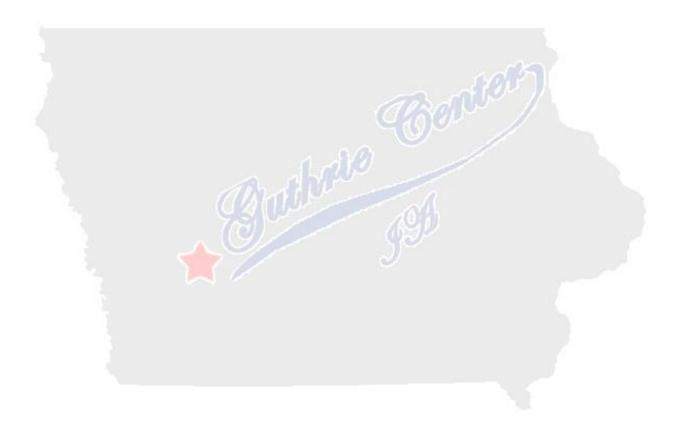


Limitations:



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Definitions:

Alluvial Aquifer: An Alluvial Aquifer is comprised of unconsolidated material deposited by water, typically occurring adjacent to rivers and in buried channels. Alluvial aquifers are generally composed of clay, silt, sand, gravel or similar unconsolidated material deposited by running water.

Alluvium: A general term for unconsolidated sedimentary accumulations deposited by rivers or streams. It includes sediment deposited in riverbeds and flood plains.

Bedrock Aquifer: An aquifer composed of consolidated material such as limestone, dolomite, sandstone, siltstone, shale, or fractured crystalline rock.

<u>Buried Valley Aquifer:</u> An aquifer formed through the filling of valleys by outwash (sand and gravel) prior to or between glacial episodes which may contain artesian pressure.

<u>Capture Zone:</u> a three dimensional area that contributes groundwater extracted by one or more wells.

Glacial Till: Coarsely graded and extremely heterogeneous sediment. Generally, its' content varies from clays to mixtures of sand, gravel, and boulders.

Loess: A loosely compacted yellowish-gray deposit of windblown sediment of which extensive deposits occur throughout lowa.

<u>Nitrate:</u> A salt or ester of nitric acid, containing the anion NO₃. Commonly used in agriculture as a fertilizer.

<u>Plume:</u> An elongated body of groundwater containing contaminants, emanating and migrating from a point source within a hydrogeologic unit.

<u>Stratified Drift Aquifer:</u> An aquifer contained within porous sands and gravels resulting from episodes of meltwater flow during glacial advances and retreats.

Surficial Aquifer: Shallow aquifers that are typically less than 50 feet thick. They mostly consist of unconsolidated sand, gravel, limestone, or sandstone, and are generally under unconfined, or water-table, conditions.



Public Water Supply Contingency/ Emergency Plan Affidavit:

The Safe Drinking Water Act Amendments of 1986 and 1996 established the concept of wellhead protection, and subsequently the Source Water Protection Program. The Program is currently overseen by the Iowa Department of Natural Resources (IDNR) and attempts to prevent potential contaminants from entering source waters and prepare for situations in which drinking water may be impaired through contamination, power outage and treatment or distribution interruptions. In order to ensure a public water supply's preparedness in such events, a Contingency/Emergency Plan has been required in every approved Source Water Protection Plan (SWPP) or Wellhead Protection Plan (WHPP).

Due to recent and growing concerns over water system security and due to many systems having previously prepared such a plan under the provisions of the 2002 Bioterrorism Act, the IDNR is now allowing an affidavit in lieu of a complete Contingency/Emergency Plan within the submitted SWPP/WHPP. Although public water supplies do not need to send IDNR completed plans, each must have an accessible up-to-date plan in case of catastrophic event occurs within their system. It is necessary for the completed water supply Contingency/Emergency Plan to contain the following information, at a minimum:

O Contact Information: Mayor, City Clerk	x, Waste Water Operator
O Contact Information: Power Company, Repair Company	Professional Electrician, Professional Plumber, and Equipmen
O Identify Critical Users of the system and homes, schools, etc.)	d define plan for immediate notification (hospitals, nursing
O Contact Information: Local media, inclu	uding newspaper, radio, and television
O Contact Information: Certified laborator departments and National Guard	ry, local emergency contacts, state and local public health
O Contact Information: IDNR 24-hour em	nergency contact and local IDNR local field office
	the City of Guthrie Center, Iowa, certify that a created for our public water supply system and that this NR upon request.
Signed:	
(Mayor)	
Date:	<u> </u>
Resolution Number:	

A Resolution Adopting the Guthrie Center Source Water Protection Plan (Phase 2)

Whereas, the Iowa Department of Natural Resources (IDNR) has developed a Source Water Protection (SWP) Program for incorporated communities in Iowa, and

Whereas, the City of Guthrie Center applied for, and was awarded funding assistance from the IDNR to participate in the SWP planning process, and

Whereas , a public hearing was held by the Guthrie Center City Council on (date/time) in the City Council building on the proposed adoption of the City of Guthrie Center's Source Water Protection Plan , and

Whereas, the process was guided by IDNR staff, IDNR publications, and a City Source Water Planning Team/ Committee, and

Whereas, the resulting SWP Plan is a policy document that considers the specifics of the City of Guthrie Center, and

Whereas, the SWP Plan has been the subject of, or a discussion item on the agenda of, public meetings, and

Whereas, the SWP Plan is a tool used for protecting the drinking of the City of Guthrie Center, and

Whereas, said plan is in the best interests of the City of Guthrie Center

NOW THEREFORE BE IT HEREBY RESOLV	VED that the C	City Council ap	oproves, adopts,	and submits
the City of Guthrie Center's Source Water Prote	ection Plan (Pl	hase 2) to the I	owa Departmen	t of Natural
Resources for review and consideration this	day of	_, 2017	•	

	(Mayor)	
Date:		
Attest:		
Signed:		
	(City Clerk)	
Date:		

Signed:

Introduction:

Background of Source Water Protection:

In 1974, the Congress of the United States ratified the Safe Drinking Water Act (SDWA) with the goal of providing safe drinking water to residents across the country. The SDWA allowed the Environmental Protection Agency (EPA) to create a drinking water protection program in order to establish standards for water related contaminants. In 1996, Congress amended the SDWA to include awareness of potential biological and chemical threats which have the potential to infiltrate drinking water and negatively affect a population.

In 1998, the Iowa Department of Natural Resources (IDNR) in conjunction with the Iowa Geological Survey began to develop a program to protect drinking water for communities within the State of Iowa. In 1999, the EPA approved the IDNR's new program which focused heavily on wellhead protection. Today, Source Water Protection (SWP) is administered through local contractors and overseen by the IDNR. The Region XII Council of Governments has taken a lead role in Source Water Protection for two communities in West Central Iowa (including Guthrie Center). In regards to SWP, the aim of Region XII is the protection of drinking water for member cities and the continuance of its commitment to environmental integrity.

Image 1: DNR Logo

Image 2: Iowa DNR Source Water Logo



Source: IowaDNR.com



Source: IowaDNR.gov

Purpose of Source Water Protection:

The Source Water Protection Plan for the City of Guthrie Center has been created to safeguard the water quality for the community. To do this the Phase 2 Plan seeks to outline basic information about the area (well-related data, contact information, etc.) with the express purpose of creating an organized approach to alleviate any potential problems posed by the city's water quality.

Source Water Planning Protection Goals for the Community:

- i. Safeguard the health of water users being served by city wells.
- ii. Prevent financial burdens caused by contaminated drinking water.
- iii. Minimize negative effects associated with contaminated drinking water, should it occur.
- iv. Offer public notice of any contamination to those affected, should it occur.
- v. Educate and provide awareness of the effects of drinking water contamination.
- vi. Educate landowners in the capture area of their potential impacts on the community's drinking water sources.
- vii. Encourage Guthrie County to address Source Water Protection efforts countywide (identification of capture zones, planning, and implementation).

City of Guthrie Center Public Water Supply

Location and Basic Information:

The City of Guthrie Center is located in West Central Iowa along Interstate 44, approximately 60 miles west of Des Moines. The city's location in Western lowa can be seen in image 3 (right). The population of Guthrie Center, as of the last Census (2010), was 1,569 constituting 14% of Guthrie County's total population. The wells which provide the city's water are located along 222nd street, just west of town. Guthrie Center's wells can be seen in more detail on page 14. The city's water supply is held in two water towers on the east side of the city near Union Cemetery.

Image 3: Guthrie Center's



Water Supply Information and Background Information:

Guthrie Center currently maintains seven wells which are used in the procurement of drinking water (5 active 2 on standby). Each of the city's active wells are located along the banks of the South Raccoon River. The city's 5 active wells are alluvial, meaning that they are located in sand and gravel deposits which are permeated by water. While alluvial aquifers, and by extension alluvial wells, have many positive attributes there are some negatives

Table 4: Guthrie Center Well Data

Well	Local	Depth	Construction	Status:	Aquifer:	SWL	PWL	Aquifer	Rate
Number	Name	(ft.)	Date:			(ft.)	(ft.)	thickness	(gpm)
								(ft.)	
40044	1	70	1/1/1984	Active	Alluvial	23	40	58	350
40045	2	70	1/1/1984	Active	Alluvial	18	40	42	350
40046	3	70	1/1/1984	Active	Alluvial	8	15	55	320
40042	4	61	11/16/1929	Standby	Dakota	0	0	0	0
40043	5	60	8/4/1941	Standby	Dakota	0	0	0	0
49955	7	75	1/1/1997	Active	Alluvial	22	49	31	360
49956	8	75	1/1/1997	Active	Alluvial	20	47	31	360
Source: G	iuthrie C	enter Ph	ase 1 Plan				•		

associated with them. Perhaps one of the largest negatives for this type of aquifer is its confining layer. A confining layer is a key attribute in negating many types of pollutants. The IDNR has attributed the thin confining layer of Guthrie Center's wells as being a major contributing factor in labeling them "highly susceptible to pollutants". Table 4 (page 11) contains information pertaining to Guthrie Center's seven wells. Given the thickness of the wells confining layer many point, and nonpoint, sources of pollution have the potential to infiltrate the city's water supply. Positive attributes of alluvial aquifers (which can be seen to translate into alluvial wells) include a high Gallons Per-Minute (GPM) rate of flow (though this can vary by aquifer), a fast rate of recharge, and a low susceptibility to certain minerals (due to the amount of time the water is in contact with underlying geologic formations).

The area which feeds into Guthrie Center's wells is known as a capture zone. The area that contributes groundwater to the city has been delineated through computer based modeling software and can be seen in the map on page 14. The capture zone is further broken down based on the amount of time it takes water in those areas to move to the wells. When water, enters these areas it will begin to percolate downward at varying rates depending on the porosity and permeability of the underlying materials. As water enters the aquifer, it will move horizontally from areas of higher hydraulic head to areas of lower head. When wells pump they create what is called drawdown. The suction of water being removed from the aquifer opens up pore spaces which pulls water towards the pump. As the water moves through the capture zone it is cleaned by layers of gravel and sand which act as a natural filter. However, if the water came into contact with a contaminant on the surface it will most likely not be filtered out and may render the water unsafe to drink. This is due to the amount of time the water has spent in the aquifer. If the water were to move more slowly the pollutants, for instance nitrates, would have time to be used up by bacteria residing in the

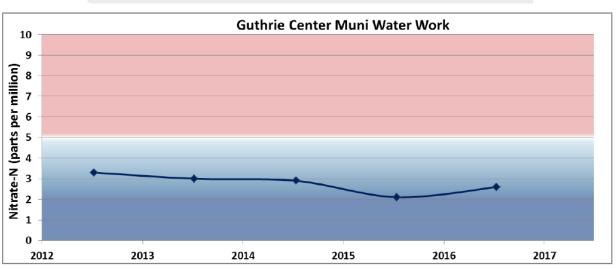


Chart 5: Guthrie Center Nitrate Levels

Source: Guthrie Center Phase 1 Report

soil. In addition, the closer a contaminant is to the well, the sooner it may be drawn in, and there is less time for natural attenuation and dilution to occur.

Nitrates are a form of fertilizer commonly used in crop fields throughout the country. Unfortunately, they have drawbacks for water quality and impact the health of people who drink water inundated with them. Methemoglobinemia, also known as blue baby syndrome, can happen when young children ingest water tainted with high levels of nitrates. Upon ingestion, the nitrates are converted to nitrites. The nitrites react with hemoglobin, in the individual's blood, causing dangerously high levels of methemoglobin. It is the methemoglobin, which decreases the bloods ability to store oxygen giving the skin of those affected a blue tint. Additionally, adults who ingest water inundated with nitrates may suffer liver or kidney damage. The World Health Organization (WHO) has found that 10 Parts Per Million (PPM) of nitrates in water is sufficient to cause bodily harm to a population. The nitrate levels in the wells of Guthrie Center have been fluctuating in recent years. In 2012, nitrates were at a highpoint of 3.2 PPM; however by mid-2015 they had reached a low of 2 PPM. The most recent well data available shows that by mid-2016 the nitrate levels had once again risen to 2.7 PPM. On a well-by-well basis, nitrates vary widely. Between the years 2015-2016, well #1 had the highest levels of nitrates at 6.4 PPM. The well which has had the least amount of nitrate is well#4 (averaging 2.5 PPM). The city has been able to lower their nitrates by selectively pumping wells.





Capture Zone

10-year

2-year

/// 5-year

Surface Runoff Area



Guthrie Center Capture Zones

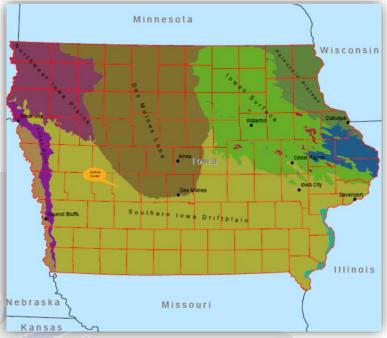
Metadata:

All information contained within this map has been obtained through legal means. Neither the City of Guthrie Center nor Region XII are liable for any misinformation.

Geology:

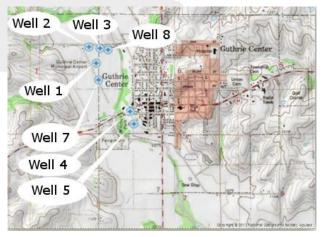
Guthrie Center is located at the northern tip of the Southern Iowa Drift Plain, near its intersection with the Des Moines Lobe. Image 7 (right) shows the seven different landform regions of lowa. The Southern Iowa Drift Plain is composed of sand, gravel, and clay deposited approximately 300,000 years ago. During that time the area, which is now Guthrie Center, was covered by glaciers. It took thousands of years for the glaciers of the Pre-Illinoian Stage to retreat, however their withdraw helped to form a new landscape. Unlike the north-central parts of lowa, where glaciers retreated within the past 10,000-15,000 years, Southern Iowa's Glaciers retreated many thousands of years prior. While much of Northern Iowa was covered by Ice, Southern Iowa was developing a well-defined drainage network which has led to the areas hilly appearance. As rain fell and washed away certain parts of hills, valleys were formed and rivers began to take shape. Most hills in the drift plain share a maximum elevation revealing the height of the landscape during the glaciation. Over the years rivers continued to flood and deposit sediment on their floodplains. Sediment deposited by the rivers is called alluvium and is what the ground under Guthrie Center's wells is composed of. Image 8 (right) shows the topography of Guthrie Center and the location of its wells. The two wells in the southwestern part of the city are no longer active. However, the wells located on the northwestern side of town are presently active.

Image 7: Landform Regions of Iowa



Source: Iowa DNR (modified to show location)

Image 8: Topography of Guthrie Center



Source: Unites States Geological Survey

Hydrology:

Generally, when looking for a site on which to build wells, surveys are done which look into characteristics of the underlying aguifer. There are three common characteristics of aquifers which are considered essential. Firstly, the rate of recharge must be sufficient to sustain the population of the city. In many cases it can take years for groundwater to reach a well. As a result, large populations may require a large area contributing to the recharge of an aquifer or several wells (which may tap into several aquifers). Secondly, it is preferable for aquifers to have a thick confining layer. A confining layer is defined as a continuous layer of low-permeability sediment or rock unit above or below an aquifer. For instance, clay can act as a confining layer (and is common in Iowa). The importance of confining layers lies in their lack of permeability. Pollutants carried by water may be able to infiltrate a drinking water supply. However, if there is a confining layer it inhibits infiltration lowering the likelihood of contamination. Additionally, the thickness of an aquifer's confining layer is important when classifying a well as either deep or shallow. Iowa's Administrative Code (IAC), Chapter 40.2, categorizes aquifers as being either deep or shallow. In order to be considered deep, a well must have a confining layer of low permeability soil or rock at least 25 feet underground with a minimum thickness of 5 feet. A well which does not meet the previously mentioned criteria (a confining layer 5 feet thick 25 feet below ground), is considered shallow. Guthrie Center's wells are not considered to be deep and as such are more susceptible to contaminants. Thirdly, and perhaps of the greatest importance, is water quality. Before a well is drilled, the quality of its water must be discerned. Certain minerals and particulates found in varying quantities and concentrations within aquifers can have a negative impact on the human body. For instance, lead deposits (sometimes present in the underlying geology of an aquifer) can contribute to poor water quality and have a negative impact on the health of citizens who drink water contaminated with it.

Throughout the State of Iowa, groundwater is the preferred means of obtaining drinking water. In fact, 79% (according to statistics from the Iowa DNR, 1995) of Iowa's drinking water is obtained through groundwater. The state has four major bedrock aquifers (Cambrian/Ordovician, Silurian/Devonian, Mississippian, and the Dakota) and three types of surficial aquifers (Alluvial, sand and gravel, and Loess Till Contact Aquifers). The following section will delve into terminology and background information pertaining to types of aquifers found in Iowa and some of their basic characteristics.

Surficial, or shallow, Aquifers are the most common category of aquifer used for drinking water in the State of Iowa. These aquifers are commonly found along the banks of current and ancient waterways. Surficial Aquifers are usually composed of sand and gravel, but can also reside within shallow bedrock. Most types of surficial aquifers do not possess a

thick confining layer which increases this categories susceptibility to pollutants. Surficial aquifers are further subcategorized into three types: Alluvial, Sand and Gravel, and Loess-till contact.

The most common type of surficial aguifer is known as an alluvial aguifer. This type of aquifer is categorized by the material of which it is composed. During wet years rivers flood and leave sediment on their banks, it is this sand and gravel which composes alluvial aquifers. The composition of alluvial aquifers dictates their location. As can be seen in image 9 (right), these aquifers are only found along the banks of rivers and streams. The drinking water quality of alluvial aquifers varies depending upon depth, the thickness of its confining layer, and overlying material (sand and gravel). Alluvial aguifers generally have a thin layer of impermeable material which mantles them. This lack of a thick confining layer allows water to move downward more quickly than it otherwise would contributing to a

Image 9: Alluvial Aquifers of Iowa



Source: University of Iowa

quicker recharge time and increasing the chance of pollutant infiltration.

The second type of surficial aquifer is known as a buried sand and gravel aquifer. lowa's buried sand and gravel aquifers were formed during the end of the last ice age (Pleistocene). As the glaciers retreated they deposited what's known as drift which is composed of pebbles, clay, and sometimes gravel. Glacial drift deposits are located throughout the State of lowa and can range in depth from 0' to 600' deep (dependent on location). In the midst of glacial retreat, melt water entered varying layers of drift and became trapped by new layers of glacial till creating buried sand and gravel aquifers. In the present day, buried sand and gravel aquifers are commonly found beneath upland landscapes that separate river valleys. Drinking water suitability varies depending upon location, pollution, and mineralization. The flows from these aquifers can be unpredictable and may yield anywhere from 10 GPM to greater than 90 GPM. The depth of wells which draw from drift are normally between 50' and 200', however some can be over 400'.

The third type of surficial aquifer is known as a Loess-Till Contact Aquifer. This type of aquifer is not used by any cities in lowa due to its low productivity. This type of aquifer is extremely shallow and prone to pollutants. They work by collecting water that percolates through loess, which is an un-stratified geologically recent deposit of silty or loamy material. Throughout much of the State of lowa loess lies above glacial till. Upon seeping through the

first layer of soil (loess) the water becomes concentrated above the less permeable glacial till. The water is then collected in large diameter seepage wells. The production of this type of aguifer is generally very low (1-3 GPM is normal). Yet, in spite of their meager production and susceptibility to pollutants these aguifers can, at times, be the best option. Loess-Till Contact Aquifers do not have a confining layer. These aquifers exist in highland areas and may have high nitrates and poor water quality

(dependent on land use and other variables) due to the amount of time the water was in contact with the surface and underlying geologic material.

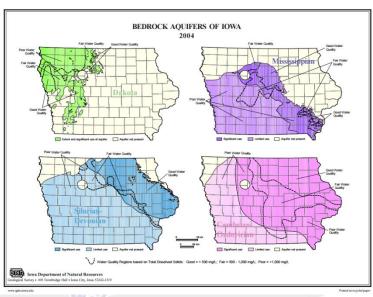
The second category of aquifers found in Iowa are Bedrock Aguifers. rock layers such as limestone, dolomite, and sandstone. The total thickness of sedimentary rock layers (in Iowa) ranges from 5,200' in Southwest Iowa to approximately 800' in Northeast Iowa. There are four primary bedrock aquifers in the state, each named after the era in

These aguifers occur within sedimentary

which the bedrock was created. For instance, the rock, which holds the Mississippian Aquifer, was created during the Mississippian Era Source: University of Iowa (also known as the Lower Carboniferous)

which occurred between 358.9 to 323.2 million years ago. In spite of this type of aguifer having a thick confining layer, their water quality varies widely based on minerals and a number of other factors. Water quality in these aquifers is localized, meaning that in different locations the quality of water might not be reflective of other areas within the same aquifer.

Image 10: Bedrock Aquifers of Iowa



Source Water Protection Plan:

Source Water Area:

The City of Guthrie Center has been taking proactive measures to safeguard their water supply. The primary location for most enacted measures is the 2-year capture zone (depicted in the map on page 80). The capture zones, which have been delineated by the IDNR, are located directly west of the city along 222nd street. To the east, the capture zones include the South Raccoon River and some facilities located along North 1st Street. Most proactive measures taken by the city include aspects which help to safeguard the water supply from nitrates and agricultural chemicals. As agriculture is the primary land use for the majority of the Source Water Area (which includes the 2, 5, and 10-year capture zones) measures inhibiting nitrates and other farm related chemicals may prove to be warranted. The site which hosts the city's wells has historically been farmland. However, during the latter half of the twentieth century the Guthrie Center Municipal Airport was located in the capture zone (in this case, the two year capture zone). This airport has been closed and a new one opened in 1992. The new airport is located 3 miles east of Guthrie Center. Maps depicting changes to the land use of the capture zones from 1930-1990 can be seen on pages 85-87.

Potential Sources of Contamination:

Given previously discussed information pertaining to Guthrie Center's wells and their characteristics, there are a number of potential contaminants, which could have a negative effect on the city's drinking water. The lowa DNR has conducted a database pull, which has allowed them to access data pertaining to the locations of potential contaminants from several sources. From there, the DNR conducted a process of ranking the contaminants. The system of ranking takes into account land use, location, and contamination potential. The potential of identified structures to impact the city's water quality varies between the capture zones. For instance, potential sources of contamination in the 2-year capture zone are normally a greater threat than those located in the 5 or 10-year zones. This is due to the short time necessary for a contaminant to move through the capture zone and end up in the city's drinking water. Conversely, potential contaminants in the 10- year capture zone are normally given a low ranking. Additionally, in order to increase the accuracy of the process both businesses and citizens were asked to identify potential contaminants located within the capture zones throughout the drafting of the phase 2 plan.

Presently, there is one main source of potential contamination in the 2-year capture zone. As can be seen in the map on page 82 of the appendix, a portion of the 2-year capture zone's land use is row crop. It is this land use which has perhaps the greatest potential to

contaminate the wells. There are a total of 97 acres in the 2-year capture zone. Of which, 29.7 acres (accounting for 30.7% of the total land use) are used for row crop agriculture. The existence of row crops in the capture zone increases the risk of contamination from agricultural chemicals during the application of pesticides or fertilizers. However, in order to mitigate potential issues the city maintains a 200-foot zone of control around their wells. In addition, local farmers who plant crops in the capture zone have begun using cover crops to lower soil erosion, potential for contamination, and to fix any nitrogen deficiencies in the soil (land using cover crops can be seen in the map on page 89). Additional land use allocations can be seen in chart 11 (below).

Chart 11: Land Use by Capture Zones

Capture Zone**	Row	Alfalfa**	Grassland**	Developed	Forested	Wetland**	Total Acres*
	Crop**			Areas**	Areas**	40	
2-year	30.7	23.3	35	4.6	5.9	.2	97
5-year	50.3	11.3	17.1	6.5	13.7	0	65
10-year	49.9	6.6	12.6	9.4	17.1	0	148
Surface runoff	82.5	1.2	8.4	.2	3.9	0	263
area							

*In Acres

Source: Guthrie Center's Phase 1 Plan

The 5-year capture zone covers an area of 65 acres and crosses the South Raccoon River. Similar to the aforementioned capture zone (2-year capture zone) the land use, which makes up the largest contingency in the 5-year capture zone is agriculture that accounts for 50.3% of total land use. This area also incorporates forestland, which is found along the banks of the river (accounting for 13.7% of total land use). There are two primary concerns related to contaminants in the 5-year capture zone. Firstly, agricultural chemicals are commonly used in the area and do represent a threat to drinking water. However, risk is lessened due to a greater amount of time needed for water to travel from its point of deposition to the wells, allowing a portion of contaminants to attenuate. Secondly, the edge of the capture zone crosses the property line of Helena Chemical Co.'s Facility on North 1st Street. This facility is known to have had a hazardous materials spill in the past. Helena's chemical spill took place July 24, 2009. At which time, contaminants were leaked onto the ground and allowed to permeate the soil. Fortunately, Helena Chemical and the lowa DNR have mitigated the majority of the threat. The extent of environmental damage caused by the spill is a small plume which has permeated the underlying soil, but has limited risk for infiltrating the city's wells. A map depicting the potential contaminants of the 5-year capture zone can be seen on page 88 of the appendix. Additionally, the city has worked with local landowners to aid in

^{**} Percentage

mitigating risk posed by land cover in the area. For instance, the use of cover crops is widely encouraged.

The 10-year capture zone contains sites which could potentially be detrimental to aguifer health and relate to not only agriculture, but business and industry as well. High-risk sites that relate to business and industry are of particular importance as they may create a plume. A plume is defined as an elongated body of groundwater containing contaminants, emanating and migrating from a point source within a hydrogeologic unit. For instance, Helena Chemical Company's hazardous materials spill created a plume. Once created, a plume may infiltrate a well through drawdown. Pollutants which have infiltrated a well will have varying impacts on the health and wellbeing of any community which draws water inundated with them. In addition, the 10-year capture zone also contains many fields which, similar to the 2 and 5-year capture zones, increase the risk for negative side effects to the aquifer. A map depicting the potential contaminants of the 10-year capture zone can be seen on page 88. Many mitigation measures in the 10-year capture zone are the same as the 2 and 5-year capture zones. For instance, the use cover crops is becoming more common throughout the area. Additionally, all businesses which have experienced a Leaking Underground Storage Tank (or have an Underground Storage Tank), a hazardous materials spill, or facilities, which are used for tier 2 chemical storage, have taken measures to ensure compliance with environmental regulations and worked to reduce their risk of future environmental degradation. As can be seen in the map on page 88, (an updated version of the map on page 81) there are presently only two non-agricultural sources of pollution located in the capture zone (Helena Chemical Company and a Metal Storage Facility).

Action Plan:

The City of Guthrie Center is responsible for final decision making on all aspects of the Source Water Protection Plan. In addition, the city will be responsible for any updates to the plan made in the future. The action plan contains steps taken by the city to proactively mitigate groundwater contamination. The following section has been broken down into three categories: local government, land/homeowner action, and education/outreach. If any technical assistance is needed the city will contact either Region XII COG or the lowa DNR.

Local Government Action:

Importance:

Any actions regarding the mitigation of groundwater contaminants taken by the City of Guthrie Center are part of the Local Government Action section. The action and cooperation of the involved parties is largely hinged upon local government, as it has the power to create codes and take proactive measures to aid in mitigating risk.

Contact: Erick Van Cura, Water Superintendent

Email: utilware@gmail.com

Phone Number: (515)-332-2164

- 1. Conduct Ongoing Monitoring of Each of Guthrie Center's Water Supply (wells): The City of Guthrie Center tests each of its' wells on a monthly basis. Tests include basic information for each well including nitrates, drawdown, and Galloons Per-Minute (GPM) of flow.
- **2.** Work with Water Conservation District: This step will be taken upon the creation of the water conservation district.
- 3. Adopt, Update, and Maintain Guthrie Center's

 Source Water Protection Plan: Upon adoption by the city, the Source Water Plan must be updated each year to ensure its viability. Updates to the Source Water Plan

are to be conducted by the Region XII Council of Governments and reviewed by the Iowa DNR.

4. <u>Use Gates to Limit Access to the Well Field:</u> As a proactive measure, Guthrie Center has begun using gates to limit access to the well field (as can be seen in Image 12).

Image 12: gates at the source water area



Source: Region XII Photo Archive

- 5. <u>Install Signs Warning Signs in the Well</u>
 <u>Field:</u> The City of Guthrie Center has installed signs warning visitors that it is unlawful to tamper with the well field. (as can be seen in Image 13).
- 6. **Join Alert Iowa:** Alert Iowa is a mass notification system for emergencies throughout the state. The system can be used by state and local governments to pass information to their citizens in times of crises. The City of Guthrie Center has joined Alert Iowa.
- 7. Construct a Security Fence around the Water

 Tower: Many towns around the State of Iowa have built security fences around their water towers to ensure safety from trespassing or tampering. The

Image 13: Warning Signs located at the entrance to the Source Water Area.



Source: Region XII Photo Archive

- City of Guthrie Center is applying for a grant through the Department of Homeland Security to ensure that only city staff may enter the perimeter around the tower.

 Acquire Land Surrounding Weller The City of Guthrie Center currently owns and
- **8.** Acquire Land Surrounding Wells: The City of Guthrie Center currently owns and maintains the land which constitutes the well field (a map depicting land ownership can be seen on page 89).
- **9.** Smoke Blowing to Check Sewer Infrastructure: The City of Guthrie Center has used smoke blowing as a means to identify leaks in their sewer infrastructure.
- **10.** <u>Monitor Water Distribution System:</u> In order to prevent the loss of water the city will continually check the water distribution system.

Chart 14: List of Local Government Activities and their status.

Activity:	Status:	Date:
1.Conduct Ongoing Monitoring of Guthrie Center's Water Supply (wells)	Ongoing	Ongoing
2.Work with Water Conservation District (upon creation)	-	
3.Adopt, Update, and Maintain Guthrie Center's Source Water Protection Plan	-	1990's
4.Use Gates to Limit Access to the Well Field	Completed	December 2015
5.Install Signs Showing the Well Area	Completed	December 2015
6.Join Alert Iowa	Completed	2016
7. Construct Security Fence Around the Water Tower	Grant is being applied for	Ongoing
8. Acquire Land Surrounding Wells	Completed	1980's
9.Smoke Blowing to Check Sewer Infrastructure	Completed/Ongoing	2005-present
10. Monitor Water Distribution System	Ongoing	Ongoing

Land/Homeowner Action:

Importance:

A number of Source Water Team (SWT) Members are Land/Homeowners in the Source Water Area. As the Source Water Program is a voluntary arrangement, the assistance of landowners in the implementation of the Phase 2 Plan is imperative.

Contact: Erick Van Cura, Water Superintendent

Email: utilware@gmail.com

Phone Number: (515)-332-2164

- 1. Plant Cover Crops to Aid in Denitrification: This aspect of the plan was brought to the attention of the SWT through a guest speaker. It was then reported that cover crops have been being planted on land owned by the city which surrounds all of the active wells and has had a positive effect on soil erosion and likely some aspects of denitrification (though this correlation cannot be proven at this time). Land on which cover crops are planted can be seen in the map on page 89, as those used for hay production.
- 2. Work with Private Well Owners to Ensure All Abandoned/Unused Wells are

 Capped/ Plugged in the Capture Zone: Concerns regarding the proper capping of the
 Source Water Area's Wells was brought to the attention of the SWT through one of its
 members. It was later found that all abandoned wells in the Source Water Area have
 been properly capped/ plugged. However, as time goes on and more people move to the
 area it is imperative for the future of Guthrie Center's clean drinking water to continue
 properly capping abandoned wells.
- **3.** Work with Landowners to Protect Water Sources: Future wellhead planning will require the assistance of local landowners. As this program is entirely voluntary, their assistance and knowledge have and will continue to contribute to the future of planning in the Source Water Area.
- **4.** <u>Properly Maintain Septic Systems:</u> In order to limit the exposure of the water table to sewage, landowners in the Source Water Area must properly maintain their septic systems.
- 5. <u>Proper Disposal of Harmful Materials:</u> Land Owners in the Source Water Area will properly dispose of harmful materials which have the potential to be detrimental to the city's water supply.

Chart 15: List of Land/Homeowner Activities and their status.

Activity:	Status:	Date:
1.Plant Cover Crops to Aid in Denitrification	Completed	1998
2.Work with Private Well Owners to Ensure	Ongoing	Ongoing
All Abandoned/Unused Wells are Capped/Plugged in the Capture Zone	(00)	
3. Work with Landowners to Protect Water	Ongoing	Ongoing
4. Proper Septic System Maintenance	Ongoing	Ongoing

Education and Outreach:

Importance:

Education and outreach took place throughout the drafting of the Source Water Plan. During each meeting a speaker was introduced and spoke about a topic of the Source Water Team's choosing. These topics ranged from land use and agrichemicals effects on underlying aquifers to negating nitrates through wetlands. Additional actions included public speaking events and presentations. Education and outreach holds the potential to increase public opinion and activism in defense of clean drinking water.

Contact: Evan Sinnott

Email: esinnott@region12cog.org

Phone Number: (712)-792-9914

- 1. <u>Inform Landowners of the Positives of Sustainable Farming:</u> Landowners in the Source Water Area were shown the positives of sustainable farming and given a brief overview of some sustainable practices through Iowa State University's Education and Outreach Program.
- 2. <u>Inform Landowners of Land Uses Effect on Contaminant Levels:</u> This information was given to the Source Water Team through a presenter. Additionally, experiences pertaining to this topic were given by local landowners.
- 3. Add Source Water Information to the City Website: Information about the Source Water Program has been added to the city's website. This mainly includes basic information such as what Source Water Protection is and how it works (information from the website can be seen on page 111).
- 4. <u>Have a Booth at the Guthrie County Fair Discussing Source Water Protection:</u>
 Members of the Source Water Team staffed a booth at the Guthrie County fair to raise awareness about SWP. Additionally, a model was contributed by the Iowa DNR to show the effects of contaminants on aquifers.
- 5. Inform Landowners of Potential Grants which could be used to pay for the Proper Capping of Wells: A member of the Source Water Team brought to light information about grants which will help to pay for the capping of wells. The grant is available through the Grants-to-Counties Program which is funded through the Groundwater Protection Act.
- **6.** Inform Landowners of Grants which Could Pay for Part of the Expense of Planting Cover Crops: While drafting the Phase 2 Plan it was discovered that there are grants to assist in the planting of cover crops. This information was relayed to the Source Water Team.

- 7. Give a Presentation at Guthrie Center High School Regarding Source Water Protection: A representative from the Source Water Team presented to several classes at Guthrie Center High School. Topics discussed included stream order, basic stream morphology (how depth is of the utmost importance when figuring stream velocity), plumes, and the significance of nitrate runoff. The presentation can be seen on pages 93-108.
- **8.** Check with Local Business Owners Pertaining to Contamination: A Source Water Team Member drove to and checked with each of the businesses in the 5 and 10-year capture zones. It was found that all of the businesses in the previously described areas had taken steps to mitigate any contamination. A map showing the sites of contaminants can be seen on page 88.
- 9. <u>Inform Local Landowners about the Conservation Reserve Program (CRP):</u>
 Local landowners have been informed about the conservation reserve program, its benefits, and additional financial offerings which they qualify for based on their lands location in the capture zone.
- **10.** Online Chart: In order to communicate information between members of the Source Water Team an online chart is being created.

Chart 16: List of Education and Outreach Activities and their status.

Activity:	Status:	Date:
1.Inform Landowners of the Positives of Sustainable Farming	Ongoing	Ongoing
2.Inform Landowners of Land Uses Effects on Contaminant Levels	Ongoing	Ongoing
3.Add Source Water Information to the City Website	Completed	July 2017
4.Have a Booth at the Guthrie County Fair Discussing Source Water Protection	Completed	September 2017
5.Inform Landowners of Potential Grants which Could be Used to Pay for the Proper Capping of Wells	Complete	February 2017
6. Inform Landowners of Grants which Could Pay for Part of the Expense of Cover Crops	Complete	December 2016
7. Give a Presentation to Guthrie Center High School Regarding Source Water Protection and Chemicals Effects on the Human Body	Complete	May 2017
8.Inform Land owners about the CRP Program	Complete	July 2017
Online Chart	In progress	December 2017

Partners and Their Responsibilities:

City of Guthrie Center:

The City of Guthrie Center is responsible for decision making on all aspects of the Source Water Plan. The city will implement the plan over the following years. If technical assistance is needed, the city will contact either the lowa DNR or Region XII Council of Governments.

Contact: Erick Van Cura, Water Superintendent

Email: utilware@gmail.com

Phone Number: (515)-332-2164

Guthrie County Emergency Management (GCEM):

GCEM is responsible for supplying emergency contact information for the City of Guthrie Center's Source Water Area. In addition, GCEM is responsible for administering the Alert Iowa system in the area.

Contact: Robert Kempf, Adair and Guthrie County Emergency Management Coordinator

Email: ageema@guthriecounty.ls

Phone Number: (515)-332-2164

Iowa Department of Natural Resources:

The Iowa DNR works with the City of Guthrie Center to ensure that its' drinking water meets state and federal standards. In addition, they provide technical assistance and have completed an update to the city's phase 1 plan.

Contact: Chad Fields, Geologist Iowa DNR

Email: chad.fields@dnr.iowa.gov

Contact: Bob Rowden, Geologist, DBA, technical assistance Source Water Program

Email: robert.rowden@dnr.iowa.gov

Contact: Jeff Vansteenburg, Source Water Coordinator

Email: jeff.vansteenburg@dnr.iowa.gov

Region XII COG:

Region XII Council of Governments is responsible for the development of the phase 2 plan and certain technical aspects of the planning process. In addition, they will provide educational services and do research regarding the Source Water Area and its wells, if required by the city.

Contact: Evan Sinnott, Regional Planner/GIS Technician

Email: esinnott@region12cog.org

Phone Number: (712) 792-9914

Iowa State University Education and Outreach (ISUEO):

Throughout the planning process ISUEO presenters were instrumental in supplementing material at all source water meetings. ISUEO is responsible for supplying presenters and helping supplement knowledge of certain aspects of the area.

Contact: Shawn Shouse, Iowa State University

Email: sshouse@iastate.edu

<u>United States Department of Agriculture (USDA)/ Natural Resources</u> Conservation Service (NRCS):

The USDA is responsible for administering the Conservation Reserve Program (CRP). Additionally, team members associated with the NRCS (which is part of the USDA) have given insight into programs which help with the procurement of seeds for cover crops.

Contact: Jeffrey Collins, USDA NRCS District Chair

Phone Number: (641) 332-2812

Appendix:

Appendix A:

Iowa DNR Phase 1 report

Municipal Water-Supply Inventory

Water Supply Survey

Source Water Team Contact Information

Community Contact Information



Source Water Assessment for Guthrie Center (PWS# 3937016) Alluvial Aquifer



Source Water Protection

The purpose of this Source Water Protection (SWP) "Phase I" assessment is to:

- Define your source water area and susceptibility;
- locate, inventory, and rank potential contaminant sources within your source water area;
- provide the results to the public for improved protection of your drinking water.

Introduction

This Source Water Protection (SWP) "Phase I" assessment is meant to provide information and be used as a tool to help protect the quality and quantity of your drinking water. Within it you will find an inventory of your wells, tables showing potential contamination sources within your source water area, and maps showing your system's source water information.

The source water area defined in this report is the region directly linked to your water supply, and where land use changes have the greatest influence on your drinking water quality. Your source water area was defined based on scientific information available to the lowa Department of Natural Resources (IDNR – Source Water Protection Program).

This "Phase 1" source water assessment by no means protects your drinking water. To protect your drinking water your system should develop

and implement a Source Water Protection Plan. Protection measures are different for each system, but commonly include reserving areas for future wells, cleaning up contaminants, and converting portions of your source water area to native vegetation. Further information on how to protect your drinking water, including a guidebook, workbook and GIS resources, can be found at www.iowasourcewater.org.

This SWP assessment includes the following sections:

- 1. Defining Your Source Water Area
- 2. Susceptibility of Your Source Water Area
- 3. Contaminant Sources within Your Source Water Area
- 4. Ranking Contaminant Sources
- 5. How to Protect Your Drinking Water
- 6. Consumer Confidence Report

Section 1: Defining Your Source Water Area

Accurate well, aquifer, and pumping information is critical to providing the best estimate of your source water area. According to our records, Guthrie Center has five active public wells open in the sand and gravel of the South Raccoon River Alluvial aquifer. The table below shows your well and aquifer information. If you believe the table is wrong, please contact the Source Water Protection Program at www.iowasourcewater.org or 515-725-8332.

W#	Local Name	Depth (ft.)	Const. date	date Status Aquifer		SWL (ft.)	PWL (ft.)	Aquifer thickness (ft.)	Rate (gpm)
40044	#1	70	1/1/1984	Active	Alluvial	23	40	58	350
40045	#2	70	1/1/1984	Active	Alluvial	18	40	42	350
40046	#3	70	1/1/1984	Active	Alluvial	8	15	55	320
40042	#4	61	11/16/1929	Standby	Dakota	0	0	0	0

Lowa	n De	nart	ment	of Na	tural	Resources	:							Раде	1
				,				1	177.0	-1	8	1	17.0	-	8

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40043	#5	60	8/4/1941	Standby	Dakota	0	0	0	0
49955	#7	75	1/1/1997	Active	Alluvial	22	49	31	360
49956	#8	75	1/1/1997	Active	Alluvial	20	47	31	360

Source Water Glossary

Aquifer: An underground waterbearing layer that provides a usable quantity of water.

Source Water Area: An estimation of the area contributing water to your public wells.

Capture zone: A computer modeled source water area, typically using 2-5-and 10 year time of travel periods.

Time of travel: A duration of time specified to determine the distance and area that water will travel.

Susceptibility: A measure of an aquifer's potential to become contaminated. Does not imply either good or poor water quality.

Confining layer: A layer of material which slows the movement of water.

Sufficient information was available concerning your wells, aquifer and pumping conditions to produce a computer modeled estimate of your source water area. For your water supply, the source area was divided and prioritized to show where we estimate groundwater to flow during "time of travel" periods; typically 2, 5, and 10-years. These source areas for your facility were estimated using an analytical element model for the purpose of delineating source water protection areas. The model requires certain input data for your aquifer, wells, and pumping rate, described below:

•Gradient: 0.001 ft./ft. •Flow Direction: unknown •Porosity: 0.25 •Transmissivity: 4,800 ft.2/day •Aquifer Thickness: 43 ft. •Average Gallons per Day: 352,000.

In addition to the delineated groundwater area, surface runoff areas from streams that contribute to the groundwater capture zone were also delineated. Spills and other uncontrolled runoff have the potential to migrate through gullies, tributaries, or drainage tiles and infiltrate into the aquifer in the floodplain.

Section 2: Susceptibility of Your Source Water Area

Research by the <u>lowa Geological Survey</u> has determined that thickness of confining layers such as till, clay, and shale between the aquifer and the land surface is inversely related to aquifer susceptibility. Aquifers overlain by thicker confining beds are less susceptible to contamination than aquifers overlain by thin confining beds. The table below summarizes

susceptibility by confining layer thickness.

Confining layer thickness Susceptibility designation

<25 feet Highly susceptible
25 to 50 feet Susceptible
50 to 100 feet Slightly susceptible
>100 feet Low susceptibility

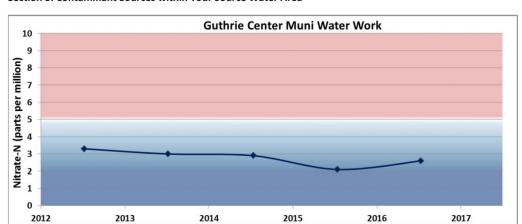
Based on our data, your wells have a cumulative confining layer thickness of less than 25 feet. Your aquifer was therefore determined to be highly susceptible to contamination from the land surface.

Another method for determining the susceptibility of your aquifer is by using nitrate concentrations in well water to evaluate the potential for contamination from the land surface. Wells that are less protected from contamination near the land surface typically have higher nitrate concentrations than wells that are more protected from contamination near the land surface. Based on our records, finished water at Guthrie Center has a six-year average nitrate-N concentration of 2.8 parts per million (ppm), based on 5 total samples.

Nitrate concentrations in your public water supply are generally medium. Elevated nitrate concentrations can disrupt the electron transport system and cause methemoglobinemia, or blue baby syndrome, in infants.

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Section 3: Contaminant Sources within Your Source Water Area

To identify potential contaminant sources we searched electronic databases for facilities and land uses that fell inside your source water area. The databases used for the inventory are described in step 3 of the lowa Source Water Protection <u>Guidebook</u>. The contaminant source inventory includes facilities and land uses that have been known to contaminate groundwater.

Table 1 lists the potential contaminant sources we found in your source water area. The map numbers correspond to the contaminant source list in Table 1. The potential contaminant sources are derived from databases that have varying degrees of locational accuracy, and therefore could be located in the wrong area or omitted from the map entirely. For this reason, locational accuracy is noted at the end of the table. You or other residents may be aware of additional contaminant sources that should be included, feel free to modify this report to reflect your knowledge.

For many aquifers, particularly those overlain by thick confining layers, the greatest threat of contamination to the aquifer is through existing wells that penetrate the confining layers. For this reason, Table 2 lists all known wells, owners, and locations identified in your source water area. A numbered symbol shown on the map at the end of this report identifies well locations. Well locations are derived from databases that have varying degrees of accuracy, and therefore could be mapped in the wrong area or omitted from the map entirely. For this reason, locational accuracy is noted at the end of Table 2.

In addition to the specific "point" sources listed in Table 1, nonpoint sources of contamination also exist in your source water area. In lowa, a potentially significant nonpoint source of contamination is row crop agriculture. Land use percentages and acreages are presented in Table 3.

Section 4: Ranking Contaminant Sources

We have attempted to prioritize the relative risk to your source water based on a three component ranking system; 1) the location of the potential contaminant source in the source water area, 2) the susceptibility ranking of the aquifer to contamination, and 3) the type of contaminant source. Points are assigned for each category and a cumulative score calculated for each potential contaminant source using the scores for each of the three components. Higher numbers always correspond to higher risk in this report.

1) Location of potential contaminant sources

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Your potential contaminant sources are ranked from 1-3 based on the capture zone they are located in, with greater weight given based on proximity to the well. Fixed radius capture zones also received greater risk as they represent unknown or poorly known hydrogeologic conditions. The table below shows the risk score assigned to each source water area.

Source Water Area	Risk score
2-year time of travel, hydrologic boundary, fixed radius, 1-mile, modified karst - high	3
5-year time of travel, modified karst – medium	2
10-year time of travel, aquifer retrieval area, surface runoff area	1

2) Aquifer susceptibility to contamination

Susceptibility rankings were given scores to give more priority to aquifers with less confining layer thickness. Aquifer susceptibilities were given ranks of 1-4, from low susceptibility to highly susceptible. If your well depth or confining layer thickness is unknown, the source water area was automatically designated as "highly susceptible" and ranked 4.

3) Land-use type

The land-use type combines the potential for different facility classes or land uses to release contaminants with an estimate of the toxicity of the contaminants that may be released. Land-use risks are assigned values from 1 to 5 (least to greatest risk).

The final "Risk Score" for the source water area is the result of summing the three components of relative risk. For a list of land-use types and additional information regarding the ranking classification, please refer to the Iowa Source Water Protection <u>Guidebook</u>.

The goal for ranking potential contaminants is to provide your system with a list to help prioritize potential risks. These risks can only be addressed through local initiatives and strategies started by your community. To begin a SWP plan, it is up to your local community to decide which potential contaminant sources carry the most risk, and to proactively engage problems you find that may affect your drinking water. The risk rankings provided in this report are only a guide; the final decision on the priority of potential contaminant sources rests with your local source water protection team.

Section 5: How to Protect Your Drinking Water

This Source Water Phase I assessment only provides information on your source water area and contaminants. Your community is responsible for taking the necessary action to ensure you have clean drinking water for future generations. To do this the Iowa Source Water Program strongly encourages you to start a Source Water Protection Plan. A SWP plan is different for each community, but the steps needed to complete one are the same for every system. Most steps have already been outlined and partially completed in the SWP "Phase 1" assessment:

Steps for completing a Source Water Protection plan

- Step 1: Organize a source water team
- Step 2: Identify your source water areas
- Step 3: Inventory well and contaminant sources
- Step 4: Assess and rank contaminant sources
- Step 5: Develop an action plan
- Step 6: Construct or update your emergency response plan
- Step 7: Submit and Implement your SWP Plan

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owa Source Water Protection Program

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If your community is interested in protecting your drinking water, there are plenty of free resources available to help guide you through this process. www.iowasourcewater.org has many online resources available, including a detailed guidebook and workbook created for lowa community water supplies. Please contact Rebecca Ohrtman (515-725-8332) of the Source Water Program for further information.

Section 6: Consumer Confidence Report

As the agency responsible for conducting drinking water programs in the state of lowa, IDNR must provide each public water supply with language to be included in their Consumer Confidence Report regarding source water protection. The following language, at a minimum, must be included in each Consumer Confidence Report you produce from now on:

"The Guthrie Center water supply obtains its water from the sand and gravel of the South Raccoon River alluvial aquifer. The alluvial aquifer was determined to be highly susceptible to contamination because the characteristics of the aquifer and overlying materials provide little protection from contamination at the land surface. Guthrie Center's Alluvial wells will be highly susceptible to contaminants near the land surface such as leaking underground storage tanks, contaminant spills, and excess fertilizer application. A detailed evaluation of your source water was completed by the lowa Department of Natural Resources, and is available from the Water Operator at 641-332-2190."

You may modify this language or include additional information if you so desire, but you must identify the source of your system's drinking water and identify known sources of potential contamination.

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Table 1. Inventory and ranking of potential contaminant sources.

Guthrie Center Public Water Supply (3937016) Phase I - Contaminant Source Inventory and Assessment

Map No.	Site Name	Site Type	Site Link ¹	Program ID	Site Address	Loc'n Acc ²	Land Use Risk ³	Risk Score ⁴
Captı	ure zone: 10-year time of travel (risk)	factor = 1)						
1	Central Iowa Fs Inc	Underground storage tank	310475957	198603881	2221 215th Rd, Guthrie Center, IA 50115	good	5	10
2	Central Iowa Fs Inc	Leaking USTs	310475957	8LTG09	2221 215th Rd, Guthrie Center, IA 50115	good	5	10
3	Helena Chemical Co	Tier II Chemical Storage	310777952	FAIDSIT2A000028	705 N 1st Street, Guthrie Center, IA 50115	poor	3	8
4	Wells Veterinary Clinic	Underground storage tank	310591234	198916381	Rte 1 Box 2, Guthrie Center, IA 50115	poor	5	10
5	Helena Chemical	Hazardous Materials Spill	311431135	052304-MAR-0921	705 N 1st Street, Guthrie Center, IA 50115	good	1	6
6	Helena Chemical	Contaminated sites	311431135	786	T79n, R31w, Sec. 6, Nw, Sw, Ne, Guthrie Ce	good	5	10

¹ID's are hyperlinked to detailed contaminant source information where available. Click once to open the spreadsheet, then click again to follow the link.

²Estimated horizontal accuracy: < 25m. = good; 25m. to 50m. = fair; >50m. = poor

³Score range: 1 to 5, see Table 3 of the lowa Source Water Protection and Assessment plan

⁴Sum of land use, capture zone, and aquifer susceptibility risk factors



Table 2. Inventory of water wells not used in source water area.

Guthrie Center Public Water Supply (3937016)

Phase I - Inventory of Wells

Map No.	Well ID ¹	Well Owner	Well ID Source	Depth (ft.)	Date Drilled/ permitted	Well Location	Locational Accuracy ²
Captu	ire zone: 2	-year time of travel (risk factor = 3)					
8	2411931	GOLD MINE COUNTY STORE	Public Water Supply well	25	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
9	2407969	ORGANIZED GROUP CAMP	Public Water Supply well	unkn	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
10	2413775	BOWMAN CHAPEL	Public Water Supply well	unkn	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
11	2411059	KNOX KNOLLS PRESBYPTERIAN CAMP	Public Water Supply well	unkn	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
15	2408517	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	70	1/1/1984	T79N, R32W, Sec. 1, NE, SE, NE	good
16	40045	Guthrie Center, City Of	IGS well database	0	1/1/1984	T79N, R32W, Sec. 1, NE, SE, NE	good
17	6384	Guthrie Center, City Of	Registered abandoned wells	24	n.a.	T79N, R32W, Sec. 1, NE, SE, SW	poor
18	W5862	CITY OF GUTHRIE CENTER	Water Use Permit Wells	79	unkn	T79N, R31W, Sec. 6, NW, SW, NW	good
19	49956	Guthrie Center, City Of	IGS well database	80	Unkn	T79N, R31W, Sec. 6, NW, SW, NW	good
20	2574749	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	78	12/31/1997	T79N, R31W, Sec. 6, NW, SW, NW	good
21	40046	Guthrie Center, City Of	IGS well database	0	1/1/1984	T79N, R31W, Sec. 6, NW, SW, NW	good
22	2410679	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	70	1/1/1984	T79N, R31W, Sec. 6, NW, SW, NW	good
23	40044	Guthrie Center, City Of	IGS well database	0	1/1/1984	T79N, R32W, Sec. 1, NE, SE, SE	good
24	2408590	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	70	1/1/1984	T79N, R32W, Sec. 1, NE, SE, SE	good
25	2574748	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	75	12/31/1997	T79N, R32W, Sec. 1, SE, NE, NE	good
26	49955	Guthrie Center, City Of	IGS well database	80	Unkn	T79N, R32W, Sec. 1, SE, NE, NE	good
27	W4858	CITY OF GUTHRIE CENTER	Water Use Permit Wells	79	unkn	T79N, R32W, Sec. 1, SE, NE, NE	good
Captu	ire zone: 1	0-year time of travel (risk factor = 1)					
13	2119903	Wolfe, Jerry	Private well tracking system	90	7/12/2006	T79N, R32W, Sec. 1, NE, SW, SE	good
14	2118331	Schrek, Dan	Private well tracking system	80	1/1/1940	T79N, R32W, Sec. 1, NE, SW, SE	good
28	2990	Guthrie County, Guthrie County	Registered abandoned wells	25	n.a.	T80N, R32W, Sec. 36, SE, SE, SE	poor
29	2991	Guthrie County, Guthrie County	Registered abandoned wells	25	n.a.	T80N, R32W, Sec. 36, SE, SE, SE	poor
30	75607	Helena Chemical	IGS well database	250	10/17/2012	T79N, R31W, Sec. 6, NW, SE, NW	poor
Captu	ire zone: s	urface runoff area (risk factor = 1)	29				
1	63760	Wickland, Roger	Wells registered for testing	unkn	unkn	T79N, R32W, Sec. 2, NE, SE, NE	poor
2	2099996	Milhollin, Bob	Private well tracking system	127	1/1/1940	T79N, R32W, Sec. 1, NW, NW, SW	good
3	2097374	Millhollin, Bob	Private well tracking system	115	1/1/1970	T79N, R32W, Sec. 1, NW, NW, SE	good
4	2120503	Van Meter, Nancy	Private well tracking system	90	1/1/1930	T79N, R32W, Sec. 2, NE, SE, SE	good
5	2129199	Wickland, Roger	Private well tracking system	136	1/21/1999	T79N, R32W, Sec. 2, NE, SE, SE	good
6	4550	Garlock, Ella	Registered abandoned wells	100	n.a.	T79N, R32W, Sec. 1, NW, NE, NE	poor
7	2120587	Schwartz, Lela	Private well tracking system	90	1/1/1980	T79N, R32W, Sec. 1, NW, SE, NE	good
12	67107	Schreck, Dan	Wells registered for testing	unkn	unkn	T79N, R32W, Sec. 1, NE, SW, NW	poor

¹Well id's are hyperlinked to detailed well information where available.

Click once to open the spreadsheet, then click again to follow the link.

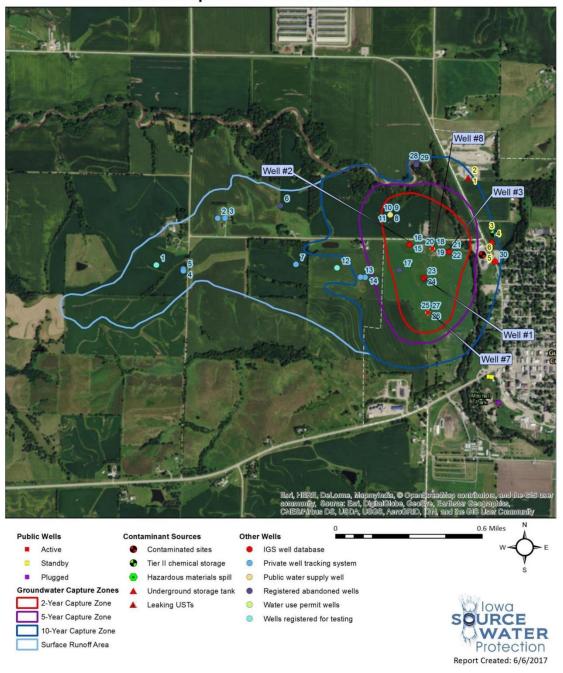
²Estimated horizontal accuracy: < 25m. = good; 25m. to 50m. = fair; >50m. = poor

Table 3. Land cover within your source water area.

Guthrie Center Public Water Supply (3937016) Phase I - 2016 Land Cover Aquifer: Alluvial Highly Susceptible (risk factor = 4)

Capture zone	No Data	Row Crop	Small Grains	Alfalfa	Other Crops	Grassland	Wetlands	Water	Developed Areas	Barren Areas	Forested Areas	Total Acres
2-year	0	11	0	9	0	13	0	0	2	0	6	97
5-year	0	12	0	3	0	4	0	0	2	0	14	65
10-year	0	28	0	4	0	7	0	0	5	0	17	148
surface runoff area	0	83	0	1	0	Ω	0	0	1	0	1	263

Guthrie Center PWSID# 3937016 Alluvial Aquifer - Source Water Protection



Iowa Department of Natural Resources Iowa Geological Survey & Land Quality Bureau

Municipal Water-Supply Inventory

MUNICIPALITY: GUTHRIE CENTER COUNTY: GUTHRIE

PWSID: 3937016 REGION: 4

CONTACT: DEAN OSEN ADDRESS: 102 NORTH FIRST STREET

PHONE: (515) 747-3154 POPULATION: 1668 YEAR: 04/01/00

GUTHRIE CENTER, IA 50115-0000

WATER SOURCE: Groundwater AVERAGE USE: 170,000 gpd 02/11/83 - 02/17/88 MAXIMUM USE: 470,000 gpd //

STORAGE CAPACITY: 440000 gal.

COMMENTS:

1988 GUTHRIE CENTER DERIVES ITS WATER FROM WELLS #1, 2, 4, 5, 6 **1988 TREATMENTS: AERATION, DETENTION, FILTRATION, CHLORINATION, & FLUORIDE**

EDIT DATE: 07/10/92

DATA FOR: GUTHRIE CENTER #1 WNUMBER: 40042			PWSID\SEQ#: 3937016- USGS ID: 414035094	
	GENERAL INFORMATION			
LOCATION: T 79N R31W Sec 6SWSEN TOPOGRAPHIC MAP: GUTHRIE CENTER E/ ELEVATION: 1076 feet SITE TYPE: Dri DRILLER: [0] 0 WELL TYPE: Municipal	AST illed hole TOTAL DEPTH: C DRILL DATE: 11/1) feet BEDROCK DEF	HOD:	
LOG TYPE: LOG QUALITY: LOG TYPE2: LOG QUALITY: COMMENTS:	ON LINE: / / ABANDONED: / : SAMPLE TYPE: BEE 2:	PLUG PROCK DEPTH: 0 feet STF BASIN: 7100007 STRIP LOG DAT SUPPLY PERCEN	RIP LOG BY: TE: / /	
GRAVEL-PACKED DEPTH ALSO REPORT DATE ALSO REPORTE	TED 60', 62', 64' ED 1949, 1943			
EDIT DATE: 07/01/92				
VULNERABILITY: 0				
WELL CONSTRUCT	ION DATA FOR GUTHRIE CENTER #1			
HYDROGEOLOGIC IN	NFORMATION FOR GUTHRIE CENTER #1			.======
MAIN WATER: Main water top: O feet	Main water bottom: 0 feet	Pump rating: 0 gpm	Pump yield: C) gpm
DRILLER's	LOG FOR GUTHRIE CENTER #1			
WATER QUALITY	Y DATA FOR GUTHRIE CENTER #1			
	WATER QUALITY INFORMATION	DN .		
	FIELD DATA			
DATE OF COLLECTION: 05/21/85 SOURCE: Quaternary	TIME: COLLECTOR: Conkling/C	conell USGS M	MINERAL NUMBER:	0
02/04/2004 43:20	Page 2			

SAMPLING POINT: at wellhead WAS SAMPLE FREE TURBIDITY WHEN COLLECTED? Yes No TEMPERATURE: 13.0 C pH: 6.900 SPECIFIC CONDUCTANCE: 625.000 micromhos PUMPING RATED: 120.000 gpm IS A POLYPHOSPHATE BEING USED? ALKALINITY mg/l CaCO3 P: ---- mg/l HOURS PUMPED: 0:40 T: ---- mg/I LABORATORY ANALYSIS SILICA (SiO2): TOTAL IRON (Fe): TOTAL RESIDUE: CATIONS (mg/l): ANIONS (mg/I) POTASSIUM (K+):
SODIUM (Na+):
CALCIUM (Ca++):
MAGNESIUM (Mg++):
MANGANESE (Mn++) soluble:
MANGANESE (Mn++) total: NITRATE (NO3-): FLUORIDE (F-): CHLORIDE (C1-): SULFATE (SO4--): BICARBONATE (HCO3-): CARBONATE (CO3--): RADIOACTIVITY (pCi/I) TRACE METALS (mg/I) ARSENIC (As):
BARIUM (Ba):
CADMIUM (Cd):
CHROMIUM (Cr):
COPPER (CU):
LEAD (Pb):
MERCURY (Hg):
SELENIUM (Se):
SILVER (Ag):
ZINC (Zn): <0.010 0.100 <0.001 <0.010 0.010 <0.010 <0.001 <0.010 <0.010 <0.010 GROSS ALPHA: 226RADIUM: 228RADIUM: GROSS BETA: 90STRONTIUM: 2.000 4.000 222RADON: ----COMMENTS: FROM THE MINERAL ANALYSIS WELL DATA Well number: 1 Date of construction: 1929 Depth: 60 ft. LABORATORY ANALYSIS
Comments: Ammonia Nitrogen = <0.01 mg/L
Soluble Phosphorus = 0.09 mg/L
FU bottle was received already preserved. The RU portion was used in it's place and was filtered in-house for filtrablresidue.

	JTHRIE CENTER #2 10043			PWSID\SEQ#: 3937016- 2 USGS ID: 414035094302502
		GENERAL INFORMATION		
TOPOGRAPHIC MAR	79N R31W Sec GSWSENWSW P: GUTHRIE CENTER EAST Feet SITE TYPE: Drilled hole 0 WELL DEPTH:	DRILL DATE: 08/0) feet BEDROCK DE	THOD:
STATUS: Standby LOG TYPE: LOG TYPE2: COMMENTS:	LOG QUALITY2: GRAVEL-PACKED DEPTH ALSO REPORTED 62'		PLUG DROCK DEPTH: 0 feet ST BASIN: 710007 STRIP LOG DA SUPPLY PERCE	TRIP LOG BY:
EDIT DATE: C	DATE ALSO REPORTED 1943, 19	140		
VULNERABILITY:	0			
	WELL CONSTRUCTION DATA FO	OR GUTHRIE CENTER #2		
	HYDROGEOLOGIC INFORMATION			
MAIN WATER: Main water	top: O feet Main wate	er bottom: O feet	Pump rating: 0 gpm	Pump yield: 0 gpm
	DRILLER'S LOG FOR GL			
	WATER QUALITY DATA FOR			
		WATER QUALITY INFORMATIO	NN .	
		FIELD DATA		
SOURCE: 1941 SAMPLING POIN	ECTION: 10/03/89 TIME: 9:0 GUTHRIE CENTER 2 VT: REE TURBIDITY WHEN COLLECTED?		PHATE BEING USED?	MINERAL NUMBER: 0
02/04/2004	13:29	Page 4		

No TEMPERATURE: 12.0 C pH: 0.000 SPECIFIC CONDUCTANCE: 352.000 micromhos PUMPING RATED: 0.000 gpm	ALKALIN HOUR	ITY mg/l CaCO3 P: S PUMPED: 0:20	mg/I	T:	mg/I
	LABORATORY ANA	LYSIS			
SPECIFIC CONDUCTANCE: 380.000 micromhos mg/l SOLUABLE IRON (Fe): mg/l FILTERABLE RESIDUE: mg/l HARDNESS as CaCO3: mg/l ALKALINITY mg/l CaCO3 P: mg/l		SILICA (SiO2): TOTAL IRON (Fe): TOTAL RESIDUE:			
CATIONS (mg/l):		ANIONS (mg/I)			
POTASSIUM (K+): SODIUM (Na+): CALCIUM (Ca++): MAGNESIUM (Mg++): MANGANESE (Mn++) soluble: MANGANESE (Mn++) total:		NITRATE (NO3-): FLUORIDE (F-): CHLORIDE (C1-): SULFATE (SO4): BICARBONATE (HCO3-): CARBONATE (CO3):	22.050		
TRACE METALS (mg/l)		RADIOACTIVITY (pCi/I)			
ARSENIC (As): BARIUM (Ba): CADMIUM (Cd): CHROMIUM (Cr): COPPER (Cu): LEAD (Pb): MERCURY (Hg): SILEVER (Ag): ZINC (Zn):		GROSS ALPHA: 22GRADIUM: 22BRADIUM: GROSS BETA: 90STRONTIUM: 222RADON:			
COMMENTS:					

	a.ıı	orpan mater capping into	,		
DATA FOR: WNUMBER:	GUTHRIE CENTER #3 19834			USGS ID:	3937016- 3 414030094302501
		GENERAL INFORMATIO	ON		
FIFVATION: 1	T 79N R31W Sec 6SWSES C MAP: GUTHRIE CENTER EA 074 feet SITE TYPE: Dri 3] Thorpe Well Co. unicipal W	ST	50 feet 12/21/67 D	BEDROCK DEPTH: 0 fe RILLING METHOD: ota/Cretaceous	et
STATUS: LOG TYPE: S LOG TYPE2: COMMENTS:	**1987 CITY REPOR NOT BLEND IT DOWN 5, 6**	N LINE: // ABANDONED: Good SAMPLE TYPE: Chips : TED THAT THIS WELL WAS SO HIGH ; THIS PROMPTED DRILLING TEST HO RTED 25', 55', 60', 55.67'**	S S IN NITRATE THAT TH	PLUGGED: / / 0 feet STRIP LOG BY: 00007 iTRIP LOG DATE: 08/25/67 iUPPLY PERCENT: 0.00% WELLS #4,	
EDIT DA	TE: 03/01/88				
VULNERABILIT	Y: 0				
		FORMATION FOR GUTHRIE CENTER #3			
MAIN WAT Main w	ER: ater top: O feet	Main water bottom: 0 feet	t Pump rating:	0 gpm Pump yie	ld: O gpm
DATE PUM STATIC W 240.0 g AQUIFER	PUMPED: MEASUREMENT:	MPED: PUMPING WATER LEVEL: 35.0 t PUMP TEST: False	feet YIELD: PUMP METHOD:		
		LOG FOR GUTHRIE CENTER #3			
		DATA FOR GUTHRIE CENTER #3			

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13:29

GUTHRIE CENTER #4 40044 PWSID\SEQ#: 3937016- 4 USGS ID: 414101094303701 GENERAL INFORMATION LOCATION: T 79N R31W Sec 6NWSWNWNE TOPOGRAPHIC MAP: GUTHRIE CENTER EAST ELEVATION: 1075 feet SITE TYPE: Drilled hole DRILLER: [103] Thorpe Well Co. WELL DEPTH: 70.00 feet AQUIFER: STATUS: Primary LOG TYPE: LOG TYPE2: ON LINE: // ABANDONED: // BEDROCK DEPTH: DG QUALITY: SAMPLE TYPE: BASIN: PLUGGED: / /
O feet STRIP LOG BY:
7100007
STRIP LOG DATE: / /
SUPPLY PERCENT: 0.00% 0.00% COMMENTS: 50'-70' OF 16" SCREEN GRAVEL-PACKED DEPTH REPORTED AS 60'-70' DEPTH ALSO REPORTED AS ~70' EDIT DATE: 07/01/92 VULNERABILITY: WELL CONSTRUCTION DATA FOR GUTHRIE CENTER #4 HOLE SCHEDULE: WELL CONSTRUCTION DATE: 01/01/84 CASING SCHEDULE: (1) Diameter: 16 inches Type: Depth top: feet Depth bottom: 50 feet Amount: GROUT SCHEDULE: SCREEN OR PERFORATED CASING SCHEDULE: GRAVEL-PACKED: False Gravel-packed top: feet Gravel-packed bottom: PUMP SCHEDULE: Pump type: SUBM inches Diameter: Rated capacity: Depth to intake: feet COMMENTS: HYDROGEOLOGIC INFORMATION FOR GUTHRIE CENTER #4 MAIN WATER: Main water top: O feet Pump rating: O feet Main water bottom: 0 gpm Pump yield: 300 gpm DRILLER'S LOG FOR GUTHRIE CENTER #4

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13:29

W	ATER QUALITY DATA FOR GUTHR	IE CENTER #4		
	WATE	R QUALITY INFORMATION		
		FIELD DATA		
DATE OF COLLECTION: SOURCE: 1984GUTHRIE SAMPLING POINT:	08/25/87 TIME: 11:10 CENTER 4	COLLECTOR:	MINERAL NUMBER:	
WAS SAMPLE FREE TURBI	DITY WHEN COLLECTED? No	IS A POLYPHOSPHATE BEING USED	?	
NO TEMPERATURE: 14.0 C SPECIFIC CONDUCTANCE: PUMPING RATED: 300.	pH: 7.200 410.000 micromhos 000 gpm	ALKALINITY mg/I CaCO3 P: HOURS PUMPED: 0:15	mg/I T: mg/	/1
	L	ABORATORY ANALYSIS		
22.000 mg/l	410.000 micromhos pH:	AND ALCOHOLOGICAL AND		
SOLUABLE IŘON (Fe): mg/l	SAME TO SAME SAME SAME SAME	TOTAL IRON (Fe):		
FILTERABLE RESIDUE: mg/I HARDNESS as CaCO3: - ALKALINITY mg/I CaCO3	mg/I	TOTAL RESIDUE:		
CATIONS (mg/l):		ANIONS (mg/I)		
POTASSIUM (K+): SODIUM (Na+): CALCIUM (Ca++): MAGNESIUM (Mg++): MANGANESE (Mn++) solu MANGANESE (Mn++) tota	1.300 8.200 47.000 13.000 ble: 0.030	NITRATE (NO3-): FLUORIDE (F-): CHLORIDE (C1-); SULFATE (SO4): BICARBONATE (HC03-): CARBONATE (C03):	44.550 0.200 14.000 32.000	
TRACE METALS (mg/I)		RADIOACTIVITY (pCi/I)		
ARSENIC (As): BARIUM (Ba): CADMUM (Cd): CHROWIUM (Cd): COPPER (Cu):		GROSS ALPHA: 226RADIUM: 228RADIUM: GROSS BETA: 90STRONTIUM:		
LEAD (Pb): MERCURY (Hg): SELENIUM (Se):		222RADON:		

GUTHRIE CENTER #5 40045 PWSID\SEQ#: 3937016- 5 USGS ID: 0 GENERAL INFORMATION LOCATION: T 79N R32W Sec 1NESENESW TOPOGRAPHIC MAP: GUTHRIE CENTER EAST ELEVATION: 1076 feet SITE TYPE: Drilled hole DRILLER: [103] Thorpe Well Co. DRILLE DEPTH: 70.00 feet AQUIFER: PLUGGED: / /
0 feet STRIP LOG BY:
7100007
STRIP LOG DATE: / /
SUPPLY PERCENT: 0.00% STATUS: Primary LOG TYPE: LOG TYPE2: ON LINE: SAMPLE TYPE: ABANDONED: DEDROCK DEPTH: LOG QUALITY: BASIN: COMMENTS: 50'-70' OF 16" SCREEN GRAVEL-PACKED DEPTH REPORTED AS 60'-70' DEPTH ALSO REPORTED AS -70' EDIT DATE: 03/01/88 VULNERABILITY: WELL CONSTRUCTION DATA FOR GUTHRIE CENTER #5 HOLE SCHEDULE: WELL CONSTRUCTION DATE: 01/01/84 CASING SCHEDULE: (1) Diameter: 16 inches Type: Depth top: feet Depth bottom: 50 feet Amount: GROUT SCHEDULE: SCREEN OR PERFORATED CASING SCHEDULE: GRAVEL-PACKED: False Gravel-packed top: feet Gravel-packed bottom: feet PUMP SCHEDULE: Pump type: SUBM Diameter: Rated capacity: inches Depth to intake: gpm COMMENTS: HYDROGEOLOGIC INFORMATION FOR GUTHRIE CENTER #5 MAIN WATER: Main water top: O feet Main water bottom: O feet Pump rating: 0 gpm Pump yield: 300 gpm

DRILLER'S LOG FOR GUTHRIE CENTER #5	

WATER QUALITY DATA FOR GUTHRIE CENTER #5

DATA FOR: WNUMBER: GUTHRIE CENTER #6 40046 PWSID\SEQ#: 3937016- 6 USGS ID: 414101094303801

GENERAL INFORMATION

COUNTY: GUTHRIE

LOCATION: T 79N R31W Sec 6NWSWSWSW TOPOGRAPHIC MAP: GUTHRIE CENTER EAST ELEVATION: 1075 feet SITE TYPE: Drilled hole DRILLER: [103] Thorpe Well Co. WELL TYPE: Municipal WELL DEPTH: EASI rilled hole TOTAL DEPTH: 0 feet DRILL DATE: 01/01/84 WELL DEPTH: 70.00 feet AQUIFER: BEDROCK DEPTH: O feet DRILLING METHOD: Unknown Alluvium

STATUS: Primary LOG TYPE: LOG TYPE2:

ON LINE: // ABANDONED: LOG QUALITY: SAMPLE TYPE: PLUGGED: / /
0 feet STRIP LOG BY:
7100007
STRIP LOG DATE: / /
SUPPLY PERCENT: 0.00% BEDROCK DEPTH: BASIN:

COMMENTS:

50'-60' OF 16" SCREEN GRAVEL-PACKED DEPTH REPORTED AS 60'-70' DEPTH ALSO REPORTED AS ~70'

EDIT DATE: 03/01/88

VULNERABILITY:

WELL CONSTRUCTION DATA FOR GUTHRIE CENTER #6

HOLE SCHEDULE: WELL CONSTRUCTION DATE: 01/01/84

CASING SCHEDULE: (1) Diameter: 16 inches Type: Depth top: feet Depth bottom: 50 feet Amount:

GROUT SCHEDULE:

SCREEN OR PERFORATED CASING SCHEDULE:

GRAVEL-PACKED: False Gravel-packed top: feet Gravel-packed bottom: feet

PUMP SCHEDULE: Pump type: SUBM

Diameter: Depth to intake: feet inches Rated capacity: gpm

COMMENTS:

HYDROGEOLOGIC INFORMATION FOR GUTHRIE CENTER #6

MAIN WATER: Main water top: Pump yield: O feet Main water bottom: 0 feet Pump rating: O apm 300 apm

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DRILLER'S LOG FOR GUTHRIE CENTER #6	
WATER QUALITY DATA FOR GUTHRIE CENTER #6 WATER QUALITY INF	
FIELD DAT	TA
DATE OF COLLECTION: 06/29/92 TIME: 13:30 COLLECTOR: SOURCE: 1984GUTHRIE CENTER (6), 3 SAMPLING POINT:	MINERAL NUMBER: 0
WAS SAMPLE FREE TURBIDITY WHEN COLLECTED? NO IS A PO	DLYPHOSPHATE BEING USED? NITY mg/l CaCO3 P: mg/l T: mg/l RS PUMPED: 0:30
LABORATORY ANA	ALYSIS
SPECIFIC CONDUCTANCE: 240.000 micromhos pH: 6.900 21.000 mg/l SOLUMBLE IRON (Fe): <0.020 mg/l mg/l FILTERABLE RESIDUE: 296.000 mg/l 239.000 mg/l HARDNESS as CaCO3: 160.000 mg/l ALKALINITY mg/l CaCO3 P: mg/l T: 130.000 mg/l	SILICA (SiO2): TOTAL IRON (Fe): TOTAL RESIDUE:
CATIONS (mg/l):	ANIONS (mg/l)
POTASSIUM (K+): 1.400 SODIUM (Na+): 8.300 CALCIUM (Ca++): 45.000 MAGNESIUM (Mg++): 12.000 MANGANESE (Mn++) soluble: 0.280 MANGANESE (Mn++) total:	NITRATE (NO3-): 8.100 FLUORIDE (F-): 0.200 CHLORIDE (C1-): 34.000 SHLORATE (SO4): 30.000 BICARBONATE (HC03-): CARBONATE (C03):
TRACE METALS (mg/l)	RADIOACTIVITY (pCi/I)
ARSENIC (As): BARIUM (Ba): CADMIUM (Cd): CHROMIUM (Cf): COPPER (Cu): LEAD (Pb): MERCURY (Hg): SELENIUM (Se): SILVER (Ag): ZINC (Zn):	GROSS ALPHA: 226RADIUM: 228RADIUM: 6ROSS BETA: 90STRONTIUM: 222RADON:
COMMENTS:	

DATA FOR: GUTHRIE CENTER #7 WNUMBER: 49955	PWSID\SEQ#: 3937016- 7 USGS ID: 0					
GENERAL INFORMATION						
LOCATION: T 79N R31W Sec 6SWNWNWSW TOPOGRAPHIC MAP: GUTHRIE CENTER EAST ELEVATION: 1070 feet SITE TYPE: Drilled hole TOTAL DEPTH: 80 feet DRILLER: [0] 0 DRILL DATE: // WELL TYPE: Municipal WELL DEPTH: 75.00 feet AQUIFER:	BEDROCK DEPTH: O feet DRILLING METHOD: Alluvium					
STATUS: LOG TYPE: LOG QUALITY: LOG TYPE: LOG QUALITY: LOG TYPE2: LOG QUALITY2: SAMPLE TYPE: BEDROCK DE BASI COMMENTS: EDIT DATE: 09/25/00	PLUGGED: / / PTH: 0 feet STRIP LOG BY: N: 0 STRIP LOG DATE: / / SUPPLY PERCENT: 0.00%					
VULNERABILITY: 0						
WELL CONSTRUCTION DATA FOR GUTHRIE CENTER #7						
HYDROGEOLOGIC INFORMATION FOR GUTHRIE CENTER #7						
MAIN WATER: Main water top: O feet Main water bottom: O feet Pump r	rating: O gpm Pump yield: O gpm					
DRILLER'S LOG FOR GUTHRIE CENTER #7						
WATER QUALITY DATA FOR GUTHRIE CENTER #7						

DATA FOR: GUTHRIE CENTER #8 WNUMBER: 49956	PWSID\SEQ#: 3937016- 8 USGS ID: 0					
GENERAL INFORMATION						
LOCATION: T 79N R31W Sec GNWSWNWSW TOPOGRAPHIC MAP: GUTHRIE CENTER EAST ELEVATION: 1070 feet SITE TYPE: Drilled hole DRILL DEPTH: 80 feet DRILLER: [0] 0 WELL DEPTH: 75.00 feet AVEL TYPE: WILL DEPTH: V/STATUS: LOG QUALITY: SAMPLE TYPE: BEDROCK DEPTH:	BEDROCK DEPTH: O feet DRILLING METHOD: Alluvium PLUGGED: // O feet STRIP LOG BY:					
LOG TYPE2: LOG QUALITY2: BASIN: COMMENTS: EDIT DATE: 02/11/02	STRIP LOG DATE: // SUPPLY PERCENT: 0.00%					
VULNERABILITY: 0						
WELL CONSTRUCTION DATA FOR GUTHRIE CENTER #8						
HYDROGEOLOGIC INFORMATION FOR GUTHRIE CENTER #8						
MAIN WATER: Main water top: O feet Main water bottom: O feet Pump ratin	ng: Ogpm Pumpyield: Ogpm					
DRILLER'S LOG FOR GUTHRIE CENTER #8						
WATER QUALITY DATA FOR GUTHRIF CENTER #8						

ER SUPPLY SURVEY

Page 1 of 4
39-32-000
Facility No.
(County/City/State)

Center,	Iowa	50115 Phone No.: 515 / 747 /	31.54
1		Title Water Superintende	nt
		Title	
		Title	
			
	_ Date	Previous Survey9-26-75	
		5 470 000	
	_gpd.	Maximum Day 4/0,000	gp
		Equivalent (@100 gpcd) 2,000	
		- C-liested 🖂	
Copy L	. IN		
Spencer	•	Date of neport	
n Aper	ur	Data Ravioussi: 9 - 26 - 78	
		Date Heriorica.	
icant obser	vations	made during the survey?**	2
Vec	No	Item	Yes No
103	T		T
	x	and the state of t	
x	† *		
	1		
	x	7. BACTERIOLOGICAL MONITORING	
			x
x		b. sampling point	X
		c. bacterial quality	X
		8. CHEMICAL QUALITY	
	X	a. latest chemical quality	
		b. raw water sources	
1	x	9. OPERATION	
X		a. test equipment	X
		b. operation reports	X
-	X	10. STAFFING & OPERATOR CERTIFICATION	
A F		a. operator, direct responsibility	x
,	Х	b. shift operators	
X_			
	X_	11. MISCELLANEOUS	
		a. permits	
	1_		
	X_		X
	X-		
	X-	e. f.	
	V_		
	EQ Copy No of to DEQ of Copy Spencer Yes X X X X X X X X X X X X	Date, gpd. gpd. Pop. EQ Copy No Sample to DEQ Copy No Spencer No Spencer X X X X X X X X X X X X X X X X X X X	Title Title Title License, Type & Grade WI-II #02374 Date, Previous Survey 9-26-75 gpd. Maximum Day 470,000 Pop. Equivalent (@100 gpcd) 2,000 EO Copy □ No Change in Operator □ Copy □ No Discharge □ On File Spencer Date of Report: August 31, 1978 Date Reviewed: 9-26-78 icant observations made during the survey?** Yes No Item 6. DISTRIBUTION a. sanitation and construction b. operation and maintenance c. flow capacity and pressure 7. BACTERIOLOGICAL MONITORING a. number of routine samples b. sampling point c. bacterial quality 8. CHEMICAL QUALITY a. latest chemical quality b. raw water sources 9. OPERATION a. test equipment b. operation reports 10. STAFFING & OPERATOR CERTIFICATION a. operator, direct responsibility b. shift operators c. general staffing 11. MISCELLANEOUS a. permits b. emergency operation c. previously noted deficiencies d.

	MEL	ENT OF ENVIOLENTAL QUALITY	
	ITCHAL YAATIN.	ILL INSPECTION / Page 2 of	4
	WATER SUPPLY IN	39-32-000	
	WASTEWATER TREA	ATMENT FACILITY INSPECTION / Facility/Permit #	
	AIR QUALITY INS	SPECTION /	
 PROCESS TO SECOND	ITEM CODE	COMMENTS AND RECOMMENDATIONS	
		GENERAL DESCRIPTION: Water for the Guthrie Center Municipal Water St is supplied by three wells. Well #1 was constructed in 1949 and is feet deep; well #2, constructed in 1941, is 60 feet deep; well #3 was constructed in 1967 and is 55 feet deep. Water treatment consists of induced draft aeration, a rapid mixing unit with the addition of lime a slow mixing unit with the addition of chlorine gas, a 40,000 gallon settling tank, an anthracite rapid filtration unit, and two clearwell (40,000 gallons and 300,000 gallons respectively). The finished water is pumped to a 100,000 gallon elevated storage tank.	61 5 6 9, 1
	1.b. & 1.c.	Source Sanitation and Construction - Well #1: There is an opening with the drawdown gauge line enters the well casing. This area should be sealed to prevent contamination.	nere ·
		Well #2: The sample tap is located on the well side of the check value it must be installed on the positive pressure side of the check value to prevent back-siphonage of contaminants.	.ve;
	2.a. & 2.b.	Treatment - Location and Construction - The gas chlorination equipmer is located on the operating floor. This is unacceptable. The city meanstruct a separate room of approved construction. A copy of the rule and regulations concerning gas chlorination and storage facilities is attached to this report.	must ules
*	2.c.	Treatment - Operation and Maintenance - The positive displacement pur used in the application of hydrofluosilicic acid is inoperative. Thi unit must be repaired immediately. Daily tests must be made to insur that fluoride levels meet minimum requirements. Fluoride concentrati of 1.0 to 1.2 mg/l must be maintained.	ls te
:		The exterior of the building housing the sedimentation basin needs material tenance and repair.	in-
	·	The head loss gauge for the filter is inoperative and should be repair or replaced. The head loss gauge is important in the proper operation of the filter. Backwashing by head loss will allow the facility the produce a quality water without using excessive amounts of water for backwashing.	on co
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	CMD-5	a s	
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2016 WATER QUALITY REPORT FOR GUTHRIE CENTER MUNI WATER WORK

This report contains important information regarding the water quality in our water system. The source of our water is groundwater. Our water quality testing shows the following results:

CONTAMINANT	MCL - (MCLG)	(Compliance	Date	Violation	Source
		Туре	Value & (Range)		Yes/No	
Total Trihalomethanes (ppb) [TTHM]	80 (N/A)	LRAA	30.00 (30 - 30)	07/11/2016	No	By-products of drinking water chlorination
Total Haloacetic Acids (ppb) [HAA5]	60 (N/A)	LRAA	10.00 (10 - 10)	7/11/2016	No	By-products of drinking water disinfection
Lead (ppb)	AL=15 (0)	90th	4.40 (ND - 5)	7/3/2014	No	Corrosion of household plumbing systems; erosion of natural deposits
Copper (ppm)	AL=1.3 (1.3)	90th	1.06 (0.0228 - 1.600) 1 sample(s) exceeded AL	7/3/2014	No	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
950 - DISTRIBUTION S	YSTEM				100000000000000000000000000000000000000	parent run res
Fluoride (ppm)	4 (4)	RAA	0.6 (0.6-1.2)	3/4/2016	No	Water additive which promotes strong teeth; Erosion of natural deposits; Discharge from fertilizer and aluminum factories
Chlorine (ppm)	MRDL=4.0 (MRDLG=4.0)	RAA	1.3 (1.24-1.34)	06/30/2016	No	Water additive used to control microbes
02 - WELLS 1, 2, 3, 7-8	AFTR TRTMT @ PI	LNT				
Combined Radium pCi/L)	5 (0)	SGL	1	05/07/2012	No	Erosion of natural deposits
Selenium (ppb)	50 (50)	SGL	3.00	07/14/2014	No	Discharge from petroleum and metal refineries; Erosion of natura deposits; Discharge from mines
Barium (ppm)	2 (2)	SGL	0.134	07/14/2014	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
odium (ppm)	N/A (N/A)	SGL	14.5	07/14/2014	No	Erosion of natural deposits; Added to water during treatment process
litrate [as N] (ppm)	10 (10)	SGL	2.600	7/11/16		Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits

Note: Contaminants with dates indicate results from the most recent testing done in accordance with regulations.

DEFINITIONS

- Maximum Contaminant Level (MCL) The highest level of a contaminant that is allowed in drinking water. MCLs are set as
 close to the MCLGs as feasible using the best available treatment technology.
- Maximum Contaminant Level Goal (MCLG) -- The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- ppb -- parts per billion.
- ppm -- parts per million.
- pCi/L picocuries per liter
- N/A Not applicable
- ND -- Not detected
- RAA Running Annual Average

March 09, 2017

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Page 1

- Treatment Technique (TT) A required process intended to reduce the level of a contaminant in drinking water.
- Action Level (AL) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a
 water system must follow.
- Maximum Residual Disinfectant Level Goal (MRDLG) The level of a drinking water disinfectant below which there is no
 known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial
 contaminants.
- Maximum Residual Disinfectant Level (MRDL) The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- SGL Single Sample Result
- RTCR Revised Total Coliform Rule

GENERAL INFORMATION

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water posed a health risk. More information about contaminants or potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. GUTHRIE CENTER MUNI WATER WORK is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

SOURCE WATER ASSESSMENT INFORMATION

This water supply obtains its water from the sand and gravel of the Alluvial aquifer. The Alluvial aquifer was determined to be highly susceptible to contamination because the characteristics of the aquifer and overlying materials provide little protection from contamination at the land surface. The Alluvial wells will be highly susceptible to surface contaminants such as leaking underground storage tanks, contaminant spills, and excess fertilizer application. A detailed evaluation of your source water was completed by the Iowa Department of Natural Resources, and is available from the Water Operator at 641-332-2164.

CONTACT INFORMATION

For questions regarding this information or how you can get involved in decisions regarding the water system, please contact GUTHRIE CENTER MUNI WATER WORK at 641-332-2164.

Board meetings are held on the 2nd Wednesday after the 1st council meeting of each month at 5:00 p.m. at city hall and are open to the public.

March 09, 2017

CCR 2016 GUTHRIE CENTER MUNI WATER WORK PWSID: 3937016

Page 2

STATE OF IOWA IONA NATURAL RESOURCES COUNCIL

Application For Permit 7. DIVERT, STORE. OR WITHDRAW Water For Beneficial Use. This application is NOT to be used by IRRIGATORS.

TO THE IOWA NATURAL RESOURCES COUNCIL:	
Application is hereby made, under the provi	sions of Chapter 455A, Iowa Code 1962, as amended, for a permit
	WELL located in GUTHRIE County, servoir, well, or name of stream)
fre Iowa, in accordance with the following parti	servoir, reil, or name of stream) culars:
1. The exact location of the diversion, st	orage, or withdrawal of water is in the <u>SW</u> quarter of
Section 6 , Township number 7	79 , Range number 31 , in GUTHRIE County, Iowa
2. The legal description of the land upon 3 IN THE SW 1/4 OF SEC. 6-	which water is to be used is: A PART OF LOT 2 OF 79-31, GUTHRIE COUNTY, IOWA
•	
recorded in the name of: CITY OF G	SUTHRIE CENTER
3. The water IS INTENDED TO BE US (is intended to be used or has been	
	() recreational use, () other use, as follows
	s 30,000,000 GALLONS per year to be diverted, stored, or facre-feet or gallons)
withdrawn at a maximum rate of 600 (cubic feet per	GPM during the period beginning on the record or gallons per minute)
L Cay of the motion of Januar	y and ending on the 31 day of the month
of DECEMBER of each year.	
5. It is requested that the permit be valid	(naximum 10 years)
6. The first actual application of water to	o the intended use WILL BE MADE on or (was made or will be made)
about November 1, 1966,	(was made or will be made)
any additional information required by	the Council will be furnished on request. ENCLOSED IS THE DBY LAW. (MAKE CHECK PAYABLE TO THE IOWA NATURAL RESOURCES COUNCIL).
Signature of Applicant	
Name of Applicant (FRINTED)	
Relationship	
(owner, agent, or if others	sise, specify)
Address (PRINTED)	
STATE OF IOWA)) SS.	
COUNTY OF	· ·
I hereby certify that the foregoing appl	lication was signed in my presence and sworn to before me by
	thisday of19
Y COMMISSION EXPIRES:	
*	
12/28/60	Notary Public
CP-24720	
8	



McCLURE ENGINEERING CO.

CONSULTING

ENGINEERS

M-21 WARDEN BLDG. AUGUST 21, 1967

FORT DODGE, IOWA

Associates
THOMAS E. NILLES
ROBERT J. BOLLANT

MR. DICK NORTHRUP GEOLOGICAL SURVEY BUILDING IOWA CITY, IOWA 52240

RE: GUTHRIE CENTER, JOWA WELL No. 3

DEAR SIR:

THANK YOU FOR YOUR ASSISTANCE DURING OUR PHONE CONVERSATION THIS MORNING. I CALLED THE JOHNSON SCREEN CO. IN ST. PAUL AND THEY ARE WORKING WITH US ON THE WELL.

UNDER SEPARATE COVER I AM SENDING SOME DRILL CUTTINGS AND A SAMPLE OF THE GRAVEL PACK ON THE ABOVE WELL. THESE WERE GIVEN TO US BY THE THORPE WELL CO. AND YOU WILL PROBABLY RECEIVE A DUPLICATE SET FROM THEM.

VERY TRULY YOURS,

McCLURE ENGINEERING CO. M-21 WARDEN BUILDING

THOMAS E. NILLES, P.E.

TEN:PM

GW- Gothrie Center foren wel folder (Gutteres Co.)

August 22, 1967

Mr. Tom E. Nilles, P. E. McClure Engineering Co. M-21 Warden Building Fort Dodge, lowa

Dear Mr. Nilles,

Relative to our phone conversation yesterday, we have received your letter and the well cuttings to a depth of fifty feet. After checking them over, we are sure that the well is definitely bottomed in the Dakota sandstone. While there is Pleistocene sand and gravel to twenty feet, the Dakota came in immediately below. Our log shows the following section:

Pleistocene: Silty soil 0-5°

Medium to find sand and gravel 5'-20'

Cretaceous:

Dakota Sandstone: Sandstone yellow, coarse, angular to

sub-angular 201-251

Sandstone yellow, fine, angular 25'-30'

Sandstone yellow, fine to coarse,

angular 30'-35'

Sandstone yellow, coarse angular to sub-

angular 351-501

We hope that the Johnson Company will be able to determine the best type of screen in developing a satisfactory well for Guthrie Center.

Thank you for forwarding the samples so promptly. Please feel free to call on us again if we can be of further service.

Yours very truly,

H. G. Hershey

HGH/RCN:g

WATER SUPPLY

/84		1984 Guth	rie Center Mun	icipal	Water Improvements	PROJECT NO.
REVI	SED					PLHMIT NO.
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		& GLUE				ADATION
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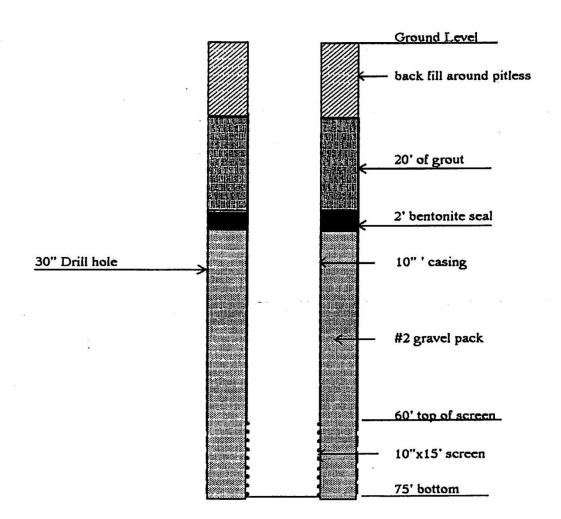
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WATER WELL PROJECT 1997

GUIHRIE CENIER Water Works

#1 W- 49955

Guthrie Center, Iowa



NORTHWAY WELL & PUMP Co. 100 North 6th, Waukee, IA

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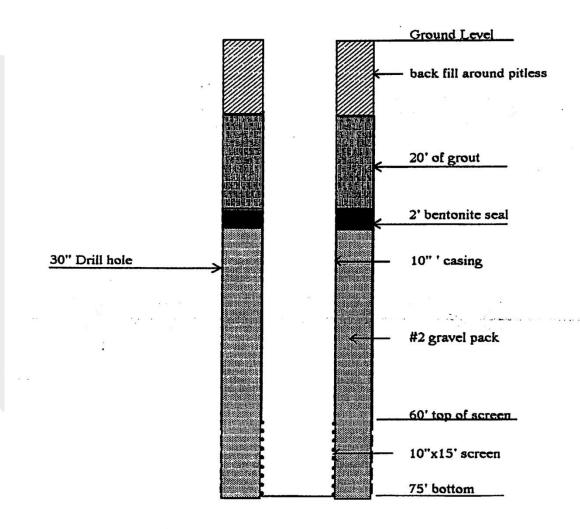
WATER WELL PROJECT 1997

GUIHRIE CENIER Water Works

#8

W-49956

Guthrie Center, Iowa



NORTHWAY WELL & PUMP Co. 100 North 6th, Waukee, IA NOT TO SCALE

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Source Water Team Contact Information:

Name:	Affiliations/Representing	Email Address	Phone Number:
Erick Van Cura	Guthrie Center Water	utilware@gmail.com	(515)-332-2164
Mike Anderson	Iowa DNR	michael.anderson@dnr.iowa.gov	(515)-725-0336
Heather Opseth	Guthrie Family Medical Center	ghopseth@gmail.com	332-2365
CW Thomas	Farmer in the Source Water Area	Diamondtfarm@gmail	(641)-740-0381
Robert Kempf	Adair and Guthrie County Emergency Management	ageema@guthriecounty.ls	(641)-332-3030
Tom Rutledge	Guthrie County Supervisors	tomrutledge@hotmail.com	(641)-757-1510
Evan Sinnott	Region XII Council of Governments	esinnott@region12cog.org	(712)-792-1751
Jeff Vansteenburg	IDNR SWP Program Coordinator	jeff.vansteenburg@dnr.iowa.gov	
Laura Imerman	City Clerk	cityutil@netins.net	(641)332-2190
Dennis Kunkle	City Mayor	cityhall@guthriecenter.com	(641)332-2190
Stephen Patterson	County Sanitarian	envhlth@netins.net	(641) 757-0815
Jeffrey Collins	USDA NRCS District Chair		(641) 332-2812
Scott Gonzales	Utility Board Chairman		(641)-332-2190
Shawn Shouse	Iowa State University	sshouse@iastate.edu	

Important Community Contact Information:

Position:	Contact:	Phone Number:
Mayor	Dennis Kunkle	(641)-332-2190
City Clerk	Laura Imerman	(641)-332-2190
Water Operator	Erick VanCura	(641)-332-2164

Category:	Contact/Company:	Phone Number:
Gas Dept	Erick Van Cura/Guthrie Center Utilities	(641)-332-2164
Electric Dept	Alliant Energy	(800)-822-4348 Emergency: (800)-255-4268
Water Department	Erick Van Cura	(641)-332-2164
Public Works	Bob Secoy	(641)-747-8161
Electrician Plumber	Sam	(641)-524-2161
Machine Repair		

Category:	Contact/Company:	Phone Number:
School District Office	Steve Smith, Sup.	(641)-747-2389
Guthrie Center Elementary School	400	(641)-332-2720
Guthrie Center High School	1 (1)	(641)-332-2236
Private Daycare	Beukema, Dean	(641)-747-2259
Private Daycare	Davis, Abby	(641)-332-2731
Private Daycare	Deboer, Penny	(641)-747-3912
Public Daycare	Guthrie County Headstart	(641)-747-2322
Private Daycare	Kent, Annette	(641)-747-3341
Public Daycare	Kid Zone Early Learning Center	(641)-332-2028
Private Daycare	Morse, Linda	(641)-747-1913
Private Daycare	Neitz, Lisa	(641)-332-2741
Private Daycare	Readinger, Jennifer	(515)-961-5960
Private Daycare	Sheeder Terry	(641)-524-4370

	Contact/Company:	Phone Number:
Category:		
Television	Guthrie Center Communications	(641)-332-2000
Radio	KKRF-107.9 FM	(515)-465-5357
Newspaper	Guthrie Center Times	(641)-332-2380

Category	Contact/Company:	Phone Number:
Airport	Guthrie Center Regional Airport	(641)-747-3563 Or (641)-747-2218

Category:	Contact:	Phone Number:
Guthrie Center Fire & Rescue	Dave Embelton, Chief	(641)-332-2328
Sheriff's Department-Guthrie Co. Sheriff Department	Marty Arganbright, Sheriff	(641)-747-2214
Iowa Department of Public Health		(515)-281-7689
National Guard	-	(515)-252-4582
Certified Laboratory/Keystone	-	(319)-235-4440
State of Iowa Health	-	(515)-281-7689
Department		7
	-	

Category:	Contact:	Phone Number:
Guthrie County Hospital	-	(641)-332-2201
Nursing Home-New Homestead and Homestead Acres	-	(641)-332-2204

Service:	Phone:
24-Hour Emergency	(515) 725-8694
Atlantic Iowa DNR Field Office	(712) 243-1934



Table 8. Potential contaminant sources.

Agricultural Agricultural drainage wells Animal burial areas

Animal feedlots Animal research facilities

Chemical application (e.g., pesticides fungicides, and fertilizers)

Chemical storage areas

Grain storage Irrigation

Manure spreading and pits Tank loading and rinsing areas

Commercial

Agricultural chemical dealers

Airports

Auto: repair, machinery, service shops

Boat yards / marinas

Car washes

Cemeteries / funeral services

Construction areas

Dry cleaning establishments

Educational institutions (e.g., labs, lawns,

and chemical storage areas)

Fuel pipelines Gas stations

Golf courses (chemical applications

and storage)

Grain storage (fumigation) Degreasing operations

Hardware stores

Jewelry and metal plating

Junk yards

Laundromats Lumber yards

Material transport (trucks and railroads)

Medical facilities Paint shops

Photography establishments

Printing / copy shops

Railroad tracks and maintenance yards Stormwater drains and retention basins Road deicing operations (road salt)

Road maintenance depots

Storage tanks and pipes (above and below ground)

Industrial

Asphalt plants

Chemical manufacturing, warehousing,

and distribution activities Construction activities Degreasing operations

Electrical and electronic products

and manufacturing

Electroplating and metal fabrication

Foundries

Former manufactured gas plants Lagoons, pits, holding ponds Machine and metalworking shops Manufacturing and distribution sites for cleaning supplies

Mining (surface and underground), mine

drainage, and waste piles

Petroleum products production, storage

and distribution centers

Pipelines (e.g. oil, gas, coal, and slurry) Radioactive materials production,

distribution, and storage

Wood preserving facilities

Storage tanks (above and below ground)

Toxic and hazardous spills
Wells, operating and abandoned
(e.g., oil, gas, water supply, injection,
Monitoring, and exploration)

Residential

Cesspools

Fuel storage sites

Furniture and wood strippers and refinishers Hazardous products (cleaners, paint, oil)

Lawns (chemical application)

Septic systems Sewer lines

Stormwater drains and retention basins

Swimming pools (e.g., chlorine)

Water softeners

Waste Management

Fire training facilities Hazardous waste management units

(e.g., landfills, land treatment areas, surface impoundments, waste piles incinerators, treatment tanks)

Leaky sewers

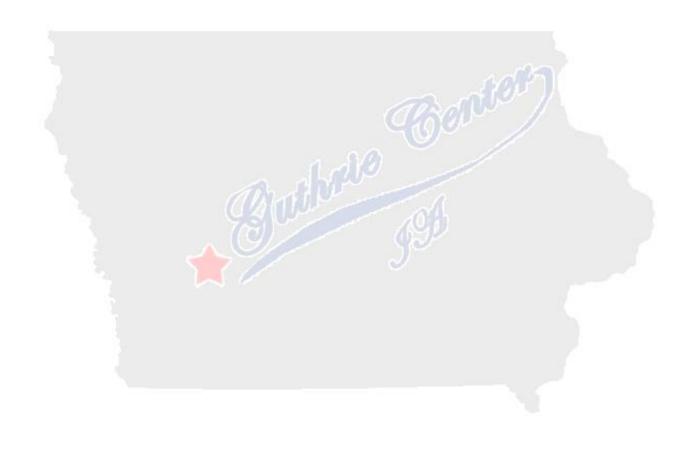
Municipal incinerators Municipal landfills

Municipal wastewater and sewer lines

Open burning sites

Recycling and waste-reduction facilities

Modified from US-EPA 1989, Wellhead Protection Programs: Tools for Local Governments. EPA 440/6-89-002.



Groundwater Risk:	Site Type:	<u>Capture Zone:</u>	Mitigation Status	Parcel Owner
1	Hazardous Materials Spill	10 -year	Plumb Created	Helena Chemical Company
3	Tier 2 Chemical Storage	10 -year	Successfully Mitigated	Helena Chemical Co.
5	Underground Storage Tank	10 -year	Tanks Removed	Wells Veterinary Clinic
5	Leaking Underground Storage Tank	10 -year	Tanks Removed	Central Iowa FS Inc.
5	Contaminated Site	10 –year	Successfully Mitigated	Rolling Hills Farm Service
4	Above Ground Storage Tank	10-Year	Tanks Remain	Guthrie County Engineer

Appendix C: Maps

Guthrie Center Location Map

Capture Zones Map

Contaminant Map

Guthrie Center Land Use Map

River Basins Map

Iowa's Geologic Landforms Map

Capture Zone Map, 1930

Capture Zone Map, 1960

Capture Zone Map, 1990





Legend

Capture Zone

10-year

2-year

// 5-year

Surface Runoff Area



Guthrie Center Capture Zones

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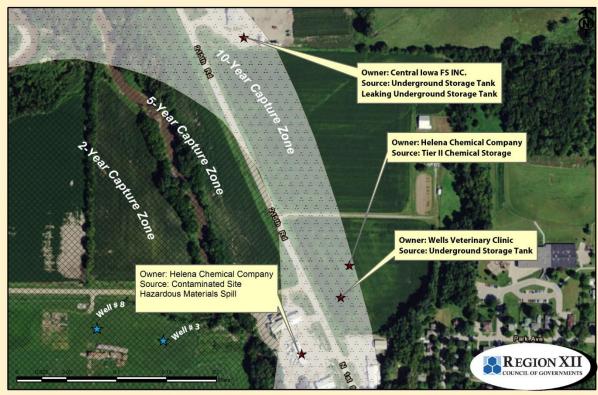
All information contained within this map has been obtained through legal means. Neither the City of Guthrie Center nor Region XII are liable for any misinformation.

Map showing the sites of contaminiants before site visits.



<u>Legend:</u>

- **★ Public Wells**
- ★ Contaminant Source Capture Zone
 - 10-year
 - 2-year
 - 5-year
 - **Surface Runoff Area**



Contaminants Within The Source Water Area

All information contained within this map has been obtained through legal means. Neither the City of Guthrie Center nor Region XII are liable for any misinformation.

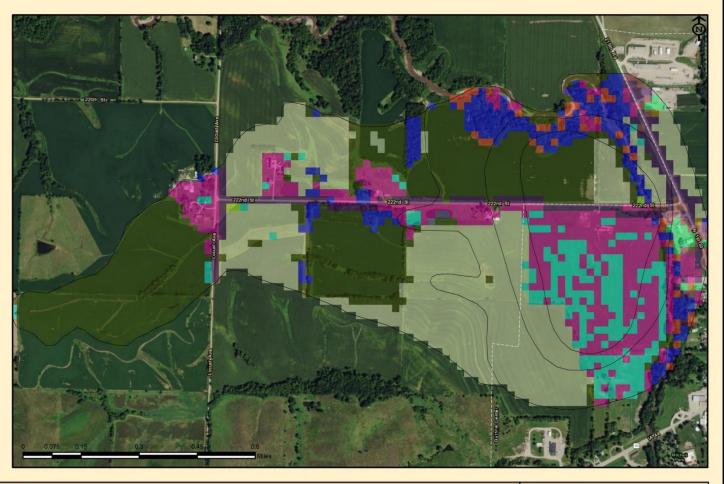
Inset Map Guthrie Center

Legend:

Capturezone

Land Cover Type

- Water
- Wetland
- Forest Bottomland
- Forest Deciduous
- Grassland
- Alfalfa, Hay
- Corn
- Soybeans
- Roads Lightly Developed Urban
- Intensively Developed Urban
- Residential Moderately Developed
 - Barren



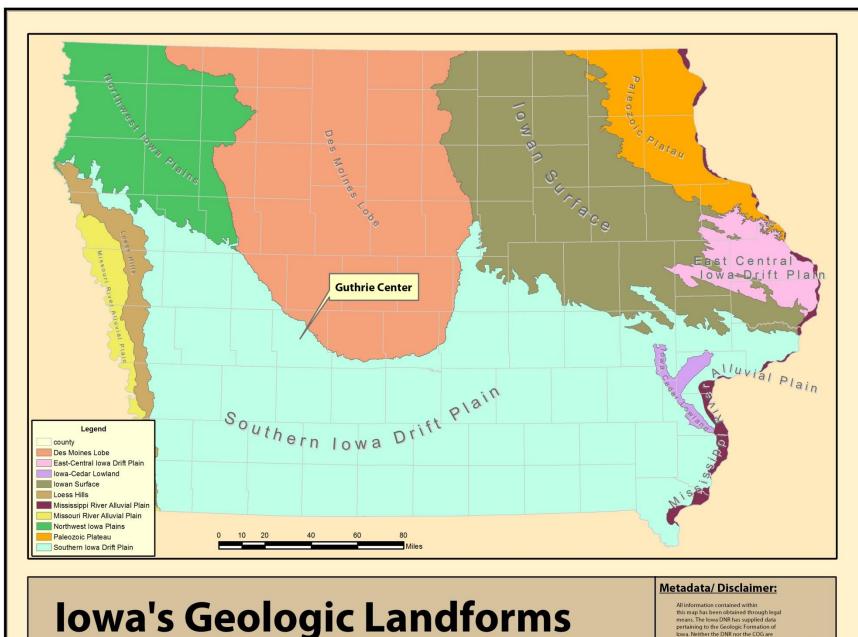
Guthrie Center Source Water Area Land Cover

Metadata/ Disclaimer:

All information contained within this map has been obtained through legal means. Base maps have been Generated by National Geographic. Additional information has been supplied by the lowa DNR.

Inset Map 0 **® Crawford County Carroll County Greene County** Brushy Creek Coon Rapids **Guthrie County Audubon County** Legend: **Guthrie Center River Basin Boundary County Boundary** Metadata/ Disclaimer **Guthrie Center River Basins** All information contained within this map has been obtained through legal means. Base maps have been

Generated by National Geographic. Additional information has been supplied



lowa's Geologic Landforms

lowa. Neither the DNR nor the COG are responsible for any information depicted inaccurately.



Legend

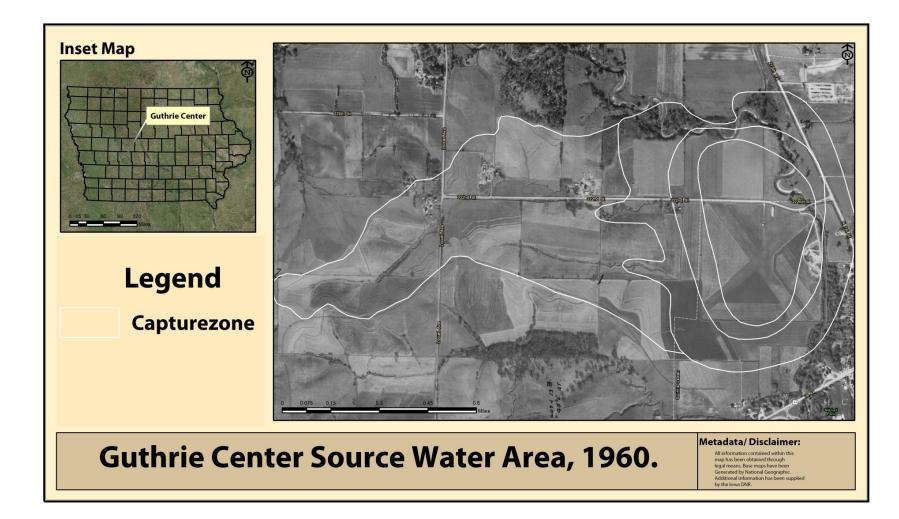
Capturezone



Guthrie Center Source Water Area, 1930.

Metadata/ Disclaimer:

All information contained within this map has been obtained through legal means. Base maps have been Generated by National Geographic. Additional information has been supplied by the lowa DNR.



Inset Map



LegendCapturezone



Guthrie Center Source Water Area, 1990.

Metadata/ Disclaimer:

All information contained within this map has been obtained through legal means. Base maps have been Generated by National Geographic. Additional information has been supplied by the lowa DNR.

Contaminant Statust List

Type:	Owner:	Status:
Leaking Underground Storage Tank	Central Iowa Fs Inc.	Remediated
Underground Storage Tank	Central Iowa Fs Inc.	Remediated
Tier 2 Chemical Storage	Helena Chemical Company	Still being used as a storage site
Underground Storage Tank	Wells Veterinary Clinic	Remediated
Hazardous Materials Spill	Helena Chemical Company	Plumb Created

Non-Existent Contaminants

Type:	Owner:	Status:
Public Water Supply Well	Gold Mine County Store	Improperly located
Public Water Supply Well	Organized Group Camp	Improperly located
Public Water Supply Well	Bowman Chapel	Improperly located
Public Water Supply Well	Knox Knolls Presbyterian Camp	Improperly located

Legend:

 Source of Contamination

Capture Zone

10-year

5-year

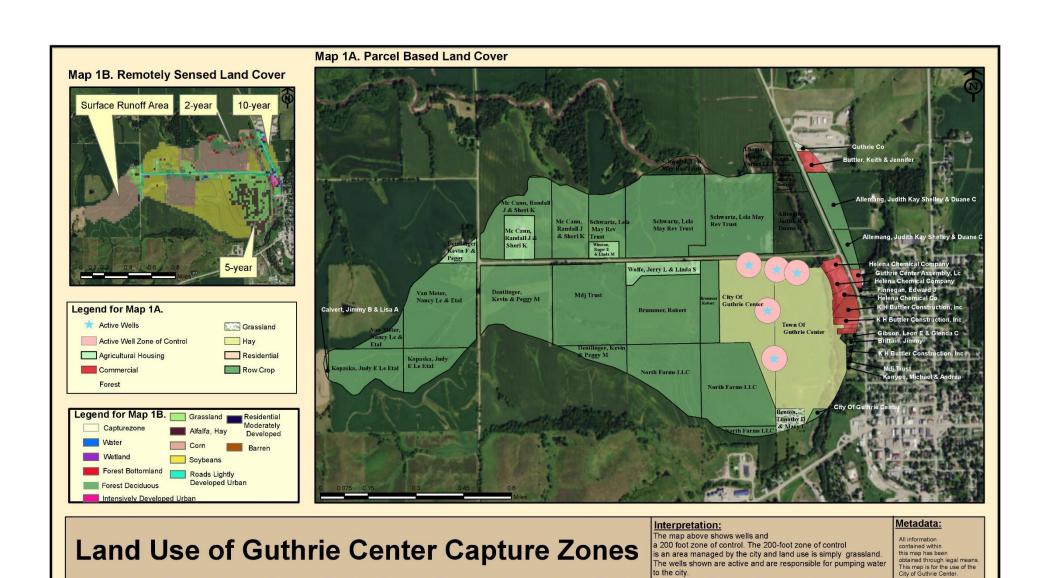
// surface runoff area



Guthrie Center Contaminants

Metadata:

All information contained within this map has been obtained through legal mea For the use of the City of Guthrie Center.



Appendix D

Handout about Low Impact Development
Slideshow from High School Presentation
Plugging Abandoned Wells in Iowa Handout
Website Information

\$EPA

Benefits of Low Impact Development

How LID Can Protect Your Community's Resources

What Is Low Impact Development (LID)?

LID includes a variety of practices that mimic or preserve natural drainage processes to manage stormwater. LID practices typically retain rain water and encourage it to soak into the ground rather than allowing it to run off into ditches and storm drains where it would otherwise contribute to flooding and pollution problems (see www.epa.gov/nps/lid).

Why Should My Community Adopt LID? LID Reduces Stormwater Runoff by Emphasizing Infiltration

As a community grows, so does the amount of surface area covered by parking lots, roads and rooftops (Figure 1). Rainfall cannot soak through these hard surfaces; instead, the rain water flows quickly across them—picking up pollutants along the way—and enters ditches or storm drains, which usually empty directly and without treatment into

local waterways. Local streams in urban areas are overwhelmed by frequent urban flash flooding and stream habitats are smothered by sediments carried by the excessive flows.

Contrast this to an undeveloped watershed, where vegetation-covered soil soaks up rainfall rather than allowing it to run off the land (Figure 2). Water filters through the soil before reaching the groundwater table or being released slowly into streams. An undeveloped watershed provides clean, safe water.

Fortunately, by adding LID solutions, communities can help their watersheds act more like undeveloped watersheds—despite the ever-expanding numbers of roads and rooftops. LID practices such as natural or man-made swales, depressions and vegetated areas capture and retain water onsite, allowing time for water to soak into the soil where it is naturally filtered.



A green roof absorbs rainwater, reduces energy costs and offers wildlife habitat in urban Portland, Oregon.





Figure 1. When roads, rooftops and parking lots cover much of the land, more than half of the rainfall runs off and flows directly into surface waters. In highly developed areas, such as in Seattle, Washington (above left), only 15 percent of rain water has the opportunity to soak into the ground.





Figure 2. When vegetation and natural areas cover most of the land, such as in Oregon's Upper Tillamook Bay watershed (above left), very little water (only 10 percent) runs off into surface waters. Nearly half of the rainfall soaks into the soil. The remaining water evaporates or is released into the air by vegetation.

LID Provides Many Environmental and Economic Benefits

- Improved Water Quality. Stormwater runoff can pick up pollutants such
 as oil, bacteria, sediments, metals, hydrocarbons and some nutrients from
 impervious surfaces and discharge these to surface waters. Using LID
 practices will reduce pollutant-laden stormwater reaching local waters.
 Better water quality increases property values and lowers government
 clean-up costs.
- Reduced Number of Costly Flooding Events. In communities that rely
 on ditches and drains to divert runoff to local waterways, flooding can
 occur when large volumes of stormwater enter surface waters very quickly.
 Holistically incorporating LID practices reduces the volume and speed of
 stormwater runoff and decreases costly flooding and property damage.
- Restored Aquatic Habitat. Rapidly moving stormwater erodes stream banks and scours stream channels, obliterating habitat for fish and other aquatic life. Using LID practices reduces the amount of stormwater reaching a surface water system and helps to maintain natural stream channel functions and habitat.
- Improved Groundwater Recharge. Runoff that is quickly shunted through ditches and drains into surface waters cannot soak into the ground. LID practices retain more rainfall on-site, allowing it to enter the ground and be filtered by soil as it seeps down to the water table.
- Enhanced Neighborhood Beauty. Traditional stormwater management infrastructure includes unsightly pipes, outfalls, concrete channels and fenced basins. Using LID broadly can increase property values and enhance communities by making them more beautiful, sustainable and wildlife friendly.

When implemented broadly, LID can also mitigate the urban heat island effect (by infiltrating water running off hot pavements and shading and minimizing impervious surfaces), mitigate climate change (by sequestering carbon in plants), save energy (from green roofs, tree shading, and reduced/avoided water treatment costs), reduce air pollution (by avoiding power plant emissions and reducing ground-level ozone), increase property values (by improving neighborhood aesthetics and connecting the built and natural environments), and increase groundwater recharge, potentially slowing or reversing land and well field subsidence.

LID Techniques Can Be Applied at Any Development Stage

- In undeveloped areas, a holistic LID design can be incorporated in the early planning stages. Typical new construction LID techniques include protecting open spaces and natural areas such as wetlands, installing bioretention areas (vegetated depressions) and reducing the amount of pavement.
- In developed areas, communities can add LID practices to provide benefits and solve problems. Typical post-development LID practices range from directing roof drainage to an attractive rain garden to completely retrofitting streets with features that capture and infiltrate rainwater.

United States Environmental Protection Agency • Office of Wetlands, Oceans, and Watersheds 1200 Pennsylvania Avenue, NW, Washington, DC 20460 EPA 841-N-12-003A • March 2012



A landscaped curb extension calms traffic and captures and infiltrates street runoff in Portland, Oregon.



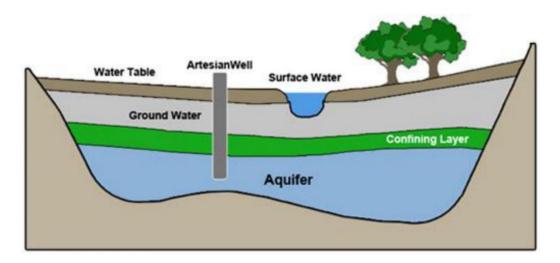
Rainfall soaks through permeable pavement and into the ground below in this parking area in west Des Moines, lowa.



Street runoff collects in stormwater planters in Portland, Oregon.

SOURCE WATER PROTECTION REGION XII COUNCIL OF GOVERNMENTS

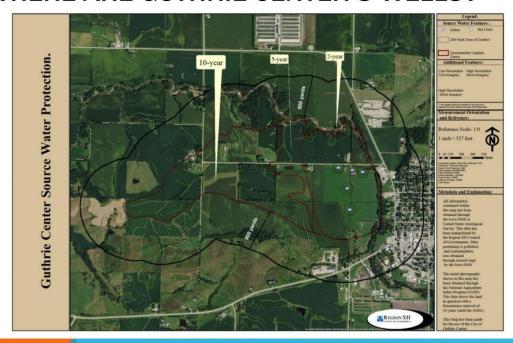
WHAT IS GROUNDWATER? WHAT IS AN AQUIFER?



Video: https://www.youtube.com/watch?v=oNWAerr_xEE



WHERE ARE GUTHRIE CENTER'S WELLS?



WATER POLLUTION COMES FROM POINT AND NONPOINT SOURCES

Point Sources

- Located at specific places
- Easy to identify, monitor, and regulate



WATER POLLUTION COMES FROM POINT AND NONPOINT SOURCES

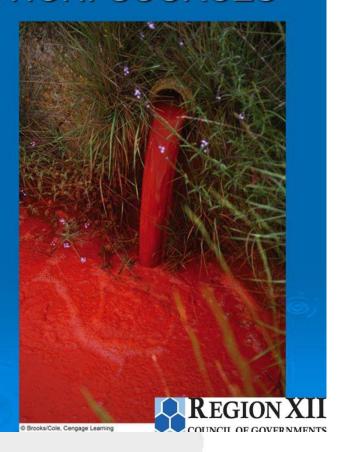
Nonpoint sources

- Broad, diffuse areas
- Difficult to identify and control
- Expensive to clean up



WATER POLLUTION: SOURCES

 <u>Point source</u>: specific location (drain pipes, ditches, sewer lines).



WATER POLLUTION COMES FROM POINT AND NONPOINT SOURCES

Agriculture activities: leading cause of water pollution

- Sediment eroded from the lands
- Fertilizers and pesticides
- Bacteria from livestock and food processing wastes

Industrial facilities:

- oils
- chemicals

- solvents

Mining:

- Heavy metals
 - mercury
 - lead

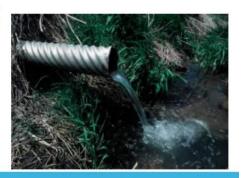
The extraction of minerals may involve the use of heavy metals.



WATER POLLUTION COMES FROM POINT AND NONPOINT SOURCES

Other sources of water pollution

- Parking lots
- Human-made materials
 - E.g., plastics
- Climate change due to global warming
- Drainage Tiling





NONPOINT SEDIMENT FROM UNPROTECTED FARMLAND FLOWS INTO STREAMS



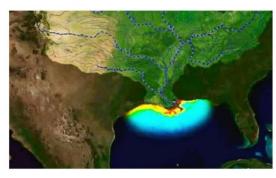
FERTILIZERS CONTRIBUTED BY NONPOINT SOURCES HAVE CAUSED AN ALGAE BLOOM IN

THE GULF OF MEXICO

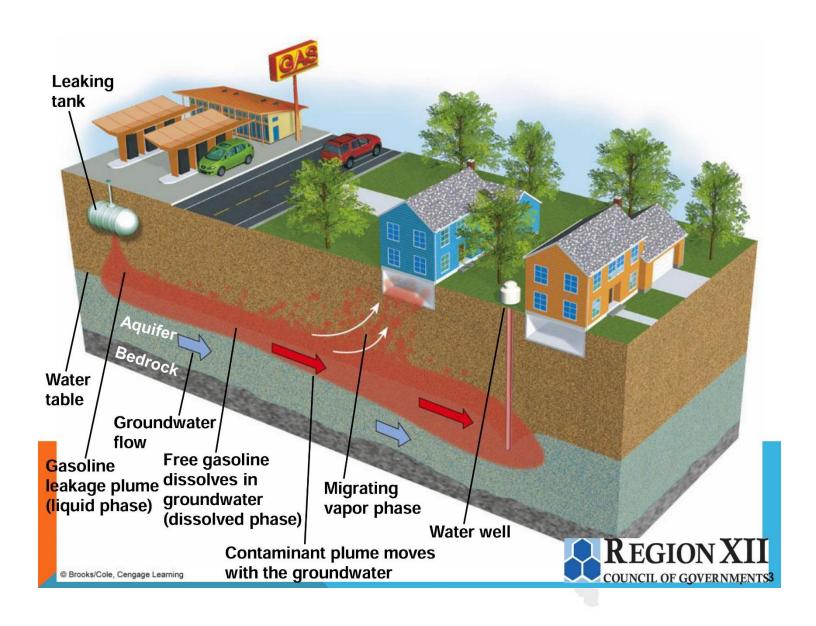
Gulf of Mexico Algae Bloom

- In 2015 the algae bloom was larger than Connecticut or Rhode Island (> 5,052 Square Miles)
- It is visible from Space





Point and Nonpoint Sources Cropland Animal feedlot POINT SOURCES development Wastewater treatment REGION XII COUNCIL OF GOVERNMENTS © 2004 Brooks/Cole - Thomson Learning



COMMON DISEASES TRANSMITTED TO HUMANS THROUGH CONTAMINATED DRINKING WATER

Table 20-2

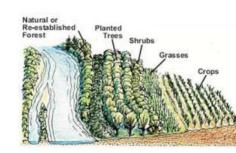
Common Diseases	Transmitted	to Humans	through	Contaminated
Drinking Water				

Dilliking wa		
Type of Organism	Disease	Effects
Bacteria	Typhoid fever	Diarrhea, severe vomiting, enlarged spleen, inflamed intestine; often fatal if untreated
	Cholera	Diarrhea, severe vomiting, dehydration; often fatal if untreated
	Bacterial dysentery	Diarrhea, bleeding; rarely fatal except in infants without proper treatment
	Enteritis	Severe stomach pain, nausea, vomiting; rarely fatal
Viruses	Infectious hepatitis (Type B)	Fever, severe headache, loss of appetite, abdominal pain, jaundice, enlarged liver; rarely fatal but may cause permanent liver damage
	Poliomyelitis	Fever, diarrhea, backache, sore throat, aches in limbs; can infect spinal chord and cause paralysis and muscle weakness
Parasitic protozoa	Amoebic dysentery	Severe diarrhea, headache, abdominal pain, chills, fever; if not treated can cause liver abscess, bowel perforation, and death
	Giardiasis	Diarrhea, abdominal cramps, flatulence, belching, fatigue
	Cryptosporidum	Severe diarrhea, cramps for up to 3 weeks, and possible death for people with weakened immune systems
Parasitic worms	Schistosomiasis	Abdominal pain, skin rash, anemia, chronic fatigue, and chronic general ill health
	Ancylostomiasis	Severe anemia and possible sympto REGION XII
© Brooks/Cole, Cengage Learning		COUNCIL OF GOVERNMENTS

REDUCING NONPOINT SOURCE POLLUTION

Reduce erosion

- Reduce the amount of fertilizers
- Plant buffer zones of vegetation and rain gardens



- Use organic farming techniques compost vs. chemicals
- Keep cropland covered with vegetation
- · Don't flush medications
- Don't pour hazardous chemicals down the drain or outside.



HOW CAN YOU HELP?

Dragoon River Romp

lowater

Project AWARE

Living Lands and Waters (Video)

Great Pacific Garbage Patch (Video)

ACTIVITY



Who can plug a well?

The DNR recommends that you hire an Iowa DNR certified well contractor to plug your well. As a well owner, you can do the work yourself if two conditions are met. 1) The well owner must plug the well following the current well plugging rules and under supervision of the local county environmental health department, and 2) A certified well contractor or the local county environmental health agent sign a form stating that the well plugging was performed according to the state's current well plugging rules

One important point to think about is that when a well owner wants to plug their own well, the well will no longer qualify for cost share assistance under the Grants to Counties (GTC) well plugging program.

Please contact your local county environmental health office or the DNR for more information on well plugging or to find Iowa DNR Certified Well Contractors.

When to plug?

All classes of wells which are abandoned must be properly plugged within 90 days of the date of abandonment.

Can I get financial assistance?

Financial assistance is available at the county level through the Grants to Counties (GTC) Well Program. The Bureau of Environmental Health Services at the Iowa Department of Public Health oversees the financial administration of the GTC Well Program. The bureau works closely with the Iowa Department of Natural Resources, who provides technical oversight of water well testing, water well closure, and water well renovation through the GTC program.

Counties participating in the GTC program can reimburse property owners up to \$500 for each well plugged and \$1000 for each well renovated.

For more information contact:

Your county health department

http://www.iowadnr.gov/Portals/idnr/uploads/water/wells/cosanitarians.pdf

Or contact:

The Iowa Department of Natural Resources
Private Well Program at (515) 725-0462

Available web sites:

Private Well Plugging Program www.iowadnr.gov/wellplugging

Find an Iowa DNR Certified Well Contractor www.iowadnr.gov/wellcontractorcert

Private Well Program www.iowadnr.gov/waterwells

Grants to Counties Program
http://idph.iowa.gov/ehs/grants-to-counties

Plugging Abandoned Wells in Iowa





Partners in protecting your drinking water

Iowa Department of Natural Resources Iowa Department of Public Health

Why plug your old wells?

In 1987, the Iowa Groundwater Protection Act was passed by our legislature to help prevent further contamination of one of Iowa's most precious resources; our groundwater. Proper plugging of abandoned wells was included in the legislation as well as a funding mechanism to help assist well owners with the cost of well plugging.

Abandoned wells can be a direct pathway for contaminants to enter the groundwater and cause water quality problems for nearby existing and future water supply wells. Large diameter wells, well pits and cisterns also pose a safety hazard for people and pets that can access and fall into these structures.

By definition, any well that is no longer in use, or is in such poor physical condition that it cannot be repaired to be safely used, is considered abandoned. This applies to all wells, including public drinking water wells, monitoring wells, commercial wells, private supply wells, heat pump wells, and irrigation wells.

Abandoned wells can be plugged, renovated to today's standards, or repaired to standby condition. A well in standby condition has been repaired and capped to prevent contamination, but can easily put back into operation in the future. Each option is designed to meet the goal of protecting groundwater from contamination

What types of materials are needed?

Properly plugging a well requires the use of both fill materials *AND* sealing materials.

Fill is clean, granular material such as washed sand or pea gravel which is used in larger diameter wells to fill space and reduce the cost of plugging.

Sealing material is bentonite clay or "neat" cement (cement mixed without gravel) and is used to replace the earth's natural confining layers that were destroyed during the construction of the well.

How the well is plugged

Wells fall into one of three well classes when well plugging is discussed. The method of well plugging depends on the well class and the local geology. See the table below to identify each type of well and one example on how it should be plugged.

plug	Dimensions	Description	Diagram
Class 1	Greater than 18 inches in diameter and less than 100 feet deep; typically located in central, southern and western Iowa; potential physical and pollution hazards. Commonly called bored wells, dug wells, augured wells, seepage wells, or cistern wells.	Slowly place alternating layers of fill and plug material. One foot of Plug material is used at the top of the water table, and again four feet from the top of the well to achieve a proper seal. Fill is used between plug layers.	Plug material Clean fill Water Table Clean fill
Class 2	Less than 18 inches in diameter and more than 100 feet deep; these can occur anywhere in Iowa, especially in northern and eastern Iowa; potential pollution hazards. Commonly called cased wells, drilled wells, deep wells, or artesian wells.	The plugging procedure for Class 2 wells will depend on the geologic formation that the well penetrates and whether or not a well log exists for the well. Because of this we recommend that you hire a Certified Well Contractor to plug all Class 2 wells. Find certified well contractors at the following web site: www.iowadnr.gov/wellcontractorert	Plug material Water Table Clean fill
Class 3	2 inches or less in diameter, and shallow, 12 - 40 feet deep. Commonly called sandpoint wells or driven wells.	Wells can be plugged by simply pulling the pipe from the ground and then filling the hole with bentonite clay, or if it cannot be pulled out, the pipe can be cut four feet below the surface and the well filled with plugging material.	

City of Guthrie Center Guthrie Center Municipal Utilities





Source Water is defined as a lake, stream, river, or aquifer from which drinking water is obtained

For more Information
Contact:
Erick VanCura:
utilware@gmail.com
Or go to the I ova DNR
SWP webpage:
http://www.iowadnr.gov/E
nvironmental-Protection/
Vlater-Quality/Source-W
ater-Protection



What is Source Water Protection?

Living in Iowa many of us are aware of how water quality has become something of a hot button issue. Nitrates, atrazine, and other chemicals commonly used in agriculture can be a risk to drinking water and the health of Iowa's population. In order to improve the water quality of the state, Iowa's DNR has created a program dedicated to improving water quality (Source Water Protection).

Source Water is defined as any lake, stream, river, or aquifer from which drinking water is obtained. Source water Protection is the prevention of contaminants from entering public drinking water sources. The majority of lowa's small towns rely on shallow aquifers which are highly susceptible to pollutants. Thus, certain steps must be taken to ensure their water quality.

How it Works:

Source Water Protection works through a series of actions helping to lower the levels of pollutants in drinking water. Source water actions can be broken up into separate categories based on the entity which is working on them or their purpose (landowners, local government, education and outreach etc.). For instance, a landowner action could be to plant a cover crop. The City of Guthrie Center has taken the initiative to start Source Water Protection planning in order to maintain the high standards of drinking water citizens have come to expect. Throughout 2016/2017 City administrators and Landowners (who live near the well area) have been meeting to discuss ideas regarding how to ensure Guthrie Center's future water quality.

Where to Learn More:

If you are interested in learning more about Source Water Protection you can contact Erick VanCura (Guthrie Center Utilities). Otherwise, the Iowa DNR has resources available through their website.

For additional information contact city hall at 641-332-2190 or email cityhall@guthriecenter.com

<u>Appendix E</u>

Work Plan

Partners and their responsibilities

Potential Contaminant Tale



Definitions

Useful Websites

Activity:	Status:	Date:	
1.Conduct Ongoing Monitoring of Guthrie Center's Water Supply (wells)	Ongoing	Ongoing	
2.Work with Water Conservation District (upon creation)	-	-	
3.Adopt, Update, and Maintain Guthrie Center's Source Water Protection Plan	-	1990's	
4.Use Gates to Limit Access to the Well Field	Completed	December 2015	
5.Install Signs Showing the Well Area	Completed	December 2015	
6.Join Alert Iowa	Completed	2016	
7. Construct Security Fence Around the Water Tower	Grant is being applied for	Ongoing	
8. Acquire Land Surrounding Wells	Completed	1980's	
9.Smoke Blowing to Check Sewer Infrastructure	Completed/Ongoing	2005-present	
10.Monitor Water Distribution System	Ongoing	Ongoing	



Activity:	Status:	Date:
1.Plant Cover Crops to Aid in Denitrification	Completed	1998
2.Work with Private Well Owners to Ensure	Ongoing	Ongoing
All Abandoned/Unused Wells are		
Capped/Plugged in the Capture Zone		
3.Work with Landowners to Protect Water	Ongoing	Ongoing
Sources		
4. Proper Septic System Maintenance	Ongoing	Ongoing

Activity:	Status:	Date:
1.Inform Landowners of the Positives of Sustainable Farming	Ongoing	Ongoing
2.Inform Landowners of Land Uses Effects on Contaminant Levels	Ongoing	Ongoing
3.Add Source Water Information to the City Website	Completed	July 2017
4. Have a Booth at the Guthrie County Fair Discussing Source Water Protection	Completed	September 2017
5.Inform Landowners of Potential Grants which Could be Used to Pay for the Proper Capping of Wells	Complete	February 2017
6. Inform Landowners of Grants which Could Pay for Part of the Expense of Cover Crops	Complete	December 2016
7. Give a Presentation to Guthrie Center High School Regarding Source Water Protection and Chemicals Effects on the Human Body	Complete	May 2017
8.Inform Land owners about the CRP Program	Complete	July 2017
Online Chart	In progress	December 2017

Partners and Their Responsibilities:

City of Guthrie Center:

The City of Guthrie Center is responsible for decision making on all aspects of the Source Water Plan. In addition to decision making, yearly updates to the Source Water Plan, meant to keep the document viable, will be made by the city. The city will implement the plan over the following years. If technical assistance is needed, the city will contact either the lowa DNR or Region XII Council of Governments.

Contact: Erick Van Cura, Water Superintendent

Email: utilware@gmail.com

Phone Number: (515)-332-2164

Guthrie County Emergency Management:

Guthrie County Emergency Management is responsible for supplying emergency contact information for the Source Water Area. In addition, Guthrie County Emergency Management is responsible for administering the Alert Iowa system in the area.

Contact: Robert Kempf, Adair and Guthrie County Emergency Management Coordinator

Email: ageema@guthriecounty.ls

Phone Number: (515)-332-2164

Iowa Department of Natural Resources:

The lowa DNR works with the City of Guthrie Center to ensure that its' drinking water meets state and federal standards. In addition, they provide technical assistance and have completed an update to the city's phase 1 plan.

Contact: Jeff Vansteenburg, Source Water Coordinator

Email: jeff.vansteenburg@dnr.iowa.gov

Contact: Chad Fields, Geologist Iowa DNR

Email: chad.fields@dnr.iowa.gov

Contact: Bob Rowden, Geologist, DBA, technical assistance Source Water Program

Email: robert.rowden@dnr.iowa.gov

Region XII COG:

Region XII Council of Governments is responsible for the development of the phase 2 plan and certain technical aspects of the planning process. In addition, they will provide educational services and do research regarding the Source Water Area and its wells.

Contact: Evan Sinnott, Regional Planner

Email: esinnott@region12cog.org

Phone Number: (712) 792-9914

Iowa State University Education and Outreach (ISUEO):

ISUEO is responsible for supplying presenters and helping supplement knowledge of certain aspects of the area. Throughout the planning process ISUEO presenters were instrumental in supplementing material at all source water meetings.

Contact: Shawn Shouse, Iowa State University Extension

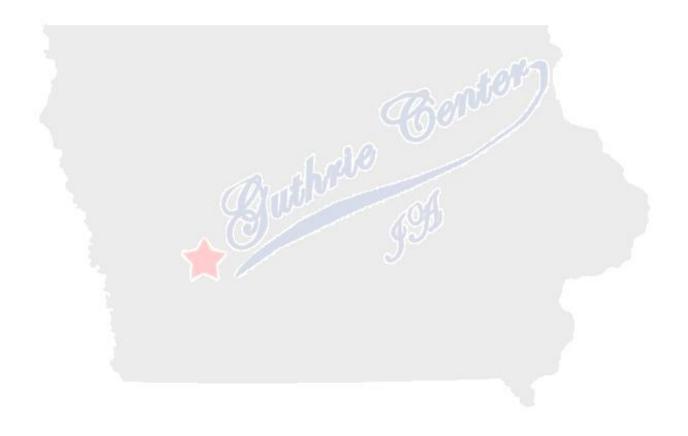
Email: sshouse@iastate.edu

United States Department of Agriculture/NRCS:

The USDA is responsible for administering the Conservation Reserve Program (CRP). Additionally, team members associated with the NRCS have given insight into programs which help with the procurement of seeds for cover crops.

Contact: Jeffrey Collins, USDA NRCS District Chair

Phone Number: (641) 332-2812



Potential Contaminant Table

Guthrie Center Public Water Supply (3937016)
Phase I - Contaminant Source Inventory and Assessment

Aquifer: Alluvial Highly Susceptible (risk factor = 4)

	adulter. Allaviar Triginy Susceptible Policy Section - 47						$\overline{}$	
Map No.	Site Name	Site Type	Site Link ¹	Program ID	Site Address	Loc'n Acc ²	Land Use Risk ¹	Risk Score ⁴
Capture zone: 10-year time of travel (risk factor = 1)								
1	Central Iowa Fs Inc	Underground storage tank	310475957	198603881	2221 215th Rd, Guthrie Center, IA 50115	good	5	10
2	Central lowa Fs Inc	Leaking USTs	310475957	SLTG09	2221 215th Rd, Guthrie Center, IA 50115	good	5	10
3	Helena Chemical Co	Tier II Chemical Storage	310777952	FAIDSITZA000028	705 N 1st Street, Guthrie Center, IA 50115	poor	3	8
4	Wells Veterinary Clinic	Underground storage tank	310591234	198916381	Rte 1 Box 2, Guthrie Center, IA 50115	poor	5	10
5	Helena Chemical	Hazardous Materials Spill	311431135	052304-MAR-0921	705 N 1st Street, Guthrie Center, IA 50115	good	1	6
6	Helena Chemical	Contaminated sites	311431135	786	T79n, R31w, Sec. 6, Nw, Sw, Ne, Guthrie Ce	good		10

¹D's are hyperlinked to detailed contaminant source information where available. Click once to open the spreadsheet, then click again to follow the link.

Private Well Information Table

Guthrie Center Public Water Supply (3937016) Phase I - Inventory of Wells

Map	fer: Alluvial Highly Susceptible (risk factor = 4) Depth Date Drilled					Locational	
No.	Well ID ¹	Well Owner	Well ID Source	(ft.)	permitted	Well Location	Accuracy ²
Capture zone: 2-year time of travel (risk factor = 3)							
8	2411931	GOLD MINE COUNTY STORE	Public Water Supply well	25	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
9	2407969	ORGANIZED GROUP CAMP	Public Water Supply well	unkn	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
10	2413775	BOWMAN CHAPEL	Public Water Supply well	unkn	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
11	2411059	KNOX KNOLLS PRESBYPTERIAN CAMP	Public Water Supply well	unkn	unkn	T79N, R32W, Sec. 1, NE, NE, SW	poor
15	2408517	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	70	1/1/1984	T79N, R32W, Sec. 1, NE, SE, NE	good
16	40045	Guthrie Center, City Of	IGS well database	0	1/1/1984	T79N, R32W, Sec. 1, NE, SE, NE	good
17	6384	Guthrie Center, City Of	Registered abandoned wells	24	n.a.	T79N, R32W, Sec. 1, NE, SE, SW	poor
18	W3862	CITY OF GUTHRIE CENTER	Water Use Permit Wells	79	unkn	T79N, R31W, Sec. 6, NW, SW, NW	good
19	49956	Guthrie Center, City Of	IGS well database	80	Unkn	T79N, R31W, Sec. 6, NW, SW, NW	good
20	2574749	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	78	12/31/1997	T79N, R31W, Sec. 6, NW, SW, NW	good
21	40046	Guthrie Center, City Of	IGS well database	0	1/1/1984	T79N, R31W, Sec. 6, NW, SW, NW	good
22	2410679	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	70	1/1/1984	T79N, R31W, Sec. 6, NW, SW, NW	good
23	40044	Guthrie Center, City Of	IGS well database	0	1/1/1984	T79N, R32W, Sec. 1, NE, SE, SE	good
24	2408590	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	70	1/1/1984	T79N, R32W, Sec. 1, NE, SE, SE	good
25	2574748	GUTHRIE CENTER MUNI WATER WORK	Public Water Supply well	75	12/31/1997	T79N, R32W, Sec. 1, SE, NE, NE	good
26	49955	Guthrie Center, City Of	IGS well database	80	Unkn	T79N, R32W, Sec. 1, SE, NE, NE	good
27	W4858	CITY OF GUTHRIE CENTER	Water Use Permit Wells	79	unkn	T79N, R32W, Sec. 1, SE, NE, NE	good
Captu	ire zone: 1	0-year time of travel (risk factor = 1)					
13	2119903	Wolfe, Jerry	Private well tracking system	90	7/12/2006	T79N, R32W, Sec. 1, NE, SW, SE	good
14	2118331	Schrek, Dan	Private well tracking system	80	1/1/1940	T79N, R32W, Sec. 1, NE, SW, SE	good
28	2990	Guthrie County, Guthrie County	Registered abandoned wells	25	n.a.	T80N, R32W, Sec. 36, SE, SE, SE	poor
29	2991	Guthrie County, Guthrie County	Registered abandoned wells	25	n.a.	T80N, R32W, Sec. 36, SE, SE, SE	poor
30	75607	Helena Chemical	IGS well database	250	10/17/2012	T79N, R31W, Sec. 6, NW, SE, NW	poor
Captu	ire zone: s	urface runoff area (risk factor = 1)					
1	63760	Wickland, Roger	Wells registered for testing	unkn	unkn	T79N, R32W, Sec. 2, NE, SE, NE	poor
2	2099996	Milholin, Bob	Private well tracking system	127	1/1/1940	T79N, R32W, Sec. 1, NW, NW, SW	good
3	2097374	Milholin, Bob	Private well tracking system	115	1/1/1970	T79N, R32W, Sec. 1, NW, NW, SE	good
4	2120503	Van Meter, Nancy	Private well tracking system	90	1/1/1930	T79N, R32W, Sec. 2, NE, SE, SE	good
5	2129199	Wickland, Roger	Private well tracking system	136	1/21/1999	T79N, R32W, Sec. 2, NE, SE, SE	good
6	4550	Garlock, Ella	Registered abandoned wells	100	n.a.	T79N, R32W, Sec. 1, NW, NE, NE	poor
7	2120587	Schwartz, Lela	Private well tracking system	90	1/1/1980	T79N, R32W, Sec. 1, NW, SE, NE	good
12	67107	Schreck, Dan	Wells registered for testing	unkn	unkn	T79N, R32W, Sec. 1, NE, SW, NW	poor

Well id's are hyperlinked to detailed well information where available.

²Estimated horizontal accuracy: < 25m. = good; 25m. to 50m. = fair; >50m. = poor

Score range: 1 to 5, see Table 3 of the Iowa Source Water Protection and Assessment plan

⁴Sum of land use, capture zone, and aquifer susceptibility risk factors

Click once to open the spreadsheet, then click again to follow the link.

Estimated horizontal accuracy: < 25m. = good; 25m. to 50m. = fair; >50m. = poor

Definitions:

Alluvial Aquifer: An Alluvial Aquifer is comprised of unconsolidated material deposited by water, typically occurring adjacent to rivers and in buried channels. Alluvial aquifers are generally composed of clay, silt, sand, gravel or similar unconsolidated material deposited by running water.

Alluvium: A general term for unconsolidated sedimentary accumulations deposited by rivers or streams. It includes sediment deposited in riverbeds and flood plains.

Bedrock Aquifer: An aquifer composed of consolidated material such as limestone, dolomite, sandstone, siltstone, shale, or fractured crystalline rock.

<u>Buried Valley Aquifer:</u> An aquifer formed through the filling of valleys by outwash (sand and gravel) prior to or between glacial episodes which may contain artesian pressure.

<u>Capture Zone:</u> a three dimensional area that contributes groundwater extracted by one or more wells.

Glacial Till: Coarsely graded and extremely heterogeneous sediment. Generally, its' content varies from clays to mixtures of sand, gravel, and boulders.

Loess: A loosely compacted yellowish-gray deposit of windblown sediment of which extensive deposits occur throughout lowa.

Nitrate: A salt or ester of nitric acid, containing the anion NO₃. Commonly used in agriculture as a fertilizer.

<u>Plume:</u> An elongated body of groundwater containing contaminants, emanating and migrating from a point source within a hydrogeologic unit.

<u>Stratified Drift Aquifer:</u> An aquifer contained within porous sands and gravels resulting from episodes of meltwater flow during glacial advances and retreats.

Surficial Aquifer: Shallow aquifers that are typically less than 50 feet thick. They mostly consist of unconsolidated sand, gravel, limestone, or sandstone, and are generally under unconfined, or water-table, conditions.

Useful websites:

Website URL	<u>Basic</u>
	<u>Information</u>
1.40	<u>:</u>
http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Source-	Iowa DNR
Water-Protection	Source Water
93/100	Protection
	Website
https://programs.iowadnr.gov/sourcewater/	Iowa DNR
	Source Water
	Tracker
https://www.rd.usda.gov/ia	USDA Website
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ia/programs/financial/eqi	NRCS Website
p/	
?cid=nrcs142p2_008016	
https://www.extension.iastate.edu/	ISU Extension
http://www.guthriecounty.org/emergmgmt/	Guthrie County
	Emergency
	Management