

Source Water Protection Plan

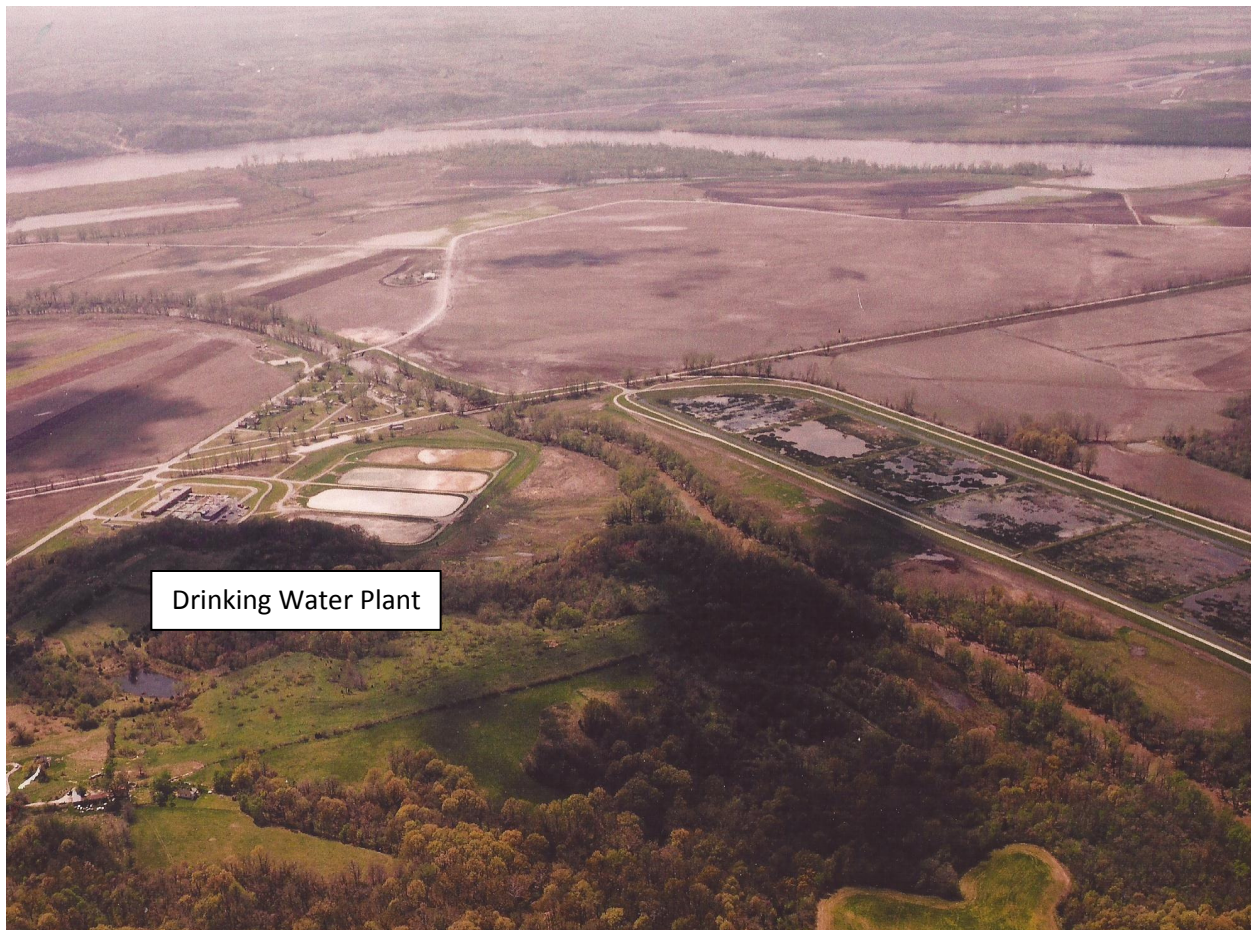
City of Columbia Missouri

Prepared By:

Columbia Source Water Protection Task Force

With Assistance From:

Missouri Department of Natural Resources



Columbia Drinking Water Plant – McBaine Bottoms

February 2013

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Purposes and Objectives of the Plan

This plan is to be used to provide education and information to the Columbia Water and Light Department, the City of Columbia and the surrounding community. Protection of public health is the foremost objective of the City of Columbia Source Water Protection Program. Protecting the environment and the infrastructure of the utilities that serve this community are important objectives that are necessary to help sustain and enhance the health and welfare of the community. The information within this plan can help to identify risks, needs, and actions for our community and the public drinking water system. This plan can guide us through a process that will enable us to become better informed and educated for the purpose of protecting Columbia's source water. This will ultimately have a positive and long term effect on the water resources that become our drinking water.

ACKNOWLEDGEMENTS

This plan is evidence of a cooperative effort between the City of Columbia and the Missouri Department of Natural Resources.

INTRODUCTION

Purpose and Scope

The purpose of this guide is to assist in the assessment of the drinking water sources for the City of Columbia. This guide is an overview of the Water and Light Department's source water and water treatment plant operation.

System and Source Overview

The Columbia Water Treatment Plant is owned and operated by the City of Columbia and the Water and Light Department. The system supplies water to approximately 45,500 customers. The water system has about 46,250 service connections and the average daily consumption is 12.60 million gallons per day. The Columbia Water Treatment Plant is in compliance with all state and federal drinking water regulations. The plant is in the Northeast Regional office district of the Missouri Department of Natural Resources.

The service territory of the Columbia Water Treatment Plant lies in Boone County, including the City of Columbia, where the majority of the customers reside. Through cooperative service connections, the City has emergency ties to the following Public Water Districts and customers: the University of Missouri and Water District #9. The area is served directly by Interstate 70 and U. S. Highway 63.

Columbia's first community water supply was derived from a small surface reservoir on a dammed section of the Hinkson Creek. In 1903, Columbia voters, motivated by public health concerns, voted by a margin of 2 to 1 in favor of an alternate deep well water supply. Following voter approval of the purchase of the Columbia Water & Light Plant in 1904, a series of 1,200-foot deep wells yielding water of exceptionally high quality were constructed. By 1947, a one-million-gallon water tower was put into service. In 1960, Guyton and Associates projected that continued withdrawals of up to 8 mgd from the deep wells would lower water levels to the top of the Roubidoux formation (700 ft. below ground surface).

In the summer of 1968, Layne-Western Company, Inc. of Kansas City, Missouri undertook a study (Nuzman, 1969) to assess the potential of the "McBaine Bottoms," a 10- square-mile

alluvial flood plain adjacent to the Missouri River extending from Huntsdale to Easley, as an alternate water source for the City of Columbia.

The alluvial fill of the Missouri River limestone erosional channel was found to be 100 feet deep to the limestone bedrock formation. Since the fill consisted of porous materials, such as silts, sands and gravel, “excellent communication” existed between the Missouri River and the aquifer in this area. Overall, the aquifer was expected to yield several times more than the 24 mgd (year 2000) projected future water use. As a result, the original planning for the well field called for 12 wells with a capacity of 2.5 mgd each for a total yield of 30 mgd.

Minimal household water use was found within the alluvial flood plain. Where such use occurred, there were complaints related to iron, including discoloration and taste. However, an alternate public water supply district source was available for domestic use.

Columbia’s water treatment plant and well water source is located ten miles south of the MU football stadium on Route K, near the small town of McBaine. The water-bearing stratum from which the City draws its water is often denoted as the “McBaine Aquifer.” The plant is about one-and-a-half miles from the Missouri River.

Water is drawn by wells from a formation called an “alluvial aquifer.” The aquifer is composed of silt, clay, coarse-grained sand, and gravel. All of this rests on top of limestone bedrock. The ten-square-mile area in the McBaine Bottoms holds an estimated 44 billion gallons of water. Columbia uses around 6 billion gallons of water each year. The limestone formation is high in water hardness and alkalinity. Average hardness averages 340 mg/L (parts per million), a water hardness much too high to pump to Columbia’s population. The water from this limestone formation is also high in carbon dioxide and dissolved iron. Other than hardness, carbon dioxide and iron, the quality in general is extremely high. Very little additional treatment has ever been necessary.

The ground water moves slowly (on average less than a couple of inches a day) through the sand and gravel aquifer. The flow of the aquifer water historically parallels the flow of the Missouri river. Water use from the aquifer is replenished by Missouri river water, precipitation, and flow from higher elevations. The United States Geological Survey (USGS) has performed a multi-decade study of the McBaine aquifer in partnership with the City of Columbia. USGS continues to sample monitoring wells in the McBaine aquifer on a regular basis and reports their findings to the City of Columbia.

The water treatment plant operation has fifteen “shallow wells” in the McBaine bottoms. These wells are situated on seven sites that are separated by a minimum of 2,500 feet to reduce the possibility of wells competing for the same water area. These wells average 95 feet in depth (65 feet of well column and 30 feet of stainless steel screen). Each of these wells when

new is capable of pumping about 2 million gallons of water per day. Each well has its own individual water meter. Information on pump drawdown is taken each month to assess the operational condition of each well. This allows Columbia Water and Light to determine well capacity. The water is pumped from these wells to the treatment plant.

Columbia's plant is a lime softening, iron removal plant. Hard water contributes to scale in water lines and hot water heaters. Iron, when it comes out of solution, causes serious staining problems in clothing and sinks. Water from the well field is first run through aerators to allow removal of CO₂ and to oxidize the iron. Slaked lime is added to the well water in four primary treatment basins to reduce the hardness from 340 parts per million to 150 parts per million. This level of hardness is considered by professionals to be a level of moderate hardness for a public water supply.

The softened water is then allowed to flow through filter beds of anthracite and sand to remove suspended particles of lime and other turbidity. Chlorine and ammonium sulfate are added to the water before it is pumped to Columbia. This process produces something called a combined chlorine residual. This chlorine stays in the finished water as a residual, in the event that some sort of contamination makes its way into the distribution system. Columbia only in recent years began adding ammonium sulfate along with the chlorine. This was done to reduce the levels of trihalomethane formation in the distribution system.

After its treatment at the McBaine plant, the finished water is pumped to three holding reservoirs in the City. A series of pumps in each of these pumping stations then sends the water out into the distribution system.

The "great Missouri River floods" of 1993 and 1995 demonstrated that the plant and wells were in a highly vulnerable area. After these floods, well platforms were raised seven feet, a concrete flood protection wall was constructed around the treatment plant, and secondary power and waterlines were run from the well field to the plant.

Seven of the City of Columbia's original deep wells are still listed by Missouri Department of Natural Resources (DNR) as part of the City's water system. Most of these wells have been inactive for decades. Although many of them are operationally non-functional, several are identified by DNR as emergency backup sources.

The old wells are deep (900-1,500') with 400-750' casings. The wellheads are fully enclosed in brick buildings. In two preliminary tours of the sites, the threats and risks to these wells appear to be minimal.

Deep wells #8 and #10 have been renovated and brought back into service as aquifer storage and recovery wells. Well #7 at the West Ash Pumping Station and well #5 at the northeast booster station are candidate sites for future aquifer storage wells.

The Crump, El Ray, and Prathersville wells were acquired by Water and Light in the 1990s. Like the majority of the remaining old deep wells, these old water district operations are not a source of supply for the city. The Crump well is operational.

Implementation Strategy

The Columbia Source Water Task Force will meet with local officials, business owners, and the citizens of the Columbia community to provide information about the actions they may take to protect the source water area. Specific action items are discussed in Step # 5, Management Planning and Education.

Step 1 - Planning Team

This task force has been organized to help compile site specific information for the Columbia Source Water Protection Plan (SWPP) Report. The task force will meet on an annual basis to review and update the SWPP.

The planning team consists of:

John Betz	Chair – City Council Appointment
Tom O’Connor	Vice Chair – Water and Light Advisory Board Appointment
Stephen Lauzier	City Council Appointment
Benjamin Ross	City Council Appointment
Joshua Lehmen	City Council Appointment
Floyd Turner	Manager of Water Operations – City Manager Appointment
Steve Hunt	Manager of Environmental Services – City Manager Appointment
David Sorrell	Sewer Utility Manager – City Manager Appointment
Todd Houts	University of Missouri Appointment

Roger Ballew	Public Water District #9 Appointment
Tim James	Department of Conservation
Vic Bogosian	Eagle Bluff's Conservation Area
David Storvick	Water and Light Department
Tomas Zajicek	Water and Light Department

Step 2 – Delineation

The City of Columbia has adopted the 20 year time of travel line in the McBaine River Bottoms that was used by the Department of Natural Resources in their original delineation. This area is located on the eastern side of the Missouri River and is bordered by the town of Huntsdale to the northwest and the Department of Conversation's Eagle Bluff's wetlands on the Southeast. This delineation may change with an updated and improved delineation or by advisement from the Missouri Department of Natural Resources.

This delineation zone around the respective well field was chosen by the planning team to provide an area that is manageable in protecting Columbia's water supply. The area of delineation will be marked on a map at the 20 year time of travel line around the fifteen McBaine aquifer wells.

Step 3 – Inventory

Inventory was conducted by the Columbia Source Water Protection Task Force. The Task Force used as an information source the Missouri Department of Natural Resources' Public Drinking Water Program's databases via the University of Missouri CARES system. Information was also collected by searching local records, historical land use data, and on-site verification.

This inventory of potential contaminant risks helped to identify not only potential for contamination to the immediate area but also the most likely risk in some cases. It is important to identify large as well as small quantities of these contaminants. With this contaminant inventory, the Task Force was able to visualize, assess, and prioritize potential risk locations. Contaminants are materials that could potentially contaminate the source water by themselves or in combination with other substances. Contaminant inventories include but are not limited to: fuel and oils, pesticides, nutrients, synthetic organic chemicals, volatile organic chemicals,

animal or human waste, etc. Owner-operators of these contaminant inventories should be reminded of their responsibilities by law (where applicable), and their ethical business practices to provide responsible storage, use, and disposal of their product(s).

Source Water Protection Areas (SWPAs) fall into two broad categories: the older in-town deep wells, and the McBaine Bottoms wells that are the actual source for Columbia's water supply.

Old Deep Wells

With regard to the old, non-operational, in-town wells, the potential threats are mostly those outlined in the DNR's Contaminant Data Sheets. These potential contaminant sources tend to be small businesses such as gas stations or retailers, who may stock chemicals such as pesticides, oil, gasoline, and cleaners.

The old deep wells include well #1, located on the west side of the City power plant; well #2, located in the basement of the power plant; well #5, located near Oakland Gravel Road; well #36, near East Boulevard; well #7, located on the site of the West Ash pumping Station; Oakview well. Non-operational wells also include the Harvester well and the Brown School Road well.

Well #4 at the City power plant is used to supply two ground storage reservoirs with water that is used for power plant cooling operations. The well and the storage reservoirs are not connected to the distribution system.

Spill Response

The staff of the Water and Light Department will contact the appropriate authorities listed in the Emergency Operations Plan – Step 6, and in Appendix 5 of any contaminant spill or inventory loss within the SWPA indicated on the provided map, or any such loss or spill of contaminant in an area which may be of concern. The spill response procedure identified in the Emergency Action Plan will be used as a guide by the Columbia Water and Light Department staff in the event of a spill.

Security

The Columbia Water Treatment Plant will continue to operate its continuous security surveillance of the facility as well as the monitoring of source water to safeguard against contamination. This facility will continue to maintain the secured high fences and locked gates.

Conservation as Source Water Protection

The many valuable benefits of source water protection are readily apparent to those in the water supply industry. Effective source water protection efforts can greatly reduce treatment costs while protecting public health and natural resources.

While many threats to our source water are readily apparent, some are less so. For example, even our own withdrawals for purpose of water supply pose a potential threat to our source waters. If our withdrawals exceed the rate at which our reservoirs or ground waters are replenished, we run the risk of depleting our supplies. If, subsequently, we are forced to dig more or deeper wells, we increase both capital costs and pumping costs. If we pump a well harder and more often, we tend to increase the size of the area of influence around the well.

Particularly with wells that are shallow, alluvial, or otherwise vulnerable, increased pumping has the potential to introduce additional contaminants to our water, resulting in increased risk and/or treatment costs.

Due to this linkage between withdrawal quantity and source water quality, conservation is, in itself, a form of source water protection.

In the strictest sense, the ground water in the McBaine bottoms is our true source water.

Potential threats to this water include:

1. Malicious tampering with individual source water (or nearby monitoring wells)
2. Use of pesticides, herbicides, and fertilizers
3. Leakage from the City of Columbia wastewater treatment wetlands
4. Groundwater migration from under the Eagle Bluffs conservation wetlands
5. Infiltration from the Missouri River

These threats could be addressed by:

1. Fencing/access control around source water; signage indicating possible fines for tampering or trespassing

2. County ordinances regarding chemical application
3. Diligent inspection/maintenance of wetland cells; testing of nearby monitoring wells
4. Modification of wetlands operational protocols
5. Conservation; minimizing use of the wells nearest the river

Step 4 – Susceptibility Determination

Missouri Department of Natural Resources Cares Maps, well data sheets, and contaminant inventory data were used by the Columbia Source Water Protection Task Force to make susceptibility determinations.

Old Deep Wells

The old, in-town wells do not appear to be susceptible to contamination. They are very deep (900' – 1500'), they are cased to between 400' and 700', and the wellheads are fully enclosed in brick buildings.

Despite being inactive, these wells have value and potential future uses as aquifer storage and recovery wells, emergency water source water, irrigation/non-potable use functionality, or assets to be sold.

Weighing the miniscule risks against the possibilities for beneficial future use, it does not appear that there are significant, compelling reasons to plug or abandon the in-town wells.

The old deep wells do not pose a credible threat to our source water. No source water protection actions are recommended at this time.

We recommend that Columbia Water and Light take this opportunity to evaluate possible future uses for these wells.

In the course of our review, we noted that the old Prathersville elevated tank and El Ray tower have been disconnected and abandoned. These inactive storage facilities should be continuously maintained or removed.

McBaine Bottoms Wells

Overall, the McBaine wells are somewhat susceptible to contamination from nearby sources, since groundwater flows relatively freely through the sand and gravel aquifer.

Although our wells are not under the direct influence of surface water, they are influenced to some degree by surface phenomena. Therefore, we must exercise caution with regard to land use in the McBaine bottoms area.

As previously outlined, the SWP Task Force identified seven potential threats to the ground water in the McBaine bottoms:

1. Malicious tampering with individual source water (or nearby monitoring wells)
2. Use of pesticides, herbicides, and fertilizers
3. Seepage from the City of Columbia wastewater treatment wetlands
4. Groundwater migration from under the Eagle Bluffs conservation wetlands
5. Infiltration from the Missouri River
6. Future activities in the McBaine bottoms area
7. Petroleum pipelines through the well field

The task force discussed the susceptibility to these threats and possible safeguards as follows.

1. Malicious tampering with individual source water (or nearby monitoring wells)

Existing Situation

Presently, there are no barriers around or signage on individual source water. However, the wells themselves are securely locked and tamper-proof. Monitoring wells are quite small and inconspicuous. Susceptibility for both sets of wells is considered to be very low.

Discussion of Potential Protective Measures

Tampering can be minimized through physical barriers and signage. There are two schools of thought regarding the helpfulness of signage. Although signs are intended to be warnings, they can inadvertently attract attention to critical infrastructure that may otherwise go unnoticed, thereby doing more harm than good.

Recommendations

- Install access control around source water: vehicle-control cable and NO TRESPASSING sign across access road
- Place signage on source water indicating possible fines for tampering
- Signage similar to that shown below should be placed on all roadways entering the source water protection area.



2. Use of Pesticides, Herbicides, and Fertilizers

Existing Situation

Susceptibility to this threat is low. It is not anticipated that the Environmental Protection Agency (EPA) and DNR regulated chemicals applied to the ground's surface would penetrate into the aquifer.

Discussion of Potential Protective Measures

Communication with landowners regarding chemical application

Learn what's being used; monitor wells for those chemicals and degradation products

Levee district annual meeting in August

Recommendation

Continue monitoring wells for regulated substances.

3. Seepage from the City of Columbia wastewater treatment wetlands

Existing Situation

The City of Columbia works diligently to maintain the integrity of the treatment wetlands. However, the nature of the system is such that water from the treatment wetlands tends to migrate into the nearby groundwater, as evidenced by elevated chloride levels in both our monitoring and water source water.

Discussion of Potential Protective Measures

Bypass treatment wetlands; send Wastewater Treatment Plant (WWTP) effluent to the Missouri River

This option would be costly and unlikely to have a substantial positive impact on source water quality.

While the existing situation is sub-optimal from a water quality standpoint, it has not reached the threshold of being a threat to human health or Safe Drinking Water Act compliance. If regulated substances from the WWTP effluent begin to enter Columbia's drinking water further action will be necessary.

Recommendations

SWP Monitoring: Develop a chemical fingerprint of water in the treatment wetlands; look for signs of that fingerprint in source water. Could be incorporated into USGS studies. Continue to monitor source water for signs of regulated substances.

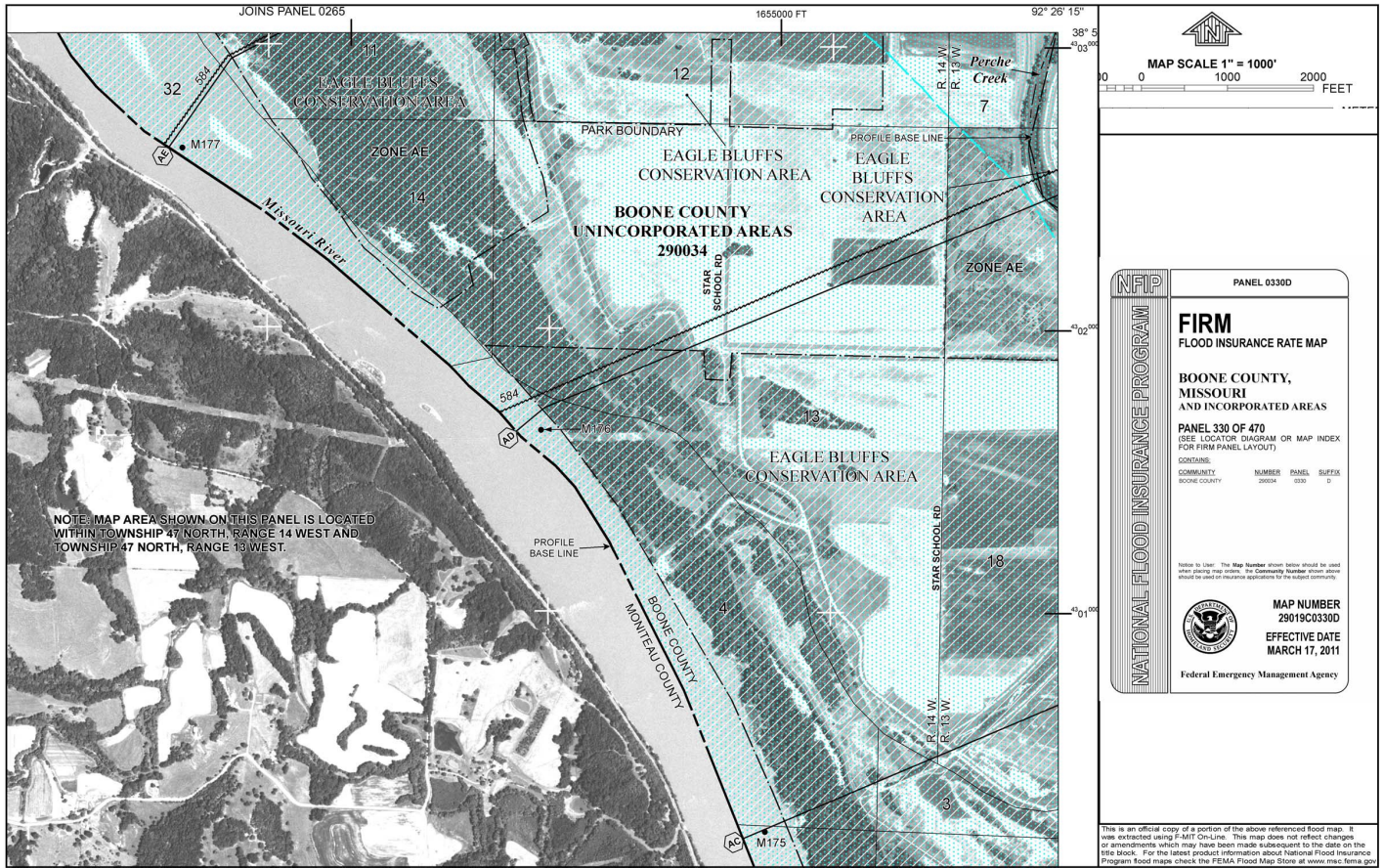
4. Groundwater Migration from Under the Eagle Bluffs Wetlands

Existing Situation


The significant amount of historical data related to water quality in the McBaine bottoms indicates that our wetland activities (both City of Columbia treatment wetlands and the Missouri Department of Conservation (MDC), Eagle Bluffs wetlands, have had an effect on both the quality and flow of groundwater.

The MDC is sensitive to the City of Columbia's well field and takes steps to minimize northward water migration.

There is a levee on the north end of the river slough to prevent effluent water from flowing north beyond the outflow point to the west of our junction box. Operationally, the MDC periodically runs their river pump and holds water in the supply channel and pool 1 (both north of pools that can be flooded with effluent water). Water above parts of the aquifer that are within 1 mile of the well field will have more influence on it than water held in pools that are not directly above it.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 47 NORTH, RANGE 14 WEST AND TOWNSHIP 47 NORTH, RANGE 13 WEST.



MAP SCALE 1" = 1000'

0 1000 2000 FEET

PANEL 0330D


FIRM
FLOOD INSURANCE RATE MAP

BOONE COUNTY, MISSOURI AND INCORPORATED AREAS

PANEL 330 OF 470
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	NUMBER	PANEL	SUFFIX
COMMUNITY	290034	330D	0
BOONE COUNTY			

Note to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

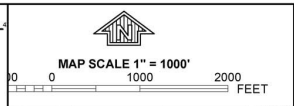
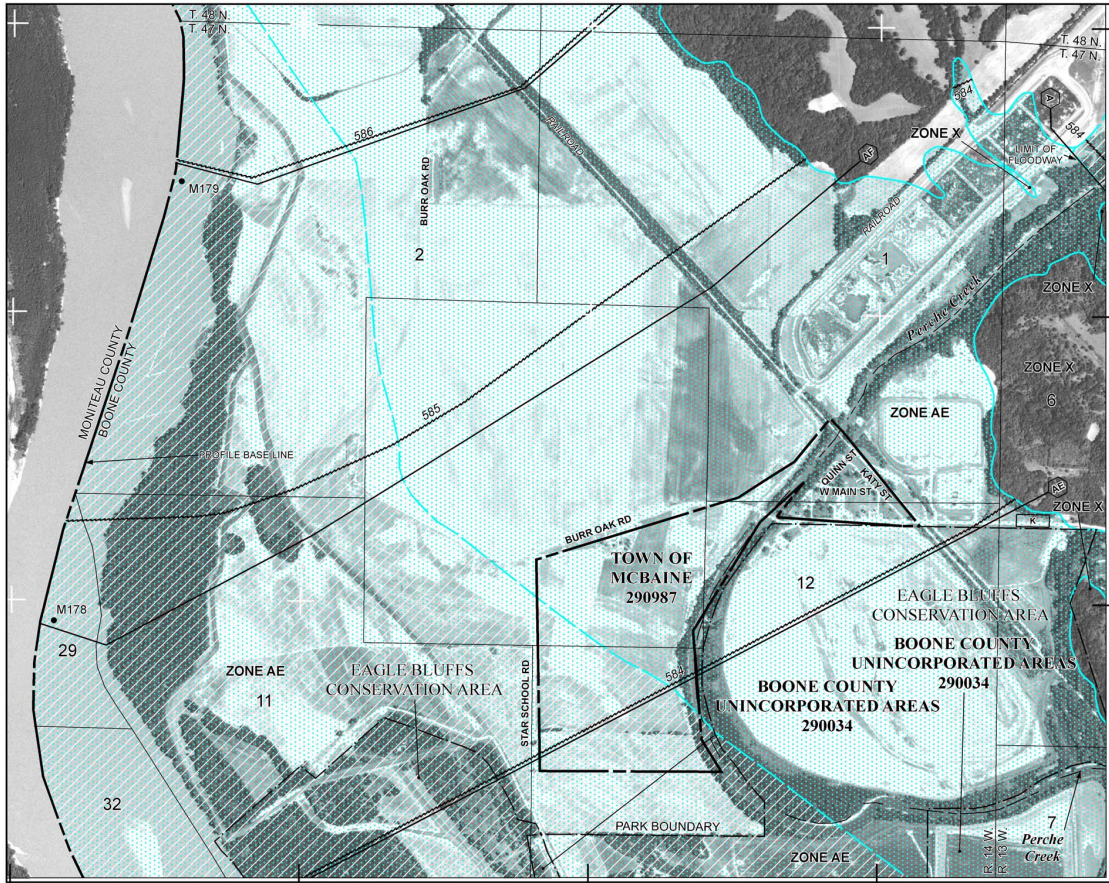


MAP NUMBER
29019C0330D

EFFECTIVE DATE
MARCH 17, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.fema.gov



NFIP PANEL 0265D

FIRM
FLOOD INSURANCE RATE MAP

**BOONE COUNTY,
MISSOURI
AND INCORPORATED AREAS**

PANEL 265 OF 470
(SEE LOCATOR DIAGRAM OR MAP INDEX
FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOONE COUNTY	290034	1005	D
HARTSDALE VILLAGE OF	290050	1005	D
MCBAINE, TOWN OF	290087	1005	D

Please to User: The Map Number shown below should be used when giving an address. The Community Number shown should be used on insurance applications for the subject community.

MAP NUMBER
29019C0265D

EFFECTIVE DATE
MARCH 17, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using FIRM On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Discussion of Potential Protective Measures

Bypass Eagle Bluffs wetlands; send treatment wetlands' effluent (or WWTP effluent) directly to the Missouri River

This would require MDC to pump water out of the Missouri River to maintain their operations, which would increase costs and energy requirements. Also, it is likely to have significant costs and unlikely to have a substantial positive impact on source water quality.

Again, while the existing situation is sub-optimal from a water quality standpoint, it has not reached the threshold of being a threat to human health or Safe Drinking Water Act compliance.

Recommendations

SWP Monitoring: Develop a chemical fingerprint of water in the Eagle Bluffs wetlands; look for signs of that fingerprint in source water. Could be incorporated into USGS studies. Continue to monitor source water for signs of regulated substances.

5. Infiltration from the Missouri River

Existing Situation

Although our wells are not under the direct influence of the Missouri River, they are hydraulically connected to a certain degree.

Discussion of Potential Protective Measures

Conservation programs, including rate structures, education, incentives

Monitoring Missouri River water quality

Recommendation

None at this time.

6. Future Activities in the McBaine Bottoms Area

Existing Situation

Landowners in the McBaine bottoms area include:

City of Columbia

Conservation Commission

John Sam Williamson

McBaine Farms, LLC

Ward Phyllis Ann Trust

B & B Agriculture

See Appendix 5 – McBaine Area Landowners

Land-use activities are currently regulated by Boone County. The unincorporated portions of the bottoms are Zoned A-1.

The entire McBaine Bottoms are in FEMA regulated floodplain. Most of the area is also a FEMA regulated floodway which has more stringent development requirements than the floodplain. See attached FEMA Maps.

Discussion of Potential Protective Measures

Land Purchase by City of Columbia

Conservation Easements

Additional Land Use/Zoning Controls (County)

Zoning Overlay District

Request “Sole Source Aquifer” Designation from USEPA

Recommendations

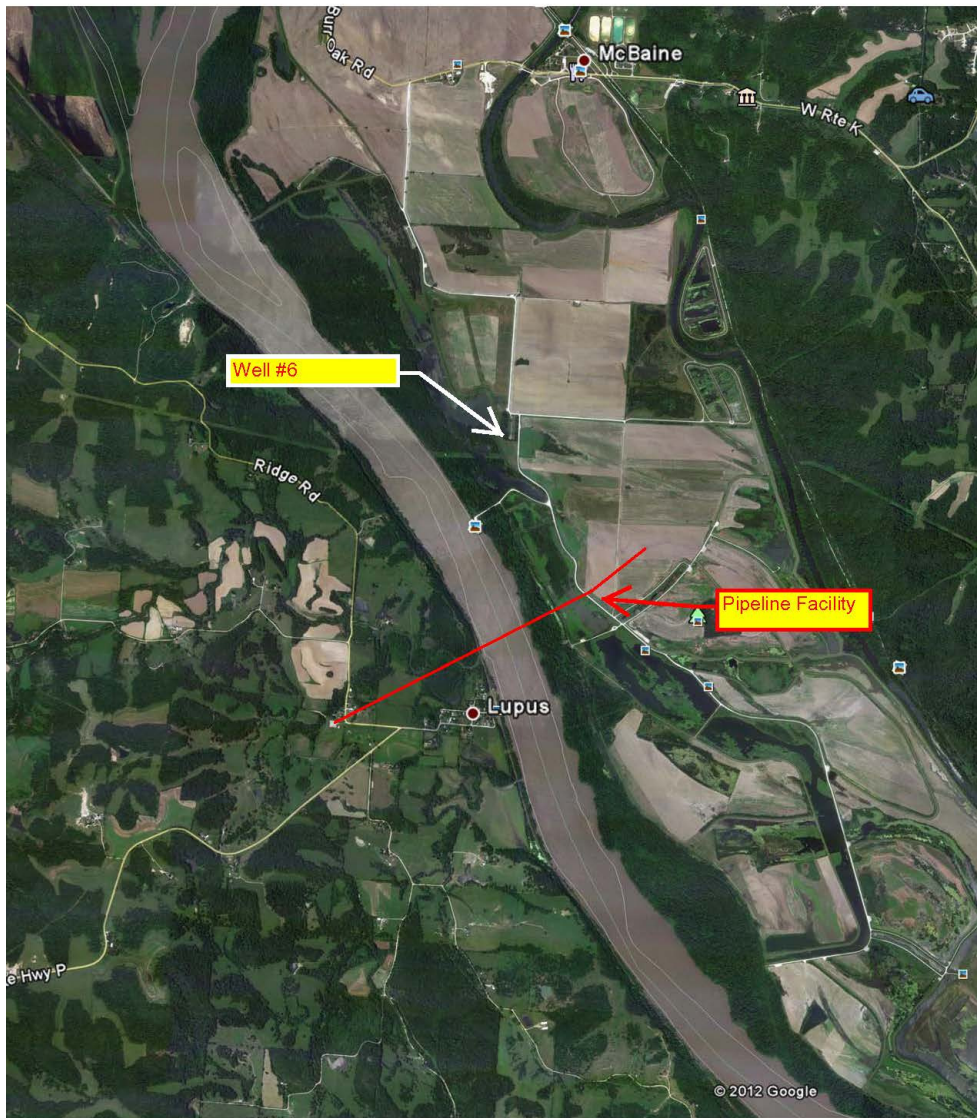
Request Boone County Resource Management Department contact Columbia Water and Light regarding any proposed development in the McBaine Bottoms.

7. Petroleum Pipelines Through the Well field

Existing Situation

Magellan and Southern Star petroleum pipelines run through the McBaine bottoms. The chances of pipeline failure are very small, but the impact on our water supply could be devastating.

McBaine Bottoms - Pipeline Facility



Recommendations

Develop a line of communication with the pipeline operators and request that they notify Columbia Water and Light as soon as possible if a spill or leak is detected.

Step 5 – Management Planning

Action Plan and Implementation

The Task Force has developed the following action items to establish an effective wellhead protection program for both the McBaine River Bottoms and the aquifers supplying the old City deep wells and acquired water district sites. These items will help to prevent, reduce, or eliminate contamination potential in the City's two water sources.

1. The Task Force will submit the Source Water Protection Plan to the Water and Light Department Advisory Board and the City Council.
2. The Task Force will submit the Source Water Protection Plan to the Missouri Department of Natural Resources for its endorsement.
3. The Task Force will present the approved Source Water Protection Plan to the Boone County Emergency Planning Groups.
4. The Task Force will arrange for the mailing of source water protection information to businesses located in the Missouri Department of Natural Resource's delineation areas for the Columbia water operation. Business operations include garages, car and truck dealers, chemical storage areas, shopping malls, chemical sales dealers, and funeral homes.
5. The Task Force will provide source water protection information to farmers in the McBaine Bottoms and will encourage them to work with the City of Columbia in protecting the quality of our water. Source Water protection will be discussed at the McBaine Levee District meetings.
6. The Task Force will arrange for the mailing of an informational source water protection brochure, via a bill insert, to all City of Columbia customers.
7. The Task Force, along with the Columbia Water and Light Department staff, will provide a plan of action for all the old deep wells referenced in the Section 3 of this report. The plan of action will examine the possibility of renovating at least two of the old deep wells for use as additional aquifer and storage wells. Consideration will also be given to the possibility of well renovation and water use for non-drinking purposes such as irrigation and street washing.

8. The Task Force will work with Water and Light staff in making a decision about the future plans for the Crump well, Oakview well, Harvester well, Brown Station School Road well.
9. The Task Force will work with Water and Light staff in making plans for the capping, plugging, removal, or renovation of all old deep wells and water district wells.
10. The Task Force will assist Water and Light staff in assuring that old deep well #4 at the City power plant and the two storage reservoirs meet all Department of Natural Resource standards for source water protection, even though the operation is not connected to the City's water distribution system.
11. The Task Force and the Water and Light Department will develop a program that deals with fencing/access control around source water; signage indicating possible fines for tampering.
12. The Task Force and the Water and Light Department will post information signs at the borders of the wellhead protection area in McBaine.
13. The Task Force will contact the Southern Star Central Gas Pipe Line Company and the Magellan Pipe Line Company about the importance of source water procedures in the event of a leak in either of their pipelines in the McBaine Bottoms.
14. The Task Force will continue to encourage neighboring water districts and other water providers in the City of Columbia to develop a regional source water protection plan.
15. The Task Force will examine already existing ordinances and regulations governing operations and businesses that have the potential to contaminate aquifers and make decisions about the need for additional rules and guidelines.
16. The Task Force will pursue an opportunity to educate children on the importance of source water protection. The Task Force will offer to assist the Missouri Department of Natural Resources and organizations such as the Missouri Water and Wastewater Conference, the Missouri Section American Water Works Association, and the Rural Water Association in any education projects these groups might be planning that deal with source water protection.
17. The Task Force will develop public education material and PowerPoint presentations on the importance of source water protection.
18. The Source Water Protection Plan will be updated annually by the Task Force and made available to the Missouri Department of Natural Resources every four years or as requested.

Public Education

The Task Force may, in conjunction with local schools and interested public or professional citizens, provide for an informational and educational opportunity by supplying this Source Water Protection Plan for their review and suggestions. Such opportunities may include annual field days to the McBaine River Bottoms, pumping stations, aquifer storage and recovery wells, and old deep well sites. Other possible opportunities to assist the SWP Task Force may include school presentations, poster contests, newspaper articles, Consumer Confidence Reports, festivals, or other informational opportunities.

This Source Water Protection Plan will be made available to the public at the Water and Light Administrative Office. It will be presented to any new business or industry, or any new location of potential contaminant sources within the delineation area.

Step 6 – Columbia Water and Light Department Emergency Operations Plan

The Columbia Water and Light's emergency plan for the Water Treatment Plant is designed to assist in the first hours and days after a major disaster has damaged or destroyed the water supply and system. This plan provides a checklist to remind employees of the many tasks and decisions that they will be faced with in an emergency situation. The procedures will provide critical information that will help staff in the event of an emergency. For security reasons, the EOP will be made available on an as-needed basis to external agencies and is not included as part of this document.

The contents of the EOP may not be inclusive of all necessary information needed for individual utilities. Continual planning and training will provide for the most effective EOP. Additional emergency notification information is included in Appendix 5.

Recommendations

The Columbia Source Water Protection Task Force encourages City of Columbia and Water and Light Department employees and administrators, council members, and the public to become involved with efforts directed toward sustainability of our water utility. There are fundamental solutions to a healthy and viable utility. Source Water Protection is the most cost effective way to help guarantee safe and affordable drinking water for future generations. The only way to

achieve the purpose and objectives of this Source Water Protection Program will be to exercise the actions and goals identified in this plan. Continual education and research are necessary to become better informed. Providing education and motivation for other system's personnel and utility stakeholders such as customers, business and industry owners, and interested community leaders, can lead to a successful Source Water Protection Program.

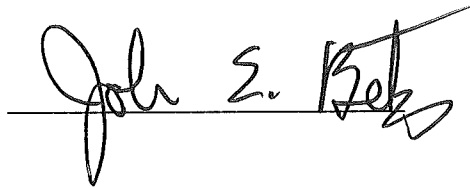
Columbia Source Water Protection Program Task Force Signature Page

The Task Force members contributed to the compilation of this document and are committed to the implementation of a source water protection plan for protection of the groundwater resources that serve as the source water for the public drinking water supply for Columbia, Missouri.

Signed:


John Betz

Chair – City Council Appointment



Tom O'Connor

Vice Chair – Water and Light Advisory Board Appointment



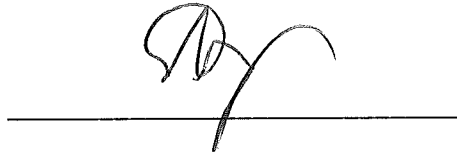
Floyd Turner

Water and Light Department Manager of Water Operations – City Manager Appointment



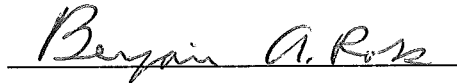
Steve Lauzier

City Council Appointment



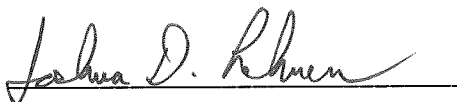
Benjamin Ross

City Council Appointment

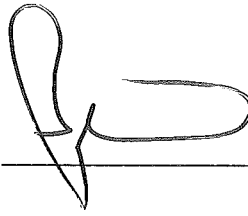


Josh Lehmen

City Council Appointment



Roger Ballew



Public Water District #9 Appointment #9

Vic Bogosian, Ph.D.



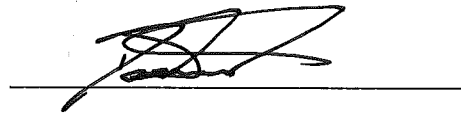
Eagle Bluff's Conservation Area

Todd Houts



University of Missouri-Columbia Appointment

David Storvick

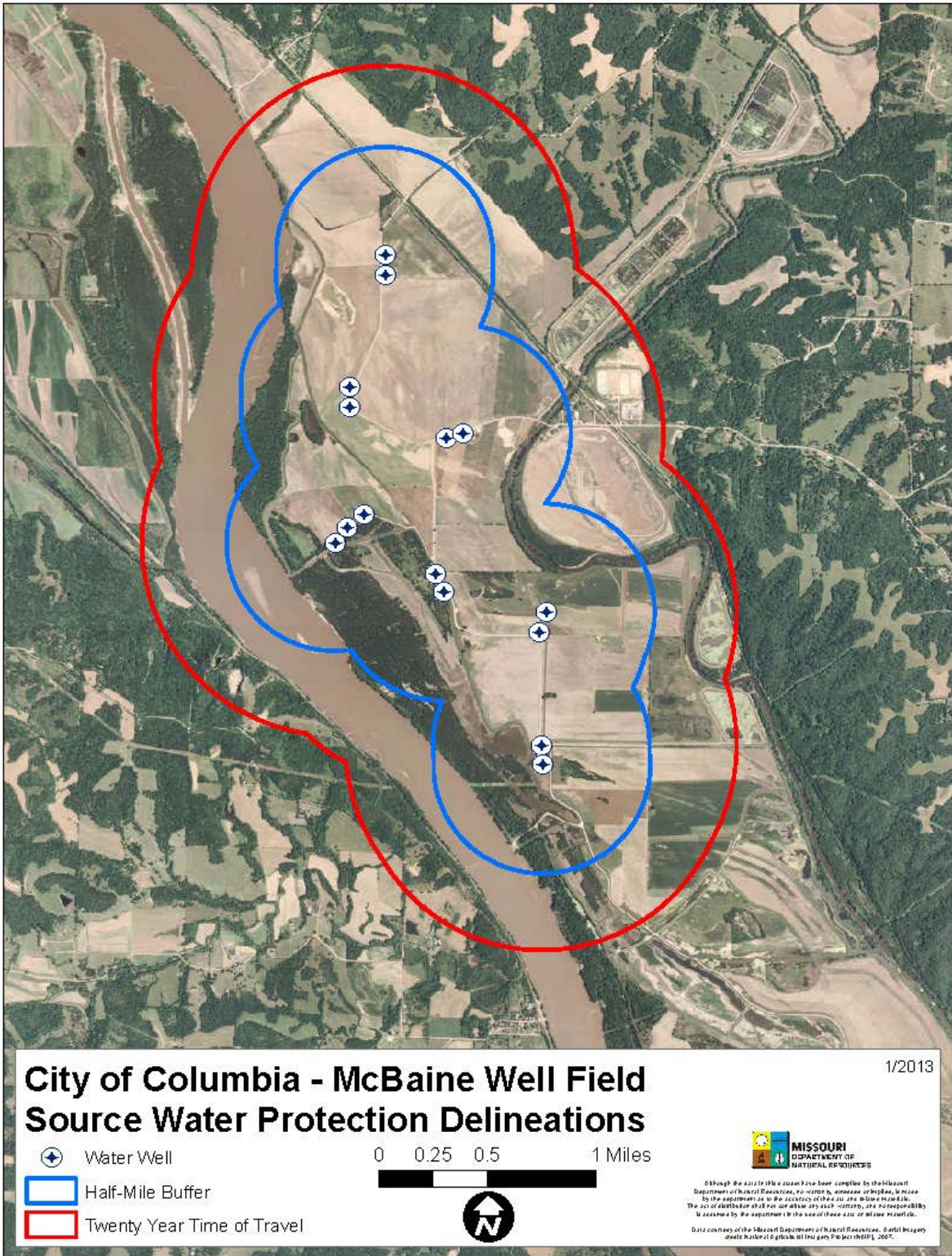


Water and Light Department

David Sorrell



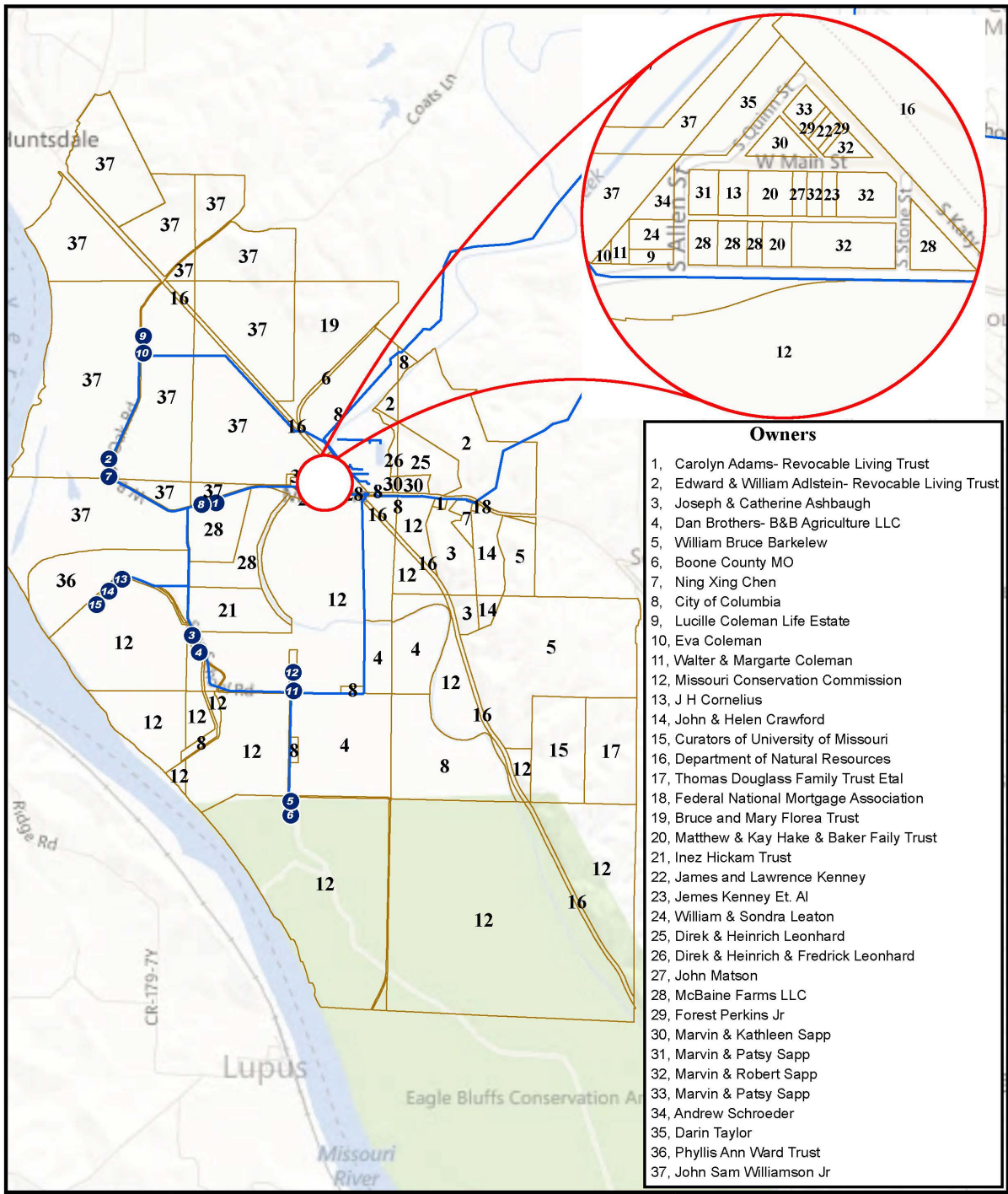
Public Works Department Sewer Utility Manager – City Manager Appointment











- Owners**
- 1, Carolyn Adams- Revocable Living Trust
 - 2, Edward & William Adlstein- Revocable Living Trust
 - 3, Joseph & Catherine Ashbaugh
 - 4, Dan Brothers- B&B Agriculture LLC
 - 5, William Bruce Barkeley
 - 6, Boone County MO
 - 7, Ning Xing Chen
 - 8, City of Columbia
 - 9, Lucille Coleman Life Estate
 - 10, Eva Coleman
 - 11, Walter & Margarte Coleman
 - 12, Missouri Conservation Commission
 - 13, J H Cornelius
 - 14, John & Helen Crawford
 - 15, Curators of University of Missouri
 - 16, Department of Natural Resources
 - 17, Thomas Douglass Family Trust Etal
 - 18, Federal National Mortgage Association
 - 19, Bruce and Mary Florea Trust
 - 20, Matthew & Kay Hake & Baker Faily Trust
 - 21, Inez Hickam Trust
 - 22, James and Lawrence Kenney
 - 23, Jemes Kenney Et. Al
 - 24, William & Sondra Leaton
 - 25, Direk & Heinrich Leonhard
 - 26, Direk & Heinrich & Fredrick Leonhard
 - 27, John Matson
 - 28, McBaine Farms LLC
 - 29, Forest Perkins Jr
 - 30, Marvin & Kathleen Sapp
 - 31, Marvin & Patsy Sapp
 - 32, Marvin & Robert Sapp
 - 33, Marvin & Patsy Sapp
 - 34, Andrew Schroeder
 - 35, Darin Taylor
 - 36, Phyllis Ann Ward Trust
 - 37, John Sam Williamson Jr



McBaine Area Landowners

Parcels and Owner Data Provided by Boone County Assesors Office

January 2013 Sheet 1 of 1

**Produced for City of Columbia
Water and Light Department
Source Water Protection Task Force**

All Wells Located on City Owned Sites

City of Columbia Source Water Protection Action Plan

Priority	Action Item	Timeline	Status	Comments
	Task Force will submit Source Water Protection Plan to Water & Light Department Advisory Board and City Council.	2013		
	Task Force will submit Source Water Protection Plan to the Missouri Department of Natural Resources for its endorsement.	2013		
	Task Force will present the approved Source Water Protection Plan to the Boone County Local Emergency Planning Groups.	2013		
	Task Force will arrange for the mailing of source water protection information to businesses located in the Missouri Department of Natural Resource's delineation areas for the Columbia water operation. Business operations include garages, car and truck dealers, chemical storage areas, shopping malls, chemical sales dealers, and funeral homes.	2013 – 2014		
	Task Force will provide source water protection information to landowners in the McBaine Bottoms and will encourage them to work with the City of Columbia in protecting the quality of our water.	2012-2013		
	Task Force will arrange for the mailing of an informational source water protection brochure, via a bill insert, to all City of Columbia customers.	2013 - 2014		
	Task Force, along with the Columbia Water & Light Department staff, will provide a plan of action for all the old deep wells referenced in the Section 3 of this report. The plan of action will examine the possibility of renovating at least two of the old deep wells for use as additional aquifer and storage wells. Consideration will also be given to the possibility of well renovation and water use for non-drinking purposes such as irrigation and	W&L Budgeting & Scheduling Item		

	street washing.			
	Task Force will work with W&L staff in making a decision about the future plans for the Crump well, Oakview well, Harvester Well, Brown Station School Road well.	W&L Budgeting & Scheduling Item		
	Task Force will work with W&L staff in making plans for the capping, plugging, removal, or renovation of all old deep wells and water district wells.	W&L Budgeting & Scheduling Item		
	Task Force will assist W&L staff in assuring that old deep well #4 at the City power plant and the two storage reservoirs meet all Department of Natural standards for source water protection, even though the operation is not connected to the City's water distribution system.	2013 - 2014		
	Task Force and the Water & Light Department will develop a program that deals Fencing/access control around supply wells; signage indicating possible fines for tampering; County ordinances regarding chemical application; diligent maintenance and inspection of wetland cells; testing of nearby monitoring wells; and modification of City wetlands operation protocols.	W&L Budgeting & Scheduling Item		
	Task Force and the Water & Light Department will post informational signs at the borders of the wellhead protection area in McBaine , at the two aquifer-storage and recovery wells, at all the old deep well sites, and old water district sites.	2013 - 2014		
	Task Force will work the Water & Light Department's staff for a program to sample all McBaine Bottom wells for chloride and total coliforms on a monthly basis.	2013		
	Task Force will contact the Southern Star Central Gas Pipe Line Company and the Magellan Pipe Line Company about the	2013 - 2014		

	importance of source water protection in the McBaine bottoms and emergency reporting procedures in the event of a leak in either of their pipelines in the McBaine Bottoms.			
	Task Force will continue to encourage neighboring water districts and other water providers in the City of Columbia to develop a regional source water protection plan. On-going.	On-going		
	Task Force will examine already existing ordinances and regulations governing operations and businesses that have the potential to contaminate aquifers and make decisions about the need for additional rules and guidelines.	2013 - 2014		
	Task Force will pursue an opportunity to educate children on the importance of source water protection. The Task Force will offer to assist the Missouri Department of Natural Resources and organizations such as the Missouri Water and Wastewater Conference, the Mo. Section American Water Works Association, and the Missouri Rural Water Association in any education projects these groups might be planning for community education.	2013 - 2014		
	Task Force will develop public education material and PowerPoint presentations on the importance of source water protection.	2013 - 2014		
	SWPP will be updated annually by the Task Force and made available to the Missouri Department of Natural Resources every four years or as necessary.	On-going		

APPENDIX 3

Emergency Response/Spills Information

Environmental Spills: Contact #s

Missouri Dept. of Natural Resources (MDNR)

Environmental Emergency Response 24 hr. Spill Line: 573-634-2436

National Response Center Spill Line: 800-424-8802

Boone County Emergency Management: 573-874-7400

U.S. EPA Region VII: 913-281-0991

MDNR Northeast Regional Office: 660-385-800

MDNR Public Drinking Water: 573-751-5331