood-prone properties and \$800,000 on capital improvement projects. The County spends approximately \$300,000 per year to meet stormwater permit requirements and another \$250,000 per year for administration of other water quality related programs such as floodplain management and on-site wastewater system inspection.

**City and County Water Quality Programs:**

The City and County both have programs to manage stormwater quality to protect the community's water resources and comply with their respective Municipal Separate Storm Sewer System (MS4) permits issued by the Missouri Department of Natural Resources (MDNR). The permits include requirements for policies,

ordinances, public education and participation efforts, inspection activities, stream monitoring, and capital improvement projects for water quality. The federal Clean Water Act requires that communities have a program with specific components to address the impacts of stormwater runoff on water quality. These requirements are implemented through MS4 permits issued to communities. In Missouri, these permits are issued and enforced by the Missouri Department of Natural Resources. Some highlights of the City and County programs are summarized below.

- Land Disturbance Programs, by both the City and County permit and inspect construction sites to minimize the discharge of sediment and other pollutants into the stormwater system. The program also provides education and training opportunities for engineers, developers, contractors, and others involved with managing construction site runoff.
- Numerous water quality and watershed activities are held in the area to educate and involve citizens. These activities include Storm Drain Reveal (a program to educate the public using storm drain murals) a rain barrel rebate program, rain garden technical assistance and workshops, Adopt-a-Stream volunteer program, and public speaking engagements with various community groups and classes. Partnerships with and support for Watershed Committee of the Ozarks, James River Basin Partnership, and others are vital to providing education and outreach on water quality issues in the community.

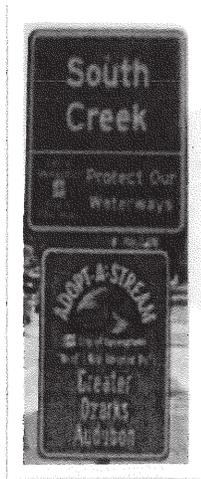


Figure 16.  
Adopt-a-Stream  
Program



Figure 17. Storm Drain Reveal mural

- Show Me Yards & Neighborhoods is a lawn and landscape education program the City of Springfield started over 10 years ago. The program provides training to home owners on sustainable lawn and landscape maintenance. The program also has over 100 trained professionals. The program participates in numerous community activities and events each year, partnering with other groups on water quality outreach in the community and region.

- Monitoring programs assess the quality of stormwater runoff and the chemical and biological health of our urban streams, as well as screening the stormwater system for illicit discharges.
- Development standards, for new developments, require the construction of best management practices such as pervious pavement, rain gardens, or water quality basins to reduce or treat runoff.

The following are some specific activities completed in 2011-2012 by the County as part of its program to address stormwater quality.

- 131 public contact events with 100,000 people in attendance.
- \$93,528 was used toward educational partnerships with the Watershed Committee of the Ozarks. These funds were used for 38 classroom field trips, 31 classroom lessons, and 8 events. The programs contributed 800 volunteer hours. Funds were also contributed to the construction of the Watershed Center.
- \$5,000 per year goes toward educational partnerships with the James River Basin Partnership for 10 watershed festivals involving 2,300 fifth graders, the annual Dam Jam event with 5,000 people in attendance, and septic tank assistance to property owners. Funds were also used for rain garden programs and the incentive program for rain barrel purchases by homeowners.
- Project WET (Water Education for Teachers) receives \$10,000 per year to help fund the WET coordinator who works closely with the public school system to incorporate water education into the curriculum and for classroom lessons and field trips.
- Greene County continues to support Legacy Trails, a Low Impact Development subdivision, with \$14,000 per year to maintain post-construction BMPs.
- Water quality monitoring is conducted four times per year at eight monitoring stations.
- The stormwater program supports training to contractors for on-site wastewater treatment system installation. Eighty-six people attended in the past year.

#### How were these stormwater management investments funded?

Historical funding sources for both the City and County have relied primarily on the tax system to address stormwater issues.

#### City of Springfield:

In February 1994, after the 1993 flood event, the City of Springfield, through the direction of a Citizens' Stormwater Task Force, placed on the ballot both a 1/10 cent sales tax and a stormwater utility to pay for stormwater improvements. Neither ballot measure was approved by the voters. A probable contributor to the failure was a controversial crime ordinance which was also on the ballot.

In 1995, voters approved the City issuing General Obligation (G.O.) bonds in the amount of \$14 million to fund stormwater improvements. In 1999, voters again approved the City issuing G.O. bonds in the same amount, with a condition that the property tax rate would remain level. The Level Property Tax (LPT) then

became the funding source to pay back future G.O. bond issues for stormwater improvements. Voters approved subsequent bond issues in the amount of \$15 million and \$13 million in 2001 and 2004, respectively, to fund additional stormwater improvements and programs. The total revenue generated from these bond issues is over \$56 million including any earned improvements to the stormwater system including construction of conveyance improvements, buyouts of flood prone properties, construction of stormwater detention ponds, and multipurpose stormwater and recreation amenities. A part of these funds was also used for water quality programs and permit compliance through 2007.

Detention buy-out or in-lieu payments provide about \$100,000 per year. This amount varies with construction activity in the community. The money stays in the same watershed in which it is collected and is used for regional detention or conveyance improvements.

A City Capital Improvements Sales Tax that began in 2010 will generate about \$2 million for stormwater improvements. The Sales Tax ends in 2013. The stormwater program in Springfield also uses a small amount of funds from the General Fund, primarily spent on administrative costs.

**Greene County Funding Sources:**

Greene County has, historically, funded a very limited stormwater program through the general fund. Stormwater management systems located within road right-of-way are maintained by the Greene County Highway Department using Road & Bridge funds. The County does not fund maintenance of stormwater management systems outside of road right of way. Prior to passage of the Parks/Stormwater tax in 2006, the County was only able to perform capital improvement projects using state and federal grants. Following passage of this tax, the County has utilized the funding to reduce flooding in the worst areas by providing much needed channel maintenance and purchasing flood-prone properties. The sales tax revenue source ended in July 2012.

The funding sources and amounts for the City and the County are summarized below and presented in **Tables 2 and 3, and Figures 18 and 19.**

Table 2. City Stormwater Program Funding Breakdown (1995-2012)

Level Property Tax	\$56,600,000
Payment in Lieu of Detention	\$ 3,000,000
Federal/State Funds	\$ 7,500,000
Parks/Stormwater Sales Tax (2007-2012)	\$16,500,000
General Fund	\$ 5,000,000
Capital Improvements Sales Tax (2010-2013)	\$ 2,000,000
<b>TOTAL</b>	<b>\$90,600,000</b>

Figure 18. City of Springfield Stormwater Revenues

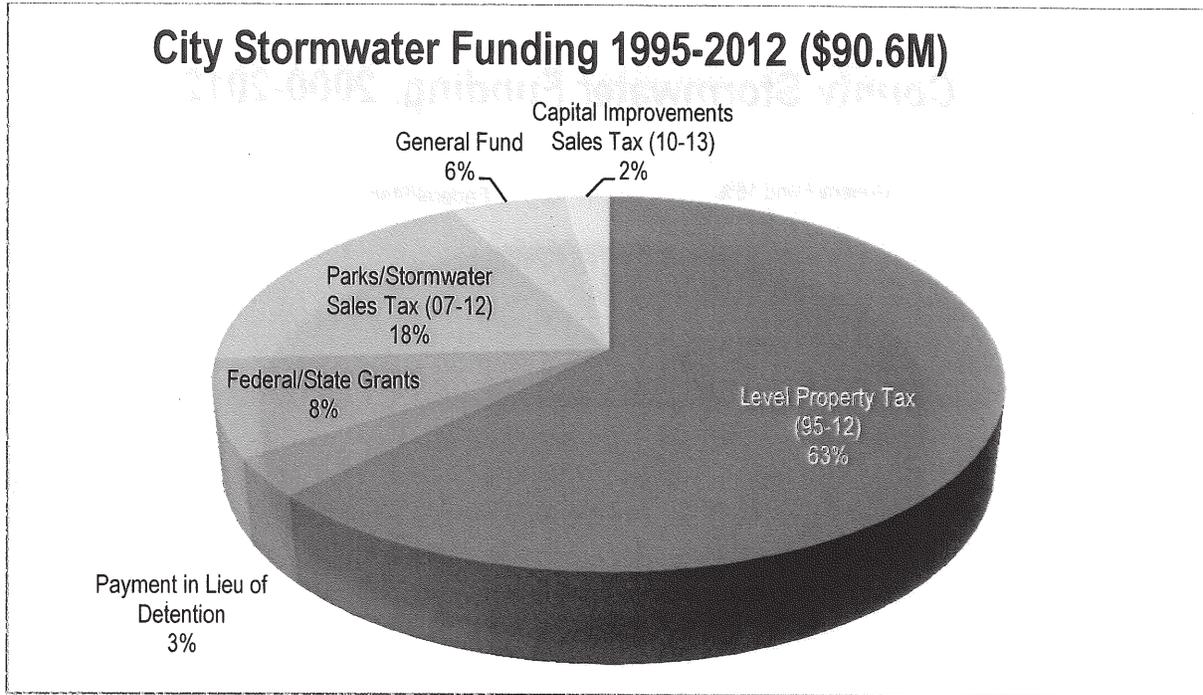
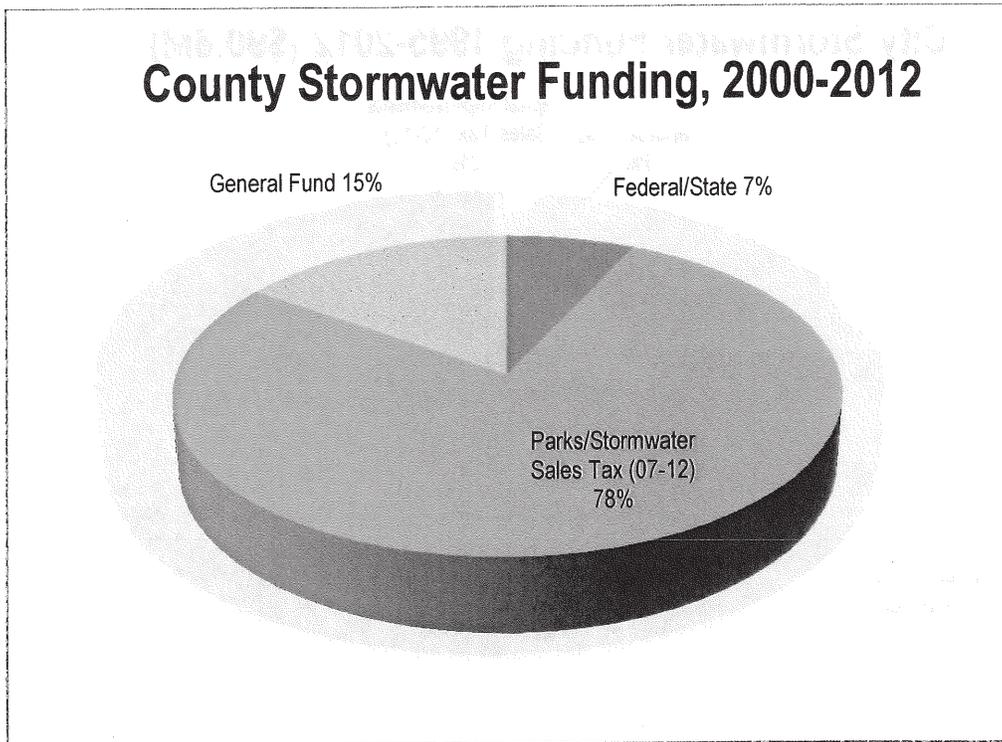


Table 3. County Stormwater Program Funding Breakdown (2000-2012)

Federal/State Funds	\$ 700,000
Parks/Stormwater Sales Tax (2007-2012)	\$7,700,000
General Fund (approx. \$250,000/year 2007-2012)	\$1,500,000
<b>TOTAL</b>	<b>\$9,900,000</b>

Figure 19. Greene County Stormwater Revenues



#### City & County Funding Sources:

##### 1/4 Cent County Sales tax

A citizen committee looking at stormwater funding recommended a 1/4 cent county sales tax. This tax was split with the Springfield/Greene County Parks Department - 1/8 cent to parks and 1/8 cent to stormwater projects. The county sales tax was passed in 2006. Collection of the tax began in July 2007 and ended in July 2012, generating about \$16 million for the City and \$8 million for the County, total over the five year period. It was used for waterways projects and programs to benefit water quality in parks and throughout the drainage system. Funds were split amongst the local governments, based on population. Several projects in parks have been completed by the City recently including Fassnight, Sequiota, Doling and Dickerson Parks. The sales tax revenue source ended in July 2012.

##### Big Urbie Water Quality Grant:

The City and County partnered with Watershed Committee of the Ozarks, James River Basin Partnership and others on a CWA Section 319 Grant application which was awarded in 2011. The 4-year grant, nicknamed "Big Urbie" provides \$1 million for projects to address the water quality impacts of stormwater runoff, including practices like rain gardens, rainwater harvesting, and pervious pavement on public and school properties, as well as in partnership with homeowners and businesses. The City is providing \$470,000 in matching funds. The City and County are providing technical assistance and project management. A stipulation of Section 319 water quality grants is that the grant can only be used for water quality projects that are above and beyond what the City and County are required to do by their MS4 permits. The Big Urbie water quality grant ends in 2015.

## THE FUTURE

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### What are the current and future needs?

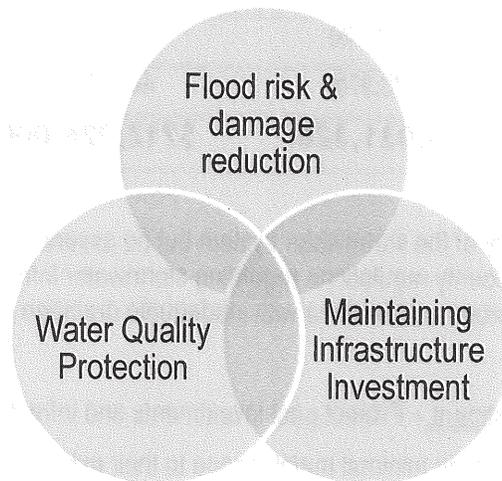
There is still a lot of work to be done to resolve stormwater management and flooding issues, as well as to meet increasing water quality permit requirements. There is not enough money to do everything. No community typically has enough resources to fix all the stormwater problems. Affordability of programs and investments in stormwater management and water quality protection will take careful balancing.

As Springfield and Greene County move forward with future investments and to meet regulatory requirements, there are three areas of focus to the work:

1. flood risk & damage reduction;
2. maintaining infrastructure investment; and
3. water quality protection.

The diagram below illustrates how the three focus areas relate to each other, with some overlapping opportunities. Projects and programs that fall within the overlapping, shaded areas will generally provide the most benefit to the community for every dollar spent.

Figure 20. Stormwater Management Issues



### Identified Needs

Flood Risk & Damage Reduction – Improving motorist safety and flood damage to structures.

It is estimated that the City of Springfield would need \$700 million to reduce flood damage and improve motorist safety to accepted national standards during heavy rains. Springfield has \$100 - \$200 million identified as high priority projects that would address the areas of most frequent and severe flooding. A study of the flood-prone areas within the City and the unfunded stormwater system needs to correct the

problems showed 664 projects totaling 293 miles of stormwater conveyance system improvements. The City's unfunded stormwater improvement needs are summarized by watershed in the following table.

Table 4. Unfunded Stormwater Improvement Needs

Watershed	Length (feet)	Estimated Cost (dollars)
Spring Branch	17,421	6,970,000
Pea Ridge Creek	62,310	22,930,000
South Dry Sac	15,300	6,550,000
Lower Jordan Creek	148,782	74,560,000
N. Branch Jordan Creek	80,836	51,540,000
S. Branch Jordan Creek	1,647,000	80,200,000
Upper Wilson Creek	196,452	76,296,000
Lower Wilson Creek	52,100	20,850,000
South Creek	145,160	58,870,000
Fassnight Creek	186,875	89,520,000
Galloway	192,615	89,620,000
Thompson	36,900	13,740,000
Inman Creek	61,902	27,200,000
Ward Branch	111,700	48,820,000
James River	75,975	44,360,000
<b>Totals</b>	<b>3,031,328</b>	<b>\$712,026,000</b>

Greene County has an inventory of the stormwater system but no assessment on the needs for capital improvement projects. Since County regulations regarding stormwater infrastructure were not implemented until the 1990s, there are numerous subdivisions with inadequate drainage infrastructure.

Maintaining Infrastructure Investment – Protect past investments and infrastructure.

Both the County and the City provide minimal maintenance to their existing infrastructure.

The City spends about \$1 million annually on maintenance which includes vegetation control and emergency repairs. Some examples of infrastructure maintenance needs facing the City of Springfield are briefly described below:

- Springfield has approximately \$500 million in stormwater system assets. This includes 600 miles of pipes, culverts, and drainage ways. The City is currently assessing the condition of this infrastructure system. In very rough terms, if the system components had a life expectancy of 100 years, then Springfield would need \$5 million for an infrastructure replacement program annually to

move from a reactive maintenance program to a proactive maintenance program protecting past investments.

- Collapsed box culverts (many are 50 to 100 years old) are a growing concern as the historical stormwater system reaches its life expectancy. Collapsed culverts can be a public safety hazard and can restrict the movement of stormwater and damage the transportation system. Several collapses have occurred in the past several years under the street, sidewalks, structures, in yards, and in parks. It is expected that as long as infrastructure replacement is underfunded that these occurrences will continue to increase.
- A specific infrastructure concern is the condition of corrugated metal pipe culverts. Many of these have been inspected and are deteriorating, nearing their life expectancy of 30 to 50 years.
- Springfield owns 23 regional stormwater basins to reduce downstream flooding that are maintained by the Springfield Public Works Department. The City stormwater permit requires the City to investigate opportunities to use these areas for more effective water quality protection. Conversion of basins to water quality treatment generally increases the maintenance requirements significantly.
- The City has acquired over 150 flood prone properties over the last 18 years. Most of these properties are maintained by the Department of Public Works. While there are many benefits of this program, property maintenance costs have gone up significantly due to these increases in City-owned property.

The County has an inventory of the stormwater system but no current assessment on the needs for maintenance projects. The County Highway Department maintains everything within the transportation system right-of-way. Everything outside this area is maintained by home owners or home owners associations. Most of the infrastructure is relatively new, built since the 1960s but not built to current standards. Due to lack of maintenance, many of the open channels have become clogged with sediment and yard waste reducing their capacity for stormwater conveyance.

#### Water Quality Program – Minimizes stormwater runoff pollution.

The City currently spends nearly \$1 million annually to comply with clean water regulations that are designed to keep our lakes and streams clean and beautiful, as well as provide a safe and natural habitat for fish and wildlife. This cost is expected to continue to increase significantly with the issuance of the City's next MS4 permit in 2013. In addition to continuing to meet current permit requirements, the revised permit is expected to contain an increased level of planning, inspection, tracking, and reporting requirements to demonstrate effective implementation. Anticipated requirements include inspection to insure best management practices for controlling stormwater are utilized on new developments and redevelopments, as well as city projects and facilities. The City's illicit discharge and industrial inspection components of stormwater management are expected to increase. Best Management Practice structures built for managing stormwater quantity may require retrofitting to better address water quality issues. These increased MS4 permit elements will require additional staffing and resources.

Greene County's stormwater permit will expire in March 2013. A permit renewal application is due in May 2013 to Missouri Department of Natural Resources (MDNR). Changes to Greene County's Stormwater

Management Program from the current permit are anticipated to be more stringent monitoring, reporting, and public involvement requirements. Additionally, it is anticipated that all new construction and re-development sites will be required to reduce the total volume of runoff using post-construction infiltrative Best Management Practices.

An unknown regulatory requirement is looming in the near future. Jordan, Wilsons, and Pearson Creeks are on the state's list of impaired waterways. Total Maximum Daily Loads (TMDLs) were issued by EPA to address these impairments. The City is currently in litigation with EPA to address the City's concerns with how these documents were written. The resulting approach will likely require some level of expenditure by the City and County to study and address these impaired streams. Columbia, Missouri has a similar situation and they are estimating 70 stormwater detention basins are needed within one watershed alone.

In addition to these water quality issues, the U.S. Environmental Protection Agency is promoting an integrated planning and permitting process. The integrated planning process combines point source permits for wastewater treatment plants (WWTP's) and the MS4 stormwater permit. Springfield is contemplating trying this new approach to set environmental priorities and save monetary resources. Integrated planning is designed to save municipalities resources, although not eliminate administrative costs.

### What are the potential funding sources?

Many communities across the Midwest and United States have grappled with securing long-term monetary resources to fund stormwater management programs. Below are some points the Task Force will consider and discuss in the coming months.

The types of funding sources generally available to governments include sales tax, property tax, or a stormwater utility fee. How much revenue can be generated by each potential source? Some estimates on a County-wide sales tax include:

- 1/10<sup>th</sup> of one percent generates \$4 million/per year.
- 1/8<sup>th</sup> of one percent generates \$5.5 million/per year.
- 1/4<sup>th</sup> of one percent generates \$11 million/per year.

A utility fee could be enacted that charges property owners for the amount of hard (impervious) surface they have on their property or the amount of runoff that is generated on their property. The Level Property Tax is considered an inconsistent source due to competing needs for the funds and the scheduling on general obligation bonds. All the needs of the local government must be weighed when deciding how to use these funds.

Any new revenue source will likely need to be approved by the voters due to the Missouri Hancock Amendment. Some revenue sources have limitations on how funds can be used. Therefore, the revenue source needs to match with the program needs.

The Vision 2020 Comprehensive Plan and the 2030 Strategic Plan both identified water quality and stormwater management as critical issues for the Springfield community to continue to address. Some recommendations from the Vision 2020 plan have been implemented. In the 2030 Strategic Plan, the Natural Environment Committee addressed Stormwater Funding and Watershed Impacts. This committee recommended a sustainable, adequate funding source be in place by 2017. The committee anticipated the renewal of the Parks/Waterways Sales Tax in 2012 for another five years. Because that renewal did not occur, the need for a sustainable, adequate funding source is now more urgent. In addition, The Police Fire Pension Fund 3/4 cent Sales Tax continues for another 5 years. The City of Springfield is committed to no new taxes during this time frame, unless they are part of a County-wide tax or necessary to meet an unfunded mandate.

### Stormwater Funding

**"Major Goal:** Ensure sustainable, adequate City and County stormwater funding for water quality protection and infrastructure management.

Provide sustainable, adequate funding for City/County stormwater management programs.

Responsible Group: Public Works Stormwater Services Division and Greene County Resource Management

Proposed Performance Measure(s):

1. Renewal of the 1/4 cent Parks/Waterways Sales Tax in 2011.
2. Convene a task force in 2014.
3. Sustainable, adequate funding in place when the 1/4 cent sunsets in 2017.

Estimated Cost to Achieve: \$16.5 million annually (2005 estimate)

Proposed Funding Source(s): To be determined by task force"

### Watershed Impacts

**"Major Goal:** Maintain or restore the pre-development hydrology of our watersheds and protect our waterways from pollution.

**Assumptions:** Urbanization has hydrologic, geomorphic, and biological effects on a watershed that can be minimized with a holistic, prioritized approach (National Research Council, 2008). Protection of Ozark streams with bank stabilization, riparian corridor restoration, and greenways is a cost-effective way to reduce phosphorus inputs and associated algae blooms in area lakes, and provides significant economic benefits in tourism, health care, and home values<sup>5</sup>. Potential impacts on karst systems and underground infrastructure need to be considered when promoting stormwater infiltration practices."

Recommendations include:

- Public use of Low Impact Development
- Coal Tar Ban
- Support State Water Pollution Control Regulations
- Riparian Corridor Restoration
- Stormwater BMP Retrofitting

More detailed information will be provided to the Task Force in future meetings. City and County staff and Shockey Consulting will provide more information in specific areas, as requested by the Task Force.

# Recorded Subdivisions Southwest Greene County by Decade



## Legend

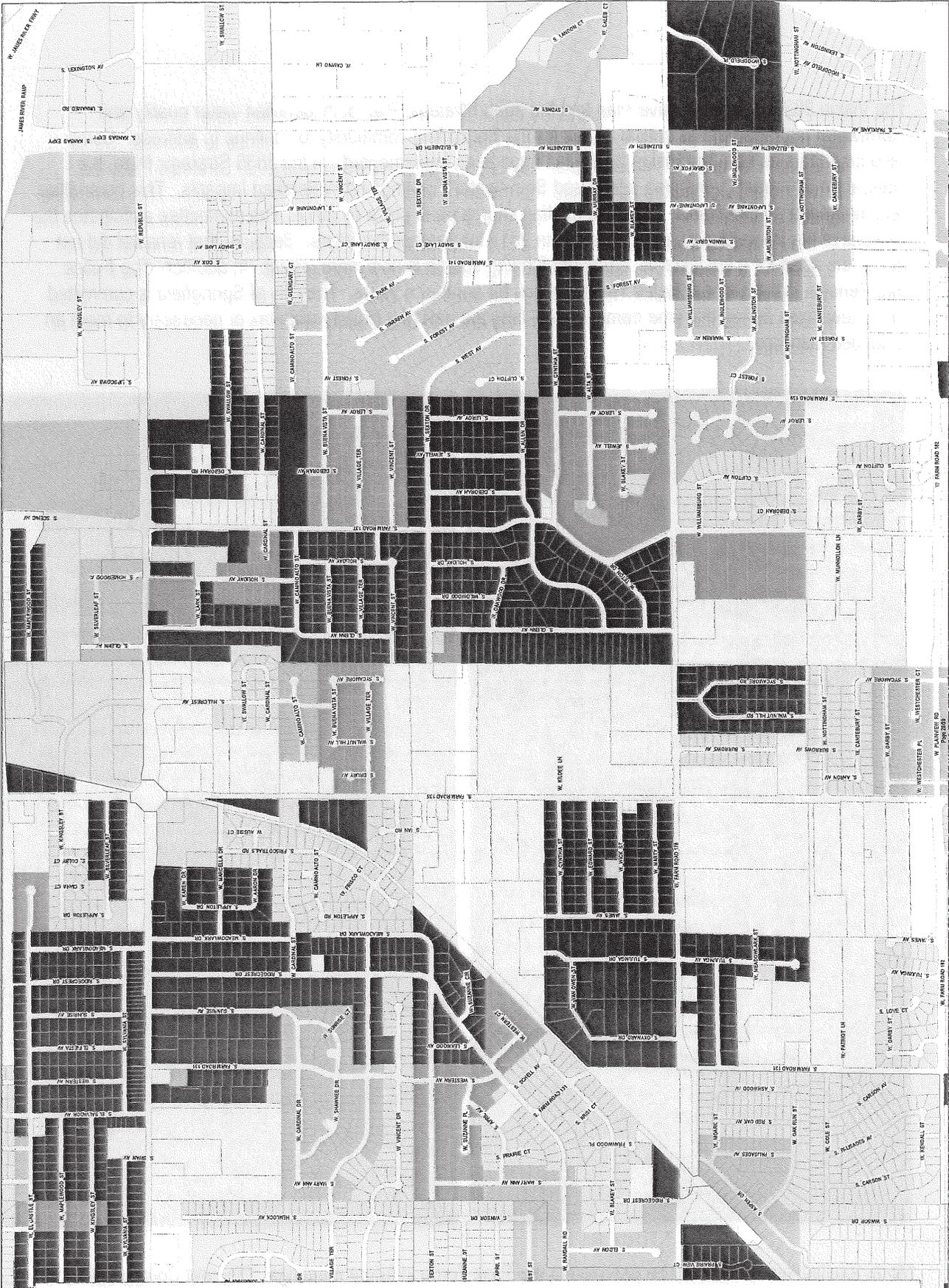
- Incorporated County Line
- Property Parcels

## By Decade

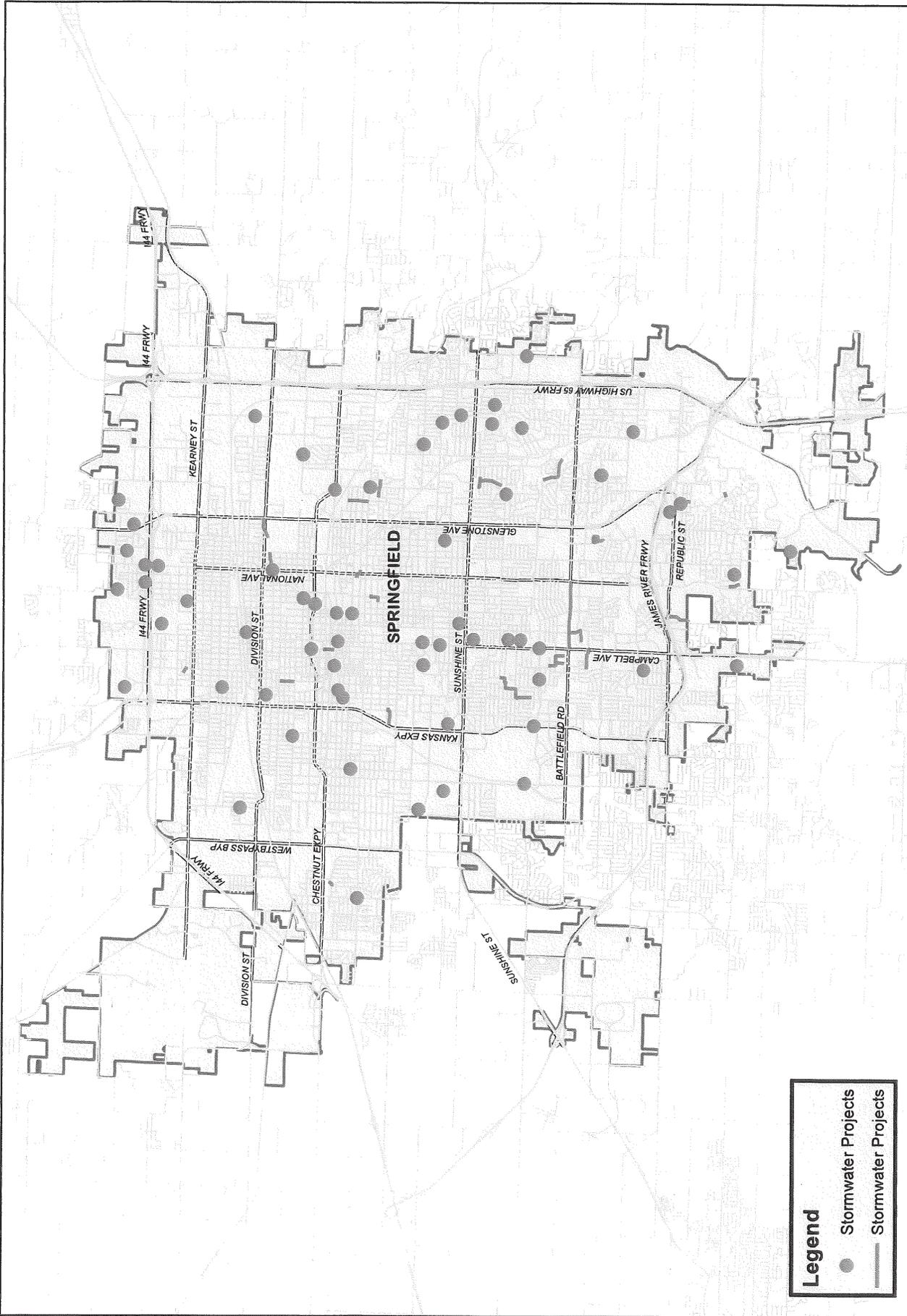
- Before 1980
- 1980 to 1989
- 1990 to 1999
- 2000 to Present



Source:  
Greene County Assessor's Office  
Greene County Planning & Zoning



# Stormwater Projects (1995-2012) City of Springfield, Missouri



**Legend**

- Stormwater Projects
- Stormwater Projects



**City of Springfield, Missouri**

0 2,900 5,800 11,600 17,400 23,200  
Feet

SCALE: 1:125,000

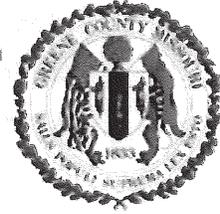


**DISCLAIMER:** All information included on this map or digital file is provided "as-is" for general information purposes only. The City of Springfield, and all other contributing data suppliers, make no warranty, expressed or implied, concerning the accuracy, completeness, reliability, or suitability of the data for any particular use. Furthermore, the City of Springfield, and all other contributing data suppliers, assume no liability whatsoever associated with the use or misuse of the data.



# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force Meeting



**Date:** Thursday, November 15, 2012  
5:00 to 7:00 p.m.

**Location:** Public Safety Center  
330 West Scott Street  
Springfield, Missouri 65802

**Map to meeting  
site on page 2**

**4:00 - 4:45 p.m.  
Optional Tour:  
Public Safety Center  
Green Roof**

### Meeting purposes:

- Select guiding principles to assist the Task Force members in their role, process, and issues to be addressed.
- Provide background on Flood Damage & Risk Reduction:
  - What is the City and County doing to reduce flood damage & risk?
  - How do we compare to other communities?
  - What still remains to be accomplished?
  - Where should the community focus its flood risk and damage reduction efforts?

### AGENDA

4:00 p.m.	<b>Optional Tour:</b> Public Safety Center Green Roof	Kevin Barnes, Greene County
5:00 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:15 p.m.	Guiding Principles Survey	Sheila Shockey, Shockey Consulting
5:50 p.m.	Flood Damage & Risk Reduction	Todd Wagner, City of Springfield Kevin Barnes, Greene County
6:20 p.m.	Task Force Discussion	Sheila Shockey
6:45 p.m.	Next steps - Information needed for upcoming meetings	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:00 p.m.	Adjourn	

***In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.***

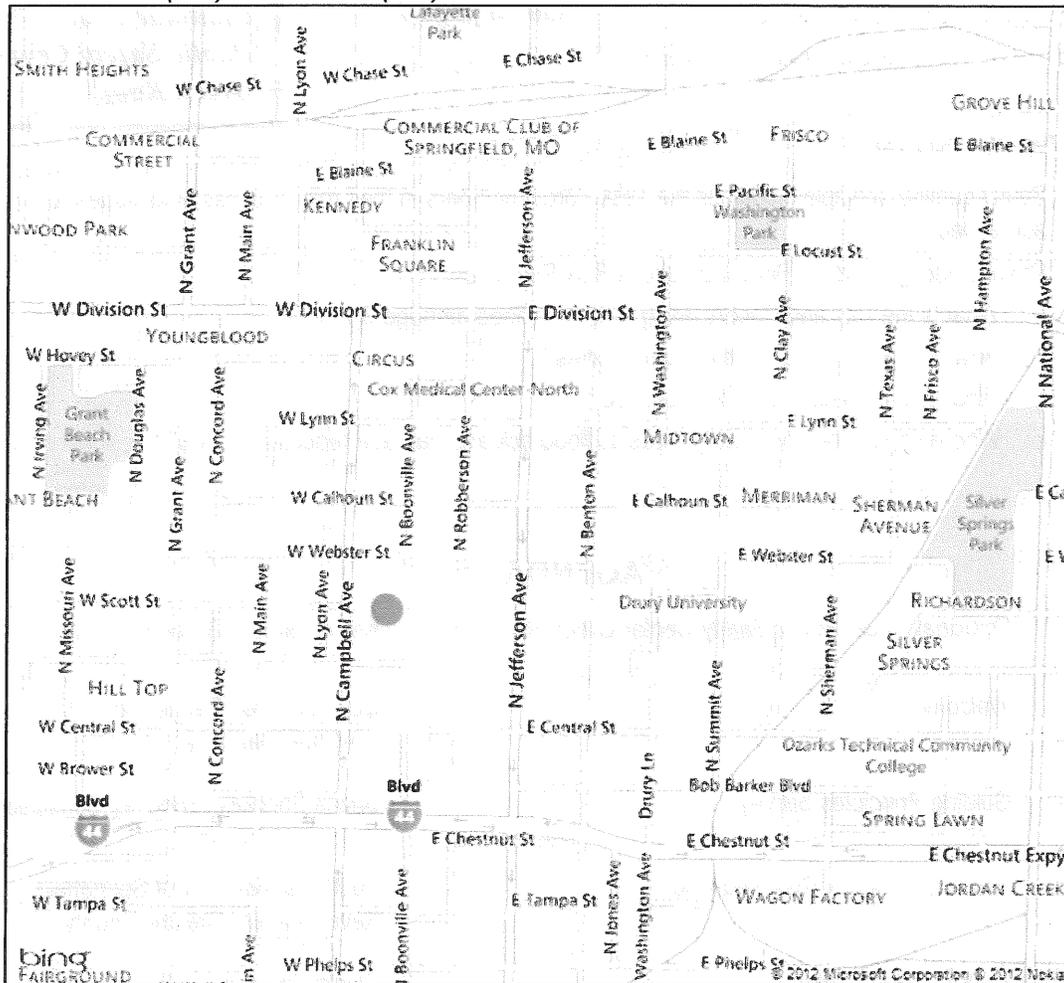
**Handouts:**

- 1. Task Force Meeting #1 Meeting Notes pages 4-8
- 2. Guiding Principles Survey Results pages 9-15
- 3. Flood Damage and Risk Reduction pages 16-32

**Meeting Site:**

Public Safety Center  
330 West Scott Street  
Springfield, MO 65803

**For assistance call (417) 864-1901 or (417) 818-6091**



**Directions:**

*From the North: Travel south on N. Kansas Expressway to Chestnut Expressway. Turn left or east and travel to North Booneville Avenue. Turn left and proceed 3 blocks to Scott Street. The Public Safety Center is on your left.*

*From Highway 65: Take the Division Street exit. Turn west (right if coming from the north, left if coming from the south) and travel to Booneville Avenue. Turn left and travel about 5 blocks to Scott Street. The Public Safety Center is on your right.*

*From the west and I-44: Take the Chestnut Expressway east to Booneville Avenue. Turn left onto Booneville Avenue and travel 3 blocks to Scott Street. The Public Safety Center is on your left.*

## Task Force Commitment

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The Stormwater Management Task Force will meet approximately eight times from October 2012 through April 2013. Meetings will be held approximately every three weeks except during the holiday season for up to two hours.

Remaining meeting dates are Thursdays from 5:00 to 7:00 p.m. on:

- December 13
- January 17
- February 7
- February 28
- March 21
- April 4

## Contacts

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Please contact the Project Team whenever you have questions or concerns.

- City Project Team contact  
Todd Wagner, PE, Principal Stormwater Engineer, City of Springfield, Missouri  
[twagner@springfieldmo.gov](mailto:twagner@springfieldmo.gov)  
(417) 864-1932
- County Project Team contact  
Kevin R. Barnes, PE, Greene County Stormwater Engineer  
[kbarnes@greencountymo.org](mailto:kbarnes@greencountymo.org)  
(417) 868-4147
- Media inquiries  
Cora Scott, Public Information Officer  
[cscott@springfieldmo.gov](mailto:cscott@springfieldmo.gov)  
(417) 864-1119
- Project Team contact  
Sheila Shockey, Shockey Consulting Services  
[Sheila@shockeyconsulting.com](mailto:Sheila@shockeyconsulting.com)  
(913) 515-4365



**Springfield/Greene County, Missouri**  
**Stormwater Management Task Force Meeting #1**  
**Meeting Notes**  
**October 25, 2012**

**DRAFT**

**Welcome & Introductions**

The Springfield/Greene County, Missouri Stormwater Management Task Force met in the C.W. Titus Education Facility at the Watershed Center. The meeting commenced at 5:00 p.m.

Greg Burris, City Manager and Tim Smith, County Administrator welcomed the Task Force members and community members in attendance. Those present included the following.

**Task Force**

Stacey Armstrong  
Matt Bailey  
Bill Bretall  
Geoffrey Butler  
Chris Carson  
King Coltrin  
Eric Dove  
Dana Elwell  
Tiffany Frey

Patty Hamilton  
Patrick Harrington  
Casey Haynes  
Ronda Headland  
Andy Hosmer  
Dan Hoy  
Jerany Jackson  
Tom Kissee  
Chris Macioce

Dave Murray  
Fred Palmerton  
Brian Perdue  
Matthew Pierson  
Rick Scarlet  
Karen Spence  
Aaron Wahlquist

Absent: Daniel Beckman, Tom DeWitt, Erik Fjeseth, Harlan Hill, Fred Schlegel

**City and County Staff**

Kevin Barnes  
Vanessa Brandon  
Phil Broyles  
Greg Burris  
Chris Coulter  
Sarah Davis

Tim Davis  
Carrie Lamb  
Barbara Lucks  
Cody Marshall  
Fred Marty

Steve Meyer  
Cora Scott  
Tim Smith  
Todd Wagner

**Community Stakeholders:**

David Casaletto  
Milton Dickensheet  
Mike Pessina

Sheila Shockey introduced herself and explained the Task Force purpose, ground rules and described the agenda for the meeting. She introduced the two co-chairs, Dan Hoy and Fred Palmerton. They introduced themselves and then each Task Force member and attendee introduced themselves. Sheila walked the group through the notebooks prepared for each Task Force member. She asked them to bring them to each meeting and include the information emailed out in advance of each meeting.

## **Presentation Defining Stormwater Management**

Carrie Lamb made a presentation describing what stormwater is, its potential impacts, and how it can be managed to minimize these impacts. She explained that the more impervious or hard surfaces a community has, that more stormwater runoff is generated. Stormwater doesn't soak in or evaporate as much as it did before the hard surfaces were installed. Springfield's watersheds are covered with about 25 to 35% impervious surface area. She said Springfield is at the top of two watersheds. Carrie described how impervious cover influences the flows in streams during dry weather (reduces the amount of inflow from ground water or subsurface seeps since less has infiltrated), increases flood flows, negatively impacts fish and critters in the streams and causes stream bank erosion. She talked about common pollutants including lawn fertilizer, litter, and motor oil, and how stormwater runoff carries these pollutants into streams. The potential impacts of poor stormwater management include: public health and safety, property damage, devaluation of property and neighborhoods, degradation of waterways, and negative impacts to the regional economy from fishing, recreation, and tourism. Good stormwater management includes: minimize flood impacts; maintain infrastructure; attractive, multi-purpose spaces; floodplain/riparian corridor protection; water quality and habitat protection; regulatory compliance; and improved quality of life and economic development.

Carrie showed a map of the infrastructure Springfield needs to maintain. The City of Springfield has over 600 miles of stormwater conveyance and over 15,000 inlets. The total with Greene County is more than 800 miles of conveyance structures and more than 20,000 inlet structures. She described a typical stormwater system and showed examples of the infrastructure and explained their purpose. She said that this system manages the quantity of stormwater. In addition, infrastructure can be designed to also improve water quality. This is a shift in how stormwater is managed. The goal is to achieve multiple benefits and create amenities with investments. She showed examples of how this has been done in Springfield and Greene County. She described how the impacts of development is being minimized using Best Management Practices (BMPs). She showed several photos of the BMPs in the community.

## **Presentation on Past Funding**

Sheila gave a brief overview of past funding sources and levels for the stormwater management program for both the City and for the County. These funding sources have included the following.

- Level Property Tax
- Detention Buy-out or In-lieu payments
- Parks and Stormwater Sales Tax
- Capital Improvements Sales Tax
- General Obligation Bonds
- General Fund
- Federal and State Grants

For the City of Springfield, total revenue generated for the stormwater management program was \$90.6 million for the years 1995 to 2012. In Greene County, the total revenue generated for the years 2000 to 2013 was \$9.9 million. Charts were displayed to provide a visual picture of the revenue sources in the past.

## **Presentation on Past Accomplishments**

Todd Wagner explained the three areas of stormwater management: flood risk and damage reduction,

water quality protection, and maintenance infrastructure investment. This part of the Task Force meeting will describe what has been done in the past in these three program focus areas in the City. Kevin Barnes will talk about what has been done in the County. Todd described what was accomplished with the investments made.

- Voluntary flood buyout program: >\$10M
- Flood reduction projects: \$70M
- Stormwater Permit Compliance: >\$400k annually.
- Water quality improvements projects -Stormwater Best Management Practices (BMPs)
- Infrastructure repairs: minimal, some projects are replacement of old infrastructure
- Public Education and Outreach

The voluntary flood buyout program accomplishments include the following.

- Stopping the cycle of repeated flooding of individual homes or entire neighborhoods, which leads to lower property values and dilapidated properties.
- Over \$10 million has been spent since 1994.
- Over 200 acres have been acquired, mostly in or adjacent to floodplains.
- Nearly 200 individual parcel acquisitions are included in this program.
- Approximately 150 structures have been removed from flood prone areas.
- The City program was matched by approximately \$750,000 in FEMA funds.

He said that the floodplain acquisition program was important to the greenway trail system development. Todd showed a map to illustrate this point. He said about 211 acres were acquired for approximately \$2.5 million. Todd described the details behind historic floods and the changes made through the flood acquisition program.

Kevin Barnes gave the history of investments made in stormwater management in Greene County. He described the historic floods and impacts on properties and public safety in the County. He gave an overview of major projects completed by the County.

Carrie gave an overview of regulatory issues and how the City and County comply with the Clean Water Act through their Municipal Separate Storm Sewer System (MS4) permits. A portion of the resources the City and County have expended are to comply with regulatory requirements including the following activities: development review process, land disturbance permit program, municipal operations good housekeeping, illicit discharge/industrial runoff, public education and involvement, and water quality monitoring. Clean Water Act requirements are fulfilled through local policies, programs, ordinances, permits, inspections, and standard operating procedures. Select examples described during the Task Force meeting include the following.

- Land disturbance permits are issued by both the City and County for construction where 1 acre or greater of land is disturbed. The property owner must provide erosion and sediment control per

City and County ordinances to minimize runoff of sediment and other pollutants from the construction site. City and County staff periodically inspect the erosion control practices for compliance. Training is provided to contractors so they understand the state and local regulatory requirements, inspections, and enforcement for noncompliance.

- The City and County have programs for investigating illicit discharges (dumping or discharging pollution to the stormwater system), sweeping public streets, and proper handling of materials and waste in municipal operations and maintenance (good housekeeping).
- The City and County have partnered with several community groups and non-profits to carry out public education and involvement programs. These programs include storm drain inlet marking and murals, Adopt-a-Stream cleanup activities, and workshops on rain barrels and rain gardens.

### **Presentation on Current and Future Needs**

Todd Wagner gave an overview of the current and future stormwater management needs. He showed a map of the service requests for the City of Springfield that total about 3,000 addresses. He explained the needs are estimated to be two-to three-times the number of calls made to the City. One need the City has is to comply with state and federal regulations for water quality. This can also mean cleaning and maintaining the system properly. Another issue is infrastructure maintenance. A third issue Springfield is facing is channel stabilization and erosion control, which include utility protection. Todd said the unfunded needs to address flooding issues are approximately \$700 million.

Of course, all of these cannot be addressed; between \$100 million to \$200 million are priority needs. Todd explained that the City and County haven't had the resources to reinvest in the stormwater system. The cost to gradually replace the system overtime would be \$5 million per year for the City. To stay in compliance with stormwater regulations the City currently spends about \$500,000 and the County spends \$300,000. More regulations will be imposed upon both the City and the County in the next permit cycle beginning in June 2013. For the City, the cost could be as much as \$1 million annually.

### **Questions and Answers**

Task Force members asked questions and the following answers were given by the support team:

**Question:** Does the limestone under the soil impact how we manage stormwater?

**Response:** Yes, our community has karst topography which means we have sinkholes, caves and underground streams. Because sinkholes are a direct connection to groundwater, we need to be careful about keeping pollution out of them. Karst topography also limits our ability to use stormwater best management practices that are designed to allow large quantities of runoff to soak into the ground in a small area because this can cause a sinkhole collapse.

**Question:** Is the City measuring the quality of water being discharged from the stormwater system?

**Response:** Yes, Springfield has had a stream sampling program for 10 years and has good baseline data. The County has a similar program for stream sampling.

**Question:** What is the population of the City and the County?

**Response:** The population of the City is 160,000 and the County (including the City) is 275,000.

**Question:** Do you know how many more properties will need to be bought out?

**Response (Todd Wagner):** The City has a list of properties in the FEMA floodplain and has a list of properties that are flood-prone. We can provide a total and general location to the Task Force at a future meeting.

**Question:** Do we have better ordinances and practices in place so we don't cause these problems in the future?

**Response:** As our knowledge has evolved, we have changed the way we manage stormwater. Springfield and Greene County have in place ordinances and development review procedures that require developments to meet certain standards to minimize potential flood impacts and protect water quality. These techniques are evolving but the goal is to better manage water quantity and quality as we development.

**Question:** How does pervious concrete hold up?

**Response:** It is primarily used on the outside lanes of streets and parking lots. Techniques and practices are evolving and many of the design professional on the Task Force have good experience implementing pervious concrete.

**Question:** How does Springfield stack up against others in the country in terms of stormwater management practices?

**Response:** Are we doing all the right things? We can share with you best practices at a future meeting and how our community compares.

### **Next Steps and Closing Remarks**

Sheila asked the task force about time of day for the meetings. Most participants felt like the current time worked. One participant said he would like to see it at 5:30 p.m. since he works until 5 p.m. The Task Force also reviewed the dates proposed for future meetings and agreed to meet at the New Public Safety Center for future meetings.

Dan Hoy and Fred Palmerton made closing comments as co-chairs of the Task Force. Dan Hoy said we need to think about how we can care for the quality of our waterways. Fred Palmerton encouraged members to prepare for the meetings, give some thoughts to the questions at hand and share your ideas and experiences, and let's focus on the task force questions.

The meeting was adjourned at 7:11 p.m.



**City of Springfield - Greene County, Missouri**  
**Stormwater Management Task Force**  
**Guiding Principles Survey Results**  
**11/8/2012**

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As part of the stormwater management process, the Stormwater Management Task Force had the opportunity to respond to a survey to develop a discussion regarding guiding principles for stormwater management.

Twenty four Stormwater Management Task Force members completed the survey, which comprised of a series of 8 questions, 7 of which were statements respondents were asked their "level of agreement." Five response options were provided" strongly agree, agree, neutral, disagree and strongly disagree. Respondents were also asked to leave their comments on the eighth question.

The results have been categorized in terms of statements with:

- Strong support: majority of respondents strongly agreed and agreed;
- No support: majority of respondents strongly disagreed or disagreed; and
- No clear consensus/split vote.

**Statements with Strong Support**

1. *Innovation/Planning:* The long-term stormwater management program should be flexible to adapt to new technologies and innovations
2. *Understandability/Public Education:* Citizens should be made aware of how they can protect water quality through their actions
3. *Public Acceptance:* The public perception should be that the stormwater management programs are fair; decision-making is open and is influenced by public input.
4. *Understandability/Public Education:* Citizens should understand how improvements help protect water quality and how improvements help water quality and how improvement programs are funded
5. *Conservation:* The efficient use of resources should be encouraged
6. *Environmental Stewardship:* I think it's more important to protect drinking water sources and improve the quality of water in streams in Southwest Missouri.

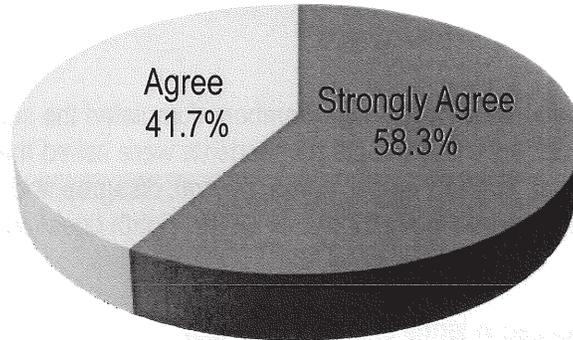
**Statements with Split Vote**

1. *Public Benefit:* The public should see a direct benefit from the investments made in stormwater management.

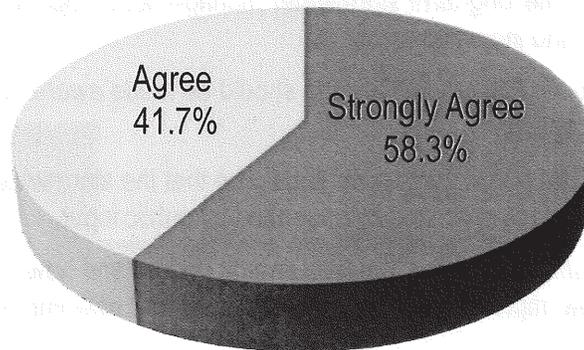
Charts illustrating the responses appear on pages 10-13.

**Strong Support**

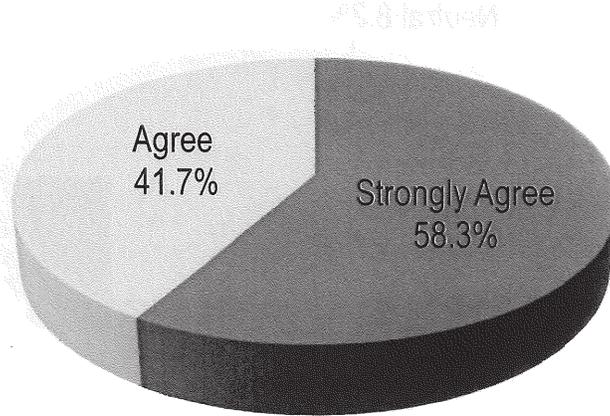
**Innovation/Planning: The long-term stormwater management program should be flexible to adapt to new technologies and innovations.**



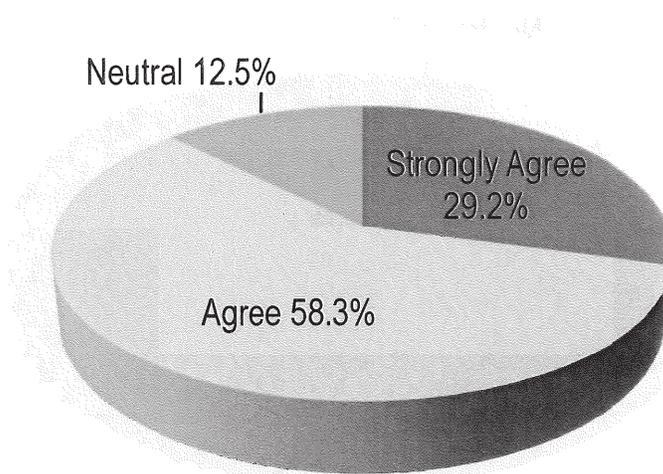
**Understandability/Public Education: Citizens should be made aware of how they can protect water quality through their actions.**



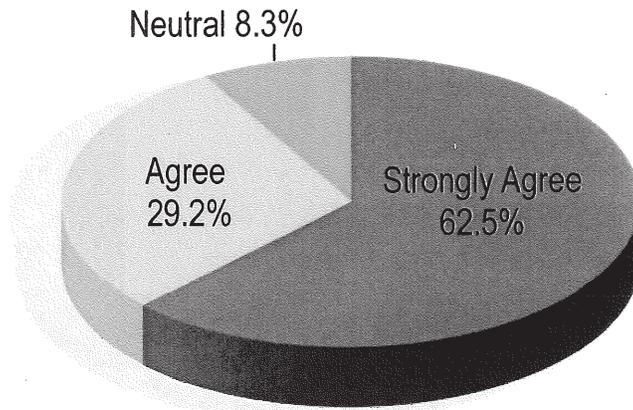
**Public Acceptance: The public perception should be that the stormwater management programs are fair; decision-making is open and is influenced by public input.**



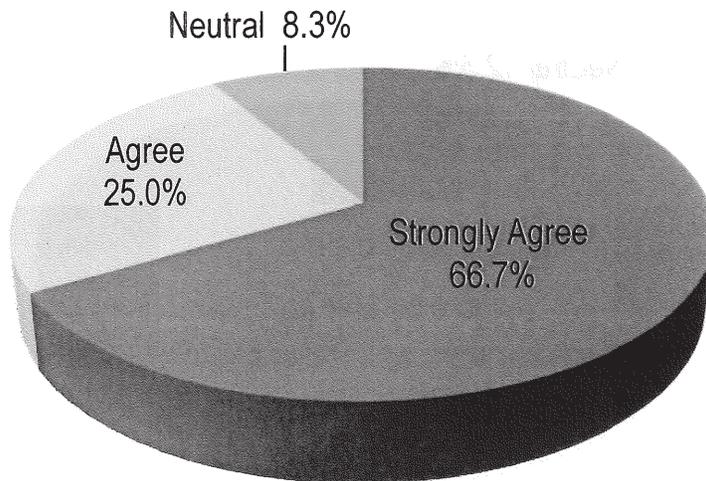
**Understandability/Public Education: Citizens should understand how improvements help protect water quality and how improvements help water quality and how improvement programs are funded.**



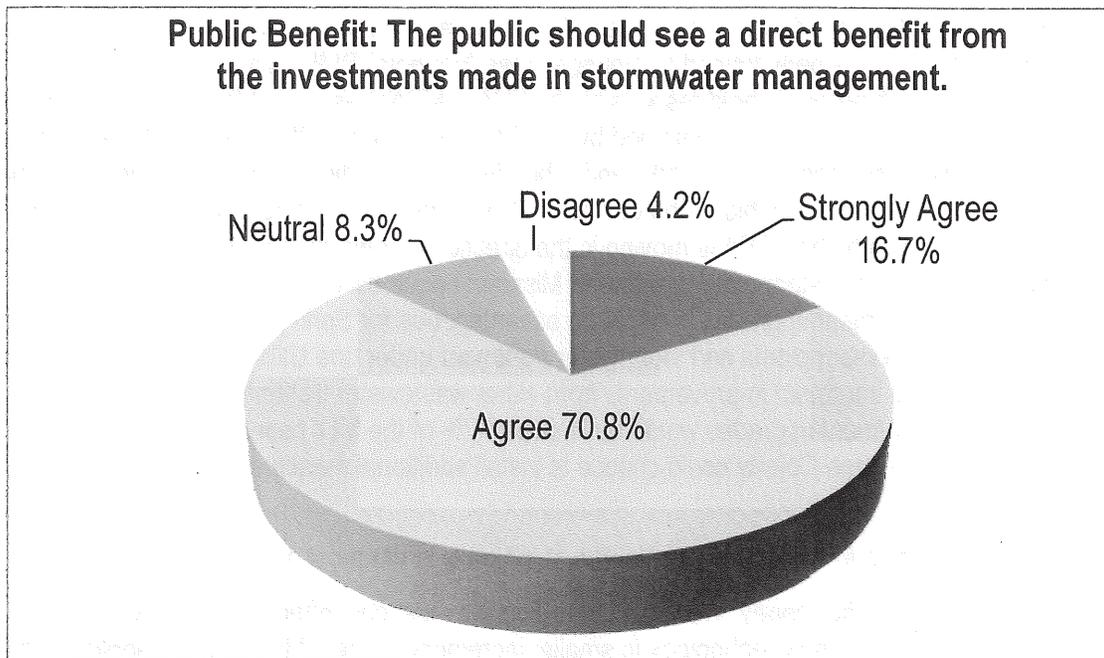
**Conservation: The efficient use of resources should be encouraged.**



**Environmental Stewardship: I think it's more important to protect drinking water sources and improve the quality of water in streams in Southwest Missouri.**



**Split Vote**



**Challenges: What are the most critical challenges our community faces regarding stormwater management?**

- Our citizens take the availability of good quality drinking water for granted. There is a broad misconception that the actions of one will not impact the many. Public education of the critical nature of our stormwater policy making, the state of our water quality and the availability of drinking water is necessary.
- Creating policy that will allow development without creating new problems that have to be solved later.
- Finding the money to correct past mistakes.
- Motivating a majority of the public to support policymakers' efforts towards good stormwater management.
- Economic constraints to implement effective solutions. Direct impact of solutions on property owners i.e. land acquisition, required easements, etc.
- Budgets are limited, how do we fund the EPA required water quality elements? Budgets are limited, how do we fund maintenance/ replacement of infrastructure? How do we attract industrial/manufacturing companies if the cost of stormwater treatment and management is higher than our neighboring communities? How do we keep the cost of living (taxes) low so that we can give our residence a high standard of living? Several detention ponds have caused the formation of sink holes. These many times cannot be detected prior to construction and they are generally "unknown". How do we infiltrate water as suggested by EPA to meet the TMDL standards without causing multiple sink holes to open? We need to change the State Statues to allow an "urban

stream" category that would apply to streams in a fully urbanized watershed. Retrofitting the watershed by installation of a lot of stormwater treatment to meet pristine stream standards does not seem reasonable. It may not even be technologically achievable. We should look at regional BMP's rather than hundreds of "pot holes" that are nearly impossible to manage. The private community is not properly trained to manage these "pot hole" BMP's and generally does not want them. The City however is held responsible by EPA & MDNR as part of the MS4 permit. Regional BMP's would be owned and maintained by the City. The regional BMP's should have multiple purposes such as soccer fields, parks and urban fisheries. Finding locations for regional facilities are difficult and the cost is high. The cost for installing and maintaining hundreds of pot holes would however be even higher. EPA is moving in the direction of integrated management of wastewater treatment plants and stormwater treatment. Missouri house bill 89 discusses the affordability of wastewater treatment upgrades. It might be advantageous for Springfield to re-organize to combine wastewater treatment plants and stormwater treatment under one Utility. The required installation of water quality treatment improvements from either wastewater treatment plant upgrades or from stormwater treatment upgrades would be limited to 2% of the MHI based on house bill 89. Springfield & Greene County could choose to install additional measures over and beyond 2% of the MHI.

- Adequate funding to do what is right for the community is the most critical challenge.
- It is always about the money. We must determine the most cost effective and proven methods first and experiment with new technology in smaller increments to see if they can be applied in the future. Stormwater and water quality is critical and should not be taken lightly.
- Funding the necessary improvements to implement additional stormwater measures.
- Funding, public perception, understanding and adoption, and acceptance of change
- Striking balance between ideal and practical (i.e. if it is not affordable it is not sustainable)  
Improving citizens awareness of each and everyone's ownership stake in stormwater management and water quality in general.
- From what I have learned so far as a task force member is that a serious funding shortfall is looming. It also appears that most of the funding since 1995 has been used to deal with issues that had been created prior that time. Going forward there needs to be some source of funding to deal with continued corrections to existing problems, a plan to fund repairs to the existing aging system, and funding to meet future requirements of state of federal regulations.
- Growth in this area with construction of residential and commercial properties The age of a lot of the stormwater drainage lines
- Determining how to measure and verify what effect a particular technology has on water quality. Finding affordable solutions.
- Who is going to pay for all the improvements?
- Finding the balance between the environmentalists that want to vegetate every foot of stream corridor and the engineers that are trying to design stream corridors to remove flood waters efficiently to reduce damage from floods to urban structures. Development pressures to fill sink holes or add fill to floodplains to make valuable property near busy intersections is a big problem. These losses of natural flood water storage should not be happening.
- How to fund it and what projects take priority.

- Achieving a paradigm shift in how practices that are effective at managing stormwater may utilize design and long-term maintenance techniques that cause the land to look different from the status quo.
- Funding
- Getting citizens of the area to understand they are part of the solution as well as part of the problem. The local governments also need to understand that they don't need to pave everything in sight to control dust.
- Do not set the bar so high we can't get there. What is very much needed is prioritize needs. Life safety number one. What I fear is penalizing existing citizens, developers for the sins of others, not only lousy developers but our own gov't that permitted building in areas that should never have been developed to begin with. I fear the wish list no matter how noble it maybe will fall under the weight of trying to do too much without resources to pay for them. The private sector is hurting so we cannot over burden them with fixing problems that they didn't create or we run the risk of winning a battle and lose the war- economic development and jobs that are needed in order to run our community.
- To educate the citizens on the importance of stormwater in our community and how it is connected to our health, public safety, economy and vitality.
- I think one of the biggest challenges will be how the community strikes a balance between encouraging growth and development on the one hand and making sure that that growth and development is done in conjunction with sound and strong stormwater management policies.
- Community willingness to help OTHERS in the community pay for improvements that do not directly impact all community members. i.e. I live on the north side, why should I pay taxes to fix the west sides problems. Or I live on high ground why should I help people who bought low ground.
- Funding, how do you pay for the needed improvements without killing growth by creating more taxes



# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force

### Flood Risk and Damage Reduction

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Historic flood events in the community defined Springfield's and Greene County's stormwater management programs during much of the past twenty years. The focus of the stormwater program in the City and County was correcting issues that caused flooding with "hard" solutions, aimed at conveying stormwater away quickly and efficiently. In the last 5 to 10 years the focus has begun to shift toward more "soft" solutions using water quality protection and considering how to develop multi-purpose projects.

#### What is the City and County doing to reduce flood damage and risk?

Springfield and Greene County have plans, policies, codes and ordinances that direct staff in the execution of their duties. The stormwater design standards provide the necessary requirements and guidance to reduce flood damage to property and safety risk to humans. The City and County use the following strategies to reduce flood damage and risk:

- Enact proper ordinances & regulations to minimize future problems;
- Properly plan for new development and redevelopment;
- Buy-out priority properties in the floodplain on a voluntary basis;
- Participate in the National Flood Insurance Program (NFIP) to allow citizens to utilize the program to purchase insurance; and
- Build new stormwater management system improvements.

#### Ordinances & Regulations

Springfield and Greene County have adopted ordinances that address stormwater runoff from new development to help minimize downstream flooding and address water quality. Like many communities, the first regulations adopted by the City and County primarily addressed the flooding aspect of stormwater runoff.

In 1983, the City was one of the first communities to adopt stormwater detention requirements on all new developments. Early computational methods were very simplified and it became apparent that detention basins did not always provide protection of downstream properties that met the public expectation. The first detention design standards only considered the 100-year storm event and simplified methods were not always accurate.

After the 1993 floods, the standard for detention design changed to more complex computer modeling methods resulting in better performance at controlling a range of flood events. At that time, the design requirements were changed to consider storm events ranging from the 2- to 100-year recurrence intervals for pre-development and post-development conditions. (A 2-year storm event is one that has a 50% chance of occurring in any given year. A 100-year storm event is one that has a 1% chance of occurring. )

Regional detention basins and conveyance improvements were funded in the City and a payment in lieu of detention was allowed in some cases in order to promote more effective regional flood control. In the late 90's, the City and County regulations were modified to address the water quality aspect of stormwater runoff providing extended detention and other practices to capture runoff from more frequent rainfall events (1 inch or less). In addition to reducing pollutants in stormwater, holding runoff from the 1 inch rainfall can provide an added benefit of reducing downstream erosion. *Figure 1* describes the commonly used design storms.

The current regulations have played an important role in reducing flood damage, improving water quality and improving downstream bank stability. However, they have not adequately addressed the change in total *volume* of runoff that occurs due to the increase in impervious surface area. Nationally, the trend has been to promote infiltration of stormwater runoff in order to mimic pre-development rates *and* volume. The Environmental Protection Agency (EPA) is currently considering a national stormwater rule that could mandate volume reduction from new and re-development. We will address this topic in more detail when we discuss water quality issues in Meeting #3.

### Commonly Used Design Storms

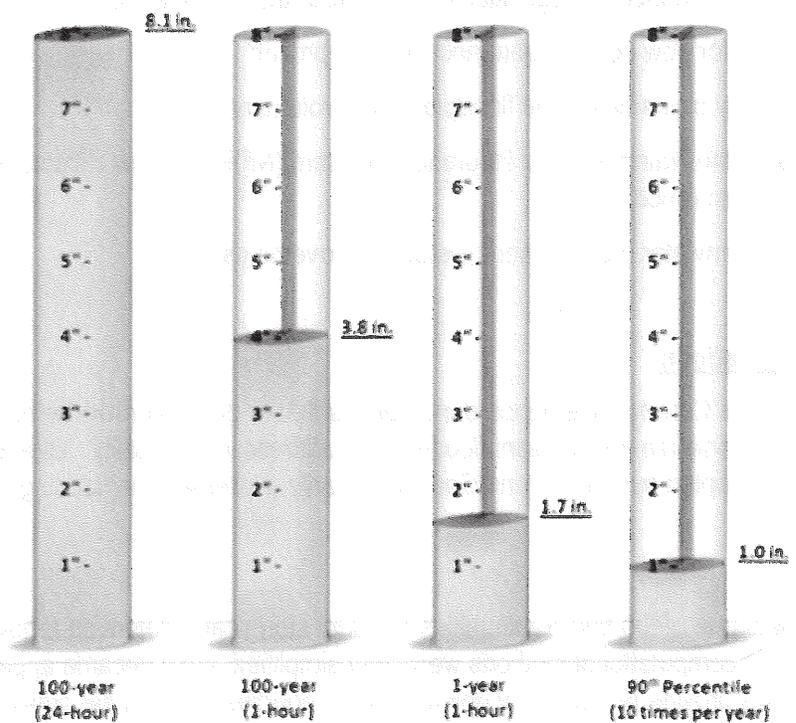
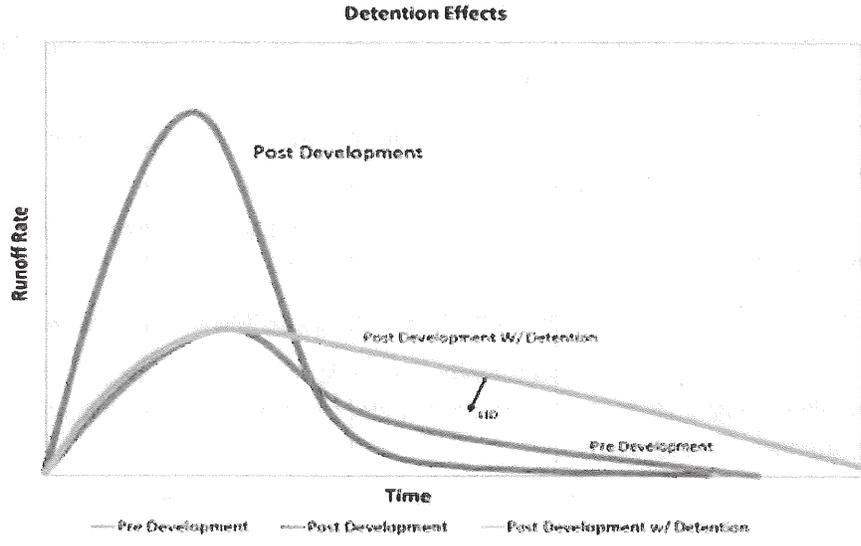


Figure 1. Commonly Used Design Storms



**Figure 2. Hydrograph**

To illustrate these concepts, *Figure 2* shows a hydrograph which is a plot of flow vs. time draining from any given watershed. The figure shows a hypothetical hydrograph from an area being developed, pre-development and post-development. The blue line shows a typical hydrograph in the pre-development conditions, typically a grass/forest area. The red line is the hydrograph in the post-development conditions, with no detention, showing an increase in peak flow and volume of flow (runoff volume is the area under the curve). The green line shows the hydrograph when detention is provided for a development, storing the additional runoff and releasing it over a longer period of time. There is still a larger total volume of runoff but the peak flow is the same as pre-development conditions. Low Impact Development (LID) seeks to reduce the volume of flow and mimic pre-development conditions, moving the green line closer to the blue line. LID is typically implemented through rainwater reuse (irrigation or gray water), evapotranspiration (plants and trees) or infiltration (pervious pavement or infiltration trenches).

There are many other design standards implemented by the City/County to reduce flooding. While detention requirements are intended to prevent new development from causing downstream flooding problems, other standards are developed to ensure channels, pipes and culverts are designed properly to minimize street and structure flooding. At stream crossings, culverts are typically designed to prevent road overtopping up to a 100-year event. Local drainage on streets is typically designed to allow for travel movement up to a 2- to 5-year event and the safe passage of emergency vehicles up to a 100-year event. Drainage systems around buildings are designed to keep water below the floor of the building up to the 100-year event. The City and County both have Stormwater Design Manuals that provide detailed criteria for the many aspects of stormwater design. Many facilities in the City and County do not meet current standards as they were constructed prior to the standards existing. This is the cause of the vast majority of the current problems.

## **Development Planning & Review Process**

When a property owner wants to develop, redevelop, or improve their property, the community development process provides several opportunities to reduce the risk of property damage and loss from flooding events. These opportunities include the following.

- Preliminary meeting between the property owner and staff to discuss the project, applicable ordinances, any restrictions, and permits required.
- When property is being sub-divided, a preliminary plat is submitted along with supporting documents showing adherence to ordinances and codes.
- Preliminary plat is submitted to the Planning & Zoning Commission for review and approval.
- Plans for construction of stormwater improvements for a subdivision or a building site development are submitted. Plans are routed to the Stormwater Engineering Division to ensure they comply with ordinances and standards.
- Improvements must be completed or escrowed prior to the recording of the final plat or building occupancy.
- Property owner applies for all necessary permits and inspection of land disturbances and stormwater improvements takes place to ensure compliance of construction.

*\*It is important to note that private, onsite stormwater improvements receive inadequate inspection due to lack of funding or staff to do these inspections. It is expected that this will become a require function by regulation in the near future. Additional funding for this function may be required by the state/federal regulation.*

## **Buy-out of Flood Prone Properties**

Based on the recommendations of the 1993 Citizens Stormwater Committee, the City and enacted a Voluntary Flood Acquisition Program to prevent future property loss from flooding events. This program includes both removal of structures from flood prone areas and preserving and restoring streams and riparian corridors. The primary benefit of the program is stopping the cycle of repeated flooding of individual homes or entire neighborhoods which leads to lower property values and often dilapidated properties. Over \$10M has been invested since 1994. More than 200 acres have been acquired from voluntary sellers, mostly in or adjacent to the floodplain. Over 200 parcels have been acquired with approximately 150 structures, approximately 75 of these properties were homes located in sinkholes that flooded on a repeated basis. Funding for the program has been matched to leverage approximately \$750,000 in FEMA funds.

Table 1 and Table 2 list the major riparian corridor preservation areas that are used for greenway trails for both the City and County funded projects.

**Table 1: City of Springfield -- Major riparian corridor preservation areas used for greenway trails**

Watershed	Year of Program	Size (acres)	Funding Amount
Galloway Creek	1998, 2003	59	\$425,000 + private funds
South Creek	1998, 2001	72	\$1,390,000
Wilsons Creek	2001	52	\$482,545
Fassnight Creek	2005	4	\$30,200
Jordan Creek	2004	30	\$172,500
<b>Total (10 properties)</b>		<b>211</b>	<b>\$2,500,245</b>

**Table 2: Greene County -- Major riparian corridor preservation areas used for greenway trails**

Watershed	Year of Program	Size (acres)	Funding Amount
Ward Branch	2001, 2002	25	\$1,800,000
<b>Total (15 properties)</b>		<b>25</b>	<b>\$1,800,000</b>

A summary of the flood acquisition program is provided in Table 3. These are part of projects completed by the City and County in the past 15 years. From 2001 to present, a total of 38 houses were purchased by the County due to flooding using Federal, State, and local funding. 22 of these houses were located in the floodplain.

**Table 3. Summary of Flood Risk Reduction Program, Springfield and Greene County**

Flood Risk Reduction Element	City of Springfield	Greene County
<b># of Structures removed in Buy-out program (to date)</b>	163	38
<b># Structures removed, not in floodplain</b>	70	16
<b># Parcels with no structures in Buy-out Program</b>	45	0
<b># of remaining structures with repetitive loss from flooding</b>	5	3
<b># of remaining Structures with repetitive loss, not in floodplain</b>	3	2
<b>Amount spent to date</b>	<b>\$16,000,000</b>	<b>\$5,000,000</b>

### National Flood Insurance Program Participation

Springfield and Greene County participate in the National Flood Insurance Program (NFIP). The benefits to the community for this participation include:

- Property owners are able to purchase NFIP flood insurance policies with premiums backed by the federal government.
- Federal grants or loans administered by Federal agencies such as the Department of Housing and Urban Development, Environmental Protection Agency, and Small Business Administration are available even in identified flood hazard areas.
- Federal disaster assistance for flood damage may be provided to repair insurable buildings located in identified flood hazard areas.
- Federal mortgage insurance or loan guarantees, such as those written by the Federal Housing Administration and the Department of Veteran Affairs, are provided in identified flood hazard areas.
- Federally insured or regulated lending institutions, such as banks and credit unions, are allowed to make conventional loans for insurable buildings in flood hazard areas.
- The community is eligible for Federal grants and loans for economic development and disaster assistance from other natural disasters.

### Flood Prone Areas

Initial flood hazard boundaries were identified for the City and County in 1974 and 1978, respectively. The first Flood Insurance Rate Maps (FIRMs) for the City of Springfield were completed on July 3, 1978. They were used for informational purposes until the City joined the NFIP in 1989, passing a floodplain ordinance and adopting the maps. Greene County adopted their first FIRMs on June 15, 1983. In order to participate in the NFIP, the City and County had to adopt stringent requirements regarding development in the floodplain. The difference in development standards for floodplain properties can be seen in *Figure 3*.

The current FIRMs, adopted December 17, 2010, were a cooperative effort between the City and County to convert paper maps to a seamless county-wide digital map. Both entities joined the Cooperating Technical Partners (CTP) program as a part of this process. The



Figure 3. Development Standards for Floodplain Properties

City of Springfield is one of only three cities in Missouri participating in the CTP program. Greene County is one of only two Missouri counties participating. Several streams in the City of Springfield were restudied as a part of this mapping process. These streams were restudied using more accurate 2-foot ground contours and much more detailed computer models to greatly improve the accuracy of the maps. The City adopted a 2-foot freeboard, meaning building floors must be elevated 2 feet above the flood elevation. This exceeds FEMA minimum requirements and provides a greater level of safety for new structures in the City.

### **Flood Insurance Policies**

Repetitive loss properties are tracked by FEMA for informational and planning purposes. FEMA defines a repetitive loss property as: "any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling ten-year period, since 1978. At least two of the claims must be more than 10-days apart but, within ten-years of each other. A repetitive loss property may or may not be currently insured by the NFIP." There are only five repetitive loss properties remaining in the City of Springfield and three repetitive loss properties remaining in the unincorporated portion of Greene County. The low number of repetitive loss properties may be attributed somewhat to the purchases made by the City and County but also may be related to the lack of flood insurance coverage in this area.

There are 172 flood insurance policies in unincorporated Greene County (as of 8/31/2012) having an insured value of \$41,706,000 and a premium of \$109,679. There are 255 flood insurance policies in Springfield having an insured value of \$57,814,300 and a premium of \$181,674. Using averages, a citizen living in the city or unincorporated portion of the county pays \$682 a year for \$233,000 of flood insurance. From 1978 to date, there were 52 flood insurance claims in unincorporated Greene County, of which, 43 were paid a total amount of \$580,935.11. During that same time period, there were 67 claims in Springfield, of which, 55 were paid a total of \$999,619.59. Just for illustration, the average payout in Springfield/Greene County was \$16,128 per accepted claim and 18% of claims were "closed without payment." Since flood insurance is not required by lenders for structures located outside the floodplain, flood insurance policies purchased for properties located outside the floodplain are often an indicator that flooding is a real, or at least perceived, problem.

### **Projects Planned or Underway**

*Table 4* lists nine (9) City projects to be completed in the next 2 years. The total estimated construction cost is approximately \$7 million. At this time, there are no immediate plans for more capital improvements until additional funding is secured. Reserves in the Parks/Stormwater Tax are being used to fund regulatory requirements through Fiscal Year 2014.

Greene County has no funds available for future capital improvement projects to address flooding.

Table 4. Current City Funded Major Stormwater Projects

Project Name	Funding Source	Completion
Fassnacht Creek Phase 2, Campbell to Jefferson	Level Property Tax	2013
Ward Branch Stream Stabilization/Trail	Parks/Stormwater Tax	2013
Close Park Lake Spillway Stabilization	Parks/Stormwater Tax	2013
Big Urbie Grant Match (flow reduction and treatment)	Parks/Stormwater Tax	2015
Edgewood Drainage	¼ Cent Sales Tax	2013
Golden and Pacific Drainage	¼ Cent Sales Tax	2013
Cooper Park Detention Expansion	¼ Cent Sales Tax	2014
Grand and Holland Drainage Phase 1	¼ Cent Sales Tax	2014
Renew Jordan Creek Detention Phase 1	Level Property Tax	2014

In terms of flood damage and risk reduction, what still remains to be accomplished?

**Watershed and Stormwater Master Planning**

Many communities such as Kansas City, St. Louis and Tulsa have developed watershed master plans throughout their cities to prioritize and plan for future expenditures. In the past, the City has typically maximized limited funding by using nearly all available funds for capital improvements, addressing the many severe flooding problems that existed 20 years ago. Today, the most severe problems are not so obvious. While many streets and properties still suffer from regular flooding, the remaining problems are not demanding the urgent attention to the degree that was after floods in 1993 and 2000 and others. This, combined with the increasing needs for infrastructure replacement and water quality protection, points to the need for more planning than in the past, emphasizing efficient and effective use of funds to complete prioritized projects.

Following are examples of focus tasks for watershed planning:

- Establish high priority riparian corridor areas, both planning ahead in developing watersheds and retrofitting developed watersheds.
- Prioritize remaining flood-prone areas for action, by either flood acquisitions or capital improvements.
- Develop BMP strategies to address watershed-specific impairments and identify opportunities to retrofit areas with water quality BMP's.
- Complete condition assessments on all stormwater facilities within the drainage system.

## Unfunded Capital Project Needs

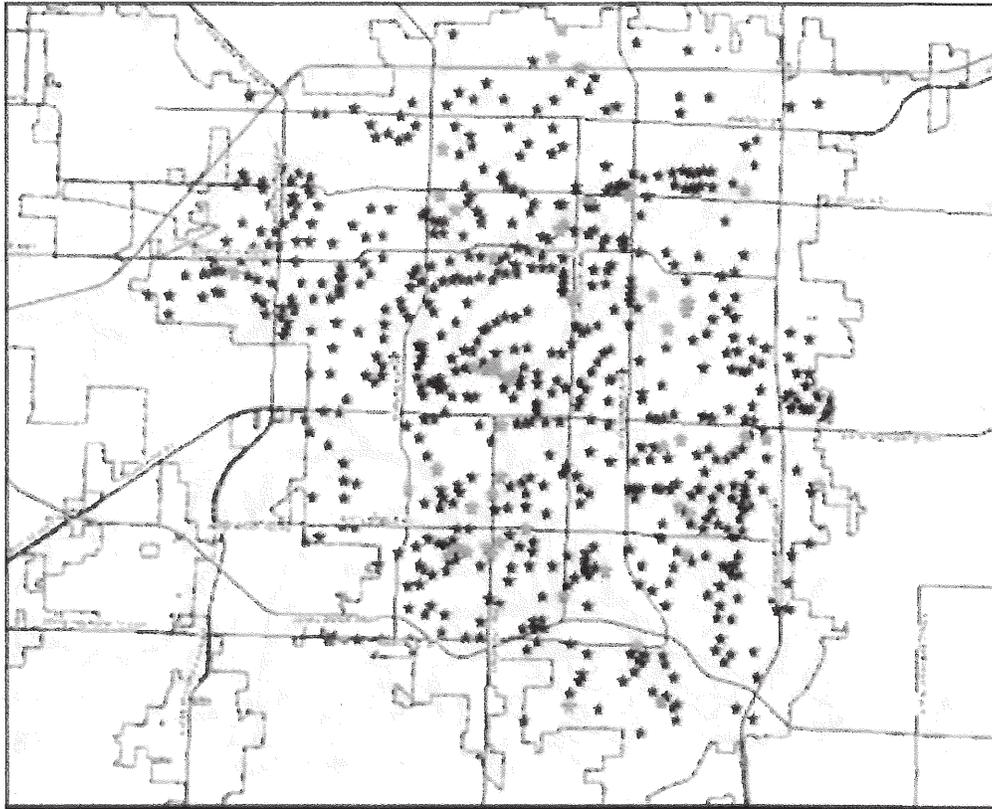
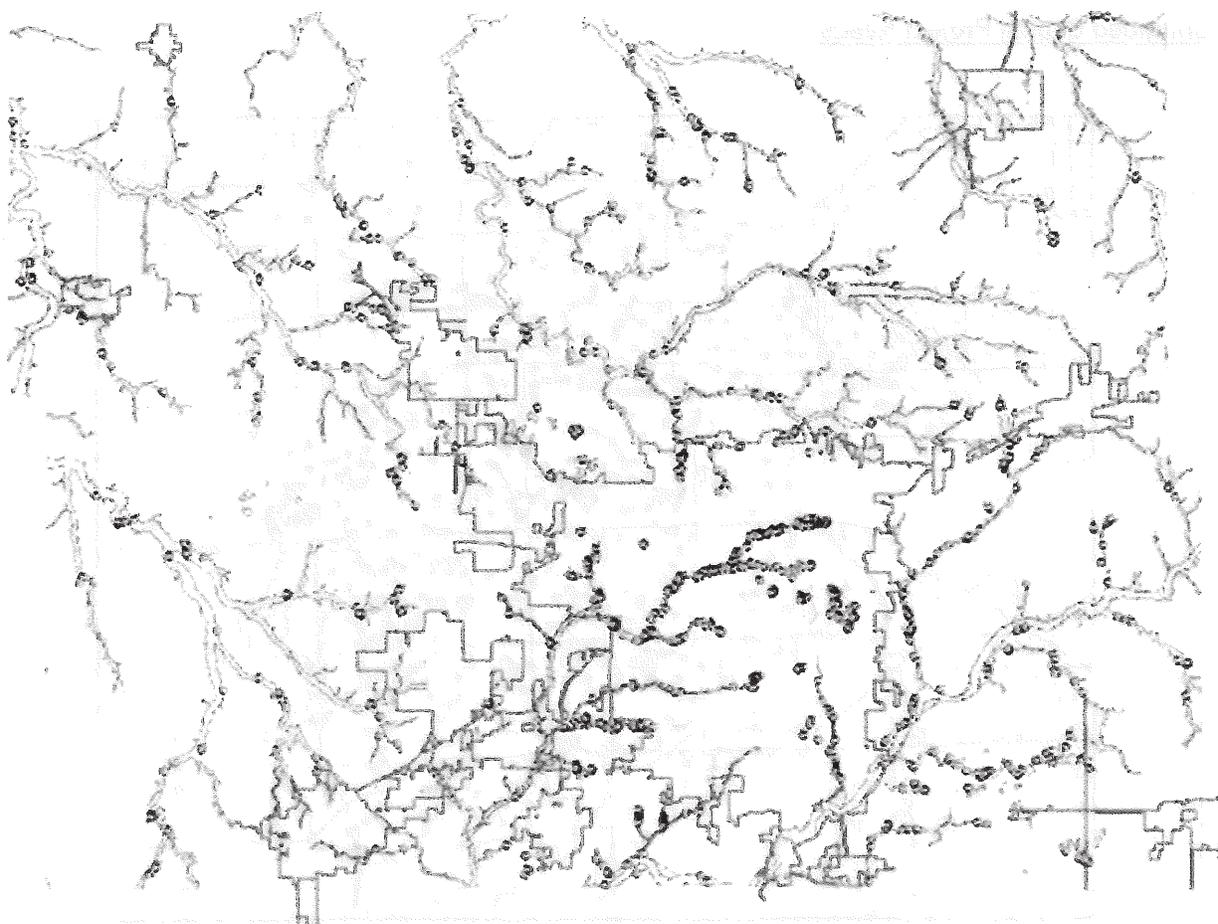


Figure 4. City Unfunded Needs List

*Figure 4* shows projects on the City Unfunded Needs List, developed several years ago. There were a total of 660 projects with a total cost of about \$700 million. It was developed from records of areas of known flooding, many reported after the 1993 and 2000 floods, and other known flood-prone areas. A recent review and update of the data has found that about 50 of these project areas (in blue) have been constructed or have funding for construction, reducing the unfunded needs list by about \$50 million.

In a report prepared for the Water Quality Funding Work Group in April, 2005, the County identified \$25 million in priority projects affecting 100 frequently flooded homes and 300 homes with frequent property damage. This list has not been further refined due to the lack of funding. Citizen complaints regarding flooding continue to be recorded and damage assessments are performed following each flood event.



**Figure 5. Greene County Structures in the Floodplain**

*Figure 5* illustrates the structures in the floodplain in all of Greene County including the City of Springfield. In July 2009, Greene County identified 329 residential (1-4 family) structures and 513 other structures located in the floodplain. Since that time, one house in the floodplain burned and was rebuilt outside the floodplain, three houses and one outbuilding were purchased and demolished by the County, and 64 houses were removed from the floodplain by Letter of Map Change using information provided by the County.

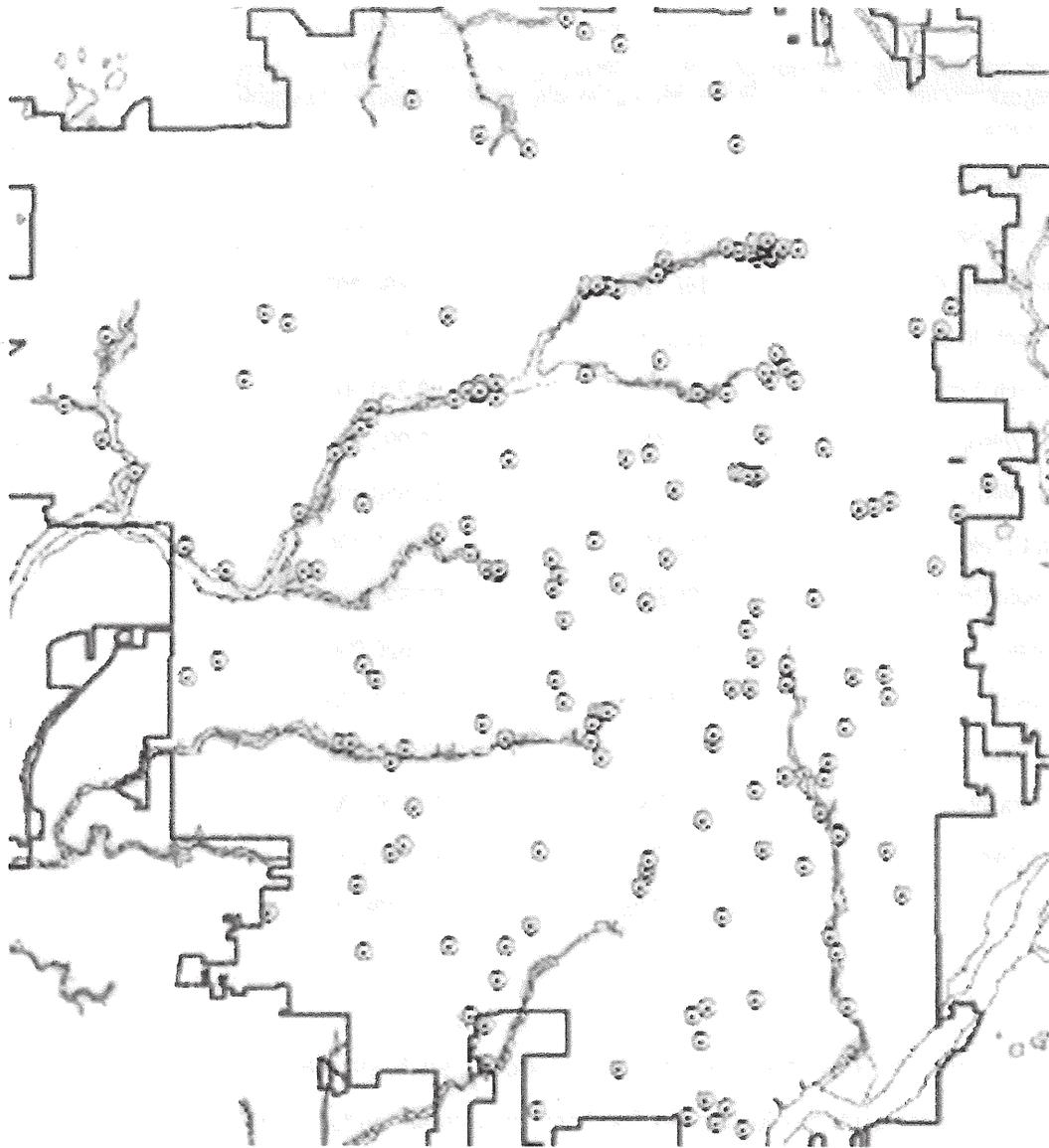


Figure 6. Properties with Flood Insurance (Springfield)

Figure 6 is a map showing the properties that have purchased Flood Insurance from the National Flood Insurance Program in the City of Springfield. Some of these properties are outside of the mapped floodplain which indicates that there is flood damage outside of the mapped floodplain.

**What are the Unfunded Stormwater Improvement Projects that could reduce risk?**

The City and County continue to work towards risk reduction for high precipitation events. Table 5 highlights two major projects (Lower Jordan Creek & Fasnicht Creek.) on City of Springfield's list that result in high priority flood risk reduction.

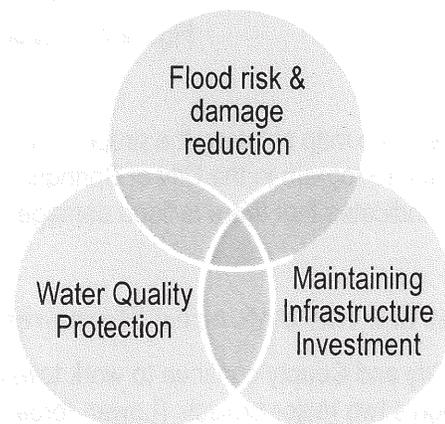
Table 5. City Unfunded Stormwater Improvement Needs in Springfield with Flood Reduction Elements

Watershed	Length (feet)	Estimated Cost (dollars)
Spring Branch	17,421	6,970,000
Pea Ridge Creek	62,310	22,930,000
South Dry Sac	15,300	6,550,000
Lower Jordan Creek	148,782	74,560,000
N. Branch Jordan Creek	80,836	51,540,000
S. Branch Jordan Creek	1,647,000	80,200,000
Upper Wilson Creek	196,452	76,296,000
Lower Wilson Creek	52,100	20,850,000
South Creek	145,160	58,870,000
Fassnight Creek	186,875	89,520,000
Galloway	192,615	89,620,000
Thompson	36,900	13,740,000
Inman Creek	61,902	27,200,000
Ward Branch	111,700	48,820,000
James River	75,975	44,360,000
<b>Totals</b>	<b>3,031,328</b>	<b>\$712,026,000</b>

**Where should the community focus its flood risk & damage reduction efforts?**

In the past, our community has focused its flood risk and damage reduction efforts on projects that reduce structure flooding and severe street flooding.

Property damage is the second priority. Many communities are now focusing on projects that also protect water quality and reinvest in maintaining the existing system. These types of projects produce multiple benefits to the community as shown as the intersection of the three areas in Figure 7.



**Example Multi-Benefit Projects**

*Renew Jordan Creek*

The Renew Jordan Creek is a City-driven project to continually enhance and restore the creek that runs through the heart of Springfield. It encompasses several miles of stream and will address some of the city's most impacted waterways. The project includes new bridges, stream restoration and regional detention basins for flood

control. *Figure 8* shows the Jordan Creek watershed and the location of proposed improvements along the waterway.

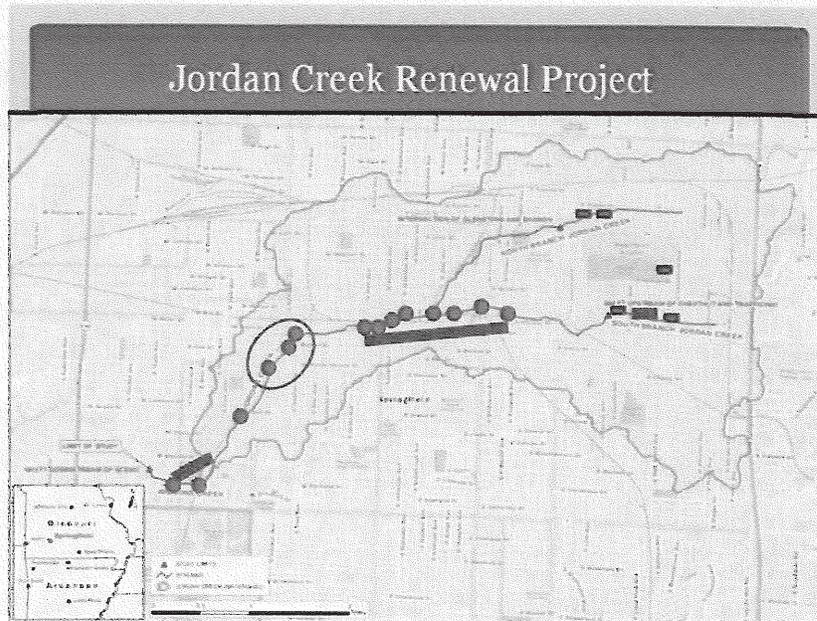


Figure 8. Jordan Creek Renewal Project

An important component of stream restoration through old industrialized areas is to clean up contaminated area near the creek and establish a clean buffer zone. *Figure 9*, *Figure 10* and *Figure 11* show the West Meadows area in the early 20<sup>th</sup> century with Jordan Creek meandering through it and the West Meadows today after restoration of its floodplain.

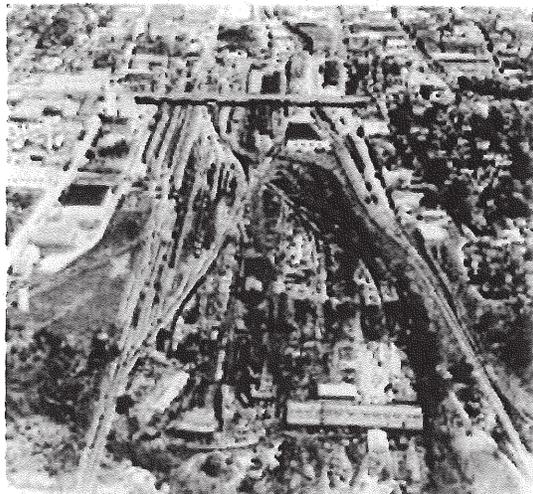


Figure 9. West Meadows Area



Figure 10. West Meadows Area

Nearly \$10 million has already been invested in Renew Jordan Creek using local, state and federal funds. Improvements include stream restoration projects, floodplain property acquisition, environmental cleanups and preliminary design work.



Figure 11: Jordan Creek Restoration

It is vitally important to make Renew Jordan Creek a community-driven project and meet multiple quality of life objectives. This rendering near the developing MSU downtown campus shows how daylighting the creek from its culvert across downtown could open opportunities for park-like landscaping, public gathering places, water quality protection, habitat improvements and even incorporation of public art. The community will help determine exactly what Renew Jordan Creek looks like.

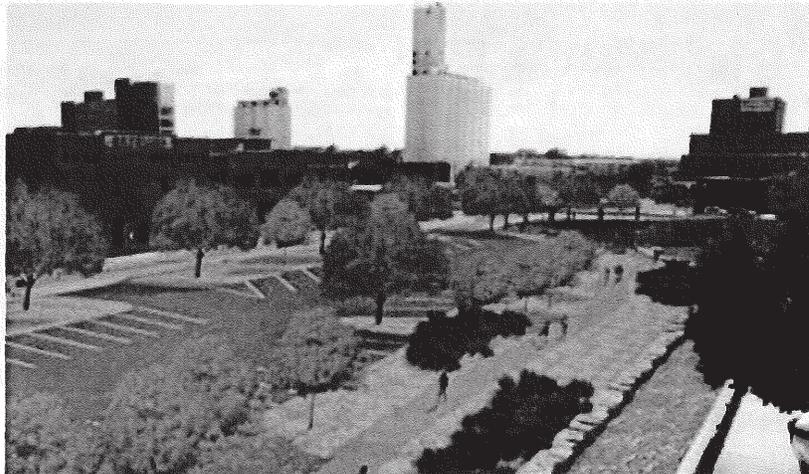


Figure 12. Jordan Creek Flood Control Feasibility Study

There are multiple community partners being developed and numerous local and non-local funding sources being explored to continue the project for years to come. Cost estimates for all of the improvements are near \$100 million. It is hoped that with all levels of public and private investment over several years, Renew Jordan Creek will become one of many outstanding community assets in downtown Springfield.

### Fassnight Watershed Projects

An important consideration when developing prioritized capital improvements program is the approach of hard infrastructure vs. soft infrastructure. Many of our minor waterways that are tributary to major waterways such as Jordan and Fassnight Creeks, were enclosed many years ago and neighborhoods built on top of them. Today, these systems typically suffer from inadequate capacity, deteriorating conditions and are transporting flow and pollutants downstream very efficiently, causing harm to the major stream. A hard infrastructure approach replaces and adds to these systems more structures with greater flow capacity, continuing to harm receiving streams. A green approach uses opportunities to restore waterways to increase capacity, but also provide flood storage and water treatment to help protect downstream receiving waters. This approach can provide community space for recreation. The concepts below show a flood-prone area tributary to Fassnight Creek with these two options. The initial cost of the soft approach is generally less, regular maintenance is higher, but long-term life cycle replacement is lower. These concepts and approaches to projects will be discussed in more detail at the meeting.



Figure 13. Existing Conditions Map

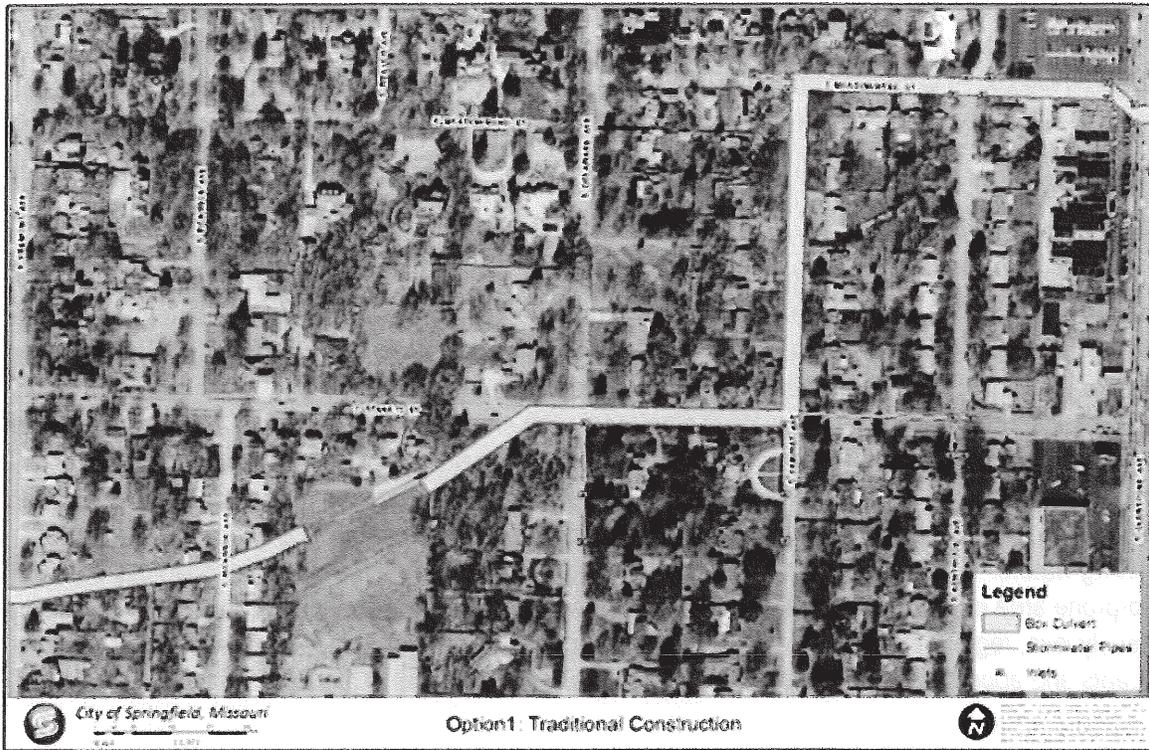


Figure 14. Traditional Construction Option 1



Figure 15. Linear Park Option 2

## What is the financial outlook for stormwater management in our community?

### Financial Forecast

Tables 7 and 8 show the decline in revenue Springfield and Greene County is facing for their stormwater management programs.

Table 7. Financial Forecast for City of Springfield Stormwater Revenue

Revenues	2012	2013	2014	2015	2016	2017
Level Property Tax	\$2,000,000	0	0	0	0	0
General Fund (current level)	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
Parks/Stormwater Sales Tax	\$2,000,000	0	0	0	0	0
Capital Improvements Sales Tax	\$1,000,000	\$1,000,000	0	0	0	0
Payment in Lieu of Detention	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
Federal/State Funds	\$300,000	\$200,000	\$200,000	0	0	0
Cash reserves	\$2,000,000	\$2,000,000	\$1,000,000			
<b>TOTAL REVENUES</b>	<b>\$7,900,000</b>	<b>\$3,800,000</b>	<b>\$1,800,000</b>	<b>\$600,000</b>	<b>\$600,000</b>	<b>\$600,000</b>

Table 8. Financial Forecast for Greene County Stormwater Revenue

Revenues	2012	2013	2014	2015	2016	2017
General Fund (current level)	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000
Parks/Stormwater Sales Tax	\$1,100,000	0	0	0	0	0
Cash reserves	\$500,000	\$500,000	\$500,000			
<b>TOTAL REVENUES</b>	<b>\$1,850,000</b>	<b>\$750,000</b>	<b>\$750,000</b>	<b>\$250,000</b>	<b>\$250,000</b>	<b>\$250,000</b>

## NEXT STEPS

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What are the next topics for the Task Force to consider?

Meeting #3 – Water Quality & Environmental Compliance.

Meeting #4 – Maintain Infrastructure Investment in Existing System.



# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force Meeting



**Date:** Thursday, December 13, 2012  
5:00 to 7:00 p.m.

**Location:** Public Safety Center  
330 West Scott Street  
Springfield, Missouri 65802

**Map to meeting  
site on page 2**

### Meeting purposes:

- Select guiding principles to assist the Task Force members to guide the recommendations developed.
- Provide background on Water Quality & Regulatory Compliance.

## AGENDA

5:00 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:15 p.m.	Task Force Survey	Sheila Shockey, Shockey Consulting
5:50 p.m.	Water Quality & Regulations	Carrie Lamb, City of Springfield Kevin Barnes, Greene County
6:15 p.m.	Task Force Discussion	Sheila Shockey
6:45 p.m.	Next steps - Information needed for upcoming meetings	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:00 p.m.	Adjourn	

*In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.*

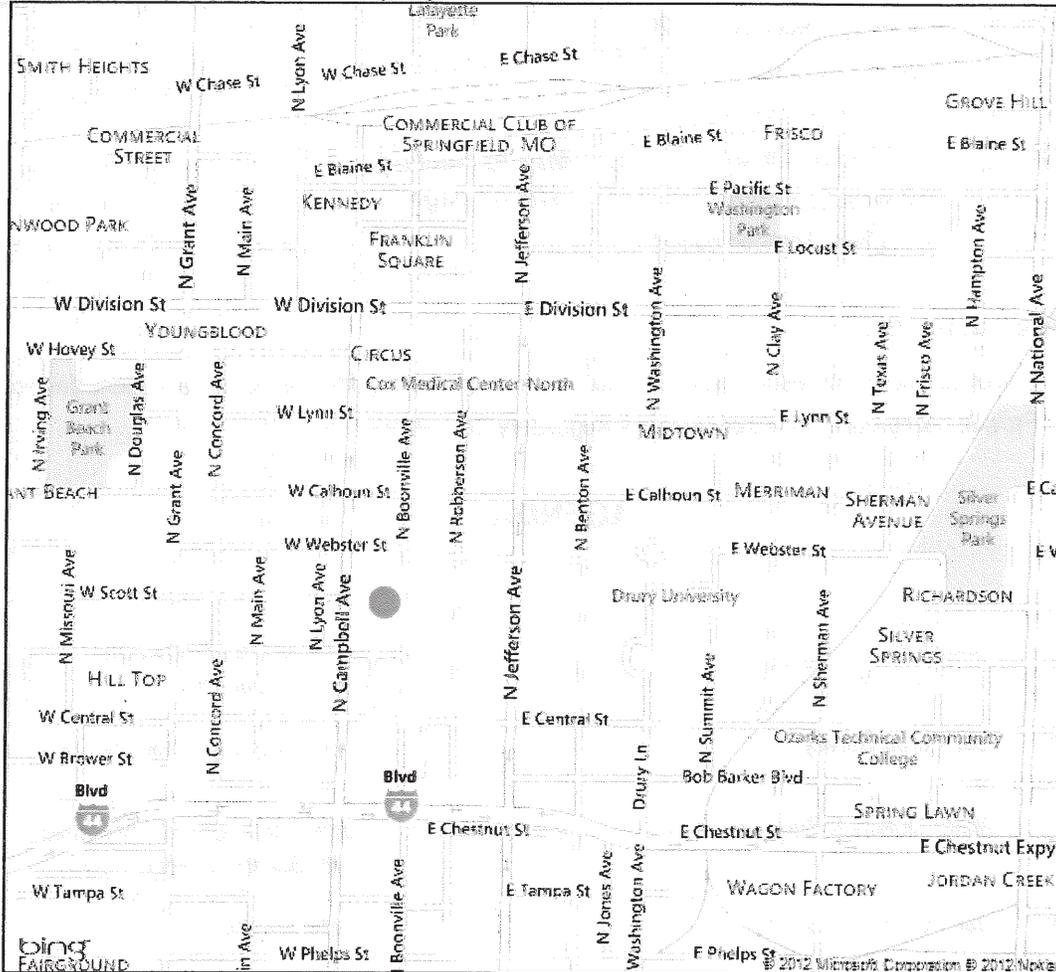
### Handouts:

1. Task Force Meeting #2 Draft Meeting Notes pages 4-9
2. Water Quality Protection & Regulatory Compliance pages 9-26
3. Task Force Survey #2 Results pages 27-32

**Meeting Site:**

Public Safety Center  
330 West Scott Street  
Springfield, MO 65803

**For assistance call (417) 864-1901 or (417) 818-6091**



**Directions:**

*From the North: Travel south on N. Kansas Expressway to Chestnut Expressway. Turn left or east and travel to North Booneville Avenue. Turn left and proceed 3 blocks to Scott Street. The Public Safety Center is on your left.*

*From Highway 65: Take the Division Street exit. Turn west (right if coming from the north, left if coming from the south) and travel to Booneville Avenue. Turn left and travel about 5 blocks to Scott Street. The Public Safety Center is on your right.*

*From the west and I-44: Take the Chestnut Expressway east to Booneville Avenue. Turn left onto Booneville Avenue and travel 3 blocks to Scott Street. The Public Safety Center is on your left.*

## Task Force Commitment

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The Stormwater Management Task Force will meet approximately eight times from October 2012 through April 2013. Meetings will be held approximately every three weeks except during the holiday season for up to two hours.

Remaining meeting dates are Thursdays from 5:00 to 7:00 p.m. on:

- January 17
- February 7
- February 28
- March 21 (consider changing to March 28)
- April 4

## Contacts

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Please contact the Project Team whenever you have questions or concerns.

- City Project Team contact  
Todd Wagner, PE, Principal Stormwater Engineer, City of Springfield, Missouri  
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**Springfield/Greene County, Missouri  
Stormwater Management Task Force Meeting #2  
Meeting Notes  
November 15, 2012**

**DRAFT**

**Welcome & Introductions**

The Springfield/Greene County, Missouri Stormwater Management Task Force met in the Greene County Public Safety Center. The meeting commenced at 5:00 p.m.

Co-Chair Fred Palmerton welcomed the committee members, discussed housekeeping items, and asked if there were any objections to the Meeting Notes from October 25 or any additions to the agenda for tonight. None were noted. Each task force member and attendee introduced themselves.

**Task Force**

Stacey Armstrong	Ronda Headland	Matthew Pierson
Matt Bailey	Dan Hoy	Rick Scarlet
Bill Bretall	Jerany Jackson	Daniel Beckman
Geoffrey Butler	Chris Macioce	Fred Schlegel
Eric Dove	Dave Murray	Harlan Hill
Tiffany Frey	Fred Palmerton	Tom DeWitt
Casey Haynes	Brian Perdue	

Absent: Aaron Wahlquist, Karen Spence, Dana Elwell, Patrick Harrington, Patty Hamilton, Erik Fjeseth, Chris Carson, King Coltrin, Andy Hosmer, Tom Kisse

**City and County Staff**

Kevin Barnes	Barbara Lucks	Tim Smith
Vanessa Brandon	Cody Marshall	Todd Wagner
Phil Broyles	Fred Marty	Kimberly White
Chris Coulter	Sheila Shockey	
Carrie Lamb	Jon Williams	

**Community Stakeholders:**

Tammy Trantham  
Amos Bridges  
Emily Austin

Facilitator Sheila Shockey introduced the topic of discussion which was Flood Damage & Risk Reduction and presented the results of the Guiding Principles survey that task force members took after the last meeting. A total of 24 task force members responded to the survey. The results showed agreement on the following survey topics with some of them showing "neutral" responses: Innovation/Planning, Understandability/Public Education, Public Acceptance, Conservation, and Environmental Stewardship.

**Question:** Is there going to be another avenue to get public input besides the task force?

**Response:** We would like the task force's input on the level of public input we should get and how.

The survey results showed some disagreement on the following survey topic: Public Benefit

**Comments:**

There was discussion about rewording the Public Benefit guiding principle.

- The benefit doesn't need to be to me personally, but to the community as a whole.
- Public won't actually be able to see the benefit from maintenance of underground system.
- We need more education of the public about the benefits and should focus on tangible benefits such as greenways.
- Perception is important. The public should perceive a benefit from their investment.
- Sometimes the benefit is the absence of something, such as no flooding.

There was general agreement to change the wording. Instead of "the public should see benefits", it should say "the public should benefit from."

Sheila Shockey summarized the members' comments that were received in the survey about the biggest stormwater challenges. The comments generally fit into the following areas:

1. Public education about stormwater issues and water quality
2. Policies that allow sustainable development
3. Aging infrastructure
4. Effective technology and Best Management Practices(BMPs) for maintenance and water quality
5. Funding

Sheila asked if there were any additional challenges not submitted in the surveys.

**Comments:**

- A challenge is that the public is sometimes uncomfortable with new methods of managing stormwater because of their aesthetics. Educating them about the function may help. An example is a swale with tall native grasses. The perception is that it's just not being mowed, when in reality it's intentional because the grasses are providing a function.
- A lot of the public is just not interested in stormwater. How do you reach them and get them to vote.
- Who will be educating them?

- Even if you educate them about the benefits, they still may not want a naturalized or native landscape because of the way it looks. Need design flexibility for them.
- The public needs to be educated that stormwater is not an isolated issue, it is connected with economic development and public health.
- Stormwater funding has other competing needs such as public school system and traffic.
- Who should be the messenger in educating the public -- government or non-profits? Sometimes there is suspicion of government.

*Sheila asked what are the challenges related to funding?*

**Response:** Getting people to vote for it.

**Response:** Promise of no new taxes for five years.

**Response:** Those at the top of the hill don't perceive that there is a problem and that they are contributing to it. Convincing them that their share in funding the needs is equitable to their contribution to the problem.

**Response:** The wish list is overwhelming and we can't fund all of it. We need to figure out what we should fund and how. Life safety and mandates should be priorities. Prioritizing the list is where we should start.

**Response:** What are the challenges to reallocating existing taxes/funds that are being spent on other things to fund stormwater? Is there a mechanism to do that?

**Response:** A challenge is not creating new problems. I know people who didn't use to have flooding problems and now they do because of new development upstream.

## **Presentation on Flood Damage & Risk Reduction**

Todd played a KSPR TV news clip from a 2009 flood at Chestnut & National. He explained what the City and County are doing to address flooding and prevent new problems from being created. This includes ordinances/regulations/standards, good planning, acquisition of flood properties, participation in the National Flood Insurance Program (NFIP), and building improvements. He explained that unlike water quality which is strictly regulated by federal/state law, the state laws related to flooding are based on "Reasonable Use" and case law. Cities establish ordinances/standards that are reasonable and we look at the national standard of practice to do that.

The City/County requires stormwater detention. There are 4 progressive levels: Flood Control, Channel Protection, Water Quality, and Low Impact Development (LID). Currently, the City and County require the first three and LID is voluntary. The first three address peak flow and water quality but do not address stormwater volume. LID addresses stormwater volume. Todd gave a local development example where it is being voluntarily implemented to prevent downstream flooding in a sinkhole area. Todd described the standards and common design storms for each of these 4 levels and how they affect peak flows and volume compared to pre-development runoff on a hydrograph. The City/County are both facing the following future requirements which are largely being driven by federal/state water quality regulations but will affect our flood control/detention requirements as well: Redevelopment standards, LID, BMP construction inspections, and long-term BMP operation and maintenance.

Our practices related to good planning at the site and watershed level include applying codes/regulations, development review, permits and inspections. Planning at the watershed level has been limited but may become more important if our focus is on building projects that address multiple issues.

**Question:** What scale and partners would you use for watershed planning?

**Response:** Some might be small-scale for watersheds wholly within the city limits but we may look at a larger scale that would involve Greene County and perhaps Christian County.

**Question:** Would those plans be different than the EPA 9-element watershed plans?

**Response:** Yes, they would be more specific and address the three elements we are talking about – flood damage & risk reduction, water quality, and infrastructure maintenance.

Todd discussed flood acquisitions, explaining that over \$10 million had been expended on purchasing flood prone properties and floodplain/riparian corridors for trails.

Kevin Barnes explained that NFIP is an insurance program that the City and County have participated in since the 1980s. It requires that municipalities adopt and enforce a floodplain ordinance. By participating, any citizen is able to buy federally-backed flood insurance regardless of what flood zone they are in. The maps were updated in 2010 and the City and County have helped affected citizens with elevation certificates and Letters of Map Amendment.

Todd discussed building improvements to address flooding and showed a list of major projects that are currently funded with remaining funding sources and reserves. What remains to be accomplished includes:

1. Federal/state water quality requirements for volume reduction, redevelopment, and BMP inspections/maintenance are anticipated or proposed and we will need to adopt ordinances to address those. A stream buffer ordinance is not anticipated to be a requirement but is a good practice that we would like to see and is common in other areas.
2. Watershed master planning to identify riparian areas for protection, flood-prone areas to be addressed, maintenance needs, and areas to retrofit for water quality.
3. Continued acquisition of floodplain structures, continued pursuit of FEMA grants, and more education of public about flood risk and insurance.
4. Continuing to address services requests related to flooding in a prioritized way. It is estimated that 400 of 4,100 requests have been fixed. Our latest assessment of unfunded needs after removing what has been fixed is \$650 million.

Kevin discussed that the County's 2005 estimate of unfunded needs was \$25 million. We don't have updated figures at this time.

Todd discussed the Renew Jordan Creek project and an area of Fassnight Creek that floods as examples of projects that could be designed in a way that addresses all three objectives of flood damage & risk reduction, water quality, and infrastructure maintenance, while reducing project cost.

Todd showed a graph of the City's annual stormwater funding from 1995-2013 and its decline to current minimal levels.

## Open Discussion

**Question:** What's being done to address Infiltration/Inflow of stormwater into the sanitary sewer which causes backups into homes?

**Response:** At the recommendation of the Wastewater Task Force, sewer rate increases were recently passed to fund the City's consent judgment to address this issue. It is a \$50 million program over 7 years is currently underway including lining sewer pipes, fixing leaky manholes, and disconnecting private downspouts and sump pumps from the sewer.

**Comment:** It's good to have flood insurance no matter where you live because flooding can occur from blocked culverts, etc. and homeowners insurance doesn't cover it.

**Question:** What is the best direction to go for funding?

**Response:** Options are property tax, sales tax, and user fee. Many programs use a combination.

Sheila asked the members what things we should do going forward.

**Comment:** More signage at street crossings which are prone to flooding should be installed.

**Response:** We only have 1 bridge in the City with a sign. It's the Bennett Bridge at Fassnight Creek which floods pretty frequently. The frequency at other crossings is so low that the public may not take signage seriously.

**Comment:** We should acquire more properties since it is usually a lower cost solution than building a project that would protect the property.

**Question:** What is the average age of homes that flood?

**Response:** 1920s-1960s

**Question:** Why do we have to do anything to address those? It's been happening for years.

**Response:** One consideration is reduction in property values from repetitive damages.

**Comment:** In some cases, maybe they didn't used to flood. It was brought on or worsened by development upstream.

**Comment:** There are public health issues with flooding.

**Comment:** It's better to address our flooding problems locally rather than being reactive to disaster and need federal aid.

**Comment:** Some homes obviously should not have been built there in the first place.

**Comment:** Property owners may have purchased without knowledge of flooding issue because there was a lack of disclosure.

**Comment:** It's an issue of public welfare.

**Comment:** It's a question of community ethics. Government's purpose is the protection of human health, safety and welfare.

**Question:** Is there a way to incentivize good behavior?

**Response:** There is a rain barrel rebate program but the community would need a lot of rain barrels to make a difference.

**Response:** Larger scale rainwater harvesting at each house would help but is expensive.

**Response:** There is a way to use incentives through a stormwater utility but it would have to be above and beyond what is required.

**Response:** That doesn't address existing development.

**Response:** These are community problems with a regional scope. We all live downstream. Blighted homes are a problem for future generations.

**Response:** We need staff to help us understand mandates as part of prioritizing the wish list.

**Comment (Sheila Shockey):** We will talk more about mandates and water quality at the next meeting, followed by infrastructure maintenance, and more about funding options.

Meeting adjourned at 7pm.

## Water Quality & Regulations

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Managing stormwater quality is important in protecting our area water resources for drinking water supply and recreational uses that are so vital to our regional economy. Not only must stormwater quality be protected for public health, quality of life and our regional economy, it is also regulated through implementation of the federal Clean Water Act (CWA). Federal and state regulations specify what communities must do in an effort to minimize the potential negative impacts of stormwater runoff on the quality of waterways. Non-compliance with federal and state rules can result in costly legal actions against the City or County.

### What are the City and County doing to meet regulations and protect water quality?

Springfield and Greene County have a history of commitment to water quality protection through proactive efforts, citizen-driven planning and priorities, and ongoing support and partnerships with local non-profit watershed groups.

### What waterways are we trying to protect?

Springfield is located on top of a major watershed divide. The area south of about Division Street drains south into the James River (Figure 1) which flows into Table Rock Lake and the White River into Arkansas, and then into the Mississippi River. The area north of this line drains north to the Sac River (Figure 2) which flows into Stockton Lake and the Osage River system, which drains to the Missouri River in central Missouri, and eventually into the Mississippi. Within the larger James River and Sac River watersheds are many smaller streams that feed into them such as Wilsons Creek, Pearson Creek and Galloway Creek to the south, and Pea Ridge Creek and South Dry Sac to the north.

City Utilities public drinking water supply comes from surface water and groundwater from the following sources: Fellows Lake, McDaniel Lake, Stockton Lake, Fulbright Spring, deep groundwater wells, and the James River. Managing stormwater quality is important in protecting the quality of these drinking water sources. Stormwater management techniques such as rainwater harvesting can but also help conserve our drinking water supply. In addition to drinking water protection (both quality and quantity), managing

stormwater quality is important to ensure the quality of our waterways for fishing, swimming, boating, and other recreational uses. These water-related activities are primary drivers of the tourism industry that contributes greatly to the economy in the Ozarks. Table Rock Lake is a tremendous draw for tourists who desire a clear, clean lake for recreation. According to the Corps of Engineers, Table Rock Lake draws over 5 million visitors a year who spend over \$50 million while they are here. Because the James River flows into Table Rock Lake, the quality of water leaving the Springfield/Greene County area can have a direct effect on the tourism industry.

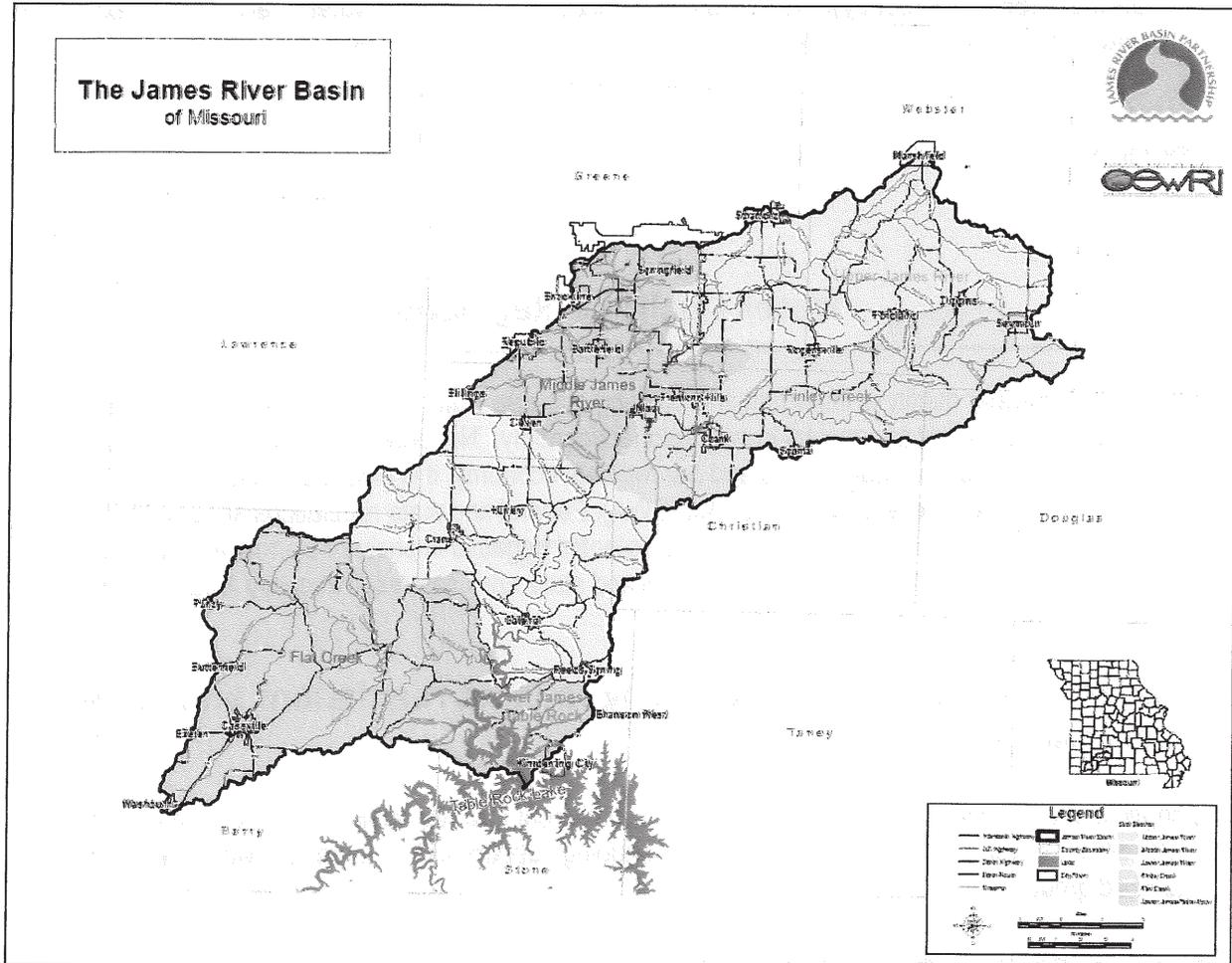


Figure 1: James River Basin

### What are the Clean Water Act and the MS4 Permit?

The federal Clean Water Act (CWA) regulates the discharge of pollutants to waterways and sets water quality standards to protect them. The National Pollutant Discharge Elimination System (NPDES) program was established under the CWA to address “point” sources of pollution, including both wastewater and stormwater discharges. Regulated point sources include wastewater treatment plants, industries, construction sites, and municipal separate storm sewer systems (MS4s). Under the NPDES program, cities and counties across the nation are required to operate under an MS4 permit which requires the development and implementation of a program to address the water quality impacts of stormwater runoff. In most states, the federal Environmental Protection Agency (EPA) delegates its regulatory authority for the NPDES program to the state. In Missouri, the Department of Natural Resources (DNR) issues and enforces NPDES permits, including MS4 permits.

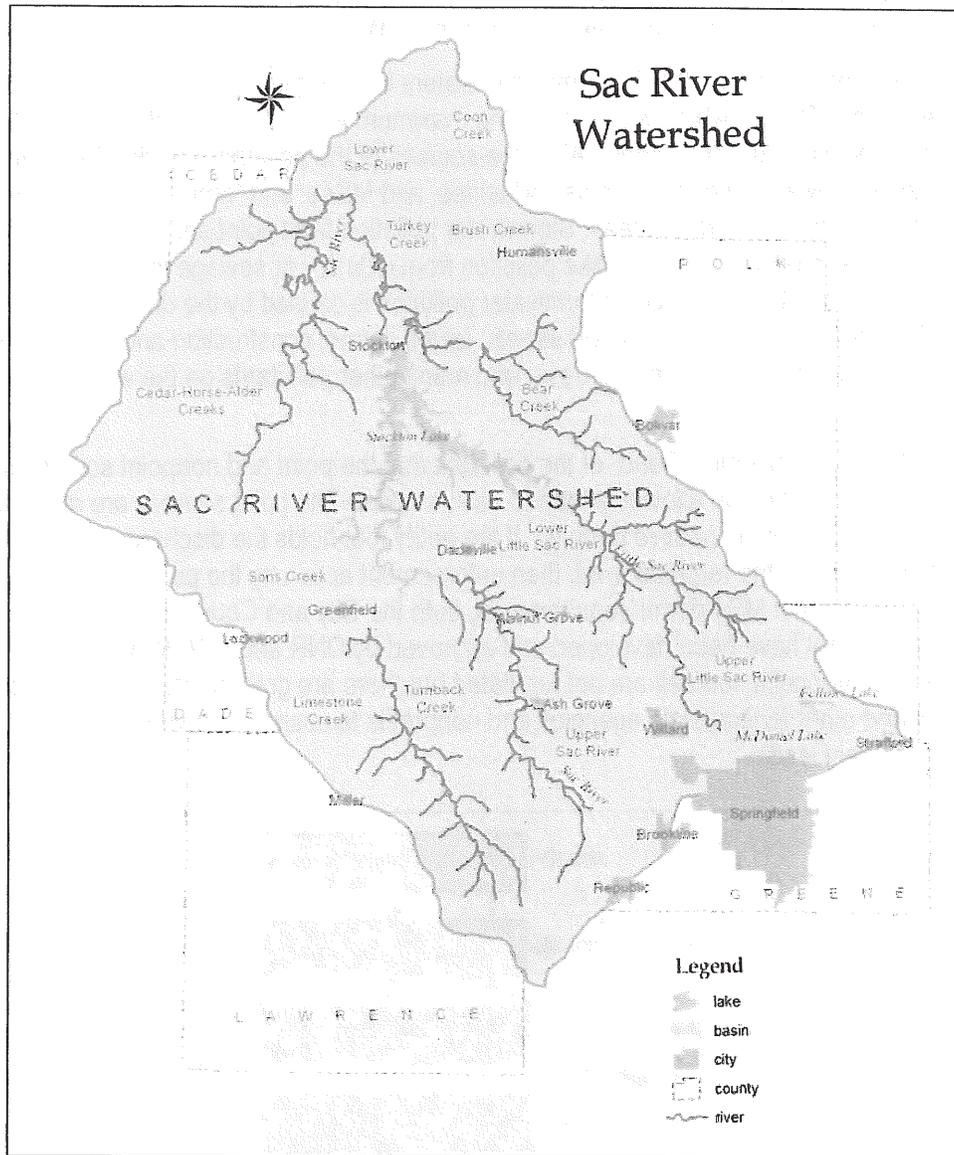


Figure 2: Sac River Basin

**What is a Total Maximum Daily Load (TMDL)?**

The CWA contains a step-by-step process (Figure 3) to ensure waterways in the U.S. are clean and healthy. Initially, the “beneficial uses” of a waterway are determined, which might be such uses as drinking water supply, aquatic life protection (fish, macroinvertebrates), and/or recreation (swimming, boating). Water quality standards are then developed to protect those beneficial uses. In Missouri, DNR establishes the beneficial uses of waterways and the corresponding water quality criteria to protect those uses, and is also responsible for determining if a waterway is not meeting those criteria. This is usually determined through water quality sampling that shows a specific pollutant (metals, bacteria, phosphorus) exceeds the numeric water quality criteria. However, there are also narrative water quality criteria, and a waterway may be determined as not meeting these narrative criteria due to conditions such as algae blooms or turbidity that affect beneficial uses such as recreation and fishing. A waterway that is not meeting the water quality

criteria for its designated beneficial uses is put on the State's "impaired waterways" list, also known as the 303d list, which refers to the section designation within the CWA.

Once a stream segment is put on the 303d impaired waters list, the next step is to develop a Total Maximum Daily Load (TMDL), which is a study of the maximum amount of the pollutant that the stream can handle and meet the water quality criteria. All of the sources of the pollutant are identified, including "point" sources such as wastewater treatment plants, industries, and MS4s, and "nonpoint" sources such as agriculture and runoff from suburban areas. Stormwater pollution from point sources and nonpoint sources is a challenging water quality problem. Unlike pollution from industry or sewage treatment facilities, which is caused by a discrete number of sources, stormwater pollution is caused by the daily activities of people everywhere. Rainwater and snowmelt run off streets, lawns, farms, construction and industrial sites, and pick up fertilizers, dirt, pesticides, oil and grease, and many other pollutants on the way to our rivers, lakes, and coastal waters.

The TMDL establishes a maximum "load" of the pollutant that the point and nonpoint sources can discharge into the stream, and allocates an allowable load to each source. The point sources are required to meet their load limits through their respective permits. If the entity that holds the discharge permit fails to reduce their pollutant discharge to the required level, then enforcement action by the permitting authority (DNR or EPA) can result. As part of MS4 permit requirements, both the City and County must comply with the TMDL requirements that have been developed and approved by DNR and EPA for waterways to which they discharge. The nonpoint sources are not regulated but there are grant funds and cost-share programs that allow DNR and other federal/state agencies and nonprofits to assist landowners with voluntarily reducing their pollutant loads.

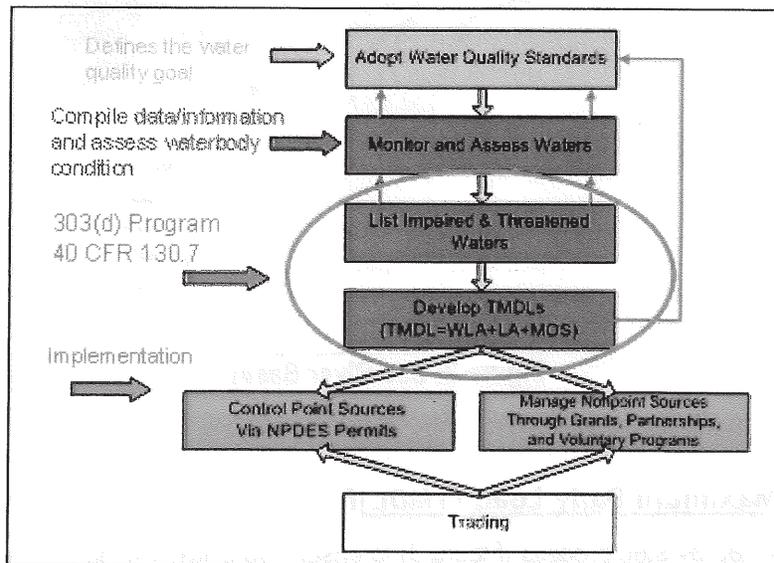


Figure 3: Clean Water Act "Water Quality-Based" Approach to Protect/Restore Nation's Waters  
(Source: <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/intro.cfm>)

Impaired waterways in our area are listed in Table 1. The James River and the Little Sac River were listed as impaired in 1998. The James River was listed as impaired due to excess phosphorus and nitrogen that caused significant algae blooms. The Little Sac River was listed as impaired because the levels of bacteria exceeded the water quality criteria. TMDLs were developed for the James River and the Little Sac River in 2001 and 2006, respectively, with an update to the James River TMDL in 2004. Requirements for

phosphorus removal at wastewater treatment plants in the James River watershed have dramatically decreased the phosphorus levels in the James River. This includes the City's Southwest Wastewater Treatment Plant which implemented phosphorus removal two years ahead of the required schedule. Efforts are ongoing to reduce the amount of phosphorus to the James River from stormwater runoff and agriculture. It is anticipated that numeric water quality criteria for nutrients will be promulgated by DNR in the near future that may be lower than the current target levels in the James River TMDL. This lower number could result in the James River being re-listed, as well as Springfield Lake, Table Rock Lake, and possibly other smaller streams being listed as impaired. The Little Sac watershed is largely rural and runoff from Springfield and the surrounding urbanized areas is estimated to account for only 2-6% of the bacteria in the river. Efforts to reduce bacteria will need to mostly focus on other sources which include springs, livestock, and wildlife. The City and County must address both of these TMDLs as part of their MS4 programs by conducting stream monitoring and focusing education and implementation efforts on best management practices that reduce nutrients and bacteria.

Pearson Creek, Wilsons Creek and Jordan Creek have also been determined by DNR to be impaired. Pearson Creek and Wilsons Creek were listed as impaired in 1998 because the diversity and abundance of macroinvertebrates (aquatic insects) are low compared with pristine streams such as Bull Creek and the North Fork River. Jordan Creek, a tributary of Wilsons Creek, was listed for the same reason in 2008. EPA or DNR must identify a specific pollutant causing the impairment in order to establish a valid TMDL. No specific pollutant was identified for these TMDLs. The TMDLs for these streams, issued by EPA in 2011, focus on stormwater runoff as a "surrogate" pollutant. The TMDLs propose reducing stormwater flows into these streams by about 40% for the 90-95th percentile storm, which is a size of storm that would generally fill a stream channel but is less than flood stage. Based on concerns that the TMDL was legally and technically flawed in its approach, and the potential excessive economic hardship this could place on the City and the citizens of Springfield, the City filed a legal challenge to these TMDLs and is currently negotiating a settlement agreement with EPA and DNR. It is anticipated that after the settlement agreement is finalized, the requirement to address the TMDLs through a process outlined in the agreement will be enforced through the City and County MS4 permits. In addition, Pearson Creek and Wilsons Creek were also listed as impaired by DNR in 2006 because the levels of bacteria exceed the water quality criteria. It is not known at this time what additional impacts that may have on the City and County MS4 permit requirements.

Table 1: Impaired Waterways & TMDL Status in the Springfield/Greene County Area

Waterway	Beneficial Uses	Impairment Pollutant	Pollutant Source	TMDL Status
James River	Irrigation, Drinking Water Supply (above Springfield Lake), Livestock & Wildlife Watering, Protection of Warm Water Aquatic Life, Protection of Human Health-Fish Consumption, Whole Body Contact Recreation (swimming), Secondary Contact Recreation (boating), Cool Water Fishery	Nutrients	Urban Point and Nonpoint Sources (e.g. wastewater treatment plants and stormwater runoff), Agricultural Nonpoint Sources	Issued 2001; Updated 2004
Little Sac River	Livestock & Wildlife Watering, Protection of Warm Water Aquatic Life, Protection of Human Health-Fish Consumption, Whole Body Contact Recreation, Secondary Contact Recreation, Cool Water Fishery	Fecal Coliform	Point and Nonpoint Sources	Issued 2006
Pearson Creek	Livestock & Wildlife Watering, Protection of Warm Water Aquatic Life, Protection of Human Health-Fish Consumption, Whole Body Contact Recreation	Unknown (causing low macroinvertebrate populations)	Unknown	Issued Jan 2011; Complaint filed by City in Sept 2011
		Bacteria	Multiple Point & Nonpoint Sources	Not Yet Issued
Wilsons Creek	Livestock & Wildlife Watering, Protection of Warm Water Aquatic Life, Protection of Human Health-Fish Consumption, Whole Body Contact Recreation	Unknown	Multiple Point Sources & Urban Nonpoint Sources	Issued Jan 2011; Complaint filed by City in Sept 2011
		Bacteria	Point Sources & Urban Nonpoint Sources	Not Yet Issued
Jordan Creek		Unknown	Urban Nonpoint Sources	Issued Jan 2011; Complaint filed by City in Sept 2011

## What is the difference in the City and County MS4 Permit requirements?

EPA implemented the MS4 program in two phases. Under Phase I, cities and counties with a population of 100,000 or greater were required to apply for and obtain their MS4 permit. Springfield is a Phase I community and was the first community in Missouri to receive its MS4 permit in 2002. Under Phase II, the regulations were extended to cities and counties with populations between 10,000 and 100,000, and smaller communities located in census-defined urbanized areas. Greene County is a Phase II community and received its MS4 permit in 2003. Both the City and County MS4 permits require programs to address the following six elements:

- **Public Education and Outreach on Stormwater Impacts** – Educate citizens on what they can do to reduce pollutants in stormwater.
- **Public Involvement** – Actively seek public input on the development of the Stormwater Management Program Plan (SWMP), and consider other public involvement activities such as volunteer stream clean-ups.
- **Construction Site Runoff** – A program that requires erosion and sediment control and other stormwater pollution best management practices (BMPs) on construction sites, and includes plan reviews, inspections, and enforcement.
- **Post Construction Stormwater Management in New Development and Redevelopment** – A program that requires new development and redevelopment projects to address the long term quality of runoff from their property after initial construction is over by using BMPs that provide water quality treatment and/or reduce runoff. The current Phase II permit language requires that developments design their sites to reasonably mimic the pre-construction runoff conditions.
- **Municipal Operations/Good Housekeeping** – Projects undertaken by or for the MS4 regulated community must follow the same regulations they enforce. This element also includes requirements for street sweeping and minimizing pollution that may enter runoff from salt storage, vehicle maintenance, or other municipal operations.
- **Illicit Discharge Detection & Elimination** – Map and routinely inspect the storm drainage system to ensure that pollutants are not being dumped or discharged into it, and investigate and address citizen complaints of pollution.

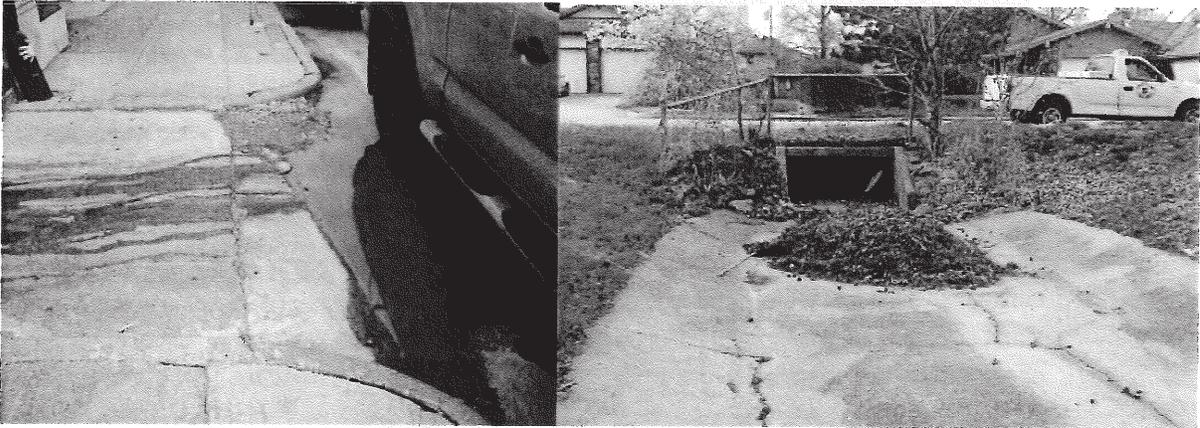
In addition, both the City and County are required to conduct water quality monitoring. Water quality data such as the amount of nutrients, sediment, chlorides, etc. is collected from numerous sites over a long period of time to try and identify trends in water quality. Because the City is a Phase I community, its monitoring requirements are more extensive than the County. The other difference is that the City is required to have a program to address industrial runoff.

The City and County are both required to have a written Stormwater Management Program Plan (SWMP) that describes how each of these components is addressed and includes measurable goals for the program. The SWMP is a dynamic document that must be reviewed and updated periodically. An annual report is also required to be submitted to DNR. The City's annual reports can be found at [www.springfieldmo.gov/stormwater/npdes\\_permit.html](http://www.springfieldmo.gov/stormwater/npdes_permit.html).

## What are we doing to comply?

The following are some of the major City and County efforts and programs to comply with the MS4 requirements:

- City Code Chapter 96 Article II, adopted in 2002, prohibits the discharge of pollutants to the MS4, providing authority and enforcement measures to address illicit discharges and industrial runoff. The County established similar regulations in 2012 by amending Article IV, Section 25 of the Greene County Zoning Regulations to prohibit the discharge of trash and pollutants into the County stormwater system and providing authority to enforce these regulations.
- An average of 30-40 citizen pollution complaints (Figures 4 & 5) are investigated by City staff annually.
- During dry weather, 50 locations/year in the City's stormwater system are checked for illicit discharges (Figure 6). The County screens 95 stormwater discharge locations annually to check for illicit discharges.
- Stormwater samples are collected at 25 locations/year in industrial areas. If results indicate pollution, efforts are made to identify and correct the source through industry inspections and enforcement (Figure 7).



Figures 4 & 5: Pollution & Dumping Complaints



Figure 6: Dry weather screening



Figure 7: Industry inspections and enforcement

- Through City and County contracts with Missouri State University, the chemical and biological quality of the City's urban streams is monitored. The City's program includes collection and analysis of water samples 5 times per year from 12 streams during wet and dry weather, and collection/identification of macroinvertebrates twice per year from two streams. The County's program includes collection and analysis of water samples 5 times per year from 8 streams.



Figure 8: Water sampler in Jordan Creek



Figure 9: Macroinvertebrate sampling in South Creek

- Both the City and County have land disturbance permit programs to minimize the discharge of sediment and other pollutants from construction sites. The County's program has been in place since 1999. The City's program was implemented in 2009 (City Code Chapter 96 Article III). City and County permits are issued for land disturbances of 1 acre or greater. The permitting process for both the City and County requires the property owner to submit a Stormwater Pollution Prevention Plan, which gets thoroughly reviewed by staff before a permit is issued. The property owner must install, inspect and maintain the best management practices. City and County staff also conduct inspections and enforcement on a routine and complaint basis. Education and information is provided to assist the development community with compliance.
- Through the public improvement and building permit process, developments in the City and County are required to design their site using best management practices to provide water quality treatment and/or runoff reduction for the 1" rainfall. Development plans are reviewed and approved for compliance with this requirement.
- The County partnered with Habitat for Humanity on the design and initial maintenance of the Legacy Trails subdivision (Figure 10), which demonstrates low impact development (LID) design. This type of design mimics the pre-construction runoff through a combination of minimizing land disturbance and impervious area, and using best management practices that promote infiltration, evapotranspiration, and rainwater reuse. Reasonably mimicking pre-construction runoff is a requirement that developments in regulated Phase II MS4 communities are supposed to meet. Many communities have begun to require LID designs to meet this requirement. Legacy Trails is a successful attempt to demonstrate how these practices can be utilized in the Springfield/Greene County area.
- The City seeks to use green infrastructure options as part of its capital improvements program. Acquisition and preservation of riparian corridors, replacing and minimizing the use of "hard" infrastructure (concrete channels, pipes) by using green infrastructure such as vegetated channels, and retrofitting detention basins to provide more water quality benefits are all integral parts of the City's capital improvements program. The

Jordan Creek North Branch Daylighting Project is one example, which removed a box culvert and constructed on open channel system with native plants and a greenways trail (Figure 11).



Figure 10: Legacy Trails subdivision

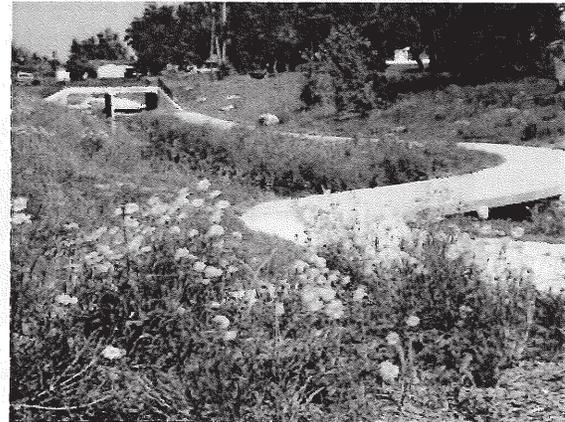


Figure 11: Jordan Creek North Branch

- The City conducts street sweeping and storm drain grate cleaning to remove accumulated trash and debris from the streets before it enters the stormwater system. The Greene County Highway Department also conducts sweeping of county roads within the Urban Services Area.
- Plans have been developed and implemented to ensure that good housekeeping and other best management practices are in place to minimize pollution from City and County operations and facilities, including the construction of a joint City/County Southwest Salt Facility to provide additional covered storage for road salt.
- Both the City and County support and work with the Watershed Committee of the Ozarks (WCO), James River Basin Partnership (JRBP), and Project WET (Water Education for Teachers) to provide programs to educate kids and teachers through field trips, classroom lessons, and teacher workshops (Figures 12 & 13). For example, WCO hosts over 25 field trips per year at the Watershed Center, providing a valuable opportunity for students to learn about water. City and County staff and partners educate the public about stormwater issues and practices through public speaking engagements and by providing information at community events.



Figure 12: Field trip at the Watershed Center



Figure 13: Classroom stormwater pollution lesson

- Homeowners and landscape professionals learn about environmentally responsible lawn care practices through the Show-Me Yards & Neighborhoods Program.
- The City and County help fund the rain barrel education and rebate program in partnership with JRBP, which has sold over 1200 rain barrels since 2007 (Figures 14-16).
- Special projects such as Storm Drain Reveal, a City-JRBP project, are a creative and successful way to engage and educate the public about stormwater through art (Figure 17).
- Through the City's Adopt-A-Stream program, volunteers conduct over 20 stream cleanups per year, removing hundreds of bags of trash, tires, and other items from our urban streams (Figure 18).



Figures 14-16: Rain barrel education and rebate program



Figure 17: Artist painting mural for Storm Drain Reveal



Figure 18: Adopt-A-Stream volunteers

**How do the City, County, & Nonprofits cooperate in compliance efforts?**

The City and County have strong partnerships with Watershed Committee of the Ozarks, James River Basin Partnership, and Project WET to carry out the Public Education component of the program. The City allocated \$40,000/year for educational partnerships with these nonprofits for the last 5 years through the now expired Parks/Waterways sales tax. This funding has been utilized for school field trips to the Watershed Center at Valley Water Mill, classroom lessons, teacher workshops, rain barrel education and rebates, Storm Drain Reveal, informational materials development, and other activities that help to fulfill the City's MS4 permit requirement for public education. The County likewise has budgeted to fund these three organizations with a total of \$31,500 annually. These non-profit organizations were established with the express purpose of protecting the Springfield/Greene County water resources in part by educating the public. They have the trained staff and experience to facilitate very effective public education programs. The City and County get a better educational product through these partnerships than attempting to do all the required educational activities themselves. The City and County also partner with these organizations and other partners on other water quality efforts in addition to complying with regulations, as described in the next section.

**What are the City and County doing to protect water quality in addition to complying with regulations?**

Through cooperation, the City, County, and nonprofits are able to successfully leverage grant funding for projects to address water quality. Previous grant projects have included the following:

- The City partnered with James River Basin Partnership in 2007 on a \$25,000 Stewardship Ozarks grant through the Community Foundation of the Ozarks. The City provided matching funds through the now expired Parks/Waterways sales tax as well as Public Works in-kind labor for the construction of rain gardens on Weller Avenue (Figure 19) and at the First Unitarian Universalist Church, and for a stormwater public education campaign (Figure 20).
- The City applied for and received a \$4,500 grant from the Missouri Department of Conservation in 2008. The City provided matching funds through the now expired Parks/Waterways sales tax as well as Public Works in-kind labor for a rain garden, infiltration swale, and native plants on a city-owned lot.



Figure 19: Rain gardens on Weller Avenue



Figure 20: Pollution reporting bus ad

- The City partnered with James River Basin Partnership in 2010 on the City's first "green streetscape" which included a rain garden and pervious pavement on Park Central East and West (Figures 21 & 22). JRBP provided \$10,000 through their Water Quality Improvement Plan grant and the City provided matching funds through the ¼-cent Capital Improvement Program sales tax and Community Development Block Grant funds.



Figure 21: Rain garden on Park Central East



Figure 22: Pervious pavement on Park Central West

- In connection with the Shadowood Neighborhood flood buyout, in 2007 the County partnered with the Missouri Department of Conservation, Missouri State University, Watershed Committee of the Ozarks, and Twin Oaks Country Club to obtain a \$164,000 federal grant and a \$15,000 grant from the Conservation Heritage Foundation to stabilize 1,000 feet of eroding stream bank on the Ward Branch (Figure 23). Stream stabilization prevents sediment and nutrients from entering the stream. Figure 24 shows the stabilized stream.



Figure 23: Ward Branch stream bank erosion



Figure 24: Ward Branch after stream bank stabilization

Currently, the City and County are partnering with Watershed Committee of the Ozarks, James River Basin Partnership, Project WET, the Ozarks Environmental & Water Resources Institute, and Ozark Greenways on the Springfield-Greene County Urban Watershed Stewardship Project (nicknamed Big Urbie). Cooperation was the key to successfully applying for and receiving \$1 million, the maximum grant award possible, through the federal Section 319 Nonpoint Source Implementation Program administered by DNR. Through this grant, practices such as rain gardens, pervious pavement, and rainwater harvesting will be

implemented on public property and in partnership with schools and private partners. Detention basins will be retrofitted to improve water quality, and monitoring will provide important data on the effectiveness of these practices. Public education efforts will focus on the benefits of low impact development and other practices. The City is providing \$470,000 in matching funds through the now expired Parks/Waterways sales tax and Level Property Tax. The City and County are also providing in-kind engineering and technical assistance valued at \$65,000. Many of these projects will be designed to meet multiple objectives, not only addressing water quality but other needs as well. For example, the Robberson Elementary (Figure 25) and Boyd Elementary (Figure 26) projects currently underway in partnership with Springfield Public Schools will reduce runoff while also improving the functionality and aesthetics of the Robberson School's courtyard for use by the students and community. The Boyd Elementary project will reduce runoff and help alleviate a parking lot flooding problem. Other potential projects in the works include large-scale rainwater harvesting to reduce runoff, but also save money for the user and reduce the use of drinking water for non-potable uses.

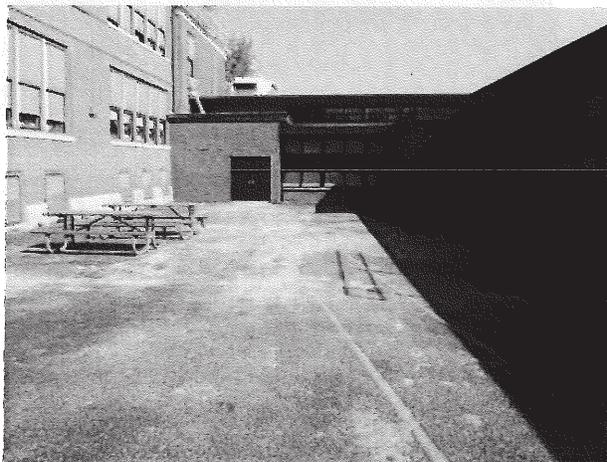


Figure 25: Robberson Elementary Courtyard



Figure 26: Boyd Elementary Courtyard

To protect the region's surface and ground water, the County has had an on-site wastewater system inspection program in place for many years. This program ensures that all on-site wastewater treatment (septic) systems are properly designed and installed. Sewage effluent from failing on-site wastewater treatment systems can pollute streams through surface runoff and can contaminate springs and wells when improperly treated wastewater effluent reaches the groundwater system. This program has had a significant impact on water quality in the areas that are not served by sanitary sewer. The On-site Wastewater Training Center at Valley Water Mill is an educational partnership between Greene County and the Watershed Committee of the Ozarks to conduct training classes for proper installation of on-site wastewater systems.

The City has done a variety of other things over the years to protect water quality. The purchase and preservation of over 200 acres of riparian corridor has protected these natural areas and allowed them to be utilized for greenway trails. The Jordan Creek North Branch Daylighting Project was an innovative project that daylighted an underground stream and constructed an open channel system and greenways trail with native plants and trees to improve water quality and recreation. The recently completed projects at Doling Park and Dickerson Park Zoo incorporated rain gardens, water quality basins, and a constructed wetland to catch and filter runoff. The Fassnight Park and Sequiota Park projects addressed severe stream bank erosion that was contributing sediment and nutrients to the streams.

## What are the unique features and geology of our area that impact our efforts?

In this area we have what is called karst topography (Figure 27), which is characterized by limestone bedrock that is easily dissolved by water. Karst features include caves, sinkholes, "losing" streams that lose their water through porous bedrock into the subsurface groundwater system, and springs through which groundwater emerges. Because of the potential for groundwater contamination, sinkhole collapses and flooding, it is important that we have regulations in place to restrict building in sinkholes and protect them from pollution since sinkholes are the primary way that surface water enters the ground water. Because of the interconnected drainage system of sinkholes, caves, and springs, surface water that carries pollutants can easily enter the groundwater without any treatment or filtration by the soil. This makes our groundwater especially susceptible to contamination. Protecting sinkholes is a critical means of protecting the water quality of springs and wells. Private wells are the drinking water source for many homes in the County, and City Utilities also relies on Fulbright Spring and wells for a portion of the public drinking water supply.

Although Greene County had some sinkhole regulations in place prior to 1999, it was then that the County's current sinkhole standards were adopted as part of the Greene County Stormwater Design Standards. The County regulations restrict activities within sinkholes based on the principles of sinkhole avoidance, minimizing potential impacts, and mitigation of any impacts on flooding and water quality. With rare exceptions, no clearing, building, dumping or other development is allowed within delineated sinkholes. These sinkhole regulations are not required by DNR or EPA permits.

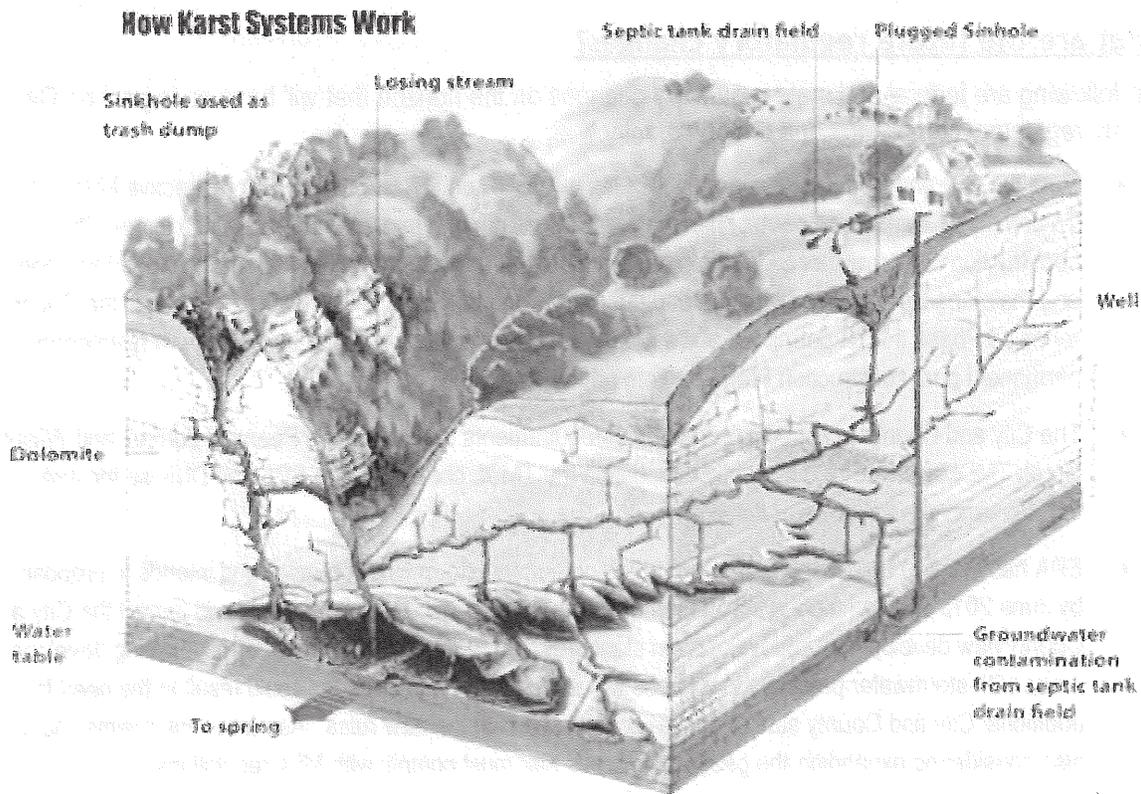


Figure 27: Karst Topography

The soils in the Springfield/Greene County area also pose a unique challenge to regulatory compliance. The MS4 permit requires increased use of infiltration to reduce the amount of runoff from new development and redevelopment sites. Although most of the surface soil (called the A-Horizon) in the area can absorb water readily, the subsoil horizons in this area can have very high clay content. Clay does not allow for the rapid infiltration and movement of water. Once the surface soil is removed for construction it can be very difficult to construct a stormwater BMP that can allow infiltration at a rapid enough rate to comply with the regulations. Once the clay particles are suspended in runoff water, it can be very difficult to remove them from suspension. Without chemical treatment, clay particles can remain suspended in water for weeks or months. This characteristic of local soils can make it difficult to comply with future numeric turbidity limits that are expected from the EPA in the next 2-3 years.

Infiltration of stormwater is also complicated by the karst geology that is discussed above. In some areas, shallow bedrock and/or a groundwater table that is close to the surface can limit the effectiveness of infiltration practices to reduce runoff. Sinkhole collapses are caused by the movement of water through the soil and into channels in the limestone bedrock. When increased volumes of runoff from development move down through the soil, the potential for creating sinkhole collapses increases. There are numerous examples in Springfield and Greene County of sinkholes collapsing in detention basins where the increase in downward water movement accelerated the rate of sinkhole development.

## How will regulations impact our community in the future?

### **What are the future regulatory changes?**

The following are federal and state regulatory changes on the horizon that will have an impact on City and County regulatory compliance and the community.

- Both the City and County are currently working with DNR on the renewal of their respective MS4 Permits. To comply with proposed permit changes, the City will need to implement programs to inspect the construction of stormwater BMPs on new development/redevelopment, and ensure the long-term operation and maintenance of privately-owned and publicly-owned BMPs. It is likewise expected that the County's renewed Phase II MS4 permit will place greater emphasis on construction and long-term maintenance of permanent post-construction BMPs on both private and public projects.
- The City and County will need to comply with requirements to address the Pearson, Jordan, and Wilsons Creek TMDLs. The City is currently negotiating the TMDL challenge with EPA and DNR so the exact requirements are unknown at this time.
- EPA has initiated a national rulemaking to strengthen the stormwater program and intends to propose a rule by June 2013 and complete a final action by December 2014. This rulemaking could impact the City and County new development/redevelopment standards and require a program to retrofit existing developed areas with stormwater practices to address water quality. These changes could result in the need for additional City and County staff to ensure compliance with the new rules. As part of this rulemaking, EPA is also considering expanding the geographic areas that must comply with MS4 regulations.
- EPA is considering numeric limits for the turbidity of runoff leaving a construction site. Turbidity is a measure of water clarity. The limits that are expected from EPA will most likely require construction site operators to use chemicals to treat their runoff water to achieve the anticipated limit. The City and County will be responsible for enforcing these limits.

- DNR is considering changes to the state's water quality standards that would greatly expand the number of small streams in the City and County that have beneficial uses and water quality criteria automatically assigned to them. The City and County would need to devote staff time and resources to evaluating and documenting the condition of these streams in order to remove beneficial use designations that are incorrect. These changes may also result in additional streams being listed as impaired by DNR, followed by TMDLs that the City and County would need to address in their MS4 permits.
- As explained in the TMDL section, it is anticipated that numeric water quality criteria for nutrients will be promulgated by DNR in the near future that may result in the need for increased efforts to address the James River TMDL and could also result in Springfield Lake, Table Rock Lake, and possibly other smaller streams being listed as impaired for nutrients. Lowering the allowable pollutant level for metals and other water quality criteria are being considered by DNR as well.

**How much does it cost to comply now vs. future?**

The City's current annual cost to comply with its MS4 permit is approximately \$450,000. The City is working with DNR on the revision and reissuance of its permit. MS4 permits are written with a 5-year expiration date. This allows DNR to revise the permit language every 5 years to incorporate new federal or state rules or regulations, or make other changes it sees as necessary. Rather than making any changes to the City's permit when it expired in 2007, DNR administratively continued its use so that the City has been operating under the same permit since 2002. It is anticipated that DNR will issue a revised permit to the City in early 2013. Based on the City's current knowledge of the proposed revised permit, a minimum and maximum range of projected annual costs for compliance with the MS4 permit for the next five years is given in Table 2. The range represents minimum and maximum estimates for some permit requirements that cannot be definitively estimated at this time. This does not include the cost of complying with requirements to address the Pearson, Wilsons, and Jordan Creek TMDLs. Not much is known yet about what the cost of compliance with these TMDLs will be, so best estimates of a potential minimum and maximum range of annual costs are shown in Table 2. Combining the projected costs of MS4 permit and TMDL compliance gives a projected total cost range for the City's regulatory compliance of \$950,000 to \$1.3 million in fiscal year 2014, increasing annually to a range of approximately \$3.1 million to \$6.7 million in fiscal year 2018. Beyond this 5-year projection, it is anticipated that the cost of MS4 permit compliance will at least remain at this level if not increase. The cost of TMDL compliance may increase or decrease depending on the effectiveness of efforts to address current TMDLs, as well as requirements to meet additional TMDLs that may be issued in the future.

**Table 2: 5-Year Projection of the City's Regulatory Compliance Cost**

	Year 1 (FY14)		Year 3 (FY16)		Year 5 (FY18)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
MS4 Permit	\$850,000	\$1,000,000	\$950,000	\$1,325,000	\$1,075,000	\$1,675,000
TMDL Compliance (Unknown)	\$100,000	\$300,000	\$1,000,000	\$3,000,000	\$2,000,000	\$5,000,000
<b>Total</b>	<b>\$950,000</b>	<b>\$1,300,000</b>	<b>\$1,950,000</b>	<b>\$4,325,000</b>	<b>\$3,075,000</b>	<b>\$6,675,000</b>

Greene County currently spends about \$300,000 per year for compliance with its MS4 permit. This includes salaries for staff and financial support of non-profits for public education. It is anticipated that the new emphasis on post construction BMP maintenance and stormwater infiltration will require inspection, maintenance, and retrofitting of existing basins. If EPA's rulemaking expands the geographic area that falls under MS4 regulation, this will have a proportionately greater impact on the County as more residential and rural areas are regulated. These uncertainties make cost estimation difficult but based on the changes that are expected in the County's new MS4 permit that will be issued in 2013, a minimum and maximum range of projected annual costs for compliance with the MS4 permit for the next five years is given in Table 3.

Currently \$20,000 per year is spent on stream monitoring for the James River TMDL to gather water quality data. It does not address the TMDL load reduction requirements. If EPA changes the water quality standards for the James River as expected, the cost of complying with nutrient load limits will increase significantly. Attempting to meet the stormwater flow reduction requirements in the Pearson, Jordan and Wilsons Creek TMDLs may involve the construction of numerous regional retention and infiltration basins within these two watersheds. Until a settlement is reached between the City, EPA and DNR, the full scope of what will be necessary for TMDL compliance is unknown. A best estimate of the range of TMDL compliance costs for Greene County is given in Table 3. Combining the projected costs of MS4 permit and TMDL compliance gives a projected total cost range for the County's regulatory compliance of \$460,000 to \$675,000 in fiscal year 2014, increasing annually to a range of approximately \$2.2 million to \$5.1 million in fiscal year 2018.

**Table 3: 5-Year Projection of the County's Regulatory Compliance Cost**

	Year 1 (FY14)		Year 3 (FY16)		Year 5 (FY18)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
MS4 Permit	\$375,000	\$425,000	\$500,000	\$650,000	\$700,000	\$1,050,000
TMDL Compliance (Unknown)	\$85,000	\$250,000	\$850,000	\$2,500,000	\$1,500,000	\$4,000,000
<b>Total</b>	<b>\$460,000</b>	<b>\$675,000</b>	<b>\$1,350,000</b>	<b>\$3,150,000</b>	<b>\$2,200,000</b>	<b>\$5,050,000</b>

## NEXT STEPS

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What are the next topics for the Task Force to consider?

Meeting #4 – Maintain Infrastructure Investment in Existing System.

Meeting #5 – Funding Options

# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force

### Guiding Principles Survey Results

#### GUIDING PRINCIPLES SURVEY #2

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As part of the stormwater management process, the Stormwater Management Task Force had the opportunity to respond to a survey to develop a discussion regarding guiding principles for stormwater management.

Twenty three Stormwater Management Task Force members completed the survey, which comprised of a series of 10 questions where respondents were asked their "level of agreement." Five response options were provided strongly agree, agree, neutral, disagree and strongly disagree.

The results have been categorized in terms of statements with

- **Strong support:** majority of respondents strongly agreed and agreed; and
- **No clear consensus/split vote.**

#### Statements with Strong Support

1. *Cost-Effectiveness:* Springfield/Greene County can't meet all the financial needs that have been identified. Investments must be made that have the most impact for the dollar spent.
2. *Innovation/Planning:* It is important to develop good plans before implementing projects so funds are spent wisely.

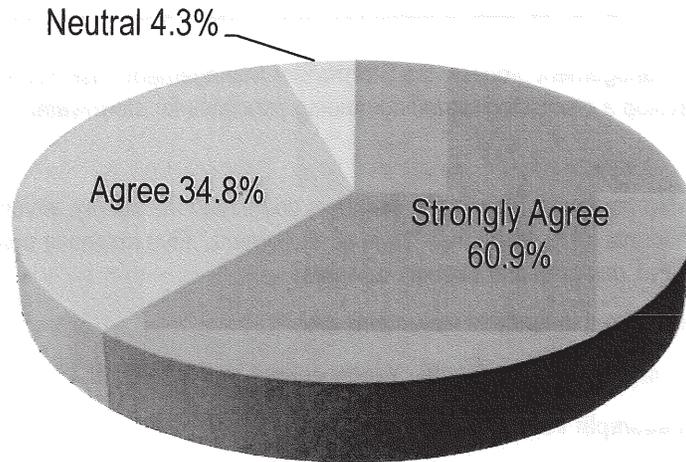
#### Statements with No Clear Consensus/Split Vote

1. *Environmental Stewardship:* Springfield/Greene County should meet all regulatory requirements designed to protect water resources for drinking and recreation.
2. *Environmental Stewardship:* Springfield/Greene County should exceed regulatory requirements if needed to protect water resources for drinking and recreation
3. *Financial Burden:* Springfield/Greene County should spend whatever it takes to reduce flood damage to properties - even with a heavy financial burden on a citizen
4. *Financial Burden:* Springfield/Greene County should spend whatever it takes to protect water quality -even with a heavy financial burden on citizens.
5. *Financial Burden:* Springfield/Greene County should spend whatever it takes to protect water quality - even with a heavy financial burden on citizens.
6. *Innovation/Planning:* Master plans of capital improvements should be developed collaboratively on a watershed basis rather than by political jurisdiction.
7. *Innovation/Planning:* It is important that projects selected for funding are located in all parts of the community.

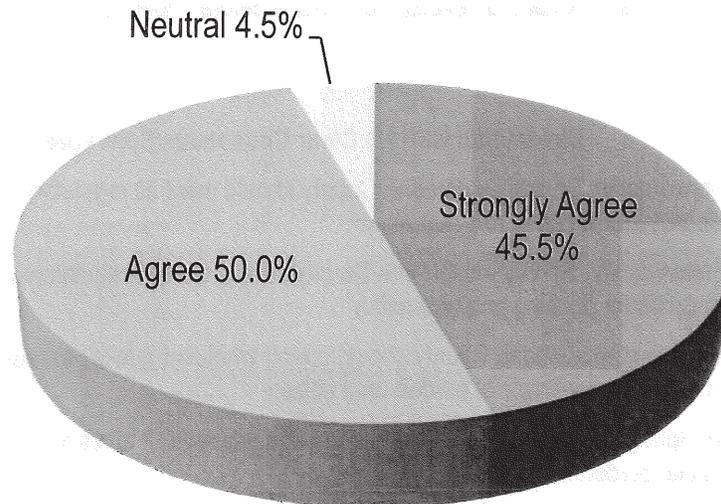
8. *Innovation/Planning*: It is important to build projects early in the funding program rather than spend the majority of funds on planning. Citizens need to see progress early on in the program.

**Strong Support**

**Cost-Effectiveness: Springfield/Greene County can't meet all the financial needs that have been identified. Investments must be made that have the most impact for the dollar spent.**

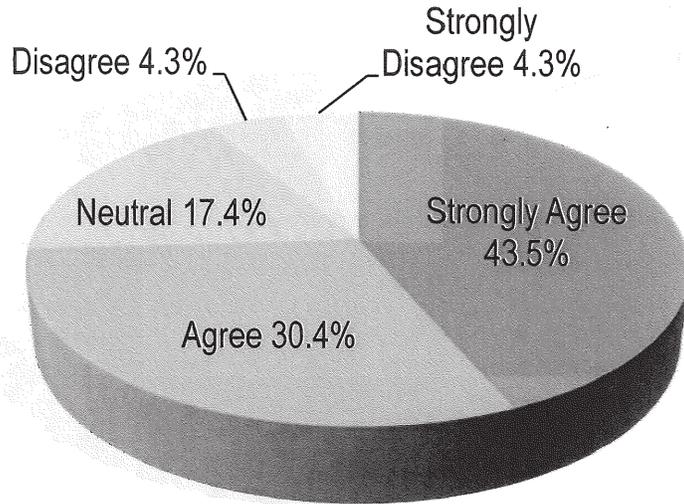


**Innovation/Planning: It is important to develop good plans before implementing projects so funds are spent wisely.**

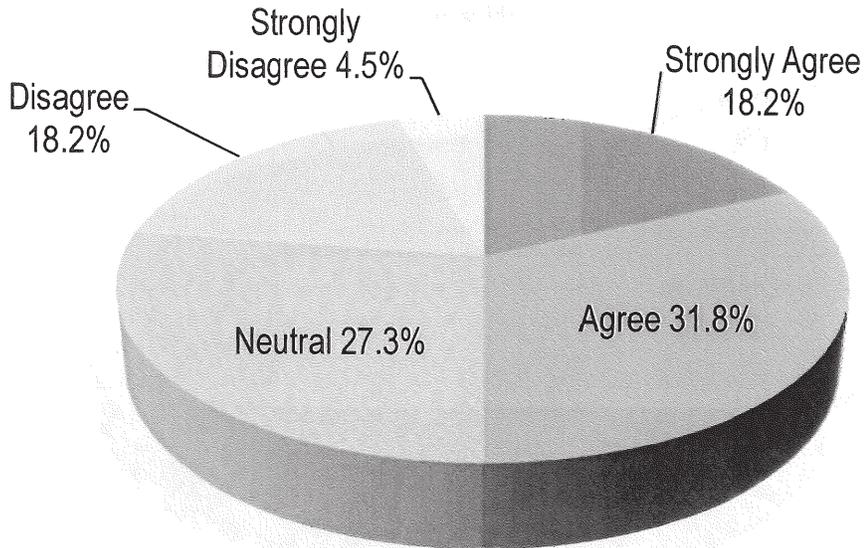


**No Clear Consensus/Split Vote**

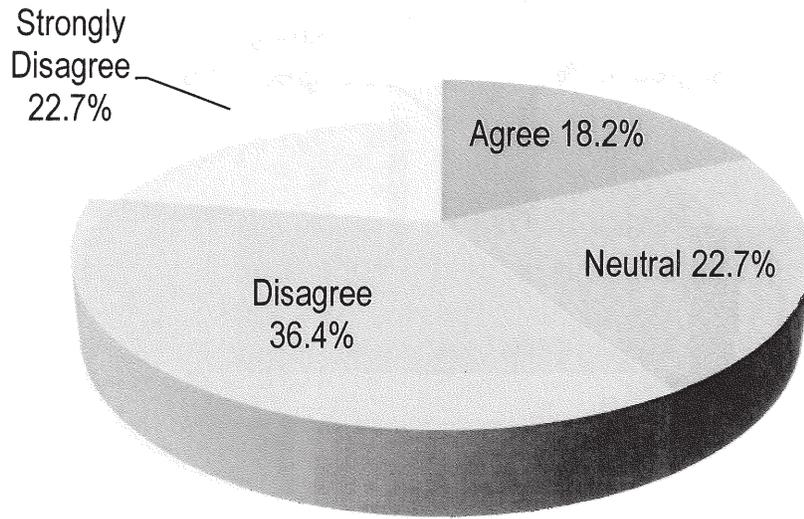
**Environmental Stewardship: Springfield/Greene County should meet all regulatory requirements designed to protect water resources for drinking and recreation.**



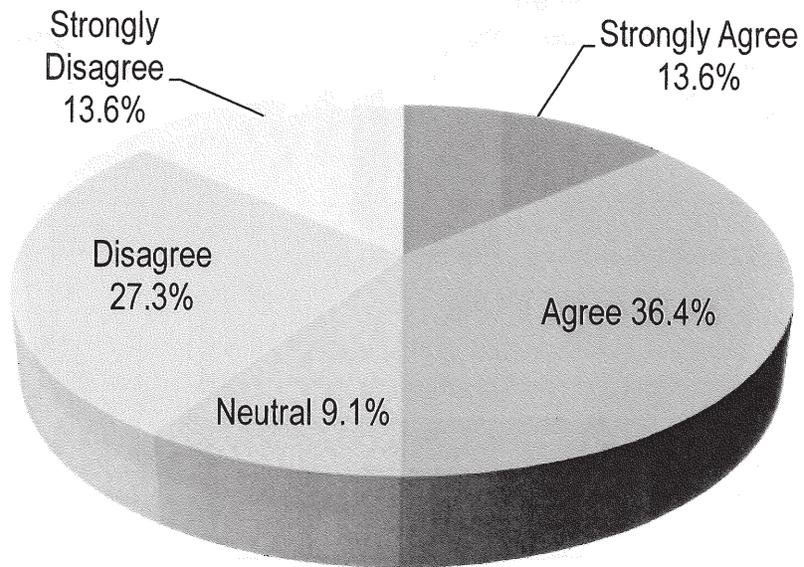
**Environmental Stewardship: Springfield/Greene County should exceed regulatory requirements if needed to protect water resources for drinking and recreation.**



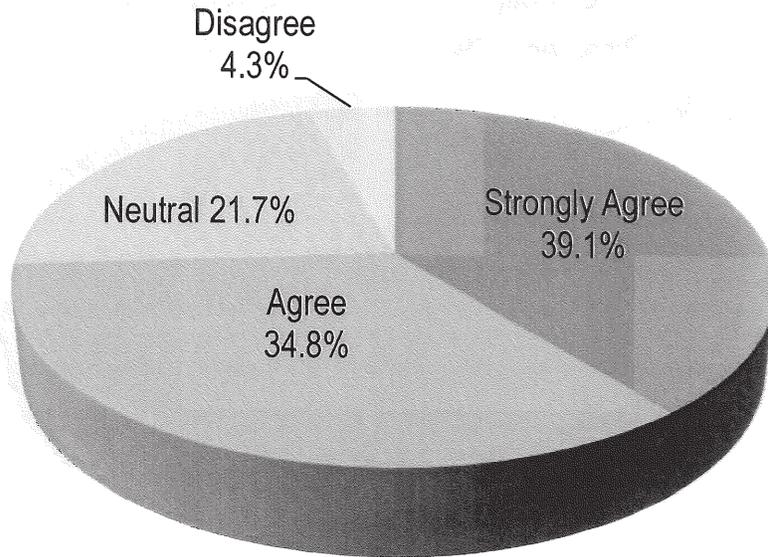
**Financial Burden: Springfield/Greene County should spend whatever it takes to reduce flood damage to properties - even with a heavy financial burden on a citizen**



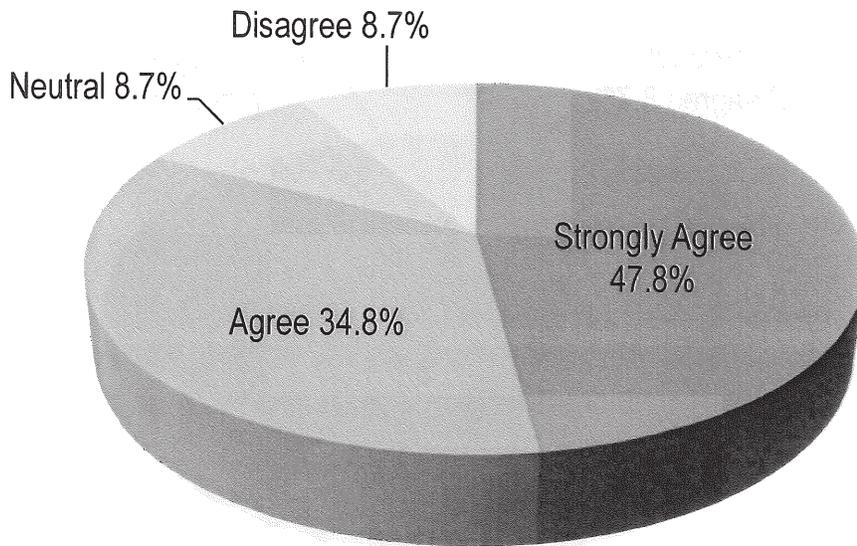
**Financial Burden: Springfield/Greene County should spend whatever it takes to protect water quality - even with a heavy financial burden on citizens.**



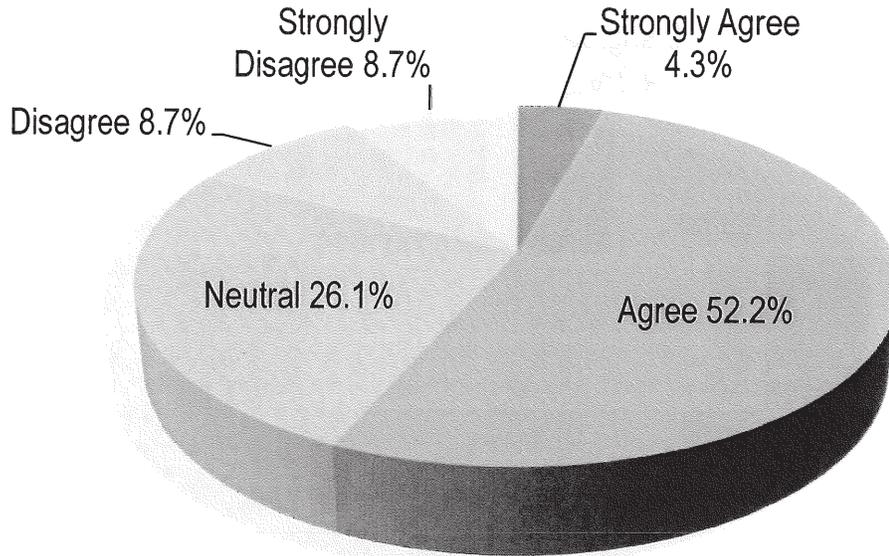
**Financial Burden: Springfield/Greene County should invest in stormwater management programs that are affordable and don't impose a heavy financial burden on citizens.**



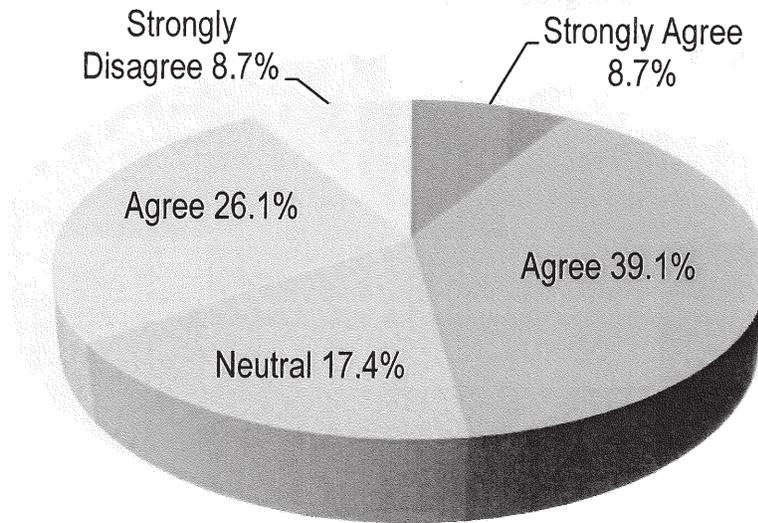
**Innovation/Planning: Master plans of capital improvements should be developed collaboratively on a watershed basis rather than by political jurisdiction.**



**Innovation/Planning: It is important that projects selected for funding are located in all parts of the community.**



**Innovation/Planning: It is important to build projects early in the funding program rather than spend the majority of funds on planning. Citizens need to see progress early on in the program.**



# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force Meeting



**Date:** Thursday, January 17, 2013  
5:00 to 7:00 p.m.

**Location:** Public Safety Center  
330 West Scott Street  
Springfield, Missouri 65802

*Map to meeting  
site on page 2*

### Meeting purposes:

- Select guiding principles to assist the Task Force members in their role, process, and issues to be addressed.
- Provide background on Infrastructure Repair & Replacement Efforts:
  - What is the City and County doing to repair & replace the existing systems?
  - What still remains to be accomplished?
  - Where should the community focus its efforts to reinvest in the existing infrastructure so that it functions properly?

## AGENDA

5:00 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:10 p.m.	Repair & Replacement Infrastructure	Todd Wagner, City of Springfield Kevin Barnes, Greene County
5:30 p.m.	Survey Results & Task Force Discussion	Sheila Shockey
6:45 p.m.	Next steps - Information needed for upcoming meetings	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:00 p.m.	Adjourn	

*In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.*

**Handouts:**

- 1. Task Force Meeting #3 Notes
- 2. Repair & Replace Infrastructure

pages 3-5  
pages 5-14

**Meeting Site:**

Public Safety Center  
330 West Scott Street  
Springfield, MO 65803

**For assistance call (417) 864-1901 or (417) 818-6091**



**Directions:**

From the North: Travel south on N. Kansas Expressway to Chestnut Expressway. Turn left or east and travel to North Booneville Avenue. Turn left and proceed 3 blocks to Scott Street. The Public Safety Center is on your left.

From Highway 65: Take the Division Street exit. Turn west (right if coming from the north, left if coming from the south) and travel to Booneville Avenue. Turn left and travel about 5 blocks to Scott Street. The Public Safety Center is on your right.

From the west and I-44: Take the Chestnut Expressway east to Booneville Avenue. Turn left onto Booneville Avenue and travel 3 blocks to Scott Street. The Public Safety Center is on your left.

City of Springfield/Green County, Missouri  
Stormwater Management Task Force Meeting #3  
Meeting Summary  
12/13/2012

DRAFT

The Springfield/Green County, Missouri Stormwater Management Task Force met on Thursday, December 13, 2012 at 5:00 p.m. Task Force members present were: Brian Perdue, Matthew Pierson, Eric Dove, Karen Spence, Geoffrey Butler, Dana Elwell, Dave Murray, Patrick Harrington, Stacy Armstrong, Fred Schlegel, Andy Hosmer, Ronda Headland, Casey Haynes, Dan Hoy, Tom Kisse, Bill Bretall, Chris Macioce, and Tom DeWitt. Greene County staff present included: Kevin Barnes, Tim Davis, Vanessa Brandon, Tim Smith, and Karen Elmer. City of Springfield staff present included: Todd Wagner, Carrie Lamb, Sarah Davis, Barbara Lucks, Fred Marty, Kimberly White, Jan Millington, Steve Meyers, Phil Broyles, Cora Scott, and Greg Burris. Others present were: Jes Wilson, AM Hydro; Milton Dickensheet, City of Nixa; Mike Pessina, HDR; Dave Fraley, City Utilities; and Sheila Shockey, Shockey Consulting Services, LLC.

Dan Hoy, Co-Chairperson, welcomed the group and asked them to introduce themselves. He asked the task force to approve the meeting minutes from the last meeting. The minutes were unanimously approved without changes.

***Water Quality and Regulations Presentation:***

Carrie Lamb, City of Springfield and Kevin Barnes, Greene County, made a presentation regarding the City and County water quality programs. Carrie described the waterways the City and County are trying to protect. They are important recreational features to the region. They also are the community's source of drinking water. She described the regulations to comply with in regards to the Clean Water Act and the MS4 Permit. She also described the process of establishing and complying with the Total Maximum Daily Loads (TMDLs). Carrie described what the City and County do to protect water quality that is not necessarily required by the regulations. She described the partnerships that the City, County and nonprofits in the region have to deliver educational programs about water quality. Kevin described the unique features and geology of the region and how that impacts stormwater management. He said that because of the karst geology, pollution in sinkholes flows to other water bodies including the community's drinking water supply.

***Task Force Discussion:***

The task force had the following conversation about the presentation.

Comment: Karst topography may be a reason to go above and beyond what the regulations say. It is important to protect our drinking water supply.

Comment: Could we have the Missouri Department of Natural Resources (MDNR) administer the Land Disturbance Permit for the City and the County? They already are involved with this process.

Response: MDNR doesn't have adequate staffing to administer the Land Disturbance Permit locally. It is also a requirement of the City's and County's MS4 permits.

Comment: Are we planning locally for the impact of climate change on stormwater?

Response: Standards are based upon average rainfall events. If climate change results in changes to annual average rainfall events, the design storms will need to be adjusted.

Response: Drury is planning for increasing drought conditions on their campus by looking at ways to better capture and utilize rainwater.

**Guiding Principles Discussion:**

Sheila Shockey facilitated a session with the task force discussing the guiding principles survey results. She reviewed the guiding principles that were developed at the last meeting.

The task force discussed the guiding principles. The following comments were made:

- "Fair" should be based on objective science.
- How are the people treated that were good stewards on their property from the beginning. Do they pay less?
- Public perception should include how cost-efficient and effective the stormwater practices are in reality.
- Sometimes a best practice such as native landscaping is perceived negatively by the public because of the way it looks.
- Our community has successful projects to point to so it is not so important to do quick win projects. We should develop good master plans.
- Improvement in water quality is hard for the public to see unless the pollution is visible like sediment. Macroinvertebrates are not easily seen.
- We don't want to spend all the money on planning and never get to implementation.
- We need a master plan so we can build projects that are a priority. What percentage of cost does planning usually take in stormwater. The response was about 10%. Master planning is usually a per square mile cost.
- It is important to do story-telling as part of planning to be able to see what the next steps are and convey it to the public.
- Small projects that show immediate benefits at the top of the watershed should be built early on and then we move downstream and have larger, more complex projects. We need to identify and prioritize what investments are needed.
- Projects should be built that help meet environmental mandates. The public will understand why those types of projects are needed. It is not that important to spread the projects around to all parts of the city/county.
- This isn't a park program, projects should be based on priorities and not politically based.
- Regulations are unclear and sometimes we can't meet them such as the TMDLs. Exceeding water quality regulations only if feasible. We should not aim for the minimum but we should aim for the best water quality we can afford. But if the wishlist is bigger than the resources we have then we can't exceed requirements.
- Drinking water and recreation shouldn't be in the same sentence as drinking water is so much more important. We need to understand the consequences of not meeting water quality regulations.
- The task force agreed that the principles should promote the use of best practices as it recognizes evolving state of the practice. The task force also agreed to the terms "balanced" and "evidence-based." Remove the phrase "heavy burden."

The task force came to agreement on the following guiding principles. They are:

*Understandability/Public Education:* Citizens should be made aware of how they can protect water quality through their actions.

*Understandability/Public Education:* Citizens should understand how improvements can help protect water quality and how improvement programs are funded.

*Conservation:* The efficient use of resources should be encouraged.

*Public Benefit:* The public should benefit from the investments made in stormwater management.

*Innovation/Planning:* The long-term stormwater management program should be flexible to adapt to new technologies and innovations.

The task force made modifications to the following guiding principles:

*Environmental Stewardship:* It is important to protect & improve drinking water sources and quality of water in streams in Southwest Missouri. Good stormwater management is in everyone's best interest.

*Public Acceptance:* The public perception should be that the stormwater management programs are balanced; decision-making is open and is influenced by public input.

*Effectiveness:* Stormwater management programs utilize best practices & sound science; investments that are cost-effective.

**Next Steps & Closing Comments:**

Sheila Shockey said the next meeting will be held on January 17 and will cover the topic of maintaining infrastructure investments.

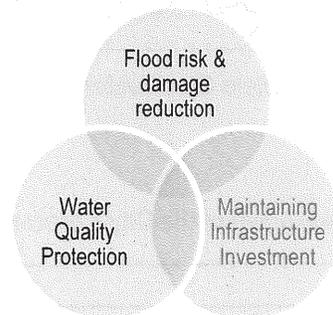
Dan Hoy invited the task force to look at the Jordan Creek: Story of an Urban Stream book that was distributed at the beginning of the meeting. They should also look on the city's website to learn more about the water quality programs.

**Adjourn at 7:00 p.m.**

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## Maintaining Infrastructure Investment

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### Stormwater System Summary

The drainage system of Springfield and the surrounding Urban Service Area is an extensive network of natural and manmade channels, box culverts, pipes, inlets, junction boxes, and detention basins, both surface and underground. Example photos of these infrastructure components are shown on page 7. This system drains into several relatively small streams that originate in or near the City due to its location on a ridge. These small streams drain north into the Sac River or south into the James River. Over the last several years, the City and County have mapped their stormwater drainage systems in geographic information system (GIS) mapping databases. The map of the drainage system and streams resembles trees with branches (Figure 1). Modifications and additions to the systems occur through capital improvement projects and by private property owners through new developments. There is a process to ensure that modifications and additions to the system are added to the City and County maps once construction is complete. Other mapping corrections or additions are made in a timely manner based on ongoing field investigations and findings. The City's mapped drainage system is approximately 675 miles in length with the breakdown shown in Table 1.

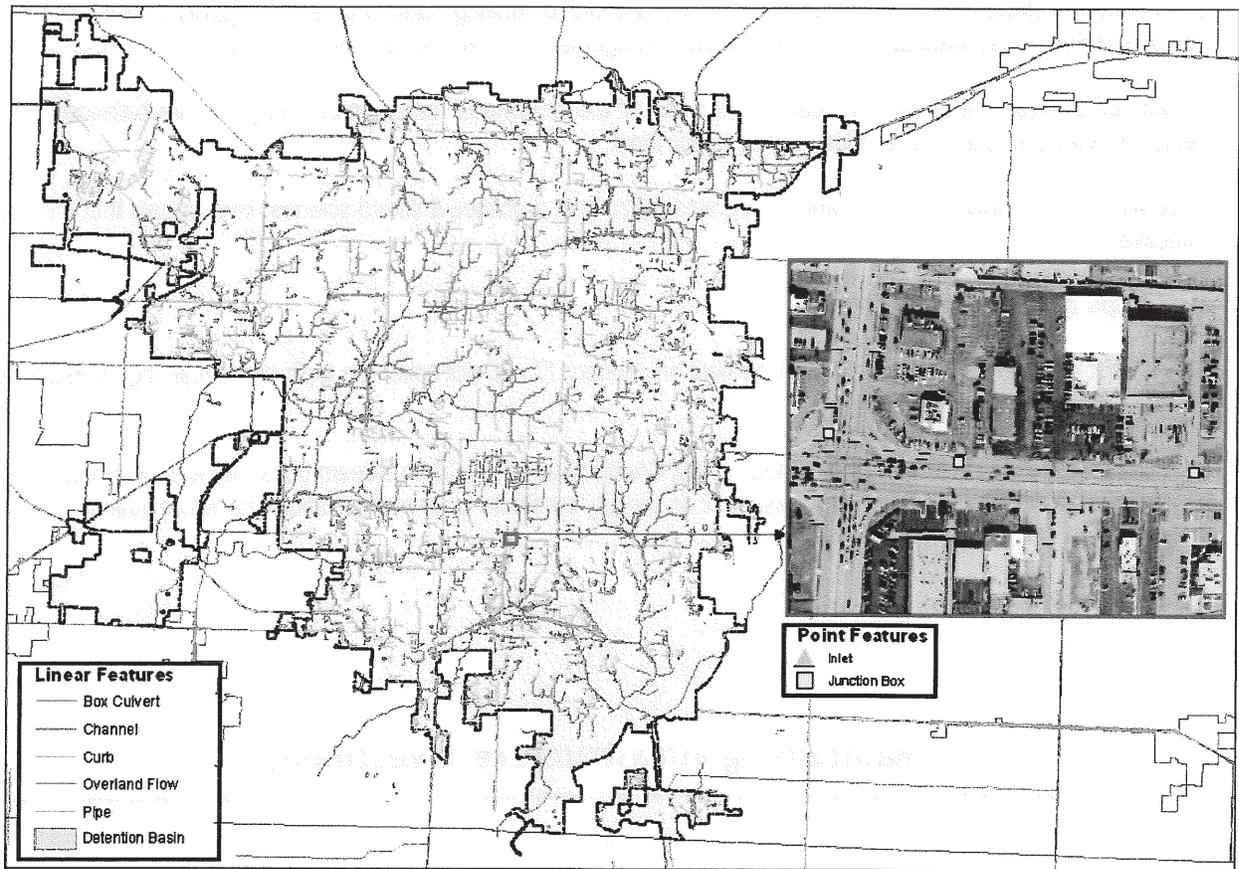
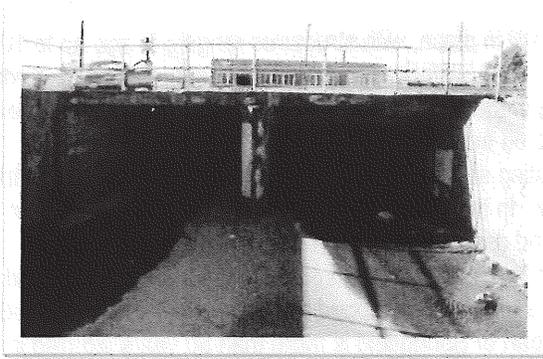


Figure 1: Springfield Stormwater Infrastructure Map

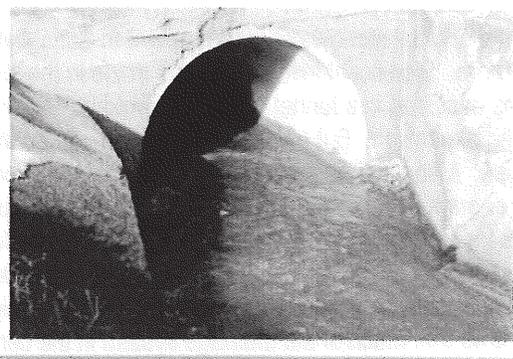
Table 1: Breakdown of the City's Stormwater System

Pipes	294 miles
Box Culverts	59 miles
Grass and Concrete Open Channels	321 miles
Inlet Structures	13,324
Junction Box Structures	1,947
Flood Control/Water Quality Basins	1,050
Best Management Practices	250

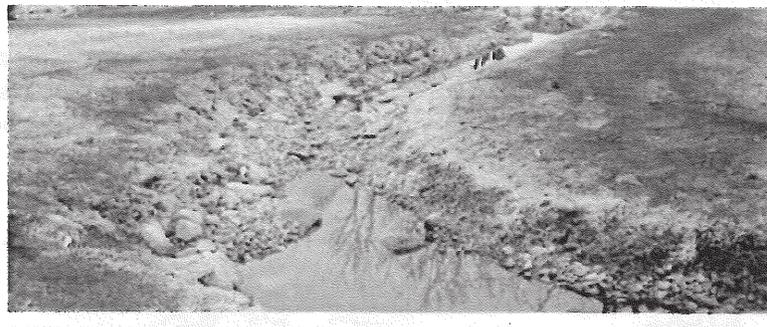
Box Culvert



Pipe



Open Channel



Inlet Structure



Junction Box Structure



Flood Control and Water Quality Detention Basins



## What is the age of the City and County stormwater systems?

Much of the original stormwater infrastructure in Springfield is still in place, with structures ranging in age up to 100 years or more. Significant investment was made in the 1930's when waterways were improved in parks and Jordan Creek was enclosed in a tunnel through downtown. Beginning in the 1950's, Springfield began to see accelerated growth and expansion. But much of the infrastructure constructed from the 1950's through the 1970's had deficiencies. Many facilities were not sized adequately for existing and future development, and in many cases there were not enough inlets constructed to collect runoff adequately. In the 1980's and 1990's, the stormwater design standards for new development began to require more inlets and associated piping to ensure there was enough collection capacity to control localized flooding. These standards resulted in the large increase in pipe length and number of inlets that has occurred in the last 20 years. Figure 2 shows the mapped drainage system, color coded by age. It shows that much of the drainage system in the central part of Springfield is more than 50 years old (red in color). Note the older structures are similar in location to the box culverts shown in Figure 1. This is due to the fact that smaller, cast-in-place box culverts were much more common during that time period, prior to the development of precast production methods of reinforced concrete pipe.

Most of the stormwater infrastructure in the County is in developments that were constructed after about 1990. Most developments prior to 1990 were designed and constructed with little or no attention given to stormwater conveyance. Consequently, developments prior to 1990 have either inadequate or non-existent storm drainage which results in flooding and safety issues.

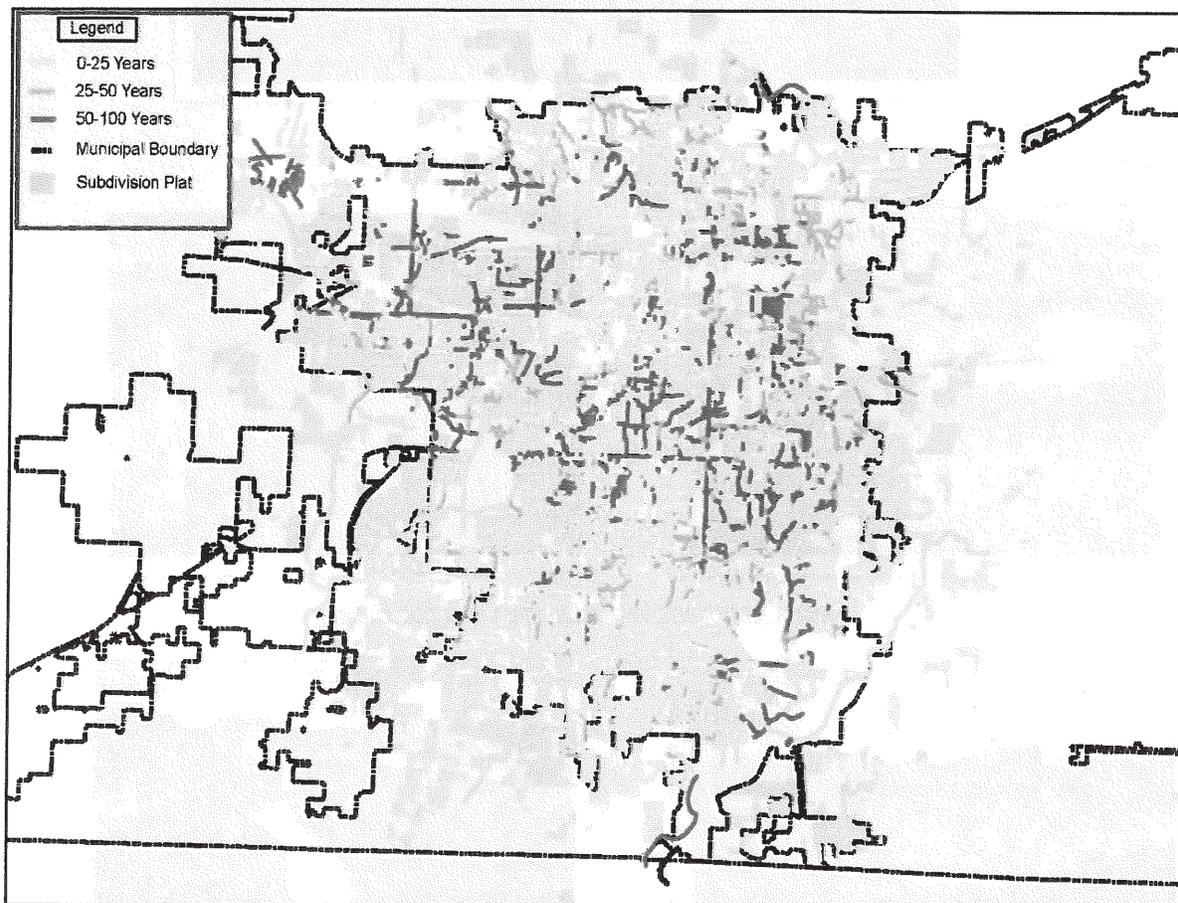


Figure 2: Map of Springfield Drainage System by Age

## What is the value of the City and County stormwater systems?

The cost to replace the constructed portion of the City's stormwater system is estimated to be approximately \$500 million. This averages to between \$200 and \$250 per linear foot. Included in this estimate is replacement of inlets and junction boxes at \$3,000 each as well as replacement of large culvert structures that can cost several thousand dollars a foot. In addition, pavement replacement, utility conflicts and traffic control are some of the factors that make the cost of this work higher.

Figure 3 shows the age distribution of the drainage system in terms of length of structures. Note that nearly half, or 46 percent, of the system is less than 20 years old. This is due to the changes in design standards mentioned above, causing an increase in smaller pipes associated with more inlets. This, coupled with the construction of numerous street/drainage projects and rapid development in the last 20 years, has led to an increase in the rate of expansion of the system. It is important to note that 27 percent, or about 100 miles, of the structural system is over 50 years old. The oldest part of the system is more likely based on a sub-standard design and is more likely to be in poorer condition with more associated repair/replacement needs. It is likely that a prioritized system condition evaluation would begin with this part of the system.

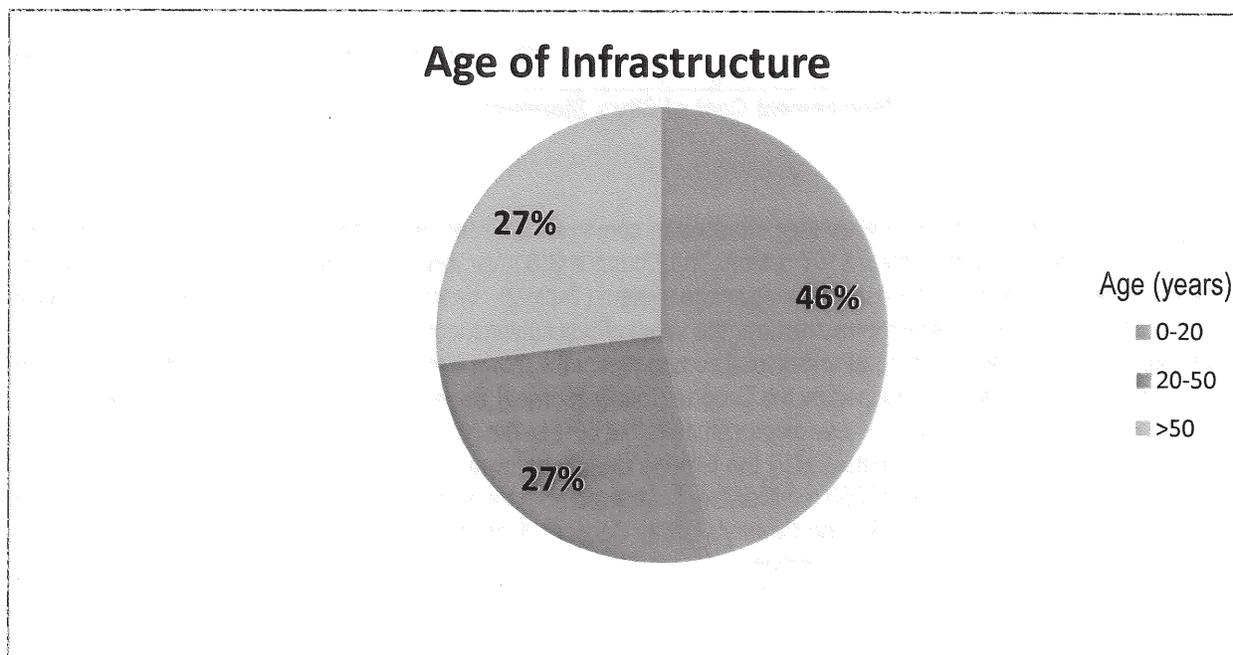


Figure 3: Age of City's Stormwater Infrastructure

Figure 4 shows a distribution of the replacement cost of the system by age. Note that the proportion of replacement cost is higher for the >50 years old category. This is due to a higher percentage of the older structures being larger and, therefore, having a higher unit replacement cost. This figure shows that 32 percent, or about \$160 million, of the total value of the system is greater than 50 years old. A rough approximation of the cost to replace this part of the system over the next 50 years is \$3-4 million annually, in 2013 dollars.

## Replacement Cost of Infrastructure by Age

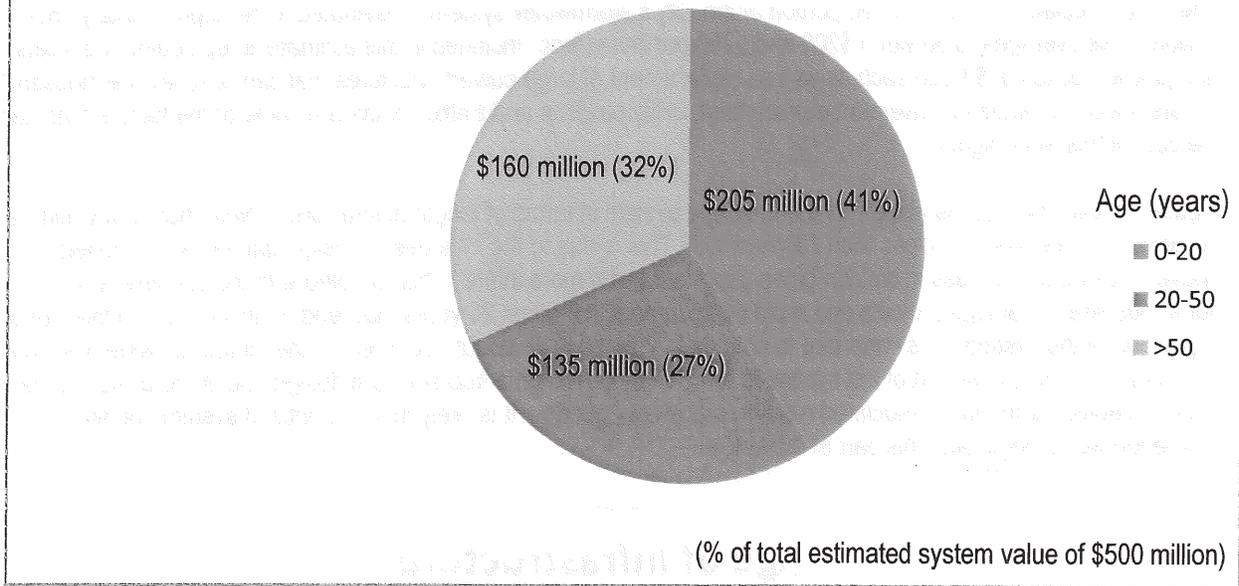


Figure 4: Replacement Cost of City's Stormwater Infrastructure by Age

The value of Greene County's total existing stormwater conveyance system within the Urban Services Area (Figure 5) is estimated to be approximately \$107 million. The County's GIS inventory of the system was used to estimate the maintenance and replacement costs of the drainage system (Table 2). When estimating the unfunded maintenance needs of the existing stormwater infrastructure, the value of box culverts, curb inlets, and bridges was not included. Although these items are an integral and pivotal component of the storm water conveyance system, they are located within the right of way and maintained by the Greene County Highway Department using dedicated highway funds. In the calculation of system value it was also estimated that 50% of the pipes in the GIS inventory were also within the right of way and therefore maintained by the Greene County Highway Department. When these items with an approximate replacement value of \$60.5 million are subtracted from the total there remains an estimated \$47 million of existing stormwater system in Greene County's Urban Services Area for which there is no mechanism to ensure adequate maintenance, repair, or replacement.

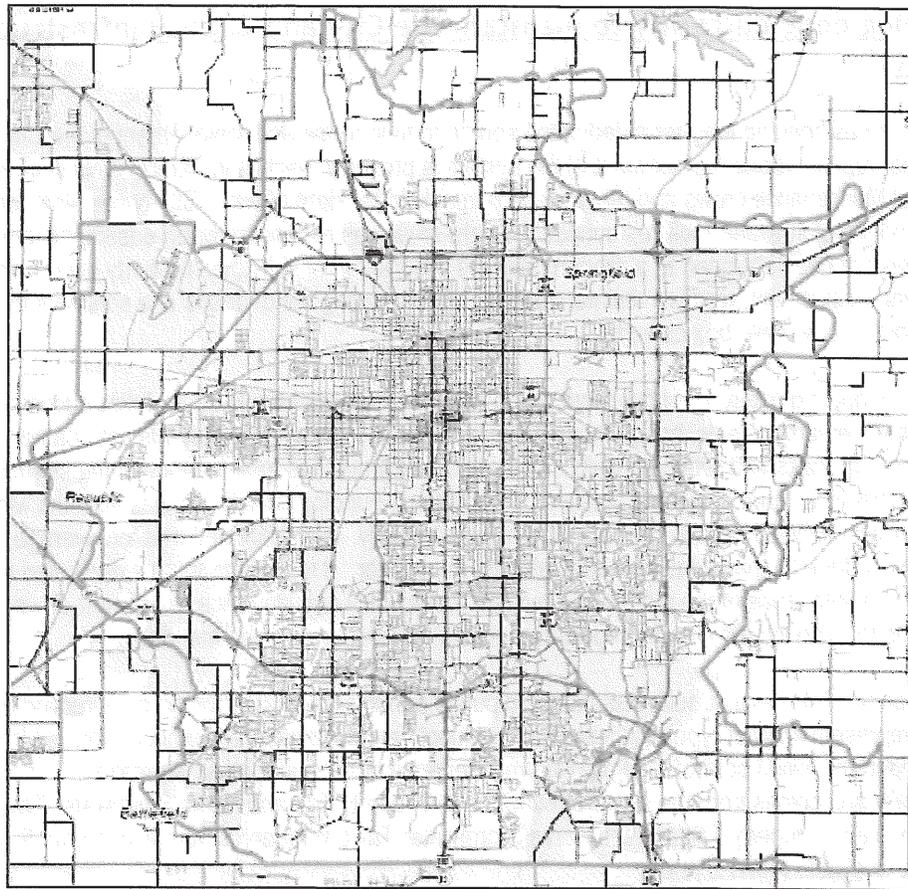


Figure 5: Urban Services Area Boundary (Green Line)

Table 2: Greene County Stormwater Conveyance System Replacement Costs

Total Estimated System Value Based on Detailed System Inventory					
	Number	Miles	feet	cost (\$/ft or (ea.)	Total
<b>Box Culverts *</b>	<b>126</b>			<b>\$23,000</b>	<b>\$2,898,000</b>
<b>Pipe**</b>		<b>85</b>	<b>448800</b>	<b>\$100</b>	<b>\$44,880,000</b>
<b>Constructed Channels</b>		<b>22</b>	<b>116160</b>	<b>\$100</b>	<b>\$11,616,000</b>
<b>Inlets*</b>	<b>4527</b>			<b>\$3,000</b>	<b>\$13,581,000</b>
<b>Junction Boxes</b>	<b>282</b>			<b>\$3,000</b>	<b>\$846,000</b>
<b>Detention Basins</b>	<b>400</b>			<b>\$30,000</b>	<b>\$12,000,000</b>
<b>Bridges*</b>	<b>36</b>			<b>\$600,000</b>	<b>\$21,600,000</b>
					<b>\$107,421,000</b>

\* These items on right-of-way are maintained by the Greene County Highway Department.

\*\*50% of the pipe in the existing system was assumed to be on right of way and therefore maintained by the Greene County Highway Department

## **What is being done currently to maintain the City and County infrastructure investments?**

Historically, there has been no long-term dedicated source to fund repair and replacement of the City's stormwater system. For that reason, repair/replacement of the system is primarily reactive in nature. This work is performed by the City's Street Maintenance crews and takes place primarily in the right-of-way. City crews also perform repair and replacement work on stormwater facilities outside the right-of-way as necessary when easements are present and maintenance has not been assigned to a property owners association or individual property owner. In addition to structural repairs/replacement, reactive maintenance includes cleaning out of debris and sediment from inlets, channels and larger accessible box culverts.

There is a crew of approximately 15 in this work group and they have numerous other duties such as snow removal, minor capital improvement projects, bridge inspections, and various other improvements not related to drainage such as streets, curbs, sidewalks and retaining walls. While this workgroup has maintenance of the stormwater system as one of its assignments, it is not dedicated solely to this function. Funding for this group is from the Motor Fuel Tax and the Use Tax with annual revenue of about \$1.6 million annually. It is estimated that, on average, about 50 percent of the work done by these crews is dedicated to stormwater. It is preferred that a dedicated funding source be developed for maintenance of the stormwater system, particularly outside of the street right-of-way. A funding source to provide for a prioritized long-term proactive maintenance plan is recommended.

City-owned properties that were acquired as flood buyouts, riparian corridors, or for the construction of stormwater improvements represent another type of investment that must be maintained. The work performed in this category is primarily mowing, brush/weed control, and planting/maintenance of trees and other vegetation. Funding is about \$300,000 annually and comes from the General Fund, Level Property Tax and Parks/Stormwater Tax reserves. Funding from the Level Property Tax and the Parks/Stormwater Tax are reserves from expired funding sources and will no longer be available within 2 years.

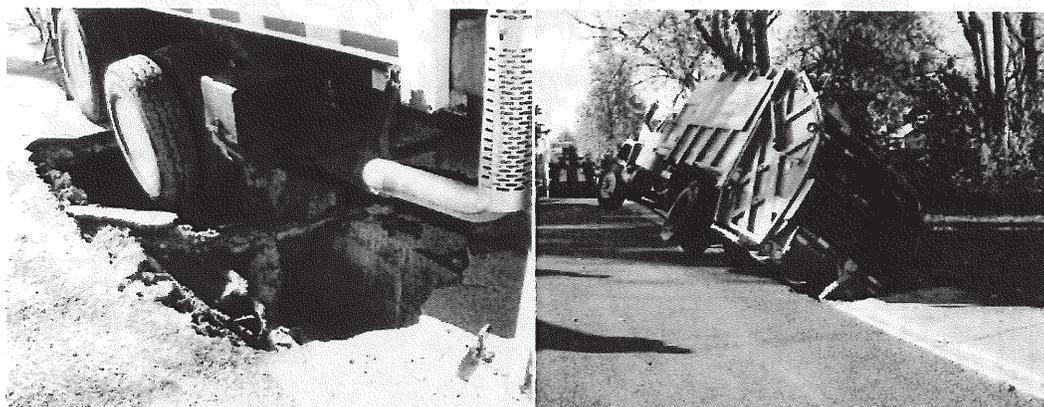
The Greene County Highway Department is tasked with maintaining all stormwater infrastructure that is within the public right-of-way in unincorporated Greene County. This includes bridge structures, most box culverts, curb inlets, roadside drainage ditches as well as about half of the stormwater pipe that is in the drainage network. The maintenance is funded by the portion of County sales tax and real property tax that is dedicated to Road and Bridge funds. The Greene County Highway Department does not maintain any stormwater infrastructure that is outside County right-of-way.

Responsibility for maintenance of storm system components such as inlets, pipes, and detention basins that are outside the public right-of-way falls to the individual property owners. In the case of most subdivisions there is a homeowner's association (HOA) that is supposed to assume maintenance responsibility. There is currently no effective mechanism to ensure that individual property owners or HOA's are performing adequate maintenance on the privately owned portions of the stormwater drainage system. Unfortunately, the result is little to no maintenance of pipes, inlets, and detention basins outside the right of way. In practice most maintenance is limited to minimal mowing of detention basins and the occasional cleaning out of trash.

## **What are the future needs?**

There is a concern that structures over 50 years of age are nearing the end of usefulness and reliability, posing a risk to the City and the public through structural collapses or other failures (Figures 6-7). Over the next 50 years, much of the older system will require repair, replacement or a completely new plan for the drainage corridor. As mentioned above, the portion of the stormwater infrastructure system that is >50 years old has a replacement cost of about \$160 million in 2013 dollars. It is recommended that the condition of the drainage system be evaluated and a prioritized long-term repair/replacement program be developed and funded to ensure the integrity of the system. Phase 1 of

this program would likely focus on evaluating the condition of the system that is known to be greater than 50 years old and funding critical repair/replacement needs found in these areas.



Figures 6-7: Examples of box culvert collapses

As previously stated, most of the stormwater infrastructure in the County is in developments that were constructed after about 1990. Most developments prior to 1990 were designed and constructed with little or no attention given to stormwater conveyance. Consequently developments prior to 1990 have either inadequate or non-existent storm drainage which results in flooding and safety issues. An estimate of the cost to bring this inadequate infrastructure up to current standards was made by multiplying the number of platted parcels (11,168) by the average per lot cost of installing stormwater conveyance in new development (\$5,500). The result is an estimated \$61 million needed to retrofit these developments to bring these inadequately served areas up to current standards. Figure 8 shows the extent of developments prior to 1990. The existing infrastructure replacement cost of \$47 million combined with \$61 million in retrofit needs gives a total unfunded value of approximately \$108 million for Greene County's stormwater conveyance system. When divided over 100 years this gives an estimated annual replacement and retrofit cost of \$1,080,000.

The maintenance of stormwater infrastructure on private properties in the County presents many challenges going into the future. Requiring maintenance by individual property owners places the full financial burden of system maintenance and replacement on just a few individuals even though the system benefits everyone whether in the development, or downstream of the property owner. Likewise, unless all individual owners perform adequate maintenance and replacement as needed, then as the system ages and begins to fail it can no longer provide the flooding protection and water quality functions it was designed for. Without a mechanism for adequate maintenance for the privately-owned portions of the stormwater system, flood protection and water quality will deteriorate.

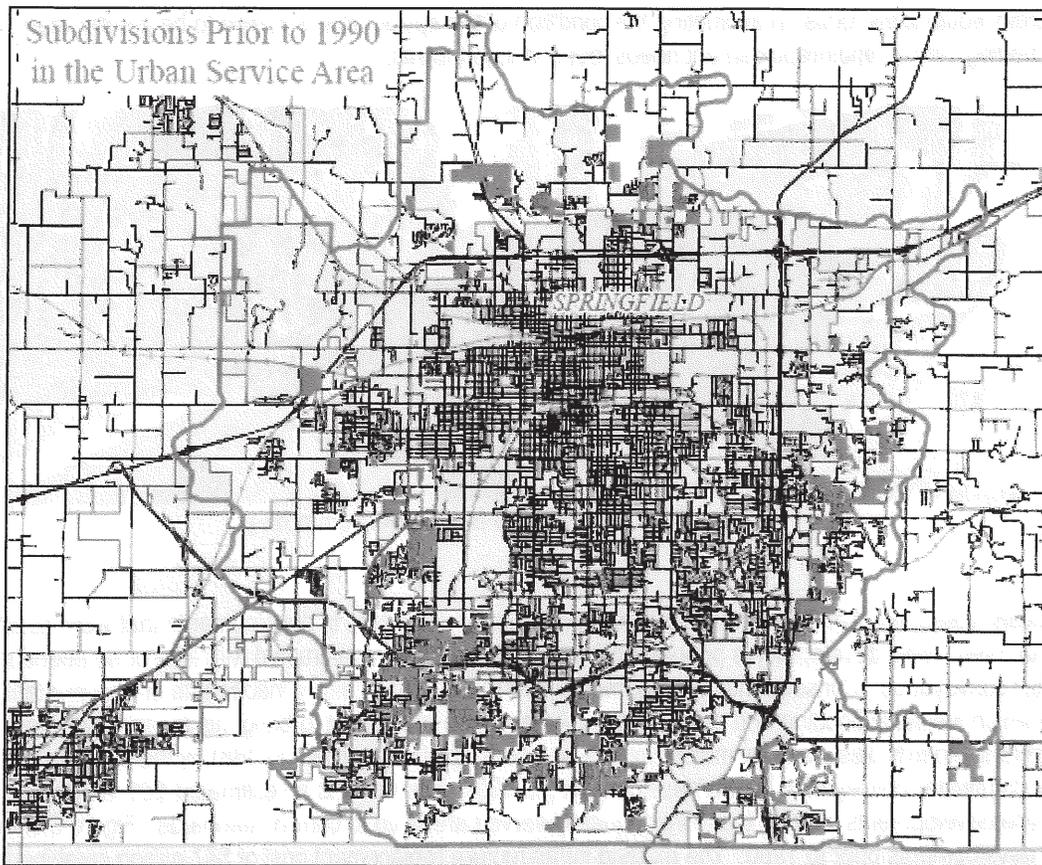


Figure 8: Greene County developments in the Urban Services Area built before 1990

**City of Springfield - Greene County, Missouri**  
**Stormwater Management Task Force Meeting**



**Date:** Thursday, February 7, 2013  
5:00 to 7:00 p.m.

**Location:** Public Safety Center  
330 West Scott Street  
Springfield, Missouri 65802

**Meeting purposes:**

- Select guiding principles to assist the Task Force members in their role, process, and issues to be addressed.
- Provide background on revenue sources.
- Where should the City and the County focus their efforts to address needs?
- What are the pros and cons of each revenue source?

**AGENDA**

5:00 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:10 p.m.	Survey Results & Task Force Discussion	Sheila Shockey
5:30 p.m.	Revenue Options Discussion	All
6:45 p.m.	Next steps - Information needed for upcoming meetings	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:00 p.m.	Adjourn	

***In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.***

Springfield/Greene County, Missouri  
Stormwater Management Task Force Meeting #4  
Meeting Notes  
January 17, 2013

**Welcome & Introductions**

The Springfield/Greene County, Missouri Stormwater Management Task Force met in the Springfield – Greene County Public Safety Center. The meeting commenced at 5:00 p.m.

Task Force Co-chair Dan Hoy welcomed the Task Force members and community members in attendance. Those present included the following.

**Task Force**

Daniel Beckman  
Fred Palmerton  
Matthew Pierson  
Karen Spence  
Jerany Jackson  
Geoffery Butler  
Dana Elwell

Dave Murray  
Patrick Harrington  
Chris Carson  
Stacey Armstrong  
Tiffany Frey  
Fred Schlegel  
Andy Hosmer

Ronda Headland  
Casey Haynes  
Dan Hoy  
Tom Kissee  
Bill Bretall  
Chris Macioce  
Tom DeWitt

Absent: Brian Perdue, Rick Scarlet, Aaron Wahlquist, Patty Hamilton, Erik Fjeseth, King Coltrin, Harlan Hill, Matt Bailey

**City and County Staff**

Kevin Barnes  
Vanessa Brandon  
Phil Broyles  
Greg Burris  
Chris Coulter  
Sarah Davis

Tim Davis  
Carrie Lamb  
Barbara Lucks  
Fred Marty  
Steve Meyer  
Tim Smith

Todd Wagner  
Kimberly White  
Jon Williams  
Jan Millington  
Sheila Shockey  
Shelby Ferguson

**Community Stakeholders:**

Michael Pinkley  
Milton Dickensheet  
Mike Pessina

## Repair and Replacement Infrastructure

Todd Wagner, Stormwater Engineer, City of Springfield, began by focusing on infrastructure repair and replacement, including the age and size of the infrastructure.

He reviewed the three areas of stormwater management: flood risk and damage reduction, water quality protection, and maintenance infrastructure investment. Mr. Wagner said he would present what has been done in the City. Kevin Barnes Stormwater Engineer, Greene County, will talk about what has been done in the County.

Currently, the City has a drainage system map which includes the City's entire infrastructure, with the exception of a few older areas. The infrastructure system is made up of open systems, grass or concrete channels, box culverts, inlet structures and junction box structures.

The majority of the infrastructure is 0-20 years-old, making up 46 percent of the system. Infrastructure 20-50 years-old comprises 27 percent of the system, and infrastructure more than 50 years-old also comprises 27 percent. Although the majority of infrastructure is 20 years of age or less, the system size has doubled with newer, small pipes and inlets. In addition, replacement cost is greater for areas 50 years of age and older. The older infrastructure has larger pipes and requires more work to replace, with a replacement cost of \$160 million. The estimated replacement cost of the current constructed system is \$500 million, an average of \$5 million for the next 100 years.

The following is an inventory breakdown of the infrastructure system by category and maintenance requirements:

- Pipes – 294 miles
  - Erosion around the pipe, generally on the top
- Box Culverts – 59 miles
  - Size-width and height cause problems for crews to efficiently access with vehicles
- Grass and Concrete Open Channels – 321 miles
  - Concrete channels require restoration of walls, concrete repair and removal of debris and sediment
  - Grass channels require frequent mowing and removal of debris
- Inlet Structures – 13,324
  - Damage from maintenance vehicles and traffic
- Junction Boxes – 1,947
  - Damage from maintenance vehicles and traffic
- Flood Control/Water Quality Basins – 1,050
  - Regular maintenance, sometimes specialized
- Best Management Practices - 250
  - Regular maintenance, sometimes specialized

Maintenance of these systems is a continuous effort on the City and County's part with no long-term dedicated source to fund maintenance of the stormwater system. Currently, maintenance of the system is broken down into two general categories: Reactive Maintenance and Vegetation Maintenance.

*Reactive Maintenance* – These are areas of routine maintenance with concerns about sediment, weeds and other debris. These are maintained by street crews and the majority of these areas are in the right-of-way. This type of maintenance is funded through the gas tax, use tax and transportation fund.

*Vegetative Maintenance* – These are areas of routine maintenance including mowing, bush/weed control and planting of trees and other natural vegetation. This type of maintenance is funded through the gas tax, use tax and transportation fund.

Kevin Barnes, Greene County, gave a brief overview of similar infrastructure, located in the urban services area, which is development served by the sanitary sewer and rural areas outside of the city limits. The system in these areas was mostly built since 1990. Areas built before 1990 had minimal consideration for stormwater management.

The value of Greene County's stormwater system is approximately \$100 million, of which \$40 million is private infrastructure needing retrofitting consideration as the structures age. The remaining \$60 million is highway funds/right-of-way.

The following is the breakdown of infrastructure by category for the county:

- Box Culverts - 126
- Inlets and Junction Structures – 4,809
- Pipe – 85 miles
- Detention Basins – 400
- Open Channels – 22 miles

Maintenance of the County infrastructure is inspected during construction phases to ensure functionality and maximize serviceable life before repairs are necessary. In systems within the right-of-way, crews replace and repair as necessary, while also removing debris and sediment from large box culverts and bridges. The County's maintenance for private properties is minimal due to the inability to enforce maintenance codes on properties containing pipes, inlets and other hard structures.

## Questions and Answers

Task Force members asked questions and the following answers were given by the support team:

**Question:** Of those 13,324 inlet structures, how many are precast?

**Response:** Almost all have precast lids, but there are some which have precast bases.

**Question:** Is all of the vegetation maintenance done by the City and City employees?

**Response:** Yes.

**Question:** Is there a human health concern for young adults, kids and maintenance crews who go into box culverts and get hurt? Is there contact with police or hospitals to keep track of how many incidents occur in or around the culverts?

**Response:** This is a concern, but we do not keep records or notifications of these incidents involving residents who have entered the box culverts.

**Question:** Are you able to teach homeowners how to maintain the channels? If so how do you educate them?

**Response:** We are able to educate homeowners with basic maintenance guidelines for mowing and keeping the channel free of debris.

**Question:** Is maintaining the channel the property owner's responsibility?

**Response:** When the channel is located behind their home, yes, they are responsible. Unfortunately it's difficult to enforce maintenance, due to drainage laws.

**Question:** Are there property maintenance codes?

**Response:** No.

## Task Force Survey Results Discussion

Sheila Shockey reported that 23 members of the Task Force participated in a Guiding Principles survey. The purpose of the survey was to gain initial input and help guide decision-making regarding the City of Springfield & Greene County's stormwater management programs. The survey was comprised of nine questions, all of which asked respondents to provide their "level of agreement." Five response options were provided: strongly agree, agree, neutral, disagree and strongly disagree.

The results showed agreement on the Public Acceptance and Ease of Administration survey topics with some of them showing "neutral" responses. The survey results showed some disagreement on the survey topics: Economic Development, Equity/Fairness and Ability to Pay.

### **Economic Development:**

The Task Force discussed rewording the *Economic Development* guiding principle:

*"Tax rates and/or fees should be competitive with other jurisdictions to help attract and retain businesses and citizens."* The following points were discussed:

1. Don't try to be the cheapest and miss out on the opportunities.
2. Economic energy drives everything. If you don't have that then you can't pay for anything.
3. It would be more appealing if it said "was adequate to services."
4. What's important is: as long as you can do the things that you need to--- balance the needs.
5. If we are going to make a statement about economic development we need to have a statement about striving for competitive tax rates and another about the value of what we receive.

Task Force members generally agreed to add "We safeguard our water resources" and to change "should be competitive" to "while keeping tax rates and fees competitive."

*"We safeguard our water resources while keeping tax rates and fees competitive with other jurisdictions to attract and retain businesses and citizens."*

There was also general agreement to add a second principle for Economic Development:

*"We attract businesses and citizens to our community because of the value gained through investments made in environmental stewardship."*

### **Equity/Fairness**

The Task Force talked about rewording the *Equity/Fairness* guiding principle:

*"Everyone in the community should pay their fair share for stormwater management."*

1. *Fair share* is the issue in this statement.
2. Just because it's controversial doesn't mean we shouldn't use it.
3. It doesn't matter who is at the bottom or top and/or has the problem, everyone should pay.
4. We need to consider those who have made infrastructure improvements and are proactive in helping stormwater issues.
5. We need to consider incentives for those who go above and beyond.

There was a general agreement to take out "fair share" and leave the guiding principle intact otherwise.  
*"Everyone in the community should pay for stormwater management."*

The Task Force talked about rewording the *Equity/Fairness* guiding principle:

*"The funding of stormwater management should be linked directly to the amount of runoff a property produces. Those who cause more of the problem pay more for the stormwater services management."*

Comments included:

1. This one is difficult as you are going to have runoff no matter what, but it just depends on the factors and what type of conditions you have.
2. How we fund the stormwater utility is the ultimate question.
3. What about using the word "negatively" impact?
4. We need to consider that we all own the watershed and not just the small section we live on or own. It's our responsibility as a whole.

The Task Force agreed to put this guiding principle on hold and continue the discussion at the next meeting.

### **Ability to Pay**

The Task Force discussed rewording the *Ability to Pay* guiding principle:

*"A program should be developed to reduce the burden of paying for the stormwater management on low-income households, spreading the subsidy across to other citizens."*

Comments included:

1. Many households would have difficulties paying more for stormwater. Maybe we should look at the 2% of median household income that regulatory agencies use to determine affordability.
2. Consider that many low-income families rent. The property owners are the ones affected.

There was a general agreement to put this guiding principle on hold and continue the discussion at the next Task Force meeting.

### **Equity/Fairness**

The Task Force talked about rewording the *Equity/Fairness* guiding principle:

*"The funding of stormwater management should be linked directly to use of the service. Those who need the services pay more."*

The Task Force agreed to delete this guiding principle.

### **Equity/Fairness**

The Task Force discussed rewording the *Equity/Fairness* guiding principle:

*"New development and redevelopment should not cause downstream impacts. The costs should be fully recovered."*

1. There is the issue that you can't make everyone fix something.
2. "As known by current science" should be added to this statement, allowing for the principle to evolve as science does.

There was general agreement for the time to add "negative" before impacts. The following sentence was also added: *"This should consider water quality and flooding using sound science."*

*"New development and redevelopment should not cause negative downstream impacts. This should consider water quality and flooding using sound science"* in the revised statement, which is still under discussion with potential deletion of the complete statement.

Ms. Shockey wrapped up the meeting with a quick session of five keypad polling statements regarding *Priorities*. She asked the Task Force to rate their level of importance for each Priority. Five options were provided: "very important," "important," "neutral," "not important," "should not be funded."

The following are the Priority statements the Task Force participated in and the results listed in priority order:

1. How important is it to fund projects/programs that reduce the risk of injury or death due to flooding those that keep streets from flooding and bridges from overtopping? (very important 54%, important 46%)
2. How important is it to fund projects that have multiple benefits: those that reduce flood damage and risk, improve water quality and help main existing infrastructure while creating community amenities? (very important 41%, important 59%)
3. How important are projects and programs that protect water quality and help our community comply with water quality regulations? (very important 53%, important 67%, neutral 6%)
4. How important is it to make sure the system we have in place to manage stormwater is in good repair by investing in proactive rather than reactive maintenance of the system? (very important 28%, important 67%, neutral 6%)
5. How important are projects that reduce property damage due to flooding - those projects/programs that keep buildings from flooding? (very important 57%, important 36%, neutral 7%)

After the Task Force rated their level of importance for the Priority statements they were asked to finish by ranking their top two priorities from the following statements. The statements are listed in the order in which they were ranked by the Task Force.

1. Projects and programs that protect water quality and help our community comply with regulations should be the highest priority. (12 votes)
2. Projects that reduce the risk of injury or death due to flooding should be the highest priority. (9 votes)
3. Projects that have multiple benefits should be the highest priority. (6 votes)
4. Projects that reduce property damage due to flooding should be the highest priority. (5 votes)
5. Our community's highest priority is to make sure the system we have in place to manage stormwater is in good repair by investing in proactive rather than reactive maintenance of the system. It is important to protect our investment in the existing stormwater management systems. (4 votes)

### **Next Steps and Closing Remarks**

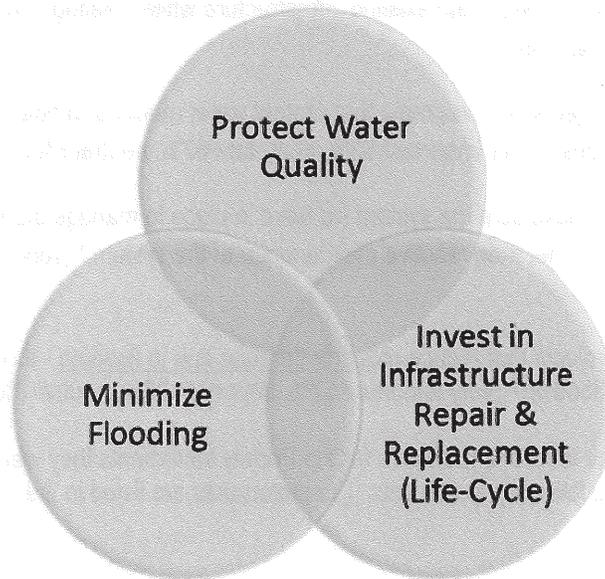
Ms. Shockey and Mr. Hoy thanked the Task Force for their participation and reminded them the next meeting would cover funding mechanisms next month: **February 7, 2013, 5:00-7:00 p.m. at the Springfield – Greene County Public Safety Center.**

The meeting was adjourned at 7:05 p.m.

# Stormwater Funding: History & Options

## Introduction

This report focuses on potential major funding sources. Supplemental revenue sources do not provide enough funds to cover the basic costs of the stormwater program. Revenue estimates provided in the following discussion are estimates and based on available data. This report also provides expenditure projections based upon various service levels. The Task Force is charged with identifying funding source(s) and recommending the amount of each stormwater program area represented by the "circles" below.



## Historical Funding Sources and Levels

The City of Springfield has funded stormwater management using several sources of revenue:

- Property Tax
  - Level Property Tax used to pay back bond issues for capital projects
- Gas Tax & Use Tax (from Street Maintenance Fund)
- Sales Tax from general sales tax and a revenue allocation from two specific sales taxes.
  - The primary source of revenue in the General Fund is sales tax.
  - ¼ cent City Capital Improvement Sales Tax (subject to voter approval and internal appropriation every three years)
  - County Parks & Stormwater Sales Tax – 1/8 cent with a portion allocated by County to City with a 5-year term expired July 2012

Greene County has funded stormwater management using two primary sources of revenue:

- County Parks & Stormwater Sales Tax
- General Fund (comprised of sales & property tax)

Both programs have also received state/federal grant funds. Grants typically require a local match of 20 to 50 percent local funds. They are not a consistent source of revenue. The following is a description of primary funding sources and historical levels.

#### *Level Property Tax:*

The City of Springfield has used level property tax revenues in the past to pay back \$56 million in General Obligation (GO) bonds issued between 1995 – 2011. The bonds for stormwater projects will be paid off in 2031. The tax is 26 cents per \$100 of assessed valuation which generates \$8 million per year. Sixty-percent (60%) or 16 cents, generating \$4.8 million annually, is used to pay back the debt for stormwater projects. As capacity is available the City can ask voters to approve new projects without raising property tax. The annual surplus or capacity is \$800,000 in 2014, \$1 million in 2016 and goes up to \$8.1 million in 2031. The City is currently planning to use the available level property tax funds beginning in 2016 to fund replacement of equipment and major repairs to city buildings.

#### *Gas Tax & Use Tax (from Street Maintenance Fund):*

The City of Springfield uses funds from the Street Maintenance Fund to pay for maintenance staff and expenses. This would include repairs, minor capital improvements, and channel cleanouts. Gas Tax & Use Tax go into the Street Maintenance Fund. A Gas Tax is a tax on fuel. A Use Tax is a tax on goods and services over \$2,000 purchased out-of-state.

#### *General Fund:*

The City's General fund contributions are approximately \$500,000 per year. This is used for administrative costs of operating the stormwater program and maintenance activities such as repairs, minor capital improvements, channel cleanouts, mowing and tree maintenance. The source of General Fund dollars is primarily sales tax, payment in-lieu of taxes and use tax.

The County's General Revenue Fund contributions are approximately \$250,000 per year. This was used for operations of the stormwater program. The source of revenue for the General Revenue Fund is primarily sales tax and property tax.

#### *City Capital Improvement ¼ cent Sales Tax:*

This sales tax was passed in 2010 and generates about \$8 million per year for the City of Springfield. For the three year period, 2010 – 2012, the City has allocated a total of \$2 million for stormwater improvements from this source; specifically for flood control projects. This sales tax will sunset in 2013. Voters will be asked to renew it in April 2013 for three more years. The proposal is to have \$4.5 million of revenue over next 3 years for stormwater if the sales tax is approved by voters.

#### *County Parks/Stormwater Sales Tax:*

Collected from July 1, 2007 to June 30, 2012, the ¼ cent sales tax was used to fund park and stormwater improvements. One half of the total tax or 1/8 cent was used for stormwater improvements benefitting parks. The 1/8<sup>th</sup> cent portion generated a total of \$24.2 million, or \$5.15 million annually and the revenue was allocated to stormwater management for the cities and county based upon population. Springfield's total was \$16.2 million over that time period or approximately \$3.24 million annually. The County's total was \$ 7.7 million over that time period or approximately \$ 1.54 million annually. This funded operations and capital projects.

The Springfield/Greene County Parks Board received half of the ¼ cent sales tax. There was no sunset on Parks' portion and this tax is still in place. Stormwater programs received half of the sales tax or 1/8<sup>th</sup> cent and this portion had a sunset ending in 2012. Missouri law allows counties to enact a maximum of ½ cent sales tax for parks and/or stormwater management.

#### *Historical Summary:*

The following tables show revenue sources and totals historically for the City and County stormwater management programs.

**Table 1. City of Springfield Annual Funding Summary**

Revenue Source	2008	2009	2010	2011	2012
General Fund – Stormwater Division	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
Level Property Tax - Mowing	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
City Gas/Use Tax -- Maintenance.	\$800,000	\$800,000	\$800,000	\$800,000	\$800,000
City Level Property Tax – System Improvements	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000
County Parks/Stormwater Sales Tax (1/8th)	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000
City Capital Improvement Tax (1/4 cent-part to Stormwater)	\$0	\$0	\$500,000	\$500,000	\$500,000
<b>Total</b>	<b>\$8,500,000</b>	<b>\$8,500,000</b>	<b>\$9,000,000</b>	<b>\$9,000,000</b>	<b>\$9,000,000</b>

**Table 2. County Stormwater Program Funding Breakdown (2000-2012)**

Revenue Source	2000-2012	Average Annual
Federal/State Funds	\$ 700,000	\$ 53,846
Parks/Stormwater Sales Tax (2007-2012)	\$7,700,000	\$ 592,307
General Fund (approx. \$250,000/year 2007-2012)	\$1,500,000	\$ 250,000
<b>TOTAL 1995 - 2012</b>	<b>\$9,900,000</b>	<b>\$896,153</b>

The County received only two grants, one in 2000 to buy flooded homes in the FEMA floodplain, and a smaller one in 2006 for stream stabilization. These totaled \$700,000, but federal/state grants are not an ongoing funding source.

### Potential Sources Moving Forward

The City of Springfield has three (3) primary sources of revenue available to fund stormwater management in the future: property tax, sales tax and utility. The following are some options available for each revenue source.

- Property Tax
  - Use a portion of existing property tax revenue from property tax;
  - Increase property taxes through a public vote; and
  - Use a portion of Level Property Tax as existing stormwater debt is paid off.
  
- Sales Tax
  - Use a portion of existing sales tax revenue from General Fund;
  - Use a portion of City Capital Improvement Sales Tax on the ballot in 2013;
  - Use a portion of County Parks & Stormwater Sales Tax;
  - Increase the County Parks & Stormwater Sales Tax; and
  - Enact a new 1/10<sup>th</sup> cent Sales Tax authorized by the State to address water quality.

- Utility
  - Enact a user-fee based stormwater utility related to the level of usage of the system, typically measured by the amount of runoff that leaves a property.

Greene County has three (3) primary sources of revenue available to fund stormwater management in the future: property tax, sales tax and utility. The following are some options available for each revenue source.

- Property Tax
  - Use a portion of existing property tax revenue from General Revenue Fund; and
  - Increase property taxes through a public vote.
- Sales Tax
  - Use a portion of existing sales tax revenue from General Fund;
  - Use a portion of County Parks & Stormwater Sales Tax; and
  - Increase the County Parks & Stormwater Sales Tax
  - Enact a new 1/10th cent Sales Tax authorized by the State to address water quality.
- Utility
  - Enact a user-fee based stormwater utility related to the level of usage of the system, typically measured by the amount of runoff that leaves a property.

The following describes each revenue source in more detail and provides an indication of the revenue that could be generated with each source.

**Property Tax**

Property tax is levied on real estate and personal property, such as automobiles, boats and equipment. Many programs and capital projects compete for City and County property tax funding. These competing uses must be considered when choosing to use property taxes to pay for stormwater management. A permanent dedicated property tax levy could be approved by voters for stormwater management.

A \$0.01 cent of \$100 assessed valuation increase in county-wide property tax would generate approximately \$400,000 annually. A \$0.01 cent of \$100 assessed valuation increase in property tax generates \$300,000 annually for the City. An example of a tax bill for a \$120,000 residential property is listed in Table 3 to show the relative tax levy for each taxing entity.

**Table 3. Example Tax Bill**

<b>Residential Property Inside Springfield City Limits, \$120,000 Value</b>		
<b>Taxing District</b>	<b>2012 Levy</b>	<b>Amount</b>
Springfield R12 School District	3.6999	\$843.58
City of Springfield	0.6083	\$138.69
Springfield-Greene County Library	0.2433	\$55.47
Ozarks Community Technical College	0.1408	\$32.10
County Road & Bridge	0.1206	\$27.50
County General Revenue	0.1206	\$27.50
County Senior Citizens' Services	0.0496	\$11.31
County Developmental Disability Programs	0.0466	\$10.62
State of Missouri	0.03	\$6.84
	<b>Total</b>	<b>\$1,153.61</b>

<b>Residential Property In Northern Greene County, \$120,000 Value</b>		
<b>Taxing District</b>	<b>2012 Levy</b>	<b>Amount</b>
Pleasant Hope School District	4.054	\$924.31
Ebenezer Fire District	0.8579	\$195.60
Springfield-Greene County Library	0.2433	\$55.47
Ozarks Community Technical College	0.1408	\$32.10
County Road & Bridge	0.1206	\$27.50
County General Revenue	0.1206	\$27.50
County Senior Citizens' Services	0.0496	\$11.31
County Developmental Disability Programs	0.0466	\$10.62
State of Missouri	0.03	\$6.84
	<b>Total</b>	<b>\$1,291.26</b>

A comparison of property tax rates for benchmark communities is provided in Table 7 near the end of this paper.

**Sales Tax**

Sales taxes dedicated to stormwater are common revenue sources for local governments. All sales taxes in Missouri are subject to the Hancock Amendment and must be approved by voters.

Table 4 includes revenue estimates for four sales rate tax options for Springfield and Greene County. Nearly 100 Missouri cities have implemented local sales taxes for stormwater programs. A comparison of sales tax rates for benchmark communities is provided in Table 7 near the end of this paper.

**Table 4. Estimated Annual Revenue - Summary  
Various Sales Tax Rates**

	<b>1/10th Sales Tax</b>	<b>1/8th Sales Tax</b>	<b>1/4<sup>th</sup> Sales Tax</b>	<b>1/2 Sales Tax</b>
Greene County, Missouri	\$ 4,035,359.22	\$ 5,147,110.98	\$ 10,088,398.06	\$ 20,176,796.12

**Stormwater Utility**

Municipalities and governmental entities create stormwater utilities so that dedicated funds are available to operate, maintain, manage, construct or reconstruct their municipal stormwater drainage systems. A stormwater utility is a dedicated revenue source intended to alleviate the burden on general funds. Essentially, the stormwater utility is identical to a water or sanitary sewer utility, in which the utility's users finance the utility's infrastructure costs. The stormwater utility charge is not associated in any way with property value, property taxes, or the owner's income.

Typically, the municipality charges a stormwater utility fee to all users within the city based on the amount of runoff that each property generates and contributes to the stormwater system. As a rule, the runoff generated relates directly to the amount of hard surface, or impervious area, found on the property. Hard surfaces such as roof-tops, driveways, and parking lots prevent rainfall from infiltrating into the ground, thus increasing the amount of runoff that a property generates. Consequently, a property with more impervious area uses the stormwater system to a greater

extent than a property with less hard surface. For estimation purposes, we calculated an average amount of hard surface a single-family residential property would have at 3,200 square feet. All other properties would pay a fee based upon the amount of hard surface they have divided by 3,200 square feet which is an Equivalent Residential Unit (ERU). Table 5 shows the estimated annual revenue generated by a stormwater utility, based on various rate levels. Three rate levels are selected for demonstration purposes, \$2 per month, \$3 per month and \$5 per month. These are within the range of stormwater utility rates in other communities (see Table 7). A stormwater utility can be implemented in a variety of ways to meet the community's needs, such as phasing in the rate over a period of time and allowing credits for installation of BMPs and good practices.

**Table 5. Estimated Annual Revenue By Area at Various Levels**

Impervious Areas Covered	Revenue/Year @ \$2/month/ERU	Revenue/Year @ \$3/month/ERU	Revenue/Year @ \$5/month/ERU
Springfield	\$4,219,314	\$6,328,972	\$10,548,286
Urban Service Area	\$948,861	\$ 1,423,292	\$2,372,154
Greene County	\$2,040,278	\$3,060,416	\$5,100,694
Total	\$7,118,453	\$10,812,680	\$18,021,134

A stormwater utility is often viewed as a tax but it is not a tax. It is a user fee. It is based upon the amount of impervious surface on a property and does not consider ability to pay or property classifications. For example, government and nonprofit tax payers do not pay sales tax. Properties owned by government or non-profit entities are not subject to paying property tax. A stormwater utility charges all properties with hard surfaces, even government and nonprofit entities because they generate stormwater runoff. Government and nonprofit entities pay for other utilities such as water, sewer, gas and electric. Table 6 on the next page provides a few examples of the annual fees that would be paid by a few example properties.

**Table 6. Examples of Commercial and Institutional Rates By Area at Various Rate Levels**

Example Properties	Property Size	Number of Parcels	Equivalent Residential Units, ERU	Base Rate	Monthly Fee	Annual Fee
Ridgecrest Baptist Church	12.9 acres	1	175	\$ 3.00	\$ 525	\$ 6,300
Price Cutter - Republic Road	6.3 acres	1	85.8	\$ 3.00	\$ 257	\$ 3,089
Battlefield Mall	90 acres	1	1225	\$ 3.00	\$ 3,675	\$44,100
Greene County	27.4 acres	2	373	\$ 3.00	\$ 1,119	\$13,428
City of Springfield	890 acres	1+	12,115	\$ 3.00	\$36,345	\$436,140
Ridgecrest Baptist Church	12.9 acres	1	175	\$ 5.00	\$ 875	\$10,500
Price Cutter - Republic Road	6.3 acres	1	85.8	\$ 5.00	\$ 429	\$ 5,148
Battlefield Mall	90 acres	1	1225	\$ 5.00	\$ 6,125	\$73,500
Greene County	27.4 acres	2	373	\$ 5.00	\$ 1,865	\$22,380
City of Springfield	890 acres	1+	12,115	\$ 5.00	\$ 60,575	\$726,900

## Comparisons of Tax/Utility Rate Levels to Benchmark Communities

The following table compares Springfield to their benchmark cities in terms of sales tax, property tax, income tax and stormwater utility levels.

**Table 7. Rate Comparisons of Selected Municipalities  
Sales Tax, Property Tax, Stormwater Utility, Income Tax**

Community	Sales Tax Rate	Property Tax Median RET Rate per \$1000 Value	Stormwater Utility Monthly Fee	State Income Tax Rate
Kalamazoo, MI	6.00%	19.33	N/A	4.35%*
Grand Rapids, MI	6.00%	13.08	N/A	4.35%*
Salt Lake City, UT	6.85%	6.49	\$3.00	5%
Savannah, GA	7.00%	6.58	N/A	6%
Evansville, IN	7.00%	7.65	N/A	3.4%*
Fort Wayne, IN	7.00%	9.37	\$3.65	3.4%*
Columbia, SC	7.00%	7.19	\$3.95	7%
<b>Springfield, MO</b>	<b>7.60%</b>	<b>7.50</b>	<b>N/A</b>	<b>6%</b>
Columbus, GA	8.00%	4.50	N/A	6%
Huntsville, AL	8.00%	4.58	N/A	5%
Abilene, TX	8.25%	14.99	\$2.45	0
Amarillo, TX	8.25%	17.65	N/A	0
Waco, TX	8.25%	15.91	N/A	0
Wichita Falls, TX	8.25%	17.23	\$1.75	0
Chattanooga, TN	9.25%	10.19	\$3.00	6%
Knoxville, TN	9.25%	10.18	N/A	6%

Notes:

1. \* percent of Federal adjusted gross income with modification
2. Sales Tax Rates are from [www.sale-tax.com](http://www.sale-tax.com)
3. Property Tax information is from NAHB study and represents 2009 effective property tax rates
4. Stormwater Utility information is from the "Western Kentucky University Stormwater Utility Survey 2007"
5. State Income Tax information is from [www.taxfoundation.org](http://www.taxfoundation.org). Rates are for a household income of \$40,000 as of July 1, 2012.

There are a pros and cons to each type of funding source considered. Table 9 below lists them.

**Table 8. Pros and Cons of Funding Sources**

Pros & Cons to Consider	Property Tax	Sales Tax	Utility
All entities in the community pay.	No	No	Yes
Visitors from outside the community pay.	No	Yes	No
Those who generate more stormwater runoff pay more.	No	No	Yes
Cost to establish billing system is minimal.	Yes	Yes	No
Easy to administer billing system.	Yes	Yes	No
Requires a vote of the people.	Yes	Yes	Yes
Stable source of revenue -- doesn't fluctuate with the economy.	No	No	Yes
Voters have approved in the past.	Yes	Yes	No
Structure considers ability to pay.	No	No	No
Stormwater competes with other funding needs unless dedicated specifically to stormwater	Yes	Yes	No

**Supplemental Funds**

Supplemental funding sources are those that can enhance stormwater program elements when funds are available or economic forces make them feasible. These include the following:

- Permit fees – funds permit application review and approval.
- State & Federal Grants
- U.S. Army Corps of Engineers – federal budget earmark projects.

## Expenditure Projections by Various Service Levels

Table 9 provides estimates through 2021 for the following service levels for the City of Springfield's Stormwater Program:

- Meet Water Quality Mandate (low estimate based upon current understanding of regulations);
- Meet Water Quality Mandate (high estimate based upon current understanding of regulations);
- Mandate (low) + Current Infrastructure Repair & Replacement Level which is minimal & reactive in nature;
- Mandate (low) + more Proactive Infrastructure Repair & Replacement Level;
- Mandate(low) + Current Infrastructure Repair & Replacement Level (reactive & minimal) + Current Flood Reduction Investment level (about \$5 million per year);
- Mandate (low)+ Proactive Infrastructure Repair & Replacement of Old System (\$5 - \$5.5 million per year) + Current Flood Reduction Service Level (\$5 million per year)

**Table 9. City of Springfield Projected Expenses by Service Level.**

Year	WQ Mandate (Minimum)	WQ Mandate (Maximum)	Mandate (low) + Proactive Infrastructure Repair & Replacement	Mandate (low) + Reactive Infrastructure Repair & Replacement + Current Flooding Service Level	Mandate (low) + Proactive Infrastructure Repair & Replacement + Current Flooding Service Level	Annual Revenue	Revenue Surplus (Shortfall - Max)
2013	\$850,000	\$1,000,000	\$5,850,000	\$7,050,000	\$10,850,000	\$5,000,000	\$(5,850,000)
2014	\$950,000	\$1,300,000	\$6,000,000	\$7,200,000	\$11,000,000	\$4,500,000	\$(6,500,000)
2015	\$1,300,000	\$2,812,500	\$6,370,000	\$7,570,000	\$11,370,000	\$3,000,000	\$(8,370,000)
2016	\$1,950,000	\$4,325,000	\$7,050,000	\$8,250,000	\$12,050,000	\$3,000,000	\$(9,050,000)
2017	\$2,212,500	\$5,500,000	\$7,362,500	\$8,562,500	\$12,362,500	\$1,500,000	\$(10,862,500)
2018	\$3,075,000	\$6,675,000	\$8,275,000	\$9,475,000	\$13,275,000	\$1,500,000	\$(11,775,000)
2019	\$3,167,250	\$6,875,250	\$8,467,250	\$9,667,250	\$13,467,250	\$1,500,000	\$(11,967,250)
2020	\$3,262,268	\$7,081,508	\$8,662,268	\$9,862,268	\$13,662,268	\$1,500,000	\$(12,162,268)
2021	\$3,360,136	\$7,293,953	\$8,860,136	\$10,060,136	\$13,860,136	\$1,500,000	\$(12,360,136)

The City's revenue estimate for 2014 – 2016 if the City Capital Improvements Sales Tax is passed on the April 2013 ballot includes \$1.5 million per year for capital projects. In 2021, the shortfall is between \$5.5 million to \$12.5 million.

The future numbers to meet mandates are based upon the best information available at this time. They assume the City and County reach agreement on the MS4 permit and current and future TMDLs that ultimately result in actions to improve waters on the 303d list and hold to requirements of the CWA and current and future rules and standards of DNR and EPA.

Chart 1 shows the current revenue levels and projected expenses for stormwater by service level for the City of Springfield, Missouri.

**Chart 1. City of Springfield Current Revenue Levels and Projected Expenses by Service Level.**

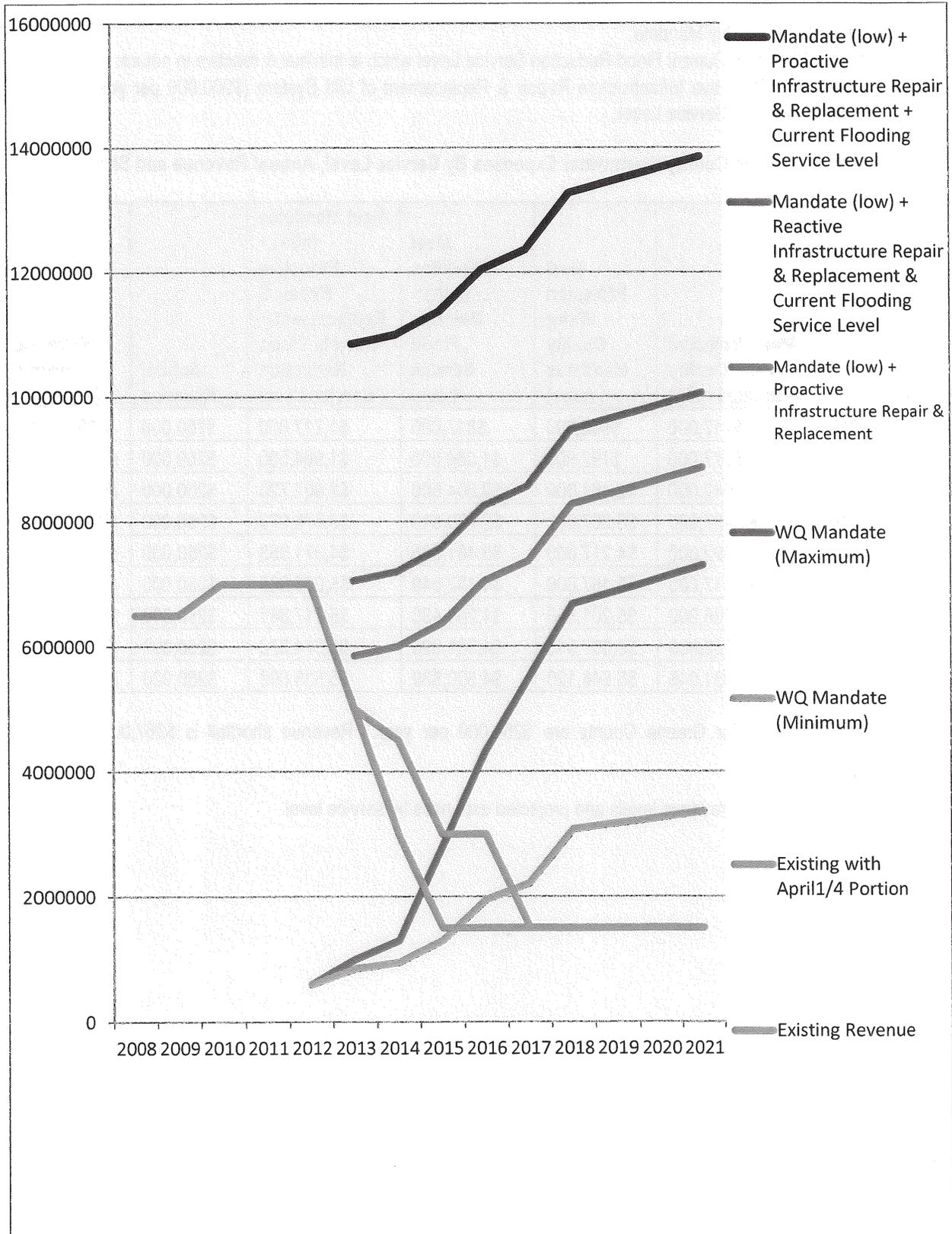


Table 10 provides estimates through 2021 for the following service levels for the Greene County's Stormwater Program:

- Meet Water Quality Mandate;
- Meet Mandate + Current Flood Reduction Service Level which is minimal & reactive in nature;
- Mandate + Proactive Infrastructure Repair & Replacement of Old System (\$900,000 per year) + Current Flood Reduction Service Level.

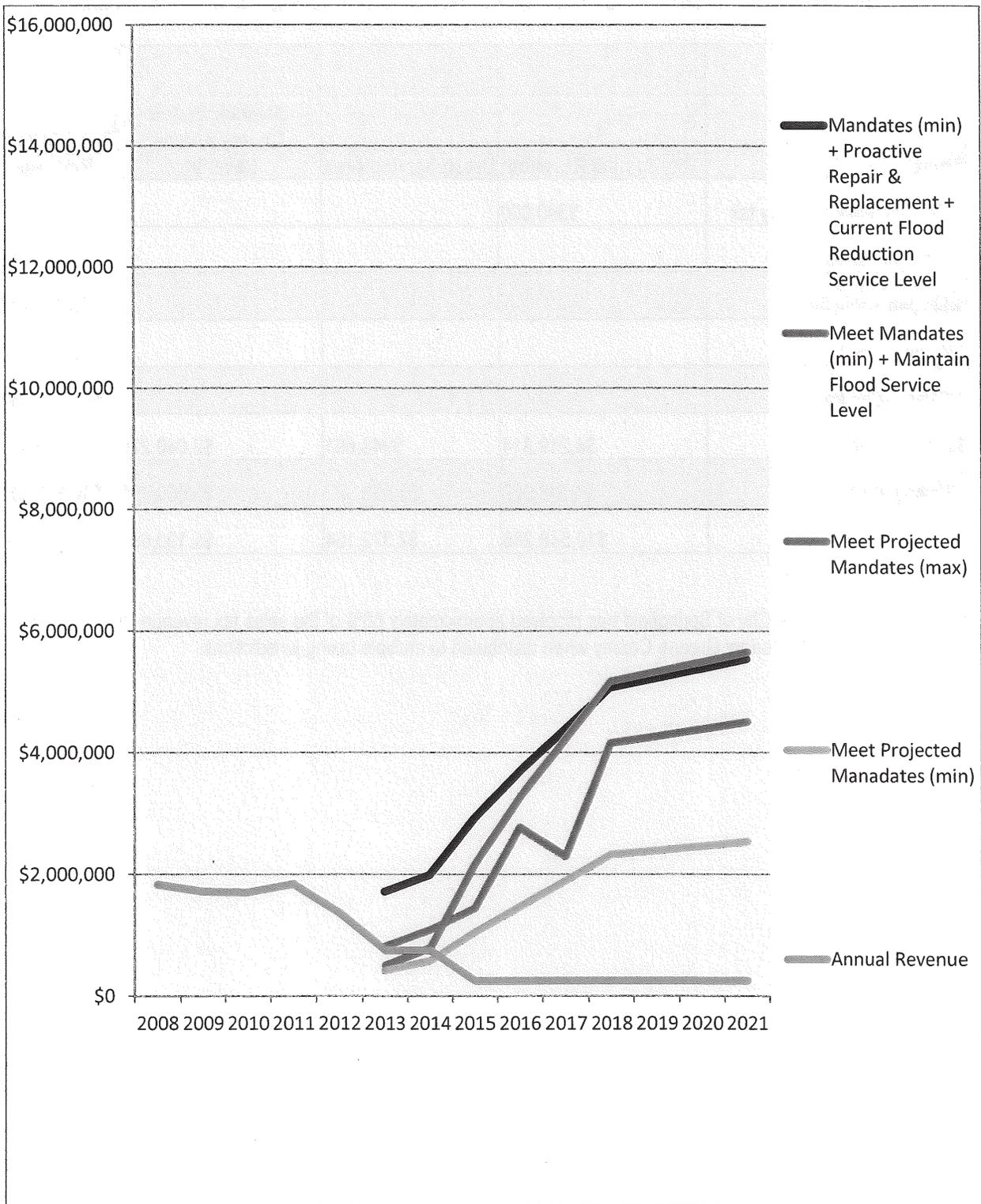
**Table 10. Greene County Stormwater Expenses By Service Level, Annual Revenue and Shortfall**

Year	Meet Projected Water Quality Mandates (min)	Meet Projected Water Quality Mandates (max)	Meet Mandates (min) + Maintain Flood Service Level	Meet Mandates (min) + Proactive Repair & Replacement + Current Flood Reduction Service Level	Annual Revenue	Revenue Surplus (Shortfall)
2013	\$417,000	\$500,000	\$817,000	\$1,717,000	\$750,000	(\$967,000)
2014	\$577,000	\$792,000	\$1,084,500	\$1,984,500	\$750,000	(\$1,234,500)
2015	\$1,042,000	\$2,167,000	\$2,004,500	\$2,907,720	\$250,000	(\$2,657,720)
2016	\$1,467,000	\$3,267,000	\$2,770,510	\$3,676,973	\$250,000	(\$3,426,973)
2017	\$1,892,000	\$4,217,000	\$3,461,625	\$4,371,353	\$250,000	(\$4,121,353)
2018	\$2,317,000	\$5,167,000	\$4,152,849	\$5,065,865	\$250,000	(\$4,815,865)
2019	\$2,266,000	\$5,201,500	\$4,265,435	\$5,217,841	\$250,000	(\$4,967,841)
2020	\$2,333,980	\$5,357,545	\$4,381,398	\$5,374,376	\$250,000	(\$5,124,376)
2021	\$2,531,848	\$5,646,120	\$4,500,839	\$5,535,608	\$250,000	(\$5,285,608)

Current revenue levels for Greene County are \$250,000 per year. Revenue shortfall is \$967,000 in 2013 to \$5,200,000 in 2021.

Chart 2 shows the current revenue levels and projected expenses by service level.

**Chart 2. Greene County Current Revenue Levels and Projected Expenses by Service Level.**



## Summary

Table 11. shows the revenue estimated from various sources for Springfield and Greene County.

**Table 11. Sources of and Annual Projected Revenue for City of Springfield & Greene County.**

Source	City Annual Revenue	Urban Service Area	Unincorporated County Annual Revenue	Total Annual Revenue
1 Cent increase property tax	\$300,000			\$440,000
1/10th cent sales tax				\$4,035,359
1/8th cent sales tax				\$5,147,110
1/4 cent sales tax				\$10,088,398
1/2 cent sales tax				\$20,176,796
\$2/month utility	\$4,219,314	\$948,861	\$2,040,278	\$7,118,453
\$3/month utility	\$6,328,972	\$1,423,392	\$3,060,416	\$10,812,780
\$5/month utility	\$10,548,286	\$2,372,154	\$5,100,694	\$18,021,134

NOTE: In the past, the City of Springfield has received approximately 60% of the sales tax revenue (allocated based upon population) collected by Greene County when distributed to multiple taxing jurisdictions.

# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force

### Guiding Principles Survey Results

#### GUIDING PRINCIPLES

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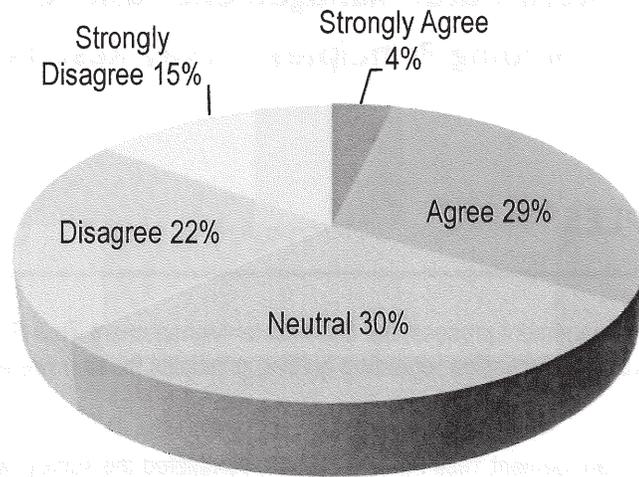
As part of the stormwater management process, the Stormwater Management Task Force had the opportunity to respond to a survey to develop a discussion regarding guiding principles for stormwater management.

Twenty seven Stormwater Management Task Force members completed the survey, which comprised of a series of 9 questions, all of which were statements respondents were asked their "level of agreement." Five response options were provided strongly agree, agree, neutral, disagree and strongly disagree.

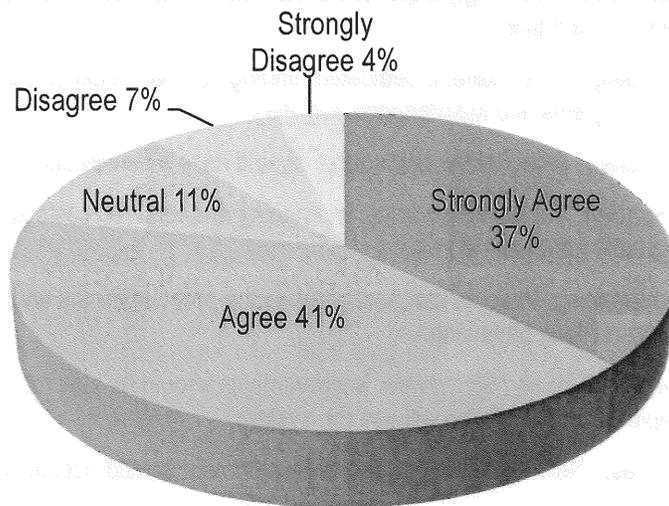
The following statements were asked of the Stormwater Management Task Force members:

- Ability to Pay: A program should be developed to reduce the burden of paying the stormwater management programs on low income households, spreading that subsidy across other citizens
- Economic Development: Being good environmental stewards, to include attention to water quality measures, will be increasingly important to the community's ability to attract and retain businesses and citizens in the future.
- Funding Strategy: A permanent, dedicated funding source should be put in place to cover the costs of required programs and maintenance activities.
- Funding Strategy: A capital funding source should have a sunset and specific project list identified.
- Funding Strategy: The funding source for ongoing and required costs should be reliable and not fluctuate greatly from year to year.
- Innovation Planning: Projects that best address the problem for the entire county should be funded jointly by jurisdictions benefiting.
- Intergenerational Equity: Stormwater improvements should be paid for over time, to distribute costs over multiple-generations who will use the system.
- Equity/Fairness: New development and redevelopment should not cause negative downstream impacts.
- Fairness/Equity: The funding of stormwater management should be linked directly to the amount of runoff a property produces. Those who cause more of the problem, pay more for stormwater management.
- Ability to Pay: A program should be developed to reduce the burden of paying for stormwater management on low-income households: spreading the subsidy across to other households who can afford to pay more.

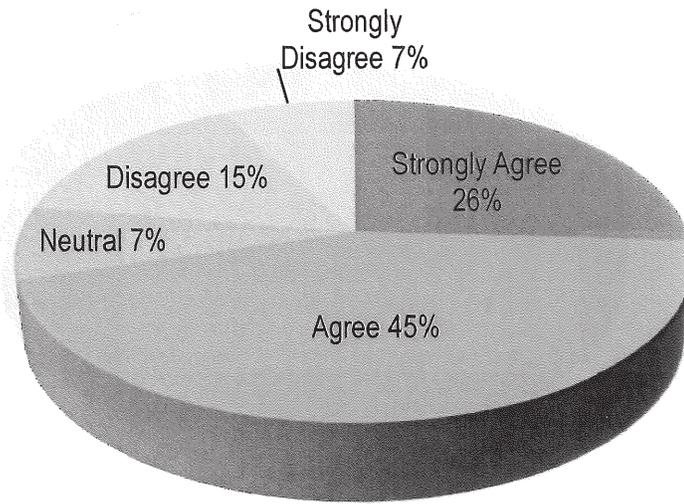
**Ability to Pay: A program should be developed to reduce the burden of paying the stormwater management programs on low income households, spreading that subsidy across other citizens**



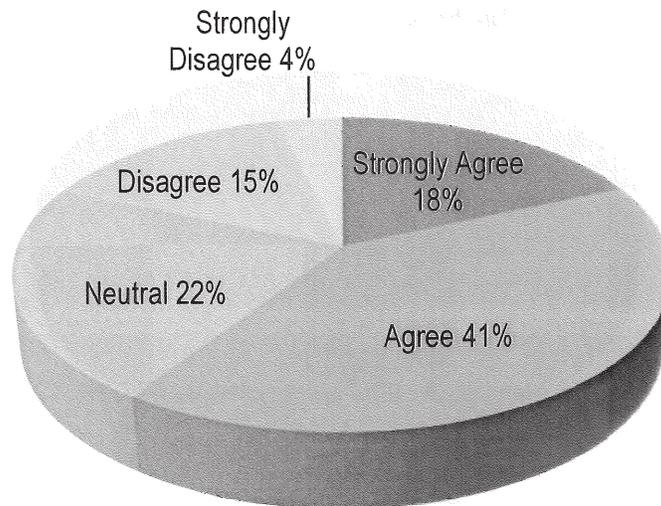
**Economic Development: Being good environmental stewards, to include attention to water quality measures, will be increasingly important to the community's ability to attract and retain businesses and citizens in the future.**



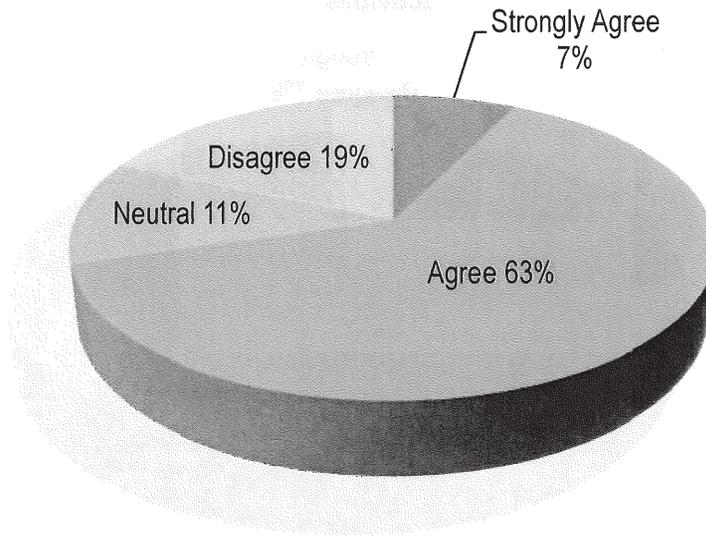
**Funding Strategy: A permanent, dedicated funding source should be put in place to cover the costs of required programs and maintenance activities.**



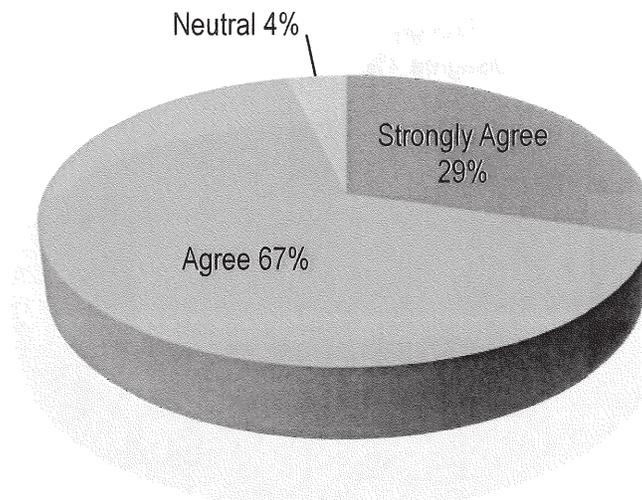
**Funding Strategy: A capital funding source should have a sunset and specific project list identified.**



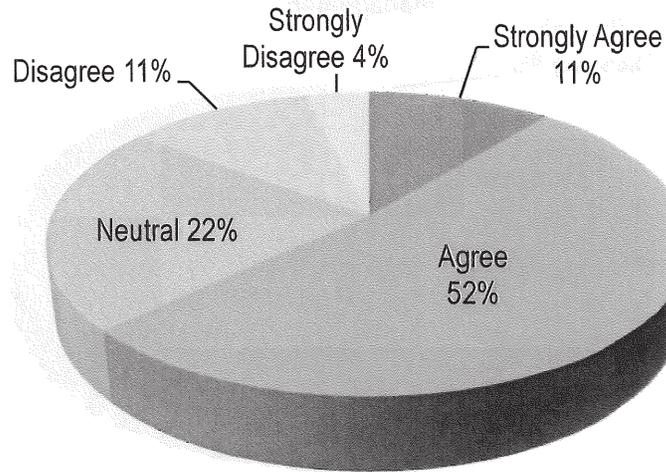
**Funding Strategy: The funding source for ongoing and required costs should be reliable and not fluctuate greatly from year to year.**



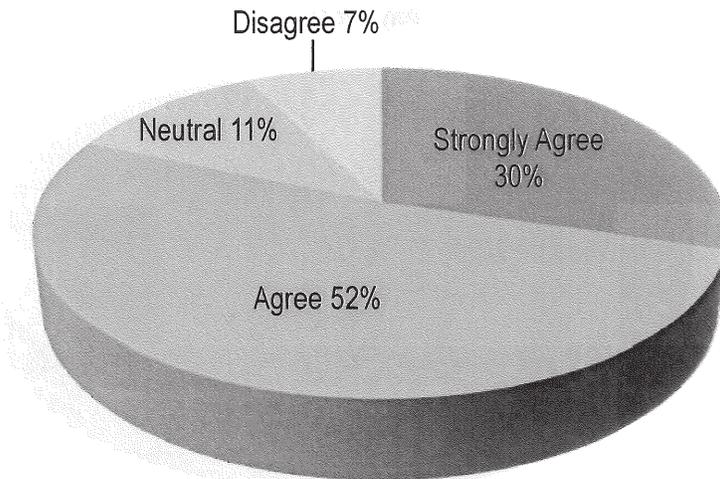
**Innovation Planning: Projects that best address the problem for the entire county should be funded jointly by jurisdictions benefiting.**



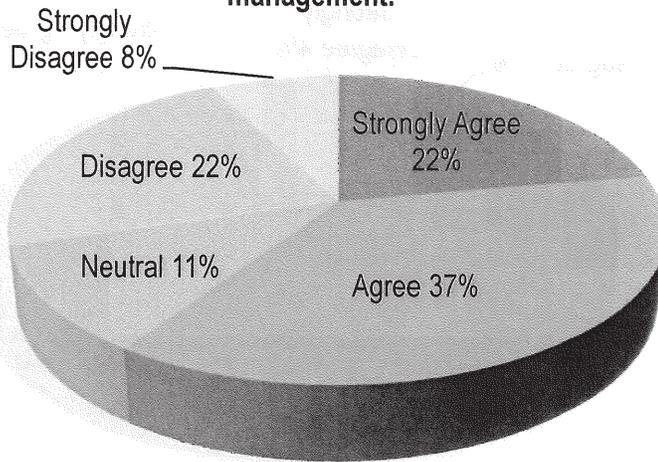
**Intergenerational Equity: Stormwater improvements should be paid for over time, to distribute costs over multiple-generations who will use the system.**



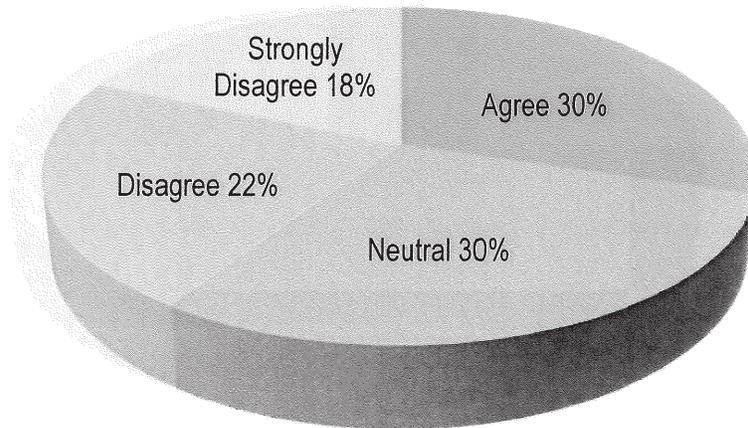
**Equity/Fairness: New development and redevelopment should not cause negative downstream impacts.**



**Fairness/Equity: The funding of stormwater management should be linked directly to the amount of runoff a property produces. Those who cause more of the problem, pay more for stormwater management.**



**Ability to Pay: A program should be developed to reduce the burden of paying for stormwater management on low-income households: spreading the subsidy across to other households who can afford to pay more.**



## EMAILS FROM TASK FORCE MEMBERS TO SHARE:

On Feb 4, 2013, at 8:42 AM, "dave murray" <[dave@rbmurray.com](mailto:dave@rbmurray.com)> wrote:

Shelia,

If you didn't see the USA Today article, suggest you take a peak. I note this because retail development is still a struggle and if these folks are having trouble it explains why so many others are too. This is obvious to yours truly but the public has a tendency to not pay attention, unless of course it's the poor soul that works for one of these companies

Why bring this up, well whatever is done with SW needs it must be done gently or we stand the risk that future new development will not stand a chance. It's hard now due to the economic conditions, make too difficult there will not be any revenue generators, can you say sales tax?

<http://www.usatoday.com/story/money/business/2013/02/01/retailers-close-stores-24-7/1873745/>

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[417 882 0541](tel:417-882-0541) fax  
[dave@rbmurray.com](mailto:dave@rbmurray.com)  
[www.rbmurray.com](http://www.rbmurray.com)

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**From:** Ronda Headland [<mailto:Ronda.Headland@mdc.mo.gov>]  
**Sent:** Monday, January 28, 2013 8:37 PM  
**To:** Sheila Shockey  
**Cc:** Bill White  
**Subject:** RE: Stormwater Management Task Force Survey - Please Respond

Sheila,

In regard to question #8 – **Equity/Fairness: New development and redevelopment should not cause negative downstream or upstream impacts.**

Negative impacts due to development and redevelopment practices can occur upstream as well as downstream. If the elevation of a stream channel is changed it may create head-cuts upstream of where the change was made as the energy of the stream seeks to regain its equilibrium. I recommend that we modify this statement to reflect that possibility.

The following was typed mostly for my benefit as I needed to "think out loud" so to speak on the funding issue:

Has the City/County conducted any type of Benefit-Cost Analysis in regard to its stormwater program? If the benefits of the stormwater program can be shown to outweigh the expense then it makes economic sense to fund it...up to the point that additional money does not result in additional worthwhile benefits.

I'm going to pull some information from book *Environmental Policy* because A. Myrick Freeman III makes some good points in his chapter titled, "Economics, Incentives, and Environmental Regulation". He states that, "We should undertake environmental protection and pollution control only if the results are worth more, in terms of individuals' values, than what is given up by diverting resources from other uses. This is the underlying principle of the economic approach to environmental policy. Benefit-cost analysis is a set of analytical tools designed to measure the net contribution of any public policy to the economic well-being of the members of society. The term, benefit-cost analysis, is used to describe a more narrowly defined, technical economic calculation that attempts to reduce all benefits and costs to a common monetary measure (that is, dollars). It seeks to determine if the aggregate of the gains that accrue to those made better off is greater than the aggregate of losses to those made worse off by the policy choice. The gains and losses are both measured in dollars and are defined as the sums of each individual's willingness to pay to receive the gain or to prevent the policy-imposed losses. If the gains exceed the losses, the policy should be accepted according to the logic of benefit-cost analysis. Policies where the aggregate gains outweigh the aggregate costs can be justified on ethical grounds because the gainers could fully compensate the losers with monetary payments and still they are better off with the policy. Thus, if the compensation were actually made, there would be no losers, only gainers. The logic of benefit-cost analysis does not require that those who benefit pay for those benefits or that those who ultimately bear the cost of meeting a standard be compensated for those costs. Whether compensation should be paid is considered to be a question of equity or distributive fairness. Benefit-cost analysis is concerned exclusively with economic efficiency as represented by the aggregate of benefits and costs.

If standards are set to maximize the net benefits, then the gainers could fully compensate the losers and still come out ahead. But when beneficiaries do not compensate losers, there is political asymmetry. Those who benefit call for ever-stricter standards and more cleanup because they obtain the benefits and bear none of the costs, while those who must bear the costs of controlling pollution call for less strict standards. Even if one objects, for either philosophical or pragmatic reasons, to basing environmental policy on benefit-cost analysis, it still makes good sense to favor cost-effective environmental policies. Cost-effectiveness means the stated environmental quality standards are achieved at the lowest possible total cost." He goes on to state that if polluters are not required to compensate those who are harmed, they have no incentive to alter their practices. I'll end my summary with this last point he makes on how, "it is not true that benefit-cost analysis is always biased against environmental protection. For many years decisions on funding for federal water resource development projects ...used techniques that systematically overstated the benefits of development; understated the economic costs; and ignored the environmental costs of building dams, diverting water for irrigation, and so forth. As a consequence, a number of economically wasteful and environmentally damaging projects were undertaken. A comparison of the benefits to recreational fishing expected to come from removal of an existing dam with the costs of removal, including the forgone hydroelectric power generation, was used by the Federal Energy Regulatory Commission to help justify its order to remove the Edwards Dam on the Kennebec River in Maine."

And just to remind myself of some of the funding mechanisms mentioned at previous meetings: a stormwater utility fee (such as a bill a homeowner or renter pays for water and sewer services), permit fees (such as paid by developers at the Planning and Zoning Department), user fees (paid by a property owner based on the amount of runoff from the property – may be calculated based on the percentage of the property covered by impervious surfaces), sales tax (paid by all who spend money within our jurisdiction). We've also discussed equity issues in regard to low-income residents and have considered strategies such as setting fees based on percentages of income versus flat rates. A sales tax is not equitable in that low-income people pay in a higher percentage of their income to a sales tax than do higher-income people.

Thanks (and sorry for the long ramble),

RONDA HEADLAND

COMMUNITY CONSERVATION PLANNER // PRIVATE LAND SERVICES DIVISION // MISSOURI DEPARTMENT  
OF CONSERVATION  
320 N. MAIN AVENUE, SPRINGFIELD, MO 65806 // 417-866-1127 EXT. 150 // [RONDA.HEADLAND@MDC.MO.GOV](mailto:RONDA.HEADLAND@MDC.MO.GOV)

The book I referenced can be cited as:

Freeman, A. M. III (2000). Economics, incentives, and environmental regulation. In M. E. Kraft & N. J. Vig (Eds.), *Environmental Policy* (4<sup>th</sup> ed. pp. 190-209). Washington, D.C.: CQ Press.

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**From:** Pierson, Matthew C [<mailto:MatthewPierson@MissouriState.edu>]  
**Sent:** Friday, January 25, 2013 5:09 PM  
**To:** Sheila Shockey  
**Subject:** RE: Stormwater Management Task Force Survey - Please Respond

Hi Sheila,

Let's please have a survey question or a discussion on the merits of incentivizing good behavior. Since development similar to the Habitat for Humanity development won't be required, there isn't much of a reward structure for developing in a way that is better for the environment and for public awareness of water quality issues.

The upside:

I strongly feel that it should be up to the developer to decide how to develop their property, within the bounds of the law. If incentives can get even a few developments to go above and beyond the standard, maybe that can keep the EPA off everyone's back when future regulations come down which would potentially require this type of low impact development. At the least the development community will have better learned how to implement these best management practices before they become required by law. In the future this would potentially expand Springfield companies' customer bases to other communities who now need expertise in implementing practices required by law, which our companies would already have lead the way on implementing here in Greene county.

At the least:

No one would take the incentive and nothing would be lost or gained.

Thank you for your consideration,

Matt

P.S. I just read through this and if you feel like that will derail or distract from your intended purposes please disregard my request.

Have a good weekend,

Matthew C. Pierson, Ph.D.  
Assistant Professor of Civil Engineering  
Missouri State Cooperative Engineering Program  
901 S. National  
Springfield, MO 65898  
785-393-2427 (cell)  
417-836-4947 (office)  
[MatthewPierson@MissouriState.edu](mailto:MatthewPierson@MissouriState.edu)

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**From:** Geoffrey Butler [mailto:butler@brpae.com]

**Sent:** Friday, January 18, 2013 10:26 AM

**To:** Lamb, Carrie (CLamb@springfieldmo.gov); twagner@springfieldmo.gov; Kevin Barnes (kbarnes@greencountymo.org); TSmith@greencountymo.org; Broyles, Phil (PBroyles@springfieldmo.gov); Burris, Greg; fmarty@springfieldmo.gov

**Cc:** Sheila Shockey

**Subject:** Storm Water Management Guiding Principals

I came away last night feeling a little conflicted. While the discussion was healthy, I do not think we really got into the meat of the matter or solved anything. For what it is worth, below are my suggestions and some discussion points

1. **Public Acceptance:** It is important to identify, prioritize, plan, source appropriate funding & build projects showing progress to the public.

*There has always been reluctance in this community to hand a blank check to anyone. It might be the conservative nature of the community coupled with a natural distrust (rightly or wrongly) of government. The most successful means of funding public improvements has been through the Capital Improvements Tax. Identify the problem, determine the solution and propose it to the community as a CIP sales tax. So this Public Acceptance principal needs to be drafted with that in mind.*

2. **Ease of Administration:** The cost related to collecting the funding for to administrate the storm water management maintenance and improvements should be minimized and uncomplicated.

*No one wants to increase the City or County bureaucracy. Figure out how to do what needs to be done with the staff we have so any dollars available for public improvements can be committed to that work.*

3. **Economic Development:** ~~Tax rates and/or fees should be competitive with other jurisdictions to help attract and retain businesses and citizens.~~ A community which has good long term plans for managing and protecting its resources at a nominal cost can promote the Economic Development of the area.

*Economic Development is driven not just by tax rates but and existence of good planning and management of these issues at a reasonable cost.*

4. **Equity/Fairness:** Everyone in the community should ~~pay their fair share for~~ contribute to the effort to manage our storm water issues..

*It is not a matter of paying their fair share (which is difficult to define), it is a matter of contributing to the effort to manage it. Some can do it with proper planning and development of their properties, other can pay a fee to help fund work to solve existing problems. The equity thing will take a lot of work but we need to all agree that everyone needs to contribute in some fashion.*

5. **Equity/Fairness:** ~~The costs to administer & review permits should be fully recovered from the applicant and not subsidized by other customers.~~

*I think we all understand that the City now does this. It does not need to be addressed.*

6. **Equity/Fairness:** ~~The funding of storm water management should be linked directly to the amount of runoff a property produces. Those who cause more of the problem pay more for the storm water~~

## services management

There are three components to this Storm Water Management issue:

1. Mandates from EPA/DNR – these are generally raising the bar on water quality and pollution control. They are a community wide burden and need to be funded by the community as a whole.
2. Maintenance of existing systems – we have a significant investment in our City/County storm water management infrastructure. As has been demonstrated, we have to maintain it or face huge future costs to replace deteriorated elements of the system. Like the Fram Oil Filter Guy said: “Pay me now or pay me MORE later.”
3. Public Improvements - Without a doubt, there are areas of the community which have problems due to old development which failed to address storm water adequately or due to the growth of the city where the new developments added storm water that even with required detention systems. Regional approaches to solving these problems is often the best means of addressing this. There is also a need to anticipate the needs and provide this infrastructure BEFORE development occurs.

The funding of each elements might be better addressed separately rather than with one single funding source.

**7. Ability to Pay:** A program should be developed to reduce the burden of paying for the storm water management programs on low income households, spreading that subsidy across other citizens.

This community does not favor subsidies. While it is easy for everyone to vote for taxes and fees that the **other guy** pays, it is really difficult to get the voting public to agree to pay for the other guy.

**8. Equity/Fairness:** The funding of storm water management should be related to the source of the problem or benefactors of the management effort. ~~linked directly to use of the service. Those who need the services pay more.~~

While this sounds logical, HOW you determine and measure the nature of the service they use is a snake pit of problems. Particularly water quality. Does a golf course using well water and spraying lots of nutrients need to pay for water quality controls any more than the Battlefield Mall with its huge parking lot? How do you measure the impacts? And the treatment for maintenance is different from the mandates or public improvements.

**9. Equity/Fairness:** New development and redevelopment should not ~~cause~~ increase downstream problems. ~~impacts. The costs should be fully recovered~~

This is basically current City Council policy. We have ordinances written designed to do this, though Todd did mention that it does not say this, the ordinances are written prescriptively in a manner which is supposed to do this.

Bottom line, I you are driving this bus looking for a single silver bullet, I don't think you will find it. This will take several different approaches to solving the problem and each needs to be easy to explain and sell. The last Task Force finally ended up agreeing that the best bet was to tag onto a very popular and easier to sell issue (the Parks Tax) to fund this. The lost opportunity was passing on the Parks Tax renewal....

I will only be able to attend the first part of our next meeting on Feb 7<sup>th</sup>. I have a zoning meeting which I might need to attend. Accordingly you might want to adjust the program so the fun stuff or controversial stuff happens when I am there or when I am gone – whatever you think suits your goals.

**Geoffrey H. Butler AIA | Architect & President**

**Butler, Rosenbury & Partners**



**City of Springfield - Greene County, Missouri**  
**Stormwater Management Task Force Meeting**



**Date:** Thursday, February 28, 2013  
5:00 to 7:00 p.m.

**Location:** Public Safety Center  
330 West Scott Street  
Springfield, Missouri 65802

**Meeting purposes:**

- Develop Task Force Recommendations (See attached questions to answer).

**AGENDA**

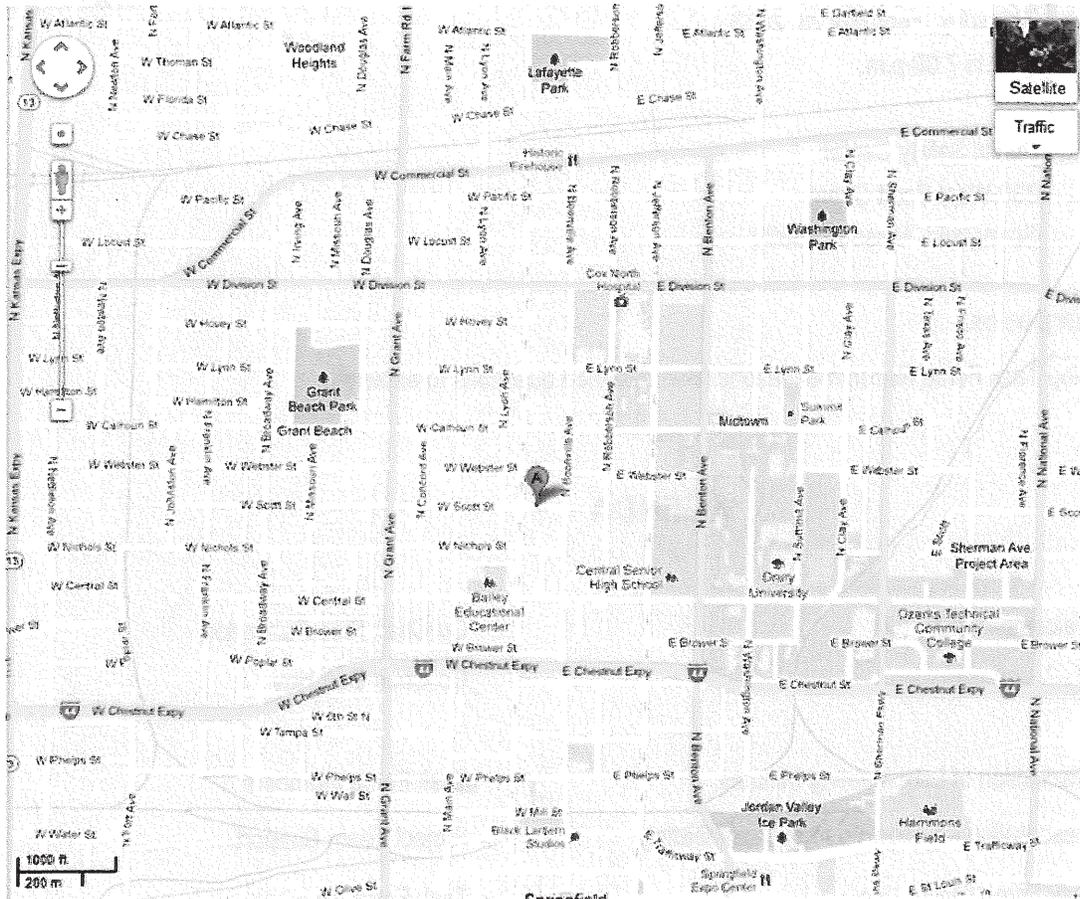
5:00 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:10 p.m.	Discussion of Last Meeting Minutes	Task Force Members
5:15 p.m.	Presentation – Follow up from Last Meeting	Project Team Support
5:30 p.m.	Task Force Discussion	Task Force Members
6:45 p.m.	Next steps - Information needed for upcoming meetings	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:00 p.m.	Adjourn	

***In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.***

**Meeting Site:**

Public Safety Center  
330 West Scott Street  
Springfield, MO 65803

**For assistance call (417) 864-1901 or (417) 818-6091**



**Directions:**

From the North: Travel south on N. Kansas Expressway to Chestnut Expressway. Turn left or east and travel to North Booneville Avenue. Turn left and proceed 3 blocks to Scott Street. The Public Safety Center is on your left.

From Highway 65: Take the Division Street exit. Turn west (right if coming from the north, left if coming from the south) and travel to Booneville Avenue. Turn left and travel about 5 blocks to Scott Street. The Public Safety Center is on your right.

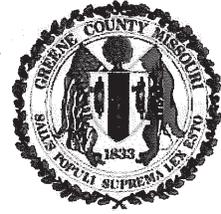
From the west and I-44: Take the Chestnut Expressway east to Booneville Avenue. Turn left onto Booneville Avenue and travel 3 blocks to Scott Street. The Public Safety Center is on your left.



## Recommendations to be Prepared

The Task Force will provide the County Commissioners and the Mayor/City Council written recommendations regarding these questions.

- What principles should guide the community stormwater management programs?
- What investments should be made in stormwater management?
  - What amount of capital investment should be made over what time period?
  - Should a permanent dedicated source of funding be implemented for required programs and maintenance?
  - Should the capital funding source have a sunset and specific projects identified?
  - What type of maintenance program should be implemented?
  - Should water quality programs be developed to comply with regulations or exceed standards?
- How should we prioritize capital investments made?
- What source(s) of funding are desired?
- What level of funding is desired?
- How should we explain the issues and task force recommendations to the community?



## Draft Program Goals & Priorities

1. Reduce injury/death caused by flooding events.
2. Protect water quality.
3. Plan for and design projects with multiple benefits.
4. Reduce property damage caused by flooding events.
5. Reinvest in life-cycle repair and replacement of existing infrastructure.

## Draft Guiding Principles

### Conservation:

- The efficient use of resources should be encouraged.

### Economic Development:

- We attract businesses and citizens to our community because of the value gained through investments made in environmental stewardship.
- We safeguard our water resources while keeping tax rates and fees competitive with other jurisdictions to attract and retain business and citizens.

### Effectiveness:

- Stormwater management programs utilize best practices & sound science; investments are effective.
- Springfield/Greene County can't meet all the financial needs that have been identified. Investments must be made that have the most impact for the dollar spent.

### Environmental Stewardship:

- Springfield/Greene County should meet achievable regulatory requirements based in sound science with the goal of protecting water resources.
- It is important to protect & improve drinking water sources and quality of water in streams in Southwest Missouri. Good stormwater management is in everyone's best interest.

Equity/Fairness:

- Everyone in the community should pay for stormwater management.
- The costs to administer & review permits should be fully recovered from the applicant and not subsidized by other customers.

Financial Burden:

- Springfield/Greene County should invest in stormwater management programs that are affordable.
- Everyone in the community should pay for stormwater management.

Innovation/Planning:

- The long-term stormwater management program should be flexible to adapt to new technologies and innovations.
- It is important to develop good plans before implementing projects so funds are spent wisely.
- Master plans of capital improvements should be developed collaboratively on a watershed basis rather than by political jurisdiction.

Public Acceptance:

- The public perception should be that the stormwater management programs are balanced; decision-making is open and is influenced by public input.
- It is important to continue to prioritize, plan & build projects showing progress to the public.

Public Benefit:

- The public should benefit from the investments made in stormwater management.

Understandability/Public Education:

- Citizens should be made aware of how they can protect water quality through their actions.
- Citizens should understand how improvements can help protect water quality and how improvement programs are funded.



**Stormwater Management Task Force  
Meeting Notes - February 7, 2013**

**Welcome & Introductions**

The Springfield/Greene County, Missouri Stormwater Management Task Force met in the Springfield-Greene County Public Safety Center. The meeting commenced at 5:00 p.m.

Task Force Co-chair Dan Hoy welcomed the Task Force members and community members in attendance. Those present included the following:

Task Force

Brain Perdue	Dave Murray	Ronda Headland
Rick Scarlet	Chris Carson	Casey Haynes
Daniel Beckman	Stacey Armstrong	Dan Hoy
Fred Palmerton	Tiffany Frey	Chris Macioce
Matthew Pierson	Fred Schlegel	Tom DeWitt
Eric Dove	Andy Hosmer	

Absent: Aaron Wahliquist, Karen Spence, Jerany Jackson, Geoffrey Butler, Dana Elwell, Patrick Harrington, Patty Hamilton, Erik Fjeseth, King Coltrin, Harlan Hill, Matt Bailey, Tom Kisse, Bill Bretall

City and County Staff

Kevin Barnes	Chris Coulter	Sheila Shockey
Vanessa Brandon	Tim Davis	Fred Marty
Phil Broyles	Carrie Lamb	Todd Wagner
Greg Burris	Barbara Lucks	Kimberly White
Karen Elmer	Jan Millington	Jon Williams
Rob Dixon		

Visitors

Mike Kromrey  
Sarah Okeson  
Mike Pessina

**Affordability Task Force Presentation**

Rob Dixon, Chamber, summarized the City/County Unfunded Environment Mandates Affordability Task Force Recommendations. The City/County is facing billions of dollars of deficit and it will impact all citizens. Concerns include environmental protection, least able to afford, and protecting economic growth. Affordability & Integrated Planning can provide a solution. The US Environmental Protection Agency (USEPA) may or may not implement. Their charge was to review the Missouri Department of Natural Resources (MDNR) affordability policy. The task force recommended that all environmental mandates be considered in the affordability for the community. MDNR is looking only at water quality (stormwater + wastewater) for the 2% of median household income affordability target.

Mr. Dixon presented 2013-2020-2030 trajectories on income levels. The following recommendations were made by the Affordability Task Force to MDNR:

1. Ask communities for information.
2. Don't penalize for good financial stewardship.
3. Consider all mandates together.
4. Consider law of diminishing returns.
5. Older technology should be allowed to finish its life cycle if still effective.
6. Study the wide impact on lower income residents.
7. Consider environmental investments already made.
8. Consider good faith efforts to maintain environmental compliance.

Questions: Any update on EPA-TMDL decision in Virginia and how does that affect us?

Response: We think USEPA will withdraw from the lawsuit. They will likely start again and use better science to create the TMDL on the stream.

Question: Is HB89 the appropriate the avenue for modifications?

Response: Affordability Task Force recommendations are for agency implementation of HB89.

### **Funding Discussion**

Sheila Shockey presented revenue options and how those correlate with the City/County needs, and priorities established by the Task Force. Considering City and County expenditures together, Sheila shared expenditure projections for 2018 as an example scenario for the discussion.

She reported that the costs for City/County expenses together in 2018 would range from \$6 million - \$17 million to \$35 million. This is for water quality, flood risk minimization and infrastructure replacement totaled together.

Question: How do you estimate mandate if we don't know?

Response: Based on other city's TMDL costs and it is a guess. There was a discussion about whether the City/County could implement a funding source that would only be triggered when TMDL's kick in.

Sheila showed graphs of City and County expenditures through 2021 for 5 different scenarios as examples: 1) minimum mandate, 2) maximum mandate, 3) minimum mandate plus proactive, 4) minimum mandate plus reactive plus flood control, 5) minimum mandate plus proactive plus flood control.

Sheila reviewed priorities established by task force surveys:

1. Protect Water Quality
2. Reduce injury/death caused by flooding events
3. Projects with multiple benefits
4. Reduce property damage caused by flooding events
5. Life cycle replacements for infrastructure

The Task Force discussed how much of each circle they want to fund from each of these priority areas.

Sheila offered some potential funding sources: utility, property tax or sales tax and gave the amount of revenue for each.

utility: She explained that utility user fees are usually based on equivalent residential units (ERU's). No entities are exempt.

Question: How was the 3,200 ERU figured?

Response: We took the impervious area of the average residence (roof, driveways, sheds, etc.) which was 3,200 square feet.

Question: Are incentives for good stewardship provided with a utility?

Response: Yes, it is common. She explained several different methods for providing incentives.

Comment: Incentives could be very complicated based on various site scenarios.

Sheila showed what the statutorily available revenue sources would provide as compared to projected expenditure.

- 1 cent property tax- 8% of Water Quality minimum
- 1/10 cent – 75% of Water Quality minimum
- 1/8 cent- 95% of Water Quality minimum, 71% of WQ & 44% of Water Quality maximum
- ¼ cent- 100% Water Quality minimum, 88% of flood mid service level
- \$3/month- 100% of Water Quality minimum, 92% of flood mid-point
- \$5/month- 100% of Water Quality min, 100% flood mid, 98% Infrastructure mid-point
- ½ cent sales tax provides: 100% of Water Quality minimum, 100% of flood mid-point, or 100% of infrastructure mid-point and some extra available revenue.

Question: What is the administrative cost of utility?

Response: There are startup and ongoing costs associated with administering a utility.

Question: Would utility revenue only be collected from CU customers?

Response: Because the stormwater program is county-wide, it would probably be charged to all county residents or charged to Springfield + urban service area property owners.

Sheila discussed the funding options. They are:

- Use multiple sources of revenue which is a common practice.
- Determine whether the community could enact an escalating funding source since it doesn't need the full amount right away.
- Set a dedicated source for mandated portions of the program and a tax that sunset for capital projects.

- Sheila reviewed the latest survey results. She presented the various pros and cons of the different funding sources, and facilitated a task force discussion to identify others. Con: Utility is burden for municipalities and non-profits to pay for their own imperviousness.
- Con: High cost of utility for churches, which is politically unfavorable.
- Con: City would have no incentive to add more impervious surfaces such as streets and sidewalks if they had to pay a utility fee. Response: You could choose to exempt roads/sidewalks.
- Con: For property tax or sales tax, it is a burden on consumers and not businesses. "No new taxes" is the current mantra.
- Pro: Utility is a disincentive for expanding impervious surfaces.
- Pro: Sales tax is easy to administer.
- Pro: The utility option has more opportunity to provide incentives to those that implement good stormwater practices, going above and beyond the required levels. Comment: For any options, we should require new development to pay for its impact on the watershed
- Con: Sales tax has negative perception of no new taxes.
- Con: A sales tax is burdensome for lower income households. It has a bigger negative effect on the poor.

Comment: The hotel/motel tax is not making enough money now. Springfield in the middle on tax rates compared to benchmark communities.

Comment: Utility could create conflict over arguments on credits plus burden of administering the program is too complicated and bureaucratic. We've had success with sales tax and so that seems to be path of least resistance and most chance of success.

Question: Some communities have a maximum cap for ERU. Have we considered this?

Response: No, because we feel it opens up the utility for lawsuit, makes it less a fee and more of a tax.

Comment: With a sales tax, incentives are not easy.

Question: Do current standards prevent future problems?

Response: Detention has evolved and water quality control is evolving. Mimicking the predevelopment hydrology is where USEPA is headed and we're not there yet. For all the different levels of mitigation that exist, depending on when a development was built and if they went above and beyond, a utility fee can be assessed to reflect that.

Comment: That connection and incentivizing good behavior seems important to our community.

Comment: Retrofits are coming, also as part of mandates.

Comment: Incentives are possible with property tax and sales tax as well, in the form of cash incentives, assistance, permitting fast forward, and public/private partnerships, etc. You could implement incentives through cost-sharing, by allocating revenue for a cost-share program in the budget. This is a way of leveraging private funds with public money.

Question: Structure of utility. How is it set up? Would it have a board of directors?

Response: Not usually. It is typically set up similar to a wastewater utility.

Comment: I'm concerned about using sales tax as that takes away the option to fund certain other community priorities

Sheila asked Task Force how much water quality protection they want to budget for when we bring certain scenarios back at the next meeting.

Comments: We need to budget more than the minimum in case mandate is higher. If unknown, go with minimum.

Question: What is administrative cost to set up and operate a utility?

Response: We will bring more information next time.

Comment: Administering a TMDL could be more costly than we think. We don't want to have zero in reserve for water quality mandates. We should look at the middle level of funding instead of the minimum.

Question: Would a sales tax have to be tied to specific items or generally anything stormwater-related?

Response: Could be generally water quality, flooding, or infrastructure replacement.

Comment: Being able to shift money between the three if mandate cost fluctuates, can increase or decrease funds for the other two. Fund water quality at the maximum level and if not as expensive as expected, funds can be shifted to other two areas.

Comment: Not in support of that, gives too much latitude to staff and that doesn't serve citizens well.

Sheila asked, 'if there is extra left from mandates, could that be used for incentives?

Question: What is water quality mandate money spent on?

Response: Programs for MS4 and study or projects for TMDLs. Detail on this was provided in meeting #3 but we will bring that back next meeting.

Question: Are credits one time or ongoing?

Response: They can be both.

Question: Can utility be modified to ease burden on commercial?

Response: Again, this could spark a legal challenge of it as a utility fee.

MS4 permit requirements will require an annual BMP self-inspection report. This could also serve as the ongoing verification for a credited BMP. This eases administration.

Question: Can we get clarification on what is mandated? If we are told we need to spend \$7 million but only spend \$3 million and EPA says this is fine, then \$7 million wasn't a mandate. Is the mandate subject to interpretation and ability to pay?

Question: What does city feel is the most likely cost of mandates?

Response: We will bring back a breakdown of MS4 permit vs. TMDL costs for the next meeting.

Comment: Businesses generate revenue. Don't lose sight of the bigger picture.

Comment: Just because our mandate expenditures don't match up, doesn't mean water quality is not important.

Comment: We shouldn't consider a funding level that we can't pass. Then it doesn't matter what we want. What matters is what we can get (by voters). Decide what we can get and then decided where to spend it (how to divvy it up).

Comments: We would like to see a utility and small sales tax scenario.

Question: Which has most effect on economic growth? (sales tax, property tax or utility) Comment: We will ask Chamber their opinion.

Question: How much funding for infrastructure? Response: Somewhere in between minimum and middle 200 year, middle 100 year. Bring both back.

Next meeting: **February 28, 2013, 5:00-7:00 p.m. at the Springfield- Greene County Public Safety Center.**

The meeting was adjourned at 7:15 p.m.

## Introduction

At the last Task Force meeting, the members requested some additional information. The following information is provided to assist in the development of recommendations:

1. Scenarios showing different revenue sources vs. expenditures
2. Breakdown of costs that are current, known and still unknown
3. Answers to a number of questions about the various revenue sources available.

## Section 1: Scenarios for Consideration

At the last Task Force meeting, the members asked for a few scenarios to be brought back for further consideration. The following provides information about revenues, expenditures and overage (shortfalls) for the various sources. The revenue sources considered were: sales tax, property tax and a stormwater utility. Estimated revenues for each source are listed in Table 1.

**Table 1. County-wide Annual Revenue Projections for Each Revenue Source**

County-Wide Funding Source	Projected Annual Revenue
1 cent Property Tax	\$440,000
1/10th Cent Sales Tax	\$4,035,359
1/8th Cent Sales Tax	\$5,147,110
1/4 Cent Sales Tax	\$10,088,389
1/2 Cent Sales Tax	\$20,176,796
\$1/month Utility	\$3,559,227
\$2/month Utility	\$7,118,453
\$3/month Utility	\$10,813,780
\$5/month Utility	\$18,021,134

The following assumptions were used for the expenditures. A more complete breakdown of the expenditures is detailed in Section 2 of this document.

*Operating Costs:* The City and the County will have ongoing costs to administer the stormwater program and those costs will increase primarily due to stricter regulatory compliance. Because the range given at the last several meetings was so wide due to the uncertainty of these regulations, the project team has narrowed these down to what is *known to be required for compliance* with the MS4 permit and to funds for TMDL planning. It does not include the estimated costs to address TMDLs with programs/projects because of the difficulty in estimating costs without more information. Current operating costs for the City and County are approximately \$1.5 million and are expected to increase to approximately \$2.8 million in Fiscal Year 2020.

**Table 2. City & County Known Operating Costs for 2013 – 2020**

Known City + County Ongoing Operating Costs	Current	FY14	FY15	FY16	FY17	FY18	FY19	FY 20
City Operating Costs	\$1,210,000	\$1,755,000	\$1,840,000	\$1,870,000	\$1,960,000	\$1,985,000	\$2,110,000	\$2,110,000
County Operating Costs	\$321,000	\$373,000	\$693,000	\$707,000	\$712,000	\$715,000	\$726,000	\$726,000
<b>TOTAL</b>	<b>\$1,531,000</b>	<b>\$2,128,000</b>	<b>\$2,533,000</b>	<b>\$2,577,000</b>	<b>\$2,672,000</b>	<b>\$2,700,000</b>	<b>\$2,836,000</b>	<b>\$2,836,000</b>

*Capital Costs & Life Cycle Replacement Costs:* At the last Task Force meeting, the members asked that scenarios be developed to include costs to minimize flood risk and repair & replace infrastructure (lifecycle). The targets set were based upon the following:

- Amount the City and County historically has spent annually on flood risk reduction. This funding level supports a good program that makes steady progress to eliminate the most severe flooding problems. This is approximately \$6 million per year for the City and County together.
- A life-cycle replacement program spanning 200 years for the entire system. The life-cycle replacement target is more than is being spent currently. It is not as much as the industry best practice of a 50-year system replacement cycle. We've included approximately \$1.7 million in the scenarios which is less than the 200-year lifecycle cost.
- Staffing needed to support these programs.

The City & County Seven Year Capital Plan is \$53.31 million for projects that improve water quality, minimize flood risk and replace existing infrastructure. These investments are not required.

**Table 3: City & County Capital Costs for 2013 – 2020 (7 Year Plan)**

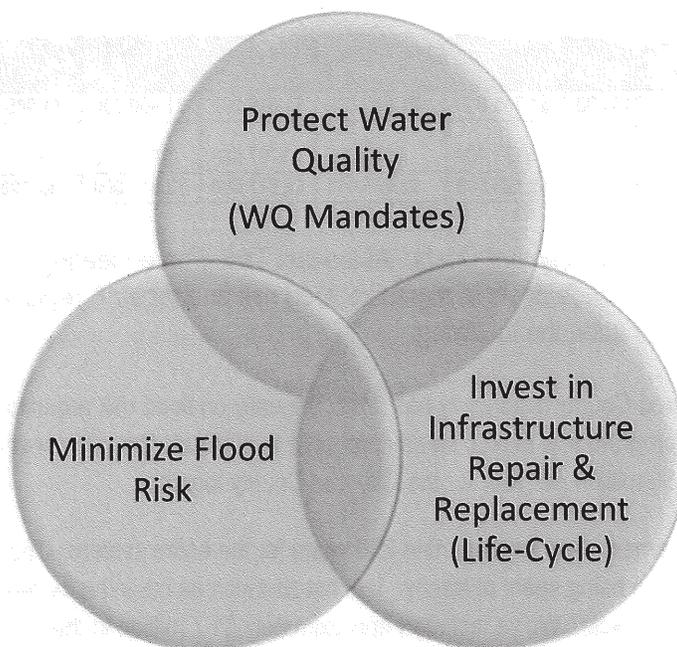
TOTAL CAPITAL & INFRASTRUCTURE REPAIR COSTS -- CITY + COUNTY	Total Project Costs	Annualized Cost
Minimize Flood Risk Capital Projects	\$36,030,000	\$5,147,143
Infrastructure Repair & Replacement (Lifecycle) Program	\$17,280,000	\$2,468,571
<b>TOTAL</b>	<b>\$53,310,000</b>	<b>\$7,615,714</b>

One of the priorities established by the Task Force was to look for ways to stretch the dollars to be spent by looking for ways to spend one dollar to address all three goals:

- Protect water quality and meet environmental regulations.
- Minimize flood risk
- Reinvest in infrastructure repair & replacement (life-cycle)

Figure 1 shows the three goals of the program overlapping. The areas where there is overlap of the circles depicts those programs and projects that are multi-objective or multi-benefit.

**Figure 1. Stormwater Management Program Goals**



To comply with TMDLs, the City and County will be required to build projects to improve the streams that are designated as polluted. Section 2 of this document describes the streams designated as polluted and what may be required to reduce the pollution. Many of the capital projects proposed will accomplish at least two or three of these goals. Tables 4 and 5 provide a list of prioritized projects that could potentially be completed with a description of the goals achieved through the project investment.

**Table 4. City of Springfield, Mo.  
Example Prioritized 7-Year Multi-Objective Capital Program**

Project	Cost	Protect Water Quality	Reduce Flood Risk	Replace Infrastructure (life cycle)
Complete Phase 1 of System Evaluation, Condition Assessment & Prioritization	\$1,000,000	x	X	x
Upper Fassnight in area of Grand/National	\$3,000,000	x	X	x
Lower Fassnight in area of Kimbrough/Cherry	\$3,000,000	x	X	x
Boonville and Central to County Campus	\$2,000,000		X	x
Additional Priority Infrastructure Repair & Replacement Projects to be identified through assessment	\$3,000,000	x	X	x
Watershed Planning & Project	\$1,000,000	x	x	x

Prioritization & Program management				
Renew Jordan Creek (USACE match phase 1 & 2)	\$7,000,000	x	x	
Renew Jordan Creek (Grant viaduct to Boonville)	\$4,000,000	x	x	
Fassnight Creek (Jefferson to Holland) to Phelps Grove Park	\$3,000,000	x	x	x
Ravenwood Branch (Charleston/Carleton to Lake Springfield)	\$3,000,000	x	x	
Galloway Stream Stabilization (South of Battlefield Road)	\$1,000,000	x		x
Jordan Creek Stream Stabilization and habitat enhancement (downstream of Grant)	\$1,000,000	x		x
Wilson's Creek Stream Stabilization and habitat enhancement (downstream of RR)	\$2,000,000	x		x
Dickerson Park Zoo channel restoration, water quality enhancement	\$2,000,000	x	x	
Grant Beach Park channel day-lighting & box replacement program	\$1,000,000	x	x	x
Additional Priority Projects to reduce flooding/improve water quality and manage the capital projects program	\$10,000,000	x	x	
<b>TOTAL</b>	<b>\$47,000,000</b>			

**Table 5. Greene County, Mo.  
Example Prioritized 7-Year Multi-Objective Capital Program**

Project	Cost	Protect Water Quality	Reduce Flood Risk	Replace Infrastructure (life cycle)
Watershed Planning & Project Prioritization	\$100,000	x	x	x
Oak Knolls Subdivision	\$1,000,000		x	x
Cherokee Estates	\$1,300,000		x	x
Prairie View Heights	\$500,000		x	x
Chapel Hill	\$400,000		x	x
Comar Addition	\$75,000		x	x

Monta Vista Heights	\$500,000		x	x
Town and Country Estates	\$750,000		x	x
Woodsboro Estates	\$320,000		x	x
Cedar Crest Estates	\$335,000		x	x
Needmore Branch Drainage and Greenway	\$700,000	x	x	x
Trail of Tears Drainage and Greenway	\$130,000	x		
Springday Hills Drainage Project Phase 2	\$200,000	x	x	x
<b>TOTAL</b>	<b>\$6,310,000</b>			

Table 6 is a summary of the 7 – year plan capital and infrastructure repair costs.

**Table 6. City & County Capital & Infrastructure Replacement/Repair (Life-Cycle) Costs**

<b>TOTAL CAPITAL &amp; INFRASTRUCTURE REPAIR COSTS -- CITY + COUNTY</b>	<b>Total Project Costs</b>
City Capital & Infrastructure Repair	\$47,000,000
County Capital & Infrastructure Repair	\$6,310,000
<b>TOTAL</b>	<b>\$53,310,000</b>

## Scenarios

Using the expenditure and revenue assumptions, five scenarios were developed. In all of the scenarios, the capital projects and infrastructure repair total costs are approximately the same but the year in which the projects are completed varies based upon revenue available for the year.

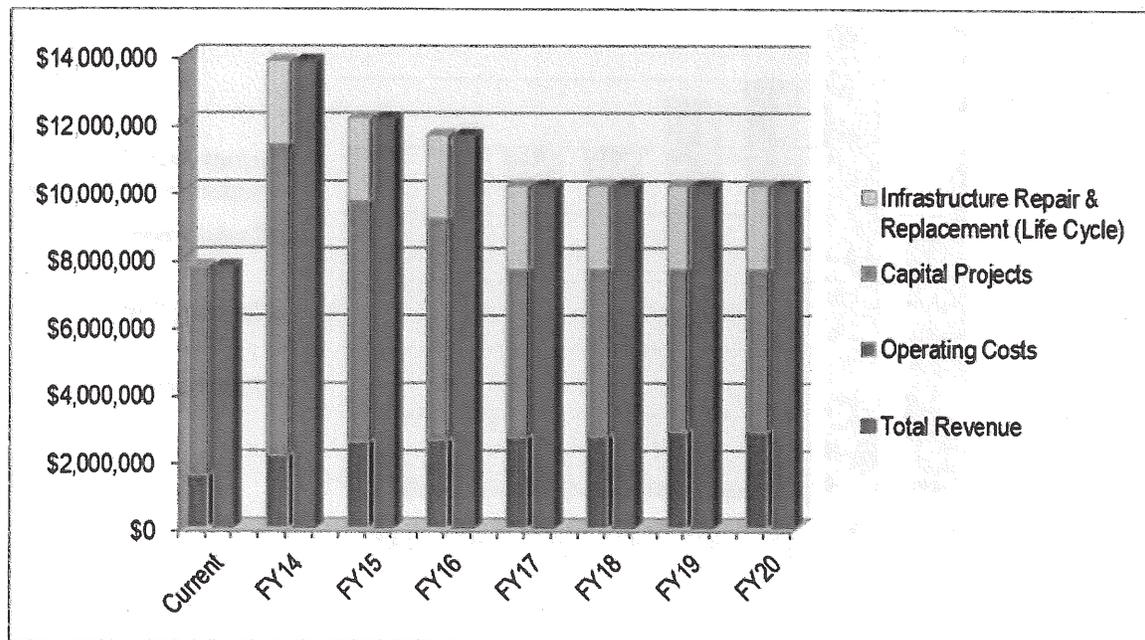
### Scenario #1: 1/10<sup>th</sup> Cent and 1/8<sup>th</sup> Cent Sales Tax

*Scenario #1:* In this scenario, Greene County would enact the 1/10<sup>th</sup> cent water quality sales tax for operating costs and 1/8<sup>th</sup> cent parks/stormwater sales tax to fund capital and infrastructure repair/replacement (lifecycle). This funding strategy provides the funding needed for the proposed seven year plan. Table 7 and Figure 2 provide revenue and expenditure estimates for the scenario.

**Table 7. Scenario #1: 1/10<sup>th</sup> & 1/8<sup>th</sup> Cent Sales Tax**

Scenario #1: 1/10 <sup>th</sup> cent + 1/8 <sup>th</sup> cent sales tax (Sunset 1/8 <sup>th</sup> after 7 year)	Current	2014	2015	2016	2017	2018	2019	2020	TOTAL
<b>Revenue</b>									
Existing City Revenues	\$7,000,000	\$3,900,000	\$2,700,000	\$2,200,000	\$700,000	\$700,000	\$700,000	\$700,000	\$18,600,000
Existing County Revenues	\$750,000	\$750,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$3,000,000
1/10 <sup>th</sup> Cent Sales Tax	\$0	\$4,035,359	\$4,035,359	\$4,035,359	\$4,035,359	\$4,035,359	\$4,035,359	\$4,035,359	\$28,247,513
1/8 <sup>th</sup> Cent Sales Tax	\$0	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$36,029,770
<b>Total Revenue</b>	<b>\$7,750,000</b>	<b>\$13,832,469</b>	<b>\$12,132,469</b>	<b>\$11,632,469</b>	<b>\$10,132,469</b>	<b>\$10,132,469</b>	<b>\$10,132,469</b>	<b>\$10,132,469</b>	<b>\$85,877,283</b>
<b>Expenditures -- City + County</b>									
Operating Costs	\$1,531,000	\$2,128,000	\$2,533,000	\$2,577,000	\$2,672,000	\$2,700,000	\$2,836,000	\$2,836,000	\$19,813,000
Capital Projects	\$6,219,000	\$9,235,898	\$7,130,898	\$6,586,898	\$4,991,898	\$4,963,898	\$4,827,898	\$4,827,898	\$48,784,286
Infrastructure Repair & Replacement (Life Cycle)	\$0	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$17,280,000
<b>Total Expenditures</b>	<b>\$7,750,000</b>	<b>\$13,832,469</b>	<b>\$12,132,469</b>	<b>\$11,632,469</b>	<b>\$10,132,469</b>	<b>\$10,132,469</b>	<b>\$10,132,469</b>	<b>\$10,132,469</b>	<b>\$85,877,286</b>
<i>Over (Under)</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**Figure 2. Scenario #1: 1/10<sup>th</sup> & 1/8<sup>th</sup> Sales Tax**



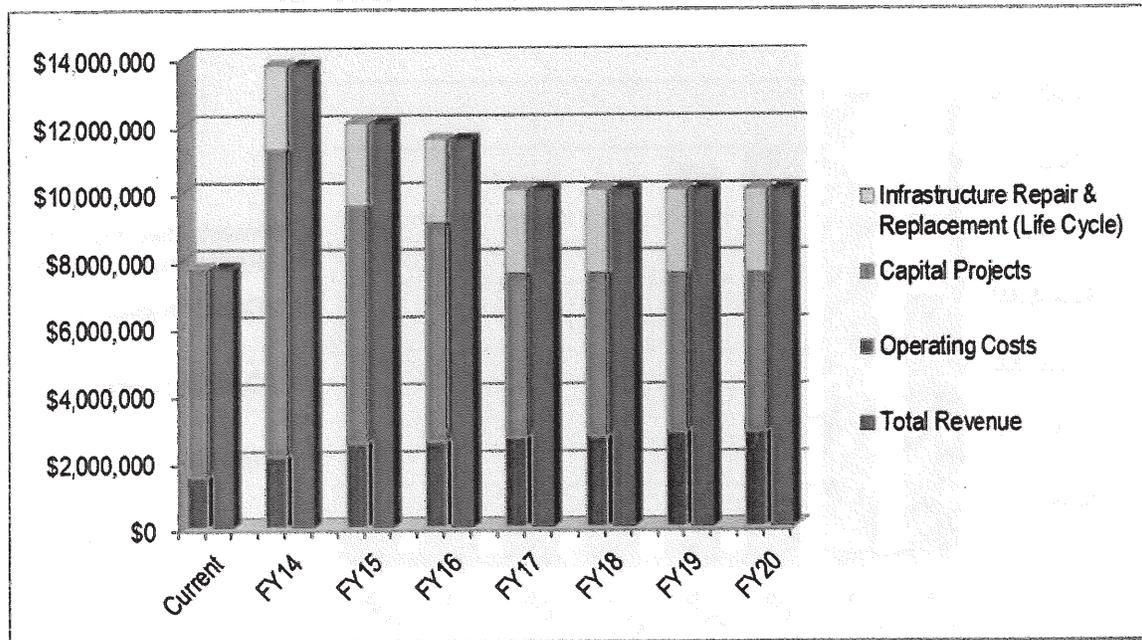
## Scenario #2: Property Tax Increase & 1/8<sup>th</sup> Cent Sales Tax

*Scenario #2:* In this scenario, Greene County would increase property taxes by nine (9) mills per \$100 of assessed valuation to cover operating costs and some infrastructure repair/replacement costs. Greene County would enact a 1/8<sup>th</sup> cent parks/stormwater sales tax to fund capital and infrastructure repair/replacement (lifecycle). This funding strategy provides the funding needed for the proposed seven year plan. Greene County property tax cannot be designated as a dedicated stormwater property tax levy because that is not authorized by Missouri state law. The City of Springfield could enact a dedicated property tax because they are a charter city. Table 8 and Figure 3 provide revenue and expenditure estimates for the scenario.

**Table 8. Scenario #2: Property Tax Increase & 1/8<sup>th</sup> Cent Sales Tax**

Scenario #2: Property Tax + 1/8th cent (Sunset it after 7 year)	Current	2014	2015	2016	2017	2018	2019	2020	TOTAL
<b>Revenue</b>									
Existing City Revenues	\$7,000,000	\$3,900,000	\$2,700,000	\$2,200,000	\$700,000	\$700,000	\$700,000	\$700,000	\$18,600,000
Existing County Revenues	\$750,000	\$750,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$3,000,000
Property Tax (Increase 9 mills)	\$0	\$3,960,000	\$3,960,000	\$3,960,000	\$3,960,000	\$3,960,000	\$3,960,000	\$3,960,000	\$27,720,000
1/8th Cent Sales Tax	\$0	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$36,029,770
<b>Total Revenue</b>	<b>\$7,750,000</b>	<b>\$13,757,110</b>	<b>\$12,057,110</b>	<b>\$11,557,110</b>	<b>\$10,057,110</b>	<b>\$10,057,110</b>	<b>\$10,057,110</b>	<b>\$10,057,110</b>	<b>\$85,349,770</b>
<b>Expenditures -- City + County</b>									
Operating Costs	\$1,531,000	\$2,128,000	\$2,533,000	\$2,577,000	\$2,672,000	\$2,700,000	\$2,836,000	\$2,836,000	\$19,813,000
Capital Projects	\$6,219,000	\$9,160,539	\$7,055,539	\$6,511,539	\$4,916,539	\$4,888,539	\$4,752,539	\$4,752,539	\$48,256,773
Infrastructure Repair & Replacement (Life Cycle)	\$0	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$17,280,000
<b>Total Expenditures</b>	<b>\$7,750,000</b>	<b>\$13,757,110</b>	<b>\$12,057,110</b>	<b>\$11,557,110</b>	<b>\$10,057,110</b>	<b>\$10,057,110</b>	<b>\$10,057,110</b>	<b>\$10,057,110</b>	<b>\$85,349,773</b>
<i>Over (Under)</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**Figure 3. Scenario #2: Property Tax Increase & 1/8<sup>th</sup> Cent Sales Tax**



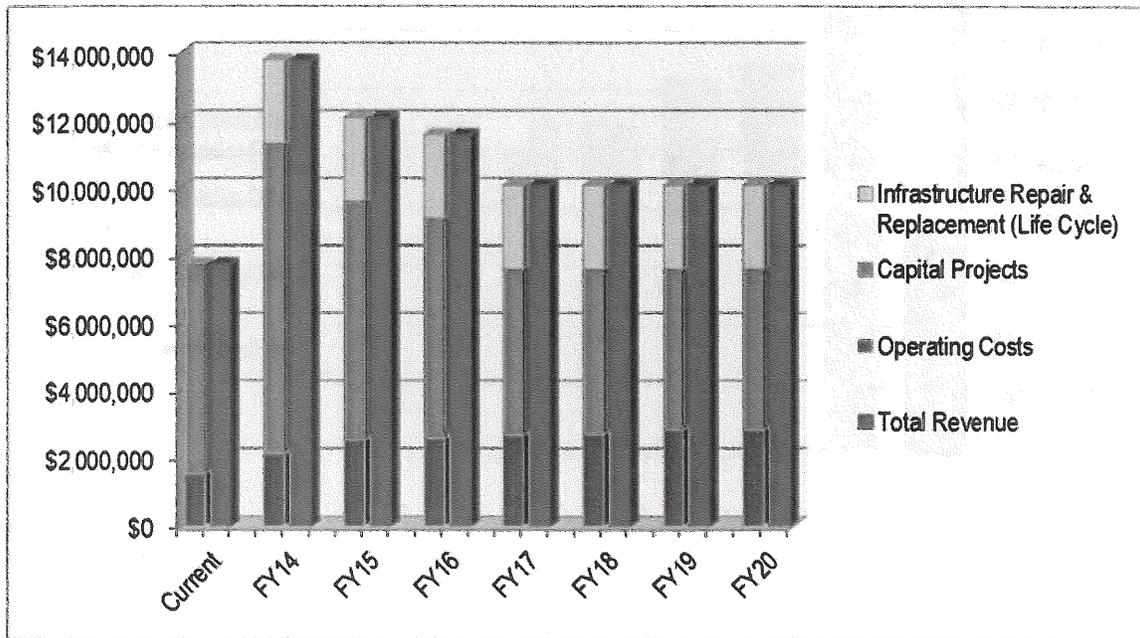
### Scenario #3: Property Tax Increase

Scenario #3: In this scenario, Greene County would increase property taxes by 20.7 mills per \$100 of assessed valuation to cover operating costs and to fund capital and infrastructure repair/replacement (lifecycle). This funding strategy provides the funding needed for the proposed seven-year plan. Greene County property tax cannot be designated as a dedicated stormwater property tax levy because that is not authorized by Missouri state law. The City of Springfield could enact a dedicated property tax because they are a charter city. Table 9 and Figure 4 provide revenue and expenditure estimates for the scenario.

**Table 9. Scenario #3: Property Tax Increase**

Scenario #3: Property Tax Only	Current	2014	2015	2016	2017	2018	2019	2020	TOTAL
<b>Revenue</b>									
Existing City Revenues	\$7,000,000	\$3,900,000	\$2,700,000	\$2,200,000	\$700,000	\$700,000	\$700,000	\$700,000	\$18,600,000
Existing County Revenues	\$750,000	\$750,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$3,000,000
Property Tax (increase 20.7 mills)	\$0	\$9,108,000	\$9,108,000	\$9,108,000	\$9,108,000	\$9,108,000	\$9,108,000	\$9,108,000	\$63,756,000
<b>Total Revenue</b>	<b>\$7,750,000</b>	<b>\$13,758,000</b>	<b>\$12,058,000</b>	<b>\$11,558,000</b>	<b>\$10,058,000</b>	<b>\$10,058,000</b>	<b>\$10,058,000</b>	<b>\$10,058,000</b>	<b>\$85,356,000</b>
<b>Expenditures -- City + County</b>									
Operating Costs	\$1,531,000	\$2,128,000	\$2,533,000	\$2,577,000	\$2,672,000	\$2,700,000	\$2,836,000	\$2,836,000	\$19,813,000
Capital Projects	\$6,219,000	\$9,161,429	\$7,056,429	\$6,512,429	\$4,917,429	\$4,889,429	\$4,753,429	\$4,753,429	\$48,263,003
Infrastructure Repair & Replacement (Life Cycle)		\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$17,280,000
<b>Total Expenditures</b>	<b>\$7,750,000</b>	<b>\$13,758,000</b>	<b>\$12,058,000</b>	<b>\$11,558,000</b>	<b>\$10,058,000</b>	<b>\$10,058,000</b>	<b>\$10,058,000</b>	<b>\$10,058,000</b>	<b>\$85,356,003</b>
<i>Over (Under)</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**Figure 4. Scenario #3: Property Tax Increase**



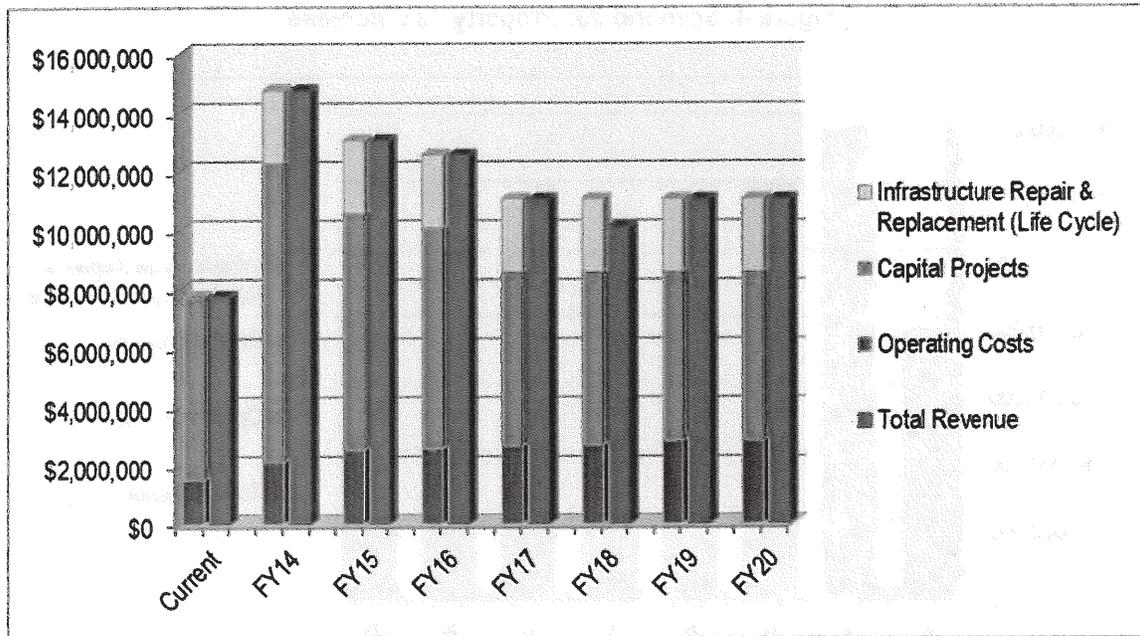
## Scenario #4: ¼ Cent Sales Tax Increase

*Scenario #4:* In this scenario, Greene County would enact the 1/4 cent parks/stormwater sales tax to fund operating costs, capital projects and infrastructure repair/replacement (lifecycle). In this scenario, an additional \$7 million total in capital projects could be funded versus the other scenarios. Table 10 and Figure 5 provide revenue and expenditure estimates for the scenario.

**Table 10. Scenario #4: ¼ Cent Sales Tax Increase**

Scenario #4: 1/4 Cent Sales Tax	Current	2014	2015	2016	2017	2018	2019	2020	TOTAL
<b>Revenue</b>									
Existing City Revenues	\$7,000,000	\$3,900,000	\$2,700,000	\$2,200,000	\$700,000	\$700,000	\$700,000	\$700,000	\$18,600,000
Existing County Revenues	\$750,000	\$750,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$3,000,000
1/4 Cent Sales Tax	\$0	\$10,088,389	\$10,088,389	\$10,088,389	\$10,088,389	\$10,088,389	\$10,088,389	\$10,088,389	\$70,618,723
<b>Total Revenue</b>	<b>\$7,750,000</b>	<b>\$14,738,389</b>	<b>\$13,038,389</b>	<b>\$12,538,389</b>	<b>\$11,038,389</b>	<b>\$11,038,389</b>	<b>\$11,038,389</b>	<b>\$11,038,389</b>	<b>\$92,218,723</b>
<b>Expenditures -- City + County</b>									
Operating Costs	\$1,531,000	\$2,128,000	\$2,533,000	\$2,577,000	\$2,672,000	\$2,700,000	\$2,836,000	\$2,836,000	\$19,813,000
Capital Projects	\$6,219,000	\$10,141,818	\$8,036,818	\$7,492,818	\$5,897,818	\$5,869,818	\$5,733,818	\$5,733,818	\$55,125,726
Infrastructure Repair & Replacement (Life Cycle)	\$0	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$17,280,000
<b>Total Expenditures</b>	<b>\$7,750,000</b>	<b>\$14,738,389</b>	<b>\$13,038,389</b>	<b>\$12,538,389</b>	<b>\$11,038,389</b>	<b>\$11,038,389</b>	<b>\$11,038,389</b>	<b>\$11,038,389</b>	<b>\$92,218,726</b>
<i>Over (Under)</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**Figure 5. Scenario #4: ¼ Cent Sales Tax Increase**



## Scenario #5: Stormwater Utility and 1/8<sup>th</sup> Sales Tax

*Scenario #5:* In this scenario, Greene County would enact a stormwater utility to fund operating costs and part of the infrastructure repair/replacement (lifecycle) costs and 1/8<sup>th</sup> cent parks/stormwater sales tax to fund capital and infrastructure repair/replacement (lifecycle). This funding strategy provides the funding needed for the proposed seven year plan. The utility fee would start out in FY 14 at \$1.00/month per Equivalent Residential Unit (ERU) and increase to \$2.00/month ERU in FY 2019. The revenues are reduced by 20% to account for credits and incentives. The cost estimated to set up the utility is \$150,000. The annual estimated cost to administer is \$40,000. Table 11 shows the gradual phase in of the utility fee. Table 12 and Figure 6 provide revenue and expenditure estimates for the scenario.

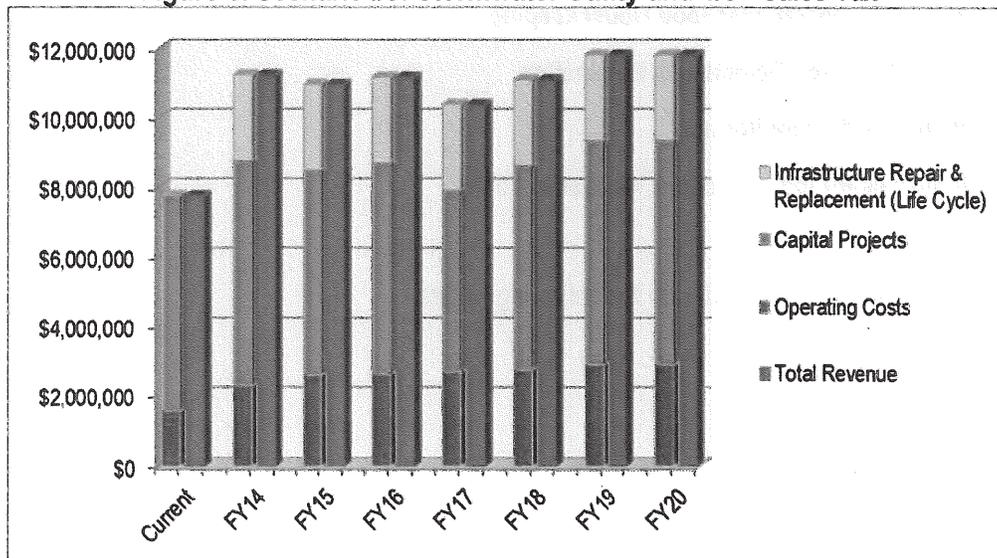
**Table 11. Stormwater Utility Monthly Fee Per ERU for FY13 to FY20**

Current	2014	2015	2016	2017	2018	2019	2020
\$0.00	\$1.00	\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	\$2.00

**Table 12. Scenario #5: Stormwater Utility and 1/8<sup>th</sup> Sales Tax**

Scenario #5: \$1.00 - \$2.00/month ERU Utility + 1/8 <sup>th</sup> cent sales tax (Sunset it after 7 year)	Current	2014	2015	2016	2017	2018	2019	2020	TOTAL
<b>Revenue</b>									
Existing City Revenues	\$7,000,000	\$3,900,000	\$2,700,000	\$2,200,000	\$700,000	\$700,000	\$700,000	\$700,000	\$18,600,000
Existing County Revenues	\$750,000	\$750,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$3,000,000
\$2.00/month ERU Utility (phased-in with credits)	\$0	\$1,423,711	\$2,847,422	\$3,559,277	\$4,271,132	\$4,982,988	\$5,694,843	\$5,694,843	\$28,474,216
1/8 <sup>th</sup> Cent Sales Tax	\$0	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$5,147,110	\$36,029,770
<b>Total Revenue</b>	<b>\$7,750,000</b>	<b>\$11,220,821</b>	<b>\$10,944,532</b>	<b>\$11,156,387</b>	<b>\$10,368,242</b>	<b>\$11,080,098</b>	<b>\$11,791,953</b>	<b>\$11,791,953</b>	<b>\$86,103,986</b>
<b>Expenditures -- City + County</b>									
Operating Costs	\$1,531,000	\$2,278,000	\$2,573,000	\$2,617,000	\$2,672,004	\$2,740,000	\$2,876,000	\$2,876,000	\$20,163,004
Capital Projects	\$6,219,000	\$6,474,249	\$5,902,960	\$6,070,816	\$5,227,667	\$5,871,526	\$6,447,382	\$6,447,382	\$48,660,982
Infrastructure Repair & Replacement (Life Cycle)	\$0	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$2,468,571	\$17,280,000
<b>Total Expenditures</b>	<b>\$7,750,000</b>	<b>\$11,220,820</b>	<b>\$10,944,531</b>	<b>\$11,156,387</b>	<b>\$10,368,242</b>	<b>\$11,080,097</b>	<b>\$11,791,953</b>	<b>\$11,791,953</b>	<b>\$86,103,986</b>
<i>Over (Under)</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**Figure 6. Scenario #5: Stormwater Utility and 1/8<sup>th</sup> Sales Tax**



## Section 2

### Known & Unknown Costs to Protect Water Quality

At previous meetings, the Task Force members indicated that protecting water quality is a high priority for the City and the County. Water resources in the region are important to quality of life and the economy. Increasing state and federal water quality regulations will increase the required City and County investment. At the third and last Task Force meetings, a cost range was given for future environmental compliance. The range was wide because costs to comply with some future known permit requirements were given as an estimated range and the cost of compliance with TMDLs is unknown.

The following section provides a brief review of these mandates. The projected costs to comply that were provided in meeting #3 has been further refined into the following categories. Previous estimated ranges for future known permit requirements have been refined into a single best estimate as requested by the task force.

- Current costs
- Future known costs
- Future unknown costs

#### Current Costs

The City and County federally-mandated MS4 permits require that programs, policies, and procedures are in place to address the following items.

- **Public Education and Outreach on Stormwater Impacts**
- **Public Involvement**
- **Construction Site Runoff** (land disturbance programs)
- **Post Construction Stormwater Management in New Development and Redevelopment**
- **Municipal Operations/Good Housekeeping**
- **Illicit Discharge Detection & Elimination**
- **Water quality monitoring**
- **Industrial Runoff** (City permit requirement only)

More detail on these costs is provided in the following pages.

**Table 13: City of Springfield, Missouri  
Current and Future Known Costs for Compliance with MS4 Permit Mandates & TMDL Planning**

Water Quality Compliance Program Costs	Current	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Programs	\$350,000	\$590,000	\$590,000	\$640,000	\$640,000	\$640,000	\$660,000	\$660,000
Education	\$50,000	\$65,000	\$70,000	\$75,000	\$85,000	\$85,000	\$90,000	\$90,000
Monitoring	\$50,000	\$50,000	\$55,000	\$55,000	\$60,000	\$60,000	\$60,000	\$60,000
BMP Maintenance	\$130,000	\$150,000	\$175,000	\$200,000	\$225,000	\$250,000	\$250,000	\$250,000
MS4 Cleaning	\$0*	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$300,000	\$300,000
Retrofits	\$0	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
TMDL Planning	\$30,000	\$50,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
<b>TOTAL</b>	<b>\$610,000</b>	<b>\$1,155,000</b>	<b>\$1,240,000</b>	<b>\$1,320,000</b>	<b>\$1,360,000</b>	<b>\$1,385,000</b>	<b>\$1,510,000</b>	<b>\$1,510,000</b>

\*Current MS4 cleaning program is funded out of the Streets/Public Grounds budget.

**Table 14: Greene County, Missouri  
Current and Future Known Costs for Compliance with MS4 Permit Mandates & TMDL Planning**

County Ongoing Costs	Current	FY14	FY15	FY16	FY17	FY18	FY19	FY 20
<b>MS4 Permit Requirements</b>								
Education	\$34,000	\$44,000	\$54,000	\$64,000	\$64,000	\$64,000	\$75,000	\$75,000
Public Involvement	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Illicit Discharge Elimination	\$147,000	\$147,000	\$147,000	\$147,000	\$147,000	\$147,000	\$147,000	\$147,000
Construction Site Inspection	\$120,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000
Post-Construction Management	\$0	\$0	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000
<b>Current Nutrient TMDL</b>								
Assessment of Compliance	\$20,000	\$22,000	\$23,000	\$24,000	\$26,000	\$26,000	\$26,000	\$26,000
<b>Future TMDLs</b>								
Assessment of Compliance	\$0	\$0	\$69,000	\$72,000	\$75,000	\$78,000	\$78,000	\$78,000
<b>TOTAL</b>	<b>\$321,000</b>	<b>\$373,000</b>	<b>\$693,000</b>	<b>\$707,000</b>	<b>\$712,000</b>	<b>\$715,000</b>	<b>\$726,000</b>	<b>\$726,000</b>

**City MS4 Permit:**

The City's current annual cost to comply with its MS4 permit is \$610,000. The following provides an explanation for the breakdown shown in Table 14:

- Programs:** This cost includes the equivalent of 4 FTE's, associated staff costs including hardware/software, vehicle fuel/maintenance, supplies, and training, and legal/technical consulting costs to provide review and input on the program. These staff persons coordinate and administer all aspects of the permit requirements listed above including the land disturbance program, development review for the post-construction program, pollution investigations/enforcement, industrial monitoring and inspections, management of water quality monitoring contracts, maintaining the GIS stormwater system inventory, and annual reporting.
- Education:** The City and County believe that the most effective use of limited education funds is to support efforts by non-profits to educate the public regarding water resources issues. This cost includes partial funding of an educator position with the Watershed Committee of the Ozarks, partial funding of the Project WET (Water Education for Teachers) educator position, cooperative projects with James River Basin Partnership (ex. rain barrel rebate program and Storm Drain Reveal), Show-Me Yards & Neighborhoods program activities, printing of educational materials, and various special projects and events such as public service announcements, workshops, and educational signage.

- **Monitoring:** The City and County have found that contracting monitoring services is an effective way to meet monitoring requirements, and partnering with the County and other local MS4 communities provides for efficiency and data consistency. Water quality monitoring costs including two contracts with Missouri State University for water sampling and macro invertebrate sampling of streams, supplies for in-house industrial water quality monitoring, and a portion of the annual service fees for the City's rain gage network which is utilized for the monitoring program.
- **BMP Maintenance:** The current permit requires that city-owned BMPs be inspected and maintained. Currently, this consists of periodic inspections and removal of sediment/debris by Street Maintenance, and vegetation maintenance by Public Grounds. These activities have been partly funded by Streets and Public Grounds as activities that would be conducted regardless of permit requirements to ensure functionality and aesthetics of the system. This funding is assumed to continue. The current cost shown in Table 1 is the portion that has been funded by the now expired 2006 Parks/Waterways sales tax to ensure a level of service that meets permit requirements.
- **MS4 Cleaning:** The current permit requires a program to remove trash/debris from the stormwater system. Currently, this consists of periodic removal of material from grate inlets and certain bridge, waterway, and sinkhole locations where accumulation is a known problem. The costs of these activities are not reflected in the current cost of MS4 permit compliance because they are funded out of the budget for Street Maintenance who has had this program in place since prior to the MS4 permit in order to maintain the functionality of the storm system for street safety. The City wishes to fund cleaning of the MS4 outside of the street right-of-way with funds dedicated for that purpose rather than with transportation funds.
- **Retrofits:** The current permit requires that city-owned detention basins that were designed primarily for flood control are evaluated for retrofitting to provide a water quality benefit. The City has evaluated the basins and determined that 5 basins are good candidates for retrofitting and 8 basins are possible candidates that would need further evaluation. Part of the requirement is to locate sources of funding to construct these retrofits. Therefore, funding for these construction projects is included in the projected cost of MS4 permit compliance beginning in FY14.
- **TMDLs:** A portion of the City's current monitoring cost shown in Table 2 is a direct cost of monitoring for the James River and Little Sac River TMDLs, while the remainder of it is monitoring that the City is required to conduct regardless of TMDLs. Additionally, the programs and policies (e.g. development requirements, land disturbance, public education) that the City and County have in place to meet MS4 permit requirements also address these TMDLs by targeting the pollutants that impair these streams. Therefore, there is not an additional current cost for compliance with the James River and Little Sac River TMDLs.

### **Greene County MS4 Permit**

Like the City's MS4 permit, Greene County's MS4 permit gives authorization to discharge stormwater as defined in 10 CSR 20-6.200. The County's current cost to comply with its MS4 permit is \$321,000. The following provides an explanation for the breakdown shown in Table 15.

The permit requires the County to address six minimum pollution control measures that were outlined in the packet for meeting #3. The six control measures are:

- **Public Education and Outreach on Stormwater Impacts** – Educate citizens on what they can do to reduce pollutants in stormwater. This cost includes funding for the Watershed Committee of the Ozarks, James River Basin Partnership, and Project WET (Water Education for Teachers)

- **Public Involvement** – Actively seek public input on the development of the Stormwater Management Program Plan (SWMP), and consider other public involvement activities such as volunteer stream clean-ups.
- **Construction Site Runoff** – A program that requires erosion and sediment control and other stormwater pollution best management practices (BMPs) on construction sites, and includes plan reviews, inspections, and enforcement. This cost includes the salary for 2.5 full-time employees for site inspection and plan review
- **Post Construction Stormwater Management in New Development and Redevelopment** – A program that requires new developments to address the long term quality of runoff from their property after initial construction is over, by using BMPs to provide water quality treatment and/or reduce runoff. The current Phase II permit language requires that developments design their sites to reasonably mimic the pre-construction runoff conditions. Currently post construction BMP's are inspected only at the time of construction. Expected changes to the new permit will likely require additional GIS mapping and database tracking of maintenance performed as well as field inspection. While this may not yet require additional staff, the added staff time taken up will necessitate moving existing staff salary out of general revenue and onto any new funding source.
- **Municipal Operations/Good Housekeeping** – Projects undertaken by or for the MS4 regulated community must follow the same regulations they enforce. This element also includes requirements for street sweeping and minimizing pollution that may enter runoff from salt storage, vehicle maintenance, or other municipal operations.
- **Illicit Discharge Detection & Elimination** – Map and routinely inspect the storm drainage system to ensure that pollutants are not being dumped or discharged into it, and investigate and address citizen complaints of pollution. This cost includes two full time wastewater inspectors and ½ salary for a GIS technician.

Currently, water quality monitoring is being done for the James River TMDL at a cost to the County of \$20,000 annually. Based on current monitoring results, additional controls will likely be required to address this TMDL.

### Future Known Costs

MS4 permits are issued for 5 years at which time they are revised by MDNR as needed and reissued. The City has been working closely with MDNR on revision of the City's permit, which is an individual permit written specifically for each Phase 1 community (population > 100,000). The City's permit may be issued sometime in 2013. The County's permit, which is a general permit issued to all Phase II communities (population < 100,000) is expected to be reissued by June 2013.

#### City MS4 Permit

The following provides an explanation for the cost breakdown shown in Table 14 for FY14-FY20. These costs have been projected with reasonable certainty based on the currently proposed permit language.

- **Programs:** This cost includes the equivalent of 6.25 FTE's, associated staff costs, and legal/technical consulting costs. The increase from 4 FTE's is due to increased mandates in the draft revised permit for the Post-Construction and Municipal Operations programs. Specifically, these increased mandates will require BMP construction inspections, private developer maintenance agreements and inspections for long-term

BMP operation and maintenance, and increased requirements for minimizing pollution from municipal facilities and operations.

- **Education:** The draft revised permit requires the City to continue to implement and improve the public education program. The increase for education beginning in FY14 in Table 14 includes additional funding support for James River Basin Partnership and Watershed Committee of the Ozarks, and for other education costs such as printing of educational materials, public service announcements, workshops, and incentive programs such as the rain barrel rebate.
- **Monitoring:** The water quality monitoring requirements are anticipated to be similar to current requirements. Costs shown in Table 14 are budgeted to cover normal increases in contract costs with MSU and small equipment/supplies costs.
- **BMP Maintenance:** The City's projected future cost includes an increasing level of funding to ensure the same level of service for city-owned BMPs as will be required for privately-owned BMPs, and due to the expected increase in city-owned BMPs as the City continues to construct more regional water quality basins and more BMPs such as rain gardens, bioswales, and pervious pavement as part of streetscapes, and city-owned buildings and parking lots.
- **MS4 Cleaning:** The draft revised permit requires that the City update this program. The City's projected future cost includes additional funds beginning in FY14 to increase MS4 cleaning to a level of service consistent with EPA guidelines and comparable with other communities, and to fund system cleaning outside of the right-of-way with dedicated stormwater funds rather than transportation funds.
- **Retrofits:** The projected costs include funding for the 5 detention basins that have been identified as good candidates for retrofits, to be completed in years 1-3. This level of funding is continued in years 4-5 for further evaluation and possible retrofit of the additional 8 basins that have been identified as potential candidates.
- **TMDLs:** On February 20, 2013, the United States Environmental Protection Agency (EPA) withdrew both "flow" TMDLs that were issued on January 28, 2011 for Wilsons/Jordan Creeks and Pearson Creek. The City believes this was a wise decision on EPA's part, to avoid the unnecessary costs of going forward with the legal challenge; however, new TMDLs will be developed by EPA for these three creeks. The City and Greene County have decided to take a proactive approach to addressing the impairments in these three creeks to reduce the potential cost of the future TMDLs. The common sense approach would be to continue to monitor the creeks for priority pollutants, locate the sources of those priority pollutants, and work to eliminate those sources. The City and County will also work with EPA in the development of the next round of TMDLs. This coordination was agreed to by EPA in exchange for the City voluntarily agreeing to not oppose their Motion to Vacate from the legal challenge by withdrawing the TMDLs. Table 14 provides a best estimate of the funding needed to move forward with this proactive TMDL planning approach.

### **County MS4 Permit**

The County future known costs are the same as the current costs. Once the permit is reissued, we will know more about the future costs.

### Future Unknown Costs

Both the City's & County's MS4 permits require compliance with any approved TMDL within the area subject to MS4 regulation. The County's MS4 permit spells out specifically the TMDL implementation steps that are required in order to meet the permit requirements, which are listed below. The City's MS4 permit language is different but the process would generally be similar.

1. Determine if water body on 303 (d) list of impaired waters (classified water bodies)
2. Determine if there is an EPA approved TMDL
3. Implement Waste Load Allocation Provisions (meet pollutant limits set in TMDL)
4. Assess if loads are being met by existing control measures
5. Determine if additional controls are needed
6. Plan and document the controls that will be implemented to meet pollutant limits
7. Monitor to see if stormwater controls are adequate to meet pollutant limits

The currently approved TMDLs which the City and County must address as part of their MS4 permits are the James River and Little Sac River TMDLs. As explained under Current Costs, the County is currently required to conduct water quality monitoring for the James River TMDL (step 4 above) at a cost of \$20,000 annually. A portion of the City's current monitoring cost shown in Table 14 is a direct cost of monitoring for the James River and Little Sac River TMDLs, while the remainder of it is monitoring that the City is required to conduct regardless of TMDLs.

Additionally, the programs and policies (e.g. development requirements, land disturbance, public education) that the City and County have in place to meet MS4 permit requirements also address these TMDLs by targeting the pollutants that impair these streams. Therefore, there is not an additional current cost for addressing the James River and Little Sac River TMDLs. Based on current monitoring results, additional controls will likely need to be implemented (step 5 above) and represent a future unknown cost. Some possible types of projects that could be implemented to meet this potential requirement for additional controls are listed in Table 15.

**Table 15: Currently Approved TMDLs and Possible Future Required Actions**

Waterways	TMDL Status	Pollutant and Source	Current Action	Possible Future Action
James River	Issued 2001; Updated 2004	Nutrients: Urban Point and Nonpoint Sources (e.g. wastewater treatment plants and stormwater runoff); Agricultural Nonpoint Sources	Water Quality Monitoring (City and County) and MS4 programs/policies.	Streambank Stabilization Stream corridor restoration/grazing exclusion cost share Detention basin retrofits Retrofits of existing development Increased education
Little Sac River	Issued 2006	Fecal Coliform: Point and Nonpoint Sources	Water Quality Monitoring (City only) and MS4 programs/policies.	Stream corridor restoration/grazing exclusion cost share Detention basin retrofits Retrofits of existing development Increased education

On February 20, 2013, the USEPA withdrew both “flow” TMDLs that were issued on January 28, 2011 for Wilsons/Jordan Creeks and Pearson Creek. The City believes this was a wise decision on USEPA’s part, to avoid the unnecessary costs of going forward with the legal challenge; however, new TMDLs will be developed by USEPA for these three creeks. The City and Greene County have decided to take a proactive approach to addressing the impairments in these three creeks to reduce the potential cost of the future TMDLs. A common sense approach would be to continue to monitor the creeks for priority pollutants, locate the sources of those priority pollutants, and work to eliminate those sources. The City and County will also work with USEPA in the development of the next round of TMDLs. This coordination was agreed to by USEPA in exchange for the City voluntarily agreeing to not oppose their Motion to Vacate from the legal challenge by withdrawing the TMDLs. As explained under Future Known Costs, Tables 13 and 14 provide a best estimate of the funding needed to move forward with this proactive TMDL planning approach. They do not include the cost to build any water quality improvements or implement other actions that may be required by the TMDLs.

The cost for compliance once EPA develops and issues new TMDLs for these three creeks represents a future unknown cost. Best estimates of a potential minimum and maximum range of annual costs for the City and County to comply with these TMDLs were given in the third meeting and are shown in Table 16. The cost of TMDL compliance may increase or decrease depending on the effectiveness of efforts to address these TMDLs, as well as requirements for additional controls to meet the current James River and Little Sac River TMDLs as discussed above, and requirements to meet other additional TMDLs that will be issued in the future.

**Table 16: Potential Range of Future Unknown Costs for Compliance with Pearson and Wilson/Jordan TMDLs**

	Year 1*		Year 3		Year 5	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
City	\$100,000	\$300,000	\$1,000,000	\$3,000,000	\$2,000,000	\$5,000,000
County	\$85,000	\$250,000	\$850,000	\$3,150,000	\$1,500,000	\$4,000,000

\*To be determined based on development and issuance of new TMDLs for these creeks.

The following are other federal and state regulatory changes on the horizon that could have an impact on the community and on the City’s and County’s costs to comply with water quality mandates.

- EPA has initiated a national rulemaking to strengthen the stormwater program and intends to propose a rule by June 2013 and complete a final action by December 2014. This rulemaking could impact new development/redevelopment standards and require a program to retrofit existing developed areas with stormwater practices to address water quality. These changes could result in the need for additional City and County staff to ensure compliance with the new rules. As part of this rulemaking, EPA is also considering expanding the geographic areas that must comply with MS4 regulations. This will have a proportionately greater impact on the County as more residential and rural areas are regulated.
- EPA is revising the federal construction site runoff regulations and will issue a final action in February 2014. The City and County will be responsible through their MS4 permits for enforcing these changes on local construction sites.

- DNR is considering changes to the state's water quality standards that would greatly expand the number of small streams in the City and County that have beneficial uses and water quality criteria automatically assigned to them. The City and County would need to devote staff time and resources to evaluating and documenting the condition of these streams in order to remove beneficial use designations that are incorrect. These changes may also result in additional streams being listed as impaired by DNR, followed by TMDLs that the City and County would need to address in their MS4 permits.
- It is anticipated that numeric water quality criteria for nutrients will be promulgated by DNR in the near future that may result in the need for increased efforts to address the James River TMDL and could also result in Springfield Lake, Table Rock Lake, and possibly other smaller streams being listed as impaired for nutrients. Lowering the allowable pollutant level for metals and other water quality criteria are being considered by DNR as well.

### Section 3

## Task Force Questions & Answers regarding Potential Funding Sources

At the last task force meeting, members discussed the pros and cons of each funding source. The funding sources are:

- Property Tax
- Sales Tax
- Utility

Table 18 lists the pros and cons discussed by the Task Force members at the last meeting.

**Table 18. Pros and Cons of Various Funding Sources**

Pros & Cons to Consider	Property Tax	Sales Tax	Utility
All entities in the community pay.	No	No	Yes
Visitors from outside the community pay.	No	Yes	No
Those who generate more stormwater runoff pay more.	No	No	Yes
Cost to establish billing system is minimal.	Yes	Yes	No
Easy to administer billing system.	Yes	Yes	No
Requires a vote of the people.	Yes	Yes	Yes
Stable source of revenue -- doesn't fluctuate with the economy.	Yes	No	Yes
Voters have approved in the past.	Yes	Yes	No
Structure considers ability to pay.	No	No	No
Stormwater competes with other funding needs unless dedicated specifically to stormwater	Yes	Yes	No

The task force members also asked for additional information about these sources of revenue for the February 28<sup>th</sup> meeting. The following are the questions and answers for consideration.

**Question:** *What are the limitations of the various sources of revenue?  
Is it legal to develop a funding option that would be variable and tied to the degree of EPA's mandates?*

**Answer:** Any ballot language must be answerable by 'yes' or 'no'. Variable language such as "if \_\_\_\_\_ (EPA mandates certain requirements), then \_\_\_\_\_ (stormwater tax will be collected)" will not be allowed.

For the specific Stormwater/Parks tax provided in Mo. Rvsd Statute §644.032 (1/2 of 1% of all retail sales), the statute provides specific ballot language which "*submission shall contain, but need not be limited to, the following language:*

*Shall the municipality (county) of \_\_\_\_\_ impose a sales tax of \_\_\_\_\_ (insert amount) for the purpose of providing funding for \_\_\_\_\_ (insert either storm water control, or local parks, or storm water control and local parks) for the municipality (county)?"*

For any tax ballot submission, the language should be as broad as possible so it can be used for as many purposes as possible. For example, more generalized 'storm water control' ballot language could allow the monies to be spent on EPA stormwater mandates, or stormwater infrastructure, or flooding, etc. Such generalized ballot language, if passed, would allow the City to have available funding if the EPA mandates are expensive, or use the stormwater tax/fee for other stormwater control needs if the EPA mandates are less expensive than anticipated. An example of a ballot question may be:

*"Shall the municipality (county) of \_\_\_\_\_ impose a sales tax of \_\_\_\_\_ (insert amount) for the purpose of providing funding for storm water control and storm water pollution abatement, for the municipality (county)?"*

**Question:** *What is the estimated cost to administer a stormwater utility? Cost to set up, and ongoing annual cost to administer the billing, etc.*

**Answer:** The cost to establish a stormwater utility and administer the collection of the fee varies widely. The set up cost is a one-time cost and is typically between \$50,000 and \$400,000. Cost is dependent upon the simplicity or complexity of rate method selected and the level of GIS data available. The cost to bill customers annually is typically \$0.50 to \$3.00 per customer.

Overland Park, Kansas and Lenexa, Kansas use the Johnson County tax collector to send out the bills. The County charges \$0.10/parcel for fee collection annually. For these communities, property owners receive one bill per year and it is included on the invoice with property taxes. The cities prepare the database showing number of ERUs to be charged. The start-up costs were minimal since both cities had extensive GIS data and a simple rate structure.

Kansas City, Missouri sends out stormwater fee bills on a monthly bill with water and sewer bills. They do not have an estimated cost to bill monthly. The cost to establish the utility included the development of a GIS system so it is not comparable to Springfield/Greene County who already has a system in place.

City Utilities charges Springfield's wastewater program 4% of the wastewater revenues to process their bills monthly.

**Question:** *What type of incentives could be instituted for the utility, property tax and sales tax revenue sources?*

**Answer:** Financial incentives are given more often in communities with a stormwater utility fee. One-time incentives are given during the development process, one-time residential incentives, such as technical assistance for rain gardens (Indianapolis) or discounts for rain barrels (Cleveland). The City and Greene County, along with City Utilities, have been funding a rain barrel rebate for Greene County residents since 2007. Some utilities give ongoing credits on the monthly bill. These are typically because the property has a stormwater management system that goes above and beyond the required levels. Financial incentives, such as cost-sharing and grants are used in programs that do not have a utility but are funded by taxes.

Table 19 below provides a summary of the more common types of credits (Reese 2007). In order for credits to be both legal and technically sound, a thorough process needs to be employed when developing the credits.

**Table 19. Examples of Two Approaches to Stormwater User Fee Credits**

Credits Based on Individuals Parcel or Parcel Grouping Reduction of Use or Impact	Credits Based on Private Actions Leading to a Reduction of Overall Local Stormwater Program Cost
Peak flow credit for detention Volume reduction credit for infiltration Volume credit for extended detention Pollution credit for BMP's designed according to local standards Green design credit for the provision of green sheet flow and infiltration areas with disconnected imperviousness Green design credit for the provision of green sheet flow and infiltration areas with disconnected imperviousness LID or green design credit for designing a neighborhood with embedded LID principles and approaches	Stormwater education credit for schools and/or other Area maintenance credits for performing maintenance on large urban area or roadways Oversize credits for provision of additional storage volume above design standards Industrial NPDES credit for complying with an individual NPDES stormwater industrial permit Non-structural BMP credit for certain non-structural practices such as parking lot sweeping, trash recycling, household Habitat credit for the provision of, or conservation of habitat for, specific species or of specific types

(Source: Stormwater Utility User Free Credits by Andy Reese in *Stormwater Magazine*, November/December 2007)

### Examples from Other Communities

Each community selects the areas they want to focus on for engaging residents and where they get the most benefit for the investment. Older municipal programs, such as Portland, Oregon and Bellevue, Washington have altered their programs with time and maturity. Programs with stormwater utilities offer more financial incentives. Some examples are listed below.

- One-time payment or stormwater utility credit for installation of rain barrels and rain gardens.
- Reimbursement of materials to install stormwater BMPs such as bioswales and green roofs.
- Grants or matching funds to non-profits for sustainable and LID projects on their properties.
- Credits on stormwater utility bill for installation of stormwater management practices that infiltrate runoff or eliminate discharges to the municipal storm system.

#### City of Austin, Texas

- Credits to stormwater utility bill for privately owned and maintained detention ponds.

#### Fort Wayne, Indiana

- Reimbursement for plant material with installation of residential rain garden and signed 'contract'. A direct cash payment and a plant matching program are available. Incentives are only available to residential properties inside the City of Fort Wayne.

- Fort Wayne is encouraging businesses to become involved. In order to provide maximum flexibility, four strategies have been outlined for supporting the installation of rain gardens on commercial properties: Construction of a Rain Garden on a Small Commercial Site; Corporate Host Program; Corporate-Sponsored Off-Site Rain Garden; Construction of a Rain Garden on a Large Commercial Site.

### **City of Minneapolis, Minnesota**

- 50 percent or 100 percent credit (reduction) in your stormwater utility fee for management tools/practices that address stormwater quantity.
- Note that maximum credits are cumulative and cannot exceed 100 percent credit.

### **Burnsville, Minnesota**

- Free installation of rain garden in street right-of-way with signed contract agreeing to maintain the rain garden. Contract stays with the property if owner sells.

### **Milwaukee Metropolitan Sewer District**

- Matching funds (up to 50% of qualified expenses) for green infrastructure projects in watersheds and along streams and rivers. Focus on methods that capture, infiltrate, and filter stormwater such as porous pavement, bioswales, cisterns and green roofs.

### **City of Portland, Oregon**

- *Treebates* - Reimbursement of \$50 for planting select native trees in yard; \$40 for select non-native trees.
- Grants of up to \$10,000 to support projects that improve neighborhoods and communities while also improving the health of Portland's watersheds.
- SW fee discounts up to 35% of the monthly stormwater management charge for private on-site facilities that manage stormwater runoff and 100% of the monthly on-site stormwater management charge for Drainage District residents and businesses.
- *GreenBucks* allows customers to contribute \$1, \$3, or \$5 per billing period to help public schools maintain green stormwater management facilities on school property.
- Groundwork Portland used CWSP 2012 funds to organize a leadership program for a dozen teens from underrepresented communities. These young people worked on a variety of environmentally-focused projects, including bioswales, ecoroofs and natural area restoration. They received stipends for their work and gained valuable experience in green jobs fields. PSU's Institute for Sustainable Solutions recently published a brief article about CWSP and Groundwork's project.
- Historical - One-time payment or SW utility credit for installation of rain barrels and rain gardens.

### **City of Indianapolis, Indiana**

- Technical assistance (free) to homeowners on rain garden design and installation.
- Grants for green infrastructure installations – green roofs, bioswales, infiltration BMPs emphasized. Funded in part by United Water, the private water supply company for Marion County.

### **City of Seattle, Washington**

- Rebates for installation of rain gardens and cisterns.

## City of Chattanooga, Tennessee

- Exemption for users that do not discharge into a municipal stormwater system.
- Multi-family and non-residential users with 3 ERUs or more may be qualified to receive up to 85% in Water Quality Fee reduction. The Fee reduction is provided for facilities with enhanced water quantity and quality controls measures.

**Question:** *What are the penalties if the City/County decides not to comply with regulations?*

**Answer:** The City can be penalized for violations of the Clean Water Act, 1) through federal statute penalties and 2) through the City's MS4 permit. The last MS4 permit (running 2007 to 2012) is still in effect, pending issuance of the new MS4 permit. The penalty section in the current MS4 permit essentially tracks the Clean Water Act and provides as follows:

### Penalties for Violations of Permit Conditions.

#### 1. *Criminal Penalties.*

A. Negligent Violations: The Act provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 318, or 405 of the Act is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

B. Knowing Violations: The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 318, or 405 of the Act is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

C. Knowing Endangerment: The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 318, or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than \$250,000, or by imprisonment for not more than 15 years, or both.

D. False Statement: The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than 2 years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both. (See Section 309(c) (4) of the Act).

2. *Civil Penalties.* The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed \$25,000 per day for each violation.

3. *Administrative Penalties:* The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

A. Class I penalty: Not to exceed \$10,000 per violation, nor shall the maximum amount exceed \$25,000.

B. Class II penalty: Not to exceed \$10,000 per day for each day during which the violation continues, nor shall the maximum amount exceed \$125,000.

The EPA Regional offices are increasing their enforcement of the Clean Water Act regulations, especially those under the MS4 stormwater requirements. EPA Region 2 (New York state area) has ordered the Village of Port Chester, New York to clean up water quality impairments from elevated bacteria levels. In another case, fines totaling \$110,000 were issued against two private companies for Clean Water Act stormwater violations related to construction activities. EPA Region 1 (New England) issued MS4 violations to nine municipalities in Massachusetts and New Hampshire. The potential fines range from \$40,000 to \$70,000 for each municipality.

The Washington Department of Ecology has fined King County, Washington for violations to stormwater regulations. In an agreement with the State of Washington, King County will pay a penalty of \$36,300, complete three green infrastructure projects for stormwater system improvements worth \$108,900 by January 2014, and complete the three-year water quality monitoring requirements.

In May 2006, the City of Dallas, Texas, reached an agreement with the federal government requiring the City to spend in excess of \$3.5 million in a comprehensive effort to decrease the amount of pollution entering the city's stormwater system. The settlement requires the City to construct two wetlands at an estimated cost of \$1.2 million-one along the Trinity River, and one along Cedar Creek near the Dallas Zoo-and to pay a civil penalty of \$800,000. The settlement resolves allegations-first made by the federal government in an EPA order issued in February 2004-that the City failed to implement, adequately fund and adequately staff the City's stormwater management program. Under the agreement, the City is required to fill staff positions, inspect hundreds of industrial facilities and construction sites, and improve management systems at several facilities.



# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force Meeting



**Date:** Monday, April 15, 2013  
5:30 to 7:30 p.m.

**Location:** Public Safety Center  
330 West Scott Street  
Springfield, Missouri 65802

### Meeting purposes:

- Develop Task Force Recommendations

## AGENDA

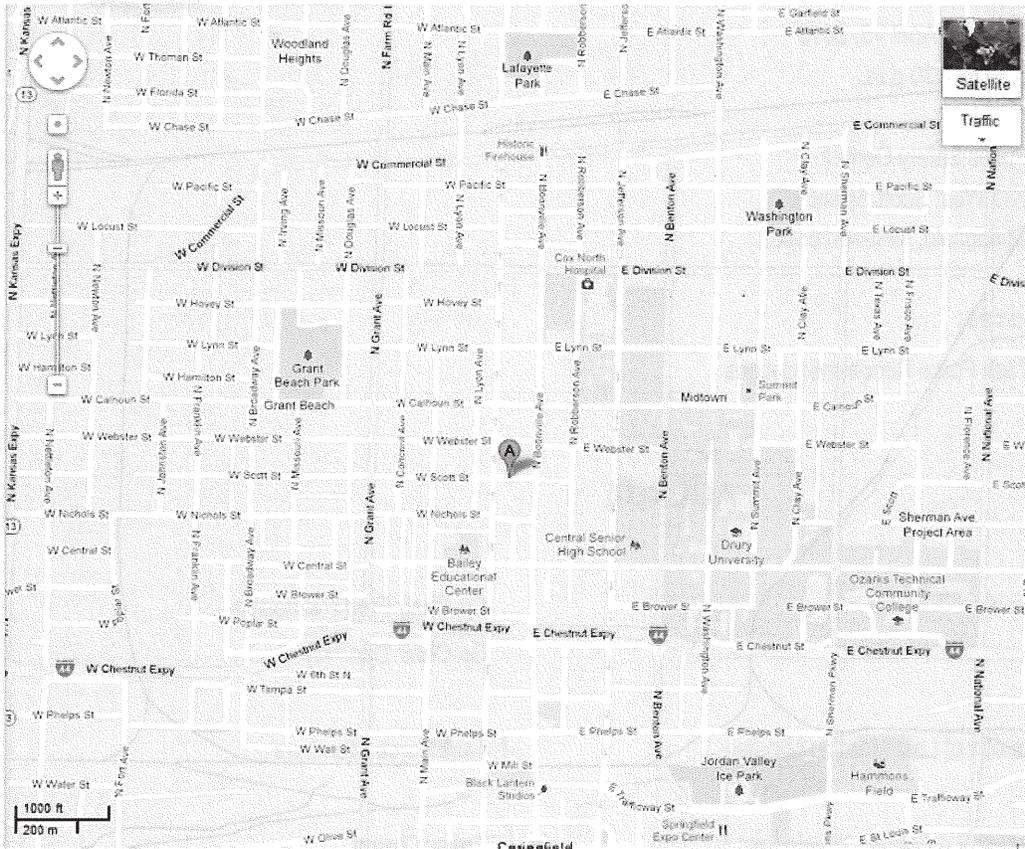
5:30 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:40 p.m.	Discussion of Last Meeting Minutes	Task Force Members
5:45 p.m.	Presentation – Follow up from Last Meeting	Project Team
6:00 p.m.	Task Force Discussion	Task Force Members
7:15 p.m.	Next steps	Sheila Shockey
7:25 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:30 p.m.	Adjourn	

***In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.***

**Meeting Site:**

Public Safety Center  
330 West Scott Street  
Springfield, MO 65803

**For assistance call (417) 864-1901 or (417) 818-6091**



**Directions:**

From the North: Travel south on N. Kansas Expressway to Chestnut Expressway. Turn left or east and travel to North Booneville Avenue. Turn left and proceed 3 blocks to Scott Street. The Public Safety Center is on your left.

From Highway 65: Take the Division Street exit. Turn west (right if coming from the north, left if coming from the south) and travel to Booneville Avenue. Turn left and travel about 5 blocks to Scott Street. The Public Safety Center is on your right.

From the west and I-44: Take the Chestnut Expressway east to Booneville Avenue. Turn left onto Booneville Avenue and travel 3 blocks to Scott Street. The Public Safety Center is on your left.

# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force

**Recommendations** *(DRAFT for further refinement at the April 15, 2013 meeting)*

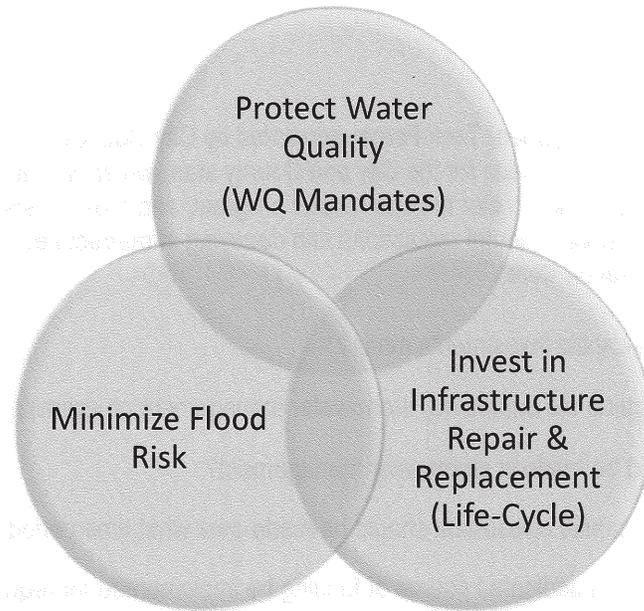


### Background

The 30-member Stormwater Management Task Force, appointed by City Council in September, was charged with studying the long-term needs for the City and County stormwater programs. The City and County will have ongoing costs to administer the stormwater program, and those costs will increase in the future primarily due to stricter environmental regulations and decaying infrastructure. The questions posed to the Task Force for consideration were:

- How should we prioritize capital investments made?
- What principles should guide the community stormwater management programs?
- What investments should be made in stormwater management?
  - What amount of capital investment should be made over what time period?
  - Should a permanent dedicated source of funding be implemented for required programs and maintenance/repair/replacement of the decaying system?
  - Should the capital funding source have a sunset and specific projects identified?
  - What type of maintenance/system repair & replacement program should be implemented?
  - Should water quality programs be developed to comply with regulations or exceed standards?
- What source(s) of funding are desired?
- What level of funding is desired?
- How should we explain the issues and task force recommendations to the community?

The task force is focused on three major components of stormwater – water quality/unfunded mandates, minimizing flood risk and replacing aging infrastructure. A major stormwater funding source for both the City and the County for the last 5 years has been the 1/8-cent Parks/Stormwater Tax which expired in June, 2012. Since that time, neither the City nor the County has a dedicated funding source to address stormwater expenses in any of these three categories.



### **Program Goals & Priorities Recommendations**

The Stormwater Task Force discussed what outcomes are important for the City and the County's Stormwater Management programs. They also discussed the program priorities which should be used to prioritize investments in the program including capital projects. The recommendations are listed here in priority order.

1. Reduce the risk of injury/death caused by flooding events.
2. Protect water quality and help our community comply with regulations.
3. Create multiple benefits with stormwater investments.
4. Reduce property damage caused by flooding events.
5. Make sure the system we have in place to manage stormwater is in good repair by investing in proactive infrastructure repair & replacement (lifecycle).

## **Guiding Principles**

The Stormwater Task Force also recommends the following Guiding Principles be considered by the City Council and County Commission and staff for the community's stormwater programs.

### Conservation:

- The efficient use of resources should be encouraged.

### Economic Development:

- We attract businesses and citizens to our community because of the value gained through investments made in environmental stewardship.
- We safeguard our water resources while keeping tax rates and fees competitive with other jurisdictions to attract and retain business and citizens.

### Effectiveness:

- Stormwater management programs utilize best practices & sound science; investments are effective.
- Springfield/Greene County can't meet all the financial needs that have been identified. Investments must be made that have the most impact for the dollar spent.

### Environmental Stewardship:

- Springfield/Greene County should meet achievable regulatory requirements based in sound science with the goal of protecting water resources.
- It is important to protect & improve drinking water sources and quality of water in streams in Southwest Missouri. Good stormwater management is in everyone's best interest.

### Equity/Fairness:

- Everyone in the community should pay for stormwater management.
- The costs to administer & review permits should be fully recovered from the applicant and not subsidized by other customers.

### Financial Burden:

- Springfield/Greene County should invest in stormwater management programs that are affordable.
- Everyone in the community should pay for stormwater management.

### Innovation/Planning:

- The long-term stormwater management program should be flexible to adapt to new technologies and innovations.
- It is important to develop good plans before implementing projects so funds are spent wisely.
- Master plans of capital improvements should be developed collaboratively on a watershed basis rather than by political jurisdiction.

Public Acceptance:

- The public perception should be that the stormwater management programs are balanced; decision-making is open and is influenced by public input.
- It is important to continue to prioritize, plan & build projects showing progress to the public.

Public Benefit:

- The public should benefit from the investments made in stormwater management.

Understandability/Public Education:

- Citizens should be made aware of how they can protect water quality through their actions.
- Citizens should understand how improvements can help protect water quality and how improvement programs are funded.

## **Funding Level Recommendations**

Springfield/Greene County can't meet all the financial needs that have been identified with current sources of revenue and levels. The following levels of funding are recommended:

The total annual expenditures are: \$7.75 million currently increasing to approximately \$11 million annually in 2020 in three major areas:

*Water Quality Mandates:* Current annual operating costs for the City and County to meet federal and state regulations and manage the stormwater program are approximately \$1.5 million and are expected to steadily increase to at least \$2.8 million by fiscal year 2020. The majority of these costs are to fund regulatory compliance. Water quality mandates and TMDL planning costs are \$900,000 currently, increasing to \$2.2 million in 2020.

*Flood Risk Reduction:* Approximately \$6 million per year is needed for capital projects to allow the City and County to mitigate local flooding. It is important to develop good plans before implementing projects so funds are spent wisely. Master plans of capital improvements should be developed collaboratively on a watershed basis rather than by political jurisdiction. The City and County should maintain the capital investment levels made annually in the past on flood risk reduction. This funding level supports a good program that makes steady progress to eliminate the most severe flooding problems. This is approximately \$6 million per year for the City and County together. These investments should also protect water quality as desired by the community and required by the state/federal regulators.

*Infrastructure Repair/Replacement:* The task force recommends that total annual reinvestment should be \$2.5 million annually, which would place the City and County on a 200-year replacement cycle for the \$500 million in existing infrastructure. The City and County have built infrastructure to manage stormwater over the past 100 years, but resources have not been available to repair and replace it. The Task Force recommends the City/County total annual reinvestment should be \$2.5 million which is more than is being spent currently but not as much as the industry best practice of a 100-year system replacement cycle.

## Recommended Funding Sources

In terms of funding sources, the following is recommended:

1. The capital funding source should be the 1/8<sup>th</sup> of a cent sales tax for Parks/Stormwater with a 7-year sunset and specific project list identified.
  
2. A permanent, dedicated funding source should be put in place to cover the costs of required programs and system repair/replacement activities. The funding source for ongoing and required costs should be reliable and not fluctuate greatly from year to year. The recommended funding source is:
  - 1/10<sup>th</sup> of one percent sales tax for water quality (\$4 million annually); or
  - 1/8<sup>th</sup> of a cent sales tax for Parks/Stormwater with no sunset (\$5.1 million annually); or
  - A stormwater user fee (\$5.2 million annually).

## Community Outreach

How should we explain the issues and task force recommendations to the community?

# City of Springfield - Greene County, Missouri

## Stormwater Management Task Force

### Background Information



### Revenues & Expenditures

The following information was provided at the last Stormwater Task Force meeting in the agenda packet and presentation. It is provided again as background information to aid in the discussion on April 15, 2013.

Estimated revenues for each source are listed in Table 1.

**Table 1. County-wide Annual Revenue Projections for Each Revenue Source**

County-Wide Funding Source	Projected Annual Revenue
1 cent Property Tax	\$440,000
1/10th Cent Sales Tax	\$4,035,359
1/8th Cent Sales Tax	\$5,147,110
1/4 Cent Sales Tax	\$10,088,389
1/2 Cent Sales Tax	\$20,176,796
\$1/month Utility	\$3,559,227
\$2/month Utility	\$7,118,453
\$3/month Utility	\$10,813,780
\$5/month Utility	\$18,021,134

The following assumptions were used for the expenditures. A more complete breakdown of the expenditures was included in the last agenda packet and presentation.

*Operating Costs:* The City and the County will have ongoing costs to administer the stormwater program and those costs will increase primarily due to stricter regulatory compliance. Because the range given at the last several meetings was so wide due to the uncertainty of these regulations, the project team has narrowed these down to what is *known to be required for compliance* with the MS4 permit and to funds for TMDL planning. It does not include the estimated costs to address TMDLs with programs/projects because of the difficulty in estimating costs without more information. Current operating costs for the City and County are approximately \$1.5 million and are expected to increase to approximately \$2.8 million in Fiscal Year 2020. The majority of this cost is for water quality compliance activities.

**Table 2. City & County Known Operating Costs for 2013 – 2020**

<b>Known City + County Ongoing Operating Costs</b>	<b>Current</b>	<b>FY14</b>	<b>FY15</b>	<b>FY16</b>	<b>FY17</b>	<b>FY18</b>	<b>FY19</b>	<b>FY 20</b>
City Operating Costs	\$1,210,000	\$1,755,000	\$1,840,000	\$1,870,000	\$1,960,000	\$1,985,000	\$2,110,000	\$2,110,000
County Operating Costs	\$321,000	\$373,000	\$693,000	\$707,000	\$712,000	\$715,000	\$726,000	\$726,000
<b>TOTAL</b>	<b>\$1,531,000</b>	<b>\$2,128,000</b>	<b>\$2,533,000</b>	<b>\$2,577,000</b>	<b>\$2,672,000</b>	<b>\$2,700,000</b>	<b>\$2,836,000</b>	<b>\$2,836,000</b>

*Capital Costs & Life Cycle Replacement Costs:* At the last Task Force meeting, the members asked that scenarios be developed to include costs to minimize flood risk and repair & replace infrastructure (lifecycle). The targets set were based upon the following:

- Amount the City and County historically has spent annually on flood risk reduction. This funding level supports a good program that makes steady progress to eliminate the most severe flooding problems. This is approximately \$6 million per year for the City and County together.
- A life-cycle replacement program spanning 200 years for the entire system. The life-cycle replacement target is more than is being spent currently. It is not as much as the industry best practice of a 100-year system replacement cycle. We've included approximately \$1.7 million in the scenarios which is less than the 200-year lifecycle cost.
- Staffing needed to support these programs.

The City & County Seven Year Capital Plan is \$53.31 million for projects that improve water quality, minimize flood risk and replace existing infrastructure. These investments are not required.

**Table 3: City & County Capital Costs for 2013 – 2020 (7 Year Plan)**

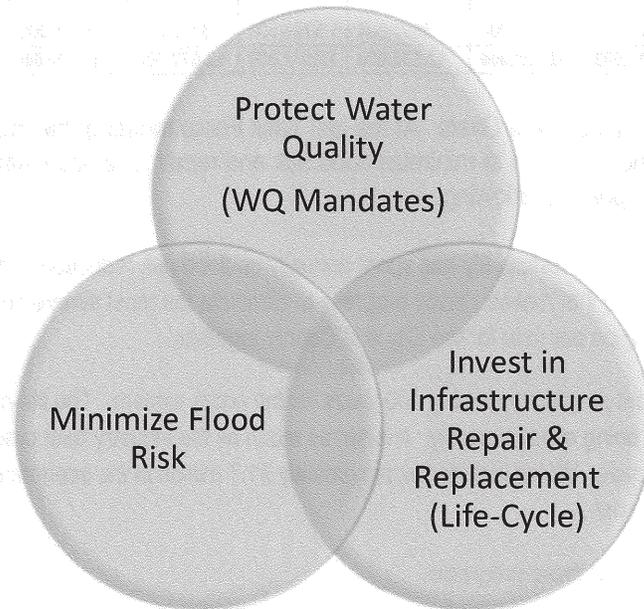
<b>TOTAL CAPITAL &amp; INFRASTRUCTURE REPAIR COSTS -- CITY + COUNTY</b>	<b>Total Project Costs</b>	<b>Annualized Cost</b>
Minimize Flood Risk Capital Projects	\$36,030,000	\$5,147,143
Infrastructure Repair & Replacement (Lifecycle) Program	\$17,280,000	\$2,468,571
<b>TOTAL</b>	<b>\$53,310,000</b>	<b>\$7,615,714</b>

One of the priorities established by the Task Force was to look for ways to stretch the dollars to be spent by looking for ways to spend one dollar to address all three goals:

- Protect water quality and meet environmental regulations.
- Minimize flood risk
- Reinvest in infrastructure repair & replacement (life-cycle)

Figure 1 shows the three goals of the program overlapping. The areas where there is overlap of the circles depicts those programs and projects that are multi-objective or multi-benefit.

**Figure 1. Stormwater Management Program Goals**



To comply with TMDLs, the City and County will be required to build projects to improve the streams that are designated as polluted. Section 2 of the agenda packet for the February 28<sup>th</sup> meeting describes the streams designated as polluted and what may be required to reduce the pollution. Many of the capital projects proposed will accomplish at least two or three of these goals. Tables 4 and 5 provide a list of prioritized projects that could potentially be completed with a description of the goals achieved through the project investment.

**Table 4. City of Springfield, Mo.  
Example Prioritized 7-Year Multi-Objective Capital Program**

Project	Cost	Protect Water Quality	Reduce Flood Risk	Replace Infrastructure (life cycle)
Complete Phase 1 of System Evaluation, Condition Assessment & Prioritization	\$1,000,000	x	X	x
Upper Fassnight in area of Grand/National	\$3,000,000	x	X	x
Lower Fassnight in area of Kimbrough/Cherry	\$3,000,000	x	X	x

Boonville and Central to County Campus	\$2,000,000		X	x
Additional Priority Infrastructure Repair & Replacement Projects to be identified through assessment	\$3,000,000	x	X	x
Watershed Planning & Project Prioritization & Program management	\$1,000,000	x	x	x
Renew Jordan Creek (USACE match phase 1 & 2)	\$7,000,000	x	x	
Renew Jordan Creek (Grant viaduct to Boonville)	\$4,000,000	x	x	
Fassnacht Creek (Jefferson to Holland) to Phelps Grove Park	\$3,000,000	x	x	x
Ravenwood Branch (Charleston/Carleton to Lake Springfield)	\$3,000,000	x	x	
Galloway Stream Stabilization (South of Battlefield Road)	\$1,000,000	x		x
Jordan Creek Stream Stabilization and habitat enhancement (downstream of Grant)	\$1,000,000	x		x
Wilson's Creek Stream Stabilization and habitat enhancement (downstream of RR)	\$2,000,000	x		x
Dickerson Park Zoo channel restoration, water quality enhancement	\$2,000,000	x	x	
Grant Beach Park channel day-lighting & box replacement program	\$1,000,000	x	x	x
Additional Priority Projects to reduce flooding/improve water quality and manage the capital projects program	\$10,000,000	x	x	
<b>TOTAL</b>	<b>\$47,000,000</b>			

**Table 5. Greene County, Mo.  
Example Prioritized 7-Year Multi-Objective Capital Program**

Project	Cost	Protect Water Quality	Reduce Flood Risk	Replace Infrastructure (life cycle)
Watershed Planning & Project Prioritization	\$100,000	x	x	x
Oak Knolls Subdivision	\$1,000,000		x	x

Cherokee Estates	\$1,300,000		X	X
Prairie View Heights	\$500,000		X	X
Chapel Hill	\$400,000		X	X
Comar Addition	\$75,000		X	X
Monta Vista Heights	\$500,000		X	X
Town and Country Estates	\$750,000		X	X
Woodsboro Estates	\$320,000		X	X
Cedar Crest Estates	\$335,000		X	X
Needmore Branch Drainage and Greenway	\$700,000	X	X	X
Trail of Tears Drainage and Greenway	\$130,000	X		
Springday Hills Drainage Project Phase 2	\$200,000	X	X	X
<b>TOTAL</b>	<b>\$6,310,000</b>			

Table 6 is a summary of the 7 – year plan capital and infrastructure repair costs.

**Table 6. City & County Capital & Infrastructure Replacement/Repair (Life-Cycle) Costs**

<b>TOTAL CAPITAL &amp; INFRASTRUCTURE REPAIR COSTS -- CITY + COUNTY</b>	<b>Total Project Costs</b>
City Capital & Infrastructure Repair	\$47,000,000
County Capital & Infrastructure Repair	\$6,310,000
<b>TOTAL</b>	<b>\$53,310,000</b>

## City of Springfield - Greene County, Missouri



### Stormwater Management Task Force Meeting Notes - February 28, 2013

#### **Welcome & Introductions**

The Springfield/Greene County, Missouri Stormwater Management Task Force met in the Greene County Public Safety Center. The meeting commenced at 5:00pm. Task Force Co-chairs Dan Hoy and Fred Palmerton welcomed the task force members and community members in attendance. Those present included the following.

#### **Task Force**

Brain Perdue  
Fred Palmerton  
Geoffrey Butler  
Chris Carson  
Tiffany Frey  
Casey Haynes  
Bill Bretall

Rick Scarlet  
Matthew Pierson  
Dana Elwell  
King Coltrin  
Fred Schlegel  
Dan Hoy  
Chris Macioce

Daniel Beckman  
Eric Dove  
Patrick Harrington  
Stacey Armstrong  
Ronda Headland  
Tom Kisse  
Tom DeWitt

Absent: Aaron Wahlquist, Karen Spence, Jerany Jackson, Dave Murray, Patty Hamilton, Erik Fjeseth, Andy Hosmer, Harlan Hill, Matt Bailey

#### **City and County Staff**

Carrie Lamb  
Vanessa Brandon  
Tim Smith  
Chris Coulter

Barbara Lucks  
Justin Foss  
Sheila Shockey  
Fred Marty

Kimberly White  
Tim Davis  
Kevin Barnes  
Jan Millington

#### **Visitors**

Milton Dickensheet

Mike Pessina

Roddy Rogers

#### **Minutes**

Minutes from the last meeting were approved.

#### **Presentations**

Sheila Shockey gave a brief presentation summarizing the meeting packet. She reviewed the task force's charge and the status of each item of the charge. Tonight will focus on what investments should be made in stormwater management and what source(s) of funding are desired. Next meetings will focus on principles to guide the program and how to communicate the recommendations to the public. She

reviewed the priorities established by the task force, with reducing injury/death due to flooding and protecting water quality being the top priorities.

Sheila explained the revenue and expenditure assumptions that were used in developing the five funding scenarios. The revenue needs for water quality mandates are based on MS4 permit costs we are certain about and costs for TMDL planning, but not implementation. Capital costs were based on continuing the current level of funding for flood risk reduction (about \$6 million/year) and a 200-year infrastructure lifecycle replacement (\$2.5 million/year).

The Wilson/Jordan and Pearson TMDL lawsuit has been dismissed and the USEPA will be developing new TMDLs. TMDL planning cost is to fund monitoring and study to work cooperatively with USEPA on developing new ones. The TMDLs currently in place are for the James and Little Sac River. Those on the horizon are the new Wilson, Jordan, and Pearson TMDLs and potentially others. Staff put together a list of projects that are multi-objective, meeting two or three of the objectives of water quality protection, minimizing flood risk, and infrastructure replacement. Maps of the City and County proposed projects lists were shown.

Todd Wagner discussed Renew Jordan Creek as an example project on the list that meets multiple objectives. This project includes multiple projects throughout the Jordan Creek watershed, and will incorporate community input and partnerships. It includes bridge replacements, channel work, such as stream daylighting, and regional detention basins. The feasibility study with the U.S. Army Corps of Engineers has been completed and determined that detention basins and flood protection of Euticals pharmaceutical plant meet the criteria for Corps funding. That would be one piece of the overall Renew Jordan Creek project. Todd showed renderings of what daylighting Jordan Creek in the downtown area could look like. It would provide flood protection and economic development. Another part of the project is the brownfields environmental cleanup in West Meadows. With local match, we've been able to leverage USEPA funds. It will incorporate riparian corridor improvements and a trail. Todd also showed a rendering of a bridge replacement with a pedestrian underpass. Similar example projects include Antelope Creek in Lincoln and Cherry Creek in Denver. The entire project cost range is \$75-\$100 million but would likely occur over a long time period of 15-20 years.

### **Guiding Principles Survey Results**

Sheila reviewed the results of surveys taken by the task force members establishing guiding principles, and discussed how the various funding sources compare to those results. There was agreement on the following:

- A permanent, dedicated funding source should be put in place to cover the costs of required programs and maintenance activities.
- The funding source for ongoing and required costs should be reliable and not fluctuate greatly from year to year.
- A capital funding source should have a sunset and specific project list identified.

Fifty-nine percent (59%) said the funding of stormwater management should be linked directly to the amount of runoff a property produces. Those who cause more of the problem, pay more for stormwater management services. This would point to a user fee for a funding source.

## Presentation on Funding Scenarios

Sheila explained the assumptions used in the user fee scenario: Start receiving revenue in second half of 2014; \$150,000 to set up the utility and \$40,000 annual cost to administer; gradual increase from \$1.00 to \$2.00/month/ERU; 20% reduction in revenue for incentives/credits.

She presented a chart summarizing and comparing all 5 scenarios.

Scenario #1: 1/10 cent + 1/8 cent sales tax (sunset 1/8<sup>th</sup> after 7 years)

Scenario #2: Property tax increase 9 mills + 1/8 cent (sunset 1/8 cent after 7 years)

Scenario #3: Property tax only – increase 20.7 mills

Scenario #4: ¼ cent sales tax

Scenario #5: \$1-\$2/month ERU user fee + 1/8 cent sales tax (sunset it after 7 years)

All provide a similar amount of revenue, so would fund the same program levels with the exception of ¼ cent which would provide more capital and lifecycle replacement funding. With scenario #5, examples of what that user fee impact would be on churches, businesses, and the City and County were shown.

The 1/10<sup>th</sup> cent to ¼ cent options would represent an approximate 1-3% increase in the overall sales tax rate. The two property tax increase scenarios would increase tax on \$120,000 value by 2% and 4% respectively.

## Discussion of Scenarios

Sheila asked the task force if they want to get rid of any of the 5 scenarios.

**There was consensus to eliminate the scenarios with property tax as the funding source.**

Sheila asked for thoughts on the ¼ cent sales tax. She noted that it would prevent Parks from getting additional funding unless a portion of it has a sunset. (1/8<sup>th</sup> cent sales tax permanent, 1/8 cent sales tax with sunset for capital.)

*Question:* What is the probability of approval of the ¼ cent by voters?

*Response:* Think it would be difficult. Voter education would be necessary.

*Comment:* All of the scenarios will be hard to sell. Need to explain the need and then explain the funding source as simply as possible. With sales tax, the voters will need to understand that the visitors also pay it. Springfield is a regional destination. That's a plus to sales tax scenario.

*Comment:* If you build impervious, you should pay. User fee is easy to explain – everyone pays. Those who have invested in a higher level stormwater management service would pay less on the credit system.

*Comment:* What about the impact on churches?

*Response:* They contribute to the problem too so they should pay.

*Comment:* It makes sense for visitors to help pay for a commodity that they use like highways. Visitors don't utilize the stormwater system to the same extent as a citizen.

*Response:* The connection between visitors and sales tax includes keeping roads free of flooding, and water quality. If that connection is not as strong, you're just passing the buck rather than having those using it pay for it.

*Comment:* A temporary funding source for a permanent problem doesn't make sense. Infrastructure won't last 200 years.

*Comment:* Makes most sense long-term to do a utility because it's the only one that builds in the motivation to invest in good stormwater management up front. Incentivize for a long-term change in better stormwater management practices.

*Comment:* Before even taking it to the voters, would need to craft the credits so that each individual property owner would know what their cost would be before voting for it.

*City/County Response:* We've done a lot of the background work on that already. Experts have told us the expected loss in revenue from credits which are only about 5%. The number of properties that would be eligible for credits is a small percentage of the total number of parcels. Tim Smith provided history on why we've done background work on a user fee. He said the County knew the 2006 parks/stormwater tax would sunset in 5 years so we funded a user fee study in anticipation that it may be one potential funding source when the tax sunset occurred in 2012.

*Question:* Are there credits for residential? *Response:* yes

*Comment:* Our economy is growing and we'll continue to be a regional destination. Those who visit do benefit from infrastructure maintenance and water quality. We need to emphasize that if we move forward with a sales tax.

*Question:* Would raising rates in the future if we have a utility have to go to the voters?

*Response:* Yes, due to legal precedence.

*Comment:* Iowa has a drainage district with a drainage tax that is billed through the assessor. It's \$10/year. That's a good value for having the storm system available for sump pump connection to keep basement from flooding.

*Comment:* The term utility may have a negative connotation. Calling it a user fee would be better because you are paying to use the stormwater system by the amount you contribute to the system.

*Comment:* Other communities have used the terms stormwater fee or water quality fee.

*Comment:* If we don't pass a funding source and get sued by the USEPA for not fulfilling mandates, where would the funding for those mandates come from? General fund?

*Comment:* Citizens will know what their monthly user fee will be and it doesn't fluctuate. Sales tax fluctuates based on what you spend. User fees are more known and easier to budget for than a sales tax.

**There was consensus among the Task force members that 1/8th cent sales tax for capital projects should sunset.**

*Question:* Would utility require hiring more staff? We assume 0.5 FTE to handle billing/questions.

*Question:* Would credits be one-time or ongoing?

*Staff Answer:* Could be some of both. Example credits we looked at were basins, education, maintenance which would be ongoing but may fluctuate for example if your education efforts decrease.

Information was handed out from the Chamber about their perspective on the impact of the different funding sources.

*Comment:* Non-profits and churches would be hit hardest by a user fee.

*Comment:* Incentive to go above and beyond on stormwater requirements will be driven by buyer/tenant desire for environmentally-friendly development regardless of incentives. We are starting to see more of that practice.

*Comment:* Cost share program may incentivize more than a user fee credit would.

*Comment:* In 1993, we got a lot of push back and negative press from churches and educational institutions on the user fee that was put on the ballot.

*Question:* How were those challenges dealt with in Lenexa and Overland Park?

*Staff Response:* It was in Kansas so the user fee didn't have to be voted on. We got businesses to help pass a sales tax at the same time so the user fee didn't have to be as high. Lenexa created Rain to Recreation as the program name for the user fee.

*Comment:* In commercial real estate, whether the user fee is on a utility bill or the property tax bill will make a difference on how it's passed on to tenants.

*Comment:* A utility/user fee can be packaged in a way to make it easier to sell. It could be called a pollution prevention fee, water quality fee, etc.

*Comment:* Being able to potentially incentivize maintenance is a pro of the user fee.

*Comment:* No matter the land use, the site can be designed to have minimal runoff and keep the user fee low. The user fee would incentivize that type of design.

**Sheila asked the Task Force members to vote on the source of funding for ongoing program costs. It was a tie vote: Utility – 9. Sales tax – 9.**

Sheila gave the task force a homework assignment. Over the next month until next meeting, ask as many people as you can whether they prefer a sales tax or user fee.

*Request:* Bring an example of how another community packaged and explained/sold their user fee to the voters.

Tim Smith reiterated that the ¼ cent and 1/8th cent sales tax compete with Park's interests, whereas the 1/10th cent sales tax doesn't because Parks isn't able to get the 1/10th of a cent sales tax by statute because it's authorized for water quality only. The ¼ and 1/8th cent sales tax are part of the ½ cent sales tax statutorily authorized for parks or stormwater.

**Next Steps and Closing Remarks**

The meeting was adjourned at 7:00 p.m.

**GREENE COUNTY  
PARKS, STORMWATER &  
LAW ENFORCEMENT  
SURVEY**

**MAY 2011**

**OPINION RESEARCH SPECIALISTS, LLC  
SPRINGFIELD, MISSOURI  
(417) 889-4506**

**GREENE COUNTY PARKS,  
STORMWATER & LAW  
ENFORCEMENT SURVEY**

**MAY 2011**

Prepared for

**The Greene County Commission**  
Springfield, Missouri

Prepared by

**OPINION RESEARCH SPECIALISTS, LLC**  
Springfield, Missouri  
(417) 889-4506

May 23, 2011

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## EXECUTIVE SUMMARY

Results from the May 2011 Greene County Parks, Stormwater and Law Enforcement Survey are based on 402 completed telephone interviews of “likely voters” residing in Greene County. Overall survey results have a margin of error of +/- 5% at the 95% confidence interval. The survey was designed, conducted, and analyzed by **Opinion Research Specialists, LLC** of Springfield, Missouri. Survey findings are summarized below.

### Support for a Parks Sales Tax Increase AND Stormwater Renewal (Option 1)

- A proposed 1/8-cent sales tax increase to fund additional parks and recreation improvements in Springfield and Greene County AND renewal of an existing 1/8-cent sales tax currently used to fund stormwater projects in Springfield and Greene County was opposed by 56% of respondents, 33% favored it, and 11% were undecided.
- 44% of respondents were **strongly opposed** to this option compared to 16% strongly in favor.
- Support for this option failed to exceed 42% among any demographic group. Respondents most likely to oppose this option were county residents living outside of Springfield and high school graduates (67% and 66% respectively).

### Support for a Parks Sales Tax Renewal Only (Option 2)

- A proposed 1/8-cent sales tax **renewal** to fund additional parks and recreation improvements in Springfield and Greene County (no funding for stormwater projects) was opposed by 66% of respondents, 22% favored it, and 12% were undecided.
- 47% of respondents were **strongly opposed** to this option compared to 5% strongly in favor.
- Support for this option failed to exceed 29% among any demographic group.

### Support for a Stormwater Sales Tax Renewal Only (Option 3)

- A proposed five-year renewal of a 1/8-cent sales tax passed in 2006 to fund stormwater projects in Springfield and Greene County (no additional funding for parks) was favored by 53% of respondents, opposed by 38% of respondents, and 9% were undecided.
- 25% of respondents **strongly favored** this option (28% were somewhat in favor), while 25% were **strongly opposed** (13% were somewhat opposed).
- With the exception of high school graduates, all demographic groups were more likely to support this option than oppose it.

### Support for a Law Enforcement Sales Tax Increase–Assumption A

- Assuming voter approval of Option 1 (parks sales tax increase AND stormwater sales tax renewal), 51% of respondents would oppose a 1/4-cent sales tax increase to fund countywide law enforcement and address overcrowding in the county jail if placed on the November 2011 ballot and 36% would favor it (13% undecided).
- 34% of respondents were **strongly opposed** to this option vs. 22% **strongly in favor**.
- Support for this proposal failed to exceed 45% among any demographic group. With the exception of respondents 18-59 years old and college graduates, all demographic groups were more likely to oppose this initiative than favor it.

### Support for a Law Enforcement Sales Tax Increase–Assumption B

- Assuming Option 1 (parks sales tax increase AND stormwater sales tax renewal) was either defeated in August or never placed on the August ballot, 45% of respondents would favor a 1/4-cent sales tax increase to fund countywide law enforcement and address overcrowding in the county jail if placed on the November 2011 ballot, while 43% would oppose it (12% undecided).
- 26% of respondents **strongly favored** this option vs. 29% **strongly opposed**.
- College educated and younger / middle-aged respondents were the most supportive of this proposal, while high school graduates and older respondents (73+ years old), were the least supportive.

## INTRODUCTION

This study was authorized by the Greene County Commission to assess the level of voter support for a sales tax proposal in August to fund additional parks and recreation improvements and/or stormwater projects in Springfield and Greene County. Moreover, level of voter support for a sales tax proposal in November to fund countywide law enforcement and address crowding in the Greene County jail was also ascertained. The survey was designed, conducted, and analyzed by **Opinion Research Specialists, LLC** of Springfield, Missouri.

## SURVEY DESIGN AND METHODOLOGY

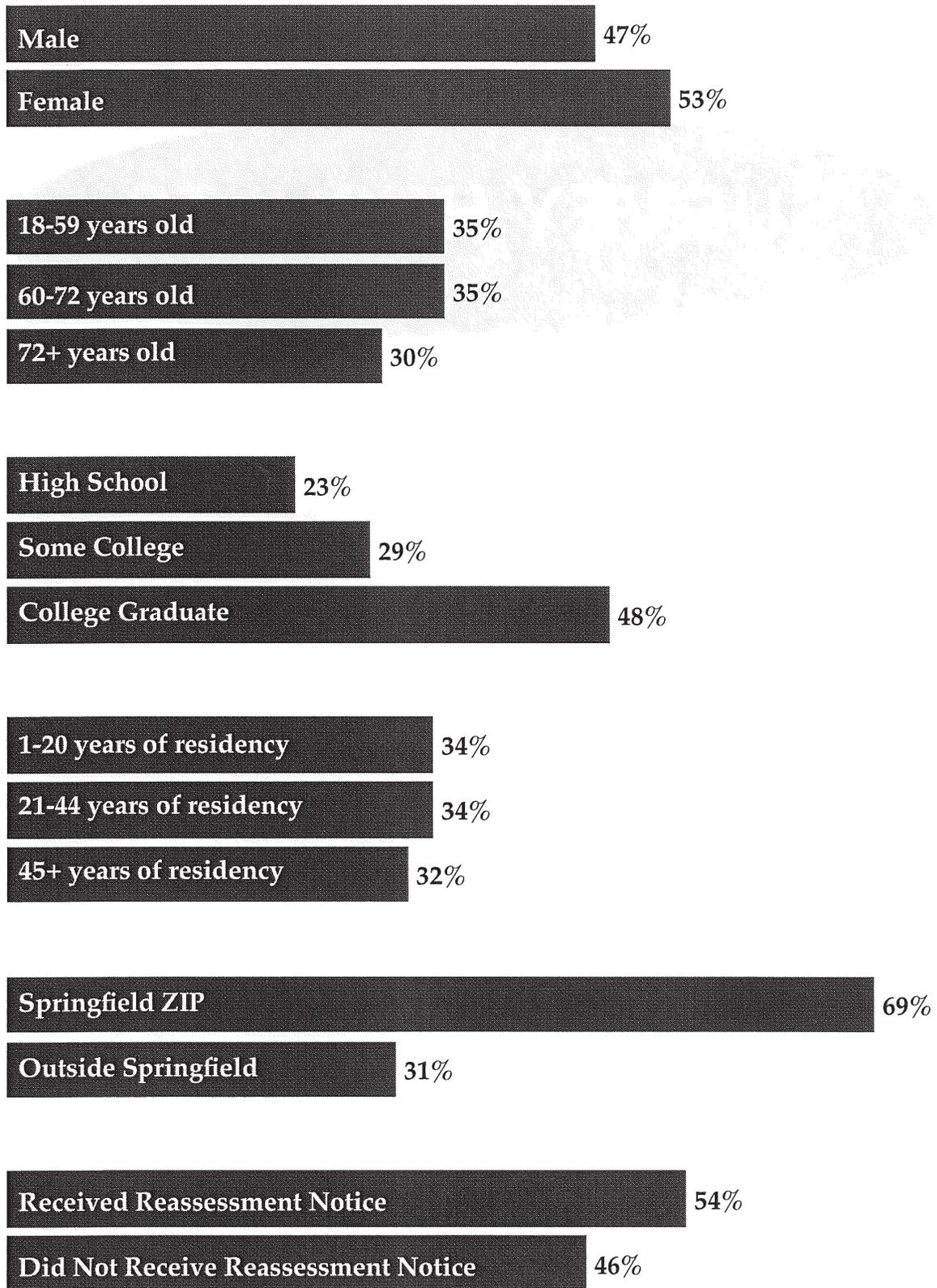
Opinion Research Specialists, LLC interviewed by telephone 402 registered voters residing within Greene County. Survey participants were randomly selected from a group of registered voters (stratified on the basis of voting precinct) who had voted in the April 2011 and/or November 2009 elections. This information was provided by the Greene County Clerk's office.

Up to four attempts were made to contact each randomly selected registered voter with at least one attempt made during the weekend, weeknight, and weekday during the calling period. Telephone interviews were conducted May 14–18, 2011 from Opinion Research Specialists' phone bank facility in Springfield, Missouri. Telephone interviews averaged four minutes in duration.

## INTERPRETATION OF DATA

Overall survey results, based on 402 completed telephone interviews have a margin of error of +/- 5% at the 95% confidence interval. For example, if a response listed in the report is 60%, one can be 95% confident that the "true" percentage, that which would have been obtained if every Greene County registered voter who had voted in the April 2011 and/or November 2009 elections had participated in the survey, is between 55% and 65%. Margin of error increases when subsets of the total sample are analyzed (e.g., male vs. female respondents).

## PROFILE OF GREENE COUNTY SURVEY RESPONDENTS

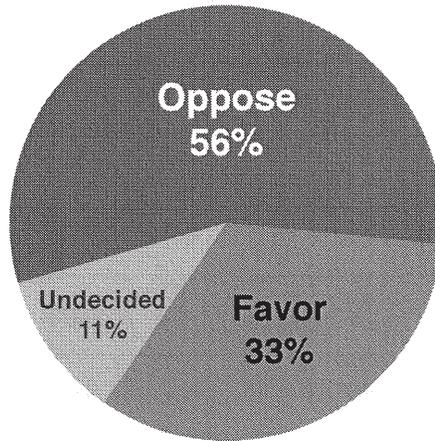


# SURVEY RESULTS

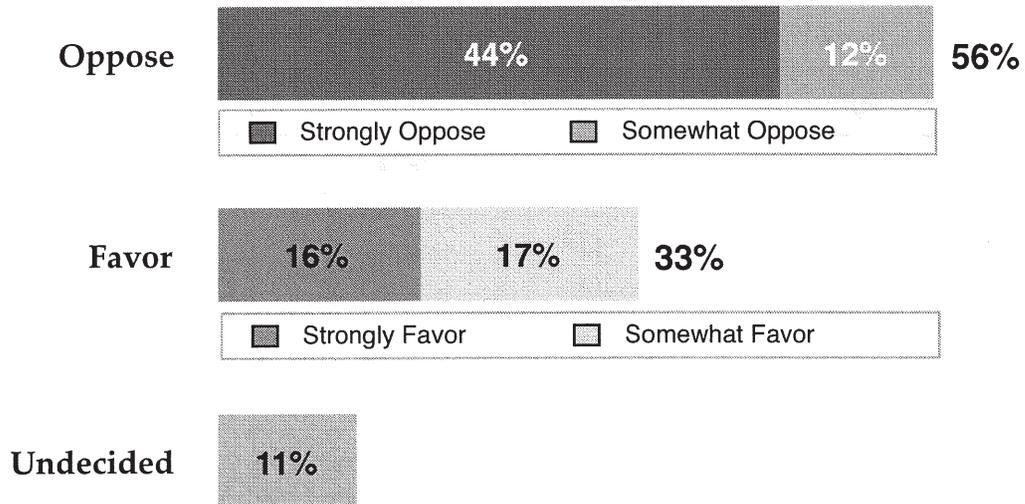
### Support for a Parks Sales Tax Increase AND Stormwater Renewal (Option 1)

Respondents were informed that the Greene County Commission was considering holding an election in August 2011 to ask voter approval for a 1/8-cent sales tax increase to fund additional parks and recreation improvements in Springfield and Greene County, plus renew an existing 1/8-cent sales tax currently used to fund stormwater projects in Springfield and Greene County.

A majority of survey respondents (56%) opposed this option, while 33% favored it and 11% were undecided at this time.



Among respondents opposed to this option, 44% were *strongly opposed* and 12% were somewhat opposed. Among those in favor, 16% were strongly in favor and 17% were somewhat in favor.

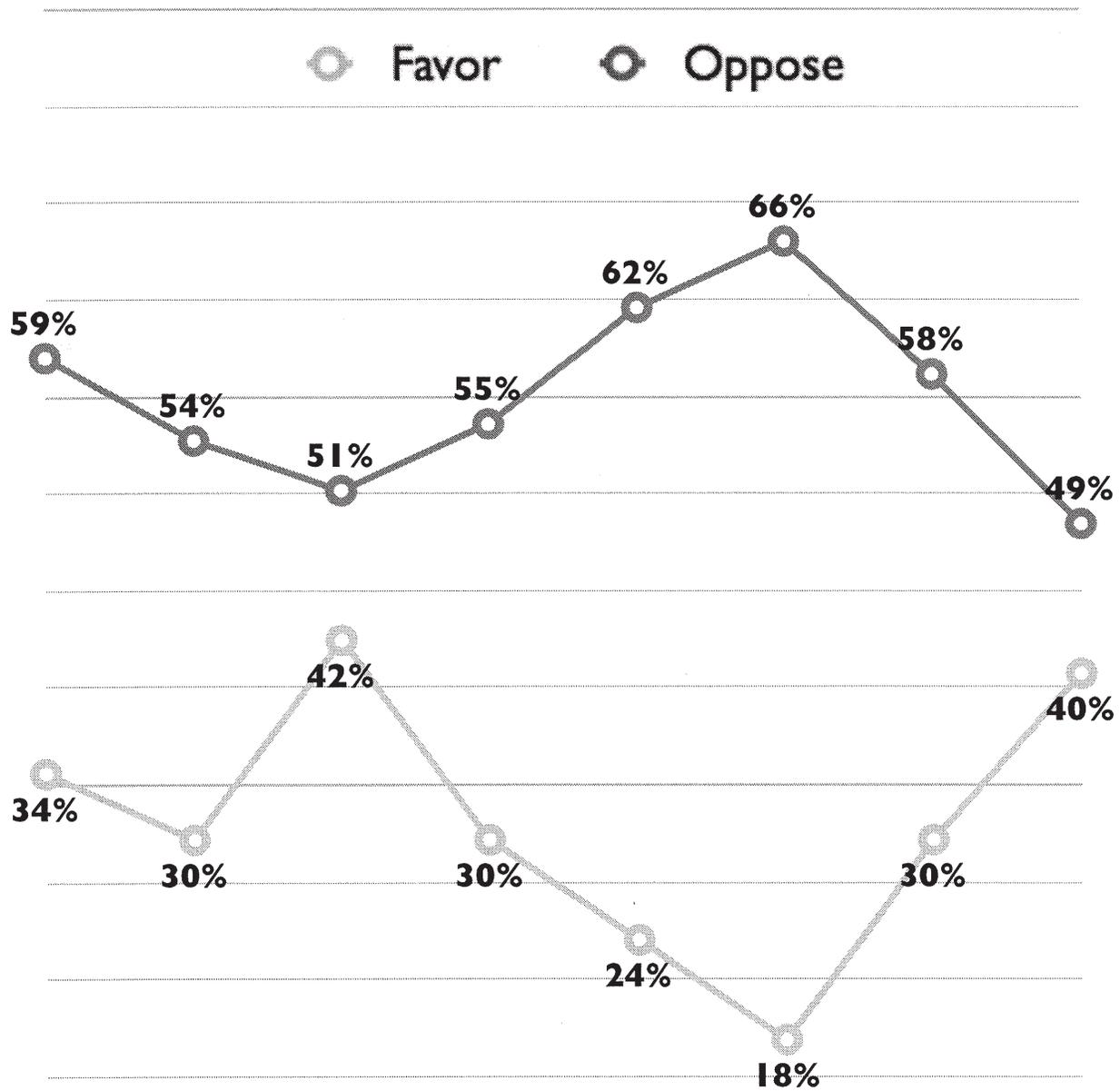


**Support for a Parks Sales Tax Increase AND Stormwater Renewal (Option 1)**

	<b>FAVOR</b>	<b>OPPOSE</b>	<b>UNDECIDED</b>
<b>Gender</b>			
Male	34%	59%	7%
Female	30%	54%	16%
<b>Age</b>			
18–59 Years	42%	51%	7%
60–72 Years	30%	55%	15%
73+ Years	24%	62%	14%
<b>Education</b>			
High School	18%	66%	16%
Some College	30%	58%	12%
College Graduate	40%	49%	11%
<b>Greene Co. Residency</b>			
< 21 Years	42%	48%	10%
21–44 Years	27%	60%	13%
45+ Years	27%	59%	14%
<b>Geographic Location</b>			
Springfield	38%	51%	11%
County	18%	67%	15%
<b>Reassessment Notice</b>			
Yes	31%	55%	14%
No	32%	57%	11%

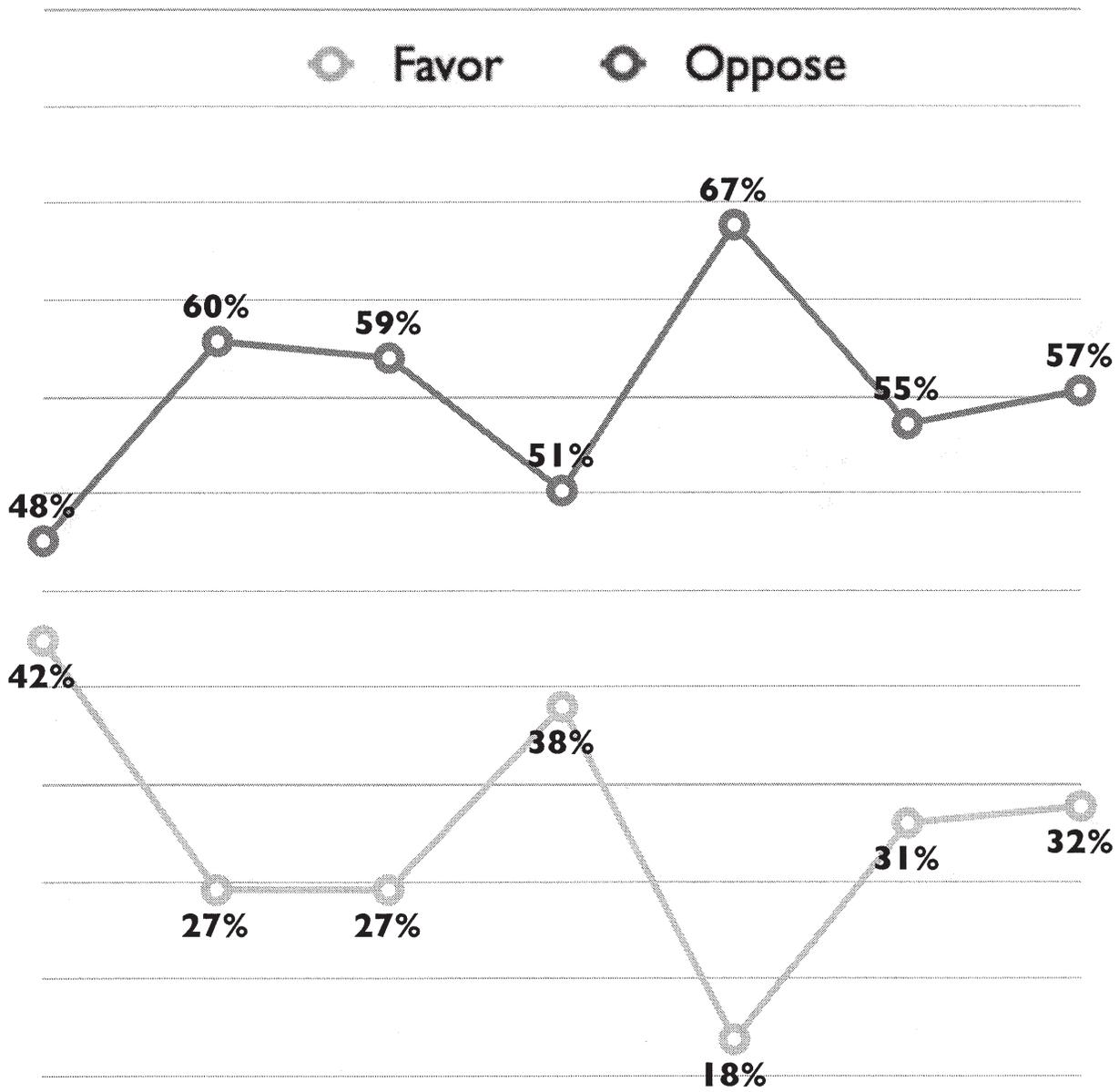
Note: Percentages in red denote statistically significant differences ( $p \leq .05$ ).

# Option 1: Level of Support/Opposition by Demographic Groups



Male	Female	18-59	60-72	73+	High School	Some College	College Graduate
Respondent Age							

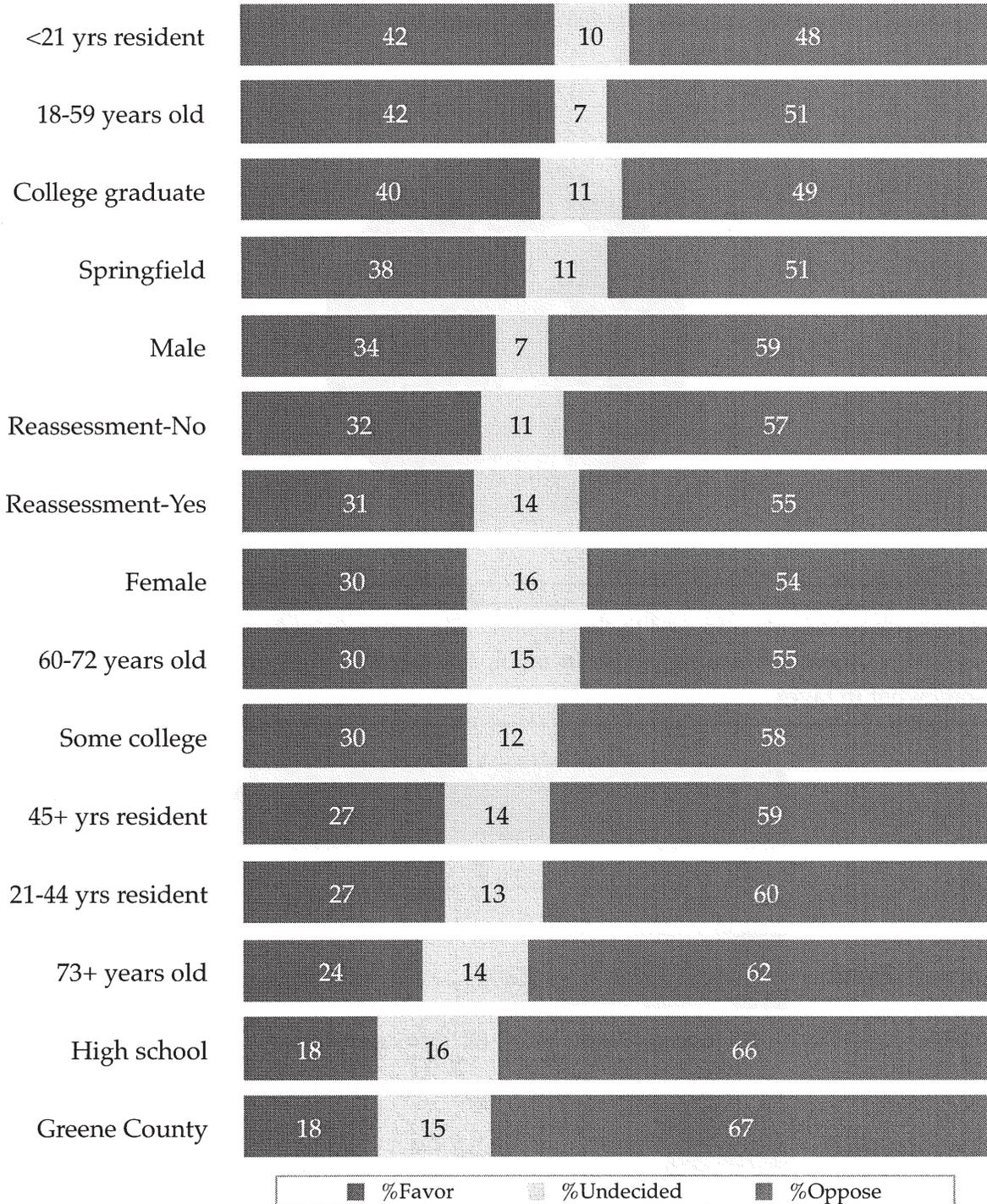
# Option 1: Level of Support/Opposition by Demographic Groups



<21	21-44	45+	SGF	County	Yes	No
Years County Resident					Reassessment Notice	

### Support for a Parks Sales Tax Increase AND Stormwater Renewal (Option 1)

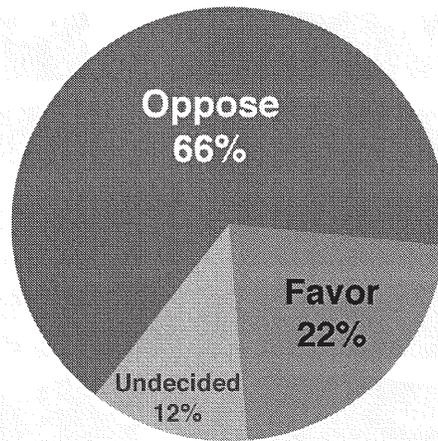
With two exceptions (college graduates and more recent residents), at least 51% of every demographic group opposed the parks sales tax increase and stormwater renewal option. Moreover, support for this option failed to exceed 42% among any of the 15 demographic groups examined.



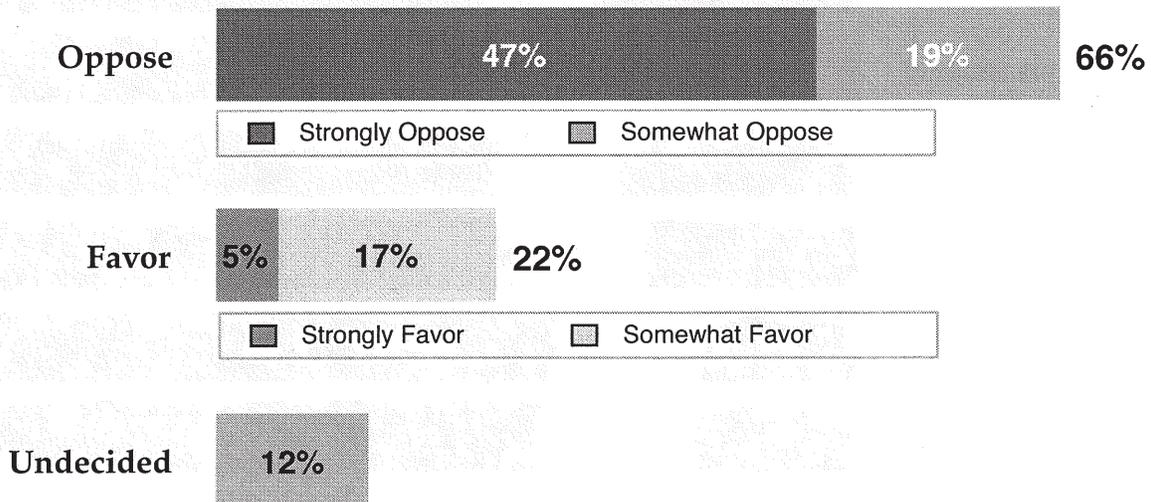
### Support for a Parks Sales Tax Renewal Only (Option 2)

A second option that respondents were asked to consider involved holding an election in August 2011 to ask voter approval for a 1/8-cent **sales tax renewal** to fund additional parks and recreation improvements in Springfield and Greene County with no funding for stormwater programs including those required by state and federal law.

A majority of survey respondents (66%) opposed this option, while 22% favored it and 12% were undecided at this time.



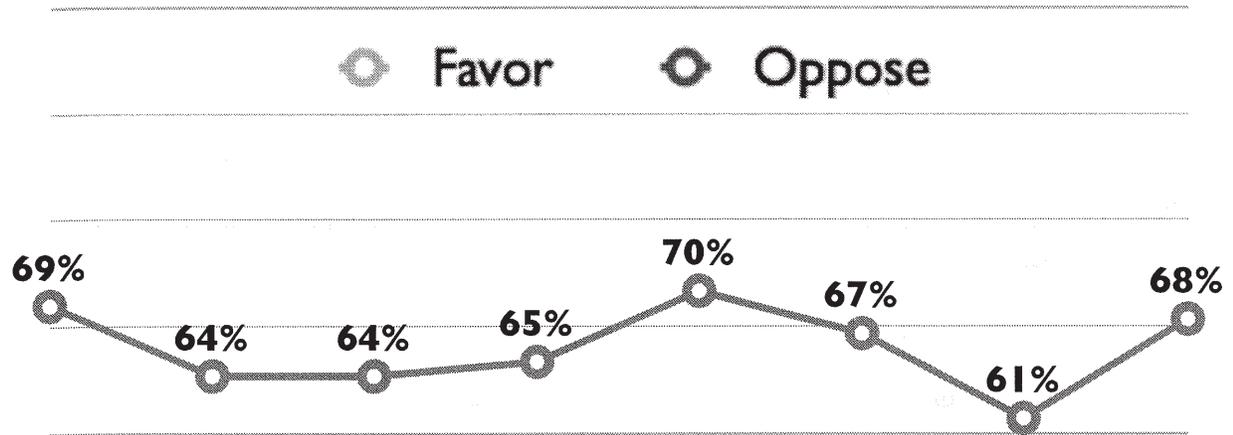
Among respondents opposed to this option, 47% were *strongly opposed* and 19% were somewhat opposed. Among those in favor, 5% were strongly in favor and 17% were somewhat in favor.



### Support for a Parks Sales Tax Renewal Only (Option 2)

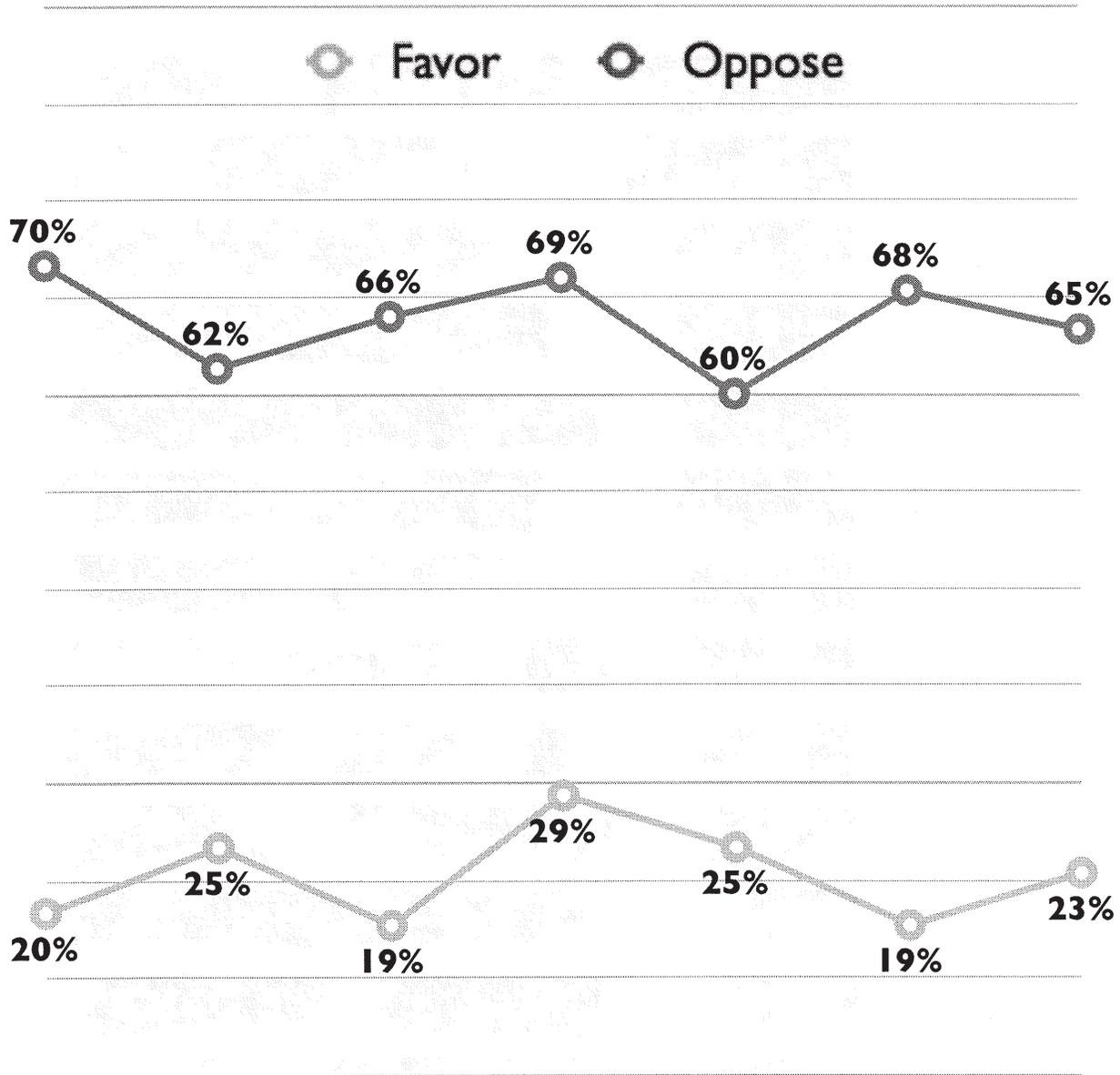
	FAVOR	OPPOSE	UNDECIDED
<b>Gender</b>			
Male	23%	69%	8%
Female	20%	64%	16%
<b>Age</b>			
18–59 Years	29%	64%	7%
60–72 Years	18%	65%	17%
73+ Years	17%	70%	13%
<b>Education</b>			
High School	15%	67%	18%
Some College	23%	61%	16%
College Graduate	24%	68%	8%
<b>Greene Co. Residency</b>			
< 21 Years	20%	70%	10%
21–44 Years	25%	62%	13%
45+ Years	19%	66%	15%
<b>Geographic Location</b>			
Springfield	29%	69%	11%
County	25%	60%	15%
<b>Reassessment Notice</b>			
Yes	19%	68%	13%
No	23%	65%	12%

## Option 2: Level of Support/Opposition by Demographic Groups



Male	Female	18-59	60-72	73+	High School	Some College	College Graduate
Respondent Age							

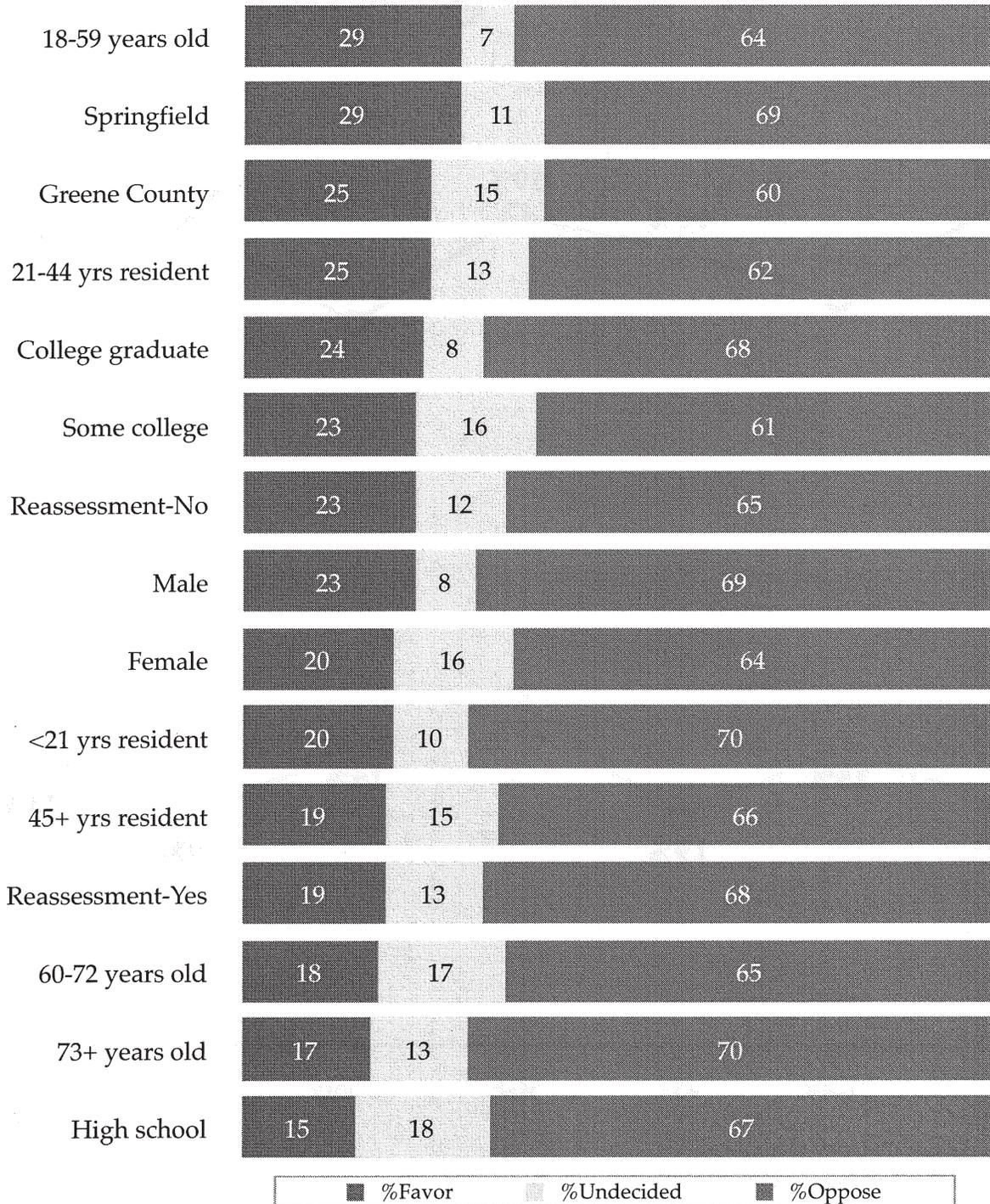
## Option 2: Level of Support/Opposition by Demographic Groups



<21	21-44	45+	SGF	County	Yes	No
Years County Resident				Reassessment Notice		

### Support for a Parks Sales Tax Renewal Only (Option 2)

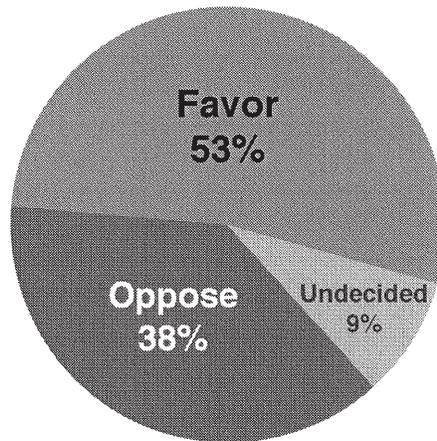
Among all 15 demographic groups opposition to the parks sales tax renewal option was widespread and ranged from 60% to 70%. Moreover, support for this proposal failed to exceed 29% among any demographic group.



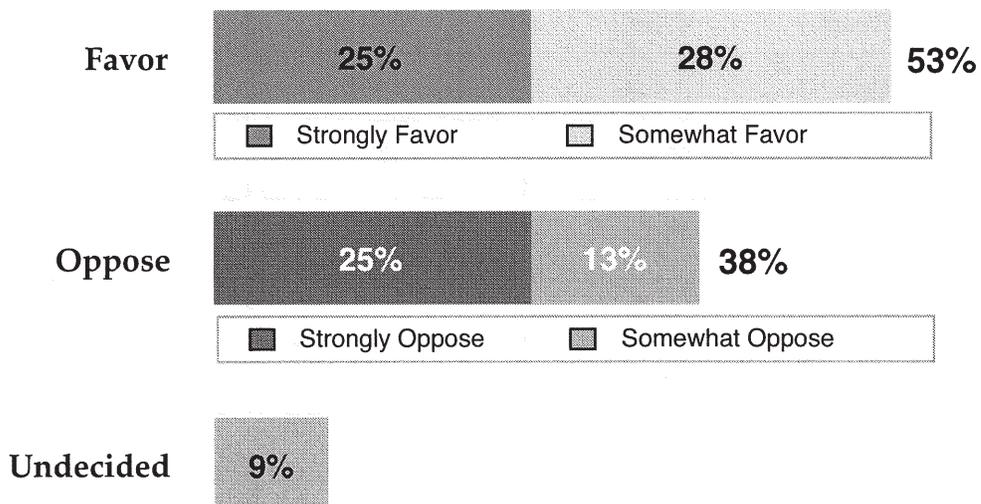
### Support for a Stormwater Sales Tax Renewal Only (Option 3)

A third option that respondents were asked to consider involved holding an election in August 2011 to ask voter approval for a five-year **renewal** of the 1/8-cent sales tax passed in 2006 to fund stormwater projects in Springfield and Greene County. This option would not include any additional funding for parks.

A majority of survey respondents (53%) favored this option, while 38% opposed it and 9% were undecided at this time.



Among those in favor of this option, 25% were strongly in favor and 28% were somewhat in favor. Among those opposed, 25% were strongly opposed and 13% were somewhat opposed.

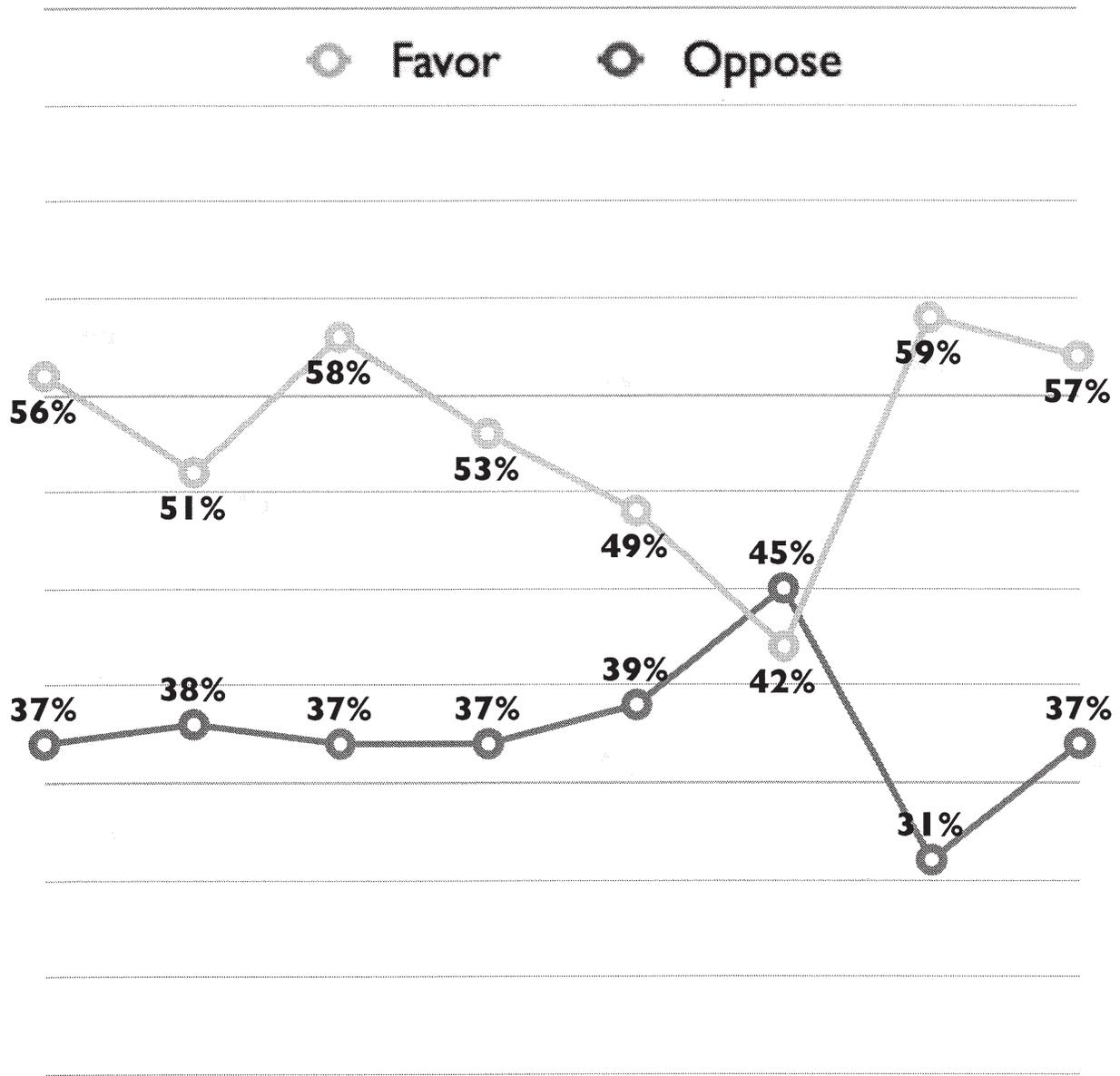


### Support for a Stormwater Sales Tax Renewal Only (Option 3)

	FAVOR	OPPOSE	UNDECIDED
<b>Gender</b>			
Male	56%	37%	7%
Female	51%	38%	11%
<b>Age</b>			
18–59 Years	58%	37%	5%
60–72 Years	53%	37%	10%
73+ Years	49%	39%	12%
<b>Education</b>			
High School	42%	45%	13%
Some College	59%	31%	10%
College Graduate	57%	37%	6%
<b>Greene Co. Residency</b>			
< 21 Years	57%	36%	6%
21–44 Years	56%	35%	10%
45+ Years	47%	41%	12%
<b>Geographic Location</b>			
Springfield	55%	36%	9%
County	48%	43%	9%
<b>Reassessment Notice</b>			
Yes	50%	42%	8%
No	57%	33%	10%

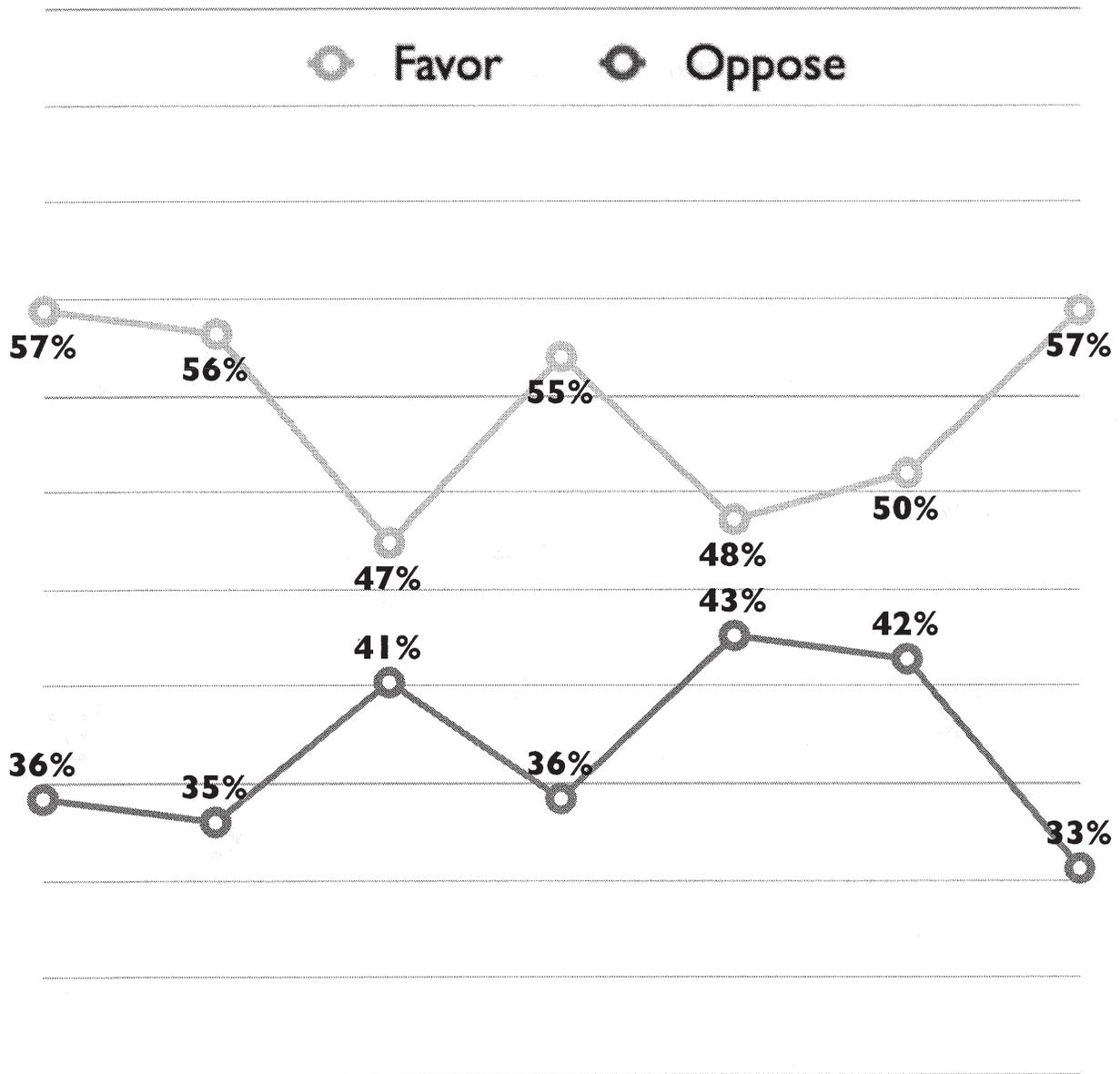
Note: Percentages in red denote statistically significant differences ( $p \leq .05$ ).

### Option 3: Level of Support/Opposition by Demographic Groups



Male	Female	18-59	60-72	73+	High School	Some College	College Graduate
Respondent Age							

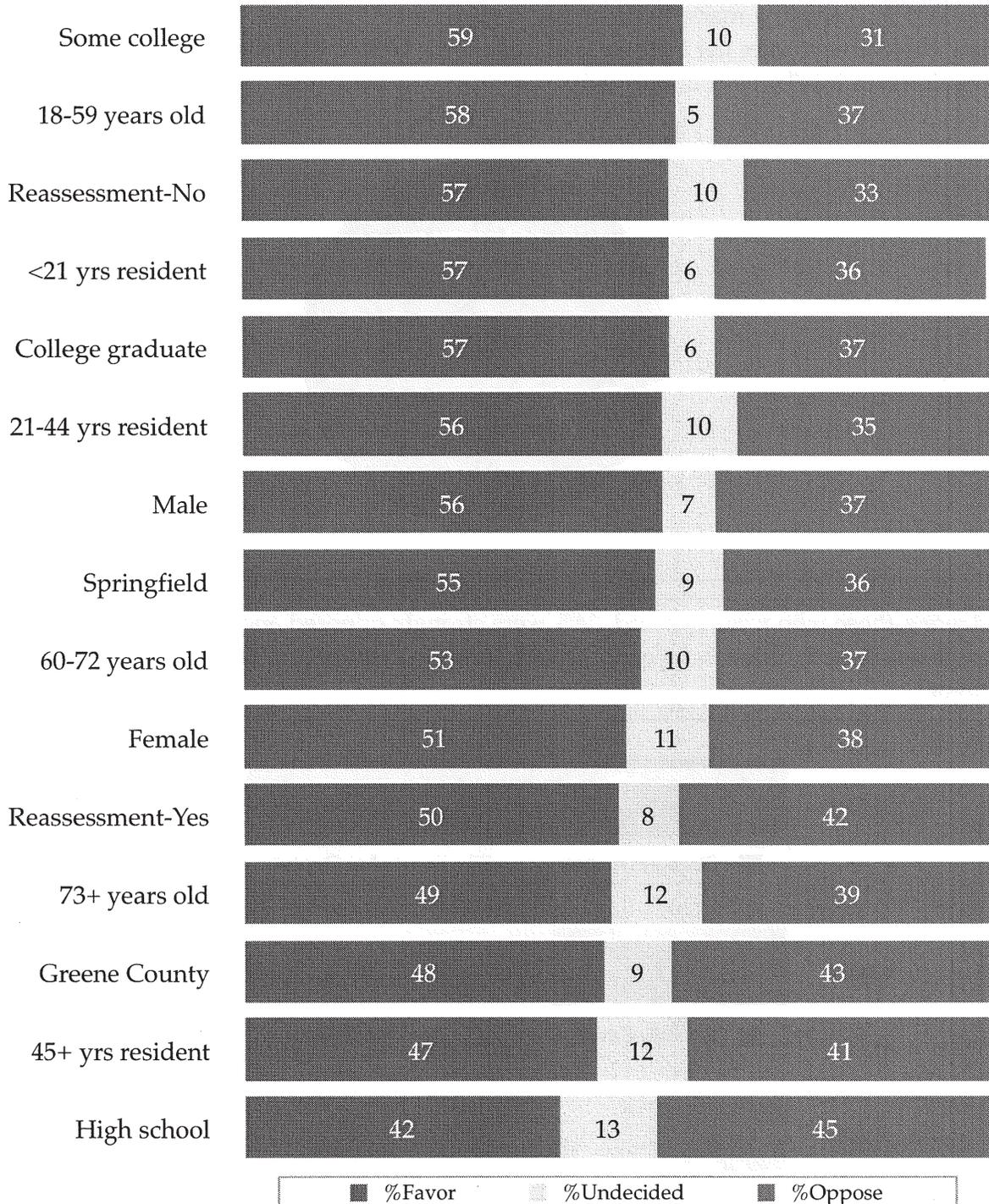
### Option 3: Level of Support/Opposition by Demographic Groups



<21	21-44	45+	SGF	County	Yes	No
Years County Resident				Reassessment Notice		

### Support for a Stormwater Sales Tax Renewal Only (Option 3)

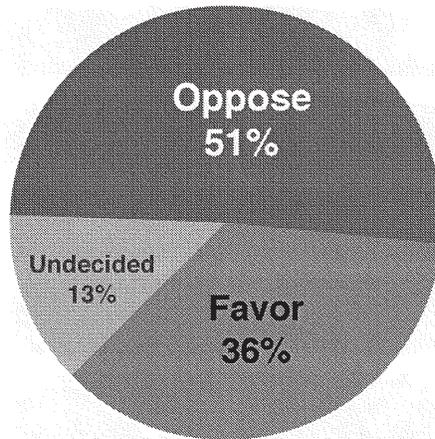
There was fairly strong support for the stormwater sales tax renewal option among the 15 demographic groups. With the exception of high school graduates, all demographic groups were more likely to support this option than oppose it.



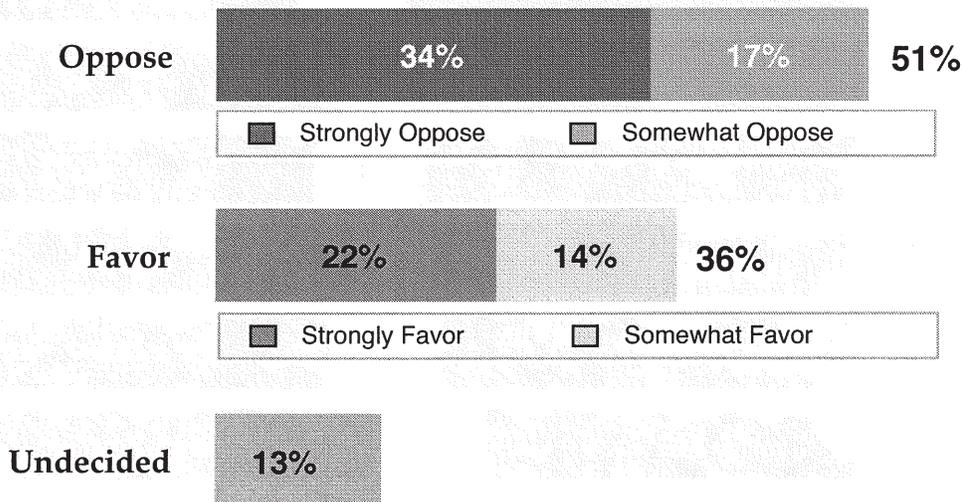
## Support for a Law Enforcement Sales Tax Increase—Assumption A

Respondents were informed that the Greene County Commission was also considering holding an election in November to ask voter approval for a 1/4-cent sales tax increase to fund countywide law enforcement and address overcrowding in the county jail.

When asked to assume voter **approval** of Option 1 (parks AND stormwater sales tax option) in August, a majority of survey respondents (51%) said they would oppose a law enforcement sales tax increase if placed on the November ballot and 36% said they would favor it (13% were undecided).



Among those who were opposed, 34% were strongly opposed and 17% were somewhat opposed. Among those in favor, 22% were strongly in favor and 14% were somewhat in favor.

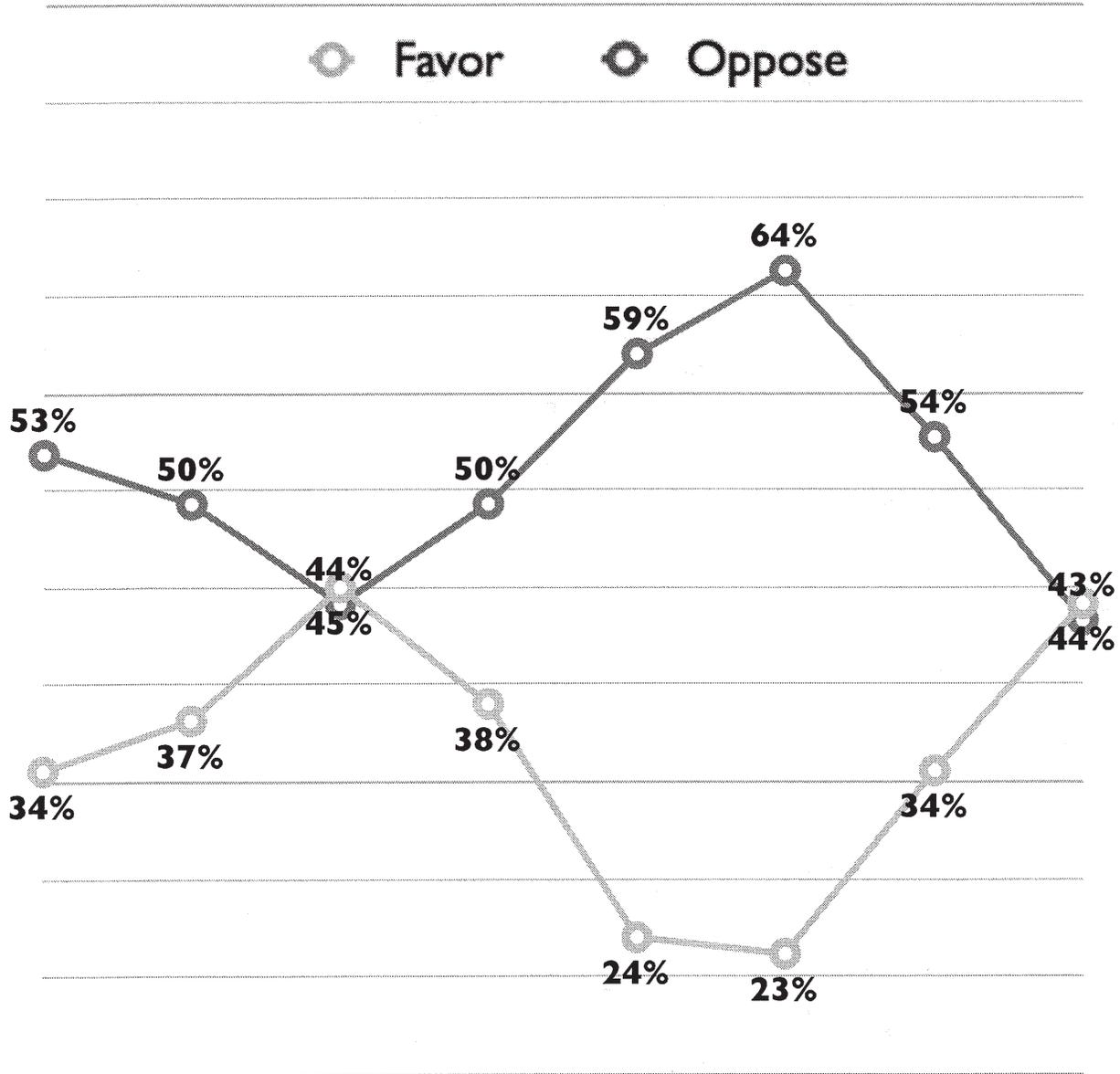


## Support for a Law Enforcement Sales Tax Increase—Assumption A

	FAVOR	OPPOSE	UNDECIDED
<b>Gender</b>			
Male	34%	53%	13%
Female	37%	50%	13%
<b>Age</b>			
18–59 Years	45%	44%	11%
60–72 Years	38%	50%	12%
73+ Years	24%	59%	17%
<b>Education</b>			
High School	23%	64%	13%
Some College	34%	54%	12%
College Graduate	44%	43%	13%
<b>Greene Co. Residency</b>			
< 21 Years	43%	49%	8%
21–44 Years	34%	48%	18%
45+ Years	31%	55%	14%
<b>Geographic Location</b>			
Springfield	35%	52%	13%
County	37%	49%	14%
<b>Reassessment Notice</b>			
Yes	34%	53%	13%
No	37%	49%	14%

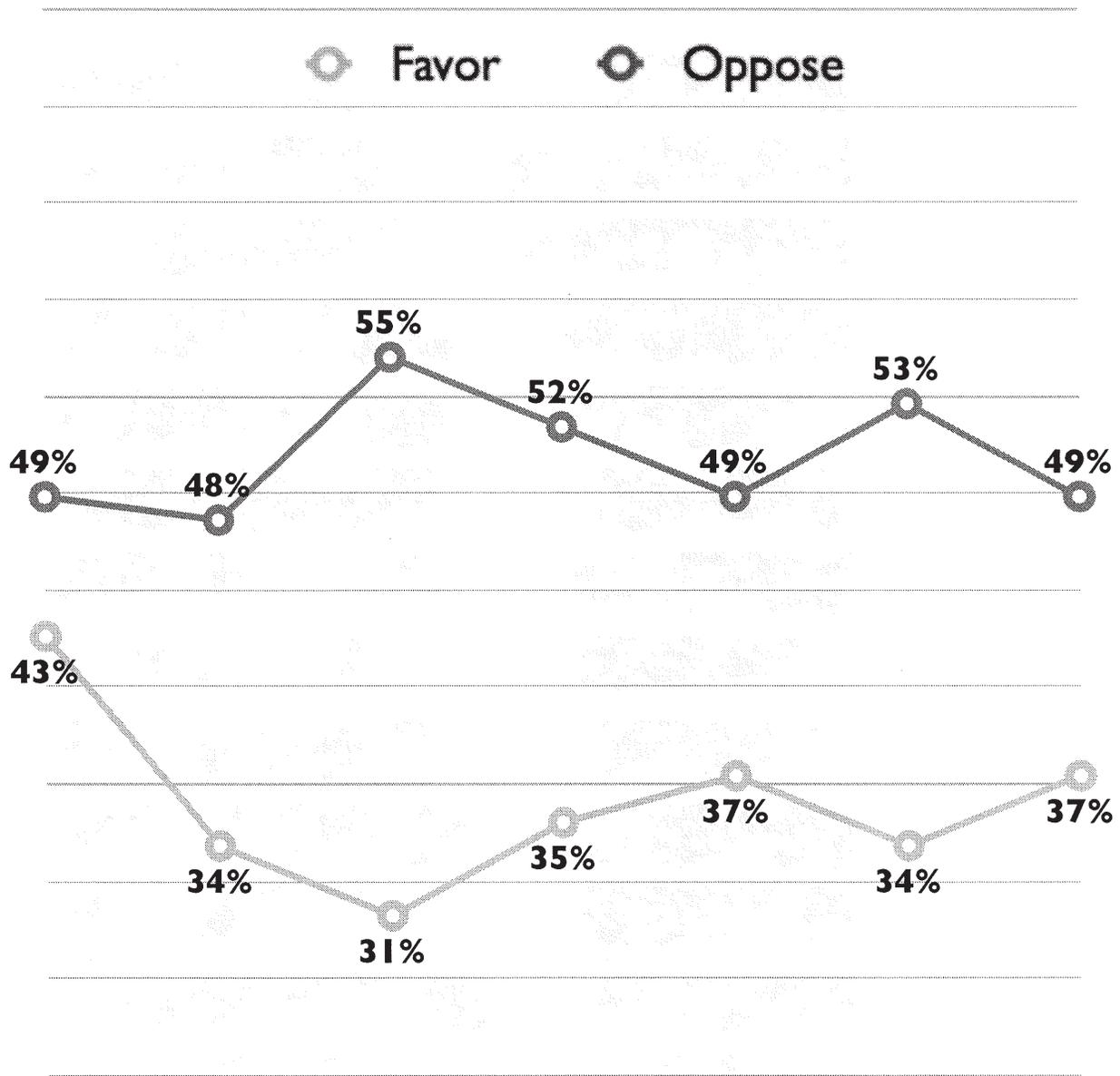
Note: Percentages in red denote statistically significant differences ( $p \leq .05$ ).

## Level of Support/Opposition by Demographic Groups – Assumption A



Male	Female	18-59	60-72	73+	High School	Some College	College Graduate
Respondent Age							

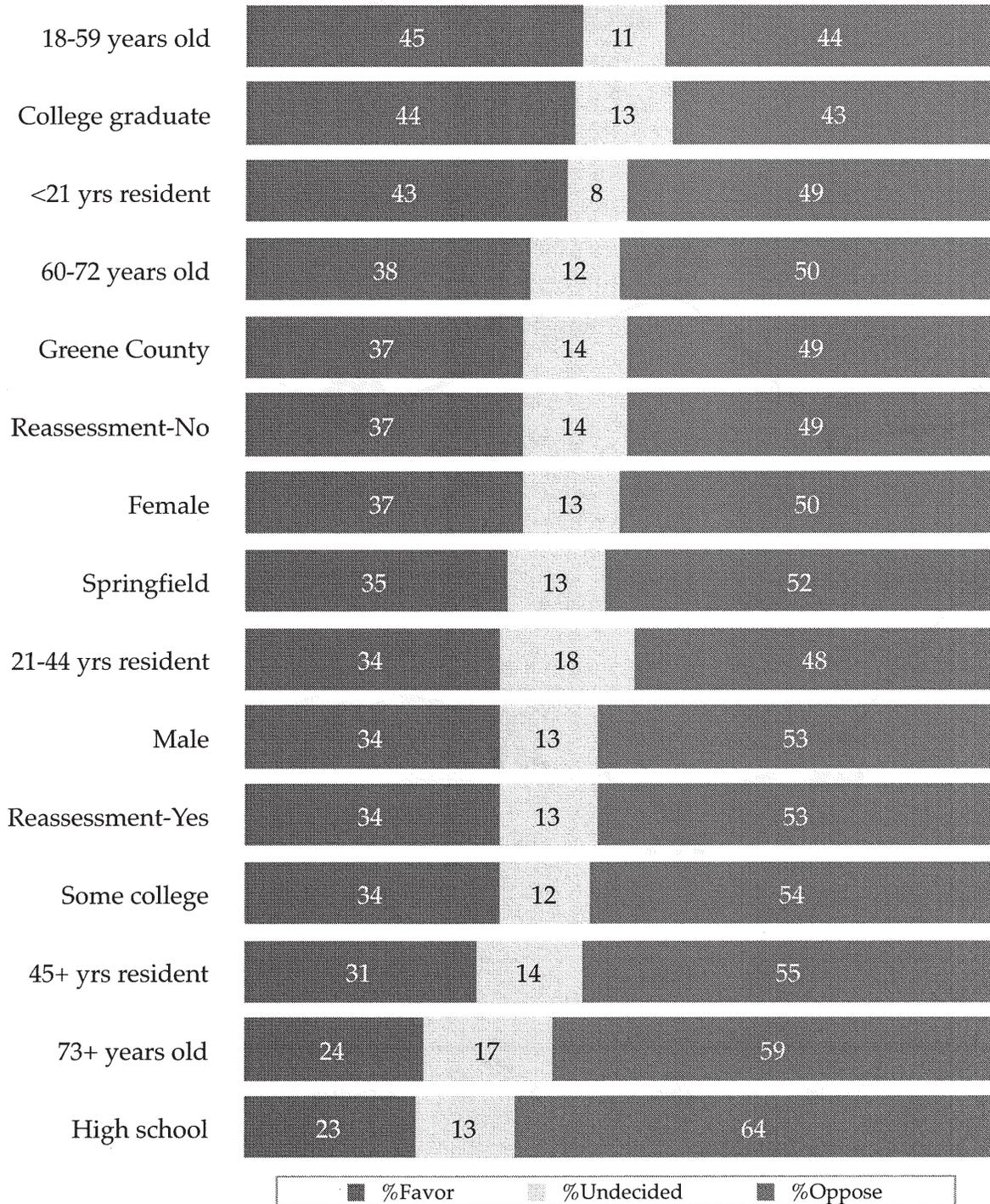
## Level of Support/Opposition by Demographic Groups – Assumption A



<21	21-44	45+	SGF	County	Yes	No
Years County Resident					Reassessment Notice	

### Support for a Law Enforcement Sales Tax Increase—Assumption A

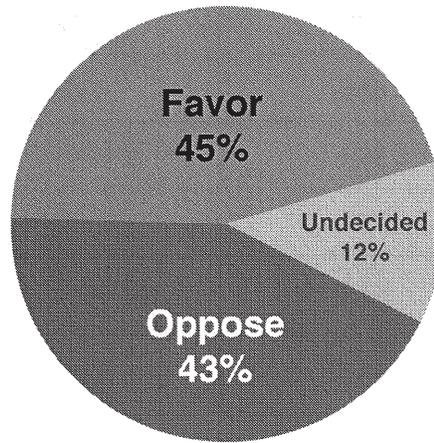
Assuming voter approval of Option 1 (parks AND stormwater option) in August, support for a law enforcement sales tax increase (November ballot) did not exceed 45% among any of the 15 demographic groups. With the exception of younger respondents and college graduates, all groups were more likely to oppose this initiative than favor it.



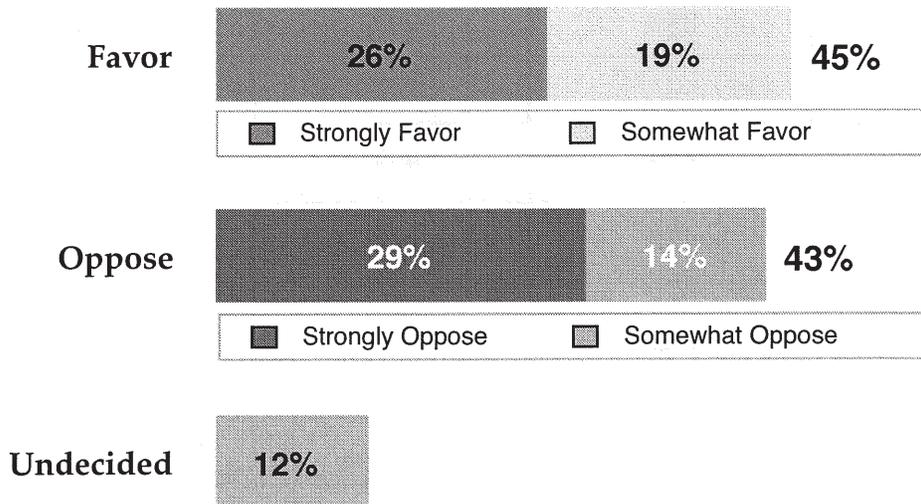
## Support for a Law Enforcement Sales Tax Increase—Assumption B

Respondents were informed that the Greene County Commission was also considering holding an election in **November** to ask voter approval for a 1/4-cent sales tax increase to fund countywide law enforcement and address overcrowding in the county jail.

When asked to assume that Option 1 (parks AND stormwater sales tax option) was either **defeated** or **never placed on the August ballot**, 45% of respondents said they would favor the November law enforcement sales tax increase and 43% said they would oppose it (12% were undecided).



Among those in favor, 26% were strongly in favor and 19% were somewhat in favor. Among those opposed, 29% were strongly opposed and 14% were somewhat opposed.

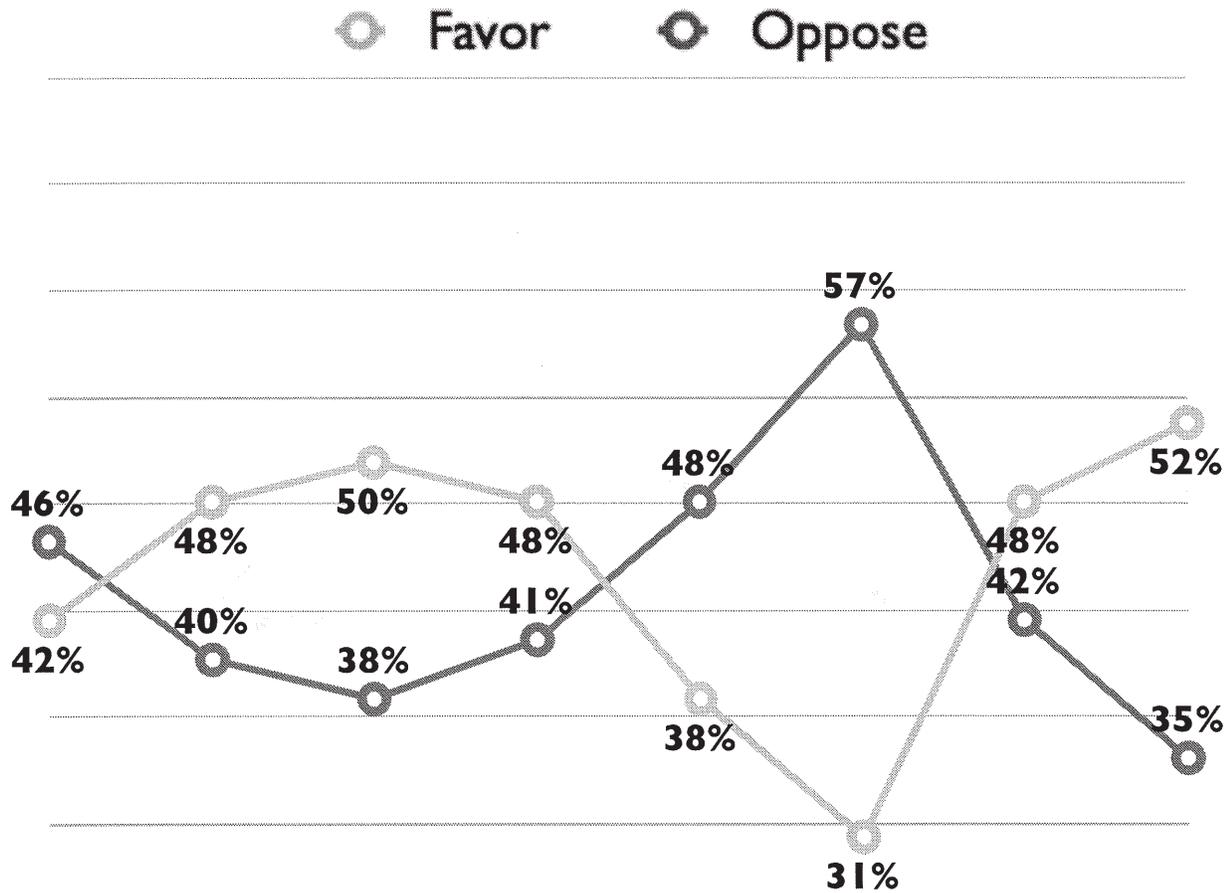


## Support for a Law Enforcement Sales Tax Increase—Assumption B

	FAVOR	OPPOSE	UNDECIDED
<b>Gender</b>			
Male	42%	46%	12%
Female	48%	40%	12%
<b>Age</b>			
18–59 Years	50%	38%	12%
60–72 Years	48%	41%	11%
73+ Years	38%	48%	14%
<b>Education</b>			
High School	31%	57%	12%
Some College	48%	42%	10%
College Graduate	52%	35%	13%
<b>Greene Co. Residency</b>			
< 21 Years	48%	45%	7%
21–44 Years	43%	38%	19%
45+ Years	45%	43%	12%
<b>Geographic Location</b>			
Springfield	44%	45%	11%
County	47%	37%	16%
<b>Reassessment Notice</b>			
Yes	44%	45%	11%
No	47%	41%	12%

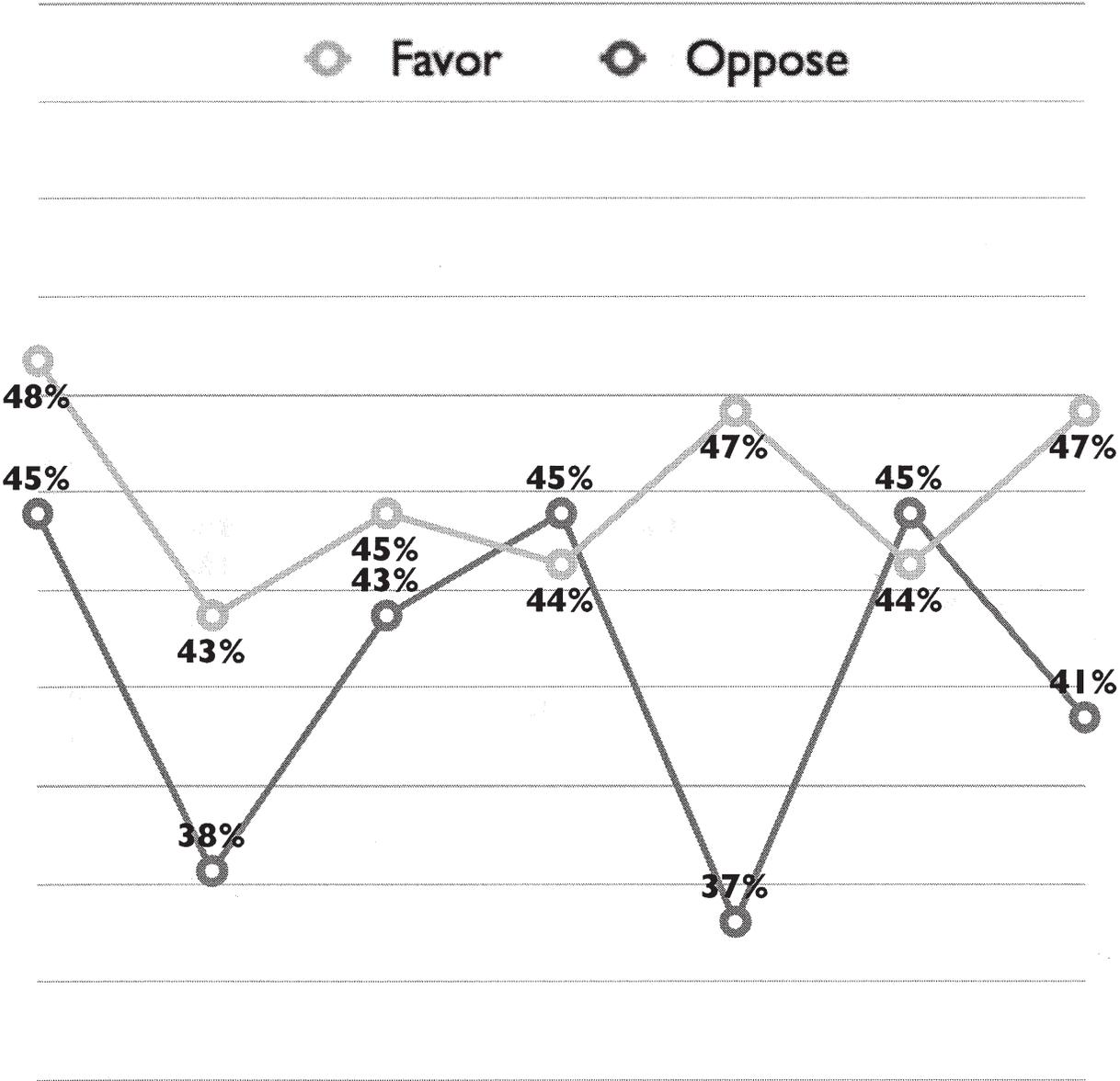
Note: Percentages in red denote statistically significant differences ( $p \leq .05$ ).

## Level of Support/Opposition by Demographic Groups – Assumption B



Male	Female	18-59	60-72	73+	High School	Some College	College Graduate
Respondent Age							

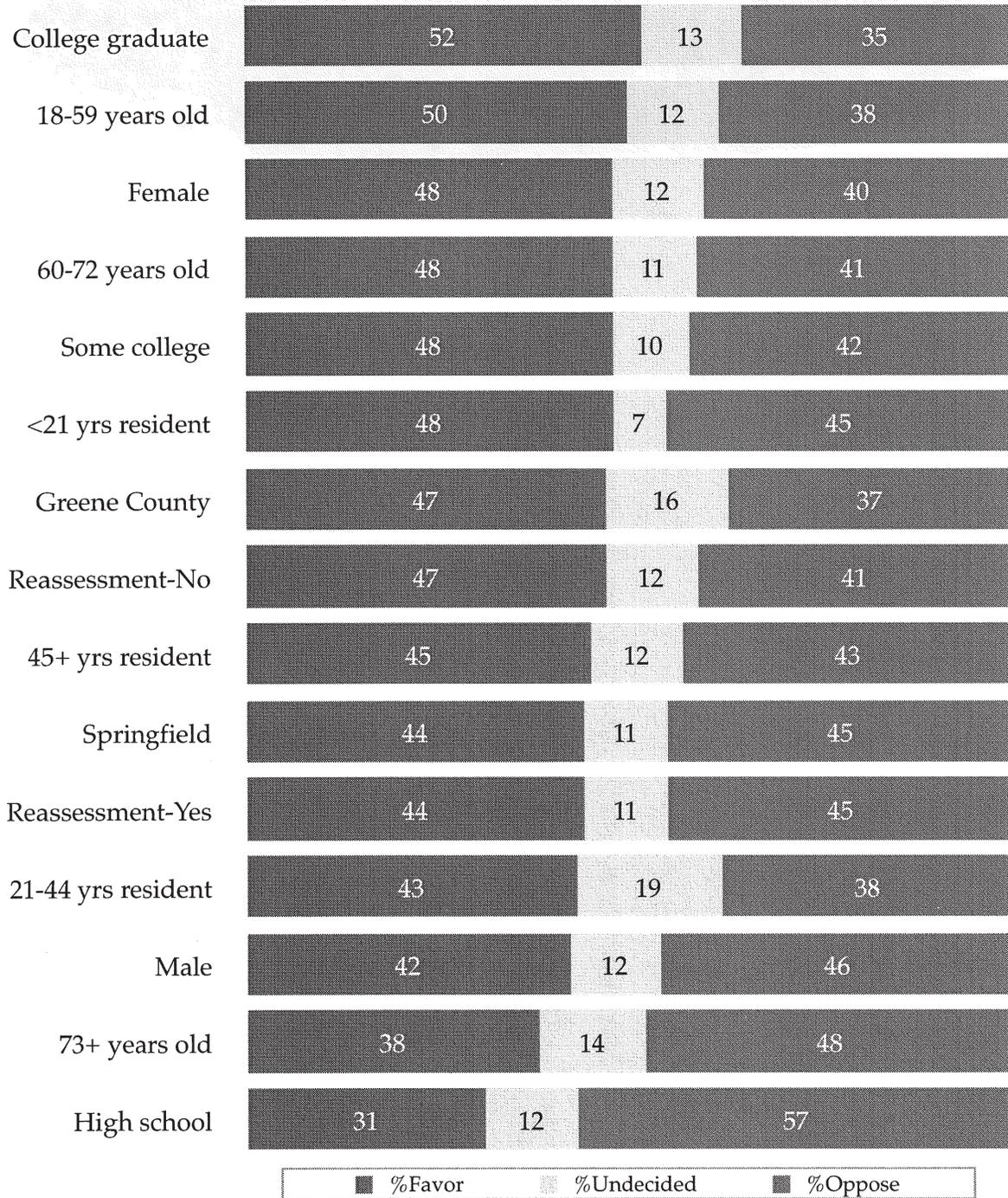
# Level of Support/Opposition by Demographic Groups – Assumption B



<21	21-44	45+	SGF	County	Yes	No
Years County Resident				Reassessment Notice		

### Support for a Law Enforcement Sales Tax Increase—Assumption B

Assuming Option 1 (parks AND stormwater sales tax option) was either defeated in August or never on the ballot, support for a law enforcement sales tax increase (November ballot) was divided primarily along educational and age lines. Specifically, college educated and younger/middle-aged respondents were the most supportive, while high school graduates and older respondents (73+ yrs) were the least supportive.





## COMMENTS

Favor option 1 (parks and stormwater), but oppose the second and third options (renewals, no tax increase) because believe both parks and stormwater should be together. We need both—9 comments.

Strongly favor option 1 (parks and stormwater). Much prefer this option to renewal options.

Strongly favor option 1 (parks and stormwater) in August and the sales tax increase for law enforcement in November. Believe we need to address the stormwater issue before law enforcement—2 comments.

Strongly favor option 1 (parks and stormwater). This is the best option. Also strongly favor option 3 (renewal for stormwater), but oppose option 2 (renewal for parks).

Favor option 1 (parks and stormwater), but somewhat oppose the second option (renewal for parks) only because I feel parks needs more money than this option would provide.

Somewhat favor option 1 (parks and stormwater). All three options need to be put before the voters—the current proposal as well as the renewal options so that parks and stormwater are not tied together.

Somewhat favor option 1 (parks and stormwater). I need to know what kind of improvements would be made for parks—general upkeep or brand new, extravagant parks?

Somewhat favor option 1 (parks and stormwater), strongly oppose options 2 and 3, but strongly favor the law enforcement sales tax increase. I feel the law enforcement sales tax increase should come first and be on the August ballot and that parks and stormwater should come later. (Also willing to support law enforcement AND parks and stormwater.)

Somewhat favor option 1 (parks and stormwater). They keep saying they are going to put in a pool at Doling. They promised it the last time there was a tax increase, but they have yet to do so. I would like assurance of this before I would be strongly in favor of option 1.

Only somewhat favor option 1 (parks and stormwater) because I don't think the funds will be distributed equally between Springfield and the county. My kids are very active in Fair Grove activities and parks so I want some of these funds to go toward Fair Grove and not have it all go to Springfield. You need to reevaluate how the funds are shared and distributed. But I do support the parks.

Undecided about option 1 (parks and stormwater) because I live in the county (Walnut Grove) and I would first like to know what percentage of the funds will go toward the rural areas and what percentage will go to Springfield parks.

Undecided about option 1 (parks and stormwater), but would like to see it on the ballot.

Somewhat oppose option 1 (parks and stormwater). I am somewhat opposed to parks (option 2) because I feel they need to address stormwater governmental regulations first (I strongly favor the stormwater renewal). I feel that Greene County has been conscientious about cutbacks, but not so much Springfield. The property tax reassessment increase has gotten completely out of hand so I will not vote another increase until that gets straightened out. I feel they are taking too big a chunk of the pie and it needs to be balanced out. The County is obviously choosing to get the extra funds through property taxes. My support of the law enforcement sales tax increase is contingent on the property tax situation being resolved.

Somewhat oppose option 1 (parks and stormwater) until things get better.

Somewhat oppose option 1 (parks and stormwater) because I believe stormwater should not be grouped with parks and I would prefer only to approve the renewal for stormwater, not parks.

Somewhat oppose option 1 (parks and stormwater) because I believe the stormwater portion should be renewed (strongly favor) and there should be no sales tax increase.

Somewhat oppose option 1 (parks and stormwater), but strongly favor a renewal for stormwater. Stormwater is more important than parks. Also somewhat favor the law enforcement sales tax increase in November, but feel stormwater should be given precedence.

Strongly oppose option 1 (parks and stormwater) as well as a renewal for parks (option 2). Strongly favor option 3 (renewal for stormwater) because I feel stormwater projects have to be in the option and should take precedence over parks.

Strongly oppose option 1 (parks and stormwater) because I feel the money just goes to southern Greene County. (Respondent from Willard)

Strongly oppose option 1 (parks and stormwater) because I can't afford more taxes (also strongly oppose law enforcement sales tax increase in November). Somewhat favor the renewal options, however.

Strongly oppose option 1 (parks and stormwater) because I feel parks already have enough funds and this is not a good time to be asking for tax increases. Also, don't like the situation with the Dan Kinney Family Center and the YMCA.

Strongly oppose option 1 (parks and stormwater) and option 2 (renewal for parks) because I don't like what parks has done. Somewhat favor option 3 (renewal for stormwater). Strongly oppose the law enforcement sales tax increase because I don't think the money will be used for law enforcement if this is passed.

Strongly oppose option 1 (parks and stormwater). I think they are biting off too much at one time with this option 1. They need to wait until the economy improves. Also, I strongly oppose the law enforcement sales tax increase. I don't think they are using the money they have wisely.

Strongly oppose option 1 (parks and stormwater) as well as options 2 and 3 (renewals) because all the money goes to Springfield and never gets out to Willard.

Strongly oppose option 1 (parks and stormwater), but somewhat favor the renewal for stormwater projects. I am not opposed to parks, but I just lost my job and money is really tight right now.

Strongly oppose option 1 (parks and stormwater) and option 3 (renewal for parks) because I feel parks are a luxury.

Strongly oppose option 1 (parks and stormwater) and option 3 (renewal for stormwater). Stormwater places are awful looking. The water sits there for days. They are not maintained at all and they draw mosquitos.

Strongly oppose option 1 (parks and stormwater). I live way out (Ash Grove) and don't ever reap the benefits of these.

Strongly oppose the parks part of the proposals. Strongly favor the renewal for stormwater and the law enforcement sales tax increase in November.

Strongly oppose option 1 (parks and stormwater) and option 2 (renewal for parks), but somewhat favor renewal for stormwater if they assure us that the money will go toward what it is designated for. What projects?

Strongly oppose options 1, 2, and 3. Somewhat favor law enforcement sales tax increase in November only if the parks and stormwater sales tax proposals do not pass. More likely to favor sales tax than property tax. Property taxes are out of control. They are taxing us to death. I feel they just drive by and arbitrarily up your real estate taxes.

Strongly oppose all options. It should be a general issue. Let the Commissioners be the leaders and decide where the money goes. I don't like the itemizing of the renewal options. Somewhat oppose the law enforcement sales tax increase because of the economy.

Undecided about option 1 (parks and stormwater). My property assessment went up a lot which makes me unsure about the parks part of the options.

Undecided about option 1 (parks and stormwater). It depends on how much of this money Springfield will get and how much the outlying areas will receive. The outlying areas don't get much. (Respondent from Republic)

No sales tax increase, but maybe a renewal.

Strongly favor option 3 (renewal for stormwater). This is the best option.

Strongly oppose a renewal for parks improvement if it has anything to do with the Dan Kinney Park.

We need the law enforcement sales tax increase more than the parks and stormwater.

Strongly oppose all tax increases and also oppose renewal for stormwater because I do not think stormwater projects will ever happen in my neighborhood. (Respondent from Springfield, 65809)

Strongly oppose the 1/4 cent sales tax increase for law enforcement, but I would consider a smaller, 1/8 cent, sales tax increase.

Oppose the law enforcement sales tax increase. Didn't they just build a jail not too long ago.

Strongly oppose the law enforcement tax because of the Sheriff who is in office right now.

Favor the law enforcement sales tax increase, but against using the money on the jail.

Somewhat favor the law enforcement sales tax increase but against the county jail. They don't need the bells and whistles.

Somewhat favor the law enforcement sales tax only if there was a stipulation that the money would only be used for law enforcement.

Undecided about the law enforcement sales tax increase, even though I strongly oppose the other options. I feel we might need the sales tax increase for law enforcement.

Undecided about options 1, 2, and 3. I would be more likely to approve option 2 (renewal for parks) rather than option 3 (renewal for stormwater) because the stormwater issue doesn't affect the county so much.

Strongly oppose all options because it is a horrible time to be asking for a tax increase! Also strongly oppose the law enforcement sales tax increase in November. Why is the jail overcrowded? Isn't it a fairly new institution? Was it poor planning? Need to get more creative instead of always asking for more money.

Strongly oppose all options and law enforcement sales tax increase in November. I got my property tax reassessment and I am not going to vote for any more tax increases, no matter what it might be for.

Strongly oppose all of it. Government doesn't know how to spend our money. I will vote "no" on any increase or renewal.

Oppose all tax increases during these bad economic times—6 comments.

Strongly oppose all options. I'm retired and against tax increases of any kind—8 comments.

# QUESTIONNAIRE

## Greene County Parks & Law Enforcement Tax—May 2011

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Hello, the Greene County Commission has asked the research company I work for to contact county residents about the possibility of placing a countywide sales tax proposal on the August ballot. May I please speak with a male/female [see calling sheet] registered voter in the household. Would that be you?

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The Greene County Commission is considering various options to address countywide needs and would like your input.

1. One option is to ask Greene County voters in August to approve a 1/8-cent sales tax increase to fund additional parks and recreation improvements in Springfield and Greene County plus renew an existing 1/8-cent sales tax currently used to fund stormwater projects in Springfield and Greene County. Do you favor or oppose this option?
  - 1...Favor--->strongly or somewhat?
  - 2...Oppose--->strongly or somewhat?
  - (5...Undecided)
  
2. A second option being considered is to ask Greene County voters in August to only renew the 1/8-cent sales tax passed in 2006 to fund additional parks and recreation improvements in Springfield and Greene County. With this option, there would be no funding for stormwater programs including those required by state and federal law. Do you favor or oppose this option?
  - 1...Favor--->strongly or somewhat?
  - 2...Oppose--->strongly or somewhat?
  - (5...Undecided)
  
3. A third option is to ask Greene County voters in August to only renew the 1/8-cent sales tax passed in 2006 to fund stormwater projects in Springfield and Greene County. If passed, this tax increase would sunset in five years. This option would not include any additional funding for parks at this time. Do you favor or oppose this option?
  - 1...Favor--->strongly or somewhat?
  - 2...Oppose--->strongly or somewhat?
  - (5...Undecided)

The Greene County Commission is also considering whether to ask voters in November to approve a 1/4-cent sales tax increase to fund countywide law enforcement and address overcrowding in the county jail.

[ROTATE Questions 4 & 5 below]

4. Assuming the parks and stormwater sales tax proposal is **approved** by voters in August, would you favor or oppose a 1/4-cent sales tax increase in November to fund countywide law enforcement and address overcrowding in the county jail?

1...Favor--->strongly or somewhat?

2...Oppose--->strongly or somewhat?

(5...Undecided)

5. Assuming the parks and stormwater sales tax proposal is either **defeated** by voters in August or never placed on the August ballot, would you favor or oppose a 1/4-cent sales tax increase in November to fund countywide law enforcement and address overcrowding in the county jail?

1...Favor--->strongly or somewhat?

2...Oppose--->strongly or somewhat?

(5...Undecided)

6. In the past few weeks, have you received a property reassessment increase notice from the Greene County Assessor's office?

1...Yes

2...No

(3...Don't Know/Not Sure)

7. About how many years have you lived in Greene County? \_\_\_\_\_

8. Which of the following best describes your educational background? Is it:

1..Some HS, 2..HS graduate, 3..Some college, or 4..College graduate?

9. Finally, may I ask your birth year? 19 \_\_\_\_

**THIS COMPLETES OUR SURVEY. THANK YOU VERY MUCH FOR YOUR TIME.**

-----  
**CALLER:**

10. Record **gender** of person you interviewed: 1...Male 2...Female

11. Record **CITY**: \_\_\_\_\_ 12. Record **ZIP**: \_\_\_\_\_

# Spring

n/s-not sampled

Spring Name	Date Sampled	Temperature (°C)	pH	DO (mg/L)	PO4 (mg/L)*	NO3 (mg/L)	T. Coll (cfu/100 mL)	E. Coll (cfu/100 mL)	Precipitait on in the Last Week (inches)	Volunteer Name	Notes
Spring Name	Date Sampled	Temperature (°C)	pH	DO (mg/L)	PO4 (mg/L)*	NO3 (mg/L)	T. Coll (cfu/100 mL)	E. Coll (cfu/100 mL)	Precipitait on in the Last Week (inches)	Volunteer Name	Notes
Silver Springs	2/8/2010	15	7.3	7.3	0	10.12	81.3	3.1		Ern Murray+Lind	Very clear water, no odors, minimal algae growth
Mckerrell	2/23/2010	15	7.2	7.2	15	5	866.4	8.4 0-1		L. Stauffer	Clear water, no odors, some algae on bottom
Hall	3/15/2010	15	7.3	7.3	13	5	547.5	61.7 0-1		L. Stauffer	Clear, no odors, some algae on floor
Stoddard	3/15/2010	14	7.5	7.5	0	13.2	65.7	2	0.25	Darrell Blech	Clear, 30% algae on bottom, 2% on surface, owner Richard Simpson
Clear Creek (N)	3/15/2010	14	7.5	7.5	0	13.2	50.4	6.3	0.25	Darrell Blech	Clear, 50% algae on bottom
Camp Cora	3/17/2010	11.1	7.6	7.6	1.2	17.6	56.7	9.8		John Bullard	Clear, very little algae
Jones Spring	3/17/2010	16.1	7.5	7.5	2.8	13.2	275.5	3.1		John Bullard	Clear/fast moving
Sequioia Spring	3/17/2010	10			3	2.1	77.1	3.1		0.1 Dave Sturdeant	Clear, Some algae, red mud on bottom
Valley Water Area-5	3/17/2010	11			7.5	3.1	517	3.1		0.1 Dave Sturdeant	Clear
Silver Springs	3/18/2010	15	7.5	7.5	4.4	6.1	25.6	8.4		0.1 Dave Sturdeant	Clear
Dolling Park	3/18/2010	12	7.4	7.4	5.1	0.3	1553.1	488.4		0.1 Dave Sturdeant	Brown cover on stones, good clarity
Southern Hills	3/29/2010	15	na	na	6	2	67.9	18.9		1 Bob Smith	clear
Nature Center	3/19/2010	13	7.7	7.7	0	0.25	410.6	9.6		0.1 Kim Banner	Lots of moss, lots of people evidence, low flow, some leafy debris
Ward	3/16/2010	13	7.8	7.8	0	0	387.3	104.3		0.56 Dan Crane	clear, no odors, some on roots, crayfish, golfballs, carboard, pants
Fantastic Caverans	3/31/2010	19	7.2	7.2	0	0	13.5	6.3		0.25 Bob Ranner	clear, 90% short mosses,
Sequioia Spring	3/16/2010	12	7.8	7.8	0	1 n/a	1 n/a	n/a		0.56 Dan Crane	clear, red clay in stream bed since last visit
<b>Summer</b>											
Silver Springs	6/21/2010	15 x			9	4 >2419.2	165.8	0.00		Dave Sturdevant	waterplants clear, odor free,
Mckerrell	5/25/2010	14.4			1.5	3	1413.6	41.6 1.57		L. Stauffer	water level up
Hall	6/21/2010	13.9			2	5 >2419.2	142.1 1.57	142.1 1.57		L. Stauffer	water striders
Stoddard	6/15/2010	5	7.5	7.5	0	11	307.6	7.4		0.05 Darrell Blech	humans & dogs
Clear Creek (N)	6/15/2010	5	7.8	7.8	0	11	228.2	4.1		0.05 Darrell Blech	
Camp Cora	6/16/2010	15.4	7.5	7.5	2	13.2	1119.9	33.6		0.00 John Bullard	
Jones Spring	6/16/2010	15.2	7.6	7.6	11.7	35.2	365.4	38.4		0.00 John Bullard	
Dolling Park	6/21/2010	21.7			3	12	1732.9	209.8		0.75 Dave Sturdevant	lot & lot of people- Park you know
Southern Hills	6/21/2010	22			2.8	0	sample compromised	0.21n		Bob Ranney	
Nature Center	6/22/2010	13.9	7.4	7.4	<.25	6 >2419.2	1986.3	29.2		1.47 Kim Banner	hot, humid, clear
Ward	6/15/2010	18	7.4	7.4	3.5	6 >2419.2	235.9	0.20		0.20	
Fantastic Caverans	6/21/2010 (DRY)										
Sequioia Spring	6/21/2010	21.1 x			3	27 >2419.2	727	1.00		Dave Sturdeant	Lots of humans, lots
Sequioia Spring	6/15/2010	20	7.6	7.6	15	3 >2419.2	435.2	0.20		Dan Crane	
**Sanders Spring	6/30/2010	15	7	7	3	2 >2419.2	44.8	215 inch		Tricia Scanlon	
Sanders Spring	8/4/2010	15.6			18 <1	>2419.2	41.9	0.51n		Mike Kromrey	
<b>Fall</b>											
Silver Springs	10/12/2010	17	7.4	7.4	4	17.6	488.4	15.1 -5-1	0.31	Randi Rosack	clear, good flow, 50% algae growth on bottom
Mckerrell	8/16/2010	13.8			0	5	579.4	8.6 -5-1		L. Stauffer	very clear, low flow, low water level, few insects
Hall	9/20/2010	16	7.4	7.4	3	0	1413.6	36.9		L. Stauffer	very clear, low water level, minimal algae
Stoddard	9/20/2010	15	7.5	7.5	1.6	17.6 >2419.2	35.9	1.4		Darrel & Pat Blech	clear, 5% algae, no odor, water striders
Clear Creek (N)	9/20/2010	17.8	7.4	7.4	1.4	17.6 >2419.2	36.4	35.9		1.4 Darrel & Pat Blech	turbid, no odors, 20% algae on bottom
Camp Cora	9/13/2010	15	7.1	7.1	7	26.4 >2419.2	156.5	1.5		John Bullard	clear, good flow, 10% algae growth, crawfish
Jones Spring	9/13/2010										clear, strong flow, 95% algae growth
Dolling Park											
Southern Hills	10/7/2010	17	7.1	7.1	1	3	1986.3	48		0 Bob Smith	increased algae growth
Nature Center	9/16/2010	14	meter not v8	drops	<.25	3 >2419.2	98.7	4.5		Kim Banner	clear, good flow, leaf debris
Ward	10/14/2010	17	7	7	8			98.7		0 Dan Crane	clear and low



7



## **APPENDIX G: Illicit Discharge Detection and Elimination**

- Dry weather outfall screening locations: list and coordinates
- Dry weather outfall screening locations updated map
- Memo of screening location changes
- Planning Board Case 1827
- Greene County Regulations and Standards for On-Site Wastewater Systems  
[http://www.greenecountymo.org/file/resource\\_management/env\\_ows\\_regulations.pdf](http://www.greenecountymo.org/file/resource_management/env_ows_regulations.pdf)



Id	Stream	long_lat	East	North	STR
1	Grandview Branch	93-15-18W 37-15-43N	477397.424739	4123961.278940	W 1/2 Lot 5-05-29-21
2	Grandview Branch	93-15-11W 37-15-48N	477565.191437	4124129.690100	W 1/2 Lot 5-05-29-21
3	South Dry Sac River	93-17-1W 37-16-38N	474844.941502	4125674.438570	SW-SE-31-3-21
4	South Dry Sac River	93-17-14W 37-16-36N	474534.264855	4125614.010920	SW-SE-31-3-21
5	South Dry Sac River	93-16-15W 37-16-5N	475975.764730	4124648.182260	W 1/2 Lot 6-06-29-21
6	South Dry Sac River	93-16-15W 37-16-9N	475978.343262	4124776.922330	W 1/2 Lot 6-06-29-21
7	South Dry Sac River	93-16-29W 37-16-9N	475644.959291	4124756.150210	E 1/2 Lot 6-01-29-22
8	South Dry Sac River	93-16-18W 37-16-8N	475914.566530	4124749.998080	W 1/2 Lot 6-06-29-21
9	Ward Branch Tributary	93-18-7W 37-6-58N	473136.948917	4107789.768200	NW-SE-23-28-22
10	South Dry Sac River	93-19-27W 37-15-56N	471233.442300	4124386.050560	W 1/2 Lot 5-03-29-22
11	Pea Ridge Creek	93-18-27W 37-15-53N	472719.989100	4124292.940610	W 1/2 Lot 5-02-29-22
12	Pea Ridge Creek	93-17-24W 37-15-52N	474293.363607	4124260.891560	W 1/2 Lot 5-01-29-22
13	Wilsons Creek	93-22-42W 37-11-11N	466429.872212	4115627.922880	SE-SW-30-29-22
14	Wilsons Creek	93-22-25W 37-11-5N	466844.023607	4115427.385610	SW-SE-30-29-22
15	Wilsons Creek	93-22-18W 37-10-53N	467013.388159	4115072.520140	NE-NE-31-29-22
16	Wilsons Creek	93-21-29W 37-11-18N	468212.084410	4115834.029320	NW-SE-29-29-22
17	Wilsons Creek	93-21-42W 37-11-7N	467909.957615	4115501.575080	SE-SW-29-29-22
18	Wilsons Creek	93-21-57W 37-11-12N	467541.475830	4115634.531540	SW-SW-29-29-22
19	Wilsons Creek	93-21-55W 37-10-60N	467570.475804	4115260.976440	SW-SW-29-29-22
20	Wilsons Creek	93-22-4W 37-10-46N	467346.210796	4114850.052120	NW-NW-32-29-22
21	Wilsons Creek	93-22-4W 37-10-52N	467346.098115	4115027.953150	NW-NW-32-29-22
22	Wilsons Creek	93-21-35W 37-10-32N	468074.468483	4114406.202650	NE-SW-32-29-22
23	South Creek	93-21-10W 37-10-27N	468684.826309	4114237.895630	NE-SE-32-29-22
24	South Creek	93-21-9W 37-10-21N	468705.826043	4114068.123590	NE-SE-32-29-22
25	South Creek	93-20-51W 37-10-17N	469147.111598	4113928.556370	SW-SW-33-29-22
26	South Creek	93-21-5W 37-10-15N	468806.451380	4113869.444020	SE-SE-32-29-22
27	South Creek	93-21-14W 37-10-14N	468826.511759	4113836.212930	SE-SE-32-29-22
28	South Creek	93-20-42W 37-9-56N	469349.613112	4113291.362930	NE-NW-04-28-22
29	South Creek	93-21-29W 37-9-44N	468194.401680	4112918.478090	SW-NE-05-28-22
30	Wilsons Creek	93-22-56W 37-9-43N	466061.929904	4112901.478630	SE-NW-06-28-22
31	Pierson Creek Tributary	93-11-45W 37-13-30N	482624.617537	4119858.085030	SW-SE-11-29-21
32	Pierson Creek Tributary	93-12-17W 37-13-13N	481831.971048	4119330.429820	NW-NW-14-29-21



Id	Stream	long_lat	East	North	STR
33	Pierson Creek Tributary	93-11-5W 37-13-47N	483608.697764	4120395.698810	NW-SW-12-29-21
34	Pierson Creek Tributary	93-11-5W 37-13-47N	483594.403787	4120395.682870	NW-SW-12-29-21
35	South Branch	93-19-33W 37-9-15N	471068.354320	4112024.838780	SE-SW-03-28-22
36	South Branch	93-19-25W 37-9-15N	471262.438242	4112025.384920	SE-SW-03-28-22
37	South Branch	93-20-21W 37-8-44N	469889.183553	4111077.382480	NW-SE-09-28-22
38	South Branch	93-20-30W 37-9-17N	469673.706552	4112096.603060	SE-SW-04-28-22
39	South Branch	93-20-31W 37-9-21N	469637.054760	4112229.348910	SE-SW-04-28-22
40	South Branch	93-20-43W 37-9-20N	469335.471010	4112182.610110	SE-SW-04-28-22
41	South Branch	93-20-58W 37-9-14N	468970.993798	4112012.633980	SW-SW-04-28-22
42	South Branch	93-20-56W 37-9-25N	469014.347946	4112353.152790	NW-SW-04-28-22
43	South Branch	93-21-3W 37-9-9N	468853.949528	4111852.323110	NE-NE-08-28-22
44	South Branch	93-21-24W 37-8-55N	468324.581848	4111429.098870	SW-NE-08-28-22
45	South Branch	93-21-8W 37-9-3N	468728.000920	4111667.665250	NE-NE-08-28-22
46	Wilsons Creek Tributary	93-21-49W 37-8-35N	467701.044060	4110809.591800	NE-SW-08-28-22
47	Pierson Creek Tributary	93-10-17W 37-13-46N	484784.540636	4120363.094140	NE-SE-12-29-21
48	Wilsons Creek Tributary	93-21-36W 37-8-17N	468019.656472	4110234.410990	NW-NE-17-28-22
49	Wilsons Creek Tributary	93-21-32W 37-8-29N	468133.006701	4110613.993820	SW-SE-08-28-22
50	Wilsons Creek Tributary	93-21-19W 37-8-33N	468457.940227	4110728.145770	NE-SE-08-28-22
51	Wilsons Creek Tributary	93-21-6W 37-8-20N	468778.367835	4110327.761060	SE-SE-08-28-22
52	Wilsons Creek Tributary	93-20-40W 37-8-12N	469419.762993	4110093.189580	NE-NW-16-28-22
53	Wilsons Creek Tributary	93-20-39W 37-8-12N	469437.520043	4110093.283140	NE-NW-16-28-22
54	Pierson Creek Tributary	93-10-59W 37-13-36N	483753.129219	4120060.558430	SE-SW-12-29-21
55	Wilsons Creek Tributary	93-21-27W 37-8-2N	468258.365169	4109769.778030	SW-NE-17-28-22
56	Wilsons Creek Tributary	93-21-20W 37-7-59N	468411.602323	4109701.514200	SE-NE-17-28-22
57	Wilsons Creek Tributary	93-21-29W 37-7-34N	468195.069597	4108931.916040	SW-SE-17-28-22
58	Wilsons Creek Tributary	93-21-7W 37-7-53N	468736.012486	4109500.232560	SE-NE-17-28-22
59	Ward Branch Tributary	93-19-38W 37-7-56N	470939.309326	4109604.666090	SE-NW-15-28-22
60	Ward Branch Tributary	93-19-38W 37-7-56N	470945.441575	4109593.162280	SE-NW-15-28-22
61	Ward Branch Tributary	93-19-48W 37-7-22N	470689.482182	4108545.137540	NW-NW-22-28-22
62	Ward Branch Tributary	93-19-52W 37-7-18N	470595.919602	4108418.749580	NW-NW-22-28-22
63	Ward Branch Tributary	93-19-51W 37-7-9N	470615.090926	4108151.612990	SW-NW-22-28-22
64	Workman Branch	93-19-10W 37-7-32N	471614.795900	4108861.357060	SE-SE-15-28-22

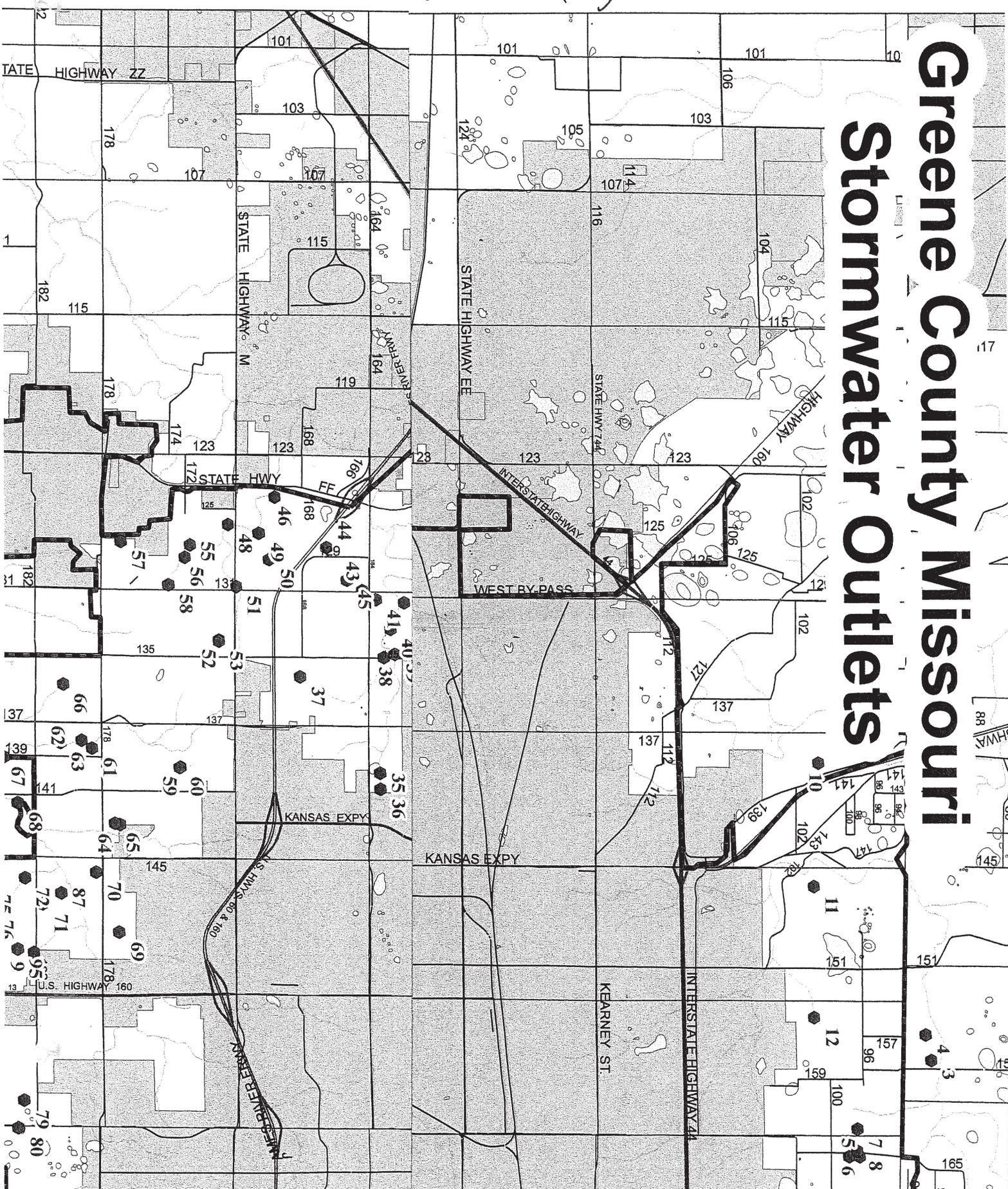


Id	Stream	long_lat	East	North	STR
65	Workman Branch	93-19-11W 37-7-30N	471601.103969	4108801.434410	SE-SE-15-28-22
66	Ward Branch Tributary	93-20-19W 37-7-11N	469913.487317	4108198.922840	SW-NE-21-28-22
67	Ward Branch Tributary	93-19-44W 37-6-47N	470781.009841	4107473.844820	NE-SW-22-28-22
68	Ward Branch	93-19-22W 37-6-52N	471332.350990	4107627.334430	NW-SE-22-28-22
69	Ward Branch	93-18-18W 37-7-32N	472913.326509	4108830.756320	SW-SE-14-28-22
70	Ward Branch	93-18-47W 37-7-23N	472185.982278	4108565.487580	NW-NW-23-28-22
71	Ward Branch	93-18-32W 37-7-2N	472556.835777	4107912.051470	SE-NW-23-28-22
72	Ward Branch Tributary	93-18-45W 37-6-55N	472237.423698	4107699.551340	NW-SW-23-28-22
73	Pierson Creek Tributary	93-12-17W 37-12-57N	481833.190790	4118841.194070	NW-SW-14-29-21
74	Ward Branch Tributary	93-18-33W 37-6-45N	472543.420905	4107393.775850	SE-SW-23-28-22
75	Ward Branch Tributary	93-18-27W 37-6-39N	472673.859530	4107223.764750	SE-SW-23-28-22
76	Ward Branch Tributary	93-18-27W 37-6-41N	472680.679780	4107260.746260	SE-SW-23-28-22
77	James River Tributary	93-17-58W 37-6-36N	473388.831653	4107112.125200	SE-SE-23-28-22
78	James River Tributary	93-17-11W 37-6-27N	474546.695932	4106848.501530	NW-NE-25-28-22
79	James River Tributary	93-16-57W 37-6-53N	474910.124134	4107649.019010	SE-SE-24-28-22
80	James River Tributary	93-16-43W 37-6-51N	475239.867627	4107577.055020	NW-SW-19-28-21
81	Pierson Creek	93-12-14W 37-9-57N	481901.138120	4113283.740110	SW-SW-35-29-21
82	Pierson Creek Tributary	93-12-29W 37-10-17N	481521.486966	4113916.929540	NE-SE-34-29-21
83	Pierson Creek Tributary	93-12-28W 37-10-23N	481564.933528	4114104.630500	SW-NW-35-29-21
84	Pierson Creek Tributary	93-12-19W 37-10-41N	481767.290796	4114636.863670	NW-NW-35-29-21
85	James River Tributary	93-13-16W 37-9-2N	480353.171043	4111598.635150	NE-NW-10-28-21
86	James River Tributary	93-13-10W 37-8-56N	480523.938195	4111399.950240	NE-NW-10-28-21
87	Ward Branch	93-18-37W 37-7-9N	472428.243970	4108129.771380	SE-NW-23-28-22
88	Pierson Creek Tributary	93-12-18W 37-10-41N	481797.661799	4114647.455900	NW-NW-35-29-21
89	Pierson Creek Tributary	93-11-5W 37-12-7N	483592.408268	4117307.930670	SW-NW-24-29-21
90	Pierson Creek Tributary	93-12-19W 37-10-50N	481784.444202	4114935.280100	SW-SW-26-29-21
91	Pierson Creek Tributary	93-12-29W 37-10-49N	481543.482460	4114896.079000	SE-SE-27-29-21
92	Pierson Creek Tributary	93-12-45W 37-10-41N	481134.051441	4114642.089830	NW-NE-34-29-21
93	Pierson Creek	93-12-24W 37-11-1N	481660.389699	4115275.280070	NW-SW-26-29-21
94	Pierson Creek	93-11-22W 37-11-52N	483217.901328	4116824.689500	NE-SW-23-29-21
95	Ward Branch Tributary	93-18-10W 37-6-52N	473094.572954	4107598.042050	NW-SE-23-28-22



100 LARGE TO SCAN

# Greene County Missouri Stormwater Outlets



100 LBS  
LEADS TO CCM

100 LBS  
LEADS TO CCM



100 LBS  
LEADS TO CCM

9-2-09  
MEMO

TO: Jim Vandiver  
Greene County Information Systems

FROM: Tim Davis  
Greene County Environmental

RE: MS-4 Screening Locations (Over 32" Outlet layer)

Over the course of the last month all of the identified outfalls were visually screened for illicit discharges. Most of the identified locations will work well for this task, but a few of the mapped locations were not suitable and will need to be adjusted. The following items are suggested changes to the current map.

- Sites numbers 85 and 86 have been assigned to duplicate sites while there is no site number 9. I suggest the site labeled 85 (93-18-7W 37-6-58N) be changed to #9 and the site labeled 86 (93-18-7W 37-6-58 N) be labeled #95.
- Site # 3 is on the South Dry Sac on the FR 165 bridge. There is perennial flow at this site making it impossible to distinguish base flow from illicit discharges. Recommend a new site at the 48" RCP at 93-17-1.49W 37-16-38.34N in Ashcroft Estates.
- Site # 4 is on a tributary to the South Dry Sac at 93-16-38W 37-16-26N about 300' off the trail north of Truman Elementary. This site is 300' through heavy brush to get to the stream which is located on private property. Recommend a new site at the 36" RCP at 93-17-14.13W 37-16-36.31N in Ashcroft Estates.
- Site # 10 is on the Dry Sac River at 93-18-46W 37-16-30N. There is perennial flow at this location making it impossible to distinguish natural base flow from any potential illicit discharges. Recommend a new location at the 36" CMP discharging from Twin Lakes Subdivision at 93-19-27.96W 37-15-56.06N.



5-24-12  
MEMO

TO: Jim Vandiver  
Greene County Information Systems

FROM: Tim Davis  
Greene County Environmental

RE: MS-4 Screening Locations (Over 32" Outlet layer)

After several rounds of visual illicit discharge screening it is clear that a few sites are not as suitable for the purpose as we had anticipated. The following items are suggested changes to the current map.

- Site number 20 duplicates site number 21. Recommend that site 20 be moved to the south detention basin in the same subdivision at 93-22-4.29 W 37-10-46.26 N.
- Site number 31 duplicates site number 30. Site 31 can be moved to the 117 x 79 inch arch in Lakes at Wild Horse Phase 4 at 93-11-45.08 W 37-13-30.26 N
- Site number 32 is on Wilson's creek making it impossible to distinguish base flow from illicit discharge. Its location under the bridge on James River Freeway means there is no safe access to the site. Please move site 32 to the 36 inch pipe discharging from Lakes at Wild Horse Phase 1 at 93-12-17.25 W 37-13-13.05 N
- Site numbers 33 and 34 are on losing sections of stream and would show no evidence of illicit discharge during dry periods. Recommend new site 33 at the end of the 72 inch pipe entering the Wild Horse Phase 3 detention basin at 93-11-5.24 W 37-13-47.76 N. Site 34 should be moved to the 72 inch pipe that discharges 20 feet to the west of the new site 33.
- Site number 47 duplicates site number 46. Recommend changing location of site 47 to the 60 inch pipe discharging into the Pearson Park detention basin at 93-10-17.54 W 37-13-46.73 N
- There is no access to site 54 if the homeowner is not around. Site 54 should be moved to the pipe discharging into the Lightner Landing detention basin at 93-10-59.23 W 37-13-36.67 N
- Site 73 duplicates site 74. Site 73 should be moved to the discharge pipe into the Pearson Meadows detention basin at 93-12-17.11 W 37-12-57.2 N
- Site 89 is of little value for screening because it is not far from the spring which is its source. For better screening value site 89 should be moved to the easternmost detention basin in Cherry hills at 93-11-5.51 W 37-12-7.92 N



**ORDER  
OF THE  
GREENE COUNTY COMMISSION  
SPRINGFIELD, MISSOURI**

**DATE ISSUED:**       **SEPTEMBER 4, 2012**

**SUBJECT:**           **PLANNING BOARD CASE NO. 1827**

**TEXT:**               **The Greene County Planning Office submitted to the Greene County Planning Board for review and recommendation to the Greene County Commission the following Amendment to the Greene County Zoning Regulations:**

**Amend Article IV Special Provisions, Section 25 Stormwater Runoff by adding Subsection C and inserting the following regulations concerning illicit discharge into the County's Stormwater system and renumbering the regulations accordingly.**

**Section C. Illicit Discharge Detection and Elimination**

**(1) Purpose: This ordinance is adopted pursuant to the authority granted in 64.907, 64.825 –64.885, Revised Statutes of Missouri and are intended to regulate non-stormwater discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. This ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this ordinance are:**

- A. To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by stormwater discharges by any user**



- B. To prohibit Illicit Connections and Discharges to the MS4**
- C. To establish legal authority to carry out all inspection, and monitoring procedures necessary to ensure compliance with this ordinance**

- (2) Applicability:** This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted.
- (3) Ultimate Responsibility:** The standards set forth in this article and promulgated pursuant to this article are minimum standards. Compliance with this article does not insure that there will be no contamination, pollution or unauthorized discharge of pollutants into the waters of the United States. This article shall not create liability on the part of the County or any agent or employee of the County for any damages that result from any discharges, reliance on this article or any administrative decision made under this article.
- (4) Illegal Discharges:** It shall be unlawful for any person to discharge or cause to be discharged into the municipal separate storm sewer system or into any watercourse any material other than stormwater. The following discharges are exempt from the prohibitions established by this article:
  - A. Waterline flushing or other potable water sources;**
  - B. Landscape irrigation or lawn watering;**
  - C. Diverted stream flows;**
  - D. Rising groundwater;**
  - E. Groundwater infiltration;**
  - F. Uncontaminated pumped groundwater;**
  - G. Foundation or footing drains excluding active groundwater de-watering systems;**
  - H. Crawlspace pumps, air conditioning condensation;**
  - I. Springs;**
  - J. Non-commercial washing of vehicles;**
  - K. Natural riparian habitat or wetland flows;**
  - L. Swimming pools if de-chlorinated to less than 1 ppm chlorine;**
  - M. Fire fighting activities;**
  - N. Other water not containing pollutants;**
  - O. Discharges specified by the County as necessary to protect public health and safety;**
  - P. Dye testing if notification is given to the County before the test; and**
  - Q. Any non-storm water discharge permitted under an NPDES permit, waiver or waste discharge order issued to the discharger and administered under the authority of the Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the municipal separate storm sewer system.**



- (5) Illicit connections:** It shall be unlawful for any person to construct, use, maintain or have an illicit connection.
- (6) Waste disposal prohibitions:** It shall be unlawful for any person to place, deposit or dump or to cause or allow the placing, depositing or dumping any refuse, rubbish, yard waste, paper litter or other discarded or abandoned objects, articles and accumulations containing pollutants into the municipal separate storm sewer system or into any waterway.
- (7) Connection of sanitary sewer prohibited:** It shall be unlawful for any person to connect a line conveying sewage to the municipal separate storm sewer system or to allow such a connection to continue.
- (8) Industrial or construction activity discharges:** It shall be unlawful for any person subject to an industrial activity or construction NPDES storm water discharge permit to fail to comply with all provisions of such permit.
- (9) Notification of Spills:**

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the County in person or by phone or facsimile no later than the next business day. Notifications in person or by phone shall be confirmed by written notice addressed and mailed to the County within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

The Greene County Planning Board did, during public hearing on June 19, 2012 vote to table this amendment to allow additional time for public comment.

The Greene County Planning Board did, during public hearing on July 17, 2012 vote to table this amendment to allow additional time for public comment.

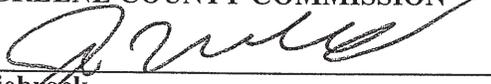
The Greene County Planning Board did vote during public hearing on August 21, 2012 to recommend approval of this amendment.



Now, therefore, the Greene County Commission did this day, upon a motion by Commissioner Viebrock, seconded by Commissioner Bengsch, and with Commissioner Bentley concurring, vote to approve this request.

Done this 4th day of September, 2012

THE GREENE COUNTY COMMISSION

  
\_\_\_\_\_  
Jim Viebrock  
Presiding Commissioner

  
\_\_\_\_\_  
Harold Bengsch  
Commissioner 1st District

  
\_\_\_\_\_  
Roseann Bentley  
Commissioner 2nd District



8



## **APPENDIX H: Construction Site Storm Water Runoff Control Program**

- Grading Permit Application

[http://www.greenecountymo.org/file/resource\\_management/env\\_grading\\_permit\\_app.pdf](http://www.greenecountymo.org/file/resource_management/env_grading_permit_app.pdf)

- SWPPP Template

[http://www.greenecountymo.org/file/resource\\_management/env\\_swppp.doc](http://www.greenecountymo.org/file/resource_management/env_swppp.doc)

- Inspection Checklist



**LAND DISTURBANCE INSPECTION CHECKLIST**  
**Greene County, MO**  
**Resource Management Department**  
940 Boonville Ave, Springfield, MO 65802 ph: 417-868-4147 fx: 417-868-4163

This form can be used for either private building and development self-inspections or by city inspection staff. For **Self-Inspections** this form is to be filled out at least once per seven calendar days, or within a reasonable time period (not to exceed 48 hours) of a rainfall event which causes stormwater runoff to occur on-site. This form is to be attached to the project's SWPPP and kept on-site according to federal and state regulations.

**Date of Inspection:** \_\_\_\_\_ **Project Name:** \_\_\_\_\_

**Grading Permit Number:** \_\_\_\_\_ **Contractor:** \_\_\_\_\_

**Location of Sediment/pollutant discharge:** \_\_\_\_\_

**Inspected by:** \_\_\_\_\_ **Date of Last Rain:** \_\_\_\_\_ **Rain Amount:** \_\_\_\_\_

**Inspection Type:**  Weekly  Rainfall Event  Complaint  Drive By  Pre-Con  Final

**INSPECTION CHECKLIST**

	Satisfactory	Deficient	N/A
1. SWPPP is on site and updated with records attached?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Sign/notice is posted at construction site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Erosion/sediment control BMPs installed according to SWPPP?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Mud tracking is controlled at construction entrance/exit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Streets and other property are free of sediment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Litter, construction debris, and construction chemicals are controlled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Disturbed areas are stabilized after activity has ceased for 14 days?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Sedimentation basins/traps are properly installed/maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Perimeter protection BMPs are properly installed/maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Discharge location's erosion control devices are adequate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Ditch checks/channel linings are installed/established/maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Diversion channels/slope drains are properly installed/maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Inlet protections for active inlets are properly installed/maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Streams/sinkholes are protected from sediment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Permanent stabilization measures are properly installed/maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Dewatering operations are filtering sediment/pollutants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Stockpiles are stabilized or contained by a BMP?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Have all temporary BMPs that are no longer needed been removed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Have all control BMPs been repaired/sediment accumulation removed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Areas Where Land Disturbance Has Ceased** \_\_\_\_\_

**Areas of Concern** (attach additional sheets if needed): \_\_\_\_\_

\_\_\_\_\_

**Recommendations** (attach additional sheets if needed): \_\_\_\_\_

\_\_\_\_\_

**Verbal**  **Written**  **Notification Given To (If applicable):** \_\_\_\_\_

**Inspector's Signature:** \_\_\_\_\_ **Date** \_\_\_\_\_







## **APPENDIX I: Post Construction Storm Water Management**

- Planning Board Case No. 1625



ORDER  
OF THE  
GREENE COUNTY COMMISSION  
SPRINGFIELD, MISSOURI

DATE ISSUED: January 3, 2006

SUBJECT: AMENDMENT TO THE GREENE COUNTY STORMWATER  
DESIGN STANDARDS

PLANNING BOARD CASE NO. 1625

TEXT: Amend the Greene County Stormwater Design Standards

The Greene County Planning Board did, during public hearing on December 20, 2005, vote unanimously to recommend approval of this request.

Now, therefore, the Greene County Commission did this day, upon a motion by Commissioner Bentley, seconded by Commissioner Bengsch, and with Commissioner Coonrod concurring, vote to amend the Greene County Stormwater Design Standards as follows:

Amendments to Section 115, Water Quality Protection, of the Greene County Stormwater Design Standards extending requirements to provide water quality best management practices (BMPs) to developments in all watersheds of the county. Water quality BMPs are currently required only in the Fulbright Spring and Pearson Creek watersheds.

Amend Section 115 - Water Quality Protection of the Greene County Stormwater Design Standards as follows:

Section 115.1 PURPOSE

This section covers the design of Best Management Practices (BMPs) to minimize the adverse effects of urban stormwater runoff on the quality of receiving waters. This policy applies only to developments in the residential, commercial, office, and manufacturing (R, C, O, and M) zoning districts and Plot Assignment Districts (P.A.D.'s) or other special zoning districts meeting or exceeding the development densities allowed in the R, C, O, and M districts. It does not apply to [RR-1, Rural Residence District,] A-R, Agriculture-Residence District or the A-1, Agriculture District.

~~[The Greene County Northeast Development Plan identifies Fulbright Spring and Pierson Creek as valuable resource waters which are sources of the community's water supply. The Northeast Plan, as well as the Short Range Recommendations of the Watershed Task Force endorsed by the County Commission in September 1996, call for protection of these water resources by implementing the recommendations of the 1995 Fulbright Spring Protection Study (Reference 115.1). The requirements of this section will apply to all new developments in these watersheds.~~

~~As the role which urban runoff from the Springfield metropolitan area plays in the quality of the James River and Table Rock Lake becomes better understood, it is anticipated that water quality requirements will be extended to watersheds of the James River and its tributaries.]~~

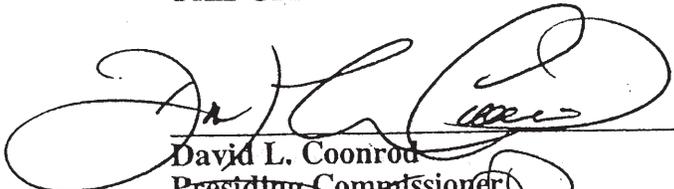
It is recognized that specific water quality standards, other than those contained in the Missouri Clean Water Laws, have not been developed or adopted for these receiving waters. The objective of this policy is not to meet specific reductions of targeted pollutants, but rather to provide a generally effective level of pollutant removal by using reasonable, cost effective measures. The goal is to minimize, to the maximum extent practical, adverse impacts on the quality of the

receiving waters.

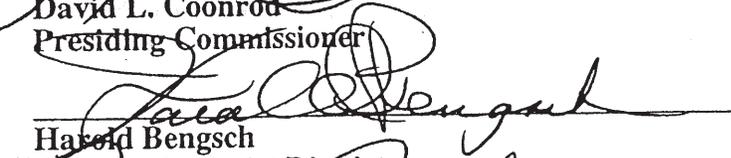
### Section 115.3 REQUIREMENTS

The following requirements will apply to any new development within the [Fulbright Spring or Pierson Creek watersheds.] [Zoning Districts listed in Section 115.1.]

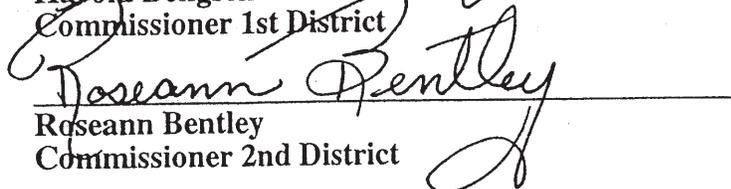
Done this 3<sup>rd</sup> day of January, 2006  
THE GREENE COUNTY COMMISSION



\_\_\_\_\_  
David L. Coonrod  
Presiding Commissioner



\_\_\_\_\_  
Harold Bengsch  
Commissioner 1st District



\_\_\_\_\_  
Roseann Bentley  
Commissioner 2nd District

M:\data\wp51\corder\pb court orders 2006\pb court order 06\1625 stormwater design.wpd

10



## **APPENDIX J: Pollution Prevention/Good Housekeeping**

- Tier 2 Data Sheets



Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102

TIER TWO - Emergency and Hazardous Chemical Inventory (General Information)

Received By/Date

Important: Please read all instructions before completing form Report period from January 1 to December 31, 2012  Check if information below is identical to the information submitted last year

Facility Identification (2a) - Facility Location  
 Facility Name: **Greene County Highway Department**  
 Street Address: **2065 North Clifton Avenue**  
 City: **Springfield** State: **MO** Zip: **65803**  
 Phone: **417-831-3591** Fax: **417-831-5216**  
 E-Mail: **gduvall@greencountymo.org** County: **Greene**

Mailing Address:  
 Name: **Greene County Highway Department**  
 Mail Address: **2065 North Clifton Avenue**  
 City: **Springfield** State: **MO** Zip: **65803**  
 SIC Code: **9199** Dun & Bradstreet Number: **176249381**  
 NAICS Code: **921190** TRI Number: **n/a**  
 Latitude: **D: 37 M: 14 S: 10** Longitude: **D: 93 M: 19 S: 40**

Fire Department with Jurisdiction: **Springfield Fire Dep**  
 Are Any Explosive Listed? **No**  
 Land Owner: **Local Government**

Owner/Operator Information (2b)  
 Name: **County of Greene**  
 Mail Address: **930 North Boonville Avenue**  
 City: **Springfield** State: **MO** Zip: **65802**  
 Phone: **417-868-4112** Fax: **417-868-4818**  
 E-Mail: **jviebrock@greencountymo.org**

Regulatory point of Contact Information (2c)  
 Name: **Dan Smith, P.E. Administrator**  
 Mail Address: **2065 North Clifton Avenue**  
 City: **Springfield** State: **MO** Zip: **65803**  
 Phone: **417-829-6505** Fax: **417-831-5216**  
 E-Mail: **dsmith@greencountymo.org**

Emergency Contact Information (2d)  
 Name: **Harry Stennett** Title: **Operations Director**  
 Phone: **417-829-6532** 24 hr. Phone: **417-838-1264**  
 Name: **Greg Duvall** Title: **Administrative Servi**  
 Phone: **417-829-6513** 24 hr. Phone: **417-576-2620**

Submission for Reporting Year:  Initial  Update

Certification (Read and sign after completing all sections)  
 I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through 3, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner/operator OR owner/operator's authorized representative  
 Name: **Dan Smith, P.E.** Title: **Administrator** Signature: *[Signature]* Date Signed: **3/1/13**

Optional Attachments  
 I have attached a site plan  
 I have attached a list of site coordinate abbreviations  
 I have attached a description of dikes and other safeguard measures

Next Page

Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102  
 TIER TWO - Emergency and Hazardous Chemical Inventory (Chemical Specifics) Page 2 of 3

Facility Name: **Greene County Highway Department** State: **MO** Zip: **65803**  
 City: **Springfield**  
 Emergency Contact Name: **Harry Stennett** 24 hr. Phone: **417-838-1264**

Chemical Description (3)  Check if info is same as last year.  
 CAS: **68476-34-6** Trade Secret:   
 Chemical Name: **#2 Diesel fuel**  
 Check all that apply: (  ) (  ) (  )  
 Pure Mix Solid Liquid Gas EHS  
       
 EHS Name:

Inventory (5)  
 Max Daily Amount Code: **09**  
 Avg. Daily Amount Code: **09**  
 No. of Days on Site Per Year: **365**  
 Optional Report

Physical and Health Hazards (4)  
 Check all that apply:  
 Fire  
 Sudden Release of Pressure  
 Reactivity  
 Immediate (Acute)  
 Delayed (Chronic)

Storage Codes and Locations (6) (Note: This information is Not Confidential)  
 Container Pressure Temperature  
**B 1 4** Storage Location: **Directly West of 2065 North Clifton Avenue. Main entrance approximately 400 feet.**

Chemical Description (3)  Check if info is same as last year.  
 CAS: **7447-40-7** Trade Secret:   
 Chemical Name: **Liquid calcium chloride solution**  
 Check all that apply: (  ) (  ) (  )  
 Pure Mix Solid Liquid Gas EHS  
       
 EHS Name:

Inventory (5)  
 Max Daily Amount Code: **04**  
 Avg. Daily Amount Code: **04**  
 No. of Days on Site Per Year: **365**  
 Optional Report

Physical and Health Hazards (4)  
 Check all that apply:  
 Fire  
 Sudden Release of Pressure  
 Reactivity  
 Immediate (Acute)  
 Delayed (Chronic)

Storage Codes and Locations (6) (Note: This information is Not Confidential)  
 Container Pressure Temperature  
**A 1 4** Storage Location: **Directly West of 2065 North Clifton Avenue. Main entrance 300 feet.**

Certification (Read and sign after completing all sections)  
 I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through 3, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.  
 Name and official title of owner/operator OR owner/operator's authorized representative  
 Name **Dan Smith, P.E.** Title **Administrator** Signature **[Signature]** Date Signed **3/1/13**  
 Previous Page Next Page

Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102  
 TIER TWO - Emergency and Hazardous Chemical Inventory (Chemical Specifics) Page 2 of 3

Facility Name: **Greene County Highway Department** State: **MO** Zip: **65803**  
 City: **Springfield**  
 Emergency Contact Name: **Harry Stennett** 24 hr. Phone **417-838-1264**

Chemical Description (3)  Check if info is same as last year.

CAS: **68476-34-6** Trade Secret:

Chemical Name: **#2 Diesel fuel**

Check all that apply:  Pure  Mix  Solid  Liquid  Gas  EHS

EHS Name:

Physical and Health Hazards (4)  
 Check all that apply:  Fire  Sudden Release of Pressure  Reactivity  Immediate (Acute)  Delayed (Chronic)

Inventory (5)  
 Max Daily Amount Code: **09**  
 Avg. Daily Amount Code: **09**  
 No. of Days on Site Per Year: **365**  Optional Report

Storage Codes and Locations (6) (Note: This information is Not Confidential)

Container Pressure Temperature  
 Code: **B 1 4** Storage Location: **Directly West of 2065 North Clifton Avenue, Main entrance approximately 400 feet.**

Chemical Description (3)  Check if info is same as last year.

CAS: **7447-40-7** Trade Secret:

Chemical Name: **Liquid calcium chloride solution**

Check all that apply:  Pure  Mix  Solid  Liquid  Gas  EHS

EHS Name:

Physical and Health Hazards (4)  
 Check all that apply:  Fire  Sudden Release of Pressure  Reactivity  Immediate (Acute)  Delayed (Chronic)

Inventory (5)  
 Max Daily Amount Code: **04**  
 Avg. Daily Amount Code: **04**  
 No. of Days on Site Per Year: **365**  Optional Report

Storage Codes and Locations (6) (Note: This information is Not Confidential)

Container Pressure Temperature  
 Code: **A 1 4** Storage Location: **Directly West of 2065 North Clifton Avenue, Main entrance 300 feet.**

Certification (Read and sign after completing all sections)  
 I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through 3, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner/operator OR owner/operator's authorized representative  
 Name: **Dan Smith, P.E.** Title: **Administrator** Signature: *[Signature]* Date Signed: **3/1/13**

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Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102  
 TIER TWO - Emergency and Hazardous Chemical Inventory (Chemical Specifics) Page 3 of 3

Facility Name: <b>Greene County Highway Department</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65803</b> Emergency Contact Name: <b>Harry Stennett</b> 24 hr. Phone: <b>417-838-1264</b>	Inventory (5) Max Daily Amount Code: <b>05</b> Avg. Daily Amount Code: <b>04</b> No. of Days on Site Per Year: <b>365</b> <input type="checkbox"/> Optional Report
Chemical Description (3) <input checked="" type="checkbox"/> Check if info is same as last year. CAS: <b>8006-61-9</b> Trade Secret: <input type="checkbox"/> Chemical Name: <b>Unleaded gasoline</b> Check all that apply: ( <input type="checkbox"/> ) ( <input checked="" type="checkbox"/> ) ( <input type="checkbox"/> ) Pure Mix Solid Liquid Gas EHS <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Physical and Health Hazards (4) Check all that apply: <input checked="" type="checkbox"/> Fire <input type="checkbox"/> Sudden Release of Pressure <input type="checkbox"/> Reactivity <input checked="" type="checkbox"/> Immediate (Acute) <input checked="" type="checkbox"/> Delayed (Chronic)
Storage Codes and Locations (6) (Note: This information is Not Confidential) Container Pressure Temperature <b>B 1 4</b> Storage Location: <b>Directly West of 2065 North Clifton Avenue. Main entrance approximately 400 feet.</b>	
Certification (Read and sign after completing all sections) I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through 3, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. Name and official title of owner/operator OR owner/operator's authorized representative Name <b>Dan Smith, P.E.</b> Title <b>Administrator</b> Signature <i>[Signature]</i> Date Signed <b>3/1/13</b>	

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Return to Facilities List

Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102  
TIER TWO - Emergency and Hazardous Chemical Inventory (General Information) Received By/Date

Important: Please read all instructions before completing form. Report period from January 1 to December 31, 2012. [X] Check if information below is identical to the information submitted last year.

<b>Facility Identification (2a) - Facility Location</b> Facility Name: <b>Greene County Highway Department Pug Mill</b> Street Address: <b>620 East New Melville Road</b> City: <b>Willard</b> State: <b>MO</b> Zip: <b>65781</b> Phone: <b>417-831-3591</b> Fax: <b>417-831-5216</b> E-Mail: <b>gduvall@greencountymo.org</b> County: <b>Greene</b>		<b>Owner/Operator Information (2b)</b> Name: <b>County of Greene</b> Mail Address: <b>930 North Boonville</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65802</b> Phone: <b>417-868-4112</b> Fax: <b>417-868-4818</b> E-Mail: <b>jviebrock@greencountymo.org</b>	
<b>Mailing Address:</b> Name: <b>Greene County Highway Department Pug Mill</b> Mail Address: <b>2065 North Clifton</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65803</b>		<b>Regulatory point of Contact Information (2c)</b> Name: <b>Dan Smith, P.E. Administrator</b> Mail Address: <b>2065 North Clifton</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65803</b> Phone: <b>417-829-6505</b> Fax: <b>417-831-5216</b> E-Mail: <b>dsmith@greencountymo.org</b>	
<b>SIC Code:</b> 9199 Dun & Bradstreet Number: 176249381 <b>NAICS Code:</b> 921190 TRI Number: n/a <b>Latitude:</b> D: 37 M: 17 S: 34 <b>Longitude:</b> D: 93 M: 24 S: 27		<b>Emergency Contact Information (2d)</b> Name: <b>Harry Stennett</b> Title: <b>Operations Director</b> Phone: <b>417-829-6532</b> 24 hr. Phone: <b>417-838-1264</b> Name: <b>Greg Duvall</b> Title: <b>Safety Director</b> Phone: <b>417-829-6513</b> 24 hr. Phone: <b>417-576-2620</b>	
<b>Fire Department with Jurisdiction:</b> <b>Willard Fire Dept.</b>		Submission for Reporting Year: <input checked="" type="radio"/> Initial <input type="radio"/> Update	
<b>Are Any Explosive Listed?</b> <b>No</b>		<b>Optional Attachments</b> <input type="checkbox"/> I have attached a site plan <input type="checkbox"/> I have attached a list of site coordinate abbreviations <input type="checkbox"/> I have attached a description of dikes and other safeguard measures	
<b>Land Owner:</b> <b>Local Government</b>		<b>Name and official title of owner/operator OR owner/operator's authorized representative.</b> Name: <b>Dan Smith, P.E.</b> Title: <b>Administrator</b> Signature:  Signed: <b>3/1/13</b>	

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Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102  
 TIER TWO - Emergency and Hazardous Chemical Inventory (General Information) Received By/Date 3/1/13 Page 1 of 2

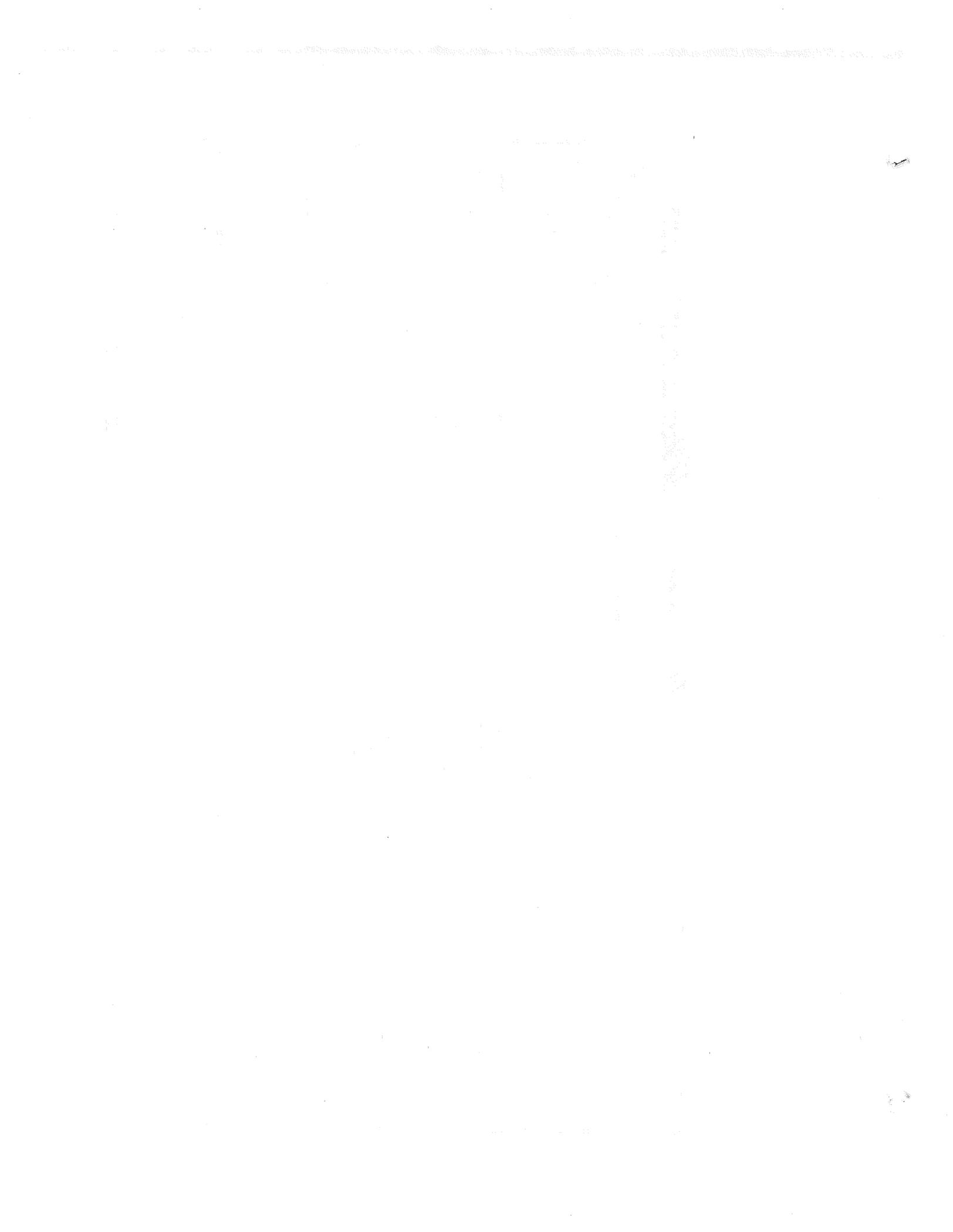
Important: Please read all instructions before completing form Report period from January 1 to December 31, 2012  Check if information below is identical to the information submitted last year

<b>Facility Identification (2a) - Facility Location</b> Facility Name: <b>Greene County Highway Department Pug Mill</b> Street Address: <b>620 East New Melville Road</b> City: <b>Willard</b> State: <b>MO</b> Zip: <b>65781</b> Phone: <b>417-831-3591</b> Fax: <b>417-831-5216</b> E-Mail: <b>gduvall@greencountymo.org</b> County: <b>Greene</b>		<b>Owner/Operator Information (2b)</b> Name: <b>County of Greene</b> Mail Address: <b>930 North Boonville</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65802</b> Phone: <b>417-868-4112</b> Fax: <b>417-868-4818</b> E-Mail: <b>jviebrock@greencountymo.org</b>
<b>Mailing Address:</b> Name: <b>Greene County Highway Department Pug Mill</b> Mail Address: <b>2065 North Clifton</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65803</b>		<b>Regulatory point of Contact Information (2c)</b> Name: <b>Dan Smith, P.E. Administrator</b> Mail Address: <b>2065 North Clifton</b> City: <b>Springfield</b> State: <b>MO</b> Zip: <b>65803</b> Phone: <b>417-829-6505</b> Fax: <b>417-831-5216</b> E-Mail: <b>dsmith@greencountymo.org</b>
SIC Code: <b>9199</b> Dun & Bradstreet Number: <b>176249381</b> NAICS Code: <b>921190</b> TRI Number: <b>N/A</b> Latitude: <b>D: 37 M: 17 S: 34</b> Longitude: <b>D: 93 M: 24 S: 27</b>		<b>Emergency Contact Information (2d)</b> Name: <b>Harry Stennett</b> Title: <b>Operations Director</b> Phone: <b>417-829-6532</b> 24 hr. Phone: <b>417-838-1264</b> Name: <b>Greg Duvall</b> Title: <b>Safety Director</b> Phone: <b>417-829-6513</b> 24 hr. Phone: <b>417-576-2620</b>
Fire Department with Jurisdiction: <b>Willard Fire Dept.</b>		Submission for Reporting Year: <input type="checkbox"/> Initial <input checked="" type="checkbox"/> Update
Are Any Explosive Listed? <b>No</b>		
Land Owner: <b>Local Government</b>		

Certification (Read and sign after completing all sections)  
 I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through 2, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.  
 Name and official title of owner/operator OR owner/operator's authorized representative: **Dan Smith, P.E. Administrator**  
 Signature: *[Signature]* Title: **Administrator** Signed: **3/1/13**

Optional Attachments  
 I have attached a site plan  
 I have attached a list of site coordinate abbreviations  
 I have attached a description of dikes and other safeguard measures

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Missouri Emergency Response Commission - Department of Public Safety - PO Box 3133 Jefferson City, MO 65102  
TIER TWO - Emergency and Hazardous Chemical Inventory (Chemical Specifics)

Facility Name: <b>Willard</b>	Emergency Contact Name: <b>Harry Stennett</b>	24 hr. Phone: <b>417-838-1264</b>
City: <b>Willard</b>	State: <b>MO</b>	Zip: <b>65781</b>

Chemical Description (3)  Check if info is same as last year.

CAS: **8052-42-4** Trade Secret:

Chemical Name: **Anionic Asphalt Emulsion, Heavy**

Check all that apply: (  ) (  ) (  ) (  )

Pure  Mix  Solid  Liquid  Gas  EHS

EHS Name:

Physical and Health Hazards (4)

Check all that apply:

Fire

Sudden Release of Pressure

Reactivity

Immediate (Acute)

Delayed (Chronic)

Inventory (5)

Max Daily Amount Code: **04**

Avg. Daily Amount Code: **04**

No. of Days on Site Per Year: **Summer Months**

Optional Report

Storage Codes and Locations (6) (Note: This information is Not Confidential)

Container	Pressure	Temperature
<b>P</b>	<b>1</b>	<b>5</b>

Storage Location: **Just South of Entrance at 620 East Melville Road, Willard, Missouri 65781**

Certification (Read and sign after completing all sections)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through 2, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name Dan Smith, P.E. Title Administrator Signature [Signature] Date Signed 3/1/13

Return to Facilities List

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